

# Adair and Guthrie Counties Multi-Jurisdictional Hazard Mitigation Plan 2024





# Chapter 1: Introduction

## Purpose

FEMA defines mitigation as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event. The goal of mitigation is to decrease the need for response as opposed to simply increasing the response capability. For the purpose of this plan, mitigation discussions focus on specific actions taken to reduce loss of life and property from hazards by modifying the built environment and undertaking other actions to reduce the risk and potential consequences of these hazards.

Section 322 of the Stafford Act, 42 U.S.C. 5165 as amended by DMA 2000 (Public Law 106-390), provides for states, tribes, and local governments to undertake a risk-based approach to reducing risks of natural hazards through mitigation planning. FEMA implemented hazard mitigation planning provisions through regulations at 44 CFR Part 201. This plan was prepared in accordance to the regulations set forth in 44 CFR §201.6. Under this regulation, local governments must have an approved plan to apply for and/or receive funding through the Hazard Mitigation Grant Program, Pre-Disaster Mitigation, Flood Mitigation Assistance, and Severe Repetitive Loss programs.

The purpose of the Adair and Guthrie Counties Multi-Jurisdictional Hazard Mitigation Plan is to reduce the effects that hazards have on people and property in Adair and Guthrie Counties. Hazard mitigation planning is the process through which hazards that threaten jurisdictions are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are identified, prioritized, and implemented. This document will be used to plan and prioritize future mitigation projects in Adair and Guthrie Counties. This plan will comply with the appropriate Federal and State laws and planning requirements while making the county and communities eligible for certain federal disaster assistance, specifically the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Program, and the Flood Mitigation Assistance Program.

Two of the most important components of emergency management deals with disaster recovery and hazard mitigation. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage. This plan demonstrates Adair and Guthrie County's commitment to reduce risks due to hazards, and serves as a tool to help decision makers facilitate mitigation activities and resources.

### *Assurance to Compliance with FEMA Requirements*

This multi-jurisdictional mitigation plan complies with Iowa Homeland Security and Emergency Management Division's and FEMA's planning guidance; FEMA regulations, rules, guidelines, and checklists; Code of Federal Regulations; existing Federal and State laws; and such other reasonable criterion as the President/Governor, Federal/State legislatures and IHSEMD/FEMA may establish in consultation with local governments while the plan is being developed. This plan also helps with the minimum planning requirements for all FEMA mitigation

programs, such as the Flood Mitigation Assistance (FMA) Program, the Pre-Disaster Mitigation (PDM) Program, and the Hazard Mitigation Grant Program (HMGP), and where appropriate, other FEMA mitigation related programs such as the National Earthquake Hazards Reduction Program (NEHRP), the National Flood Insurance Program (NFIP), and the Community Rating System (CRS).

## Planning Process

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Region XII Council of Governments was hired by Adair and Guthrie Counties to facilitate the development of the Multi-Jurisdictional Plan. Region XII used the FEMA prescribed process to complete this plan. The plan was developed by the Planning Team which included representatives from incorporated cities, local businesses and organizations, and local residents. Participants in the planning process and measures taken to solicit and encourage public participation are identified in the public participation section. Planning guidance from FEMA and IHSEMD has established a framework used to complete the planning process. This plan is organized around the four-phase process that includes: organizing resources, assessing risks, developing the mitigation plan, and implementing the plan. This plan is an update and looks different from previous plans as planning processes have changed, the planning team has more experience, good examples have been examined and plan update requirements are found throughout.

### *Meetings*

*Section 201.6 (c)(1): [The plan shall document] 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.*

Region XII in conjunction with SICOG moderated the committee meetings. There was no set time limit for each meeting, but most lasted between one and two hours, depending on the committee's discussion. Each city held meetings to discuss and adopt the hazard mitigation plan.

The first meeting on November 9, 2023 of the planning committee was an introductory meeting as well as a productive one. This introductory meeting allowed Region XII staff to present an overview of the plan requirements as outlined in FEMA guidance, with particular note of multi-jurisdictional requirements. Previous critical facility maps were handed out along with the community profiles, and committee members were asked to add or remove facilities as necessary. To ensure accuracy, these maps were also sent to city staff. Discussion about which hazards should be included in the plan were held and the hazards identified in the 2023 State of Iowa Hazard Mitigation Plan was referenced. Committee members scored hazards based on probability, severity, warning time, and duration.

During city meetings, city staff and elected officials were given their respective community profiles, previous goals, and respective appendix. In order to determine plan goals, goals from the previous plan were handed out, and evaluated. The evaluation led to adding new goals, and the determination of what goals the committee wanted to include was completed. Along with the discussion of the goals were the mitigation actions, as these ensure that the city meets their goals. Each city's respective goals and mitigation actions can be found in their respective appendix. The County goals are located in Chapter 4.

When necessary, there were a couple additional meetings held to allow for additional input outside of the committee meetings. School board members were invited to their respective city meetings, but staff attended each school board for the adoption of the plan to answer any questions.



# Participation

To be a participating jurisdiction, certain guidelines needed to be met. These guidelines include:

- An official of the jurisdiction must attend the planning team meetings;
- Participate in surveys and data collection activities;
- Participate in a local planning session in the jurisdiction, as needed, to finalize local elements of the plan;
- Review the plan draft and provide applicable feedback;
- Adopt the final plan.

The jurisdictions that participated in the creation of this plan include Adair County, Guthrie County; the cities of Adair, Bagley, Bayard, Bridgewater, Casey, Fontanelle, Greenfield, Guthrie Center, Jamaica, Menlo, Orient, Panora, Stuart, and Yale; and the AC/GC, Adair-Casey, Nodaway Valley Community, Orient-Macksburg, Panorama, and West Central Valley School Districts. The following table lists the appointed committee members, the jurisdiction they represent, and the position they hold.

Adair and Guthrie Counties Planning Committee		
Jurisdiction	Name	Position
Adair & Guthrie County Emergency Management	Jeremy Cooper	Deputy Emergency Management Coordinator
Adair County Public Health	Stephanie Claussen	Director
Adair County Medical Center	Catherine Hillestad	CMO
City of Adair	Joanne Byars	Mayor
City of Bagley	Glen Foresman	Mayor
City of Bayard	Allen Long	Mayor
City of Bridgewater	Roberta Carpenter	Mayor
City of Casey	Nicholas Lindberg	Mayor
City of Fontanelle	Mary Dodson	City Clerk
City of Greenfield	Jimmie Schultz	Mayor
City of Guthrie Center	Michael Herbert	Mayor
City of Jamaica	Dennis Meinecke	Mayor
City of Menlo	Chad Waddell	Mayor
City of Orient	Matthew Swanson	Mayor
City of Panora	Curtis Thornberry	Mayor
City of Stuart	Ashraf Ashour	City Administrator
City of Yale	Beverly Loak	Mayor
AC/GC School District	Josh Rasmussen	Superintendent
Nodaway Valley Community School District	Paul Croghan	Superintendent
Orient-Macksburg School District	Jeff Kruse	Superintendent
Panorama School District	Kasey Huebner	Superintendent
West Central Valley School District	Rusty Shockley	Superintendent

Other organizations were invited to participate in the planning process and develop projects within one or more of the jurisdictions. The following table lists people who attended at least one meeting in addition to the committee members. The input from the following individuals helped fully develop the Hazard Mitigation Plan.

Additional Plan Contributors		
Jurisdiction	Name	Position
City of Bagley	Deanna Gibson	City Council
City of Bagley	Lexee Bonus	City Council
City of Bagley	Daphne Clark	City Council
City of Bagley	Jennifer Richardson	City Council
City of Bagley	Kylie Carmichael	City Council
City of Bagley	Emily Chapman-Olesen	Mayor Pro Tem
City of Casey	Rick Richter	City Council
City of Casey	Rick Blake	City Council
City of Casey	Gwen Blass	City Clerk
City of Casey	Bret Wedemeyer	City Council
City of Casey	Leland Acker	City Council
City of Menlo	Katie Reynolds	City Clerk
City of Panora	Lisa Grossman	City Administrator
City of Panora	John DeLavergne	EMS Director
City of Panora	Mark Sheeder	City Council
City of Panora	Blake Michelsen	City Council
City of Panora	Roger Door	City Council
City of Panora	Brian Dorsett	City Council
City of Guthrie Center	Carolyn Masters	City Council
City of Guthrie Center	Ian Steensen	City Council
City of Guthrie Center	Fidel Hernandez	City Council
City of Guthrie Center	Garold Thomas	City Council
Guthrie County	Maggie Armstrong	County Supervisor
Guthrie County	Mike Dickson	County Supervisor
Guthrie County	Brian Johnson	County Supervisor
Guthrie County	JD Kuster	County Supervisor
Guthrie County	Steve Smith	County Supervisor
City of Jamaica	Michael Fagen	City Council
City of Jamaica	Mathew Meinecke	City Council
City of Jamaica	HD Meinecke	City Council
City of Jamaica	Dina Martinez	City Council
City of Jamaica	Josh Atwell	City Council
City of Jamaica	JackLynn Morey	City Clerk
City of Jamaica	Laurie Cornaham	Librarian
City of Jamaica	Frankie Hanes	Water Board
City of Greenfield	Rod McMorran	City Council

Additional Plan Contributors		
City of Greenfield	Johnathan Christensen	City Council
City of Greenfield	Laura Wolfe	City Clerk
City of Greenfield	Rita Eble	City Council
City of Greenfield	Jeff Clayton	City Council
City of Greenfield	Brian Fox	City Council
City of Greenfield	Brian Hoadley	Public Works
City of Greenfield	Jeff LaSarge	Police Department
City of Greenfield	Todd Oder	Greenfield Fire Dept.
City of Greenfield	Caleb Nelson	Adair County Free Press
City of Greenfield	Catherine Olsen	Community Member
City of Greenfield	Danica Clayton	Community Member
Adair County	John Twombly	County Supervisor
Adair County	Jerry Walker	County Supervisor
Adair County	Mandy Berg	County Auditor
Adair County	Jodie Hoadley	County Supervisor
Adair County	Nathan Baier	County Supervisor
Adair County	Matt Wedemeyer	County Supervisor
Adair County	Brenda Standley	Co-General Manager SIRWA
Adair County	Terry Niestadt	Regional Planner
Adair County	Dominic Johnson	Conservation Director
Adair County	Nick Kauffman	Engineer
Adair County	Jeff Rick	SIRWA
City of Bridgewater	Steve Frese	City Council
City of Bridgewater	Kristen Walker	City Council
City of Bridgewater	Mary Dunn	City Clerk
City of Yale	Jonetta Long	City Clerk
City of Adair	Renee Jensen	City Council
City of Adair	Shannon Haus	City Council
City of Adair	Paul Gettler	City Council
City of Adair	Lorene Grubbs	City Clerk
City of Adair	Clint Fichter	City Attorney
City of Adair	Ryan Billheimer	City Supervisor
City of Adair	Jade Irlmeier	City Council
City of Fontanelle	Sam McIntire	Utilities/Public Works
City of Fontanelle	Matthew Heinz	Chief of Police
City of Fontanelle	Hunter Ernst	City Super/Utilities
City of Fontanelle	Bryce Edwards	City Council

## Public Involvement

*44 CFR 201.6(b): 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 planning approval.*

Committee and additional meetings were open to the public. Agendas were posted in the Courthouse or respective jurisdiction prior to each meeting. Public outreach was strongly sought after at the mitigation action meeting, as well as during the draft plan period. All meetings were conducted in compliance with Chapter 21 of the Code of Iowa.

The hazard mitigation plan was discussed during various city council, county supervisor, and school board meetings, which are all conducted in compliance with the Iowa Open Meeting Law-Iowa Code Chapter.

When the plan reached draft stage, the public was encouraged to view it online and leave comments and criticisms. On March 28, 2024, a draft of the plan was uploaded to Region XII's website which is accessible to all members of the public. If the public wished to view the plan prior to this, they were able to request it from either their jurisdiction, either county, or Region XII COG. After March 28, as content and spelling/grammar changes were made, the newest draft was uploaded to the website. Jurisdictions were advised to use the link that would lead interested parties to the website, to reduce paper waste, and to ensure the newest draft was readily available.

## Plan Content

This plan evaluates all aspects of hazard mitigation. The plan is split into six chapters, which serve as an overview for the plan. The first chapter is an introductory chapter which explains the planning process used in development of the plan. Adair and Guthrie County's general backgrounds, as well as profiles for each city are given in chapter two. The planning process is put in motion by explaining the specific steps taken to generate each jurisdiction's risk assessment (chapter 3), vulnerability assessment and loss estimates (chapter 4), and mitigation strategies (chapter 5). The final chapter of the plan explains how the plan was adopted and how it will be maintained in the future.

Appendices A-P present the details of each jurisdiction's hazard mitigation plan outcomes. Each appendix includes the jurisdiction's critical infrastructure, risk assessment, vulnerability and loss estimates, mitigation strategies, flood maps (when applicable), and resolution adopting the plan.

*Section 201.6 (c)(5): [The local hazard mitigation plan shall 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.*

## *Plan Content Updates/Changes*

In all phases of the planning process, the planning team reviewed the existing sections of the plan and provided comments on necessary changes. Planning requirements from FEMA and other applicable bodies become increasingly stringent, requiring new and updated data.

## *Referenced Plans*

Referenced plans throughout the planning process and within this document include:

- Iowa State Hazard Mitigation Plan, 2023
- Adair County Hazard Mitigation Plan, 2018
- Guthrie County Hazard Mitigation Plan, 2018
- FEMA State and Local Hazard Mitigation Planning How-to Guides





# Chapter 2: Community Profiles

## Adair County

### *History*

The area that became Adair County was ceded by the United States Government in 1842, and the organization of the county began during this decade. In 1851, the General Assembly of Iowa established the borders of Adair County– named in honor of General John Adair, a general in the War of 1812 and a governor of Kentucky. The General Assembly appointed three commissioners to locate a county seat and they selected Summerset (now Fontanelle) in 1855. The first settlers of the county were primarily farmers and businessmen who founded the first cities in the County. The first courthouse was built in 1856, and burned in 1910. The town of Greenfield, located near the center of the county, was laid out in 1856 and for the next twenty years, there were countless petitions and votes to move the county seat from Fontanelle to Greenfield. After many years of near bloodshed that involved a military response, theft of records, and a lengthy court battle, the “county seat war” came to an end when the court’s final decision moved the county seat to Greenfield.

In preparation for this move, the Greenfield Building Association had erected a two-story frame building on the East side of the square, which was used by county officials until it burned in 1883. Following the fire, court was held in the Opera House and a temporary office building was built over the vaults of the burned down building. Eight years later, on July 4, 1891, the cornerstone of the present courthouse was laid. Some items placed in the cornerstone were: histories and lists of members of local organizations, a Bible, an 1891 nickel, several copies of various newspapers of the day, and one bottle each of corn, oil, and wine. The building was completed in March 1892. It was originally adorned with a large square tower rising 100 feet in the air, which was removed in 1935 when it became unsafe.

Early in its development, Adair County was home to several railroad lines, which supported local industries such as farming and the commercial trades spurring the county’s rapid growth. Since the peak in population in 1900, the county has experienced declining population, with an increasing share of that population located in the incorporated cities. Today, few large employers exist in Adair County and the local economy continues to be driven by small businesses, small to mid-sized manufacturers, and agriculture.

Over the years, Adair County grew from a remotely populated Native American community to a modern agricultural and industrial county with a diverse workforce. While the population has declined from its peak in the early 20th Century and some former towns have dis-incorporated, the county still has a vital and strong economy focused on industry and small businesses. One of several railroads that once crossed the county still remains. Interstate 80’s development in the 1950s has more than replaced the economic impact of the loss of railroads.

### *Geography and Environment*

Adair County is located in the southern part of Iowa and occupies 576 square miles, 99% of the surface being land and 1% water. The vast majority of the county is rural land used for farming and open areas (forests and unused land). Much of the county is also used for rural transportation and recreational facilities. Approximately 2% of the county’s land area is occupied by incorporated cities, of which 60% of the county’s population can

be found. Topography is mostly rolling hills with a mean elevation of approximately 1,300 feet. Many streams and several small rivers are found in the county.

Adair County is wholly located in the landform region known as the Southern Iowa Drift Plain. Glacial deposits left by ice sheets that extended south into Missouri over millennia dominate this region. The deposits were carved by deepening episodes of stream erosion into steeply rolling, well-drained terrain. Numerous rills, creeks, and rivers branch out across the landscape shaping the old glacial deposits into steeply rolling hills and valleys. Table 2.1 displays the different types of soils found in Adair County.

**Table 2.1: Soils of Adair County**

<b>Soil Association</b>	<b>% of County</b>	<b>Description</b>
Sharpsburg-Nira	25%	Nearly level to moderately sloping, moderately well drained silty clay loam soils that formed in loess; on uplands
Macksburg-Sharpsburg-Winteret	5%	Nearly level to moderately sloping, moderately well drained to poorly drained silty clay loam soils that formed in loess; on uplands
Sharpsburg-Shelby	50%	Moderately sloping to steep, moderately well drained silty clay loam and clay loam soils that formed in loess and glacial till; on uplands
Gara -Ladoga	10%	Gently sloping to steep, moderately well drained and well drained loam and silt loam soils that formed in glacial till and loess; on uplands
Colo-Zook-Nodaway	10%	Nearly level, moderately well drained and poorly drained silty clay loam and silt loam soils that formed in alluvium; on bottom lands

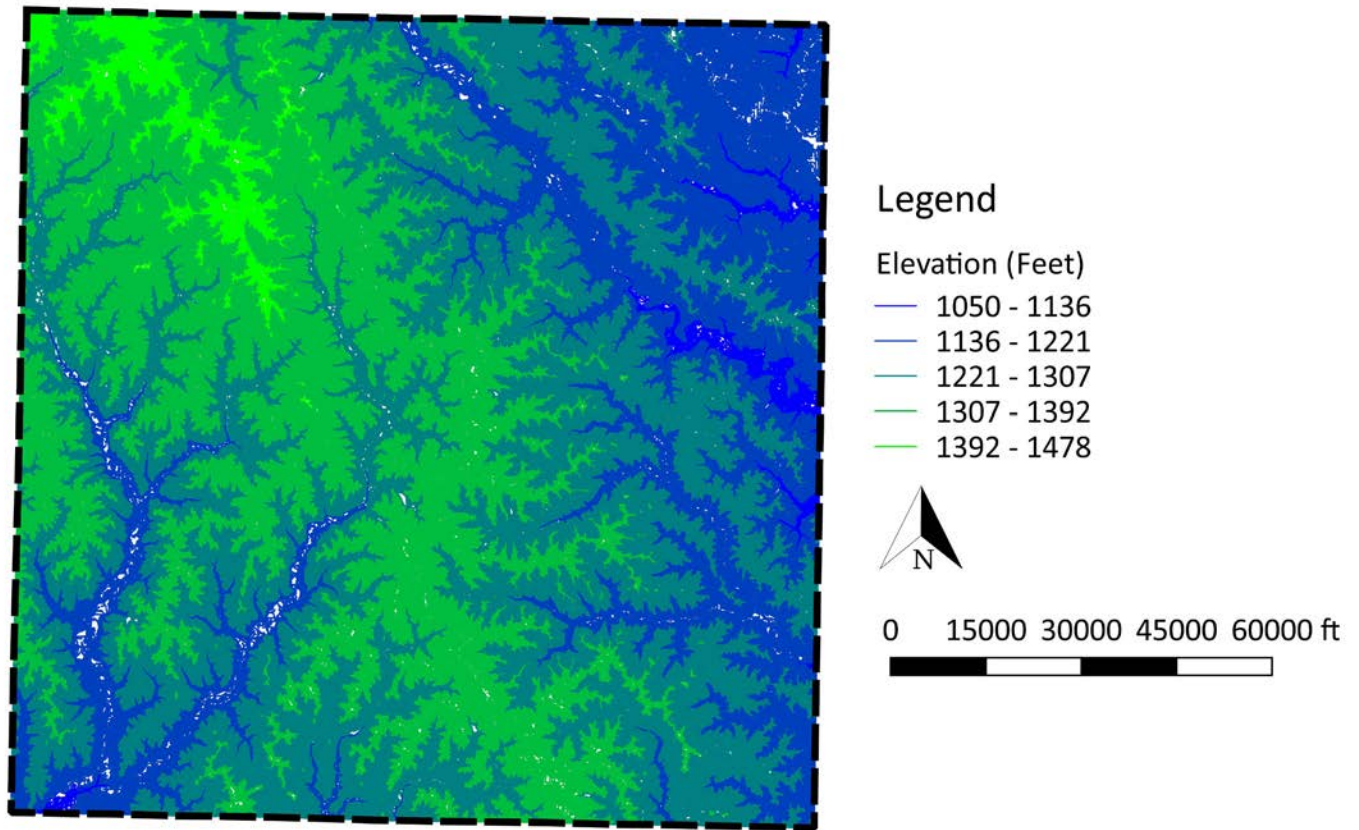
Source: Iowa DNR

Over 99% of the county is covered by land that is gently sloping to moderately steep (2-9% slope) and covered by soil over deep bedrock. Adair County is nearly devoid of unique, fragile, or hazardous landforms or landform regions. The county does not have significant outcroppings, limestone bluffs, or erosion areas. No known hazards are found resulting from terrain or topography. Map 2.1 displays Adair County's elevation.

Adair County is well drained by numerous streams and rivers that flow through the county, and several significant waterways exist. Principally, the Middle River crosses the northeast quarter of the county before flowing into Madison County. The upper end of the Grand/Thompson River flows from north-central Adair County to the southeast into Union County. Several tributaries or branches of the Nodaway River originate in the central and northwest part of Adair County and flow to the south and southwest into Adams and Cass County. A map of significant waterways and recognized watersheds can be found in Map 2.2.

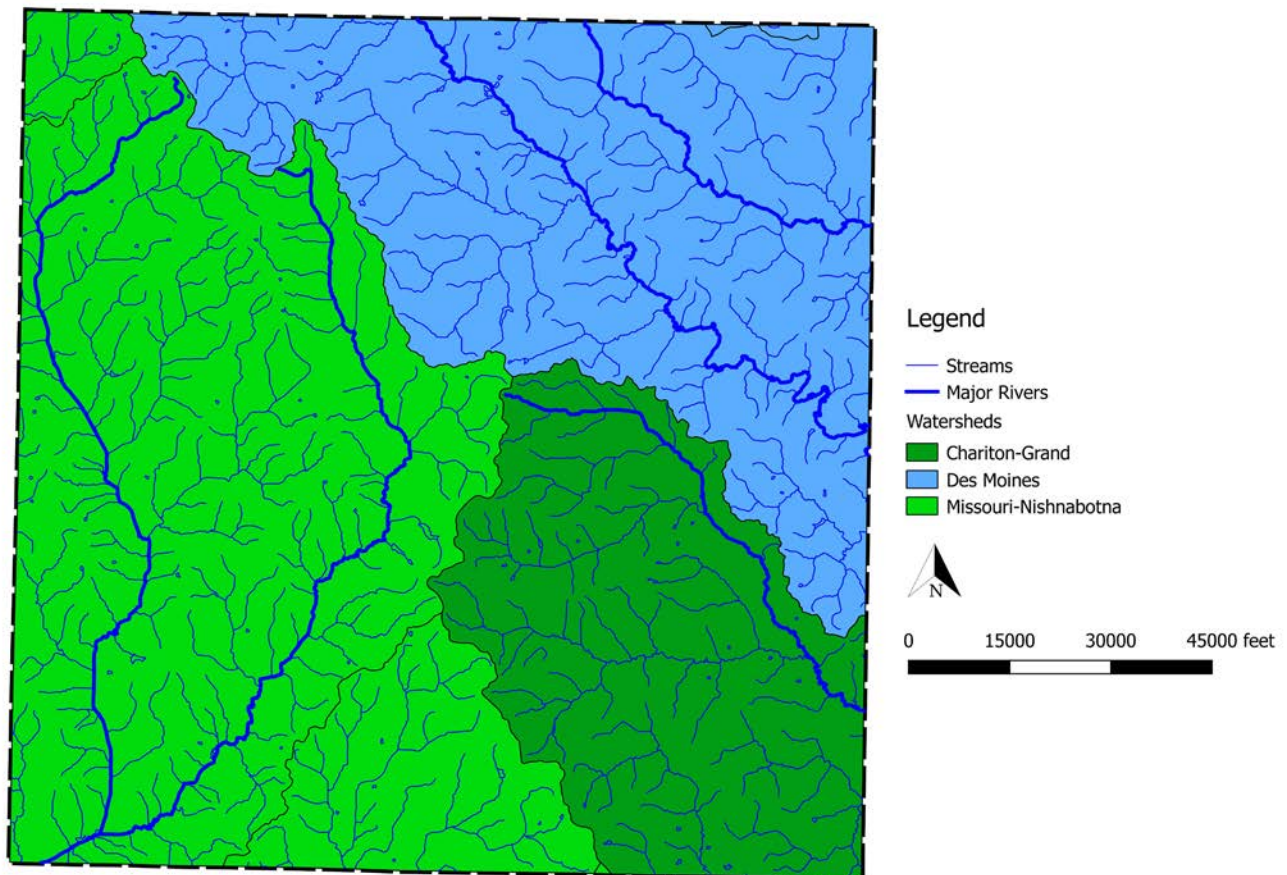
Floodplain mapping has been nonexistent on a county-wide basis throughout history until the past few years. In 2017, FEMA updated a large number of Adair County's maps. City maps can be found in the city's respective appendix, and unincorporated Adair County maps can be found in the Adair County Appendix. In the areas that are not mapped, flood hazards are those in the alluvial plain in general. Fortunately, all waterways are small streams, meaning that catastrophic flooding is not possible. In most cases, stream flooding is more descriptive of flash flooding, which means that small streams flood quickly and are short-lived. Gully, ditch, roadway, and bridge erosion and damage are common in individual sections of stream in individual events. The planning team estimates that 5% of the planning area is located in an alluvial floodplain area that might be subjected to flooding.

**Map 2.1: Adair County Elevation**



Source: Iowa DNR

**Map 2.2: Adair County Waterways and Watersheds**



Source: Iowa DNR



## Transportation

The principal highways in the county are listed in Table 2.2 below, in addition to the approximate mileage of farm-to-market and secondary roads in Adair County. Adair County contains two key State highways and an interstate highway. The average daily traffic is between 22,100 and 26,500 vehicles per day on I-80.

The five participating communities in Adair County have roads to all developed areas. Most of the roads in the incorporated communities are seal coated or paved. Most communities have gravel roads as well. The Southern Iowa Trolley offers public bus transit using an “on-demand” service throughout the county.

The Iowa Interstate Railroad operates approximately 8 miles of track along the northern few miles of Adair County, including sections of the Cities of Adair and Stuart.

Greenfield Municipal Airport is the only airport located in Adair County. It is located approximately 1 mile north of Greenfield and has a 3,400 foot hard-surface runway. This airport is owned and operated by the City of Greenfield. The Iowa Aviation System Plan identifies the Greenfield Municipal Airport as a General Service airport.

**Table 2.2: Adair Transportation Network**

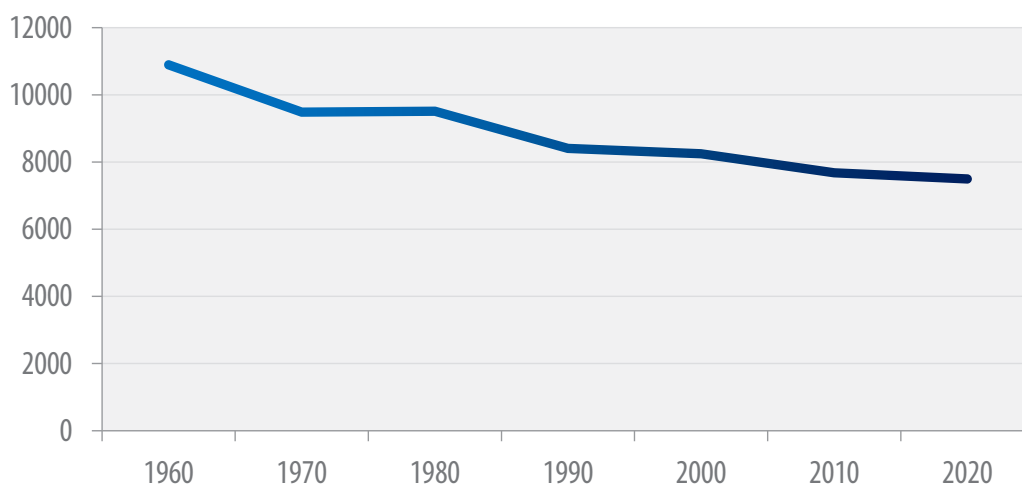
Roadway	Mileage (approximate)	Communities Served
Interstate 80	25	Adair, Casey, Stuart
State Highway 25	27	Greenfield and Orient
State Highway 92	27	Bridgewater, Fontanelle, Greenfield
Farm-to-Market	350	All
Secondary Roads (area serviced)	600	All

Source: Iowa DOT

## Demographics

Like other counties in the region, Adair is predominately rural with a centrally located county seat that contains much of the population. The county’s population peaked in 1900 with 16,192 people, but has been declining ever since. Since 2010, the County has lost 2.4% of the total population. The population trend can be seen in Figure 2.1. Adair County’s population trend is not unlike most other rural Iowa Counties, as many have also had a steady population decline over the previous fifty years.

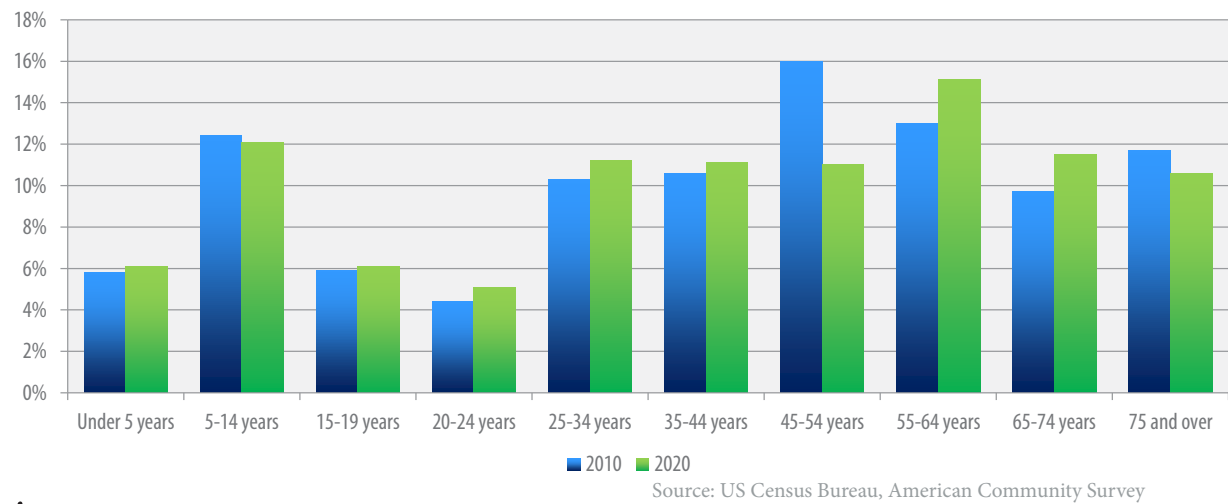
**Figure 2.1: Adair County Population, 1960-2020**



Source: US Census Bureau, American Community Survey

Figure 2.2 is a comparison of the age distribution in Adair County from 2010 to 2020. The biggest population decrease occurred in the 45-54 age cohort which, in 2010, represented 16% of the total population, but only 11% in 2016. The county didn’t experience any other large increases or decreases, but noticed small changes throughout the complete population. The age distribution in Figure 2.2 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. These rural counties also experience higher percentages of those age 35-54 as people look to move back to smaller rural towns once they are ready to start families and settle down.

Figure 2.2: Adair County Age Distribution, 2010 & 2020



Housing

A county’s housing stock, type of households, and housing availability and affordability are determining factors as to how attractive a county is to potential residents. From 2010 to 2022, Adair County lost 113 housing units. During the same period of time, the number of vacant units decreased from 11% of the total to 10.3%. The percent of owner-occupied units rose during this time as well. A complete breakdown is found in Table 2.3

Table 2.3: Adair County Housing Units, 2010 & 2022

	2010		2022	
	Number	Percent	Number	Percent
Occupied Housing Units	3,292	89.0%	3,217	89.7%
Owner Occupied	2,520	76.6%	2,274	70.7%
Renter Occupied	772	23.5%	943	29.3%
Vacant Housing Units	406	11.0%	368	10.3%
Total Housing Units	3,698	100%	3,585	100%

Source: US Census Bureau, American Community Survey

This breakdown is important during hazard events due to the populations that occupy these units. Homeowners who occupy their home may be more likely to want to rebuild, while vacant homes, if damaged, would either sit vacant with no activity, or may be torn down. Renters are unpredictable as some may choose to stay within the same location, or they may decide to move.

According to the 2022 Adair County Assessor’s data (Table 2.4), the median housing value was \$131,600. 30% of the homes in Adair County are valued under \$100,000, and of those houses, 9.5% are valued less than \$50,000. Since the population within the county continues to decline, it is unlikely that a large number of new homes will be built, instead, the cities and county should invest in the rehabilitation of the existing structures. The rehabilitation of these homes will improve the safety and reduce the susceptibility to numerous hazards.

**Table 2.4: Adair County Value of Owner-Occupied Units, 2022**

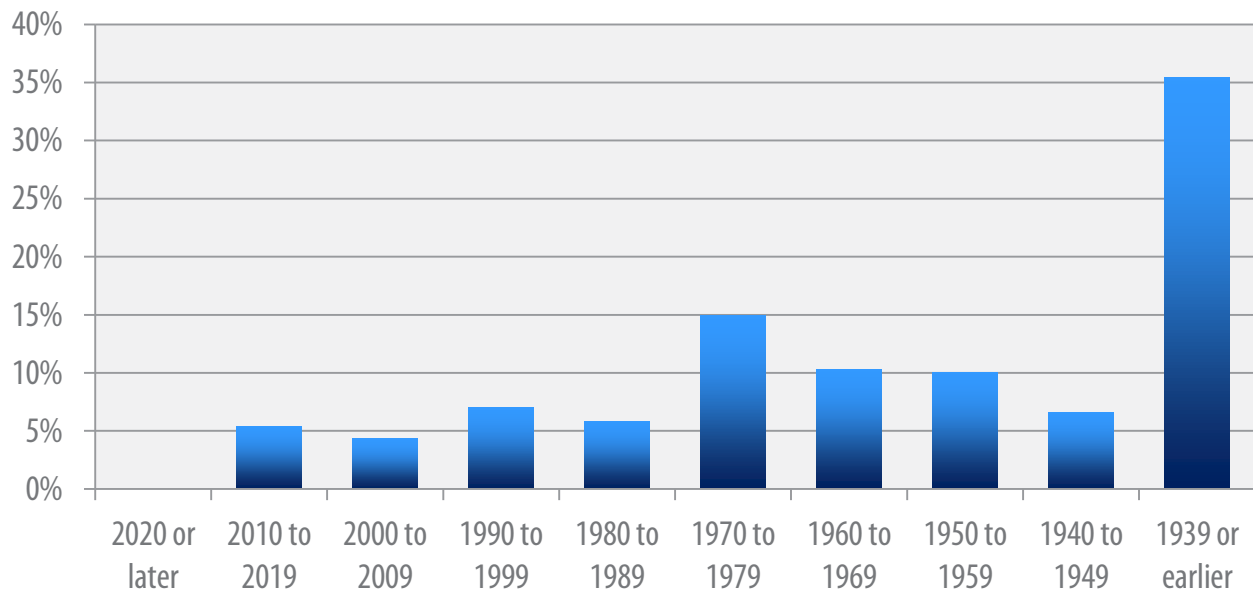
Value of Housing Unit	Percent of Homes
Less than \$50,000	9.5%
\$50,000 to \$99,999	25.5%
\$100,000 to \$149,999	22.0%
\$150,000 to \$199,999	15.3%
\$200,000 to \$299,999	12.8%
\$300,000 to \$499,999	6.1%
\$500,000 to \$999,999	7.9%
\$1,000,000 or more	1.0%

Source: Adair County Assessor

Figure 2.3 shows that 35.5% of the housing units in Adair County were constructed before 1939. From 1970 to 1979, the county saw an increase in units constructed with 15% of the county's units being built during this decade. Older homes generally show deterioration in the structural aspect and in the overall general features. These homes were built to the standards of the time, and may not meet current building codes and standards, making them more susceptible to damage from hazards such as fires, severe storms, and other hazardous weather conditions.

Survey estimates show that there have been no new home builds since 2019, but the building permits issued in the county tell us different. There have been new builds in rural areas and towns such as Greenfield and Stuart. Virtually all homes within the county have adequate gas or other fuel heating systems and kitchen facilities. Most homes are connected to the public water and sewer, except in rural areas, where many homes are connected to individual septic tanks regulated by the Adair County Sanitarian.

**Figure 2.3: Adair County Year Housing Units Constructed, 2022**



Source: Adair County Assessor

## *Economics*

Local income characteristics tell us about the ability of the community to support the costs of hazard mitigation. In this section, we summarize the household income data for the planning area. Table 2.5 shows estimated income statistics for the planning area in 2022.



**Table 2.5: Adair County Household Income, 2016**

<b>Income (In 2016 Inflation Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	110	3.4%
\$10,000 - \$14,999	155	4.8%
\$15,000 - \$24,999	297	9.2%
\$25,000 - \$34,999	261	8.1%
\$35,000 - \$49,999	455	14.1%
\$50,000 - \$74,999	625	19.4%
\$75,000 - \$99,999	509	15.8%
\$100,000 - \$149,999	458	14.2%
\$150,000 - \$199,999	206	6.4%
\$200,000 or more	145	4.5%
Median Household Income	\$63,172	-
Mean Household Income	\$81,199	-

Source: US Census Bureau, American Community Survey

The local economy is vital to the sustainability of the planning area. Understanding the implications of data about the economy helps with mitigation planning by providing insight into the kinds of jobs that are at risk, the ability of residents, based on their income, to implement mitigation actions, and the level of investment in economic activity, such as buildings and machinery that may be damaged in a disaster event. As the data implies, Adair County, once composed mostly of many small farms, is now increasingly mechanized and industrial. Agriculture is still vital, but fewer people are employed in farming activities. Most workers are employed in Greenfield or commute outside of the county to work in the Des Moines metro, Creston, or Atlantic. Table 2.6 displays the employment by industry in Adair County for individuals 16 years and older and employed.

**Table 2.6: Adair County Employment by Industry, 2022**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	3,652	100.0%
Agriculture, Forestry, Fishing, Hunting, Mining	629	17.2%
Construction	322	8.8%
Manufacturing	596	16.3%
Wholesale Trade	83	2.3%
Retail Trade	384	10.5%
Transportation and warehousing and utilities	211	5.8%
Information	13	0.4%
Finance and insurance, and real estate and rental and leasing	221	6.1%
Professional, scientific, management, administrative, and waste management services	181	5.0%
Educational, health care, and social assistance	589	16.1%
Arts, entertainment, recreation, accommodation, and food services	156	4.3%
Other services, except public administration	127	3.5%
Public Administration	140	3.8%

Source: US Census Bureau, American Community Survey

Adair County has an active labor force, with a large number of both men and women participating. In 2022, an estimated 3,652 persons (63.3% of those aged 16 and older) were involved in the workforce, of which all but two were civilians. The total number that was employed was 3,952 and the number that was unemployed was 154 (a low 3.9%). Traditionally, the planning area’s labor participation rate has been average compared to Iowa and somewhat higher than the national average. The unemployment rate has traditionally remained below average to Iowa and much lower than the national average. The latest employment data for the planning area, at the time this section was authored, was produced for January 2024. In that report, Adair County had a 2.6% unemployment rate, compared to 3.0% in Iowa and 3.7% nationally. This data, produced monthly by the Iowa Workforce Development, illustrates that the county is typical for the southwest region.

Overall, Adair County has a fairly stable economy with diverse industry sectors represented. Few large employers have closed or opened that have changed the economy significantly. This characteristic makes it somewhat easier to implement mitigation actions. While the national unemployment rates have fluctuated significantly in the past ten years, Iowa and Adair County have been more stable. The local construction industry is stable and a strong part of the economy. If a disaster does occur, this could be mobilized to repair homes, streets, and businesses damaged. Adair County has a limited supply of fuel sources and building materials dealers, but these can be accessed in nearby Des Moines. Markets for food and materials can be accessed via Interstate 80, Highways 25 and 92, and nearby railroads.

*Existing Documents*

Table 2.7 provides a compilation of the current planning and regulatory documents in place for Adair County, the table also shows the last time the documents were last updated.

**Table 2.7: Adair County Existing Documents**

Document	Yes/No	Year
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	Yes - For County Facilities	-
Zoning Ordinance	No	-
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	No	-
Flood Plain Regulations	No	-

*NFIP Participation*

A large number of Adair County’s FEMA Flood maps were approved in April of 2017. There are still some areas of the county that are considered Areas of Minimal Flood Hazard that have not been mapped. Since the maps have been approved by FEMA, the county can now start the process of joining the NFIP program. The county’s flood maps can be found in the county’s appendix.

*Outlook and Future Development*

The population of the rural part of the county is likely to continue a slow decline, as has been the case in recent years, with some growth likely in the northeastern corner of the county (which is closest to Des Moines). Most rural development will be residential, but some may be commercial, government, institutional, and recreational. Conversion of farmland on a very modest scale is likely, but development is not likely in possible

flood hazard areas. There is no zoning or flood regulations at this time to prevent such development. If in the future a comprehensive plan and zoning is prepared and adopted, hazard mitigation principals will be used within the planning process and document.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Examples of critical facilities include, but are not limited to: hospitals and other medical facilities, police and fire stations, emergency operations centers, evacuation shelters, public works facilities, schools and colleges, transportation systems (airways, highways, railways, waterways), lifeline utility systems (potable water, wastewater, oil, natural gas, electricity, communication systems), high potential loss facilities (nuclear power plants, dams, military installations), and hazardous material facilities (corrosives, explosives, flammable materials, radioactive materials, toxins, etc.). The critical facilities for Adair County can be found in Map 2.3.

Other critical facilities, like the trail and pipeline locations can be found in the Adair County Appendix.

## *Essential Infrastructure and Services*

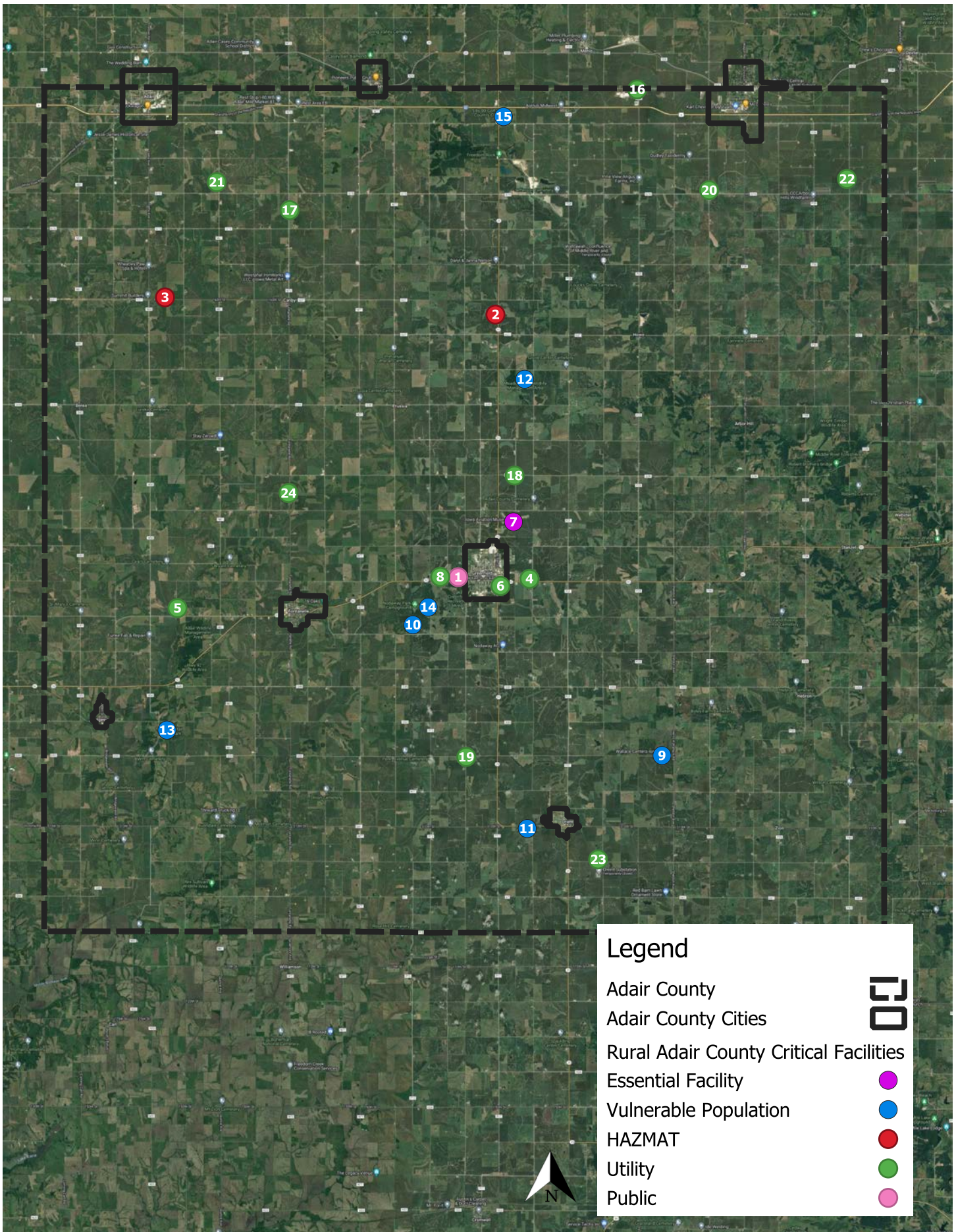
Knowing what services and infrastructure serve the county as a whole, and each individual community can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The county's essential infrastructure and services can be found in Table 2.8.

**Table 2.8: Adair County Essential Infrastructure and Services**

<b>Major Arterials</b>	I-80, Iowa 92 & 25	<b>Air Service</b>	Greenfield Airport
<b>Water Service</b>	SIRWA, wells, other providers	<b>Sewer Service</b>	Individual septic systems
<b>Electric Service</b>	Farmer's Electric Coop; Alliant Energy and MidAmerican Energy have scattered service to rural areas	<b>Gas Service</b>	None; individual propane dealers
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Mediacom, wireless	<b>Law Enforcement</b>	Adair County Sheriff
<b>Fire Service</b>	6 city departments	<b>Ambulance Service</b>	Adair County Health System



# Map 2.3: Adair County Critical Facilities



**Table 2.9: Adair County Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Adair County Historical Complex	2393 S Lakeview Drive	Public
2	Adair County Landfill	1645 Highway 25	HAZMAT
3	Agriland FS	1347 160th Street	HAZMAT
4	Farmers REC Office	2389 IA-92	Utility
5	Fontanelle WWTP	2482 Dover Avenue	Utility
6	Greenfield WWTP	625 SE 6th Street	Utility
7	Greenfield Airport, Iowa Aviation Museum	2251 Airport Road	Essential Facility
8	Greenfield Water Plant	2150 240th Lane	Utility
9	Henry A. Wallace Center	2773 290th Street	Vulnerable Population
10	Ken Sidey Nature Area	2521 Lewis Avenue	Vulnerable Population
11	Lake Orient Recreation Area (FEMA safe room)	3103 Orange Avenue	Vulnerable Population
12	Meadow Lake and Park	2370 180th Street	Vulnerable Population
13	Mormon Trail Park and Lake	2828 Delta Avenue	Vulnerable Population
14	Nodaway Lake	2061 250th Street	Vulnerable population
15	5x80 Golf and Country Club	1086 State Highway 25	Vulnerable Population
21 to 16	Menlo Electric Substation (Farmer's REC)	2698 350th Street	Vulnerable Population
17	Casey Electric Substation (Farmer's REC)	1350 Fontanelle Road	Utility
18	Greenfield Electric Substation (Farmer's REC)	2103 Norfolk Avenue	Utility
19	Orient Electric Substation (Farmer's REC)	2206 290th Street	Utility
20	Stuart Electric Substation (Farmer's REC)	1290 Trenton Avenue	Utility
21	MidAmerican Energy Substation	1247 Fallow Avenue	Utility
22	MidAmerican Energy Substation	1259 York Avenue	Utility
23	MidAmerican Energy Substation	2591 320th Street	Utility
24	Fontanelle Substation	North of Town on Fontanelle Road	



# Guthrie County

## *History*

Guthrie County was originally part of the old Keokuk County, which was comprised of approximately the western two-thirds of the State of Iowa. Keokuk County was later organized with its present boundaries and Guthrie County was then part of a vast unorganized region until the Honorable P.M. Casady prepared and pushed through the legislature a bill dividing the region in to counties, one of which was Guthrie, in 1851. Guthrie County was named for Captain William Guthrie, formerly of Keokuk, who was the captain of the only company Iowa sent to the Mexican War. Captain Guthrie was killed in the battle.

Southern Guthrie County once contained a portion of the Underground Railroad during the mid-1800s. Numerous families in the area were “conductors” who assisted the runaway slaves during their escape. Although Iowa was a “free” state, the Fugitive Slave Law of 1850 made it illegal for anyone to help a runaway slave; therefore, runaways could not settle in Iowa.

The original county seat of Guthrie County was Panora, however that was only for a short period of time. In 1853, there was a contract to build the courthouse, but it was never built. In 1859, a petition asking that the location of the courthouse be moved to Guthrie Center was filed and sent to voters of the county. Panora won by a count of 297 to 277. The courthouse was finally built later in 1859. In 1860, another petition was filed and election was held. This time, Panora lost and Guthrie Center became the new county seat. Panora then rebutted with a petition of their own to relocate the county seat back in Panora in which they won, moving the records again to Panora. In 1870, Guthrie Center again petitioned, losing the vote. Guthrie Center petitioned again in 1873 and won. The county seat has been in Guthrie Center ever since.

## *Geography and Environment*

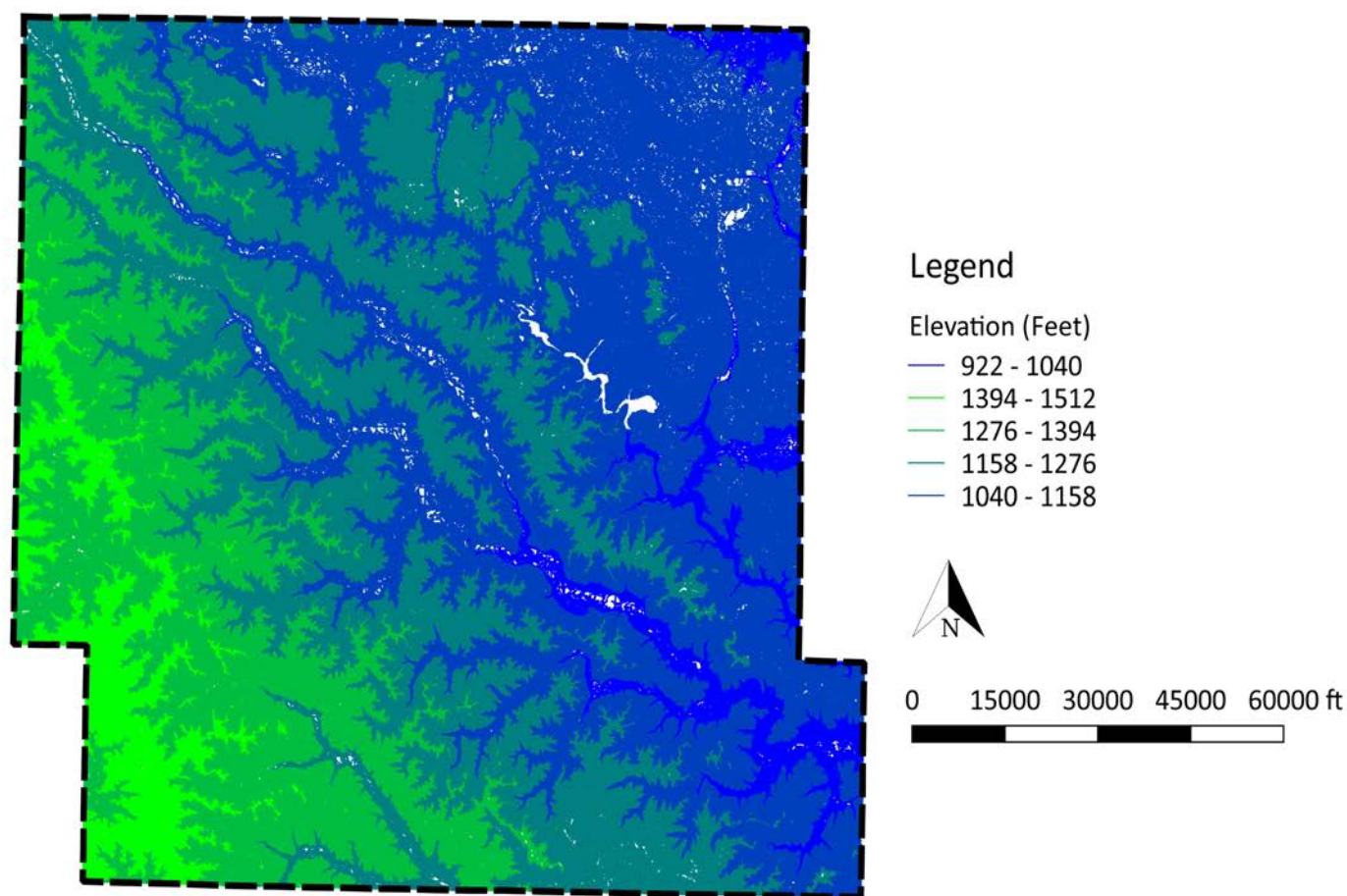
Guthrie County is located in the west central part of Iowa. Adair, Madison, Dallas, Greene, Carroll, Audubon, and Cass Counties all are bordering counties. The main means of transportation for residents of Guthrie County are Iowa Highways 25, 141, and 4. Interstate 80 runs just south of the Guthrie County Border in Adair County, but is easily accessible. Additionally, Highway 20 runs north/south on the east side of Guthrie County. Guthrie Center is the county seat and is located in the center of the county. The 593 square mile county is made up of ten communities: Adair, Bagley, Bayard, Casey, Guthrie Center, Jamaica, Menlo, Panora, Stuart, and Yale.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. As one moves north and east through the county, where most of the communities are located, the county continues to decline to as little as 960 feet above sea level. Map 2.4 displays Guthrie County's elevation.

As agriculture is the county's main industry, the soil is one of the county's most valuable natural resources. Sand and gravel found in the underlying soils on floodplains in the southern half of the county are also considered to be important natural resources. Table 2.10 displays Guthrie County's soils and their different descriptions.



## Map 2.4: Guthrie County Elevation



Source: Iowa DNR

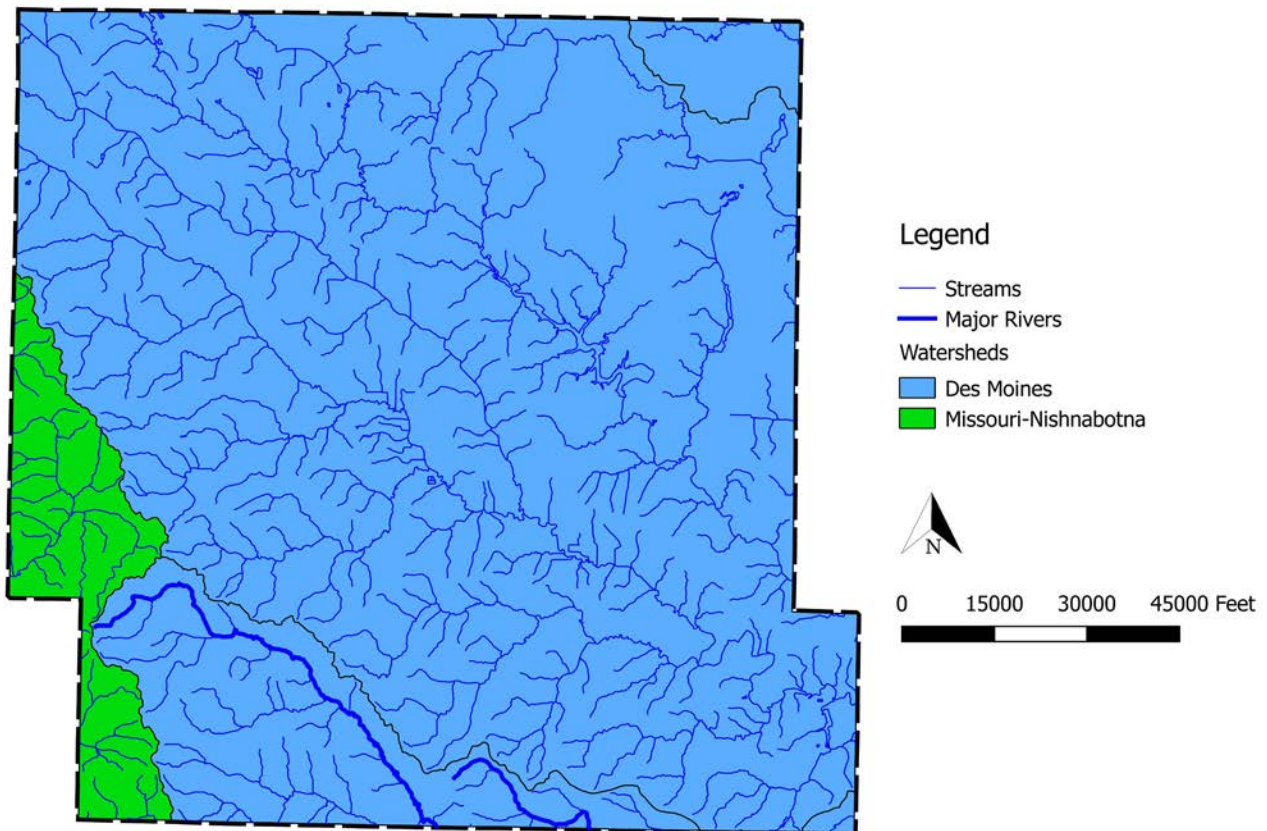
**Table 2.10: Soils of Guthrie County**

Soil Association	% of County	Description
Sharpsburg-Ladog-Shelby	25%	Gently sloping to moderately steep, silty and loamy, moderately well drained, suitable for crops, mostly used for pasture
Sharpsburg	20%	Gently to moderately sloping, silty, moderately well drained, primarily used for crops, but sheet erosion is common
Clarion	15%	Gently to strongly sloping, loamy, well drained, primarily used for crops but are fairly erodible
Gara-Lindley	14%	Strongly sloping to very steep, loamy, moderately well drained, primarily used for livestock, floods easily
Webster-Nicollet	10%	Nearly level, loamy, poorly to somewhat poorly drained, mainly used for crops but have to be drained with tile
Marshall-Shelby	9%	Gently to strongly sloping, silty and loamy, well to moderately well drained, used for crops and pasture
Zook-Colo-Vesser	5%	Nearly level, silty, poorly drained, primarily used for crops, can be frequently flooded or cut up by erosion
Sharpsburg-Macksburg	2%	Nearly level to gently sloping, moderately well to somewhat poorly drained, primarily used for crops

Source: Iowa DNR

There are a number of major rivers located in Guthrie County. Those rivers include the Middle Raccoon River, Bushy Creek, and the South Raccoon River. Also located in Guthrie County is Lake Panorama, just north of Panora. The majority of the county is located in the Des Moines River watershed; however, the southwest corner is located in the Missouri-Nishnabotna River watershed. Map 2.5 displays the rivers and streams located in Guthrie County, as well as which watershed they reside in.

**Map 2.5: Guthrie County Waterways and Watersheds**



Source: Iowa DNR

## *Transportation*

The principal highways in the county are listed in Table 2.11, in addition to the approximate mileage of farm-to-market and secondary roads in Guthrie County. Guthrie County has four state highways that run through a portion or the whole county.

The ten participating communities in Guthrie County have roads to all developed areas. Most of the roads in the incorporated communities are seal coated or paved. Most communities have gravel roads as well. Western Iowa Transit offers public bus transit using an “on-demand” service throughout the county.

The Iowa Interstate Railroad operates approximately 23 miles of track along the southern few miles of Guthrie County, including sections of the cities of Casey, Menlo, and Stuart. BNSF operates on approximately 9 miles of track located in the northern portion of the county running through Bayard.

Guthrie County Regional Airport is the only airport located in Guthrie County. It is located just outside Guthrie Center and has a 3,400 foot hard-surface runway. This airport is owned and operated by the Guthrie County Regional Airport Authority with membership from Guthrie County and the cities of Guthrie Center, Yale, and Panora.

**Table 2.11: Guthrie Transportation Network**

Roadway	Mileage (approximate)	Communities Served
IA- 4	12	Panora
IA- 25	40	Bayard, Guthrie Center
IA- 44	33	Guthrie Center, Panora
IA- 141	22	Bagley, Bayard, Jamaica
Farm-to-Market	308	All
Secondary Roads	954	All

Source: Iowa DOT

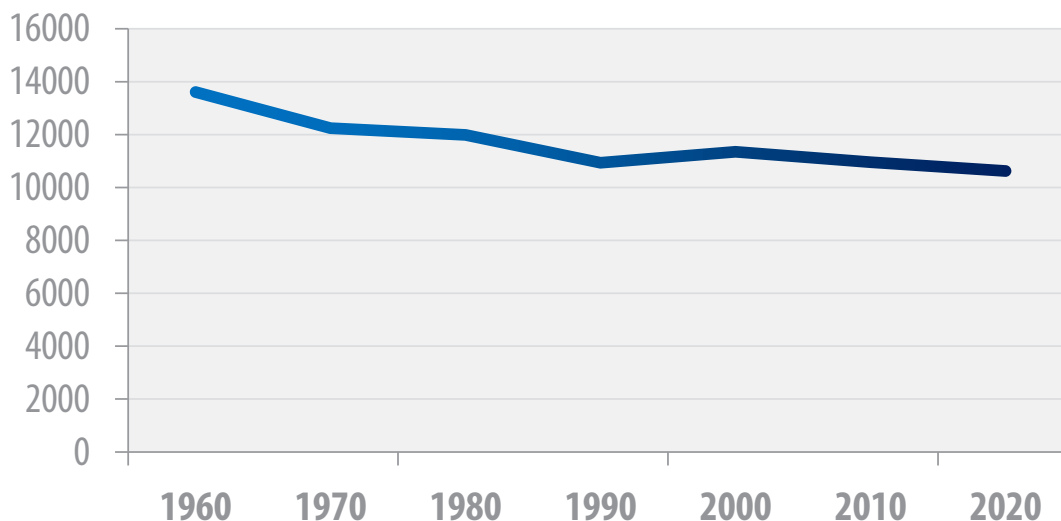
## Demographics

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Guthrie County's population through past, present and future trends of the region.

The size and composition of a county's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a county can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give county leaders information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Since 1960, the population of Guthrie County as a whole has steadily declined. In 1960, the population totaled 13,607. Three straight decades of decline reduced the total population to 10,935. During the 1990's, the population increased to 11,353. Since 2000, the county's population has declined to its 2020 population of 10,623. Guthrie County is not alone when it comes to this trend as many Iowa Counties have also lost population over the previous fifty years. Figure 2.4 shows the historical population trend for Guthrie County.

**Figure 2.4: Guthrie County Historic Population, 1960-2020**

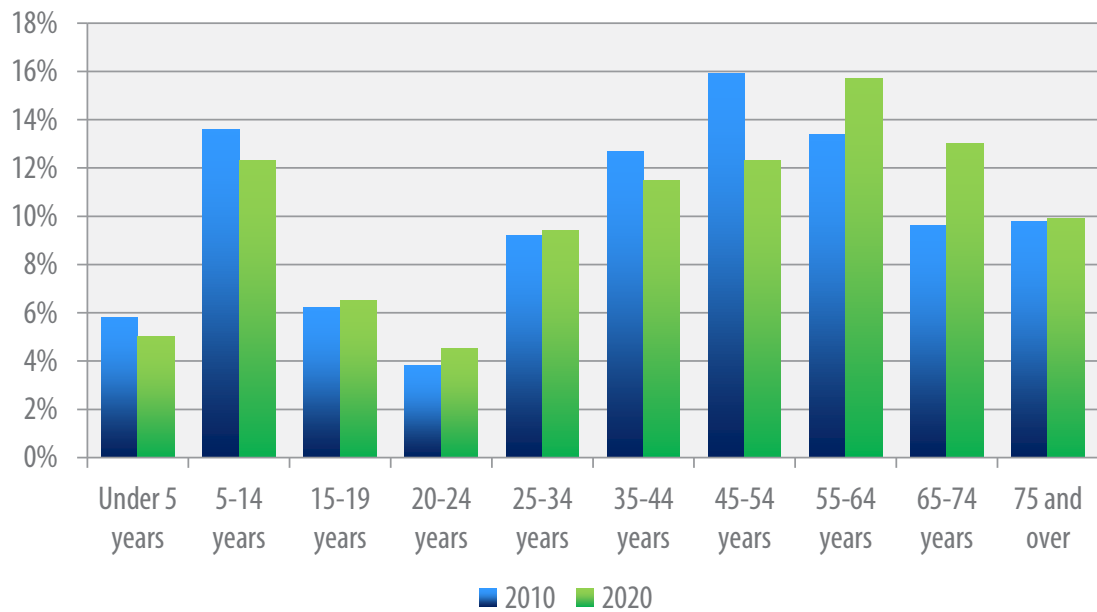


Source: US Census Bureau, American Community Survey

Figure 2.5 is a comparison of the age distribution for Guthrie County from 2010 to 2020. The biggest population decrease occurred in the 45-54 age cohort which, in 2010, represented 15.9% of the total population, but only 12.3% in 2020. The largest population increase was seen in the 55-64 age cohort, which increased from representing 13.4% of the population in 2010 to 15.7% in 2020.

The age distribution in Figure 2.5 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as “brain drain.”

Figure 2.5: Guthrie County Age Distribution, 2010 & 2020



Source: US Census Bureau, American Community Survey

Housing

A county’s ability to attract new residents is important. One of the most essential aspects to attracting residents is housing. A county’s housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2022, Guthrie County gained 24 housing units. During this time period, the number of vacant homes increased by 164 total units. The number of renter-occupied units decreased by 228 units, while owner-occupied units increased by 88 units. Table 2.12 shows the comparison of housing units in Guthrie County between 2010 and 2022.

Table 2.12: Guthrie County Housing Units, 2010 & 2022

	2010		2022	
	Number	Percent	Number	Percent
Occupied Housing Units	4,669	81.2%	4,529	78.5%
Owner Occupied	3,693	79.1%	3,781	83.5%
Renter Occupied	976	20.9%	748	16.5%
Vacant Housing Units	1,080	18.8%	1,244	21.5%
Total Housing Units	5,749	100.0%	5,773	100.0%

Source: US Census Bureau, American Community Survey



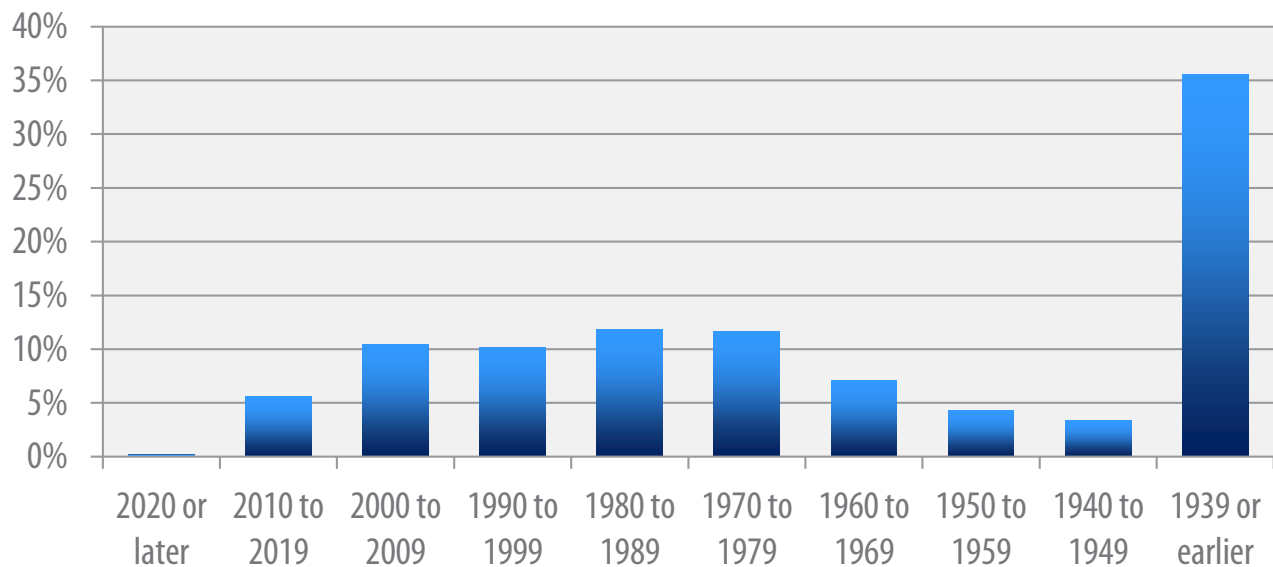
**Table 2.13: Guthrie County Value of Owner-Occupied Housing Units, 2022**

Value of Housing Unit	Percent of Homes
Less than \$50,000	10.2%
\$50,000 to \$99,999	21.0%
\$100,000 to \$149,999	18.1%
\$150,000 to \$199,999	13.5%
\$200,000 to \$299,999	19.6%
\$300,000 to \$499,999	10.8%
\$500,000 to \$999,999	6.5%
\$1,000,000 or more	0.3%

Source: Guthrie County Assessor

According to the Guthrie County Assessor's parcel data, 31.2% of all homes in Guthrie County were valued below \$99,999. Since the population has been declining, it will be important to invest in the rehabilitation of existing housing. This will improve the safety of homes and reduce their susceptibility to numerous types of hazards. Table 2.13 displays the value of housing units in 2022.

**Figure 2.6: Guthrie County Year Housing Unit Constructed, 2022**



Source: Guthrie County Assessor

Figure 2.6 shows that over 35% of the housing stock in Guthrie County was constructed prior to 1940. Since then, construction has significantly declined. From 1970 to 2009, the county saw each decade construct approximately 10.5% of the counties total homes. Older homes generally show more structural deterioration and were constructed using less stringent building codes and standards, indicating that these homes may be more prone to hazards such as fires, severe storms, and other damaging weather conditions.

## *Economics*

Table 2.14 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$75,795 and the mean household income was \$92,867. According to the 2022 American Community Survey 5-Year Estimates, 35% of Guthrie County's households had incomes below \$49,000 and 37.4% had incomes above \$100,000. This is consistent with the city's housing values.

**Table 2.14: Guthrie County Household Income, 2022**

<b>Income (In 2022 Inflation-Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	167	3.7%
\$10,000-\$14,999	167	3.7%
\$15,000-\$24,999	330	7.3%
\$25,000-\$34,999	339	7.5%
\$35,000-\$49,999	578	12.8%
\$50,000-\$74,999	646	14.3%
\$75,000-\$99,999	596	13.2%
\$100,000-\$149,999	1,035	22.9%
\$150,000-\$199,999	348	7.7%
\$200,000 or more	307	6.8%
Median Household Income	\$75,795	-
Mean Household Income	\$92,867	-

Source: US Census Bureau, American Community Survey

**Table 2.15: Guthrie County Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	5,323	100.0%
Agriculture, forestry, fishing and hunting, and mining	286	5.4%
Construction	429	8.1%
Manufacturing	660	12.4%
Wholesale trade	220	4.1%
Retail trade	543	10.2%
Transportation and warehousing, and utilities	264	5.0%
Information	120	2.3%
Finance and insurance, and real estate and rental and leasing	554	10.4%
Professional, scientific, and management, and administrative and waste management services	382	7.2%
Educational services, and health care and social assistance	1035	19.4%
Arts, entertainment, and recreation, and accommodation and food services	274	5.1%
Other services, except public administration	340	6.4%
Public administration	216	4.1%

Source: US Census Bureau, American Community Survey

The employment by industry statistics are shown in Table 2.15. The leading employment industries were Educational Services, and Health Care and Social Assistance (19.4%), Manufacturing (12.4%), and Finance and Insurance, and Real Estate and Rental and Leasing (10.4%). The employment percentages are based on the total number of individuals 16 years and older that are from Guthrie County and are employed.

## *Existing Documents*

Table 2.16 provides a compilation of the current planning and regulatory documents in for Guthrie County.



**Table 2.16: Guthrie County Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2005
Building Code	Yes*	2010
Zoning Ordinance	Yes	2010
Strategic Plan	Yes	2005
Housing Needs Assessment	Yes	1994
NFIP Participant	Yes	1996
Floodplain Regulations	Yes	2018

\*State of Iowa Building Code

## *NFIP Participation*

In the past, there have been instances of significant flooding in Guthrie County. Guthrie County began participating in NFIP in 1996, and the flood maps were updated in 2017. The County's FIRMs can be found in the the county's appendix.

## *Outlook and Future Development*

The population of the rural part of the county is likely to continue a slow decline, as has been the case in recent years, with some growth likely in the eastern part of the county (which is closest to Des Moines). Most rural development will be residential, but some may be commercial, governmental, institutional, and recreational. Conversion of farmland on a very modest scale is likely, but development is not likely in flood hazard areas. If in the future a comprehensive plan is prepared and adopted, hazard mitigation principals will be used within the planning process of this document.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Guthrie County's critical facilities can be found on Map 2.6. Other critical facilities, like trails and pipeline locations, can be found in the Guthrie County Appendix.

## *Essential Infrastructure and Services*

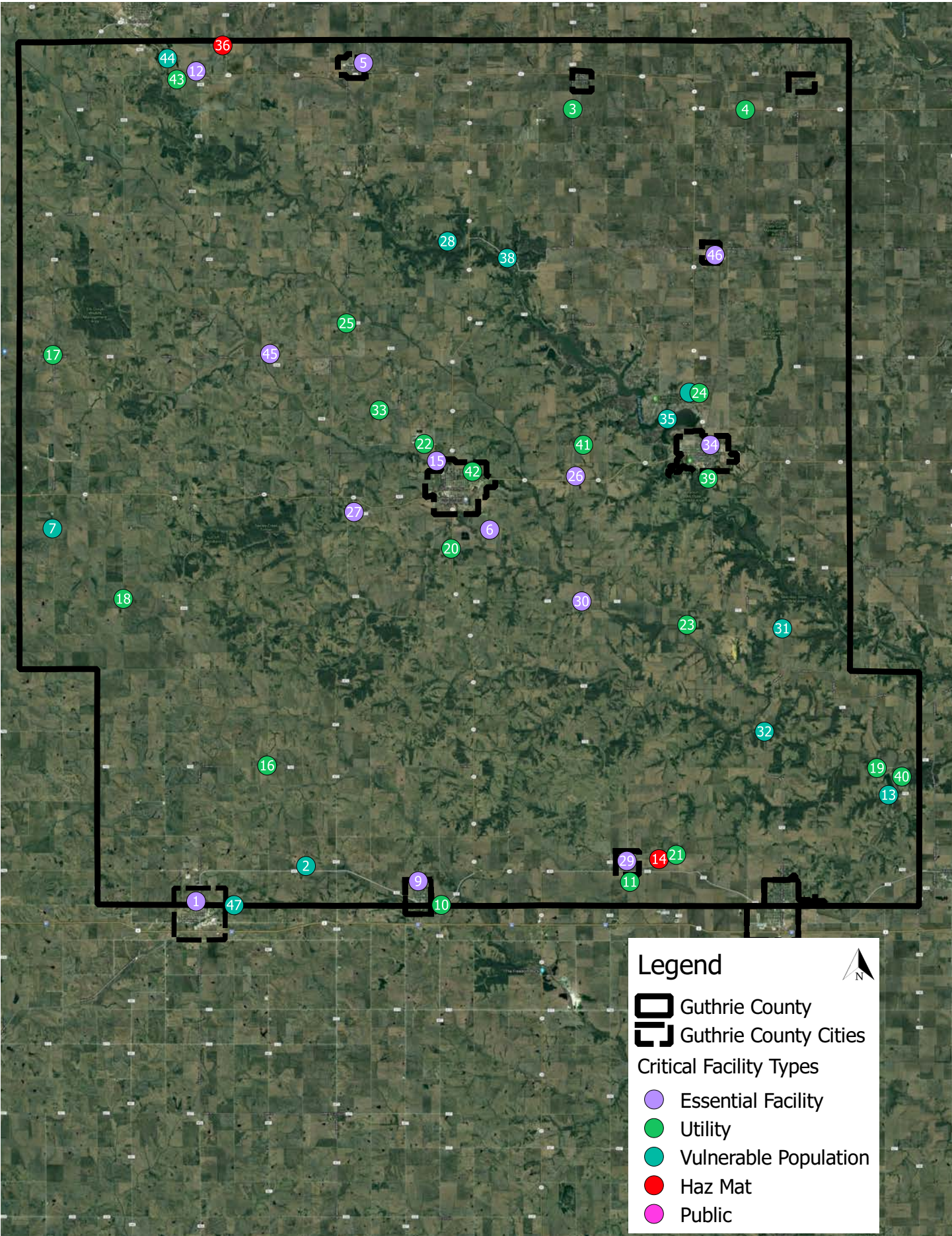
Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The County's essential infrastructure and services can be found in Table 2.17.

**Table 2.17: Guthrie County's Essential Infrastructure and Services**

<b>Major Arterials</b>	IA 4, 25, 44, & 141 White Pole Road, P28	<b>Air Service</b>	Guthrie County Regional Airport
<b>Water Service</b>	SIRWA, Xenia Rural Water	<b>Sewer Service</b>	Private septic tanks
<b>Electric Service</b>	Alliant EnergyGuthrie County REC	<b>Gas Service</b>	Alliant Energy, MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Panora Fiber, Casey Telco, Coon Valley Telephone, Windstream, Mediacom, Wireless	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	8 city departments	<b>Ambulance Service</b>	Panora EMS, Stuart EMS



Map 2.6: Guthrie County Critical Facilities



**Table 2.18: Guthrie County Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Adair Grader Shed	1000 North Avenue, Adair	Essential Facility
2	Adair-Casey School	3384 Indigo Avenue, Adair	Vulnerable Population
3	Alliant Energy Bagley Substation	120th Street & Quail Road	Utility
4	Alliant Energy Herndon Substation	Highway 141 & Victory Avenue	Utility
5	Bayard Grader Shed	Corner of Prairie Street and Hwy 25	Essential Facility
6	Bear Grove Grader Shed	1559 240th Street, Guthrie Center	Essential Facility
7	Bowman Chapel	Corner of Bowman Avenue and 240th Street	Vulnerable Population
8	Brethren Church	2946 200th Road, Panora	Vulnerable Population
9	Casey Grader Shed	1204 Wallace Street, Casey	Essential Facility
10	City of Casey Sewer Treatment Plant	East of Casey on 350th Street	Utility
11	City of Menlo Lagoons	South of Menlo	Utility
12	Coon Rapids Grader Shed	1400 Block of Hwy 141, Coon Rapids	Essential Facility
13	Diamondhead Lake	8498 Meadow Wood Drive, Dexter	Vulnerable Population
14	Flint Hills Ethanol	3363 Talon Ave, Menlo	HAZMAT
15	Guthrie County Engineers Office	2211 215 Road, Guthrie Center	Essential Facility
16	Guthrie County REC Adair Substation	3099 Hickory Avenue	Utility
17	Guthrie County REC Audubon Substation	1095 190th Street	Utility
18	Guthrie County REC Bear Grove Substation	1301 260th Street	Utility
19	Guthrie County REC Diamondhead Substation	3476 310th Street	Utility
20	Guthrie County REC Guthrie Substation	2451 Highway 25	Utility
21	Guthrie County REC Hawkeye Substation	2890 335th Street	Utility
22	Guthrie County REC Industrial Substation	2161 215th Street	Utility
23	Guthrie County REC Panora Substation	2666 Tank Avenue	Utility
24	Guthrie County REC Panorama Substation	2883 200th Street	Utility
25	Guthrie County REC Seeley Substation	1801 Justice Road	Utility
26	Guthrie County Regional Airport	2607 IA 44, Guthrie Center	Essential Facility
27	Guthrie County Transfer Station	2349 Jaguar Trail, Guthrie Center	Essential Facility



<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
28	Guthrie Grove Church & Campground	2232 158th Lane, Guthrie Center	Vulnerable Population
29	Menlo Grader Shed	110 Sherman Street, Menlo	Essential Facility
30	Monteith Grader Shed	2632 Monteith Road, Guthrie Center	Essential Facility
31	Morrisburg Church	268th Street and Wagon Road, Stuart	Vulnerable Population
32	Nations Bridge County Park	2997 Wagon Road, Stuart	Vulnerable Population
33	Northern Natural Gas	Various, runs through the county	Utility
34	Panora Grader Shed	317 E Clay Street, Panora	Essential Facility
35	Panorama Lake	North west of Panora	Vulnerable Population
36	Poet Biorefining	1015 Grant Avenue, Coon Rapids	HAZMAT
37	Raccoon Valley Electrical Cooperative Poet Biorefining Substation	1023 Grant Avenue	Utility
38	Springbrook State Park	2437 160th Road, Guthrie Center	Vulnerable Population
39	Sprint Tower	2247 Wagon Road, Panora	Utility
40	US Cellular Tower	3125 Zenith Avenue, Redfield	Utility
41	US Cellular Tower	2760 215th Street, Panora	Utility
42	US Cellular Tower	1310 Oak Street, Guthrie Center	Utility
43	Verizon Tower	1474 110th Street, Coon Rapids	Utility
44	Whiterock Conservancy Visitors Center	1436 IA 141, Coon Rapids	Vulnerable Population
45	Wichita Grader Shed	1890 Harvest Trail, Guthrie Center	Essential Facility
46	Yale Grader Shed	704 Oak Street, Yale	Essential Facility
48	Correll Wildlife Area	Elk Avenue & 350th Street	Vulnerable Population

# Chapter 3: Local Hazard Analysis & Risk Assessment

The hazard analysis and risk assessment (HARA) is a process for determining the emergency management needs for a jurisdiction. The determination is possible when the knowledge of the hazards is combined with the knowledge of the impact it would have on citizens and property within the jurisdiction. The HARA process includes four steps and shows the jurisdictions how frequently damage from a particular event could occur; the extent of damage; and which portions of the jurisdiction could be impacted during an event.

**Step 1: Identify Hazards** – determine which hazards can affect the jurisdiction.

*What kinds of hazards can affect the jurisdiction? What happened in the past that the jurisdiction should have known about?*

Many people are only aware of the most obvious risks, usually as a result of a disaster that affected their community in recent years such as a tornado or flood. In many cases, a large majority of the population is not aware of certain hazards because they have not affected the jurisdiction during their lifetime.

**Step 2: Community Profile** – determine if and to what extent these hazards will affect the assets of the jurisdiction.

*What will be affected by these hazards? Are there buildings, roads, utilities, or other facilities in the jurisdiction that will be damaged or destroyed by these hazards? Are there concentrations of certain populations in the hazard area that are especially vulnerable, such as elderly, children, or non-English speaking people? Are there unique or symbolic characteristics about the jurisdiction that will be impacted adversely by a hazard? How will the economy of the jurisdiction or region be impacted by the occurrence of the hazard?*

An inventory will help identify the assets that can be damaged or affected by the hazard event. In many cases, jurisdictional assets may be vulnerable to more than one type of hazard, in which the jurisdiction may need to look at different characteristics of the same asset to understand its vulnerability to each type of hazard. For example, if a building is subject to both floods and tornadoes, the jurisdiction will be interested in the location and elevation of the building in order to determine how much of the structure and its contents will be damaged by flooding. The jurisdiction will also be interested in the construction of the building and its ability to resist physical damage caused by high winds and debris during a tornado.

**Step 3: Profile Hazard Events** – determine how impactful a hazard can be

*How “big” is each hazard’s potential impact? Will it affect every area the same or will certain areas get hit harder than others? How often will each type of hazard impact the jurisdiction?*

It is important to know the location and amount of land area that may be affected by certain hazard types. For example, there may be areas that can be affected repeatedly by a hazard in one part of the jurisdiction such as floodplains adjacent to streams and rivers or areas around chemical facilities, or there may be potential jurisdiction-wide impacts from events such as windstorms or winter storms.

Hazards can create direct damages, indirect effects, and secondary hazards to jurisdictions. Direct damages are caused immediately by the event itself, such as a bridge washing out during a flood. Indirect effects usually



involve interruptions in asset operations and community functions. For example, when a bridge is washed out due to a flood, traffic is delayed or rerouted, which then impacts individuals, businesses, and public services that depend on the bridge for transportation. Secondary hazards are caused by the initial hazard event, such as when flooding causes a dam break. While this is a disaster in its own right, its consequent damages should be included in the damage calculations of the initial hazard event. Loss estimations will include a determination of the extent of direct damages to property and indirect effects on functional use.

**Step 4: Prioritizing Hazards** – determine which hazards need to be addressed through mitigation planning *Which hazards are priorities for planning? Which hazards are candidates for special attention for response planning? Which hazards should mitigation efforts be focused on? Which hazards require further planning for post-disaster recovery?*

Through completion of steps 1, 2, and 3, the hazards can be sorted by their composite score. The hazards with a higher score represent a higher risk to the jurisdiction. At first glance, the top third can be taken as the first priority group, the following third as the second priority group, and the remaining third as the third priority group. Adjustments can be made to this preliminary ranking by the planning team.

Since the last plan update was approved by the jurisdictions in 2018, there have been five disaster declarations within this plan's jurisdictions. One of Guthrie County's disaster declarations (DR-4642) was a result of Severe Storms, Straight-line Winds and Tornadoes that affected Guthrie County on December 15, 2021. Iowa disaster declaration DR-4421-IA affected both Adair and Guthrie Counties. This declaration was a result of severe storms and flooding beginning on March 12, 2019 and continuing. Due to storms that happened on August 10, 2020, disaster declaration (DR-4557-IA) was declared with both Adair and Guthrie Counties being affected. For the COVID-19 Pandemic, DR-4483-IA and EM-3480-IA were declared. Declaration DR-4483-IA included the entire state of Iowa with the incident period being March 17, 2020 to May 11, 2023. Declaration EM-3480-IA also included the entire state of Iowa with the incident period being January 20, 2020 to May 11, 2023. More information about these declarations can be found in the applicable hazard section later in this chapter.

**Table 3.1: State of Iowa Hazards**

<b>Natural</b>	<b>Non-Natural</b>
Drought	Animal/Crop/Plant Disease
Tornadoes and other High Wind Events (including derechos)	Pandemic Human Disease
Flooding - River	Hazardous Materials
Flooding - Flash	Infrastructure Failure
Severe Winter Storms	Radiological Incident
Hail and Lightning Storms	Terrorism
Excessive Heat	Transportation Incident
Dam and Levee Failure	
Landslides	
Earthquakes	
Wildfire, including Grass Fire	
Sinkholes	
Expansive Soils	

# Hazard Profiles

*Section 201.6 (c)(2)(i): [The risk assessment shall include a] description of the type ... of all natural hazards that can affect the jurisdiction.*

This plan's risk assessment was completed on a planning area wide basis, rather than analyzing each jurisdiction. Unique conditions within participating jurisdictions are noted in each hazard profile. School districts worked with their respective communities in determining the risk analysis scores, which gives them the same score as the community in which the district's assets are located.

The hazard analysis identified potential hazards that could affect Adair County or Guthrie County for the purpose of mitigation planning. It is important to note that the focus of mitigation is on reducing long-term risks of damage or threats to public health and safety caused by hazards and their effects.

To identify the hazards that threaten the planning area, the Hazard Mitigation Committee reviewed hazard data from the National Climatic Data Center among other sources, and discussed the impacts of each hazard required by FEMA, and natural and human-caused hazards that were included in the State of Iowa Hazard Mitigation Plan. Hazards that the committee determined could affect Adair County or Guthrie County are shown in table 3.6.

**Table 3.2: Hazards Affecting Adair and Guthrie Counties**

Natural Hazards		Combination Hazards
Animal/Plant/Crop Disease	Grass/Wild Land Fire	HAZMAT Incident
Drought	Human Disease	Infrastructure Failure
Earthquake	River Flooding	Levee/Dam Failure
Expansive Soils	Severe Winter Storm	Radiological
Extreme Heat	Thunderstorm/Lightning/Hail	Terrorism
Flash Flood	Tornado/Windstorm	Transportation Incident

Not all of the hazards were determine to affect Adair County or Guthrie County. The hazard shown in table 3.7 was eliminated.

**Table 3.3: Hazards Not Affecting Adair and Guthrie Counties**

Hazard	Reason for Omission
Sinkholes	There is no history of sinkholes in the counties. Source: IADNR, Iowa Geological Survey



# Natural Hazards

## *Animal/Plant/Crop Disease*

An outbreak of disease that can be transmitted from animal to animal or plant to plant represents an animal/plant/crop disease. A disease outbreak will likely have economic implications, cause crop production losses, and possibly have environmental damages.

A plant disease is any abnormal condition that alters the appearance or function of a plant. It is a physiological process that affects some or all plant functions and may reduce the quality and/or quantity of the harvested product.

Fungi are the largest and perhaps most well-known group of plant pathogens. The vast majority of fungi do not cause disease. However, numerous fungi can cause plant disease, and a relatively small number of them cause disease in humans and livestock.

Bacteria are perhaps more familiar as the cause of human and animal diseases, such as tuberculosis and pneumonia. Nonetheless, some bacteria can also be destructive plant pathogens. Like bacteria, viruses are probably most familiar as the cause of human and animal diseases, such as influenza, polio, rabies, smallpox, and warts. Viruses, however, also cause several plant diseases.

Nematodes are microscopic, non-segmented, round, slender worms. Several thousand species of nematodes are found in soil, fresh and salt water, animals, and within or on plants throughout the world. Some nematodes are parasites on animals, plants, insects or fungi (Soybean Diseases-ISU Extension Office).

Table 3.10 displays some common plant and crop diseases found in Iowa. The animal diseases are either found in Iowa or could potentially be found in Iowa.

**Table 3.5: Animal, Plant, and Crop Diseases**

<b>Animal</b>	<b>Plant</b>	<b>Crop</b>	
		<b>Corn</b>	<b>Soybean</b>
Avian Influenza	<b>Trees</b>		
BSE "mad cow"	Anthraxnose	Anthraxnose Leaf Blight	Anthraxnose Stem Blight
Brucellosis	Bur Oak Blight	Common Rust	Asian Soybean Rust
Chronic Wasting Disease	Cankers	Common Smut	Bacterial Blight
Epizootic Hemorrhagic Disease	Dutch Elm Disease	Ear Rot	Bacterial Pustule
Exotic Newcastle Disease	Emerald Ash Borer	Eyespot	Bean Pod Mottle
Foot and Mouth Disease	Leaf Spot	Gray Leaf Spot	Brown Spot
Johne's Disease	Oak Wilt	Nematodes	Cercospora Leaf Blight

<b>Animal</b>	<b>Plant</b>	<b>Crop</b>	
Pseudorabies	<b>Trees</b>	<b>Corn</b>	<b>Soybean</b>
Rabies	Pine Wilt	Northern Leaf Blight	Downy Mildew
Scrapie	Thousand Cankers Disease	Northern Leaf Spot	Frogeye Leaf Spot
Tuberculosis	Verticillium Wilt	Southern Rust	Root Rot
West Nile Virus	<b>Ornamental (Garden)</b>	Salk Rot	Soybean Cyst Nematode
	Anthrachnose	Stewart's (Wilt) Disease	Soybean Mosaic Virus (SMV)
	Black Spot	<b>Alfalfa</b>	Stem Rot
	Crown Gall	Bacterial Wilt	Sudden Death Syndrome (SDS)
	Crown Rot	Crow Rot	
	Gray Mold	Fusarium Wilt	
	Leaf Spot	Nematodes	
	Nematodes	Root Rot	
	Powdery Mildew	Verticillium Wilt	
	Rose Mosaic		
	Tomato Spotted Wilt Virus		
	Verticillium Wilt		

## *Avian Influenza*

Found amongst poultry, most Avian Influenza strains are classified as low pathogenicity and cause few clinical signs in infected birds. In contrast, high pathogenicity is a severe and extremely contagious strain that leads to death. This disease is of concern in Iowa because the state leads the nation in egg production. Production operations randomly test for the disease and will notify the Iowa Department of Agriculture and Land Stewardship (IDALS) if there is a sign of the disease.

## *Emerald Ash Borer*

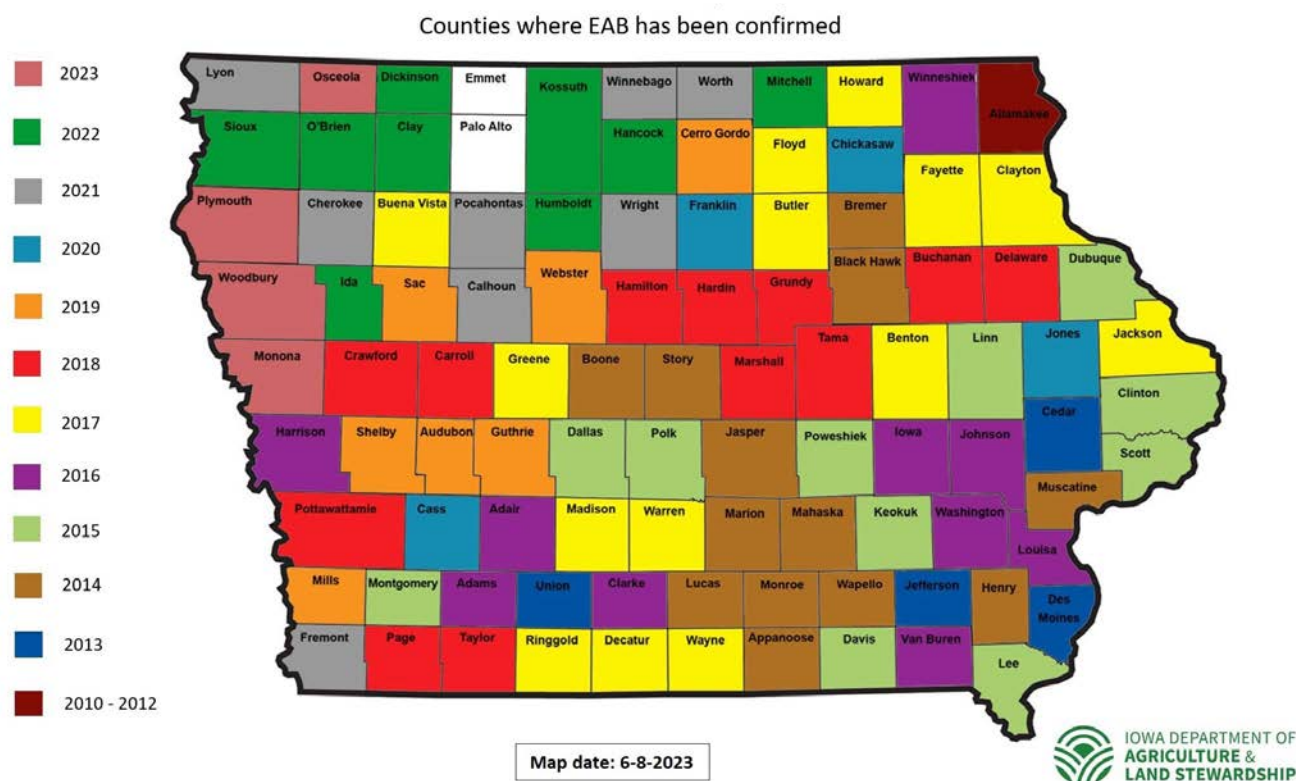
Emerald Ash Borer (EAB) is a small green invasive wood-boring beetle that attacks and kills ash trees. The adults live on the outside of ash trees, feeding on the leaves during the summer. The larvae feed on the living plant tissue by tunneling underneath the bark of the trees, which disrupts the vascular flow and ultimately leads to the tree's death. EAB attacks native ash trees of any size, age, or stage of health and trees that have been attacked can die within two years.

Much of Iowa's forestland is densely populated with ash trees and Iowa's community street trees are heavily planted with ash cultivars. Iowa has an estimated 50 million rural ash trees and 3 million urban ash trees (USFS, 2008). EAB was first introduced to Iowa in May of 2010, when they were found on an island in the Mississippi River in Allamakee County. By 2012, EABs were caught in separate locations in Allamakee County, confirming that they had moved inland. EAB has since spread to 97 Iowa counties and have killed millions of ash trees.

According to the Iowa DNR the Emerald Ash Borer was discovered in Adair County in 2016 and in Guthrie County in 2019. Map 3.1 shows when the Emerald Ash Borer was discovered in the 97 affected Iowa counties.



## Map 3.1: Iowa Emerald Ash Borer Detection



### *Rabies*

Rabies is a deadly viral disease found in mammals that infects the central nervous system, ultimately causing disease in the brain and death. It is most often transmitted by animal bites, specifically in bats, skunks, coyotes, foxes, and raccoons. The rabies infection is nearly always fatal unless prompt treatment is administered before symptoms begin. In Iowa, the two most common strains are found in bats and skunks, and many different species can be infected with them. In 2012, thirty-one cases of animal rabies were reported in Iowa, consisting of seventeen bats, nine skunks, three bovine, and one feline. It is important to note that data is greatly influenced by the number of animals tested (Iowa Department of Public Health).

### *Soybean Cyst Nematode (SCN)*

The SCN is the most important pathogen of soybean in Iowa. Damage may not be obvious; however, yield losses up to 40% on susceptible varieties are possible. Infected plants usually occur in patches within a field. SCN survives in the soil as eggs within dead females called cysts. These eggs can survive several years in the absence of a soybean crop. The second stage juvenile hatches from the eggs and infects soybean plants. Unfortunately, conditions that favor soybean growth are also favorable for SCN development. The number of SCN in a field can be greatly reduced through proper management, but it is impossible to eliminate SCN from a field once it is established (ISU Extension).

### *Stewart's (Wilt) Disease*

Caused by bacteria, this disease is generally more destructive on sweet corn than on popcorn or dent corn. It is unique because its spread depends almost completely on an insect: the corn flea beetle. High levels of ammonium nitrogen and phosphorus tend to increase susceptibility, while high levels of calcium and potassium tend to decrease susceptibility. High temperatures also enhance development of the disease (ISU Extension).

In Adair County, 92% of the land is dedicated to agricultural uses. In Guthrie County, 88% of the land is dedicated to agricultural uses. With such large percentages of land dedicated to agricultural uses including animal and crop uses, it is anticipated that animal/plant/crop diseases will impact at least a portion of the county annually. On average, these diseases do not cause widespread damage, but can last weeks to months. There have been some instances where an entire species of plant is effected and widespread damage is caused, i.e. Emerald Ash Borer. Climate changes including the increased average atmospheric temperature and increase in the moisture holding capacity of the air, it is anticipated that there will be increased pressure on agriculture from diseases and pests. As plant hardiness zones shift northward due to the warming climate, invasive plant and animal species may become more common. (Iowa Hazard Mitigation Plan, 2023)

While each instance of animal/plant/crop disease is different, there are some measures that may be taken to mitigate the spread of diseases.

- Not moving firewood from county to county
- Encourage reporting of potential disease outbreaks
- Encourage the use of preventative health care for animals
- Routine cleaning and disinfection
- Creating plans for preventing infections disease
- Creating plans for responding to infectious diseases
- Increased training for veterinarians and farmers about diseases and their presentations

## *Drought*

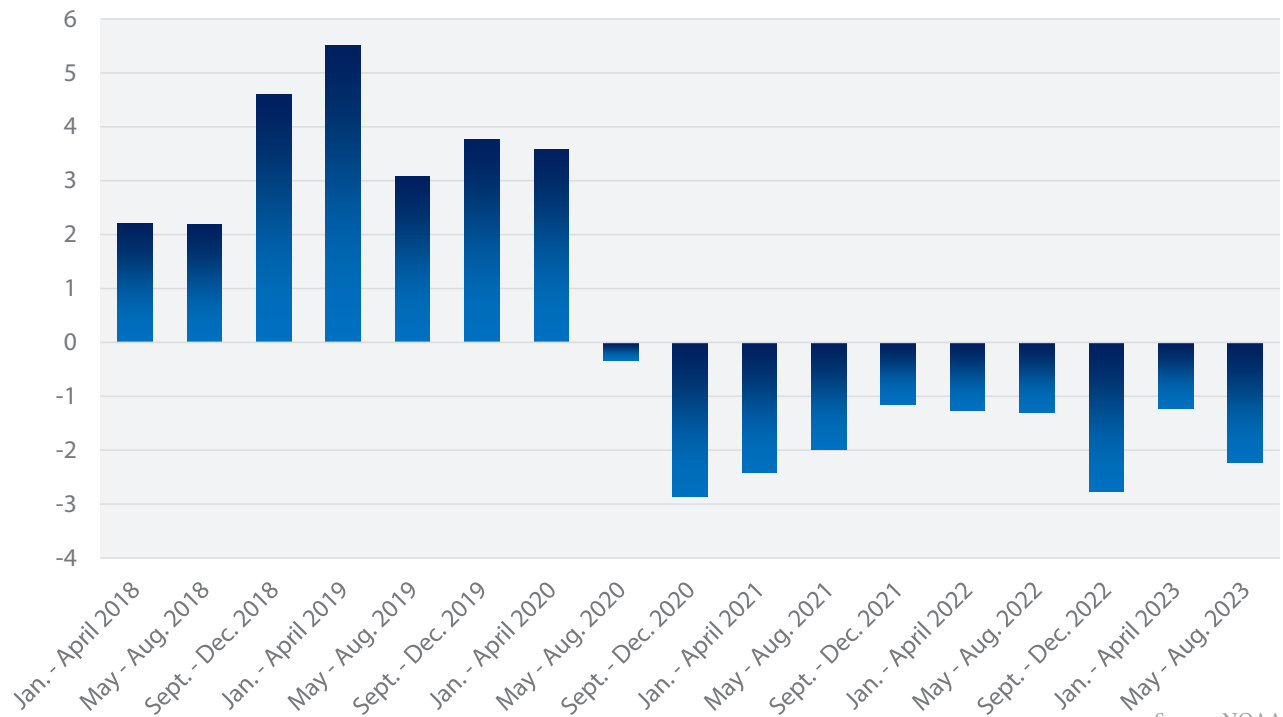
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Droughts are defined as periods of prolonged dry weather that lasts long enough to cause serious problems such as crop damage and/or water supply shortages. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size of the affected area. The four ways droughts can be defined are meteorological, hydrological, agricultural, and socioeconomic. A meteorological drought is a drought that refers to the precipitation deficiency, hydrological droughts pertain to the declining surface and groundwater supplies, agricultural droughts refer to soil moisture deficiencies, and socioeconomic droughts refer to physical water shortages affecting people.

In Iowa, the highest occurrence of drought conditions are associated with meteorological and agricultural as a result of either a decline in precipitation or low soil moisture. Droughts can have widespread adverse economic, environmental, and social impacts as rivers, reservoirs, groundwater levels, and soil moisture decrease. Droughts can be spotty or widespread and last from a few weeks to a number of years. During prolonged droughts, communities can notice serious impact on their water supply and economy, and increased demand for water and electricity may result in shortages of resources. If agricultural production is damaged or destroyed by a loss of crops or livestock, food shortages can occur. While droughts are generally associated with extreme heat, droughts can and do happen during cooler months.

The Palmer Drought Severity Index (PDSI) was developed by Wayne Palmer in the 1960s and uses temperature and rainfall information in a formula to determine dryness. The PDSI is most effective in determining long-term drought (several months) and is not as efficient with short-term forecasts. An advantage of the Palmer Index is that it is set to local climate, so it can be applied to any part of the country to demonstrate relative drought or rainfall conditions. The Palmer Index uses 0 as normal, with drought conditions shown as negative numbers and excess rainfall shown as positive numbers. Figure 3.1 displays the Palmer Drought Severity Index for the State of Iowa from 2018-2023. The Palmer Drought Severity Index has seven categories of wet and dry conditions that are displayed in table 3.11.

**Figure 3.1: Palmer Drought Severity Index, 2018-2023**



Source: NOAA

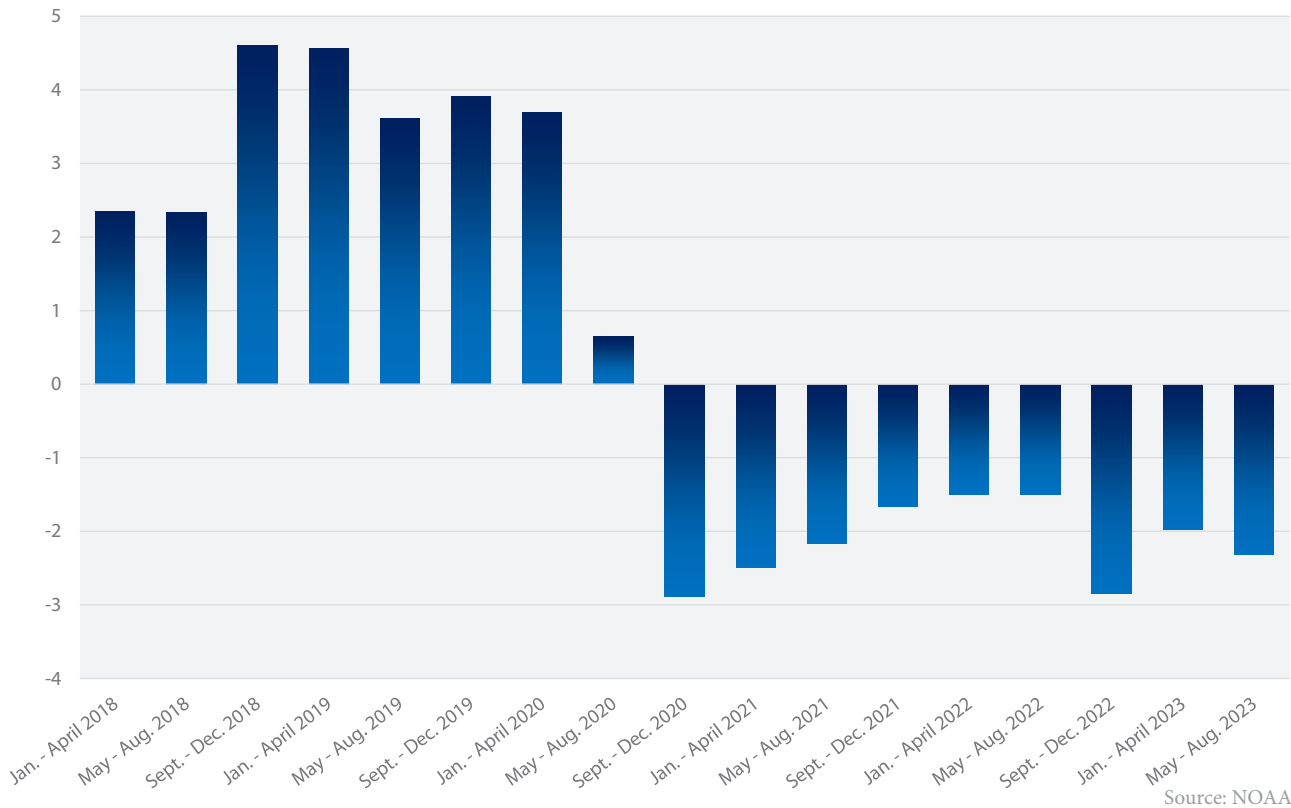
**Table 3.6: Palmer Drought Severity Index**

Numerical Value	Condition
-4.0 or less	Extreme Drought
-3.0 to -3.9	Severe Drought
-2.0 to -2.9	Moderate Drought
-1.9 to 1.9	Near Normal
2.0 to 2.9	Unusual Wet Spell
3.0 to 3.9	Very Wet Spell
4.0 or more	Extremely Wet

Source: NOAA

The Palmer Hydrological Drought Index (PDHI) shows hydrological drought and wet conditions, which more accurately reflect groundwater conditions, reservoir levels, etc. The hydrological impacts of a drought take longer to develop and longer to recover, therefore PDHI responds more slowly to changing conditions than PDSI. Figure 3.2 shows the Palmer Hydrological Drought Index for Iowa from 2018-2023

**Figure 3.2: Palmer Hydrological Drought Index, 2018-2023**



Since 2018, Adair County has experienced ten droughts. The National Center for Environmental Information did not report any drought damage due to the droughts. These ten instances of drought occurred from July 2020 to August 2022. There were 246 days with drought conditions for an average drought of 25 days per instance.

Guthrie County has experienced ten droughts since 2018. Droughts, no matter how brief, have an impact on the crop production. The National Center for Environmental Information did not report any drought damage due to the droughts. These ten instances of drought were reported from July 2020 to July 2021 with 235 total days recording drought conditions. The droughts in Guthrie County lasted an average of 24 days, according to the National Weather Service.

When droughts occur, they tend to affect more than just one county or state. As the agriculture sector is reliant on precipitation and when droughts occur it tends to be the most impacted sector. During water shortages, water dependent manufacturers are also affected. Drinking water is drawn from surface and groundwater sources, so prolonged droughts may affect all citizens if there were to be a drop in the stream flow coupled with the drop in the water table.

Over the past century, studies have been conducted that show meteorological droughts are never the result of one single cause. Scientists are not able to predict a drought more than a month or so in advance, as predicting droughts depends on forecasting precipitation and temperature. Anomalies of precipitation and temperature may last weeks, to months, to even decades and is dependent on several unstable weather systems at the global level. Drought prediction improvements differ by region, season, and climate. The U.S. Drought Monitor map provides a weekly summary of drought conditions across the United States and combines a variety of data-based drought indices, indicators and local expert input. This map is the most widely used gauge of drought conditions throughout the country.

Droughts do not pose as much threat to physical structures as they do to humans and the environment. During the past five years, both counties have experienced ten drought events, but with none causing property or crop damage. These events also caused no deaths or injuries. With ten drought events happening within each of the counties during the past five years, it is anticipated that the counties will continue to see period of drought annually. The past five years saw two drought events each year within each county. The previous reporting period saw four total events between the two counties. While the frequency of these events has increased, the amount of damage caused decreased drastically from the previous planning period when there was a total of \$42 million of crop damage reported.

While there are no mitigation actions jurisdictions can take to stop drought instances, there are actions that can be undertaken to alleviate the effects of them.

- Create a response plan
- Have a plan in place for reduction of water usage
- Educate the public on the effects of a drought and how they can do their part
- Encourage communities to create additional redundancy in their water systems to reduce loss

## *Earthquake*

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An earthquake is any shaking or vibration of the earth caused by the sudden release of energy that may impose a direct threat on life and property. It is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. This shaking can: cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods, and fires. (Iowa Hazard Mitigation Plan 2023).

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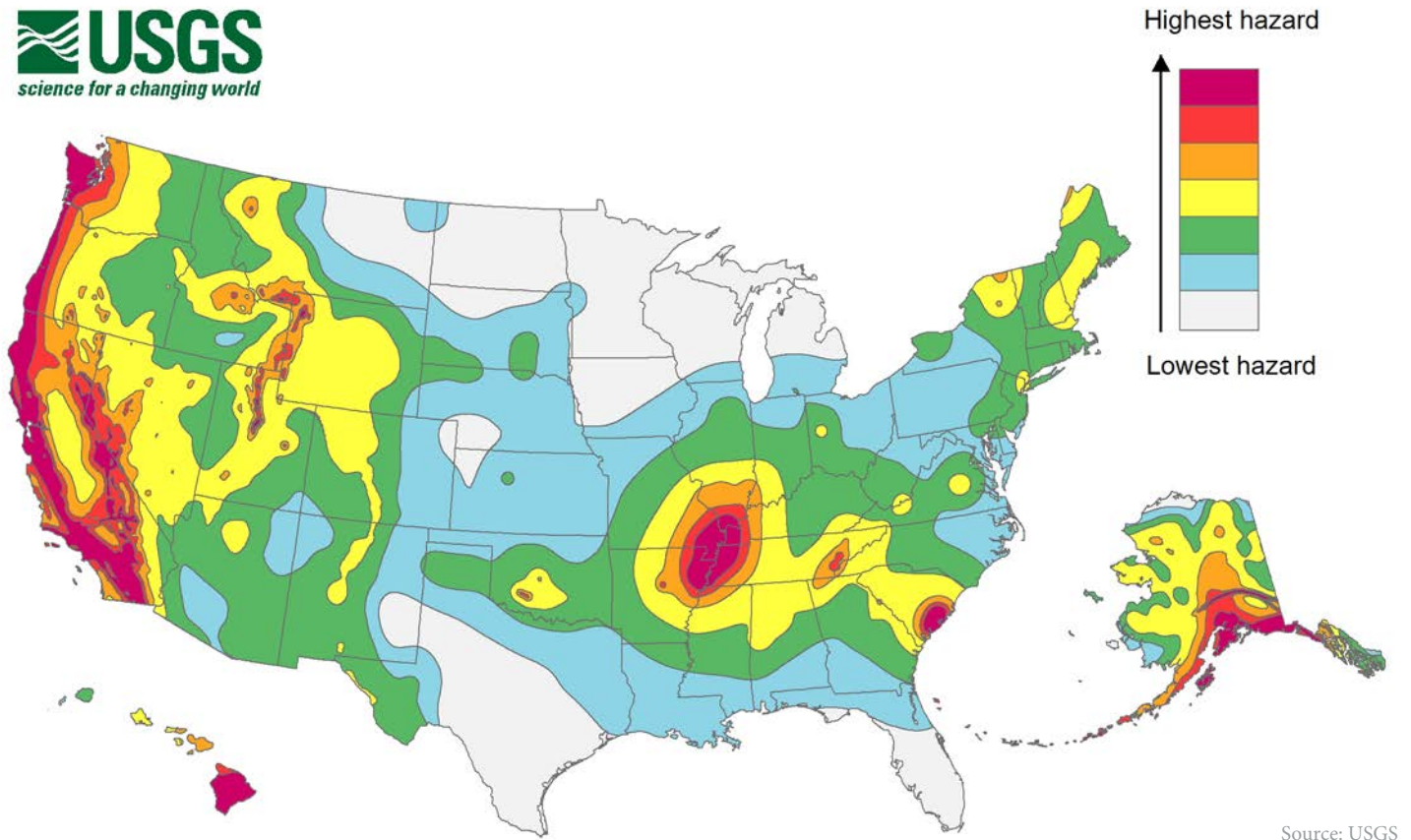
Adair and Guthrie Counties are located in the lowest risk Seismic Zone. Previously this zone was categorized as Seismic Zone 1, but the USGS map shown in Figure 3.3 recognizes this area as the lowest hazard zone. Most structures in Iowa are not built to earthquake standards, but because of the relatively low magnitude of a possible quake, property damage would likely be minor foundational damage. The most vulnerable structures are houses built on poorly consolidated substrate, especially floodplain materials.

Iowa as a whole has experienced the effects of only a few earthquakes in the past 175 years. The epicenters of thirteen earthquakes have been located in the state with the majority along the Mississippi River. While more than twenty earthquakes have occurred in or around Iowa over the past 175 years, they have not seriously impacted the state.

There is a low probability of an earthquake causing damage in Iowa, but that does not mean that Iowans could not feel the effects of an earthquake. Iowans may feel earthquake shaking on occasion, but it may feel more like the vibrations similar to a passing large truck. Southeast Iowa has a greater risk of damage than the other portions of the state.



**Figure 3.3: USGS 2018 Long-Term National Seismic Hazard Map**



Both Adair and Guthrie Counties are located in lowest earthquake hazard designation areas. This designation comes from the United States Geological Survey who ranks areas based on the past faults and earthquakes, behavior of seismic waves as they travel through different parts of the U.S. crust, and the near-surface site conditions at a specific location of interest (USGS). Adair and Guthrie Counties have not experienced an earthquake in the within the recorded past, and is unlikely to experience an earthquake in the future. Neither Adair or Guthrie Counties rank within the top 10 most vulnerable counties in Iowa to earthquakes. Iowa as a whole anticipates \$1,024,407 in expected annual loss due to earthquakes with the top ten counties anticipating \$570,494 of that amount. The remaining 88 counties are anticipated to share the remaining \$453,913 in expected annual loss (average of \$5,158 per county). This information, coupled with the location of the planning area have assisted in the determination that this particular hazard is unlikely to effect the planning area. If an earthquake were to occur, it is more likely that the planning area would feel minor aftershocks and suffer extremely minimal damage.

## *Expansive Soils*

Soils and soft rock that tend to swell or shrink excessively due to changes in moisture content are commonly known as expansive soils. The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. The hazard develops gradually and seldom present a threat to life. The hazard occurs in many parts of the southern, central, and western United States. The availability of data on expansive soils varies greatly. For large areas of the United States, little information is reported other than field observations of the physical characteristics of clay.

The most extensive damage from expansive soils happens to highways and streets. Houses and one-story commercial buildings are most apt to be damaged by the expansion of swelling than are multi-story buildings, which usually are heavy enough to counter swelling pressures. The warning time for expansive soils is consistent with other geological hazards that occur slowly over time.

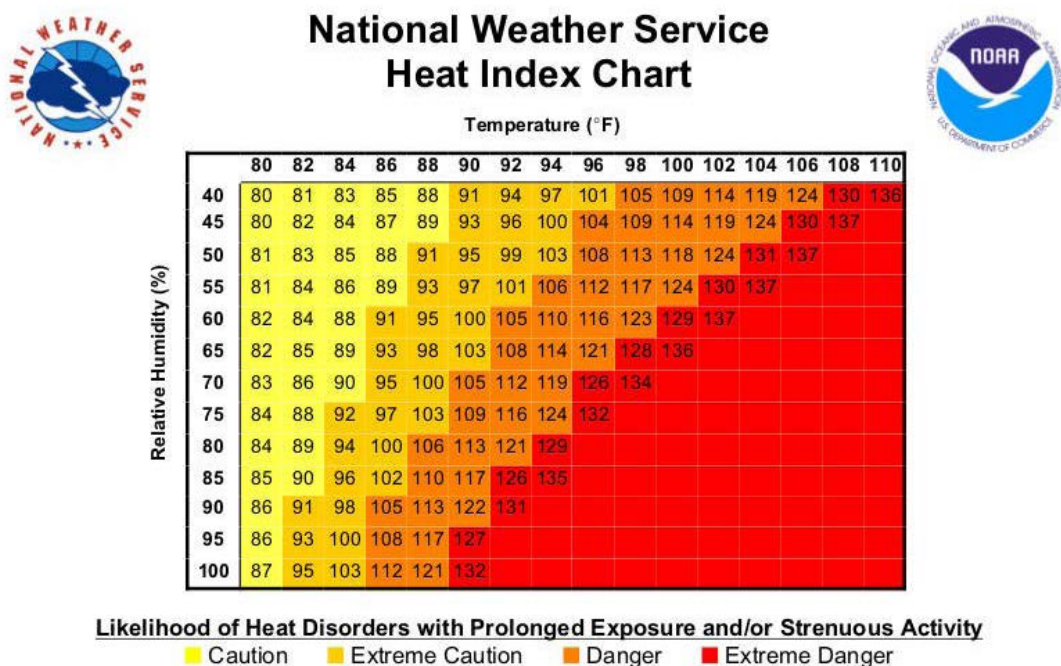
There have been no past instances of disasters associated specifically to expansive soils in Iowa (State of Iowa Hazard Mitigation Plan, 2023). Also, there is no comprehensive data available to compare losses throughout the region and State of Iowa. With no past instances of expansive soil damage or events within the planning area, including extensive mitigation measures for this hazard is unnecessary. One potential mitigation measure could be to test and analyze soils prior to construction to ensure proper codes are met.

## Extreme Heat

Extreme heat is the number one weather-related killer in the United States, and has the highest 30-year average compared to other weather events. The 30-year average for heat-related deaths is 130 per year, 49 more than flooding, which has the second highest average. Extreme heat conditions are defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. This includes temperatures (including heat index) in excess of 100 degrees Fahrenheit or at least three consecutive days of 90 plus degree weather. Heat advisories are issued at 105 degrees and warnings are issued at 115 degrees. A heat index is a temperature that tells how hot it really feels when relative humidity is added to the actual air temperature. When exposed to full sunshine, the heat index can be increased by 15 degrees. Figure 3.3 displays heat index and likelihood of experiencing a heat disorder with rising temperatures and humidity.

The body’s ability to cool itself is affected during extreme heat. When the body heats too rapidly, to cool itself properly or when too much fluid or salt is lost through dehydration or perspiration, the body temperature rises and heat-related illnesses may develop. These illnesses can include heat cramps, sunstroke, heat exhaustion, and heat stroke. As heat stroke can be deadly, immediate medical attention is necessary.

Figure 3.4: National Weather Service Heat Index Chart



Source: National Weather Service

Since 2018, Adair County experienced one extreme heat event. The event occurred on July 17, 2019 and lasted for four days. Heat index values during this time were consistently in the 105 to 115 degree range during the daytime with little relief during the nighttime when temperatures remained in the 70 to 80 degree range.

From July 17, 2019 to July 20, 2019 Guthrie County experienced their only extreme heat event since 2018. The event had heat index values consistently in the 105 to 115 degree range during the daytime and 70 to 80 degree range during the night. The event caused no reported property or crop damage.

Many factors can determine how extreme heat affects all types of life. Older adults, young children, people with disabilities, and those who work outdoors are more susceptible to illnesses caused by heat. Households that do not have air-conditioning are also more at risk as they cannot escape the heat. Livestock and other animals are also adversely affected by extreme heat and extreme heat at the wrong time can inhibit crop production. Roadways and railroad tracks can also be distorted or even fail during extreme heat.

Adair and Guthrie Counties are both anticipated to experience extreme heat events within the planning period. Extreme heat events can be predicted a few days in advance. When the heat index is expected to exceed 105 degrees for at least two consecutive days, the National Weather Service initiates alert procedures. Since extreme heat events have to have at least three days of 90 plus degree weather, these events are expected to last a minimum of three days, but no more than seven days. The extreme events that Adair and Guthrie Counties have experienced within the recent past have caused no property or crop damage and have caused no deaths. With proper precautions taken, there should be little to no harm done to humans or livestock.

While mitigation actions for jurisdictions are unable to stop excessive heat events, there are actions that can be taken to protect the populations from the effects of excessive heat.

- Create a response plan
- Designate cooling shelters and equip shelters with necessary items
- Suspend utility shutoffs during excessive heat events
- Publicize information related to personal safety during heat events

## *Flash Flood*

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Flash flooding is one of the most dangerous weather events because there is little to no warning time. Flash floods occur when the water along a stream or low-lying area rises rapidly. These events happen within six hours of a significant rainfall caused by heavy rainfall in a short amount of time from intense storms, slow-moving storms, or storms repeatedly moving over the same area. Other flash floods can be caused by dam or levee failures, or sudden releases of water held by an ice jam. Some flash floods are strong enough to roll boulders, tear out trees, destroy buildings or bridges, and scour out new channels.

Areas with dense populations are at a high risk of flash floods, as the construction of buildings, highways, driveways, and parking lots increase runoff. Streams through cities are sometimes routed underground into storm drains and during heavy rains, the storm drains can be overwhelmed and flood roads and buildings, particularly low spots such as underpasses, underground parking garages, and basements. Areas near rivers are at risk from flash floods. Levees are often built along rivers and used to prevent high water from flooding bordering land.

Nearly half of all flash flood deaths occur as vehicles are swept downstream after the driver drives onto the flooded highway. Six inches of fast-moving water can knock a person off their feet; water only twenty-four inches (two feet) deep can carry away most vehicles. The National Weather Service has the "Turn Around Don't Drown" program to educate the public about the dangers of floods and fast moving waters.

Since 2018, Adair County has experienced one flash floods. In May 2019 a flash flood occurred approximately 4 miles southeast of Canby, an unincorporated community within the county. This flash flood caused \$50,000 in property damage in Adair County.

Since 2018, Guthrie County has experienced one flash flood. This is remarkably lower than the fifteen reported from 2010 to 2018. The flash flood occurred approximately one mile east of Jamaica when the area experienced heavy rainfall. This event caused no reported damage, but did lead to road closures in Jamaica and Bagley for a period.

Land that is located within a floodplain or in low-lying areas are at the most risk of experiencing flash floods. Properties that have aging sewer systems can also be at risks due to the design of the drains. Older systems were designed for what was necessary at the time, and current capacities could be significantly larger. When possible, the National Weather Service forecasts flash flood watches 12-36 hours in advance when conditions look favorable for a flash flood. Although a watch is issued 12-36 hour in advance, warnings, on average, are issued thirty minutes to an hour before the flood occurs. These weather events start and end quickly. According to the NOAA Storm Weather Database, the flash floods in Adair and Guthrie Counties lasted for an average of 4.5 hours.

While there is a good deal of information pertaining to river flooding for the state, data for flash floods is not readily available. Flash floods occur with little to no warning, and with no data being usable to predict future instances, it is important that both Adair and Guthrie Counties are prepared for these events. Both counties have experienced flash floods within the last planning period, and even though there were no deaths caused by these events, flash floods are unpredictable, and the jurisdictions need to be prepared for all results of a flash flood event. These events that happened caused property damage and it is important that the jurisdictions are prepared to minimize the damage caused by these events by implementing mitigation items prior to their occurrences.

There are some mitigation actions that can be implemented to alleviate the effects of flash floods.

- Restore rivers and drainage districts to prevent flooding
- Encourage jurisdictions to participate in the NFIP or to continue their participation
- Encourage permeable pavement installation
- Educate homeowners about on-site stormwater management practices

## *Grass/Wild Land Fire*

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A grass/wildland fire is an uncontrolled fire that threatens life and property in either rural or wooded areas. When conditions are favorable, such as periods of drought when natural vegetation is drier, fires are more likely to occur.

Wildland fires are a serious threat to life and property in the United States. Fire seasons have become progressively worse over the past fifty years due to the combination of drought, warmer temperatures, high winds, and an excess of dried vegetation in forests and grasslands. As the wildland threat grows, so does the cost of fighting the fires. Although lightning is a common ignition source of wildland fires, nine out of ten fires are started directly or indirectly by people through debris burning, campfires, arson, discarded smoking products, sparks from equipment in operation, arced power lines, or other means.

Weather is the most variable of the factors that affect fire behavior. The combination of wind, temperature, and humidity affects how fast wildland fires can spread. Strong winds can push the flames toward new fuel sources or pick up and transfer burning embers, sparks, and other materials that are capable of starting "spot

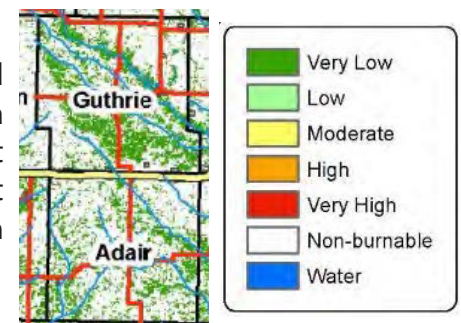


fires". Temperature affects the spread of wildland fires because the temperature of the fuel affects how quickly or slowly they will reach their ignition point and burn. Humidity dampens the fuel, slowing the spread of flames.

Grass and Wild Land fires are the most common types of fires that occur in Adair and Guthrie Counties, and all jurisdictions can be affected by this hazard. Most jurisdictions have been affected by a grass or wild land fire in the past, but these types of fires tend to occur in the rural parts of the Counties most often. Consistent and accurate data is not readily available for Adair and Guthrie Counties, but in total, the area fire departments report multiple incidents per year.

According to the National Interagency Fire Center (NIFC), the United States saw 68,988 fires resulting in 7,577,183 acres burned in 2022. Iowa reported 7 wildland fires resulting in 288 acres burned in 2022. The five year total for the State of Iowa (2018-2022) was 859 wildfires resulting in 20,440 acres burned. According to the NIFC, no fire in Iowa has been reported as a historically significant wildfire or a large wildfire (more than 100,000 acres). The NIFC puts out a monthly National Significant Wildland Fire Potential Outlook, warning areas where wildland fires have the potential to breakout.

**Figure 3.5: Wildfire Hazard Potential (2020)**



Most grass/wildland fires are contained to highway right-of-way and rail right-of-way ditches; however, high winds can turn a small fire into a multi-acre grass fire within a matter of minutes. The extent is dependent of weather conditions and topography. Grass/wildland fires occur without warning and can spread rapidly. The majority of Iowa wildfires are short in duration.

Grass and wildland fires are unpredictable and both Adair and Guthrie Counties are susceptible to these hazard events. While both counties and their jurisdictions are at risk of grass/wildland fires, recent data has shown that the risk to humans is reduced. These fires tend to primarily damage crops and other property (including farm machinery). Fires are not uncommon in Iowa, therefore it is important that the jurisdictions are informed on the mitigation actions that can reduce the impact these fires have on the environment and population.

Mitigation actions to minimize the effect of grass and wildland fires can include:

- Proper training for first responders
- Ensure first responders have adequate equipment to fight fires
- Education of citizens on preparedness and reaction prior to and during a wildfire

## *Human Disease*

This hazard includes a medical, health, or sanitation threat to the general public, such as a contamination, epidemics, plagues, insect infestations, and pandemics. Public health action to control infectious disease in the 21st century is based on the 19th century discovery of microorganisms as the cause of many serious diseases (e.g., cholera and Tuberculosis). Disease control resulted from improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs. Scientific and technologic advances played a major role in each of these areas and are the foundation for today's disease surveillance and control systems. Scientific findings have contributed to a new understanding of the evolving relationship between humans and microbes (Iowa Hazard Mitigation Plan 2023).



Prior to 2020, this hazard was not at the forefront of the public view. That is until the COVID-19 pandemic hit worldwide. This pandemic caused major disruptions within the healthcare fields, society, and economies at all levels. To this day, the effects that the COVID-19 pandemic had on the world are still being felt.

The Iowa Department of Public Health tracks epidemiological statistics in Iowa. Public health agencies work to protect Iowans from infectious diseases and preserve the health and safety of Iowans through disease surveillance, investigation of suspect outbreaks, education, and consultation to county, local, and health agencies. As of 2013, 67 infectious diseases were designated as notifiable at the national level. A notifiable disease is one for which regular, frequent, and time information regarding individual cases is considered necessary for the prevention and control of the disease.

A pandemic human disease is defined as a disease that has spread around the world to many people. The word “pandemic” means occurring over a wide geographic area and affecting an exceptionally high proportion of the population (Merriam-Webster Dictionary). Some examples of pandemic diseases, past and present, include Tuberculosis, Polio, HIV/AIDS, SARS, and Influenza. Response and recovery to a pandemic disease will likely be lengthy.

The COVID-19 pandemic started in China in 2019 and by early 2020 the United States declared an emergency. This pandemic led to quarantine and social-distancing. Individualized responses happened on a jurisdiction by jurisdiction case with some jurisdictions implementing the public to “stay at home,” some jurisdictions restricting large gatherings, closing schools and daycares, closing local bars and restaurants, requiring masks and some even required vaccines. The United States officially declared the end of the pandemic incident period on May 11, 2023. The COVID-19 pandemic triggered multiple declarations within the state and nation. The two declarations in Iowa were EM-3480-IA and DR-4483-IA. Under DR-4483-IA both individuals and public assistance was available for the public to utilize. This DR designation allowed \$30,857,350.22 of Individual and Household Program dollars to be approved, \$278,916,181.53 of Public Assistance grant Dollars to be obligated and \$11,864,979.19 obligated to the Hazard Mitigation Grant Program. The EM-3480-IA declaration supplemented the state and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.

In Adair County, from the onset of the pandemic to October 2, 2023, there were 1,794 cases of COVID-19 reported with 52 deaths being related to the pandemic. In Guthrie County during the same time period, there were 2,745 cases of COVID-19 reported with 48 deaths being related to the pandemic.

There have been two cases of measles in Iowa in 2019, since then, however, there have been no additional cases reported. Prior to 2019, there were no cases reported since 2011. Since 2018, there have been 37 cases of mumps in Iowa. Prior to that, a statewide Mumps outbreak began in the summer of 2015 and lasted throughout 2017, causing over 1,200 confirmed cases of the disease (Iowa Department of Public Health).

The COVID-19 pandemic brought human disease back to the forefront of the public eye and reminded Iowans that they are not exempt from disease outbreaks. Adair and Guthrie Counties both experienced the effects of the pandemic and forced jurisdictions to react and be proactive to the ever-changing guidelines. While another pandemic of the COVID-19 magnitude may not happen in the near future, there are other diseases that effect the counties on a regular basis and lessons learned from the pandemic may be beneficial when looking to mitigate the effects of all human disease. Some mitigation actions that jurisdictions can consider include:

- Create plans to disseminate accurate information on a regular basis
- Create plans to mitigate the spread of disease (quarantine, improved personal hygiene)
- Work with the public to ensure that the jurisdiction still can provide necessary services

# River Flooding

A river flood occurs when water levels rise due to heavy rains, persistent thunderstorms over the same area for extended periods of time, snow melt, ice jams, or dam/levee breakage. Other factors that contribute to flooding include topography, soil conditions, and ground cover. Flooding may impact an area with only a few inches of water or cover entire houses, it could last a couple days or carry on for several weeks. As much as 90% of the damage related to all natural disasters (excluding droughts) is caused by flooding and associated debris flow. On average, flooding causes more than \$2 billion in property damage each year.

Flooding is the most common of all natural hazards- it occurs in every U.S. state and territory and is a threat experienced anywhere in the world that receives rain. From 1983-2012, floods in the United States have killed more people than tornadoes, hurricanes, or lightning. Since 1900, flooding has caused more than 10,000 deaths, and though numbers can fluctuate from year to year, the thirty-year national average is 89. It is believed that many people underestimate the power and force of water; six inches of fast moving water can knock a person off their feet, twenty-four inches can carry away most automobiles.

Between 2018 and 2023, Adair County experienced only one reported flood on May 28, 2019. It happened in Canby, an unincorporated hamlet located 8.5 north of Fontanelle, lasted ten hours, and resulted in \$50,000 of property damage and \$50,000 of crop damage.

Between 2018 and 2023, Guthrie County experienced one reported flood. The flood that occurred three miles southwest of Bagley on June 5, 2022 and lasted one day. The flood caused no reported property or crop damage.

The National Flood Insurance Program (NFIP) was created by Congress in 1968 to mitigate future flood losses. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs caused by floods. The flood insurance is offered to homeowners, renters, and business owners if their community participates in the NFIP. Participating communities must agree to adopt and enforce ordinances to reduce the risk of flooding. Guthrie County, Bagley, Bayard, Casey, Guthrie Center, Jamaica, Menlo, Panora, Stuart, Yale, Adair, Bridgewater, and Fontanelle participate in the NFIP. Each participating jurisdiction's flood maps can be found in the appendix of this document.

The National Weather Service provides flood forecasts for the State of Iowa. Local National Weather Service forecast offices issue flood watches 12-36 hours in advance of a possible flood. Warnings are issued when river flooding is occurring or imminent.

The report Climate Change Impacts on Iowa 2010 ("Report") notes that there is a trend toward more frequent intense rainfall events. If this trend continues, flash flooding events and their associated impacts will likely occur more often in Iowa. As for riverine flooding, very heavy precipitation does not always result in flooding, but it can when the very heavy precipitation occurs frequently without enough time for the watershed to drain properly. The impact of these climate changes in Iowa may be impacting eastern Iowa more than the rest of the state. Both Adair and Guthrie Counties have portions of the county that are susceptible to river flooding. With each county experiencing one flood within the five years, this hazard requires attention from the county with that attention focused on the flood prone areas. Reducing the impacts of flooding can reduce the impacts on the population, crops, and property.

Mitigation actions to minimize the effect of river flooding can include:

- Implement the "watershed approach" for flood reduction when appropriate.
- Get all jurisdictions within the two counties to participate in NFIP

- Create plans which limit construction within floodplains
- Elevate or protect wastewater lift stations
- Put in impervious manholes, pumps, or backflow prevention, or similar small-scale flood protection projects
- Promote the implementation of green infrastructure
- Educate the public about flood preparation and response
- Reduce erosion and flooding through riverbank improvement projects

## Severe Winter Storms

Every year, winter weather kills hundreds of people in the United States, primarily from automobile accidents, overexertion, or exposure. Severe winter storm events can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold. They are most common from the months of October to April.

The various types of severe winter weather can cause considerable damage. Heavy snow can immobilize transportation systems, down trees and power lines, collapse buildings, and lead to the loss of livestock and wildlife. Loose snow begins to drift when wind speed reaches 9-10 mph under freezing conditions. The potential for drifting is substantially higher in open country than urban areas where buildings, trees, and other features obstruct the wind. Ice storms have resulted in fallen trees, broken tree limbs, downed power lines and utility poles, fallen communications towers, and impassable transportation routes. Severe ice storms have caused total electric power outages over large areas of Iowa and rendered assistance unavailable to those in need due to impassible roads. Extreme cold often accompanies a winter storm or is left in its wake. Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening. Table 3.20 displays the definitions for severe winter storms.

**Table 3.7: Severe Winter Storm Definitions**

<b>Blizzard</b>	Sustained or frequent winds of 35 mph or greater; falling and/or blowing snow that frequently reduces visibility to 1/4 of a mile or less; conditions are expected to last for a minimum of three hours
<b>Heavy Snow</b>	4" or more of snow in 12 hours or less, 6" or more of snow in 24 hours or less
<b>Ice Storm</b>	Damaging accumulations of more than 1/4" of ice are expected during freezing rain
<b>Sleet Storm</b>	Pellets of ice composed of frozen or mostly frozen raindrops; these pellets cause slippery surfaces. Heavy sleet is a relatively rare occurrence defined as an accumulation of sleet covering the ground to a depth of 1/2" or more
<b>Extreme Cold</b>	Temperatures at or below 0 degrees Fahrenheit and wind chill temperatures at -25 degrees Fahrenheit for at least three hours is considered extreme cold. Wind chill is not the actual temperature, but rather how wind and cold feel on exposed skin.

Between 2018 and 2023, Adair County experienced eighteen severe winter storm events: two blizzards, two heavy snows, three frost/freezes, five extreme cold/wind chill events, and six winter storm events, meaning that more than one significant hazard met or exceeded locally defined warning criteria. During the same time period, Guthrie County experienced fifteen severe winter storm events: one blizzard, two heavy snows, three frost/freezes, five extreme cold/wind chill events, and four winter storm events, meaning that more than one significant hazard met or exceeded locally defined warning criteria.

Bridges and overpasses are particularly dangerous because they freeze before other structures. This, along with heavy snow, can cause hazardous conditions that can slow or stop the flow of supplies as well as disrupt emergency and medical services.

Both Adair and Guthrie Counties experience several instances of severe winter storms each year. Some of these events cause reported damage, but the majority do not. The economic impact of winter weather each year is huge, with costs of snow removal, damage repairs, and loss of business in the millions. So while the severe winter storm events in Adair County and Guthrie County caused no reported damage, these hazard instances cost the local jurisdictions money to remove the snow and ice these hazard caused. Each jurisdiction spends numerous hours planning for snow removal and emergency service response during these events. While there is little that can be done to prevent these events, jurisdictions continue to strive for a quick and efficient response that will reduce costs to taxpayers.

Mitigation actions to minimize the effect of severe winter storms can include:

- Electric utility retrofit/hardening
- Encourage the use of NOAA radios
- Purchase and installation of back-up electrical generation
- Educate the population about carbon monoxide and its dangers and ways to reduce the potential for carbon monoxide poisoning

## *Thunderstorm/Lightning/Hail*

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The National Weather Service has developed effective weather advisories that are widely distributed. Accurate information is made available hours in advance if a severe winter storm is threatening an area. A winter storm can range from a heavy snow over a few hours to blizzard conditions that last several days.

A thunderstorm is a rain shower during which thunder occurs. Since thunder comes from lightning, all thunderstorms have lightning. Most thunderstorms are 15 miles in diameter and last an average of 30 minutes. A thunderstorm is classified as “severe” when it contains one or more of the following:

- Hail three-quarter inch or greater
- Winds gusting in excess of 57.5 mph
- Tornado

There are about 100,000 thunderstorms each year in the United States and approximately 10% of those results in severe thunderstorms. Severe thunderstorms are found most often from Texas to Southern Minnesota. Thunderstorms are common in the spring and summer months, and during the afternoon and evening hours. However, thunderstorms can occur year-round and at all hours.

There are four types of thunderstorms: single cell, multi-cell cluster, multi-cell line, and supercell.

### *Single Cell*

Single cell thunderstorms typically last less than 30 minutes and are not usually severe; however, it is possible for a single cell storm to produce a brief severe weather event with heavy rainfall and occasionally a weak tornado.

### *Multi-Cell Cluster*

Multi-cell cluster thunderstorms are the most common type of thunderstorm. The multi-cell cluster consists of multiple cells, moving along as one unit, with each cell in a different phase of the thunderstorm life cycle. It can produce moderate size hail, flash floods, and weak tornadoes. While a multi-cell cluster may last for several hours, each cell in a multi-cell cluster only lasts about 20 minutes.

## *Multi-Cell Line*

Multi-cell line thunderstorms consists of a long line of storms with a continuous well-developed gust front at the leading edge of the line. The line of storms can be solid, or there can be gaps and breaks in the line. These thunderstorms can produce hail up to golf-ball size, heavy rainfall, and weak tornadoes, but they are best known to produce strong downdrafts.

## *Supercell*

Supercell thunderstorms are rare, but highly organized and pose a high threat to life and property. A supercell thunderstorm is similar to a single-cell thunderstorm because they both have one main updraft. The difference is that the updraft of a supercell is extremely strong, reaching speeds of 150-175 mph. It is set apart from the other thunderstorm types due to the presence of rotation. The rotating updraft of a supercell thunderstorm helps it to produce extreme severe weather threats, such as giant hail (more than two inches in diameter), strong downbursts of 80 mph or more, and strong to violent tornadoes. The leading edge of a supercell is usually light rain as heavier rain tends to fall closer to the updraft with severe weather typically forming towards the rear of the storm.

Unlike other weather hazards that often involve sophisticated watches and warnings from the National Weather Service, lightning can occur anywhere there is a thunderstorm. It is one of the most underrated severe weather hazards, yet ranks as one of the top weather killers in the United States. According to the National Weather Service, from 2008-2017, lightening killed an average of thirty-one people each year, with hundreds of documented injuries. It is estimated that lightening causes more than one billion dollars in damage each year.

There are three types of lightening: ground flashes, cloud-to-ground, and cloud flashes

## *Ground Flashes*

Natural ground flashes occur because of normal electrification in the environment while artificially initiated lightning occurs because of strikes to very tall structures, airplanes, and towers. Natural lightning travels from the cloud to the ground; artificially initiated lightning travels from the ground to the cloud.

## *Cloud-to-Ground*

Cloud-to-ground lightning is the result of a step leader, a channel of negative charge, traveling downward through the cloud. As it nears the ground, the negatively charged step leader is attracted to a channel of positive charge, called a streamer, normally through something tall such as a tree, house, or telephone pole. When the leader and streamer connect, a powerful electrical current begins flowing, resulting in a flash of lightning.

## *Cloud Flashes*

Cloud flashes sometimes have visible channels that extend out into the air and around the storm, but they do not strike the ground. A related term for cloud flashes is heat lightning.

The lightning rate peaks in the summer months, specifically July, with rapid increase during May and rapid decrease in September. Most lightning occurs during the afternoon or early evening. Besides causing injury and death, a lightning strike can result in extensive property damage by sparking a fire or surging through the electrical circulatory of a home or business. Damage to the emergency management center may affect warning systems, communications equipment, and computer systems.



Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into ice. There is no clear distinction between storms that do and do not produce hailstorms. Nearly all severe thunderstorms produce hail, though it may melt before reaching the ground. Hailstorms can have layers like an onion if they travel up and down in an updraft, or they can have no layers if they are “balanced” in an updraft. One can tell how many times a hailstone traveled to the top of a storm by counting the layers. Drops of super-cooled water hit the ice and freeze on it, causing it to grow. Hail falls when it becomes heavy enough to overcome the strength of the updraft and is pulled by gravity towards earth.

Hail size is estimated by comparing it to a known object. Most hail storms are made up of a mix of sizes, and only the very largest hail stones pose serious risk to people caught in the open. Hail that is quarter size (one inch) or larger is considered severe. The stronger the thunderstorm updraft, the larger the hailstone can grow. The largest hailstone recovered in the United States fell in Vivian, South Dakota on June 23, 2010, with a diameter of 8 inches and a circumference of 18.62 inches. It weighed one pound and fifteen ounces.

Damage from hail approaches \$1 billion in the United States annually and most of the damage is to crops. Crops are particularly vulnerable and even relatively small hail can destroy them in a matter of minutes. Vehicles, roofs, buildings, homes, and landscaping are other things that are most commonly damaged by hail. Hail only rarely results in loss of life directly, although injuries can occur.

Data collected from the National Climatic Data Center (NCDC) shows that Iowa experiences many thunderstorm and lightning events every year. Between 2018 and 2023 in Adair County, there were 27 days with thunderstorm/lightning/hail instances. There were thirteen days with hail reported, and 2 with thunderstorm wind reported. These storms resulted in a total of \$480,000 in property damage and no crop damage. Between 2018 and 2023, Guthrie County experienced 19 days with thunderstorm/lightning/hail instances. There were ten days with hail reported and nine with thunderstorm wind reported. These storms resulted in a total of \$67,000 of property damage and \$50,000 in crop damage. When these hazards impact the county, a large area is usually impacted. This hazard tends to impact a large swatch of land from the western portion of the county to the eastern boundary.

Between 1997 and 2012, Iowa experienced, on average, 628,511 cloud-to-ground flashes per year. This ranks Iowa fifteenth nationally in terms of cloud-to-ground flash densities with 11.1 flashes per square mile. From 1959-2011, Iowa experienced 72 fatalities due to lightning (Vaisasla). Iowa’s last reported lightning fatality was in 2008. Lightning injures more people than it kills and leaves some victims with life-long health problems.

Some thunderstorms can be seen approaching, while others hit without warning. The National Weather Service usually issues severe thunderstorm watches a few hours before the storm hits an area, but an area may only have minutes after a warning is issued. Most single-cell thunderstorms are 15 miles in diameter and last an average of 30 minutes. However, multi-cell cluster thunderstorms are the most common type of thunderstorm and can last several hours.

Both Adair and Guthrie Counties are likely to experience thunderstorms/lightning/hail during the planning period. Research indicates that these two counties are likely to expect two to four hailstorms annually. This hazard typically does not cause harm to property, crops, and people, but can cause reported damage to all. The past planning period saw large amounts of damage from these hazard events totaling over \$500,000 in damage. Based on information collected from FEMA for the Iowa Hazard Mitigation Plan, Adair and Guthrie Counties are categorized as experiencing relatively low hail expected annual loss and very low lightning expected annual loss. Both people and property are vulnerable to this hazard and mitigation actions should be implemented to reduce the overall vulnerability of the counties.

Mitigation actions to minimize the effects of thunderstorms/lightning/hail may include:

- Encourage the use of NOAA weather radios
- Construct shelters or safe rooms at public locations where there people gather
- Provide education on how to respond to thunderstorm events, especially if they are not at home
- Electric system hardening, including putting electric systems underground

## *Tornado*

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Tornadoes are the most violent of all atmospheric storms. A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. The funnel is made visible by dust and debris sucked up and condensation of water droplets in the center of the funnel.

There are two types of tornadoes: those that come from the supercell thunderstorm and those that do not. Tornadoes that form from a supercell thunderstorm are most common, and often are the most dangerous. In a supercell, the tornado is a very small extension of a larger rotation that can be as large as ten miles in diameter and up to 50,000 feet tall. Field studies show that as few as 20% of all supercell thunderstorms produce tornadoes. Non-supercell tornadoes are circulations that form without a rotating updraft. One type of non-supercell tornado is the gustnado. A gustnado tornado has a whirl of dust and/or debris at or near the ground with no condensation funnel. Another non-supercell tornado is a landspout. A landspout tornado is a narrow, rope-like condensation funnel that forms when the thunderstorm cloud is still growing and has no rotating updraft, instead the spinning motion originates near the ground. Waterspouts are similar to landspouts, except they occur over water. Damage from non-supercell tornadoes tends to be F2 or less.

The Enhanced Fujita Scale (EF-Scale) replaced the Fujita Scale on February 1, 2007. The EF Scale addresses some of the Fujita Scale limitations identified by meteorologists and engineers. The EF Scale is still a set of wind estimates, not measurements, based on damage. The original Fujita Scale lumped together homes, schools, mobile homes, vehicles, and trees in one short description of damage for each F-Scale category. In the EF-Scale, detailed descriptions are given for examples of damage to twenty-three types of buildings, taking into account types of buildings, construction quality and maintenance, and five additional objects like trees, towers, and poles. Wind speed estimates are then provided for each structure and type of damage ([www.weather.com](http://www.weather.com)). Table 3.23 shows the estimated wind speed for the Enhanced Fujita Scale, as well as the expected damage associated with the tornado's intensity. Table 3.24 displays the relationship between tornado strength and associated damages.

Approximately 1,000 tornadoes hit the nation yearly, killing an average of 60 people per year—mostly from flying or falling debris. The peak tornado season for the northern plains and upper Midwest is in June or July. Most tornadoes occur between 3 pm and 9 pm; however, it is important to remember that they can happen at all hours of the day and any day of the year.

Tornado Alley is a nickname given to the area of the United States that consistently experiences a high frequency of tornadoes each year. The relatively flat land in the Great Plains allows cold, dry, polar air from Canada to meet warm, moist, tropical air from the Gulf of Mexico. A large number of tornadoes form when these two air masses meet. Figure 3.4 depicts the warm and cold air masses, as well as Tornado Alley.

**Table 3.8: Tornado Ratings and Expected Damage**

EF Rating	Wind Speeds	Expected Damage	
<b>EF-0</b>	65-85 mph	'Minor' damage: shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.	
<b>EF-1</b>	86-110 mph	'Moderate' damage: more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.	
<b>EF-2</b>	111-135 mph	'Considerable' damage: roofs torn off well constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.	
<b>EF-3</b>	136-165 mph	'Severe' damage: entire stories of well constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their bark.	
<b>EF-4</b>	166-200 mph	'Extreme' damage: Well constructed homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.	
<b>EF-5</b>	> 200 mph	'Massive/incredible' damage: Well constructed homes are swept away, steel-reinforced concrete structures are critically damaged, high-rise buildings sustain severe structural damage, trees are usually completely debarked, stripped of branches and snapped.	

<https://mgtvwrbl.files.wordpress.com/2016/01/ef-ratings.jpg>

**Table 3.9: Tornado Facts**

Weak Tornadoes (EF0 and EF1)	Strong Tornadoes (EF2 and EF3)	Violent Tornadoes (EF4 and EF5)
88% of all tornadoes	11% of all tornadoes	1% of all tornadoes
Less than 5% of all tornado deaths	Nearly 30% of all tornado deaths	70% of all tornado deaths
Lasts 1-10+ minutes	May last 20 minutes or longer	Can exceed 1 hour
Light to moderate damage	Considerable to severe damage	Devastating to incredible damage

**Figure 3.6: Air Masses and Tornado Alley**



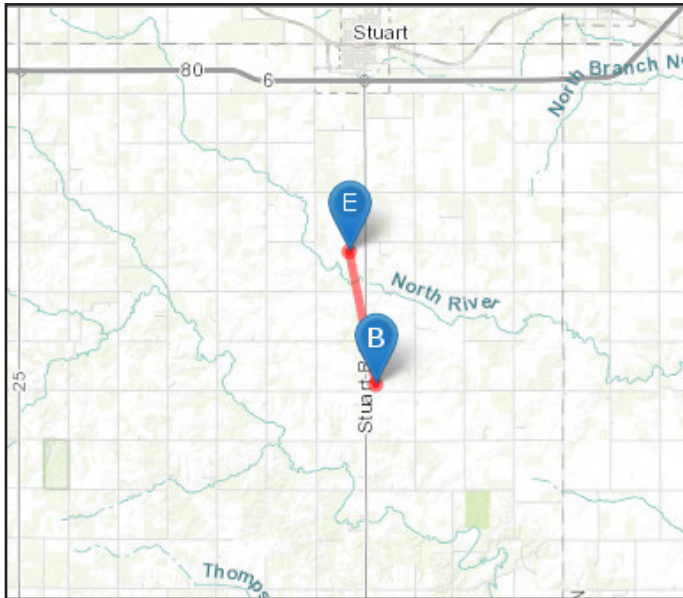
Source: Farmer's Almanac

According to the National Climatic Data Center, there have been five tornadoes and two funnel clouds in Adair County from 2018 to 2023. Two tornadoes were categorized as EF0, two were categorized as EF1, and one was an EF2. The funnel clouds did not cause any property or crop damage, but the tornadoes caused a total of \$600,000 in property damage and \$2,000 in crop damage. The EF2 tornado caused one fatality and injury to another individual when the tornado hit a residence. The maps on the following pages show the approximate path and information for the Adair and Guthrie County tornadoes.

According to the National Climatic Data Center, there have been ten tornadoes and three funnel clouds in Guthrie County from 2018 to 2023. Specific tornado locations and additional information can be found in the maps on the previous pages. One tornado was categorized as an EF2, four as an EF1, one EFO, and four as EFU. The funnel clouds did not cause any property or crop damage, but the tornadoes caused a total of \$571,000 in property damage and \$1,500 in crop damage. The tornadoes in Guthrie County did not cause any reported fatalities or injuries.



**Map 3.2: Adair County EF1  
Tornado 10-9-2018**

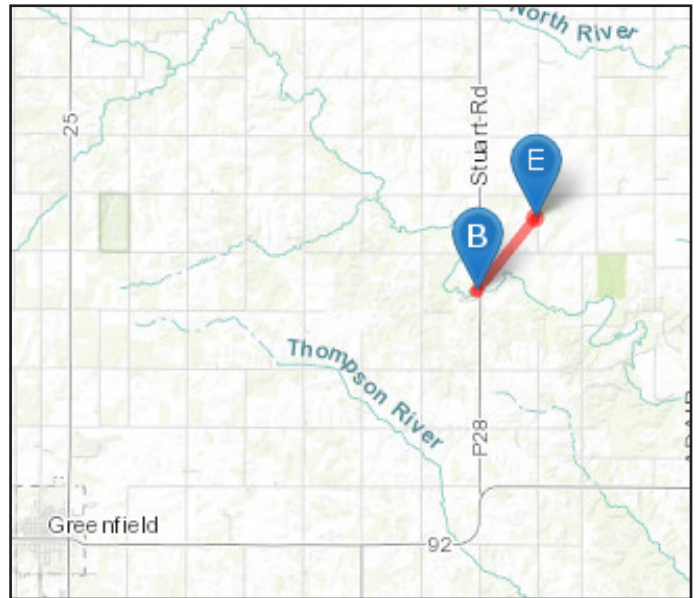


Starting location: 2 N ARBOR HILL  
10/09/2018 1703 CST-6

Ending location: 4 NE HOWE  
10/09/2018 1708 CST-6

Scale: EF1, Width: 80 Yards, Length: 2.71 Miles  
Property Damage: \$0 Crop Damage \$1,000

**Map 3.3: Adair County EF0  
Tornado 10-9-2018**

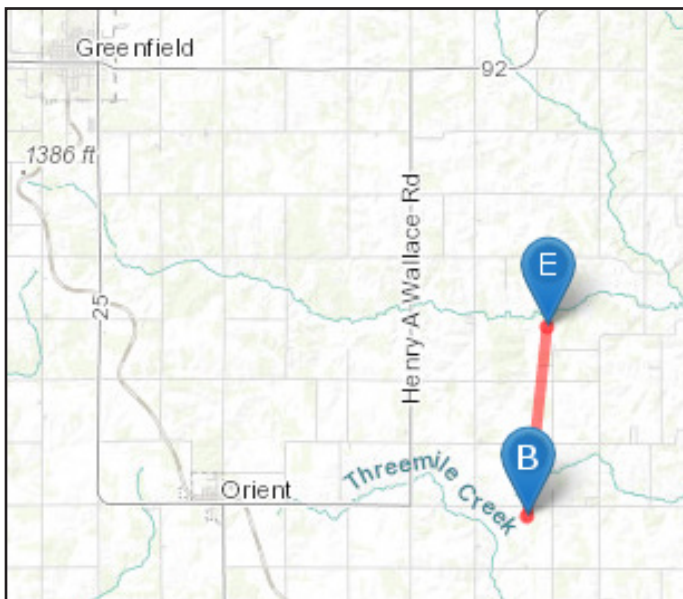


Starting location: 0 S ARBOR HILL  
10/09/2018 1658 CST-6

Ending location: 1 NE ARBOR HILL  
10/09/2018 1701 CST-6

Scale: EF0, Width: 30 Yards, Length: 1.57 Miles  
Property Damage: \$0 Crop Damage \$0

**Map 3.4: Adair County EF0  
Tornado 10-9-2018**

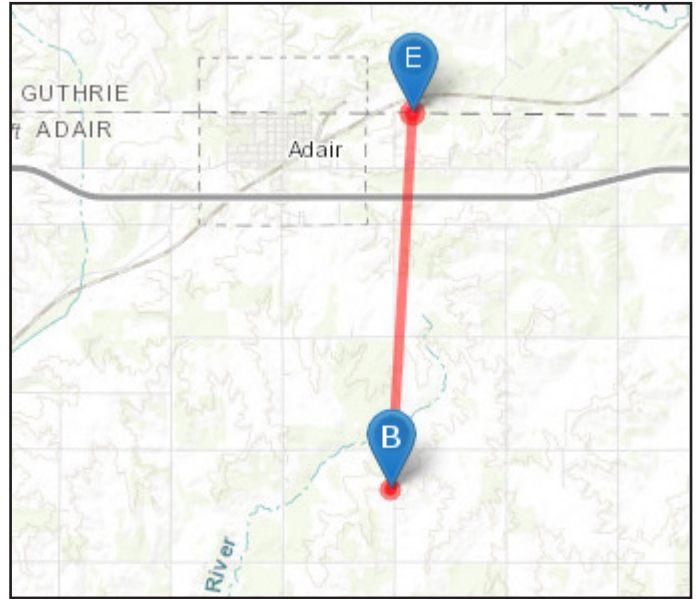


Starting location: 0 SSW ZION  
10/09/2018 1642 CST-6

Ending location: 1 SW HEBRON  
10/09/2018 1647 CST-6

Scale: EF0, Width: 40 Yards, Length: 3.05 Miles  
Property Damage: \$5,000 Crop Damage \$1,000

**Map 3.5: Adair County EF2  
Tornado 5-22-2019**



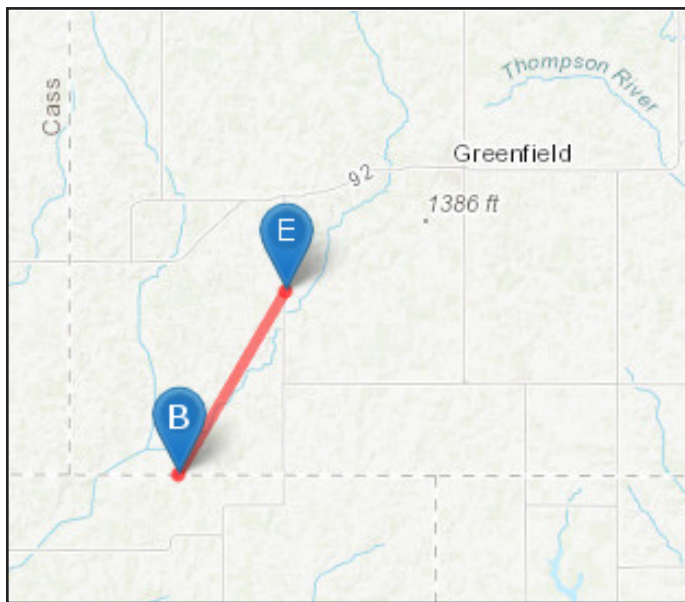
Starting location: 3 SSE ADAIR  
05/22/2019 29 CST-6

Ending location: 2 E ADAIR  
05/22/2019 35 CST-6

Scale: EF2, Width: 150 Yards, Length: 3.34 Miles  
Property Damage: \$500,000 Crop Damage \$0



**Map 3.6: Adair County EF1  
Tornado 3-28-2020**



Starting location: 6 WSW FISK

03/28/2020 1300 CST-6

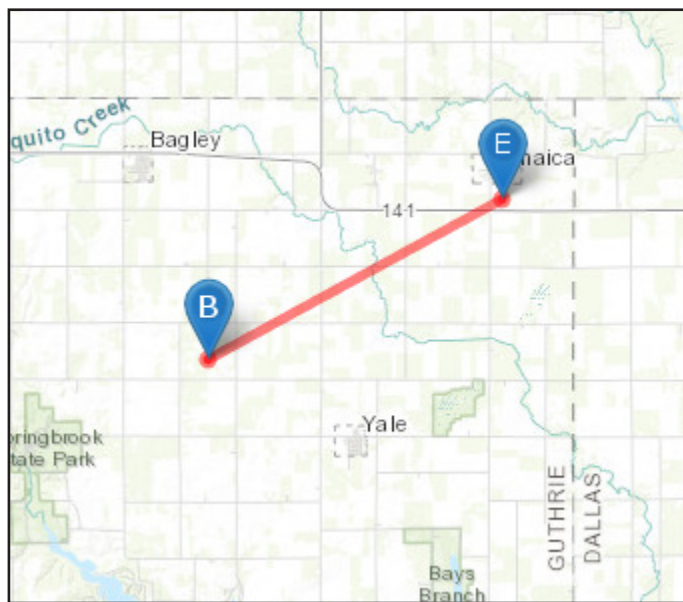
Ending location: 4 NNW FISK

03/28/2020 1315 CST-6

Scale: EF1, Width: 115 Yards, Length: 6.9 Miles

Property Damage: \$95,000 Crop Damage \$0

**Map 3.7: Guthrie County EF0  
Tornado 10-8-2018**



Starting location: 4 SSE BAGLEY

10/08/2018 1722 CST-6

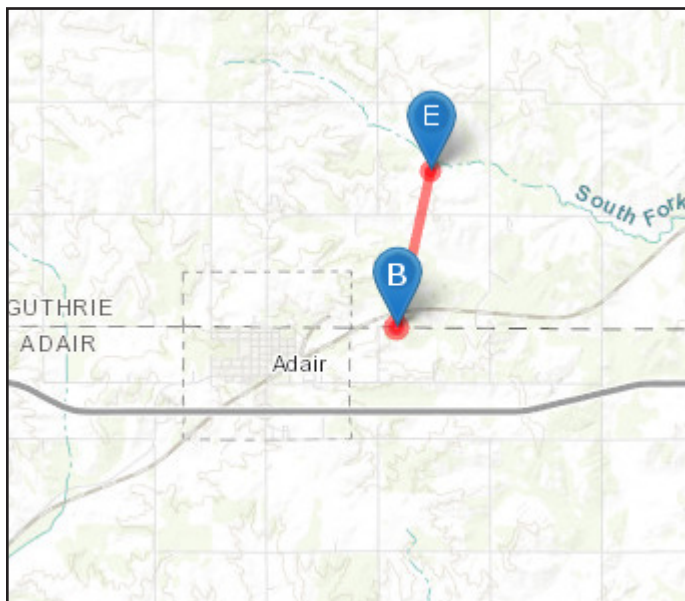
Ending location: 1 SE JAMAICA

10/08/2018 1732 CST-6

Scale: EF0, Width: 100 Yards, Length: 5.91 Miles

Property Damage: \$0 Crop Damage \$1,000

**Map 3.8: Guthrie County EF1  
Tornado 5-22-2019**



Starting location: 2 E ADAIR

05/22/2019 35 CST-6

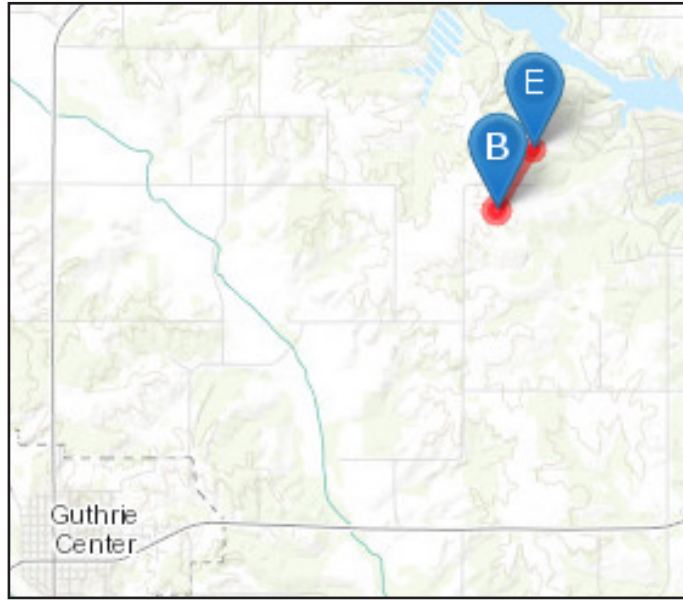
Ending location: 2 NE ADAIR

05/22/2019 37 CST-6

Scale: EF1, Width: 60 Yards, Length: 1.41 Miles

Property Damage: \$0 Crop Damage \$0

**Map 3.9: Guthrie County EFU  
Tornado 11-30-2019**



Starting location: 3 SSE FANSLERS

11/30/2019 1604 CST-6

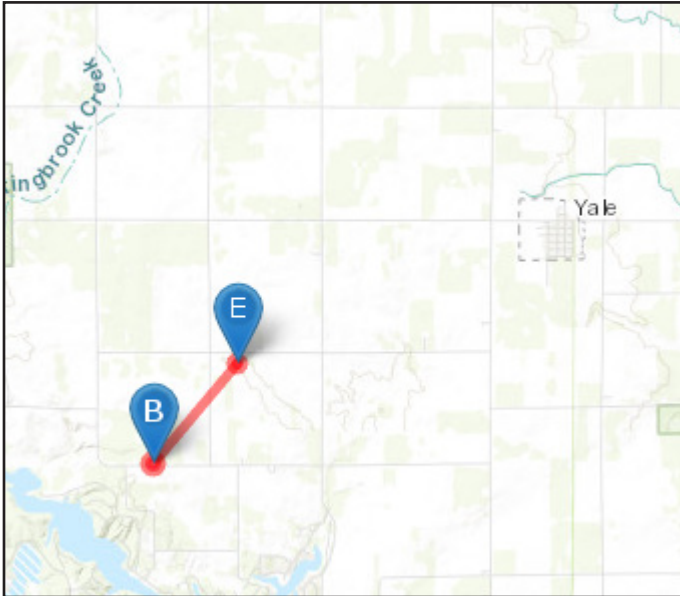
Ending location: 3 SE FANSLERS

11/30/2019 1605 CST-6

Scale: EFU, Width: 20 Yards, Length: 0.53 Miles

Property Damage: \$0 Crop Damage \$0

**Map 3.10: Guthrie County EFU  
Tornado 11-30-2019**

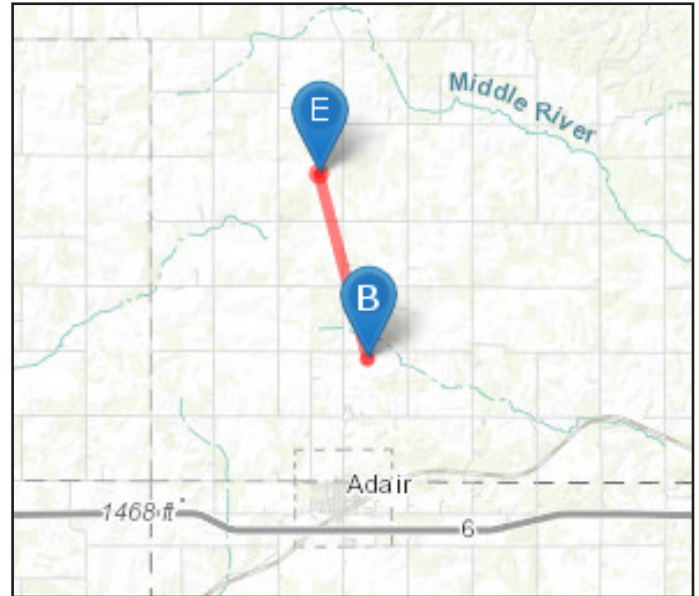


Starting location: 2 E FANSLERS  
11/30/2019 1613 CST-6

Ending location: 3 E FANSLERS  
11/30/2019 1615 CST-6

Scale: EFU, Width: 25 Yards, Length: 1.17 Miles  
Property Damage: \$0 Crop Damage \$500

**Map 3.11: Guthrie County EFU  
Tornado 5-26-2020**

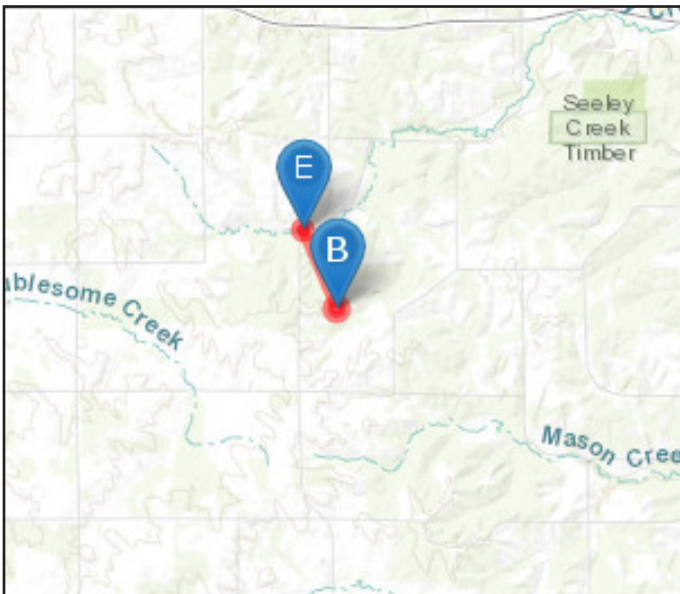


Starting location: 2 NNE ADAIR  
05/26/2020 1453 CST-6

Ending location: 5 N ADAIR  
05/26/2020 1458 CST-6

Scale: EFU, Width: 35 Yards, Length: 2.94 Miles  
Property Damage: \$0 Crop Damage \$0

**Map 3.12: Guthrie County EFU  
Tornado 5-26-2020**

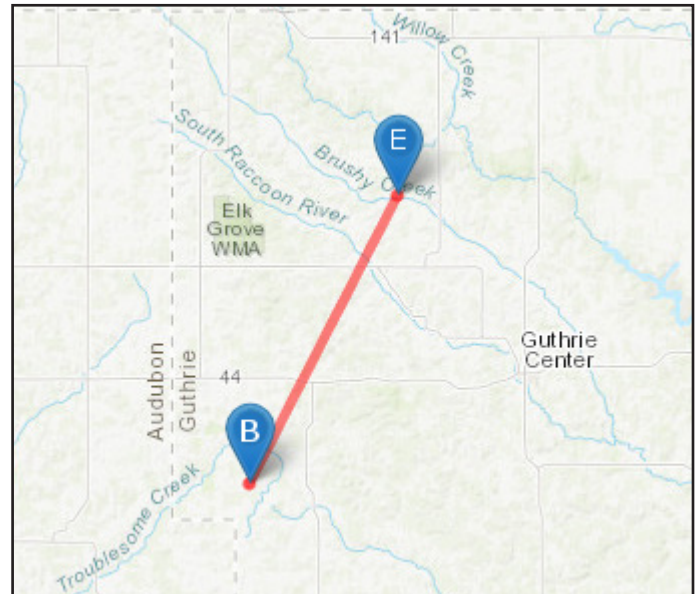


Starting location: 4 E NORTH BRANCH  
05/26/2020 1516 CST-6

Ending location: 4 E NORTH BRANCH  
05/26/2020 1517 CST-6

Scale: EFU, Width: 20 Yards, Length: 0.66 Miles  
Property Damage: \$0 Crop Damage \$0

**Map 3.13: Guthrie County EF1  
Tornado 12-15-2021**



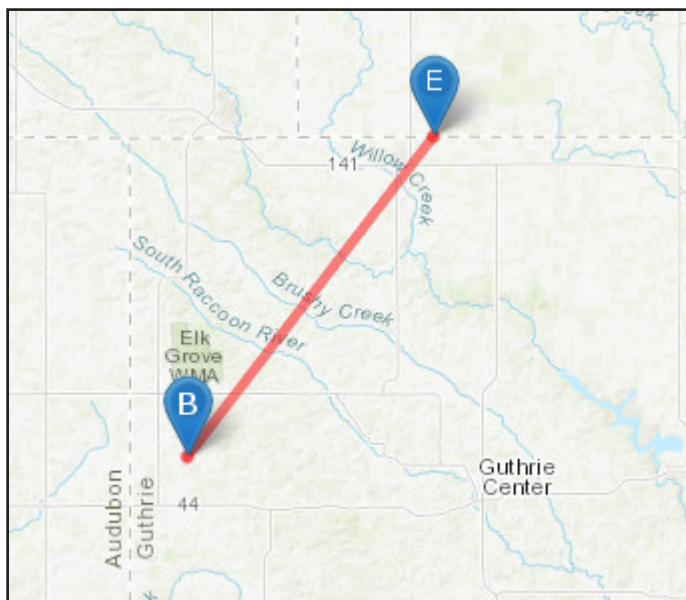
Starting location: 3 SE NORTH BRANCH  
12/15/2021 1710 CST-6

Ending location: 3 NNE WICHITA  
12/15/2021 1718 CST-6

Scale: EF1, Width: 70 Yards, Length: 11.45 Miles  
Property Damage: \$100,000 Crop Damage \$0



**Map 3.14: Guthrie County EF2  
Tornado 12-15-2021**

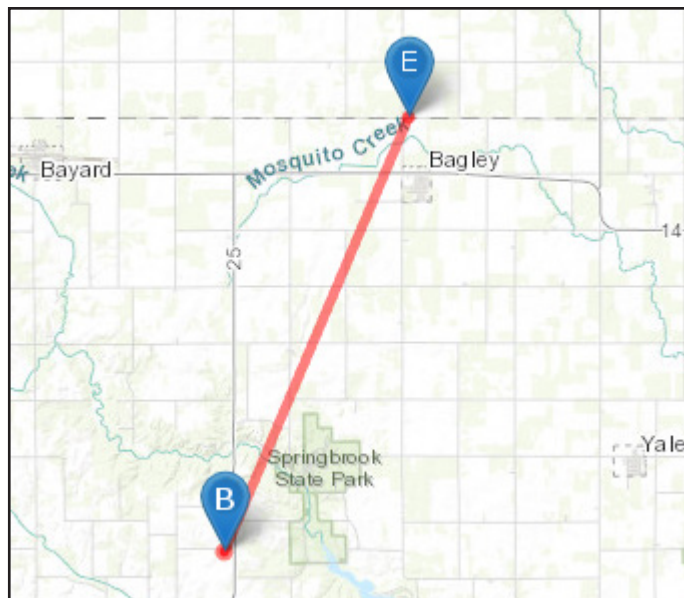


Starting location: 4 NNE NORTH BRANCH  
12/15/2021 1714 CST-6

Ending location: 2 ENE BAYARD  
12/15/2021 1724 CST-6

Scale: EF2, Width: 100 Yards, Length: 14.24 Miles  
Property Damage: \$350,000 Crop Damage \$0

**Map 3.15: Guthrie County EF1  
Tornado 12-15-2021**

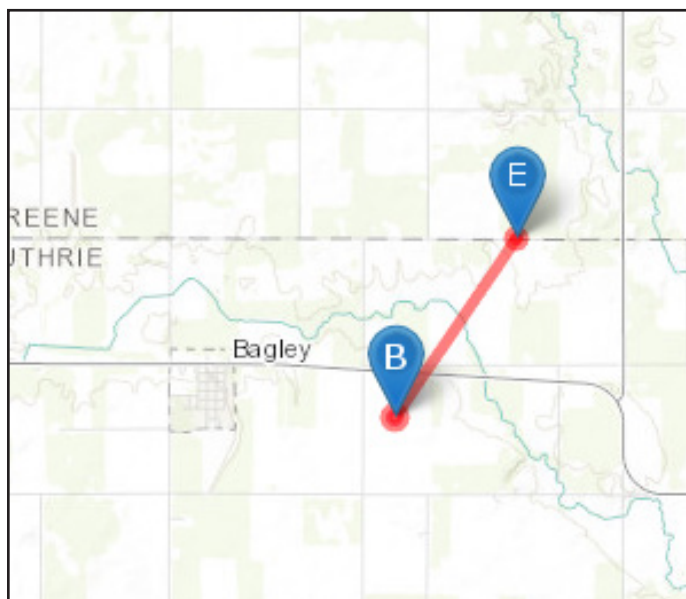


Starting location: 1 W FANSLERS  
12/15/2021 1721 CST-6

Ending location: 1 N BAGLEY  
12/15/2021 1727 CST-6

Scale: EF1, Width: 100 Yards, Length: 8.34 Miles  
Property Damage: \$120,000 Crop Damage \$0

**Map 3.16: Guthrie County EF1  
Tornado 12-15-2021**



Starting location: 2 ESE BAGLEY  
12/15/2021 1727 CST-6

Ending location: 2 WNW HERNDON  
12/15/2021 1729 CST-6

Scale: EF1, Width: 100 Yards, Length: 1.67 Miles  
Property Damage: \$1,000 Crop Damage \$0

Advancement in weather forecasting has allowed tornado watches to be delivered up to hours in advance. However, the best lead-time for a specific severe storm and tornado is about thirty minutes. Tornadoes can develop and change paths rapidly, limiting the warning time. They can last from several seconds to over an hour, though most tornadoes last about five minutes. The tornadoes from 2018 to 2023 were not the cause for any disaster declarations. From 2018 to 2023, tornadoes in Adair County lasted an average of nearly 15 minutes (14.8) and tornadoes in Guthrie County lasted an average of nearly 5 minutes (4.7).

Adair and Guthrie Counties have a high probability of experiencing tornado events within the five year planning period of this plan. Reports show that the overall number of tornadoes reported annually has increased. Although there have been advancements in the predictability of the events, the warning time is still limited putting people and property at a high risk of damage. Damage to the economy can continue to happen even after the weather event has ended. Damage caused by tornadoes can cause counties, cities, and the public large amounts to clean up the damage, get streets opened back up, and utilities back up and running. Educating the public about tornados and what to do in the event of one occurring can be a mitigation effort that can save lives.

Mitigation actions to minimize the effects of tornadoes may include:

- Encourage the use of NOAA weather radios
- Construct shelters or safe rooms
- Installation of storm sirens
- Electric system hardening, including putting electric systems underground
- Adoption and enforcement of higher building standards with the jurisdictions

## *Windstorm*

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Damaging winds are classified as those exceeding 50-60 mph. Damage from severe thunderstorm winds account for half of all severe reports in the lower forty-eight states and are more common than damage from tornadoes. According to the majority of Storm Prediction Center forecasts, severe wind is the most difficult threat to forecast because they come from a wider range of environments than just supercells, tornadoes, or large hail. Damaging wind events can develop with little advanced warning as they can occur on their own, with severe winter storms, or with severe thunderstorms.

There are several types of damaging winds: straight-line, downdrafts, downbursts, microbursts, gust front, derecho, and bow echo.

### *Straight-Line*

Straight-line winds are any thunderstorm wind that is not associated with rotation and is used mainly to differentiate from tornadic winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.

### *Downdrafts*

Downdrafts are a small-scale column of air that rapidly sinks towards the ground.

### *Downbursts*

Downbursts are strong downdrafts with horizontal dimensions larger than 2.5 miles, resulting in an outward burst of wind on or near the ground. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.

## *Microbursts*

Microbursts are small, concentrated downbursts that produce an outward burst of damaging winds at the surface. Microbursts are generally small (less than 2.5 miles) and short-lived, lasting only five to ten minutes.

## *Gust Front*

A gust front wind is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm.

## *Derecho*

A derecho wind is a widespread thunderstorm wind event caused when new thunderstorms form along the leading edge of an outflow boundary. The thunderstorms feed on this boundary and continue to reproduce themselves. Derechos typically occur in the summer months when complexes of thunderstorms form over the plains and northern plains states. Usually these thunderstorms produce heavy rain and severe wind, as they can last a long time and cover such large areas.

## *Bow Echo*

A bow echo wind is a radar echo which is linear but bent outward in a bow shape. Damaging straight-line winds often occur near the "crest" or center of a bow echo. Bow echo winds can be over 186 miles in length, last for several hours, and produce extensive wind damage at the ground.

Microbursts and downbursts are very dangerous to aviation. They are known for their ability to produce wind shears which can slow airspeed and cause aircrafts to lose altitude at a very critical time for flight near the ground. A plane will encounter strong headwinds followed by strong tailwinds as it enters and flies through a microburst. Great strides have been made in understanding and avoiding the risk from low altitude wind shears. Major airports routinely use Terminal Doppler Weather Radars, developed during the 1990s. These radars pay particular attention to weather conditions occurring within a few miles of the airport, especially conditions that might cause deadly microbursts.

From 2018-2023, Adair County experienced three recorded high wind events and Guthrie County experienced two high wind events. There were two events which impacted both Adair and Guthrie Counties and these events were derechos coupled with thunderstorms and tornadoes. The first derecho occurred on August 10, 2020. This event caused massive widespread damage nationwide with an estimated \$11.5 billion in losses nationwide (agriculture, infrastructure, private property). This event had winds that exceeded 120 miles per hour and approached 140 miles per hour near the Mississippi River. While Adair County noticed some of the extreme high winds from this event, the county had minimal damage and none reported, therefore was not included in the state's disaster declaration. This event led to disaster declaration DR-4557-IA. Through this declaration Guthrie County was eligible for public assistance. This declaration approved \$8,178,199 in total housing assistance, \$3,245,137 in other needs assistance through 3,092 assistance applications. It also obligated \$160,163,212 for emergency work and \$25,887,748 in permanent work. \$41,413,376 was obligated for hazard mitigation assistance. This event did not cause any damage to be reported in Adair County. There was damage reported in Guthrie County, but there were no monetary values of damage reported.

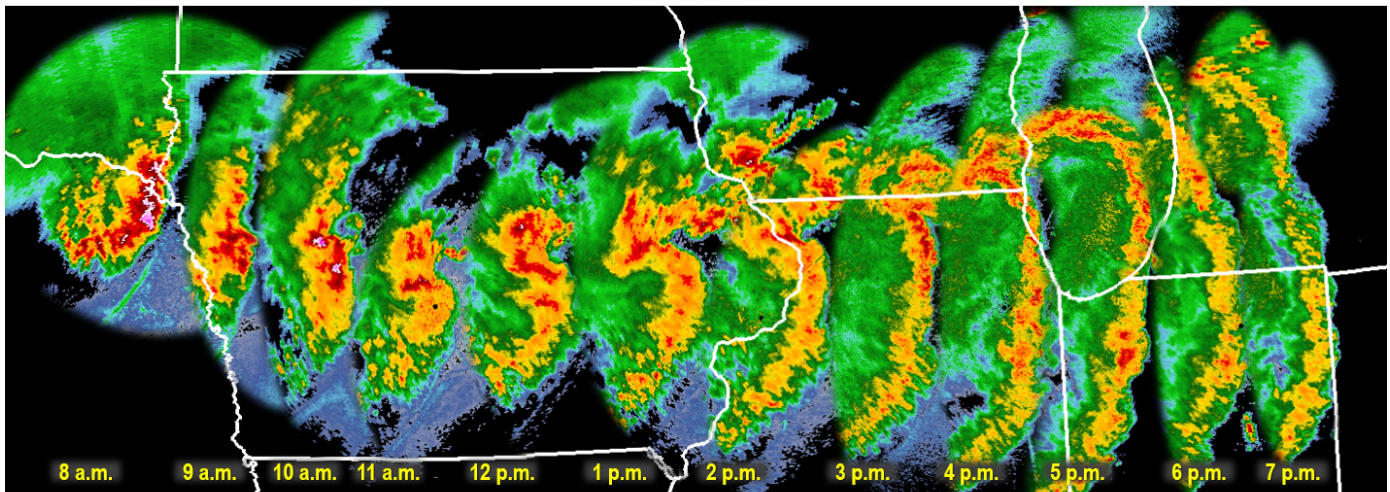
The second derecho occurred on December 15, 2021 and was the first-ever December derecho in the United States. This derecho was accompanied by 63 confirmed tornadoes. During this event, gusts were reported over 70 miles per hour throughout most of the affected area, and in some areas, wind gusts were recorded at over 80 miles per hour. This weather event did not cause any reported damage within Adair County. In



### Figure 3.7: August 10, 2020 Derecho Radar

August 10, 2020 Derecho: Lowest Angle NWS Radar Reflectivity at One-Hour Time Steps

All times in CDT

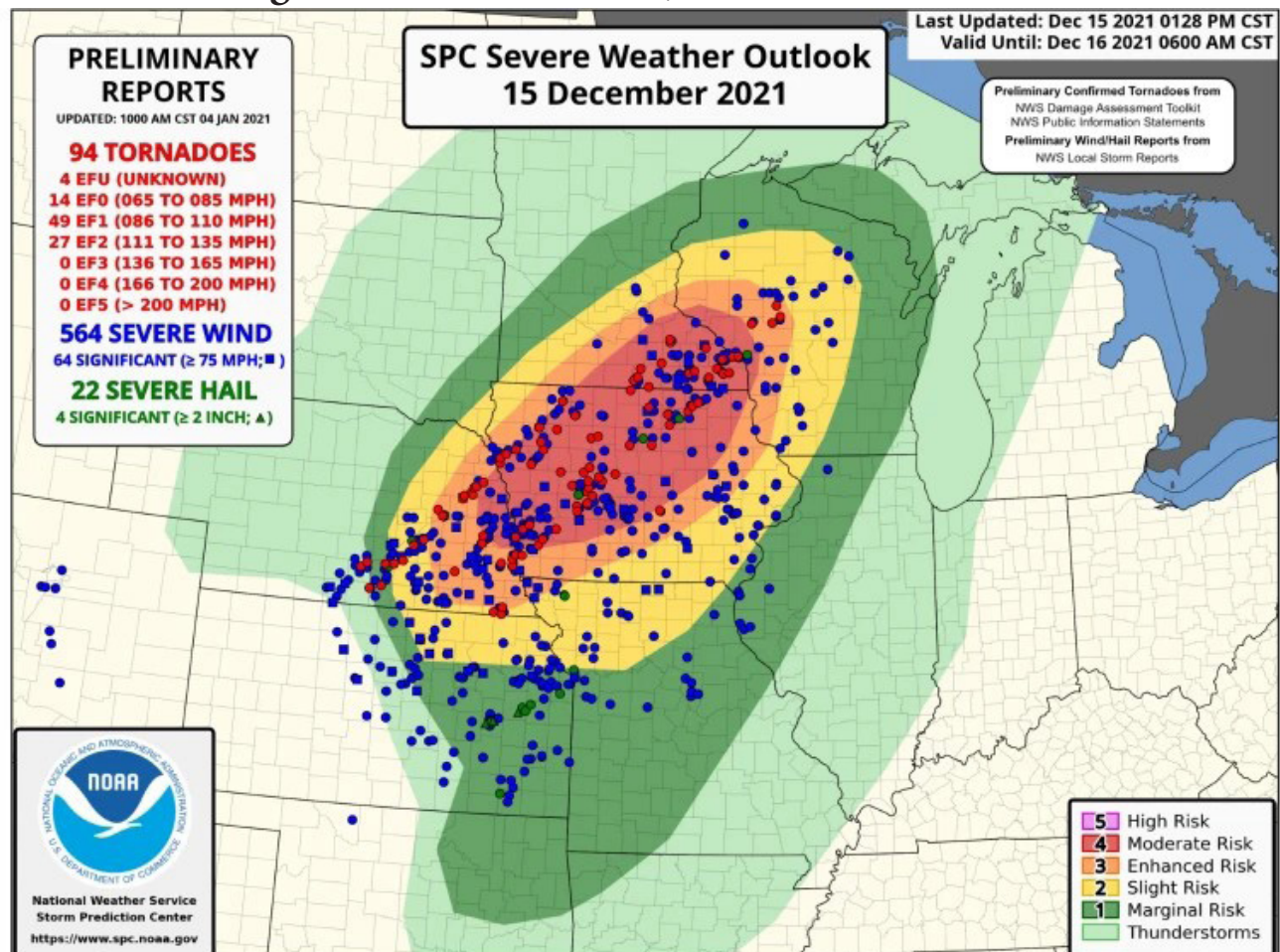


This long-lasting, severe wind thunderstorm complex (known as a derecho) produced hundreds of reports of damage along with likely a few tornadoes.

 NWS Chicago | [weather.gov](https://weather.gov)

Aug 11, 2020

### Figure 3.8: December 15, 2021 Weather Events



Guthrie County, this weather event, which included thunderstorms and tornados caused \$571,000 in property damage and no crop damage. This event triggered the disaster designation of DR-4642-IA to be declared on February 23, 2022. The declaration obligated \$252,342 for emergency work and \$3,946,830 in permanent work. It also obligated \$861,231 in hazard mitigation assistance.

The final high wind episode in Adair County occurred on April 23, 2023 where wind gusts were reported over 60 miles per hour. The damage from this event was reported as a vehicle tipped by the high winds.

Damaging winds can develop with little advanced warning. The National Weather Service has developed a windstorm warning system similar to other events such as tornadoes, winter storms, and thunderstorms, and watches are issued when conditions are favorable. Advisories are issued when sustained winds of 31 to 39 mph are expected to last for three hours or longer, or when there are wind gusts of 46 to 57 mph. Windstorm warnings are issued when there are sustained winds of 40 mph or greater for one hour or more, or when there are wind gusts of 58 mph or greater for one hour or more. Windstorm watches are generally delivered hours in advance, but the best warning lead-time for a specific storm is about 30 minutes.

Both Adair and Guthrie Counties are likely to experience windstorms over this planning period. Those most at risk during windstorms include people in mobile homes, at campgrounds, or at other dwellings without secure foundations. Windstorms may have a destructive path that is tens of miles wide and the duration could range from hours to days. Damages can include broken tree branches, roof damage, broken windows, or crop damage. There are a number of projects each jurisdiction can undertake to improve the safety for the residents and protection of property during a windstorm.

Some of the mitigation actions that jurisdictions can implement to reduce the impact of a windstorm include:

- Encourage the use of NOAA weather radios
- Construct shelters or safe rooms
- Installation of storm sirens
- Electricity hardening/under grounding
- Purchase and installation of backup generators for critical facilities
- Develop and enforce building codes



# Combination Hazards

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## *HAZMAT Incident*

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A hazardous material is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Hazardous materials are categorized as toxic, corrosive, flammable, irritant, or explosive. They can pose a risk to life, health, or property, possibly requiring evacuation, a hazardous material incident can occur at a fixed location, in pipeline transportation, or while transporting hazardous materials.

A fixed hazardous materials incident is the accidental release of chemical substances or mixtures, which presents a danger to public health or safety during production or handling at a fixed facility. Chemicals are manufactured and used in every-increasing types and quantities- each year over 1,000 new synthetic chemicals are introduced and as many as 500,000 products pose physical or health hazards and can be defined as hazardous chemicals. Hazardous material incidents generally affect a localized area and the use of planning and zoning can minimize the area of impact.

A pipeline transportation incident occurs when a break in a pipeline creates the potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak to a large rupture where an explosion is possible. Inspection and maintenance of the pipeline system, along with marked gas line locations, and an early warning and response procedure can lessen the risk to those near the pipelines.

A hazardous materials transportation incident constitutes an accidental release of chemical substances or mixtures that presents a danger to public health or safety during transportation. Large quantities of hazardous materials are transported daily on Iowa's streets, highways, interstates, and railways. The DOT regulates the routes and speed limits used by carriers and monitor the types of hazardous materials crossing state lines. More and more potentially hazardous materials are being used in commercial, agricultural, and domestic uses, and are being transported on roadways and railways (Iowa Hazard Mitigation Plan 2010).

The State of Iowa requires any person manufacturing, storing, handling, transporting, or disposing of a hazardous substance to notify the department and local law enforcement of the occurrence of a hazardous condition. According to the Iowa Department of Natural Resources Hazardous Substance Database, Adair County had 35 reported hazardous spills between 2018 and 2023. Of the 35 reported spills, 19 posed no threat to humans or the environment. There were two spills that threatened the soil and surface water, one spill threatened just surface water, and 14 spills that threatened the soil.

Between 2018 and 2023, Guthrie County reported fifteen hazardous spills. Nine of the spills posed no threat to humans or the environment. There were three reported spills that threatened the soil, two that posed threats to the soil and groundwater and one spill that threatened people, soil, surface water, and groundwater.

While there were a large number of reported spills between 2018 and 2023, the committee based their probability score on the likelihood of a high impact spill occurring. A high impact spill is defined as an environmental emergency by the Environmental Protection Agency. An environmental emergency is a sudden threat to the public health or the well-being of the environment, arising from the release or potential release of oil, radioactive materials, or hazardous chemicals into the air, land, or water (Iowa Hazard Mitigation Plan 2023).



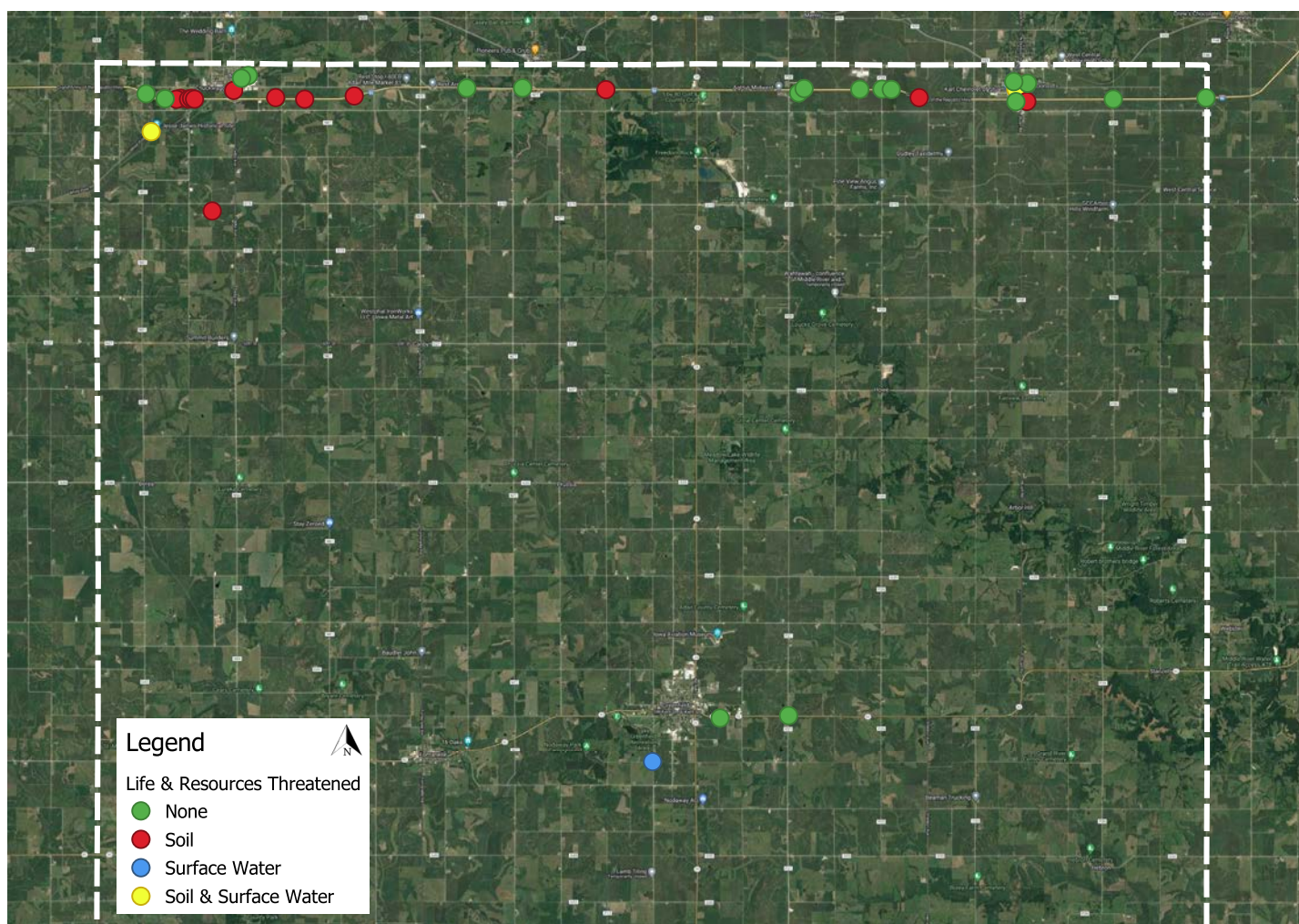
A hazardous material spill can occur almost anywhere and with little to no warning. Public address systems, television, radio, and the NOAA Weather Radios are used to disseminate emergency messages about hazardous material incidents. The two following maps display where the spills occurred during 2018 and 2023 in Adair and Guthrie Counties.

Hazardous Spills are a man-made hazard that while actions can be taken to reduce the number of spills and reduce the impact these spills have on the man-made and natural environment, it is unlikely that these spills will be completely eliminated. The maps in this section show that these spills are most likely to occur on roadways with increased amounts of traffic and in areas where there are larger populations. In general, safeguards are increasing to reduce the impact spills have, but the amount of more potentially-hazardous materials that are used on a day-to-day basis is increasing. Both Adair and Guthrie Counties should anticipate a hazardous spill occurring and plan to respond in a quick and efficient manner if required.

Mitigation actions to minimize the effect of a Hazardous Materials Incident can include:

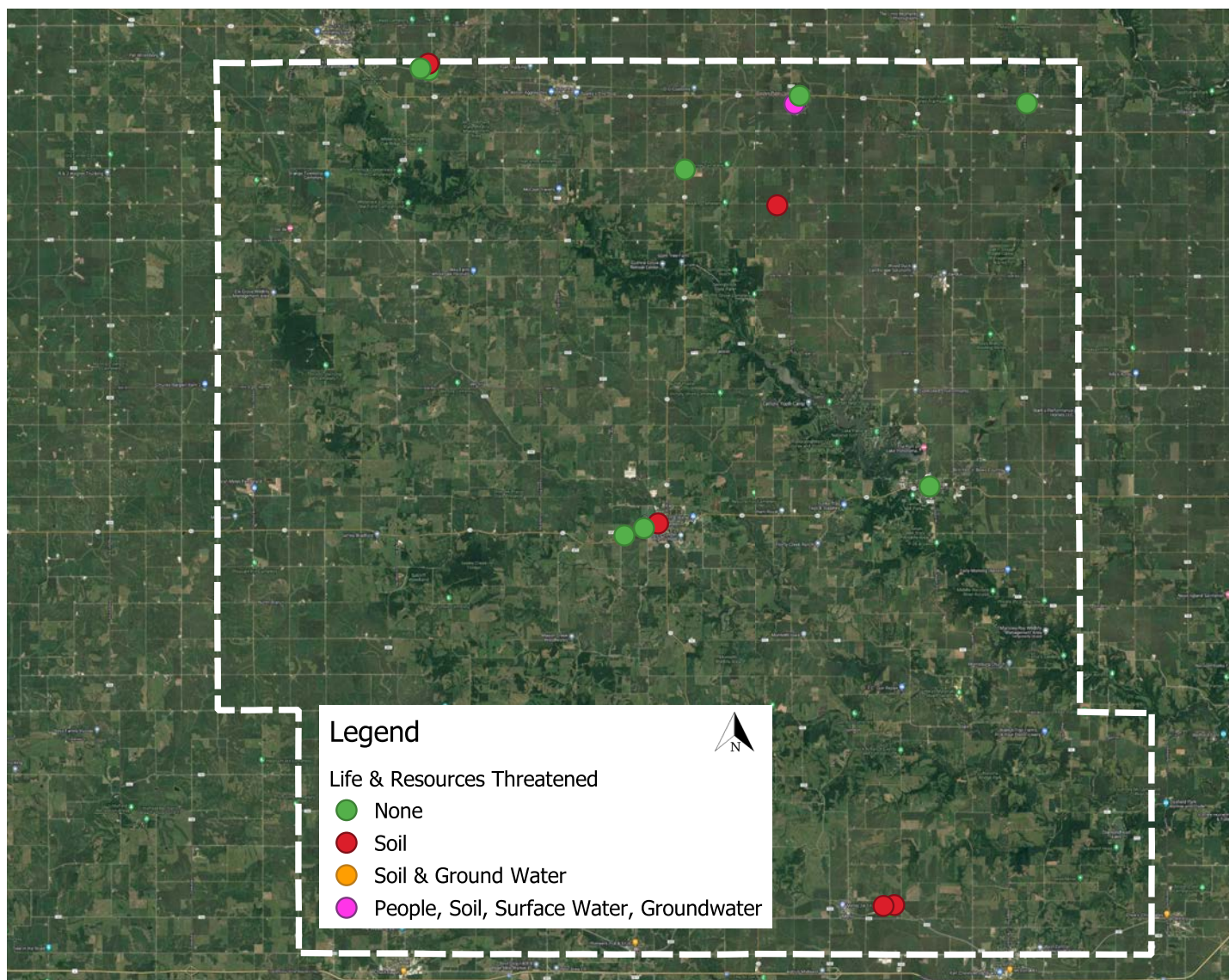
- Create or contract with a HAZMAT response team for incident response
- Encourage businesses to complete employee training, installation of containment systems, and regular maintenance and inspection of hazardous material storage and equipment

**Map 3.17: Adair County Hazardous Spill Locations 2018-2023**





**Map 3.18: Guthrie County Hazardous Spill Locations 2018-2023**



## *Infrastructure Failure*

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

### *Communications Failure*

Communications failure is the widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities, and long-term interruption of electronic broadcast services. Emergency 911, law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services which rely on communication systems to effectively protect citizens. Disruptions and failures can range from localized and temporary to widespread and long-term.

## *Energy Failure*

An extended interruption of service either electric, petroleum, or natural gas, which by an actual or impending acute shortage of usable energy could create a potential health problem for the population and possibly mass panic. International events could affect supplies of energy producing products while local conditions could affect distribution of electricity, petroleum, or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems. Stockpiles of energy products eliminate short disruptions but can increase the level of risk to the safety of people and property near the storage site.

## *Structural Failure*

The collapse (all or part) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. A road, bridge, or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may cause the roof of a building to collapse under the weight of the snow. Heavy rains and flooding can undercut and washout a road or bridge. The age of the structure is sometimes independent of the cause of the failure. Enforcement of building codes can better guarantee that structures are designed to hold-up under normal conditions, routine inspection of older structures may alert inspectors to “weak” points. The level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge, and the type and amount of products stored in the structure (Iowa Hazard Mitigation Plan 2010).

## *Structural Fire*

A structural fire is an uncontrolled fire in a populated area that threatens life, property, is beyond normal day-to-day response capability, and has the potential for large economic losses. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of material involved.

No widespread communications failures have occurred in Iowa. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported. The energy crisis of the 1970s had significant impacts on consumers in Iowa. High inflation and unemployment were associated with the dependence on foreign oil during that time. An energy shortage of that magnitude has not affected Iowa since. There have been sporadic structural failures across the counties. Most have included homes, commercial structures, or communications towers. Structural fires occur occasionally and are quickly extinguished by local fire departments.

Most of the highly necessary communication systems have backup and redundant designs to provide continuity of service. Most communication failures would be limited to localized areas. They can have a negative impact on businesses that are dependent on the internet for servicing and communicating with customers. Communication failures can hamper emergency response efforts when they are not able to communicate as quickly or effectively with injured citizens, and vice versa.



The effects of a petroleum or natural gas shortage would be felt throughout the state. Iowa is almost entirely dependent on out-of-state resources for oil, coal, and natural gas. Electricity failure can result from many hazard events. Severe winter storms, thunderstorms, lightning, extreme heat, tornadoes, high winds, transportation incidents, and others can cause power outages. The loss of electricity could also cause many problems throughout towns including the shutdown of water pumps, sump pumps, and communications.

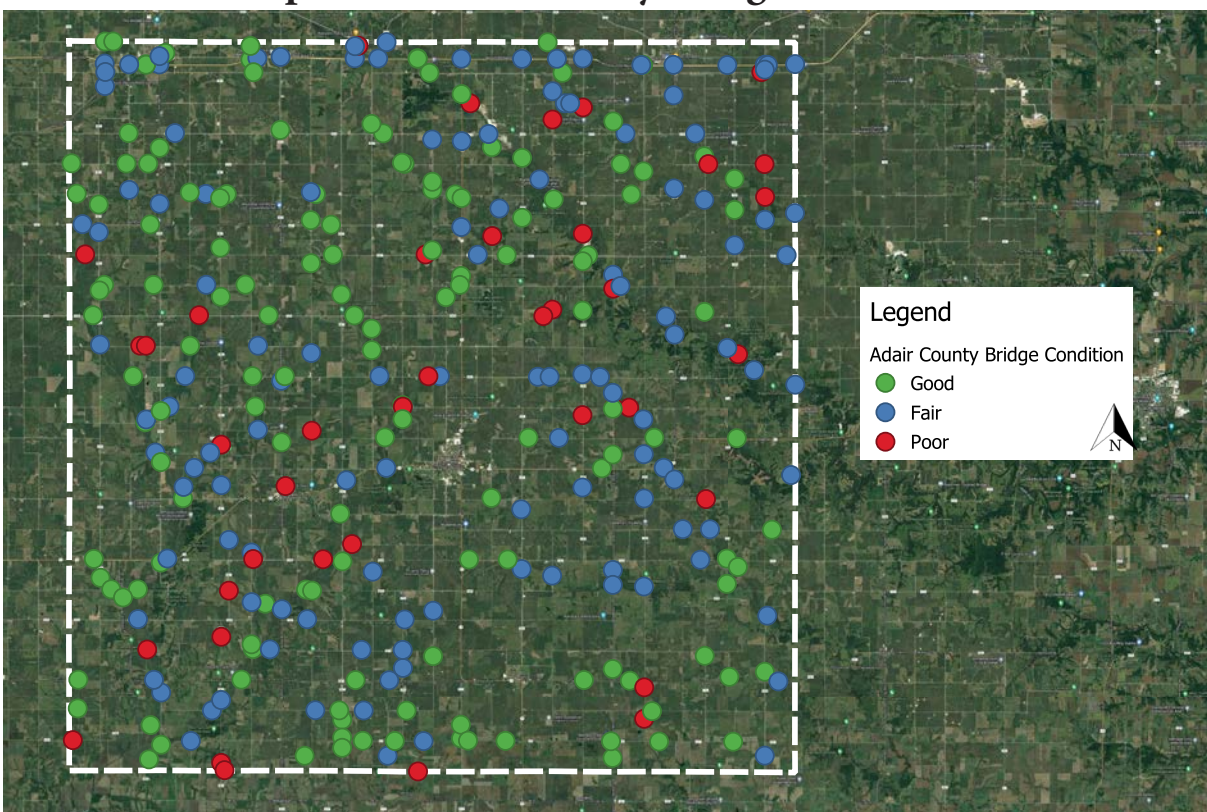
Damages from structural fires can range from minor aesthetic damage to completely destroying the building. Many factors determine the strength of a fire including: wind, fuel sources, and density of buildings. Older structures with outdated electrical systems and fire codes are particularly vulnerable to fires. With modern training, equipment, fire detection devices, and building regulations and inspections, most fires can be quickly contained and limited to the immediate structure involved.

When a structure does fail, the level of damage and severity of the failure is dependent on factors such as the size of the structure, the number of occupants in, on, or near the structure, the time of day, day of week, etc. Structural failure can be caused by the age of the structure, poor maintenance, or by other hazard events such as tornadoes, fires, floods, or severe winter storms.

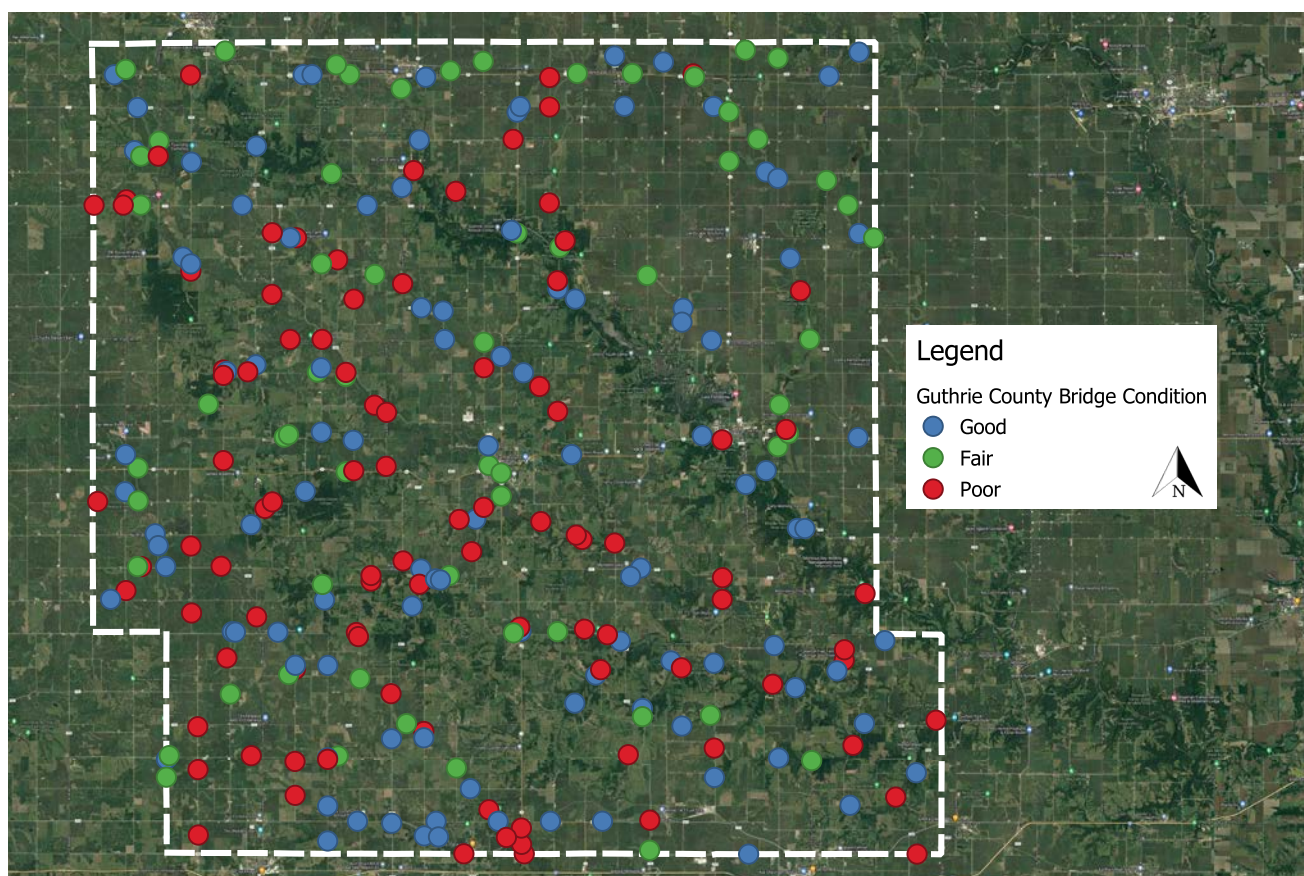
Map 3.18 shows the number of state and county bridges in good, fair, and poor condition for Adair County as of February 10, 2020. Bridges in good condition represent 46.6% of the County's bridges, 40.5% of the bridges are in fair condition, and 13.1% of the bridges are in poor condition.

Map 3.19 shows the number of state and county bridges in good, fair, and poor condition for Guthrie County as of February 10, 2020. The information shows that 25% of the bridges are in good condition, 40% of the bridges are in fair condition, and 36% are in poor condition. Since 2011, there has been an increase in the number of bridges in Guthrie County that are in poor condition.

**Map 3.19: Adair County Bridge Conditions**

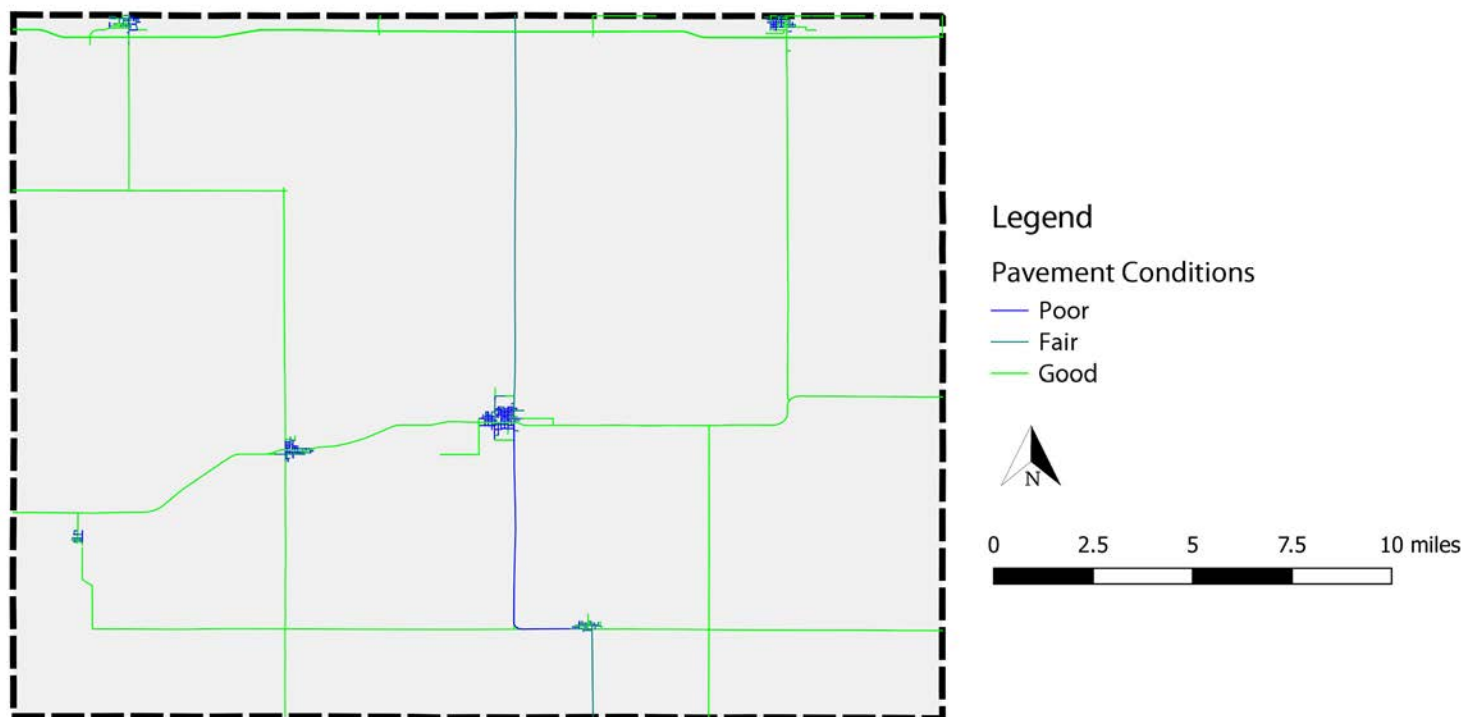


**Map 3.20: Guthrie County Bridge Conditions**



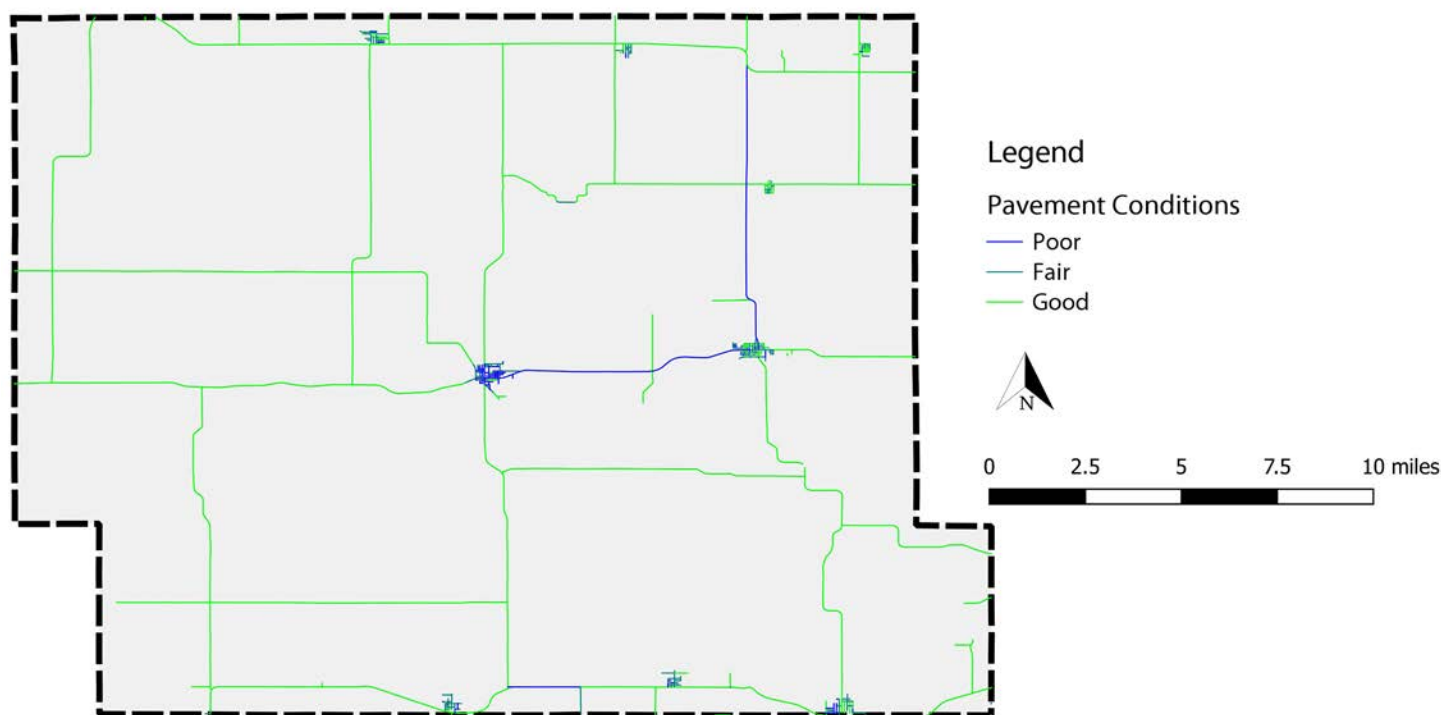
Map 3.3 shows the pavement condition of state and county roadways in Adair County from 2018 data. Map 3.4 shows the pavement condition of state and county roadways in Guthrie County from 2018 data.

**Map 3.21: Adair County Pavement Conditions**





### Map 3.22: Guthrie County Pavement Conditions



Adair and Guthrie Counties are vulnerable to infrastructure failures as they occur with little or no warning. It is impossible to predict a communication failure, power outage, fires, or structural failure. While a petroleum or natural gas shortage may be predicted in advance, emergencies can rise suddenly and unexpectedly. Communication failures and power outages can last from several minutes to several days, depending on the nature of the outage and the area that the outage covers. Petroleum and natural gas distribution problems can lead to shortages locally for a few days. The duration of structural fires and structural failures is dependent on the size of hazard. These hazards also are hard to track the total economic impact they have on each county. Within the life of this plan it is anticipated that each county will experience an infrastructure failure of some kind with an unknown magnitude. Each jurisdiction should plan to implement mitigation actions to alleviate the effects of these instances.

Mitigation actions to minimize the effects of infrastructure failure may include:

- Implement a bridge repair program to fix poor quality bridges
- Create and enforce building codes

### *Levee/Dam Failure*

A dam is defined as an artificial barrier with the ability to impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water. Dams are constructed for a variety of uses, including flood control, erosion control, water supply impoundment, hydroelectric power generation, and recreation.

A dam failure occurs when there is an uncontrolled release of impounded water, resulting in downstream flooding, which can affect life and property. FEMA states that dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage



- Structure failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep

In Iowa, dams are classified according to the downstream damages that would occur if that dam were to fail. The higher the risk, the higher the standards that have to be met during dam construction and modification. There are three dam classifications: High Hazard, Significant Hazard, and Low Hazard. High Hazard dams have to meet the state's highest level of criteria and are inspected on a two-year cycle. Dam hazard potential classifications have nothing to do with the condition of a dam, only the potential for death and/or destruction due to the size of the dam, the size of the impoundment, and the characteristics of the area downstream of the dam.

A dam is classified as a High Hazard when it is located in an area where dam failure may create a serious threat of loss of human life. A Significant Hazard Dam is where 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. Dams are also classified as Significant Hazard when the dam and its impoundment are themselves 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 dams are classified as such where damages from a failure would be limited to loss of the dam, livestock, farm outbuildings, agricultural lands and lesser used roads, and where loss of human life is considered unlikely.

Levees differ from dams in that they are constructed alongside the edge of a stream or river channel to manage or prevent water flow into the adjacent land. They were first built in the United States more than 150 years ago and were traditionally used by farmers to protect agricultural areas from frequent flooding, but since then levees have been built to protect urban areas. Artificial levees are typically needed to control the flow of rivers meandering through broad, flat floodplains. Levees are usually constructed from dirt, clay, or artificial material such as concrete or steel and are built wide enough so that they will not collapse or be eroded when saturated with moisture from rivers running at unusually high levels. Grass or some other dense vegetation can be planted on top of the levee's bank to minimize erosion.

It is important to note that levees reduce the risk of flooding, but do not eliminate it. The failure of a levee can be attributed to overtopping or breaching. Overtopping occurs when the river rises higher than a levee's crown. Breaching can result from the loss of structural integrity of a wall, dike, berm or elevated soil by erosion, piping, saturation, under seepage, and even animal burrows. Levees can and do deteriorate over time, so regular maintenance and periodic upgrades are necessary to ensure a levee performs as designed.

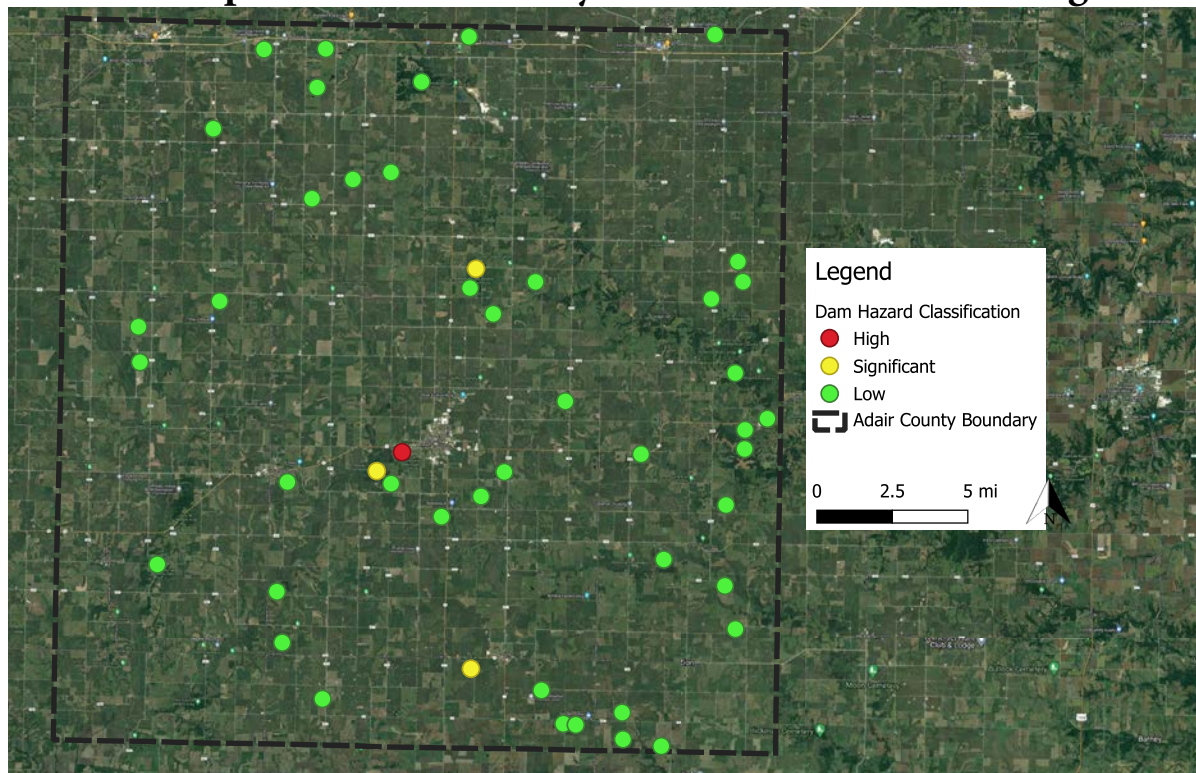
Nearly 85% of levees are locally owned and maintained. It is the responsibility of the levee's owner to provide evidence that the levee meets or exceeds minimum federal requirements. A levee is certified if evidence has been presented showing that the system meets current design, construction, maintenance, and operation standards to provide risk reduction from the one-percent-annual-chance-flood.

According to the National Inventory of Dams, Adair County has 50 dams and Guthrie County has 57 dams as of 2017. The dams that are included in the inventory meet at least one of the following criteria:

- High hazard classification—loss of human life is likely if the dam fails
- Significant hazard classification – possible loss of human life and likely significant property or environmental destruction
- Equal or exceed 25 feet in height and exceed 15 acre-feet in storage
- Equal or exceed 50 acre-feet storage and 6 feet in height

Of the forty-eight Adair dams in the inventory, one is considered to be a high hazard dam and three are considered significant hazard dams. There have been no known occurrences of dam failure in Adair County. Sound design, quality construction, and continued inspections and repairs reduce the probability of dam failure. Adair County's dams and their hazard ranking can be found in map 3.5.

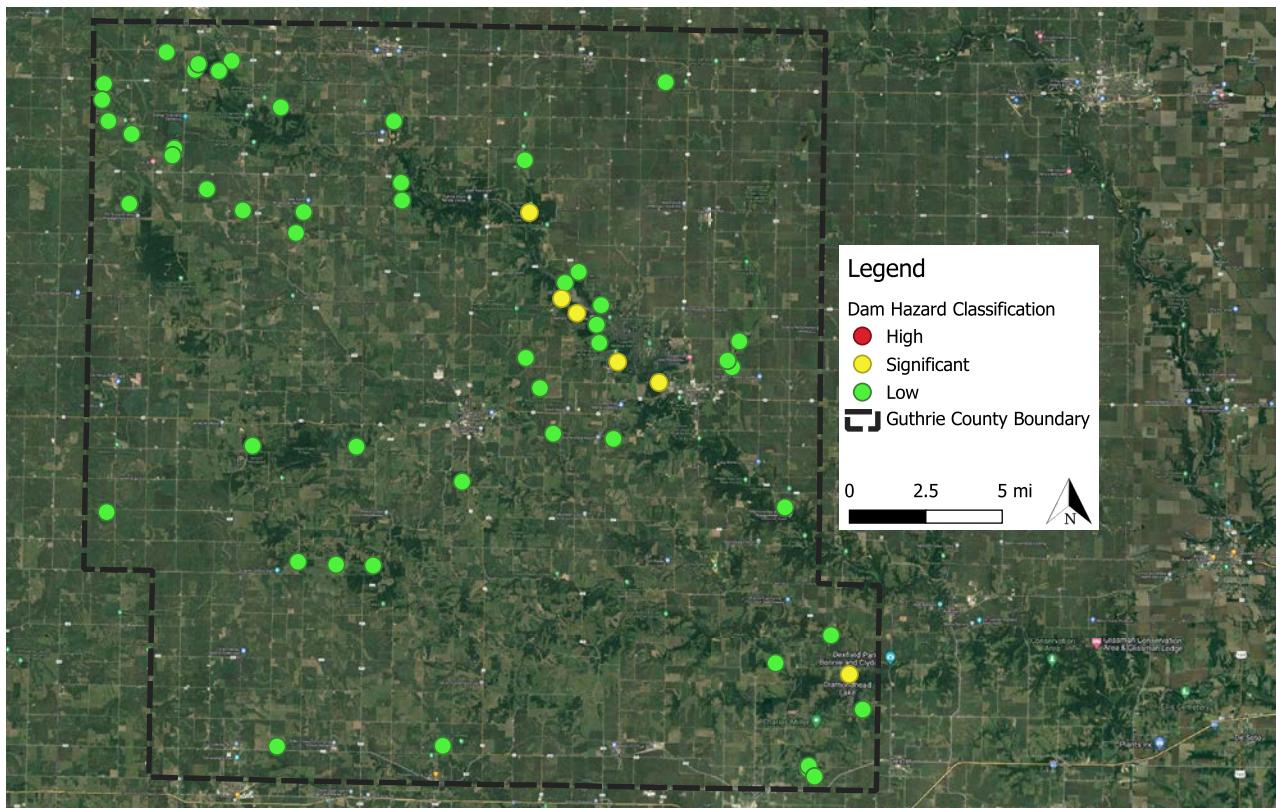
**Map 3.23: Adair County Dams and Hazard Ranking**



Of the fifty-six Guthrie dams in the inventory, six are considered to be significant hazard dams. The dams that are classified as significant are located near Guthrie County's two large lakes, Lake Panorama and Diamondhead Lake. The location of these and other Guthrie County dams, as well as their hazard ranking can be found in map 3.6. There have been no known occurrences of dam failure in Guthrie County. Sound design, quality construction, and continued inspections and repairs reduce the probability of dam failure.



**Map 3.24: Guthrie County Dams and Hazard Ranking**



The Iowa DNR is responsible for the state's dam safety program. The program involves the review and approval for the construction of new dams, maintaining an inventory of existing dams that meet minimum size criteria, and the periodic inspection of certain dams. The inventory excludes all dams less than six feet in height regardless of storage capacity and dams less than fifteen acre feet of storage regardless of height. Currently, there are approximately 3,800 dams in the state's inventory.

A majority of Iowa's dams on major rivers are well past their design life cycles. The average life span of a dam is fifty years. The average age of dams in Adair County 45 years with the average completion year of 1978. In Guthrie County, the average dam age is 49 years with the average completion year being 1974. This means that within the next one to five years, these dams will reach the end of their design life. With the majority of these dams being at the end of their design life, it is important that they are routinely inspected and maintained to ensure that the dams continue to function properly. The proper maintenance of these dams is important as there are people and properties located in the area which a dam failure would greatly impact. A dam failure could result in everything from minor property damage to significant property damage and potentially death.

Although Adair and Guthrie Counties have not had a dam failure in the reporting period, a dam failure can occur without warning, leaving little or no time for those downstream to escape. Some weak areas and possible failure points can be identified shortly ahead of a failure, allowing some time for evacuation and possible repair of the dam. Similar to dam failures, levee failures are difficult to predict and can occur without warning. High water levels that may result in the overtopping of a levee can sometimes be predicted hours in advance; however, if a levee is breached, there may not be any warning time. Mitigation actions that the jurisdictions may decide to implement could include both prevention and response actions to alleviate the impacts.

Mitigation actions that may be implemented to reduce the impacts of a dam failure may include:

- Consider the creation of a dam failure emergency action plan
- Budget for the demolition and reconstruction of old higher hazard dams to reduce potential for failure

## *Radiological Incident*

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A radiological event is an incident resulting in a release of radiological material at a fixed facility to include power plants, hospitals, laboratories and the like. Although the term “nuclear accident” has no strict technical definition, it generally refers to events involving the release of significant levels of radiation. Most commercial nuclear facilities in the United States were developed in the mid-1960s and are designed to withstand aircraft attack. Therefore, they should withstand most natural hazards even though they may not have been specifically designed for those forces (Iowa Hazard Mitigation Plan 2023).

Emergency Classification is a set of plant conditions which indicate a level of risk to the public. Nuclear power plants use the four emergency classifications listed below in order of increasing severity.

### *Notification of Unusual Event*

Under this category, events are in process or have occurred which indicate potential degradation in the level of safety of the plant. No release of radioactive material requiring off-site response or monitoring is expected unless further degradation occurs.

### *Alert*

If an alert is declared, events are in process or have occurred that involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the Environmental Protection Agency (EPA) protective action guides (PAGs).

### *Site Area Emergency*

A site area emergency involves events in process, or which have occurred, that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the EPA PAGs except near the site boundary.

### *General Emergency*

A general emergency involves actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs for more than the immediate site area (US Nuclear Regulatory Commission).

The Nuclear Regulatory Commission (NRC) defines two emergency planning zones around each nuclear power plant. The exact size and configuration of the zones vary from plant to plant due to local emergency response needs and capabilities, population, land characteristics, access routes, and jurisdictional boundaries. Generally, the two types of emergency planning zones are:

### *Plume Exposure Pathway*

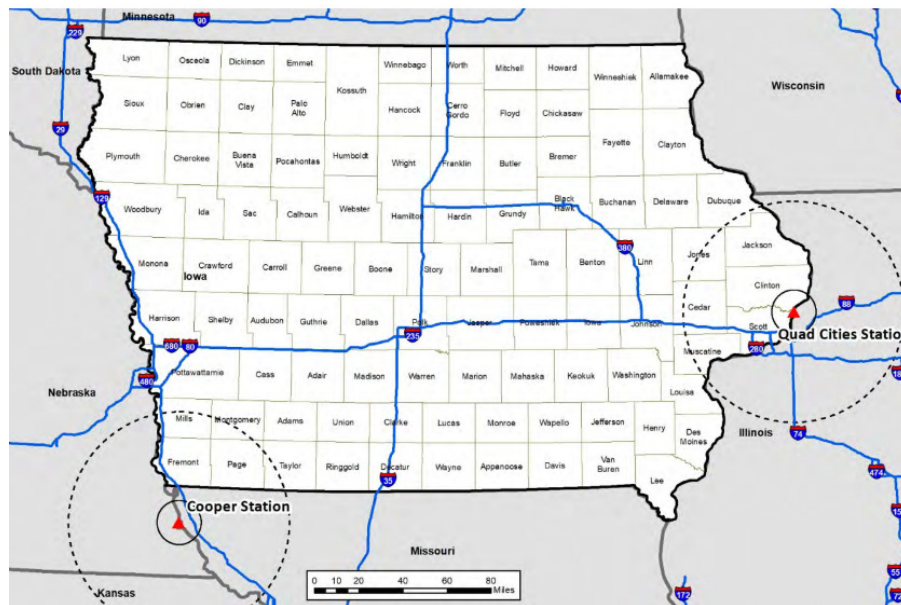
The Plume Exposure Pathway extends about ten miles in radius around the plant. The primary concern is exposure of the public to, and the inhalation of, airborne radioactive contamination.

## Ingestion Pathway

The Ingestion Pathway extends about fifty miles in radius around the plant. The primary concern is ingestion of food and liquid that is contaminated by radioactivity.

There are two nuclear power plants that operate close to Iowa's borders; the Quad Cities Generating Station near Cordova, Illinois, and the Cooper Nuclear Station near Brownsville, Nebraska. The map below identifies the location of each facility as well as the 10-mile and 50-mile planning buffers. Neither of these power plants are close enough to the planning area to be included in the 10 or 50 mile planning buffer, but it is still important to recognize their locations and the disruptions that an event at one of these plants could cause within the state.

**Map 3.25: Nuclear Plants Impacting Iowa, 2021**



Although no longer a power-producing plant, the Fort Calhoun Station was operable until the fuel was removed by November 13, 2016, and will not be considered fully closed until 2026. The site continues to be monitored and follows protocol for site decommissioning.

There have been no general emergency incidents in the United States since the NRC established the classification system in 1980. Iowa has one nuclear power plant located in Linn County. There are three other nuclear power plants near Iowa's borders. In over fifty years of nuclear power production in the United States, no deaths or injuries from radiation have been recorded among the general public. Time, distance, and shielding minimize radiation exposure to the body. It is more likely that a radiological incident in Adair or Guthrie County would occur because of a transportation incident. Radiological incidents occur with little or no warning. Map 3.8 displays the potential transportation routes that nuclear waste could travel throughout the State of Iowa. The map shows that one potential route of travel would be Interstate 80 which runs through the northern portion of Adair County, less than half a mile from the Guthrie County border. Since 1990, hundreds of shipments have been made through Iowa. There have been no occurrences of a radiological incident in Iowa. Transportation accidents are the most common type of incident involving radioactive materials because of the sheer number of radioactive shipments (Iowa Hazard Mitigation Plan, 2023).



# *Terrorism*

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

## *Enemy Attack*

An enemy attack incident that would cause massive destruction and extensive casualties. An all out war would affect the entire population. Some areas would experience direct weapons' effects: blast, heat, and nuclear radiation; others would experience indirect weapons' effects, primarily radioactive fallout. (Iowa Hazard Mitigation Plan, 2023)

## *Biological Terrorism*

The use of biological agents against persons or property for purposes of intimidation, coercion, or ransom can be described as biological terrorism. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point of line sources. Biological agents may pose viable threats from hours to years depending upon the agent and the conditions in which it exists. Depending on the agent and the effectiveness in which it was deployed, contamination can be spread by wind or water. Infections can also be spread by human or animal vectors.

## *Agro-Terrorism*

Agro-Terrorism is causing intentional harm to an agricultural product or vandalism of an agricultural/animal related facility. Activities could include the following: intentional release of lab animals, deliberate contamination of bulk milk tanks, poisoning animals, destruction of crops/facilities, and theft of agricultural products, machinery or chemicals, and vandalism of agricultural facilities.

## *Chemical Terrorism*

The use or threat of chemical agents against persons or property for purposes of intimidation, coercion, or ransom. Liquid/aerosol or dry contaminants can be dispersed using sprayers or other aerosol generators. Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists. Contamination can be carried out of the initial target area by people, vehicles, water, and wind.

## *Conventional Terrorism*

The use of conventional weapons and explosives against persons or property for purposes of intimidation, coercion, or ransom. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failures, etc. Conventional terrorism can also include tactical assault of sniping from remote locations.

## *Cyber Terrorism*

Cyber terrorism is an electronic attack using one computer system against another in order to intimidate people or disrupt other systems. Cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection. Generally, there are no direct effects on the built environment, but secondary effects may be determined depending upon the system being terrorized. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.

## *Radiological Terrorism*

Radiological terrorism is the use of radiological materials against people or property for purposes of intimidation, coercion, or ransom. Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits, moving sprayers, or by the detonation of a nuclear device.

## *Public Disorder*

Public disorder is the assembling of people together in a manner to substantially interfere with public peace to constitute a threat, and with use of unlawful force or violence against another person, or causing property damage or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Examples include mass demonstrations, or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community (Iowa Hazard Mitigation Plan 2023).

There are many small military installations in Iowa; most are Iowa National Guard assets spread throughout the state comprised of various military units and functions. The Iowa National Guard headquarters resides at Camp Dodge in Johnston. There have been no enemy attacks on or in Iowa in modern times and it is unlikely that Iowa would be a primary target during an enemy attack. However, an enemy attack is still a possibility due to international conflicts and the large number of weapons in existence throughout the world.

Following September 11, 2001, the country became more aware that terrorism is a very real threat. The Center for Disease Control (CDC) & Health Resources and Services Administration (HRSA) felt public health departments and hospitals would play a large role in preparedness for bioterrorism. In September 2002, the Iowa Department of Public Health (IDPH) received grant funding from the CDC for public health preparedness and funding from HRSA for hospital readiness efforts. All Iowa public health departments and hospitals are responsible for these efforts in their counties. The IDPH has set up six regions across Iowa to work together in these planning and preparedness efforts.

Agro-terrorism incidents have occurred in the State of Iowa, although on a limited scale. Animal rights activists have vandalized or released animals in agricultural facilities; also there has been vandalism to agricultural facilities or incidents of disgruntled employees causing damage to animals and animal products. There are frequent cases of theft of agricultural machinery, products, and chemicals. Chemical terrorism is even more uncommon than agro-terrorism, there have only been two identified chemical terrorism incidents in Iowa. One incident involved mailing rat poison to a number of state and local officials; the other incident involved individuals breaking into a city's water supply and suspected of depositing chemicals in the water supply.

The State of Iowa has experienced many bomb threats. In the spring of 2002, eighteen pipe bombs were found in mailboxes in five states stretching from Illinois to Texas, including Iowa. Five pipe bombs were found in Iowa and six people were injured in the bombings in Iowa and Illinois. In 2005 and 2006, pipe bombs were used in attempted murder cases in Forest City and Altoona.

Cyber-security and critical infrastructure protection are among the most important national security issues facing the United States today, and they will likely only become more challenging in the future. Recent attacks have disrupted electronic commerce and have had a debilitating effect on public confidence in the Internet.

Although large-scale destructive civil disturbances are rare, the potential is always there for an incident to occur. Often times, television, radio, and internet coverage helps to spread the incident to other uninvolved or unaffected areas, exacerbating an already difficult situation. Alcohol is often involved in public disorder, especially related to college campuses, sporting events, and concerts (Iowa Hazard Mitigation Plan 2010).

Unfortunately, there will never be a way to totally eliminate all types of terrorism. Adair and Guthrie Counties are unlikely to experience a terrorism incident within the planning period, but with the uncertain nature of the world, each jurisdiction may want to plan for the response and mitigation of the attack. If a person or persons are inclined to cause death and destruction, they are usually capable of finding a way to carry out their plans. Areas near government buildings, military complexes, and transportation, communication, and fuel facilities, would experience the largest impacts. Because Iowa serves as a food provider to the world, there is an increased risk of agro-terrorist activity. A full-scale attack in the foreseeable future is not likely; however, a limited attack could take place that could potentially threaten target areas. Acts of terrorism can be immediate and often come after little or no warning. The duration of a terrorist attack depends on the type of terrorism. A biological, chemical, or radiological attack could affect people/property for days, weeks, months, even years, depending on the substance used and the size of the area impacted. Due to the small size of the communities in Adair and Guthrie Counties, if public disorder should occur, it is expected to be resolved within hours. Conventional terrorism usually involves firearms and/or explosives. These events are short-term in nature, and would not be expected to last very long. The committee determined that on average, a terrorism event would last less than one day.

Mitigation actions that may be implemented to prevent or reduce the impacts of a terrorism may include:

- ▶ Promote the “If You See Something, Say Something” campaign

## *Transportation Incident*

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The hazard includes all modes of transportation- air, highway, railway, and waterway. This includes any transportation accident that directly threatens life and which results in property damage and/or death(s)/injury(s) and/or adversely impacts a community’s capabilities to provide emergency services.

An air transportation incident may involve a military, commercial, or private aircraft. Air transportation is playing a more prominent role in transportation as a whole. Airplanes, helicopters, and other modes of air transportation are used to transport passengers for business and recreation, as well as thousands of tons of cargo. A variety of circumstances can result in an air transportation incident: mechanical failure, pilot error, enemy attack, terrorism, weather conditions, and on-board fires can all lead to an incident. Statistics from the National Transportation Safety Board and the airline industry show that the majority (over 75%) of airplane crashes and accidents occur during the takeoff or landing phases of the flight.

A highway transportation incident can be single or multi-vehicle requiring responses exceeding normal day-to-day capabilities of response agencies. An extensive surface transportation network exists in Iowa; local residents, travelers, businesses, and industries rely on this network on a daily basis. Hundreds of thousands of trips a day are made on the streets, roads, highways, and interstates in the state; if the designed capacity of the roadway is exceeded, the potential for major highway incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the state.

Railway incidents may include derailments, collisions, and highway/rail crossing accidents. Train incidents can result from a variety of causes: human error, mechanical failure, faulty signals, and/or problems with the track. Results of an incident can range from minor “track hops” to catastrophic hazardous material incidents and even human/animal casualties. With the many miles of track in Iowa, vehicles must cross the railroad tracks at numerous at-gate crossings.

Waterway incidents will primarily involve pleasure crafts on rivers and lakes. In the event of an incident involving a water vessel, the greatest threat would be drowning, fuel spillage, and/or property damage. Waterway incidents may also include events in which a person, persons, or object falls through the ice on partially frozen bodies of water (Iowa Hazard Mitigation Plan 2023).

The 2020 Iowa Aviation System Plan classifies airports into five categories: Local Service, Basic Service, General Service, Enhanced Service, and Commercial Service. Each system role is defined by a set of criteria based upon current levels of infrastructure and services. Currently there are eight Commercial, fifteen Enhanced, thirty General, eighteen Basic, and forty-one Local airports within the state.

Adair County has three airports: two private and one public. The public airport, Greenfield Municipal Airport, is located in Greenfield and is owned by the City of Greenfield. The airport is located approximately one mile north of the city. The Iowa Aviation System plan 2010-2030 estimates that the Greenfield Municipal Airport will grow from fourteen based aircraft in 2010 to eighteen based aircraft in 2030. During that same period, the number of operations will increase from 3,500 to 4,500.

Guthrie County has one local service airport. Local Service airports support local aviation activity with little or no airport services. The Guthrie County Regional Airport is owned and operated by the Guthrie County Regional Airport Authority, with membership from Guthrie County and the cities of Guthrie Center, Yale, and Panora. The airport is located approximately three miles east of Guthrie Center. The Iowa Aviation System plan 2010-2030 estimates that the Guthrie County Regional Airport will grow from fifteen based aircraft in 2010 to nineteen based aircraft in 2030. During that same period, the number of operations will increase from 3,750 to 4,750.

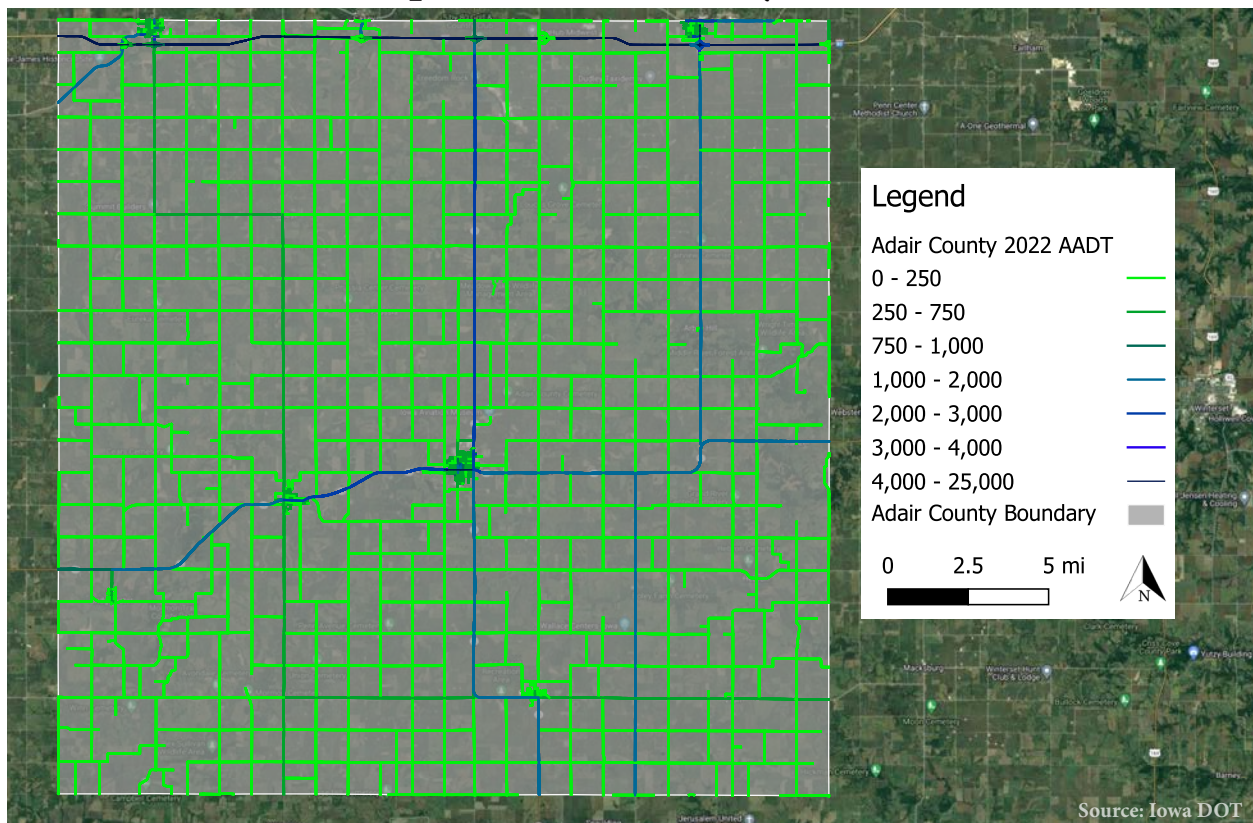
From January 1, 2013 to October 27, 2023 there were 3 air transportation accidents in Adair and Guthrie Counties. According to the National Transportation Safety Board, Adair County accounted for one of the accidents during this time frame and Guthrie County accounted for two of them. The Adair County incident occurred on March 17, 2022 and caused minor injuries. The first Guthrie County incident occurred on September 12, 2015 and caused minor injuries and the second occurred on November 9, 2018 and was a fatality.

The predominant transportation network in the planning area, as well as the State of Iowa, is highways and roads. All modes of transportation, including air, rail, trails, and transit systems require the use of highways and roads.

Map 3.8 displays the major highways and their average annual daily traffic (AADT) in Adair County. According to the Iowa Department of Transportation, from 2012-2016, Adair County had 783 traffic accidents. These accidents resulted in 31 fatalities and 283 injuries. Over 40% of the accidents in Adair County caused an injury or fatality.

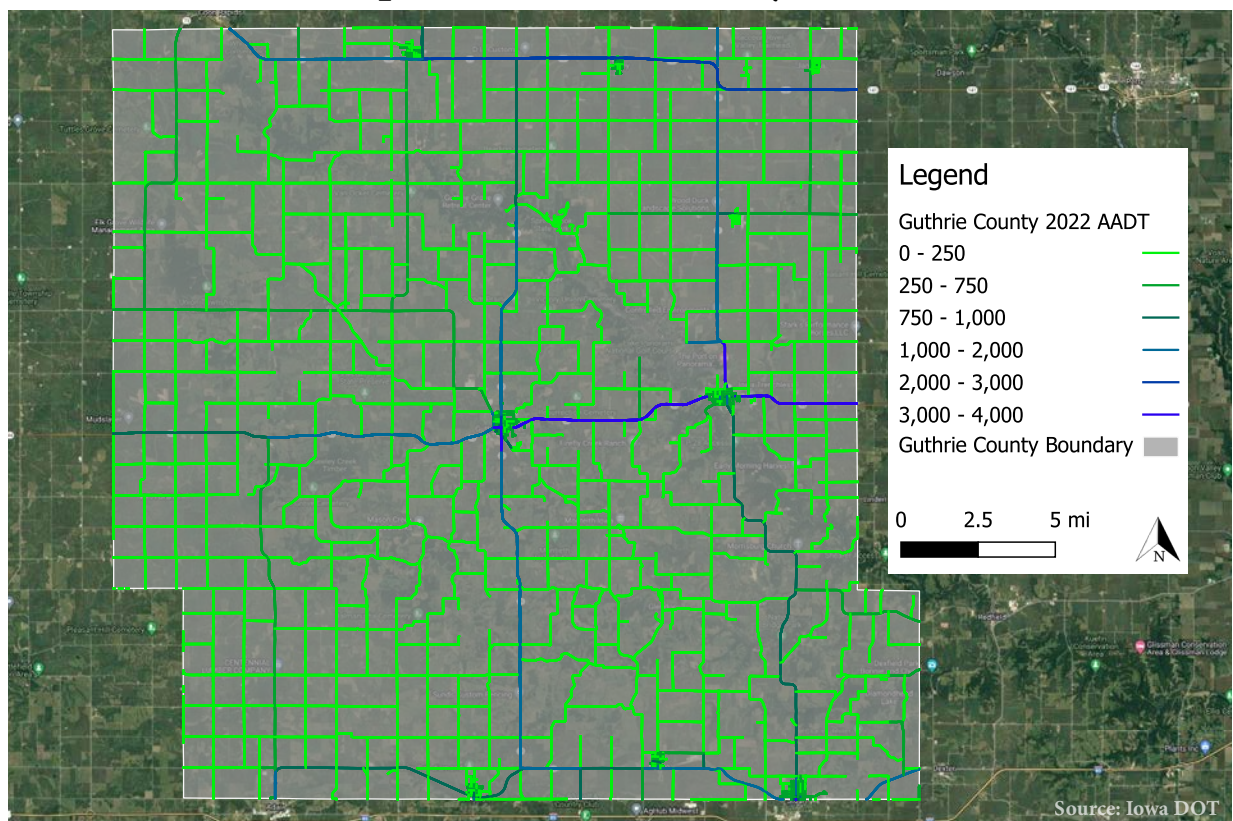


### Map 3.26: Adair County AADT



Map 3.9 displays the major highways and AADT in Guthrie County. AADT is a measurement providing the average number of vehicles per day on a given roadway segment over a one-year period. From 2012-2016, Guthrie County had 604 traffic accidents. These accidents resulted in 15 fatalities and 226 injuries. 41% of the traffic accidents in Guthrie County caused an injury or fatality.

### Map 3.27: Guthrie County AADT



As the volume of traffic on streets, highways, and interstates increase, the number of traffic accidents will increase too. The combination of traffic volume, weather conditions, mechanical error, and human error creates the potential for a traffic accident.

Railroads are a vital part of Iowa’s overall transportation system, helping to move both freight and passengers safely and efficiently. Railroads are critical in moving some of Iowa’s commodities including corn, soybeans, chemicals, motor vehicles, wood and paper products, minerals and ores, coal, and biofuels. Maintaining and improving railroad service in Iowa requires a proactive partnership between a number of organizations, including private rail carriers, rail shippers, passengers, the Iowa DOT, other state and federal agencies, and local governments.

Adair County does not have a large rail presence, with only the Iowa Interstate Railroad running through the northern part of the county. Adair County had an average of three thru train movements over a 24-hour period in 2023. On average, 6,730 vehicles within Adair County cross railroad tracks daily, with approximately 7% of those being trucks. Map 3.10 shows the railroad carries in Adair County, along with their annual gross tons per mile.

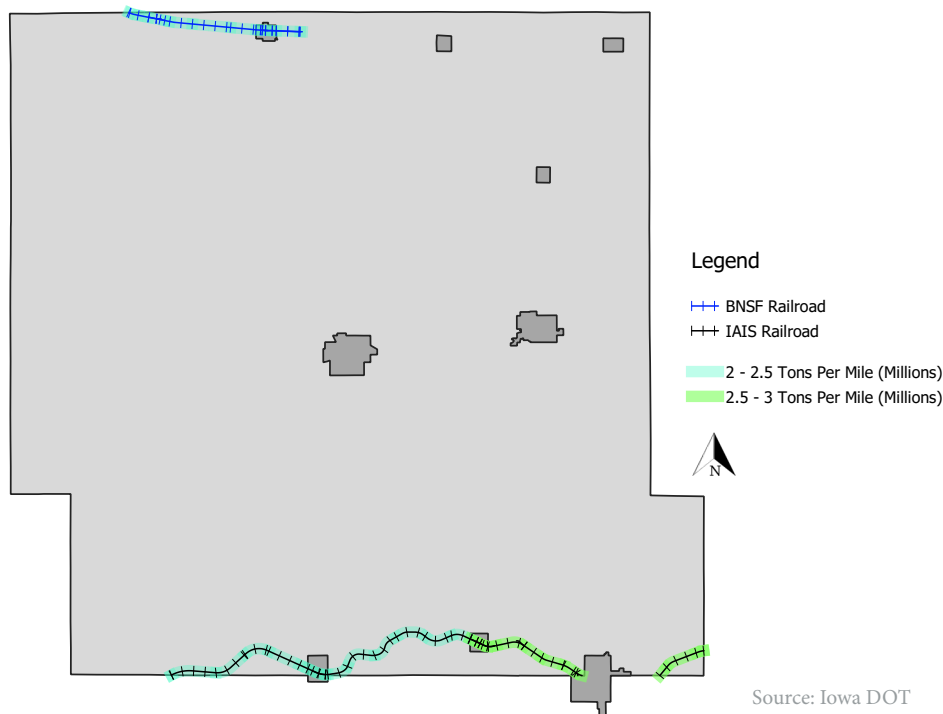
**Map 3.28: Adair County Railroads**



Source: Iowa DOT

Guthrie County does not have a large rail presence, despite its west-central location in Iowa. There are two rail lines that serve Guthrie County; BNSF, and the Iowa Interstate Railroad. Guthrie County is served by BNSF in the very northern portion of the county, and the Iowa Interstate Railroad running east-west through the southern portion of the county. Adair County had an average of 3 thru train movements over a 24-hour period in 2016. On average, 3,785 vehicles within Guthrie County cross railroad tracks daily, with approximately 11% of those being trucks. Map 3.11 shows the railroad carries in Guthrie County, along with their annual gross tons per mile.

### Map 3.29: Guthrie County Railroads



Even with rail miles decreasing, Iowa's rail traffic has doubled over the last fifteen years and is expected to keep increasing. Iowa ranks eleventh in the country in terms of total rail miles. Rail cars are getting larger and trains are getting longer. In 1990, the majority of trains were twenty-four cars or less; today, the majority of trains are averaging one hundred cars. Overall, derailments have declined, as have rail/highway crossing accidents. There are still incidents that occur, but the number of those incidents has decreased.

In 2021, 517,100 rail carloads originated in Iowa and 257,300 terminated in the state. These carloads hauled the 60.1 million tons of freight that originated in Iowa, 29.9 million tons that terminated in Iowa. Roughly 215.4 million tons of freight passed through the state in 2021.

Rail accidents of all kinds, including derailments and track or equipment failures, have decreased over time. More importantly, crossing accidents involving trains and automobiles have also decreased. This comes at a time when rail traffic is increasing, which means that safety is improving substantially. From 2020 to 2023, Adair County did not experience any rail-automobile accidents. During that same period, Guthrie County experienced seven rail-automobile accidents.

There have been no disasters causing waterway incidents in Iowa. There have been numerous search and rescue events involving a single person or small boats with only a few people on board. Small-scale incidents on lakes and rivers have resulted in the loss of life from pleasure craft collisions and/or falls from vessels. Neither Adair County nor Guthrie County have any navigable waterways for commercial purposes.

Adair and Guthrie Counties will experience some form of transportation incident within the life of this plan. Vehicular accidents are the most likely to occur on a regular basis. There were 783 incidents of traffic accidents in Adair County from 2012-2016 and during the same time period, Guthrie County reported 604 incidents. While both counties experienced an air traffic accident during the last planning period, these incidents are not as likely to occur as only 3 were reported between the two counties. Both counties may experience a rail-automobile accident, but these incidents occur on a limited basis. If a waterway incident were to occur, it would not include a commercial watercraft, but could include personal pleasure craft collisions and/or falls. All

jurisdictions should be prepared to respond to any transportation incident as they occur without warning and each incident is different. As transportation modes and infrastructure varies by jurisdiction, each jurisdiction will need to evaluate their transportation system and implement action items that fit their needs.

*A number of resources were used in gathering the information used in this chapter. They are as follows: Iowa Hazard Mitigation Plan 2023; Association of State Dam Safety Officials; Iowa DNR; National Inventory of Dams; FEMA; National Weather Service; NOAA; National Climatic Data Center; National Drought Mitigation Center; National Wildfire Coordinating Group; National Fire Protection Association; National Severe Storms Laboratory; Vaisala Inc.; Storm Prediction Center; The Weather Channel; Iowa Department of Agriculture; Iowa State University Extension; American Association of Equine Practitioners; Iowa Department of Public Health; The Center for Food Security and Public Health; U.S. Nuclear Regulatory Commission; Iowa Department of Transportation; American Association of Railroads; Federal Railroad Administration Office of Safety Administration; and Guthrie County Home Health, Hospice and Public Health*



# Chapter 4: Vulnerability Assessment and Loss Estimates

The final step in the risk assessment is to identify the likely level of loss for each type of hazard determined to affect the jurisdiction. The vulnerability assessment and loss estimates assess the County's total exposure to identified hazards. The vulnerability assessment consists of a vulnerability overview for each profiled hazard, an evaluation of potential losses to existing development, a description of the methodology used to estimate losses, and data limitations/corrective actions.

Risk assessment information was gathered from all jurisdictions through discussions held at jurisdiction meetings. Information provided was compared to reported data and compiled. The information provided and discussions identified if a hazard had occurred in the jurisdiction previously, if the hazard was likely to occur in the future, the probability of the hazard occurring in a given year, the magnitude/severity the hazard would have on the jurisdiction, the amount of warning time before a hazard occurred, and the estimated duration that the hazard would last. The final risk assessments were written after further discussion with the Hazard Mitigation Committee, public responses and further detailed research on past hazard occurrences. The risk assessment information, as provided by Adair and Guthrie Counties and individual jurisdictions in Appendices A through P, varies slightly due to geographical area and jurisdictional representatives' personal opinions on the identified hazards and their associated risks. For example, a transportation incident may impact each jurisdiction differently depending on the location of highways, railways and airports in relation to the jurisdiction.

County-wide assessments have been determined for each hazard that could have affect a large portion of the county. These hazard assessments are represented in the Adair County and Guthrie County Appendices. Each individual city has assessed these individual hazards differently based upon history and experience.

## Structural Inventory

A structural inventory was completed for the corporate limits of each jurisdiction in Adair and Guthrie Counties. Structural inventories were completed to determine the type, number and value of structures within each jurisdiction. This information is critical to help determine vulnerability and potential losses in each jurisdiction. Structures were classified into the following categories:

- Residential – structures which are primarily used or intended for human habitation.
- Commercial – structures primarily used or intended as a place business where goods, wares, services, or merchandise is stored or offered for sale. Commercial also includes hotels, motels, rest homes, structures consisting of three or more separate living quarters and any other buildings for human habitation that are used as a commercial venture.
- Industrial – structures used primarily as a manufacturing establishment.
- Agricultural – Structures located on all tracts of land which are used primarily for agricultural purposes, except buildings which are primarily used or intended for human habitation.

# Loss Estimates

Potential losses for each hazard, as identified by each jurisdiction, were estimated using the structural inventory. It is beyond the scope of this plan to complete an inventory of structures and critical facilities located within the 100-year floodplain. The Iowa Department of Natural Resources, along with the Iowa Flood Center, created new, comprehensive, accurate floodplain maps for Iowa cities and counties. The maps show the boundaries of flooded areas for the 1% annual chance (100-year) and 0.2% annual chance (500-year) floods. According to Iowa Department of Natural Resources, there are no repetitive loss properties located within Adair County. The only repetitive loss property within Guthrie County is zoned A-2 and is utilized as public land, which limits the structures that can be placed on the property to limit losses. The results from the structural inventories are discussed in more detail for each jurisdiction in Appendices A through P.

To determine the extent of an area that is susceptible to damages from each hazard, the committee estimated the magnitude/severity of each hazard on the jurisdiction. The magnitude/severity is an assessment in terms of injuries, fatalities, and property and infrastructure damage. The number of structures in the hazard area was determined by taking the maximum magnitude/severity percentage from chapter 3. Table 4.1 shows the percentages used.

**Table 4.1: Loss Estimate Magnitude and Severity Impacts**

Description		Percentage Used in Loss Estimates
Catastrophic	More than 50% of property severely damaged Shutdown of facilities and services for more than 30 days Multiple deaths	100%
Critical	25% to 50% of property severely damaged Shutdown of facilities and services for at least 2 weeks Injuries/illnesses that results in permanent disability	50%
Limited	10% to 25% of property severely damaged Shutdown of facilities and services for more than a week Injuries/illnesses that do not result in permanent disability	25%
Negligible	Less than 10% of property severely damaged Shutdown of facilities and services for less than 24 hours Injuries/illnesses treatable with first aid	9%

The committee determined that Adair and Guthrie Counties are vulnerable to the following hazards:

- Animal/Plant/Crop Disease
- Drought
- Extreme Heat
- Flash Flood
- Grass or Wild Land Fire
- Hailstorm
- Hazardous Material
- Human Disease
- Infrastructure Failure
- Radiological
- River Flooding
- Severe Winter Storms
- Sinkholes
- Terrorism
- Thunderstorm and Lightning
- Tornado
- Transportation Incident
- Windstorm

Based on the potential impacts of each hazard that is listed above, the vulnerability and loss estimates for each jurisdiction in Adair and Guthrie Counties were calculated. All structural data in the tables and figures are based on 2021 parcel data provided by the Adair and Guthrie County Assessors and population data came from the 2020 U.S. Census.

The parcel data was manipulated to eliminate missing or incomplete information. Parcel data was not used if it did not have a designated land use or if it has a dwelling or building value of \$0. The calculations for “Number of Vulnerable Structures” are based on those structures that are exposed to each hazard. While 100% of the jurisdiction may be vulnerable to a hazard, not 100% of jurisdiction will necessarily experience damages due to the hazard. The “Number of People Vulnerable” for each hazard was based on the total population. By multiplying the total population for the county by the percentage of exposure, the number of residents at risk could be calculated.

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table B.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table 4.2: Adair County Maximum Exposure**

Type of Structure	Value of Structures	Number of People
Residential	\$250,547,248.00	7,496
Commercial	\$59,837,232.00	
Industrial	\$179,716,537	
Agricultural Structures	\$7,474,587.00	

**Table 4.3: Guthrie County Maximum Exposure**

Type of Structure	Value of Structures	Number of People
Residential	\$463,967,628.00	10,623
Commercial	\$56,690,865.00	
Industrial	\$58,778,424.00	
Agricultural Structures	\$4,957,300.00	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to tables 4.4 and 4.5. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table 4.4: Adair County Limited Hazard Impacts**

Type of Structure	Value of Structures	Number of People
<b>Agricultural</b>	\$1,868,647	1,874
<b>Commercial</b>	\$14,959,308	
<b>Industrial</b>	\$44,929,134	
<b>Residential</b>	\$62,636,812	

**Table 4.5: Guthrie County Limited Hazard Impacts**

Type of Structure	Value of Structures	Number of People
<b>Agricultural</b>	\$1,239,325	2,656
<b>Commercial</b>	\$14,172,716	
<b>Industrial</b>	\$14,694,606	
<b>Residential</b>	\$115,991,907	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to tables 4.6 and 4.7. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

**Table 4.6: Adair County Critical Hazard Impacts**

Type of Structure	Value of Structures	Number of People
<b>Agricultural</b>	\$3,737,294	3,748
<b>Commercial</b>	\$29,918,616	
<b>Industrial</b>	\$89,858,268	
<b>Residential</b>	\$125,273,624	

**Table 4.7: Guthrie County Critical Hazard Impacts**

Type of Structure	Value of Structures	Number of People
<b>Agricultural</b>	\$2,478,650	5,312
<b>Commercial</b>	\$28,345,432	
<b>Industrial</b>	\$29,389,212	
<b>Residential</b>	\$231,983,814	

*Each individual jurisdiction and rural county loss estimates can be found in their respective appendix.*



# Chapter 5: Mitigation Strategies

*Section 201.6 (c)(3)(i): The plan must contain a mitigation strategy that provides the jurisdictions 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 must include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.*

*Section 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.*

The hazard mitigation goals, objectives and actions are directly connected to the hazard analysis and risk assessment. After the hazard risk analysis was completed for each jurisdiction, broad-based county-wide goals were developed to address hazards and their impact on jurisdictions. The committee used a top-down approach where the overall goals were determined, then worked down to establish more specific objectives and even more specific mitigation actions. As a starting point, each jurisdiction was provided with the goals from their previous hazard mitigation plan. If a jurisdiction did not have a previous hazard mitigation plan, they were given the county's previous goals. This hazard mitigation plan's goals are identified as follows:

- Maintain and protect public infrastructure
- Minimize deaths, injuries, property loss, and vulnerability due to natural hazards
- Improve coordination, public communication, education, and awareness of hazards
- Enhance community protection
- Maintain and support public safety facilities, including equipment and training

Using the plan goals as a platform, each jurisdiction decided upon mitigation objectives and actions to help reduce or eliminate the impacts of hazards. Objectives were defined as strategies or steps to achieve the goals that have been set. They are more specific and narrower in scope than goals. It is important that the objectives be measurable in order to determine if the action was successfully implemented. Actions were defined as specific activities to reduce hazard risks. Actions can be classified into six mitigation categories-prevention, property protection, public education and awareness, natural resource protection, emergency services and structural projects.

Each committee member was supplied with a supplement to provide help in picking mitigation actions. The supplement was titled *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*. The booklet contained a list of possible hazard mitigation measures for communities compiled from FEMA. The list gives mitigation ideas for natural hazard types, such as flood, tornadoes and drought. A worksheet was also distributed to committee members with examples of mitigation objectives and actions from several approved mitigation plans. In addition, committee members were given copies of their jurisdiction's previous objectives and actions from past hazard mitigation plans. As extensive as the three resources were, they did not prohibit other local ideas for actions to save lives and prevent or reduce damages.

This plans mitigation goals and objectives fall under the state's three main goals to provide complete protection to the citizens of the county. Each of the county's goals falls under the umbrella of the states three main goals which include:

- Protect the health, safety, and quality of life for Iowa citizens while reducing or eliminating property losses, economic costs, and damage to the natural environment caused by a disaster.
- Ensure government operations, response, and recovery are not significantly disrupted by disasters.
- Expand public awareness and encourage intergovernmental cooperation, coordination, and communication to build a more resilient community against all hazards.

## Action Plan

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The Action Plan is a combination of the hazards addressed by each action, the prioritization of actions, the responsible department for the action, the estimated cost of the action, the potential funding source for the action, the mitigation measure category, and the target completion date of the action. All of these categories are explained in the following sections. The county-wide action plans can be found later in this chapter, the city and school district's Action Plans can be found in their respective appendix.

### *Priority*

Priority for each action is determined as High, Moderate, or Low.

➤ High- Completing this action item is vital to the jurisdiction's efforts towards either mitigating hazards or responding to them. The benefit of completing this project is greater than the cost. These projects tend to need to be completed within a short timeframe.

➤ Moderate – Completing this action would benefit the city's efforts towards mitigating hazards or responding to them, but if these projects are not completed, the jurisdiction can still further their efforts. The cost of these projects equals the benefit on the jurisdiction. These projects need to be completed in the mid timeframe.

➤ Low- If this action were to be completed, the jurisdiction would benefit, but if it is not completed, it will not be detrimental to the city's hazard mitigation efforts or response. The cost of the project outweighs the benefit the project will have on the jurisdiction. These projects tend to be completed long-term.

### *Estimated Cost*

Estimated costs for each action is determined as: minimal, low, moderate or high based on the following:

- Minimal – cost estimate is \$9,999 or less
- Low – cost estimate ranges from \$10,000 to \$99,999
- Moderate – cost estimate ranges from \$100,000 to \$299,999
- High – cost estimate is \$300,000 or greater

### *Mitigation Measure Categories*

#### *Prevention Actions*

Prevention actions are intended to address future development. These actions influence the way land and buildings are developed and built. These actions ensure that future development does not increase hazard losses, and guides future development away from hazards. Examples of these actions include:

- Planning and zoning codes that limit development in a floodplain
- Building codes
- Capital improvement programs that prevent extension of public infrastructure into hazard areas
- Open space preservation and development of parks and recreational areas in hazard prone areas
- Storm water management regulations.

## *Property Protection Actions*

Property protection actions modify existing structures or their surroundings to protect them from a hazard. These actions directly protect people and property at risk. Protecting a building does not necessarily affect the building's appearance and is therefore a popular mitigation action for historic and cultural sites. Examples of these actions include:

- Acquisition of lands that are vulnerable to damage
- Elevation
- Relocation of hazard-prone structures to safer areas
- Structural retrofits to reduce damage by future hazards
- Storm shutters
- Flood-proofing

## *Public Education and Awareness Actions*

Actions to inform and educate citizens, elected officials, and property owners about hazards and the actions they can take to avoid potential damage and injury. These actions are directed toward property owners, business owners, and visitors to the community. Examples include:

- Outreach projects that provide hazard information to the public, business and property owners
- Real estate disclosure so that potential property owners are informed of the risk before purchase
- Hazard information centers
- School-age and adult education programs

## *Natural Resource Protection Actions*

Actions that reduce the intensity of hazard effects and preserves or improves the quality of the environment and wildlife habitats. The actions are usually implemented by parks, recreation, or conservation agencies and organizations. These actions can include:

- Sediment and erosion control
- Stream corridor restoration
- Watershed management
- Forest and vegetation management
- Wetland restoration and preservation
- Expanding public open space

## *Emergency Services Actions*

Actions that protect people and property before, during, and immediately after a disaster or hazard event. Examples of these actions are:

- Warning systems
- Emergency response services
- Protection of critical facilities and infrastructure

## *Structural Project Actions*

Actions are called “structural” because they involve the construction of structures or devices to reduce the impact of hazards. Actions in this category directly protect people at risk. These actions can include:

- Dams
- Levees
- Floodwalls
- Retaining walls
- Safe rooms
- Reservoirs to store drinking water
- Diversion of storm water

## Target Completion Date

The target completion date is the estimated amount of time that the jurisdiction feels the action can be completed in. It is broken into four categories:

- Short – 0 to 2 years
- Mid – 3 to 6 years
- Long – 7+ years
- Ongoing

## Rural Adair County Status of Previous Mitigation Actions

**Table 5.1: Rural Adair County Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Annually, train key local leaders about hazard mitigation			X		
Assure local plans are in place and current					X
Build and/or replace culverts and bridges		X			
Business and residential preparedness programs			X		
Clear and deepen ditches		X			
Community drills			X		
Consider local Code Red (E911) participation	X				
Construct community safe rooms in or near existing and future critical assets and parks	X Some Locations				X
Develop and implement watershed studies and plans for possible flood prone areas		X			
Develop continuity of operations & succession plans for jurisdiction	X				
Develop debris disposal sites	X				
Develop electronic resource directory of local resources	X				
Develop soil erosion stabilization projects/riprap projects		X			
Develop/update FIRM Flood Maps	X				
Encourage citizen purchase and use of smoke detectors		X			



	Status				
Previous Actions	Complete	Underway	Ongoing	Future	Not Implemented
Encourage purchase of private home/ property insurance		X			
Full review of policy, procedure, and codes					X
Install siren warning systems	X				
Involve more groups in hazard mitigation			X		
Maintain local streets, roads, highways; upgrade quality, pave			X		
Purchase snowplows, trucks, and sanders				X	
Put hazard maps and other local data on county's GIS Mapping					X
Update first responder and interagency communications protocols and equipment to meet national/state interoperability standards			X		
Update the hazard mitigation plan every 5 years		X			

# Rural Adair County Action Plan

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table 5.2: Rural Adair County Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

**Table 5.3: Rural Adair County Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Acquire and demolish or relocated buildings and infrastructure in high-risk areas	Infrastructure Failure, River Flood	Mod.	Supervisors, Departments that manage infrastructure and assets, private utilities	Low	Local, State, FEMA	Property Protection	Mid
Acquire and use conservation easements and restrictive covenants to prevent development in known hazard areas.	River Flood, Flash Flood	Low	Supervisors, EMA, flood manager	Low	Local, FEMA, State	Property Protection	Long
Acquire flood prone buildings and convert to open space/green space or elevate to or above base flood elevation or above flash flood reach.	River Flood, Flash Flood	Low	Supervisors, EMA, flood manager, FEMA/IHSEMD	Low	Local, FEMA, State	Property Protection	Long
Adopt tree trimming ordinances.	Severe winter storm, tornado/windstorm	High	Supervisors, Co. Engineer	Minimal	Local	Prevention, Property Protection	Short
Bury existing overhead utility lines.	Energy Failure, Severe Winter Storm	Mod.	Private Utilities, Funding Agencies	Moderate	Local governments, utility providers, property owners	Prevention, Property Protection	Mid
Clear and deepen ditches on right of ways (ROWs).	Flash Flood, Structure failure	Mod.	Secondary Roads	Low	Local, FEMA/State, property owners, USDA, Iowa SRF	Prevention, Property Protection	Short
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornadoes/Windstorms, Thunderstorms	Mod.	Supervisors, EMA, Conservation Board	High	Local governments, property owners, State/FEMA	Property Protection	Short
Create and maintain a special needs/oxygen user registration program or inventory.	Infrastructure Failure, severe winter storm	Low	EMA, local response agencies	Low	Local, State/FEMA	Property Protection	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Discourage/prohibit development in flood plain areas; join or continue participation in the NFIP.	River Flood	Mod.	Supervisors, flood manager, EMA, IDNR	Minimal	Local, FEMA, IDNR	Prevention, Property Protection,	Short
Distribute tornado shelter location information.	Tornado/windstorm, thunderstorm	Mod.	Conservation Board	Minimal	Local, FEMA, local grants	Property Protection	Short
Elevate, raise grade, or relocate roads, bridges, sewer lift stations, water pumps, and other infrastructure and critical assets.	Transportation incidents, flash flood	Mod.	Supervisors, Secondary Roads	Moderate/High	Local, FEMA/State, Iowa DOT, Federal Transportation Funding, USDA, Iowa SRF, CDBG	Property Protection, Structural Project	Short
Encourage the implementation of water-saving measures, including soil and water conservation practices.	Drought, River Flooding	Mod.	SWCD/NCRS, ISU Extension, agriculture groups	Minimal	Local, local conservation groups, State and Federal water quality cost share programs	Public Education and Awareness	Mid
Encourage the use of non-combustible materials (i.e. stone, brick, etc.) for structures in wildfire hazard areas.	Grass/Wild Land Fire, Structural Fire	Low	Supervisors, EMA, DCD	Minimal	Local, sustainability groups/foundations	Property Protection, Structural Project	Long
Encourage/install sustainable storm water control and water quality practices such as buffer strips, bioswales, rain gardens, porous pavement, vegetative buffers, and parking area islands.	Flash Flood, Infrastructure failure	Mod.	Conservation Board, S&W Conservation District	Low/Moderate	Local governments, local SWCD/ NRCs offices, Iowa Dept. of Ag, ISU Extension	Property Protection, Public Education and Awareness	Mid
Flood proof critical assets in the community.	River Flood, Flash Flood	High	Local Governments, EMA, Facility owners	Low	Local, FEMA/State, local foundations, facility owners	Property Protection, Emergency Services	Mid



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Implement GIS mapping system and utilize digital hazard maps.	Infrastructure Failure, River Flooding	Mod.	EMA, SICOG, GIS Provider	Minimal	Local, foundations, state/federal grants	Public Education and Awareness	Short
Implement stream modifications/channel improvements and stream bank stabilization.	River Flood, Flash Flood	Mod.	Conservation Board, Secondary Roads, S&W Conservation District	Varies	Local, FEMA, USDA, IDALS, IDNR, CDBG, SRF	Property Protection, Natural Resource Protection	Short
Improve transportation infrastructure (resurface, pave, widen roads, increase bridge capacity, etc.), and replace deteriorated infrastructure.	Transportation Incident	High	Supervisors, Secondary Roads	Moderate	Local, RUTF, Iowa DOT, Federal Highway Funding, bonding, TIF, special assessments	Property Protection	Short
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms.	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA, Supervisors, SICOG	Minimal	Local, FEMA/State, private foundation	Prevention	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Increase production capacity - redundant systems and looping (water, sewer, electric, gas).	Drought, Infrastructure Failure	Mod.	Private Utilities, Supervisors	Moderate	Local, energy/ utility companies, USDA, Iowa SRF, CDBG, Bonding, TIF, Federal EDA	Prevention, Property Protection	Mid
Install windbreaks (permanent and seasonal). Use snow fences or "living snow fences" (e.g. rows of trees or other vegetation) to limit wind effects.	Severe winter storm, Grass/ Wild Land Fire	Mod.	Supervisors, Conservation, Secondary Roads, private landowners, NRCS/SWCD	Minimal	Local, USDA, conservation partners, cost share programs, affected property owners, grants	Prevention, Property Protection	Mid
Integrate tornado safe room retrofits into critical assets/facilities.	Tornado/Windstorm	Mod.	Local governments	High	FEMA/State, local	Property Protection, Structural Project	Long
Participate in the FEMA Community Rating Service (CRS) program.	River Flood, Structural Failure	Low	Supervisors, EMA, IDNR, FEMA, Flood Manager	Minimal	FEMA/State, local in-kind	Property Protection, Public Education and Awareness	Long
Promote the construction of private in-home tornado safe rooms.	Tornado/Windstorm	Low	EMA, SICOG, ISU Extension, IHSEMD	Minimal	EMA, FEMA/ State, local, engaged property owners	Property Protection, Structural Project	Mid
Provide safe room education for builders and developers.	Tornado/Windstorm	Low	EMA, SICOG, IHSEMD	Minimal	Local, State/ FEMA, in-kind	Public Education and Awareness	Short
Purchase stand-by portable pumps and generators.	Infrastructure Failure, Flash Flood	Mod.	Supervisors, Secondary Roads, EMA, Conservation	Minimal	Local, USDA, CDBG, grants, utility partners	Property Protection	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Purchase/install backup fixed power generators and pumps.	Infrastructure Failure	Mod.	EMA, Conservation, Secondary Roads	Low	Local, FEMA/State, USDA, CDBG, Iowa SRF, grants	Property Protection	Short
Repair and weatherize old and/or structurally weak homes.	Severe winter storm, tornado/windstorm, thunderstorm	Mod.	Supervisors, SICOG HTF, MATURA	Low	SCICAP, USDA, CDBG, grants	Property Protection	Short
Retrofit/harden existing overhead utility lines.	Infrastructure Failure	High	Private Utilities, funding agencies	High	FEMA/State, local, utility providers, USDA	Property Protection	Short
Dredge public lakes	Infrastructure Failure	Mod.	Conservation Board, Utility providers, Supervisors	High	FEMA/State, local, utility providers	Property Protection	Short
Address intermittent electrical power shortages south of Greenfield	Infrastructure Failure	Mod.	REC, Supervisors	High	FEMA/State, local, utility providers	Property Protection, Structural Project	Mid
Purchase snowplows, sanders, road graders	Infrastructure Failure, Severe Winter Storm, Flash Flood, River Flood	High	Supervisors, Secondary Roads	High	FEMA/State, local	Property Protection	Mid

# Rural Guthrie County Status of Previous Mitigation Actions

**Table 5.4: Rural Guthrie County Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Continue to acquire NOAA Weather Radios when possible			X		
Educate citizens about the advantages of radios			X		
Install siren at Diamond Head Lake				X	
Install two sirens at Lake Panorama				X	
Install storm sirens in each city			X		
Activate warnings from Sheriff's Department			X		
Acquire new warning systems for every city except Guthrie Center			X		
Continue participation in the NFIP			X		
Seek funds to protect buildings from flooding				X	
Continue wetland and CRP program and dam development to control water flow			X		
Develop a plan to improve the sewer systems around Lake Panorama			X		
Purchase sand bags			X		
Develop a Lake Panorama Water Protection Plan			X		
Implement Diamonhead Lake wastewater improvements			X		
Construct a new water storage tank to fulfill current water needs at Lake Panorama				X	
Contract with an engineer or consultant to map dry hydrant locations throughout the county				X	
Apply for grants for dry hydrants to improve the reach of fire protection to more areas of the County				X	
Install 30 amp outlet at each fire station			X		
Construct public safe rooms for government facilities, recreation areas, schools, and day care centers			X		



Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Construct a safe room for Guthrie County Hospital				X	
Construct public safe rooms for each County Roads Department facility as needed				X	
Obtain generators for critical facilities and shelters			X		
Stockpile shelter supplies to support people for extended periods of time			X		
Develop a plan to get to homebound people during severe weather events			X		
Update emergency dispatch systems			X		
Continue to monitor and upgrade E911 system			X		
Purchase essential vehicles and equipment			X		
Obtain funding to hire a full-time Emergency Manager	X				
Regularly update Emergency Operations Plans and Strategies			X		
Invest in continued training of emergency operations staff and volunteers			X		

# Rural Guthrie County Action Plan

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table 5.5: Rural Guthrie County Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Protect health and safety with structural projects
Objective 3	Improve first responder resources and capabilities
Objective 4	Provide back-up systems for all critical systems and assets
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Provide education and training to increase public awareness
Objective 2	Protect health and safety with structural projects
Objective 3	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 4	Account for vulnerable populations
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Improve public infrastructure and critical assets in hazard impact areas
Objective 3	Provide education and training to increase public awareness
Objective 4	Account for vulnerable populations
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Improve public warning capabilities
Objective 2	Provide education and training to increase public awareness
Objective 3	Protect health and safety with structural projects
Objective 4	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 5	Improve first responder resources and capabilities
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Improve first responder resources and capabilities
Objective 3	Develop plans to become less vulnerable to hazards

**Table 5.6: Rural Guthrie County Action Plan**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Promote hazard mitigation to the public	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	Supervisors	Minimal	Local	Public Education and Awareness	Ongoing
Increase amount of shelter supplies on hand	Terrorism, Tornado, Severe Winter Storms, Extreme Heat	Low	EMA	Low	Local	Emergency Services	Ongoing
Develop a county co-op plan	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	EMA	Minimal	Local	Emergency Services	Short
Educate the public regarding communications failure	Infrastructure Failure	Mod.	Sheriff, EMA	Low	Local	Public Education and Awareness	Ongoing
Information on location of tornado shelters and cooling centers	Tornado, Extreme Heat	Mod.	EMA	Minimal	Local	Public Education and Awareness	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Business and residential preparedness programs	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA	Low	Local, State, Federal	Prevention	Ongoing
Annually train key local leaders on hazard mitigation issues	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA	Minimal	Local	Public Education and Awareness	Ongoing
Upgrade utility poles	Infrastructure Failure	High	Utility Providers	Minimal	Local, private	Prevention	Ongoing
Install hazard signs in area camp-grounds	Flash Flood, Tornado, Windstorm, Hailstorm, River Flood, Thunderstorm/Lightning	Mod.	Conservation Board	Minimal	Local, State, Federal	Public Education and Awareness	Mid
Activate warning sirens from Sheriff's Department	Tornado/Windstorm	Mod.	Sheriff, Fire Departments	Moderate	Local, State, Federal	Emergency Services	Mid
Invest in continued training of emergency operations staff and volunteers	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA	Low	Local, grants	Emergency Services	Ongoing



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Purchase generators and pumps	Infrastructure Failure	High	Board of Supervisors	Low	Local, State, Federal, grants	Emergency Services	Short
Promote NOAA Weather Radios	Flash Flood, Tornado, Windstorm, Extreme Heat, Hailstorm, River Flood, Severe Winter Storm, Thunderstorms	Mod.	EMA	Minimal	Local	Public Education and Awareness	Ongoing
Increase knowledge of special needs people in unincorporated areas	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA	Minimal	Local	Emergency Services	Ongoing
Purchase sandbags/maintain sandbags in dry storage	Flash Flood, River Flood	Mod.	EMA	Low	Local, State, Federal	Prevention	Mid
Continue to acquire NOAA Weather Radios when possible	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA, Cities	Minimal	Local, State, Federal, Grants	Emergency Services	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Regularly update Emergency Operations Plans and strategies	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	EMA	Low	Local	Emergency Services	Ongoing
Construct storm water drainage (underground, culverts, curb and gutter)	Flash Flood, River Flood	Mod.	Roads Department, Supervisors	Moderate	Local, State, Federal, SRF, CDBG	Structural Project	Ongoing
Continue wetland and CRP program and dam development to control water flow	River Flood, Flash Flood	Low	County Conservation, DNR, Supervisors	High	Local, State, Federal, grants	Natural Resource Protection	Ongoing
Enhance the Global Connect System	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flood, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	EMA	Low	Local	Public Education and Awareness	Ongoing
Obtain funding to hire a full-time Emergency Manager	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Board of Supervisors	Low	Local	Emergency Services	Mid
Continue NFIP through Flood Plain Management and Zoning Ordinance Enforcement	River Flood	High	Assessor	Minimal	Local	Property Protection	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Development of more dry hydrants	HAZMAT Incident, Infrastructure Failure	Mod	Fire Departments	Low	Local, State, Federal, FEMA grants, FEMA AFG	Emergency Services	Long
Develop a plan to improve the sewer systems around Lake Panorama	Human Disease	Mod	Sanitation	Low	Local	Prevention	Short
Develop a Lake Panorama Water Protection Plan	Infrastructure Failure	Mod	Lake Association	Low	Local, State, Federal, Conservation, IDNR	Natural Resource Protection	Short
Implement Diamondhead Lake wastewater improvements	Human Disease	Mod	Sanitation	Low	Local, State, Federal	Prevention	Mid
Construct a new water storage tank to fulfill current water needs at Lake Panorama	Infrastructure Failure	Mod.	Lake Association	High	Local, State, Federal	Structural Project	Long
Develop a plan to get to homebound people during evacuations	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	EMA	Low	Local	Emergency Services	Mid
Local road flood prevention	River Flood, Flash Flood	Mod	Roads Department	Moderate	Local, State, Federal	Property Protection	Ongoing
Acquire new warning systems for every city except Guthrie Center	Tornado, Windstorm	Mod	Sheriff, Fire Departments	Moderate	Local, State, Federal	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Construct public safe rooms for government facilities, recreation areas, schools, and day care centers	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Board of Supervisors	High	Local, State, Federal	Structural Project	Long
Construct a community safe room at county facilities	Tornado, Terrorism, Radiological	Mod	Board of Supervisors	High	Local, State, Federal	Structural Project	Long
Construct a safe room in school	Tornado, Terrorism, Radiological	Mod	Adair-Casey School Board/ Staff	High	Local, State, Federal	Structural Project	Long
Discourage/prohibit development in floodplain	Flash Flood, River Flood	Low	Assessor	Low	Local	Property Protection	Short
Purchase essential vehicles and equipment	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Board of Supervisors	Moderate	Local, State, Federal	Emergency Services	Long
Seek funds to protect buildings from flooding	River Flood, Flash Flood	Mod	Board of Supervisors	Moderate	Local, State, Federal	Property Protection	Ongoing



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Continue to monitor and upgrade E911 system	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Sheriff	Moderate	Local, State	Emergency Services	Long
Purchase SCBAs for emergency responders	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Departments	Low	Local, State, Federal, grants	Emergency Services	Ongoing
More equipment and personnel to open and maintain secondary roads in severe weather conditions	Tornado, Severe Winter Storms, River Flood, Flash Flood	Mod	Roads Department, Supervisors	Moderate	Local, State, Federal	Prevention	Mid
Maintain current support for IT infrastructure	Infrastructure Failure	High	Board of Supervisors	Low	Local	Emergency Services	Short
Update emergency dispatch systems	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Sheriff	Moderate	Local, State	Emergency Services	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Flood plain ordinance implementation/enforcement	Flash Flood, River Flood	Low	Assessor	Low	Local	Property Protection	Short
Install new warning sirens	Tornado, Windstorm	High	Lake Association, Board of Supervisors	Low	Local, State, Federal, grants	Emergency Services	Long
Install 30 amp outlet at each fire station	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Fire Departments, EMA	Low	Local, State, ISHMED	Structural Project	Ongoing

# Chapter 6: Plan Maintenance and Adoption

*Section 201.6 (c)(4)(i): [The maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.*

## Monitoring, Evaluating, and Updating the Plan

With the adoption of this plan, the Emergency Management Commission will be tasked with initiating the review, evaluation, and maintenance of the plan. The Emergency Management Commission will be in charge of making it a priority to update the Adair and Guthrie Counties Multi- Jurisdictional Hazard Mitigation Plan. The Adair and Guthrie Counties Multi-Jurisdictional Hazard Mitigation Plan will be evaluated once a year for potential changes, and to maintain compliance with FEMA rules and regulations. If Adair or Guthrie County, or any individual city, decides to update the plan, the Emergency Management Commission will be responsible to initiate the update. If there is not an update within four years of the plan being adopted, then the process will begin to update the plan. The Emergency Management Commission will coordinate the meeting time and place and will notify the other members of the committee. If a new committee needs to be formed, it should be comprised of representatives of the city government, businesses, citizens, emergency staff, school board, etc. The members of the Emergency Management Commission agree to:

- Meet annually to monitor and evaluate the implementation of the hazard mitigation plan
- Act as a forum for hazard mitigation issues
- Disseminate hazard mitigation ideas and activities to all members of the committee
- Pursue the implementation of hazard mitigation actions that are included in the plan
- Monitor any sources of possible funding to help the jurisdictions implement the plan's recommended actions
- Monitor and assist in implementation and update of this plan
- Inform and gather input from the public

The primary duty of the Adair and Guthrie Counties Emergency Management Commission, in relation to maintaining and updating this plan, is to see that the plan is successfully carried out and report to the Board of Supervisors, and to make information available to the public regarding the status of the plan and the progress of hazard mitigation actions.

## Implementation Policies and Issues

The hazard mitigation planning team was created to develop the mitigation plan and guide the plan preparer. The planning team should not formally end with the approval of the plan. The planning team should become a watchdog to help local officials move the plan's goals forward and should take a key role in implementing projects. Members can help remind public officials of that particular year's mitigation strategy and possible funding options and can volunteer in the implementation process for certain actions. The team and local governments may participate in the process and engage regional organizations, state agencies, colleges, schools, NGOs, and churches via memoranda of agreement.

Throughout the mitigation plan, there are gaps in data that are outlined in the plan. In addition to specific mitigation actions in this chapter, it is important that the Adair and Guthrie Counties jurisdictions review this plan periodically as the County prepares for the next five-year update of this Plan. This process would help satisfy FEMA Region VII requirements. Missing data should be found and included by the next major update.

This hazard mitigation plan is a guide for future policy planning for participating jurisdictions in the county. The plan considers demographic trends and projections, community background information, current and future political decisions, and overall important goals and objectives for the county's jurisdictions. The goals and objectives have been developed to reflect the general consensus of the county's Hazard Mitigation Planning team, the broad range of elected officials, and the citizenry of the county. These recommendations have been developed to look five-plus years into the future with the expectation that periodic updates will occur in order to reflect changes within the county.

The success of this plan will require the support of the emergency management commission/agency, elected officials, department heads, and volunteers (including civic groups, academia, and general citizens). Cooperation from the public and private sectors will allow implementation of the recommendations that will provide long-term benefits for the entire county and each jurisdiction. By implementing these recommendations, the jurisdictions will be furthering other civic goals also.

Simply listing a project or discussing an issue does not cause anything to be done about it. It is vital that the jurisdictions make a sustained effort to implement projects, actions, and policies as outlined in this plan. Reviewing the text intermingled among the tables and lists also provides ideas on how to carry out the plan and meet mitigation goals. This chapter also provides more details about the regular activities involved in carrying out this plan and preparing for future planning efforts.

The following ideas should be kept in mind when considering how the plan should be implemented.

- Funding and resources are very limited due to the small population size, modest land value and tax base, and other funding obligations that make it impossible to save for long-term emergency needs.
- Adair County has a limited number of volunteers and support agencies to handle either mitigation projects or response needs. Funding is too limited to provide proper training and equipment, and volunteers do not have the time to undertake the necessary training. Many volunteers and staff wear multiple "hats" and cannot meet all the demands when hazards occur.
- Many members of the public are apathetic to hazards and particularly to the sustained efforts necessary to mitigate them. Some citizens and public officials do not properly respect the need for mitigation planning, the risks the county face, and the roles they have in the process. Few members of the general public have attended planning meetings.
- Information and data to bring about detailed hazard analysis and the analysis of possible mitigation actions is often lacking on a local level.
- Local jurisdictions have limited legal authority to implement some possible mitigation actions.
- Because prioritization is needed in order to effectively use limited resources, it is important that the jurisdictions perform studies on community infrastructure and services provided.
- Because of the risk of failure of investments in key hazard areas where the area is defined, the jurisdictions should consider a policy to prohibit or limit public expenditures for capital improvements in such areas.
- Small towns should use mitigation before hazards occur as a means to be prepared for the fact that, in a widespread hazard, resources are not likely to be available to them until larger jurisdictions are served.

# Annual Review and Plan Maintenance Process

The DMA of 2000 suggests that each local jurisdiction review the plan annually. Principally, each jurisdiction's government body and key staff should review the actual implementation plan for that jurisdiction. A review of capabilities, goals/objectives, and proposed actions is particularly warranted. It is important that the review notes and suggested changes be made at a public meeting and records are kept. If any of the changes relate to a project that is being submitted to FEMA, such as through a PDM, FMA, or HMGP application, the jurisdiction must adopt the changes at a council or supervisor meeting to make the changes officially part of the plan and thus eligible for mitigation funding. The local jurisdictional body, such as city council, board of supervisors, or school board, is responsible for ensuring reviews are completed.

The public should be invited to all formal meetings where the plan is discussed and possible changes can be made. Local media should be used to alert the public. Each jurisdiction is responsible for review of the parts of the plan relevant to the said jurisdiction.

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation)

The annual reviews and updates to this plan will:

- Consider changes in vulnerability due to action implementation
- Document success stories where mitigation efforts have proven effective
- Document areas where mitigation actions were not effective
- Document any new hazards that may arise or were previously overlooked
- Incorporate new data or studies on hazards and risks
- Incorporate new capabilities or changes in capabilities
- Incorporate growth and development-related changes to inventories, and
- Incorporate new action recommendations or changes in action prioritization

In order to best evaluate the mitigation strategy during plan review and update, the participating jurisdictions will follow the following process:

- A representative from the responsible office identified in each mitigation action will be responsible for tracking and reporting the action status on an annual basis to the jurisdictional HMPC member and providing input on any completion details or whether the action still meets the defined objectives and is likely to be successful in reducing vulnerabilities.
- If the action does not meet identified objectives, the jurisdictional HMPC member will determine what additional measures may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.
- As part of the annual review process, the Adair County Emergency Management Coordinator will provide the updated mitigation strategy with current status of each mitigation action to local elected officials of various jurisdictions requesting that the mitigation strategy be incorporated, where appropriate in other planning mechanisms.

Changes will be made to the plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities



will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of the plan will be by written changes and submissions, as the planning team deems appropriate and necessary, and as approved by the Adair and Guthrie County Boards of Supervisors and the governing boards of the other participating jurisdictions.

## Opportunities for Publicity

*Section 201.6 (c)(4)(iii): [The maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.*

Several times the local media can make comments about the effort and successes that may arise:

- Adoption of the mitigation plan
- Receipt of approval by FEMA
- Initiation and completion of tangible mitigation actions or projects
- Update and evaluation meetings and results

Annually, each jurisdiction is to hold at least one public meeting or hearing so that the public can comment on the status of the mitigation plan's implementation and changes that are needed to the plan.

## Incorporation into Other Planning Mechanisms

*Section 201.6 (c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvements, when appropriate.*

The planning team is partly responsible to ensure that the public officials are incorporating mitigation actions into relevant plans and planning mechanisms, such as zoning, annexation plans, and bonding proposals. Communities should also include mitigation initiatives as regular line items in community capital or operational budgets to ensure ongoing funding for hazard mitigation initiatives.

The local jurisdictions did not incorporate any of the mitigation actions into existing plans in any formal sense since the previous plan was adopted. However, mitigation ideas were incorporated informally in budget decisions, such as to fund a mitigation action. The jurisdictions commit to improved formal planning efforts in the next five years. Ways each jurisdiction will incorporate this plan can be found in their respective appendix.

Where possible, Adair and Guthrie County and all other jurisdictions, will consider the findings from this document when updating or creating new planning and operating documents. Examples of planning documents that would benefit from information provided in this plan include, but are not limited to:

- Incorporated City Codes
- Adair County Comprehensive Plan
- Guthrie County Comprehensive Plan
- Adair County Code of Ordinances
- Guthrie County Code of Ordinances
- Other existing and future plans, such as water conservation plans, storm water management plans, and parks and recreation plans

As of the writing of this plan, not all of the above-mentioned plans are in place within Adair and Guthrie Counties. It is anticipated that this plan would be used to guide the creation of the documents listed above, if they were to be developed. Some jurisdictions have some documents currently in place, but if the document is to be updated, the hazard mitigation plan should be referenced in the update.

# Appendix A: Rural Adair County

**Table A.1: Rural Adair County Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	
<b>Drought</b>	
<b>Earthquake</b>	
<b>Expansive Soils</b>	
<b>Extreme Heat</b>	
<b>Flash Flood</b>	
<b>Grass/Wild Land Fire</b>	
<b>HAZMAT Incident</b>	
<b>Human Disease</b>	
<b>Infrastructure Failure</b>	
<b>Levee/Dam Failure</b>	
<b>Radiological</b>	
<b>River Flooding</b>	
<b>Severe Winter Storm</b>	
<b>Terrorism</b>	
<b>Thunderstorm/ Lightning/Hail</b>	
<b>Tornado</b>	
<b>Transportation Incident</b>	
<b>Windstorm</b>	

# Loss Estimates

**Table A.2: Rural Adair County Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	758	\$5,728,909	3,471
<b>Commercial</b>	17	\$20,781,402	
<b>Industrial</b>	6	\$169,139,505	
<b>Residential</b>	1,392	\$5,728,909	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire rural portion of the county, the numbers in table A.2 show the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table A.3: Rural Adair County Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	190	\$1,432,227	868
<b>Commercial</b>	4	\$5,195,351	
<b>Industrial</b>	2	\$42,284,876	
<b>Residential</b>	348	\$1,432,227	

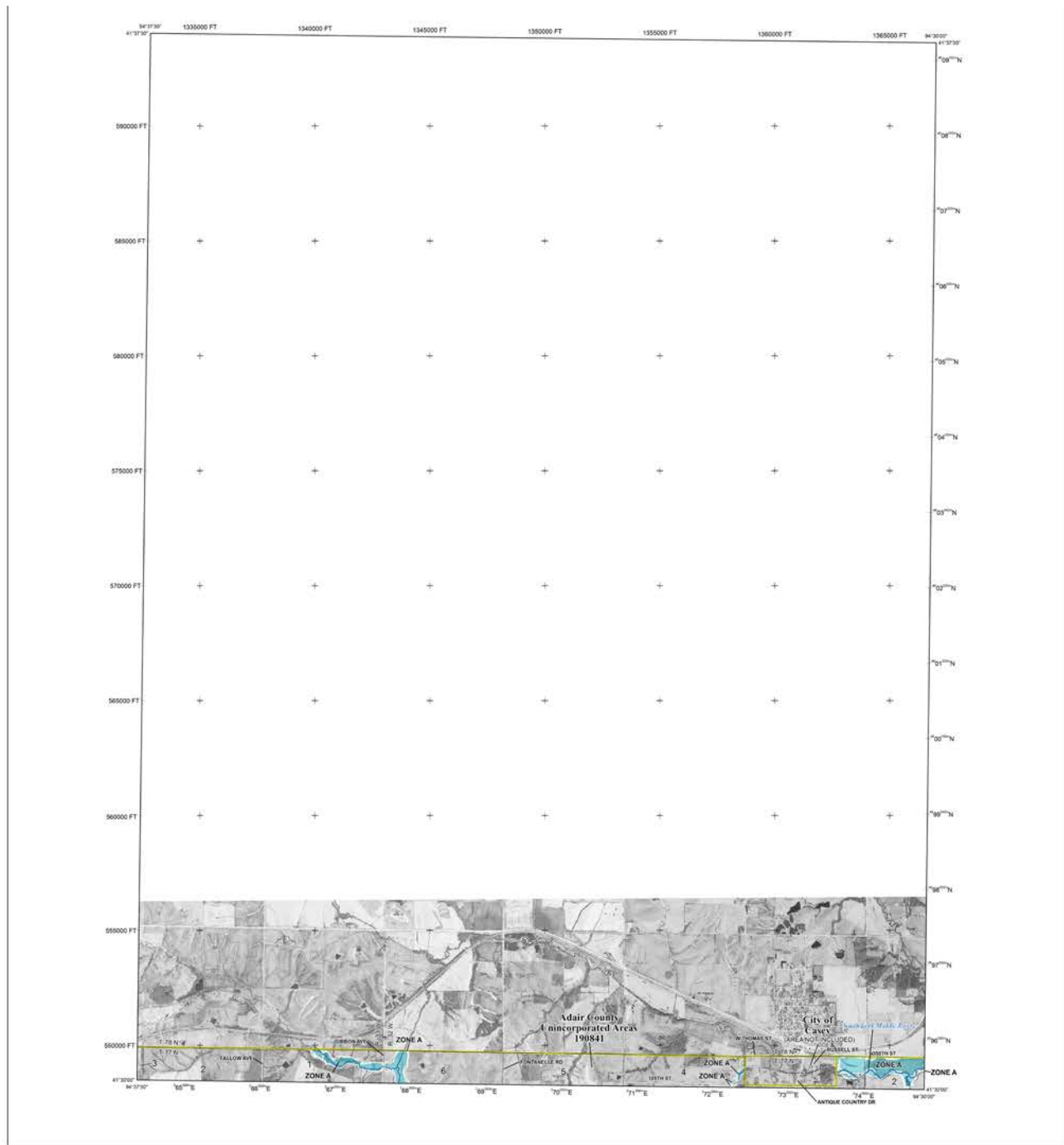
If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table A.3. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the rural county would be impacted.

**Table A.4: Rural Adair County Critical Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	379	\$2,864,455	1,736
<b>Commercial</b>	9	\$10,390,701	
<b>Industrial</b>	3	\$84,569,753	
<b>Residential</b>	696	\$2,864,455	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table A.4. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the rural county would be impacted.





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth Zone AE, AO, AH, VE, VEI, AH
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

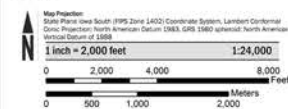
For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA, how to order products or the National Flood Insurance Program or the FEMA Map Service Center website at <http://mmsc.fema.gov>. Available products may include previously unincorporated into the FEMA Map Information Exchange at 1:50,000 scale (1:50,000) or not. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

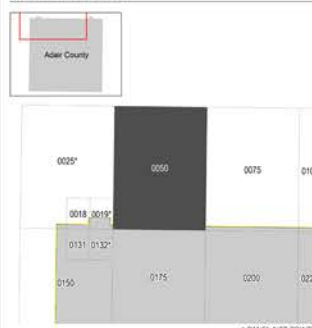
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 50 of 500



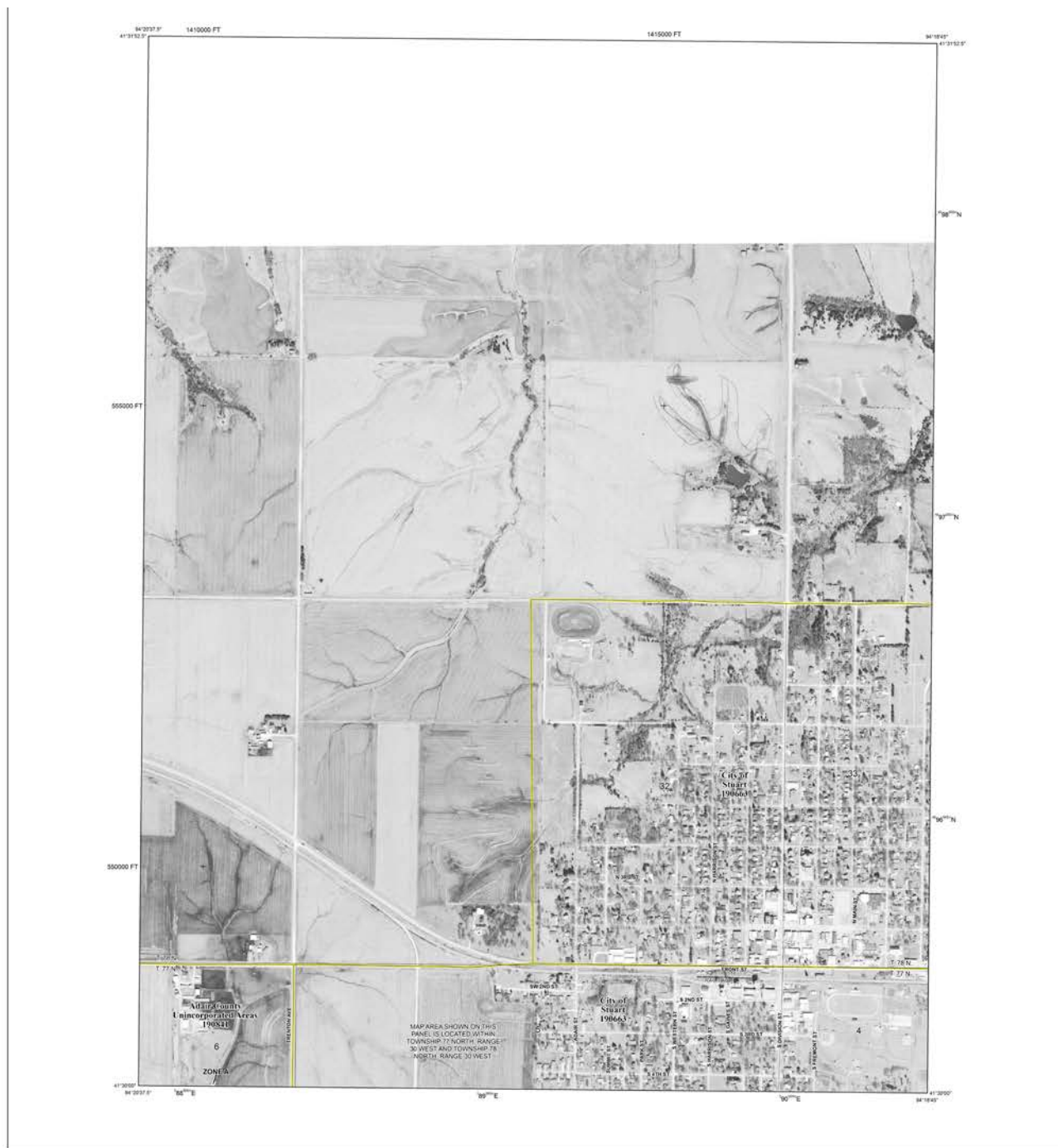
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COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0050 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0050A  
EFFECTIVE DATE  
APRIL 5, 2017

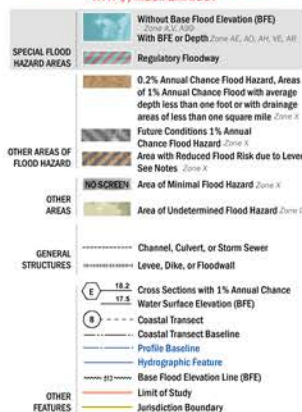






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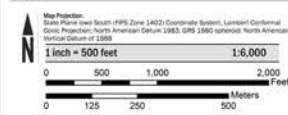
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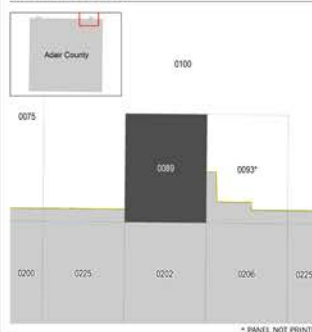
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

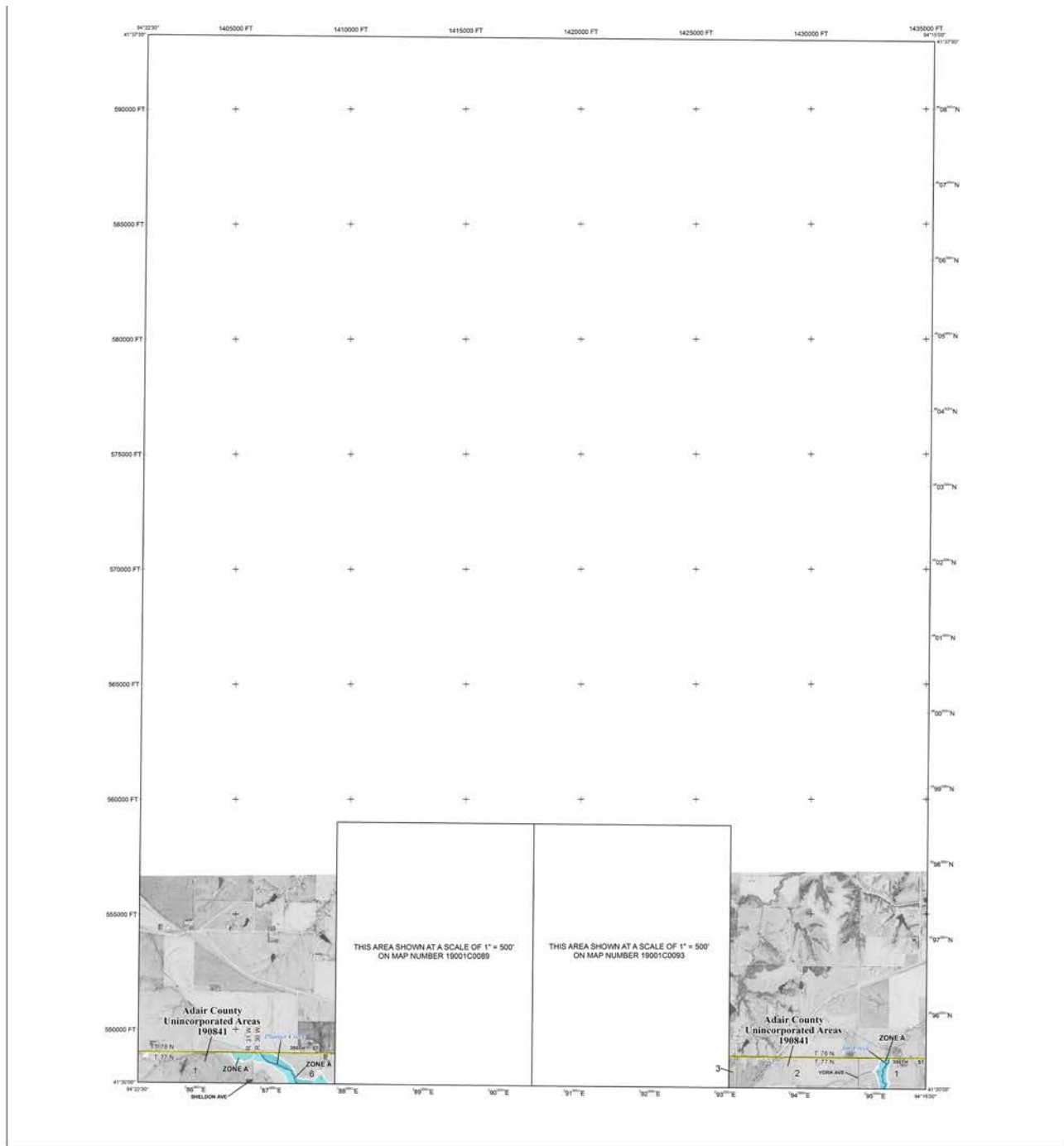
PANEL 89 OF 500



Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
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STUART, CITY OF	100863	0089	A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0089A  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VEI, AH
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, or for FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mmsc.fema.gov>. Available products may include previously unincorporated data for FEMA Flood Insurance Study Report, digital digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

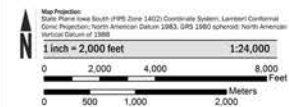
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

PANEL 100 OF 500

Panel Contents:

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0100 A

VERSION NUMBER

2.3.3.0

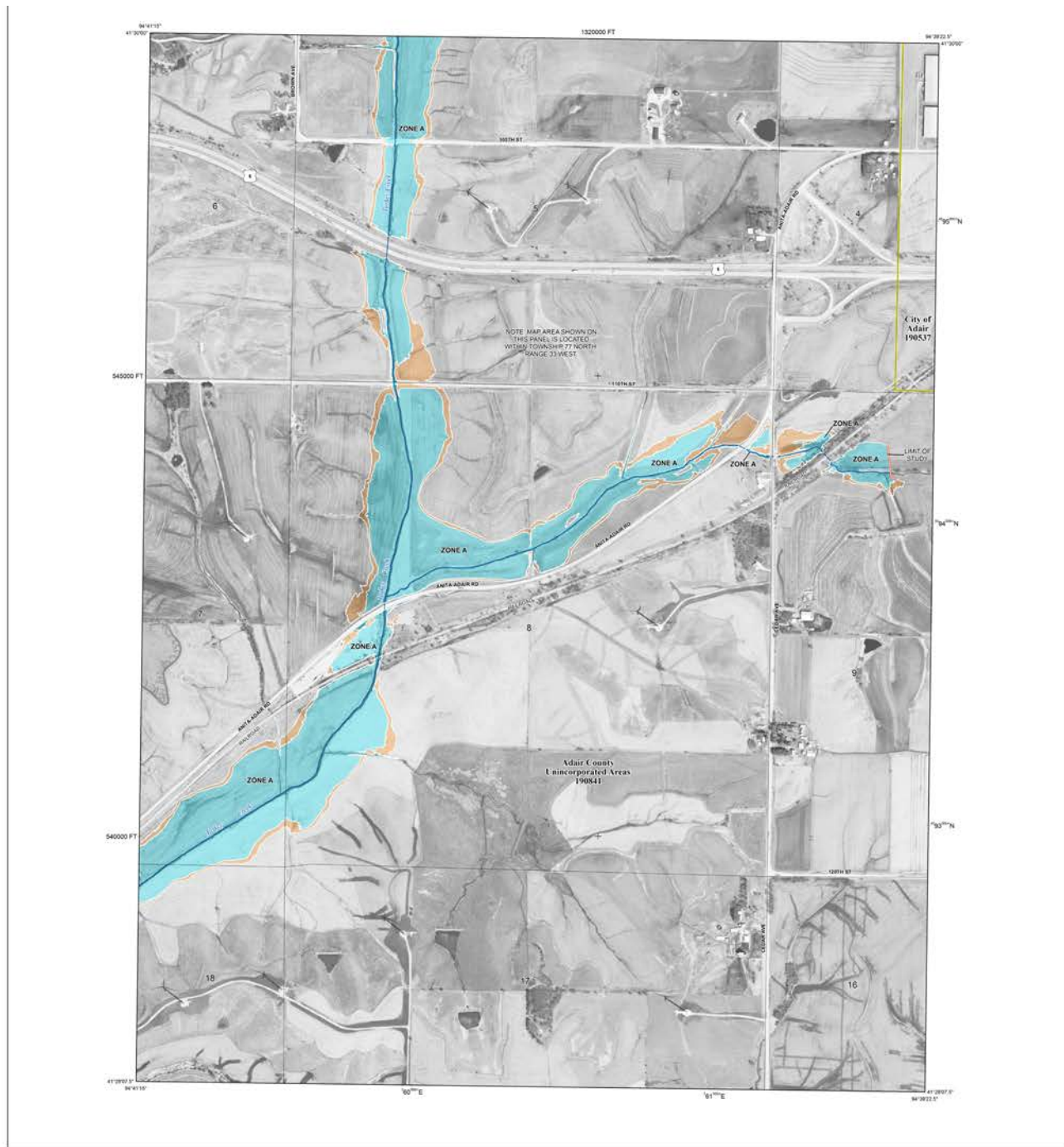
MAP NUMBER

19001C0100A

EFFECTIVE DATE

APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, AE, AO, AH, VE, AL
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
OTHER AREAS		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
GENERAL STRUCTURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
OTHER FEATURES		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

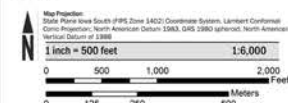
For information and questions about this map, available products associated with the FIRM including historic editions, of the FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-8488 (1-877-366-8488) or visit the FEMA Map Information eXchange at <http://mex.fema.gov>. Available products may include previously issued editions of the Flood Insurance Study Report, digital digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

For communities seeking land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

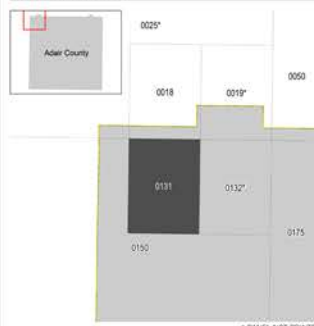
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 131 of 500

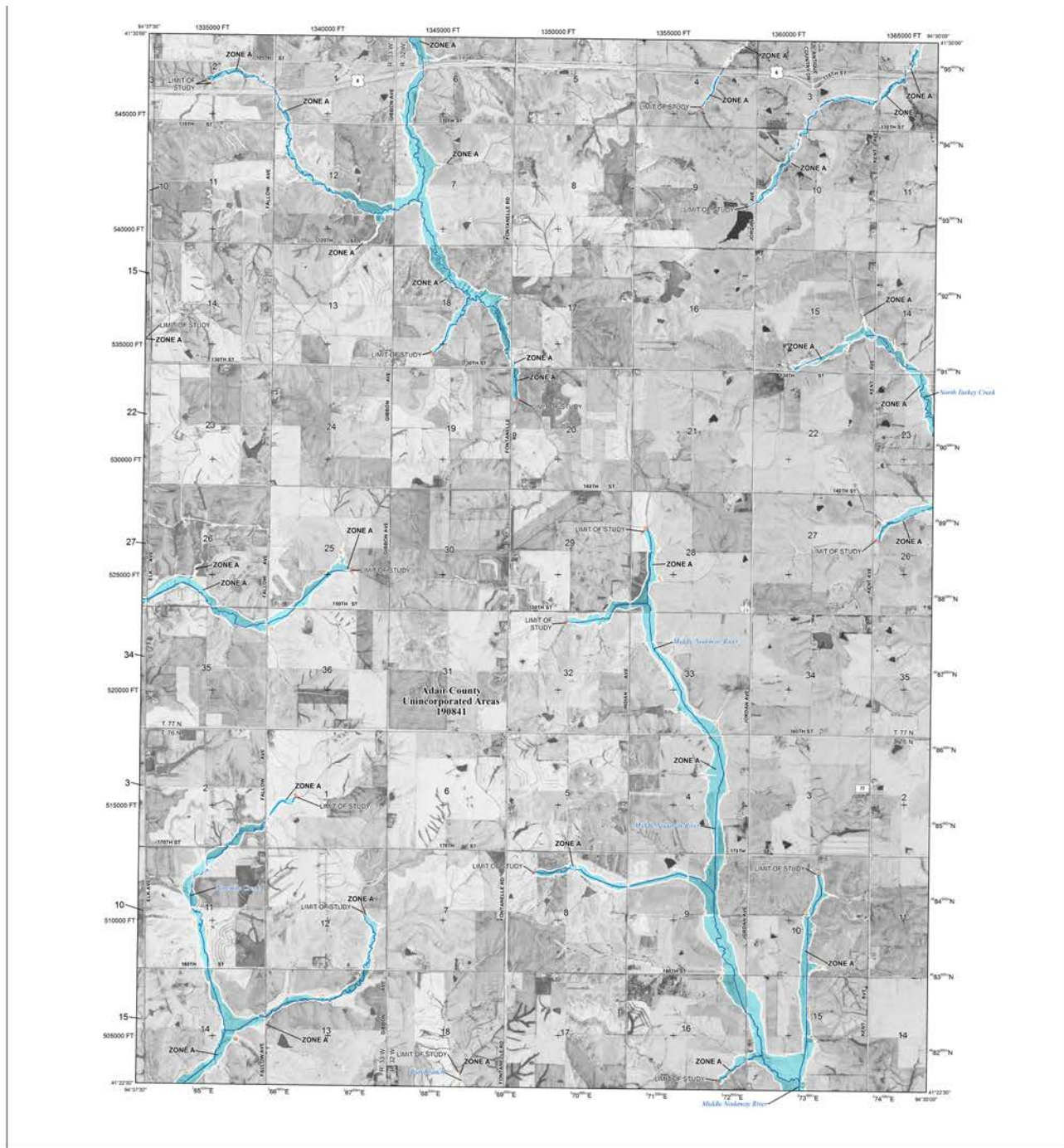


Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR, CITY OF 190537 0131 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0131A  
EFFECTIVE DATE  
APRIL 5, 2017

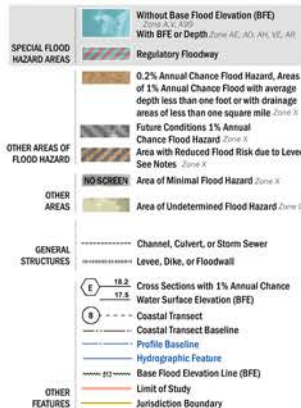






## FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

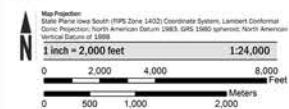
For information and questions about this map, available products associated with the FIRM including historical editions, or for FEMA, flow to order products or the National Flood Insurance Program as the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously issued editions of this map, a Flood Insurance Study Report, or other digital editions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

Communities receiving hard copy FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

PANEL 175 OF 500

Panel Contains:

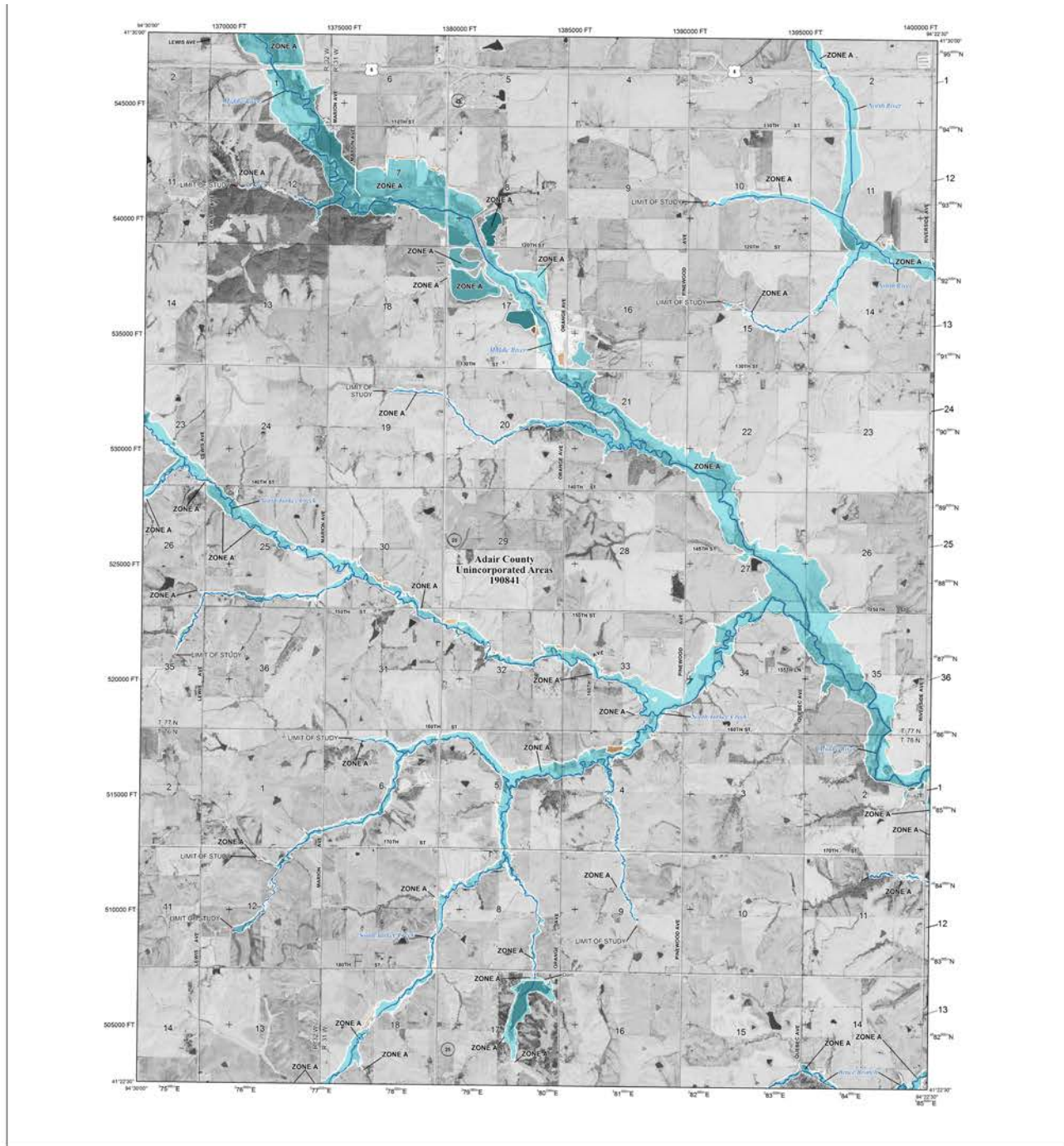
COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0175 A

VERSION NUMBER 2.3.3.0

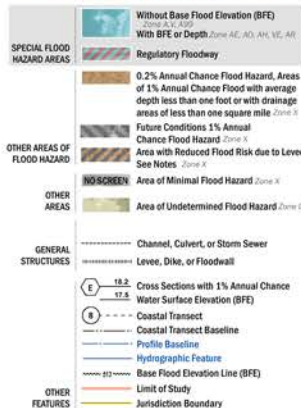
MAP NUMBER 19001C0175A

EFFECTIVE DATE APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical editions, of this FIRM, how to order products or the National Flood Insurance Program as the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously generalizations for the FEMA Map Information Exchange at 1:87,500 scale (1:87,500 2007) or not. Users of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information Exchange.

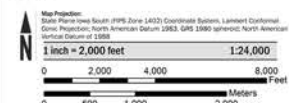
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

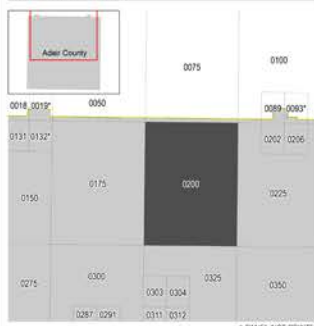
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from 1999 to April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

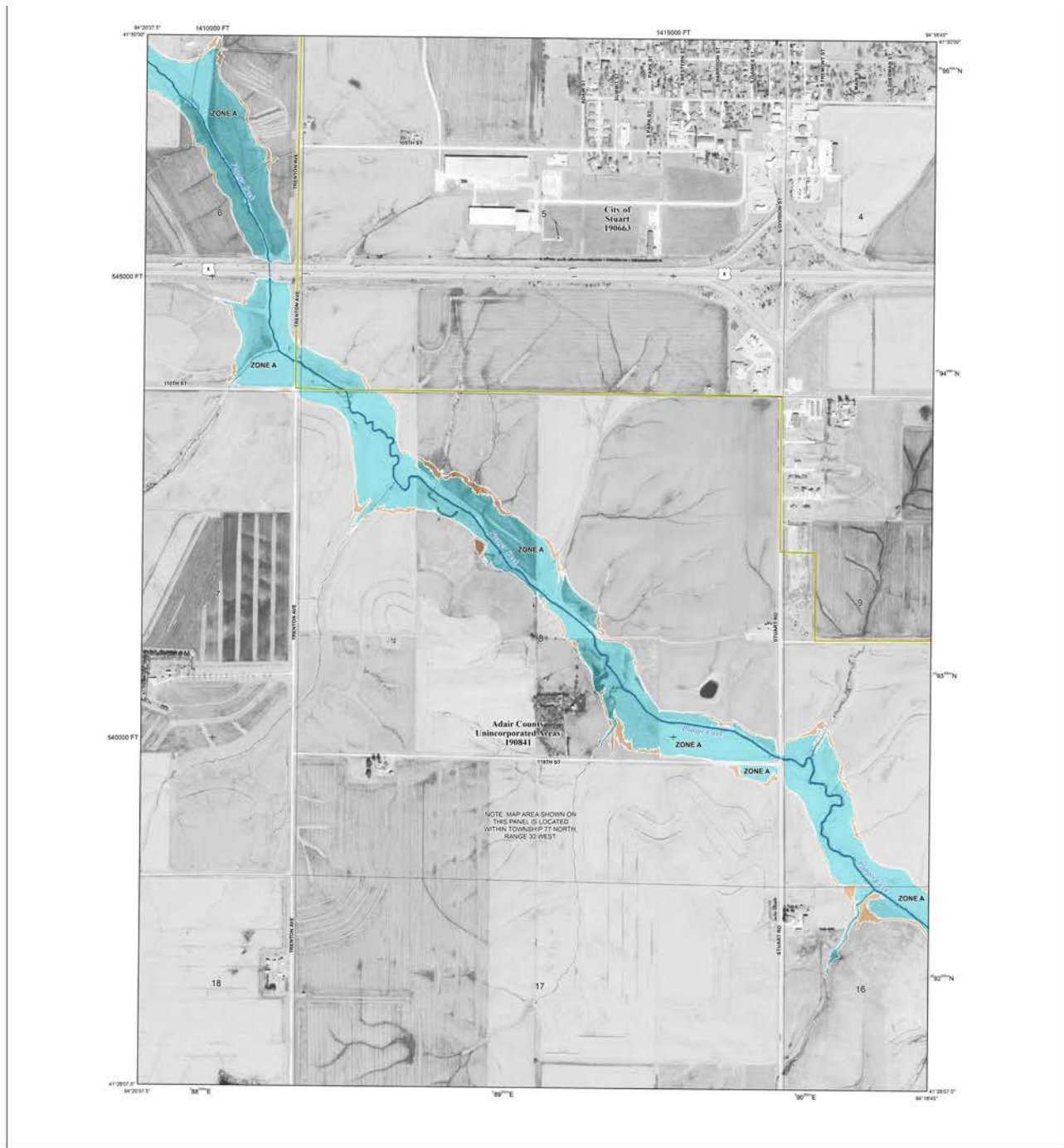
PANEL 200 OF 500



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190041 0200 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0200A  
EFFECTIVE DATE  
APRIL 5, 2017





#### FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth Zone AE, AO, AH, VE, AL
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

#### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical editions, or for FEMA, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Knowledge at 1-877-FEMA-8477 (1-877-362-8477) or visit the FEMA Map Information Knowledge at <http://msc.fema.gov>. Available products may include previously issued editions of the FIRM, Flood Insurance Study Report, and other digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Knowledge.

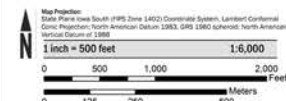
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

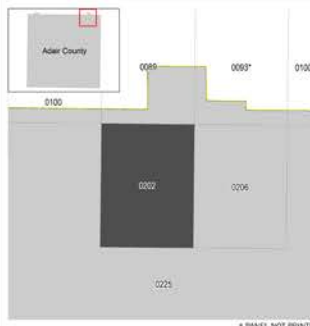
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

#### SCALE



#### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 202 of 500



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0202 A  
STUART, CITY OF 190863 0202 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0202A  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VE-1
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical editions, of the FEMA, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-8471 (1-877-362-8471) or visit the FEMA Map Information eXchange at <http://mex.fema.gov>. Available products may include previously issued editions of the Flood Insurance Study Report, digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

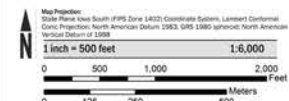
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

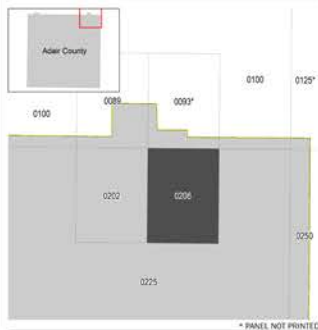
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

Panel 206 of 500

Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0206 A

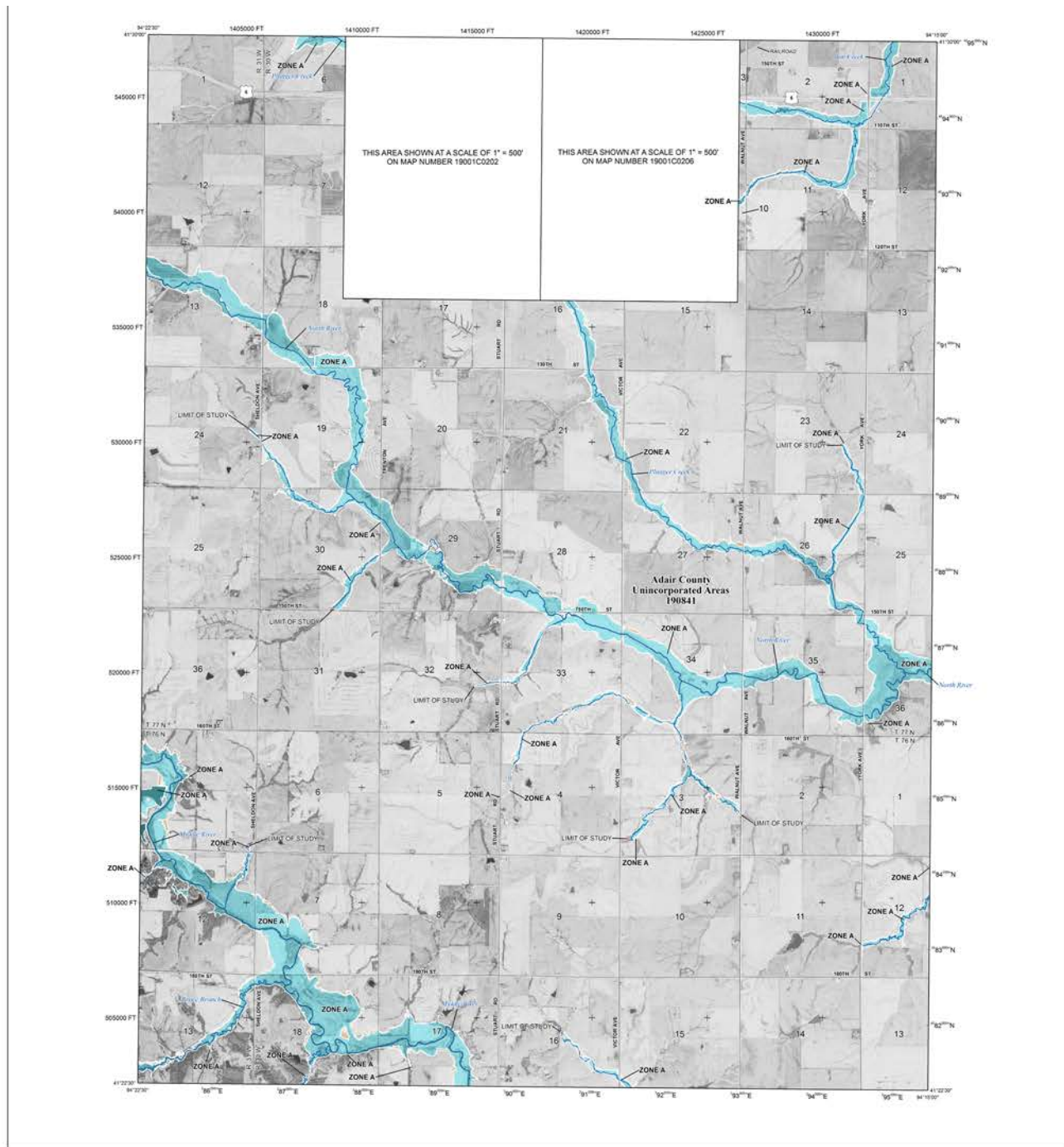
STUART, CITY OF 190663 0206 A

Version Number 2.3.3.0

Map Number 19001C0206A

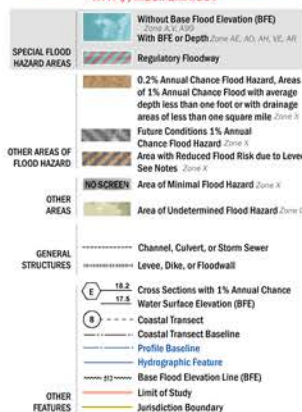
Effective Date APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

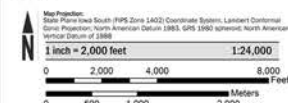
For information and questions about this map, available products associated with the FIRM including historical editions, or for FEMA, how to order products or the National Flood Insurance Program as the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously unincorporated areas and the FEMA Map Information Exchange at 1:62,500 scale (1:62,500 scale) or not. Maps of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information Exchange.

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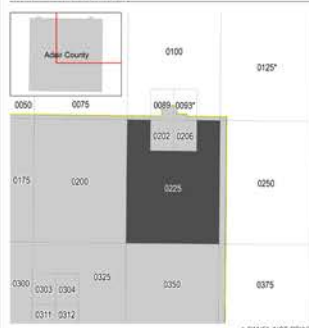
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from 1999 to 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

### FLOOD INSURANCE STATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

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Panel: 225 or 500

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Panel: 225 or 500

Panel: 225 or 500

Panel: 225 or 500

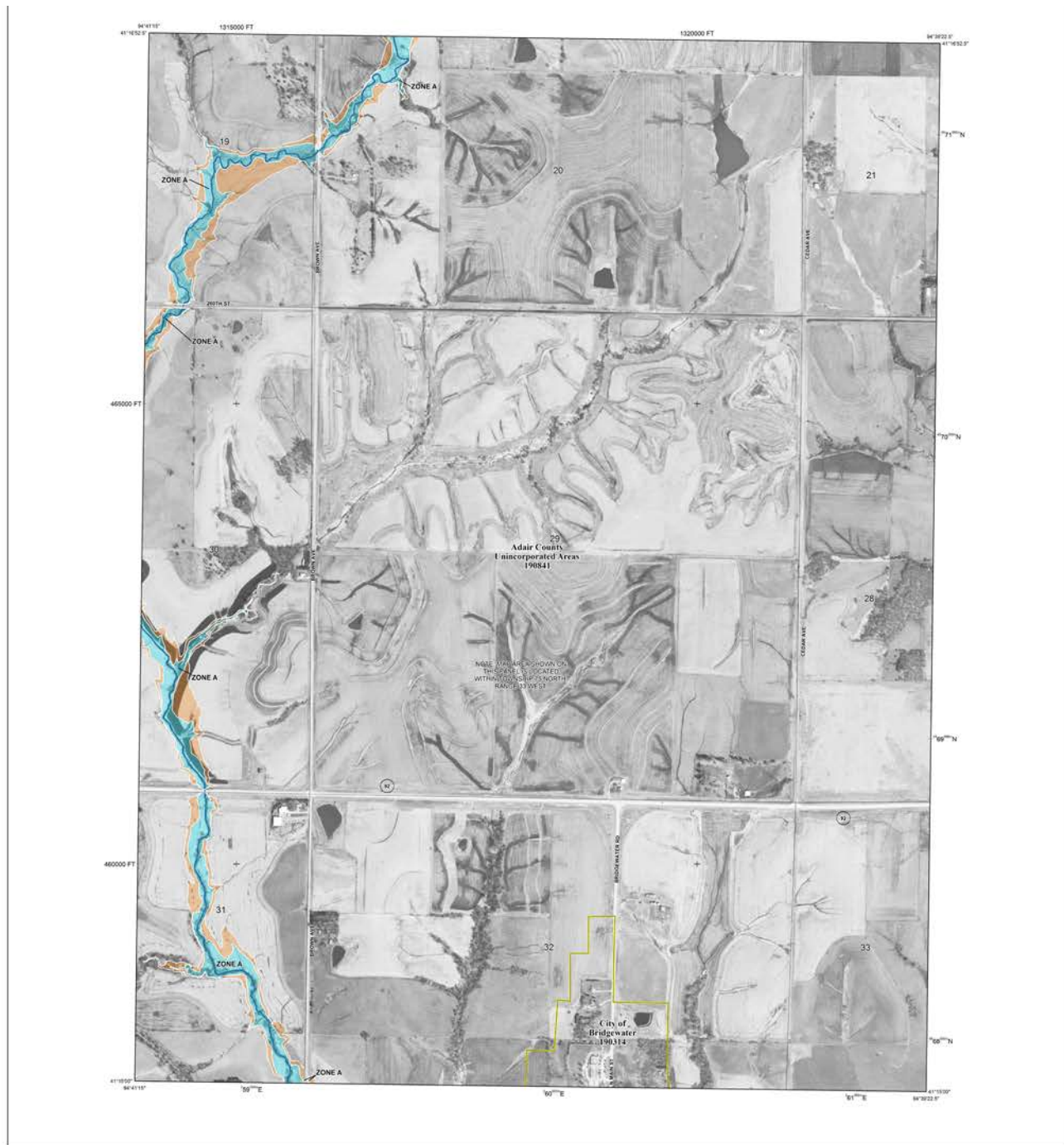
VERSION NUMBER  
2.3.3.0

MAP NUMBER  
19001C0225A

EFFECTIVE DATE  
APRIL 5, 2017







## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, AD, AH, VE, AE
		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS OF FLOOD HAZARD		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
OTHER AREAS		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
GENERAL STRUCTURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
OTHER FEATURES		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, or for FEMA help to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://msc.fema.gov> or 1-877-FEMA-8087 or 1-877-236-2627 or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued editions of the Flood Insurance Study Report, digital digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

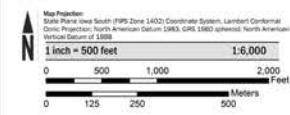
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

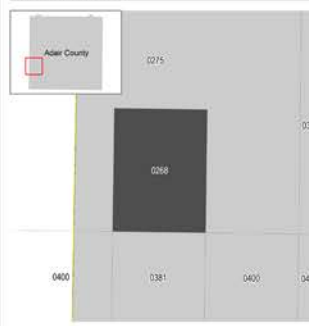
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery from April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

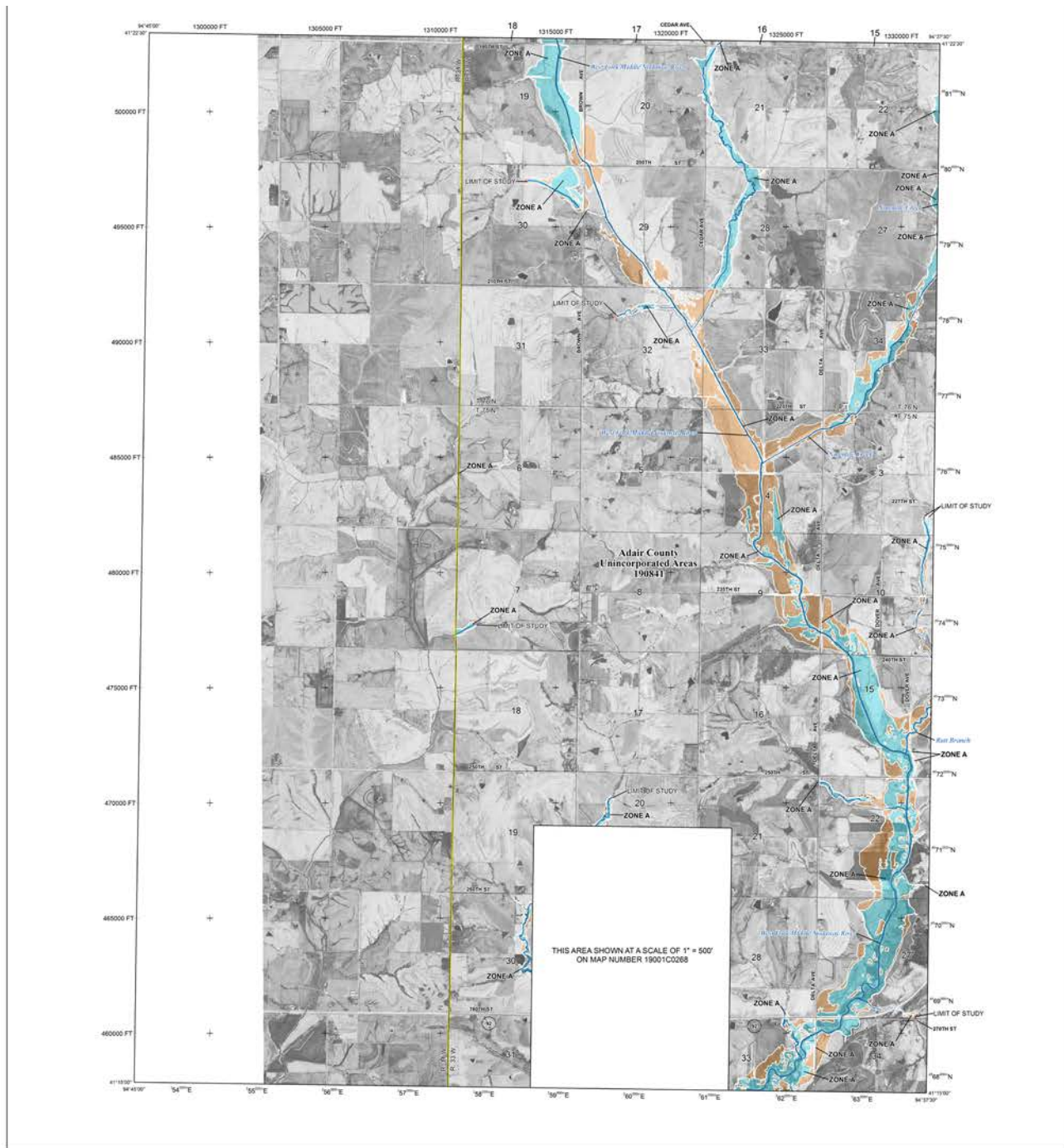
ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 268 of 500



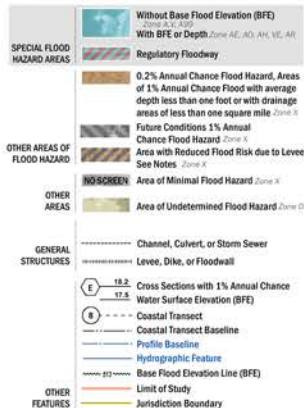
Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0268 A  
Bridgewater, City of 190841 0268 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0268A  
EFFECTIVE DATE  
APRIL 5, 2017



#### FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



#### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, or for FEMA Zone 14021 Coordinate System, Lambert Conformal Conic Projection, North American Datum 1983, GRS 1980 spheroid, North American Vertical Datum of 1988, call the FEMA Map Information Exchange at 1-877-FEMA-4000 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

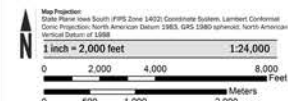
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

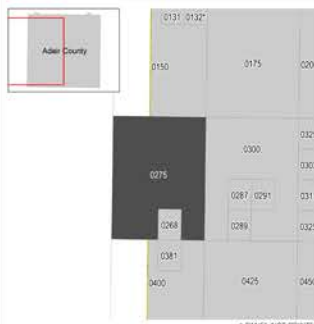
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6629.

Base map information shown on the FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from Imagery flown in April 2009.

#### SCALE



#### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
ADAIR COUNTY, IOWA  
And Incorporated Areas

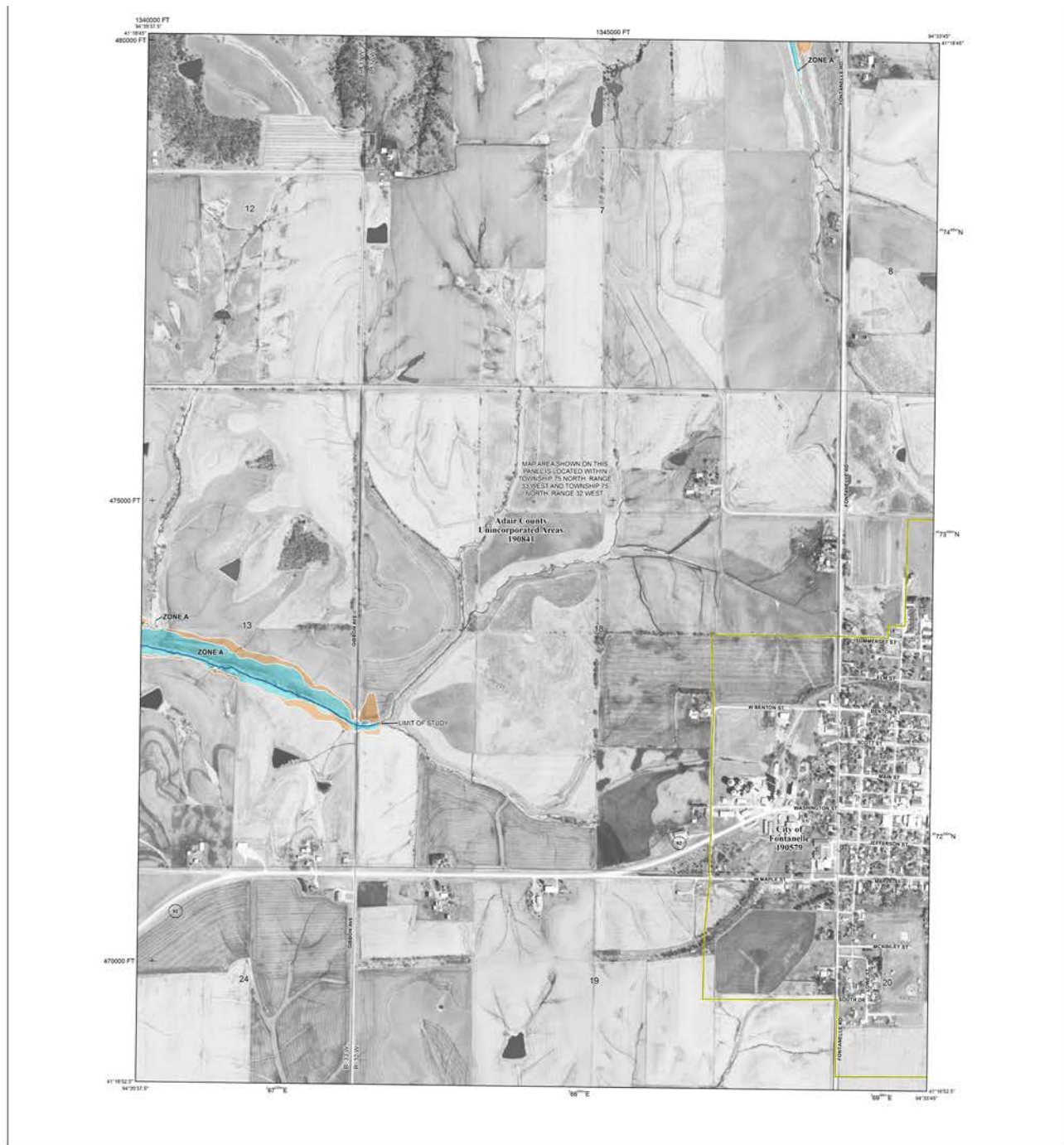
Panel: 275 of 500



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0275 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0275A  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA Flood Insurance Study or the National Flood Insurance Program in the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued editions of the FIRM, Flood Insurance Study Report, and other digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

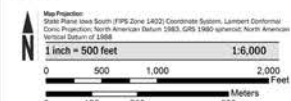
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

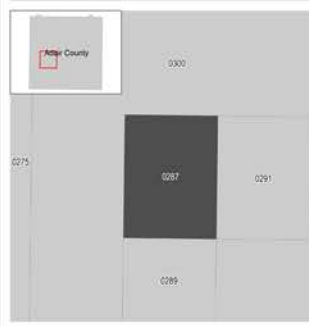
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 287 of 500



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0287 A  
FONTANELLE, CITY OF 190879 0287 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0287A  
EFFECTIVE DATE  
APRIL 5, 2017

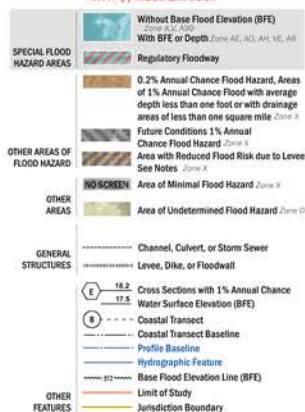






## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)



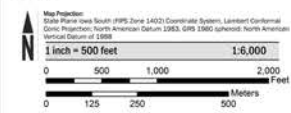
## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously unpublished data for the FEMA Map Information Exchange at 1:50,000 scale (1:50,000) or the FEMA Map Information Exchange at 1:50,000 scale (1:50,000). Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

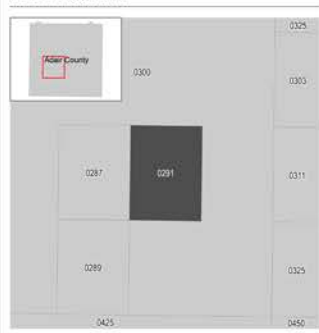
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

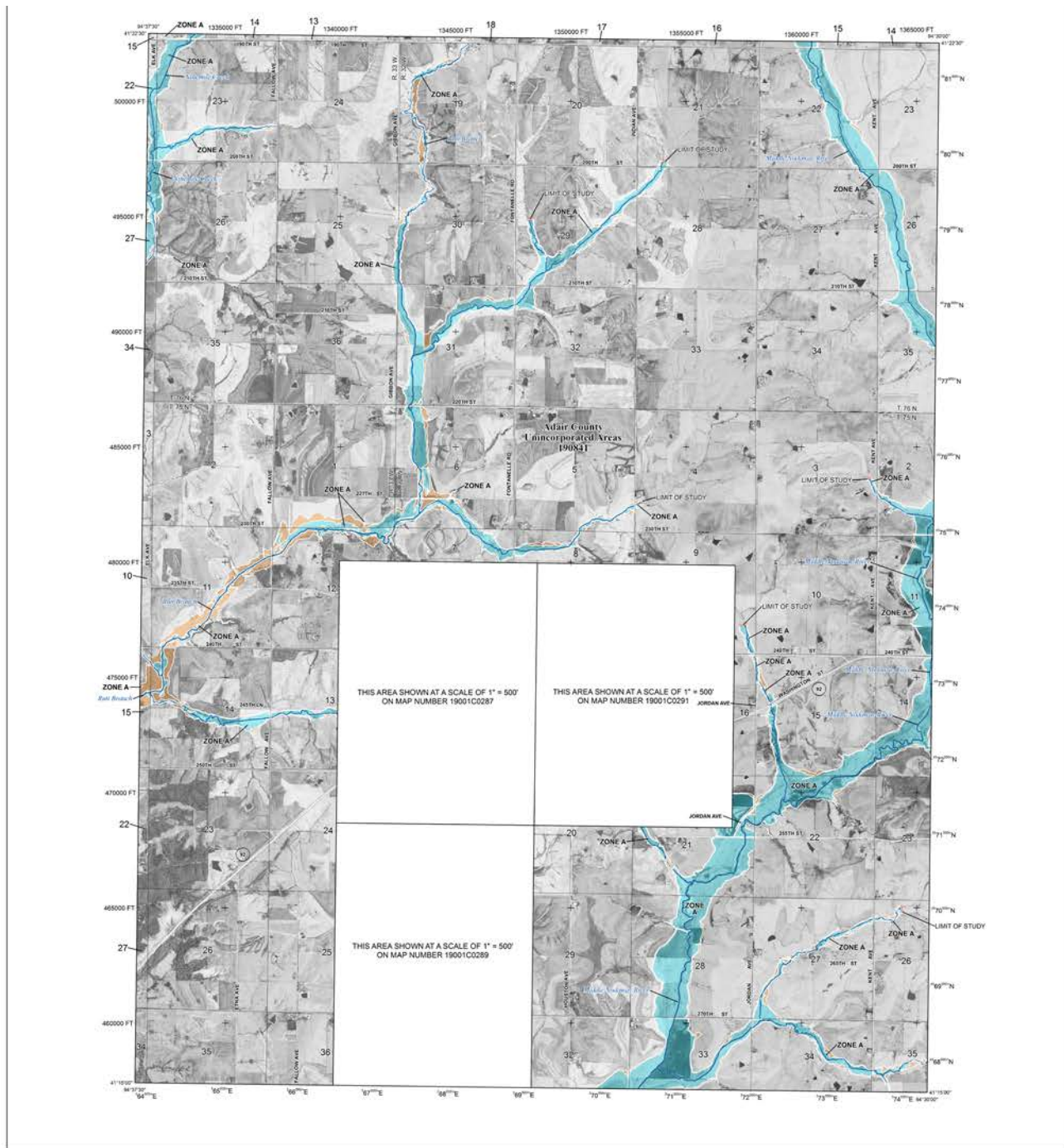
ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 291 of 500



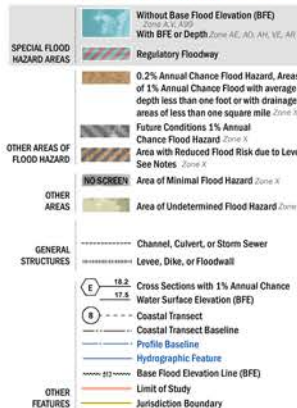
Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 100841 0291 A  
POTTAWATOMIE, CITY OF 100879 0291 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0291A  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

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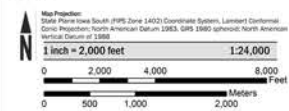
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
ADAIR COUNTY, IOWA  
And Incorporated Areas

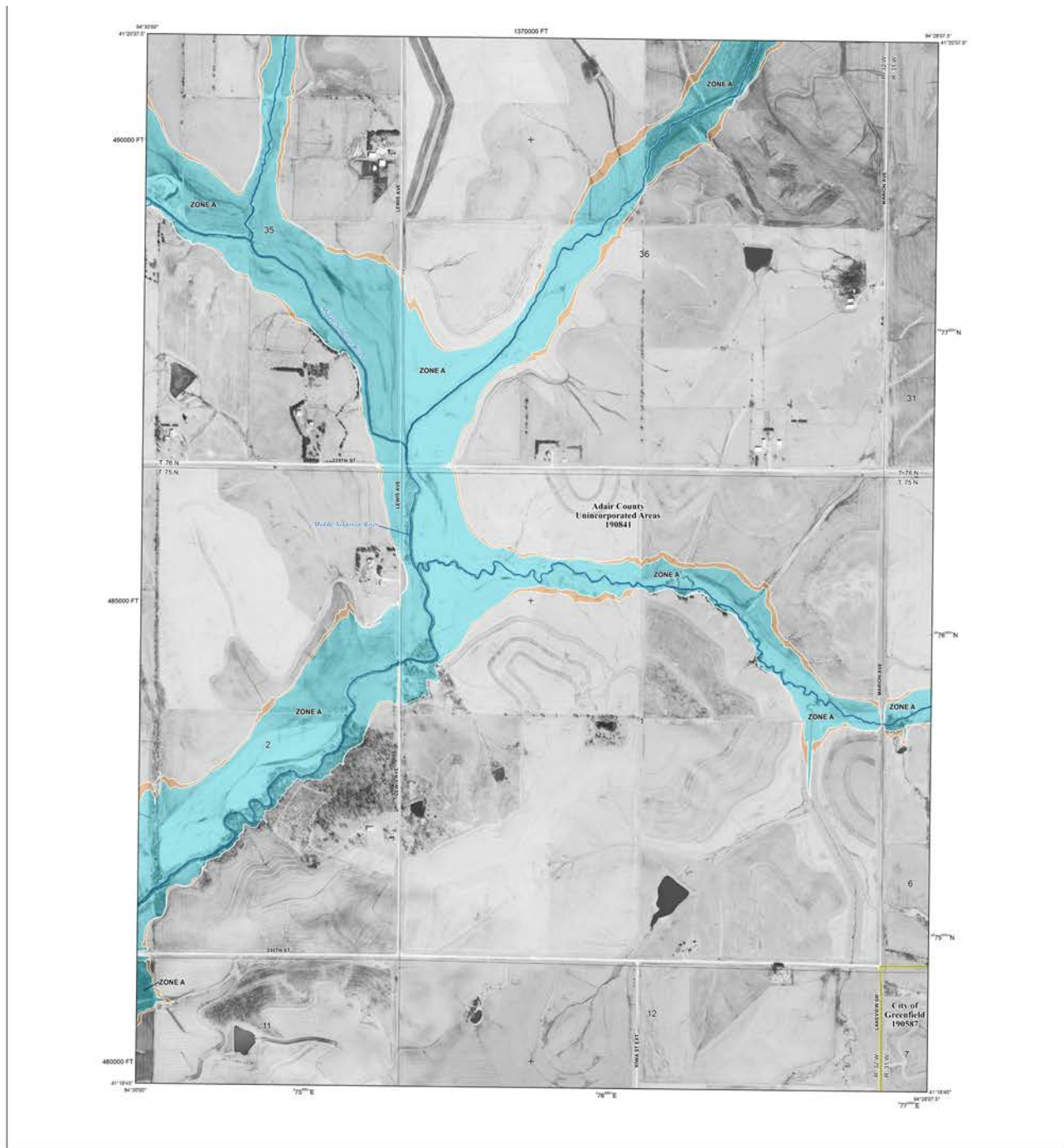
PANEL 300 OF 500



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190041 0300 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0300A  
EFFECTIVE DATE  
APRIL 5, 2017





### FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, AO, AH, VE, AE
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, or for FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously unincorporated areas of the FIRM, Flood Insurance Study Report, digital editions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

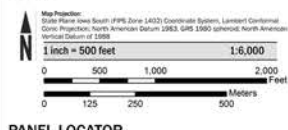
Communities answering land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

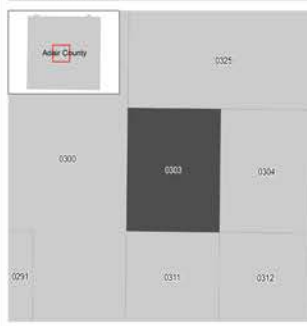
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery flown in April 2008.

### SCALE



### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

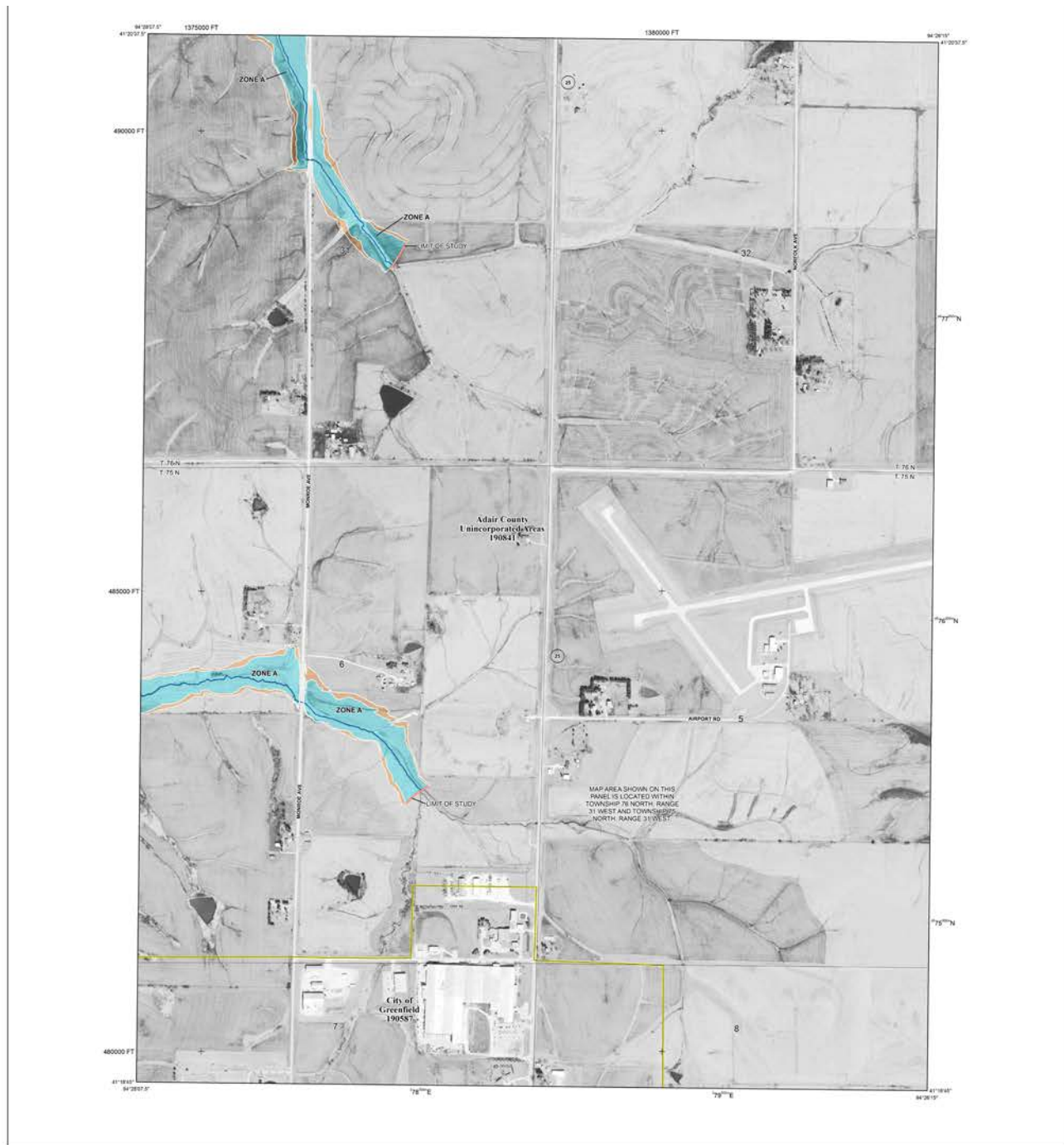
ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 303 OF 500



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0303 A  
GREENFIELD, CITY OF 190587 0303 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0303A  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE ITS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VE1, VE2
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical editions, or for FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously unincorporated areas of the FEMA Map Information Exchange at 1:50,000 scale (1:50,000) or less. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

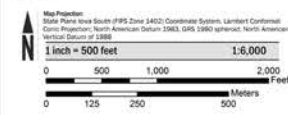
Communities answering land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

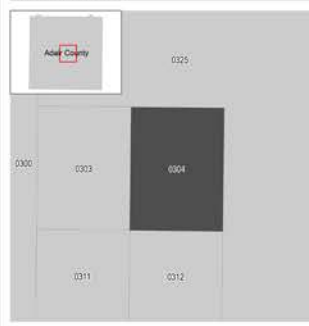
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

PANEL 304 of 500

Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0304 A

GREENFIELD, CITY OF 190587 0304 A

VERSION NUMBER 2.3.3.0

MAP NUMBER 19001C0304A

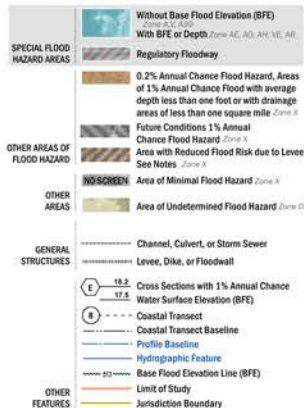
EFFECTIVE DATE APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA, how to order products, or the National Flood Insurance Program in the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously unincorporated into the FEMA Map Information eXchange at 1:67,100 scale (1:67,100 scale) or not. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

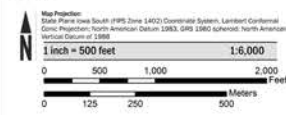
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

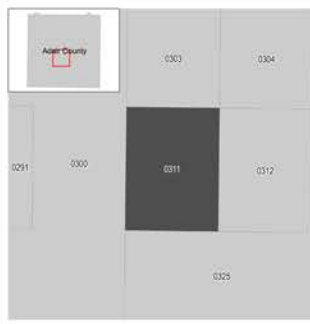
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE STATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 311 of 500



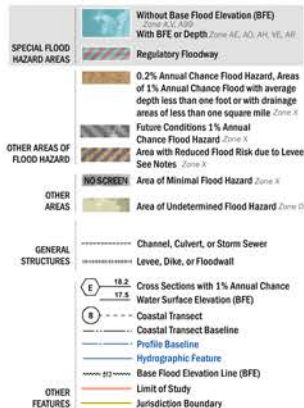
Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0311 A  
GREENFIELD, CITY OF 190841 0311 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0311A  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

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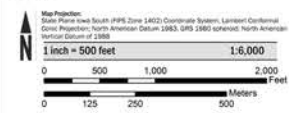
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be obtained directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

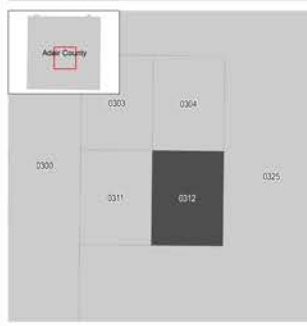
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

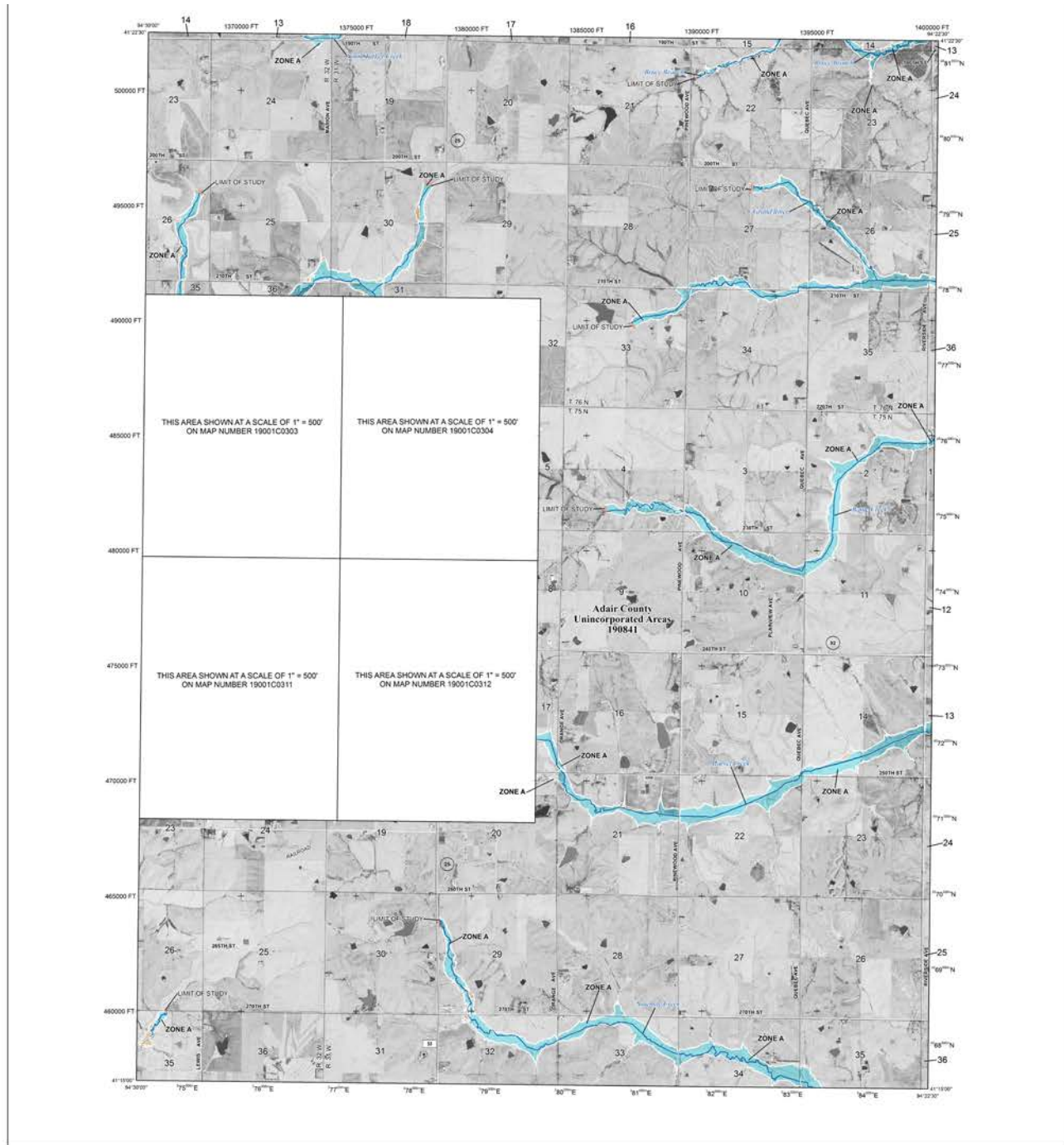
PANEL 312 OF 500



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0312 A  
GREENFIELD, CITY OF 190867 0312 A

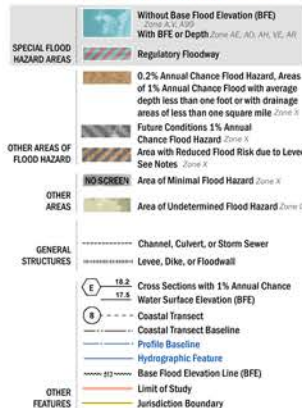
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0312A  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



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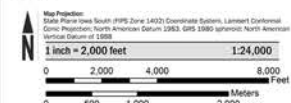
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 325 of 500



Panel Contents

COMMUNITY NUMBER PANEL SUFFIX

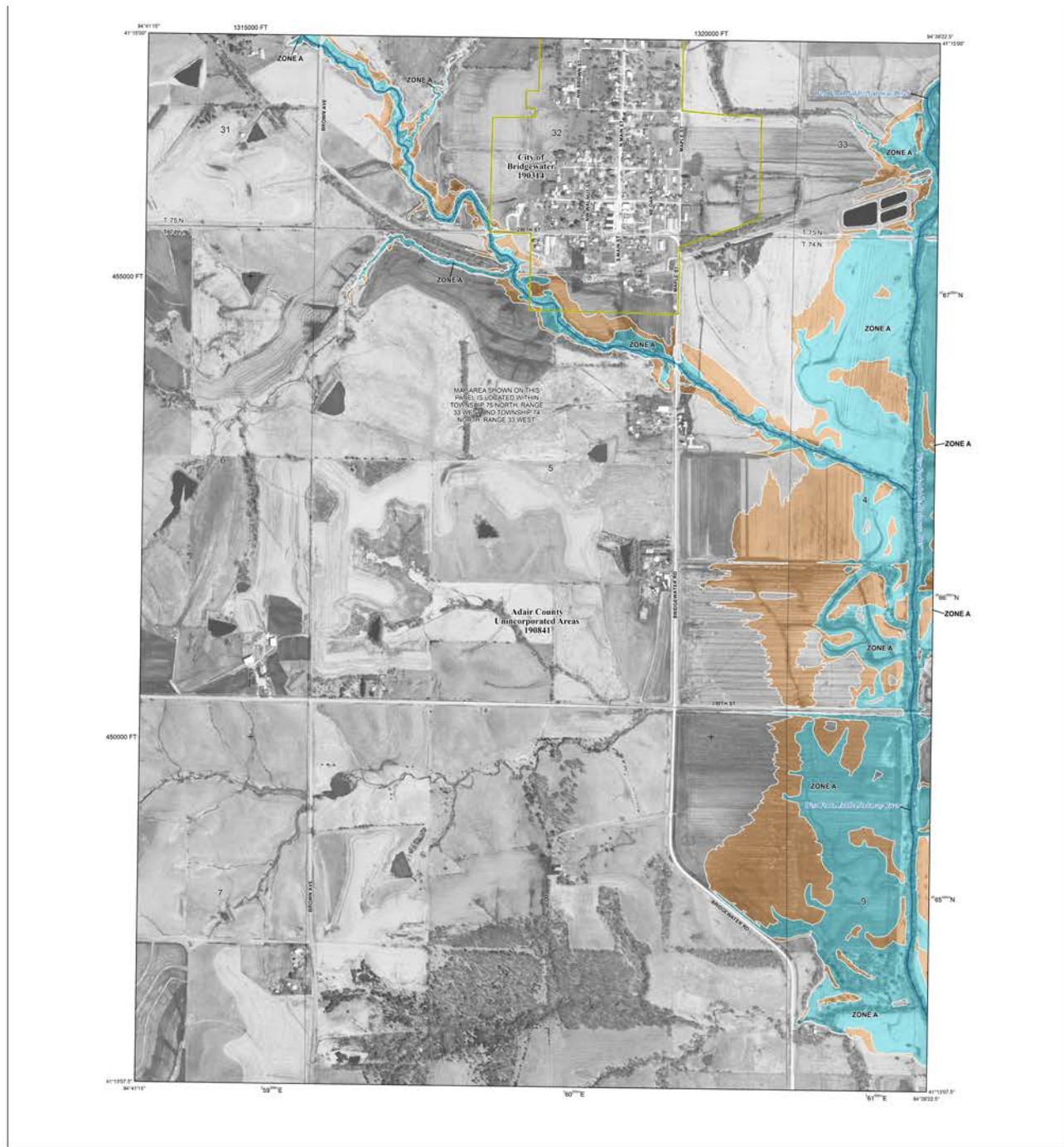
ADAIR COUNTY 190841 0325 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0325A  
EFFECTIVE DATE  
APRIL 5, 2017

EFFECTIVE DATE  
APRIL 5, 2017







## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VE-1
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
OTHER AREAS		Area of Undetermined Flood Hazard Zone D
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

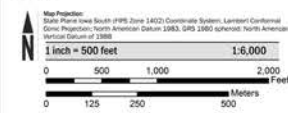
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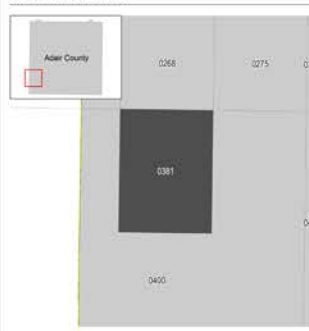
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

Panel 381 of 500

Panel Contents:

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0381 A

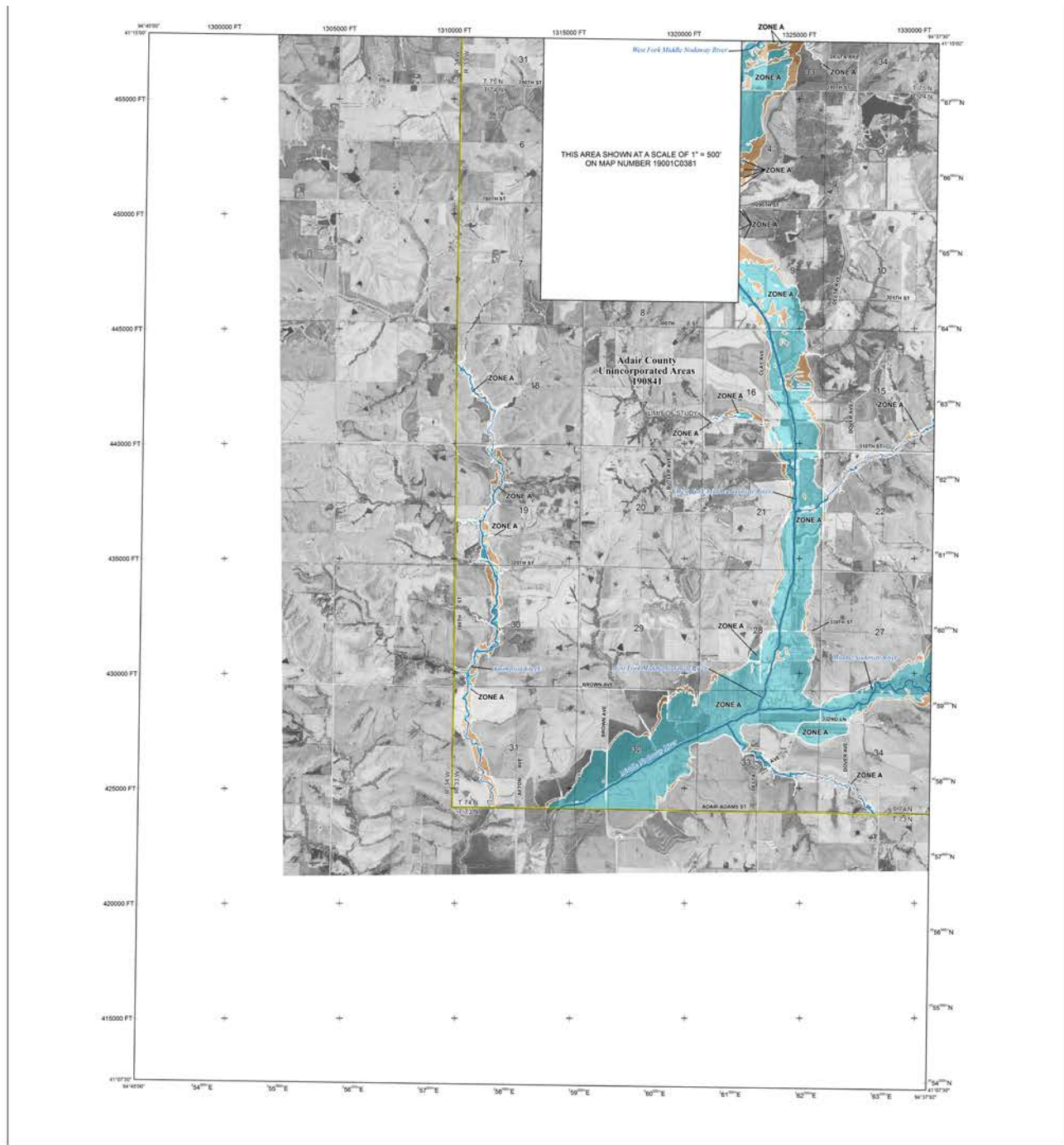
BRIDGEPORT, CITY OF 190314 0381 A

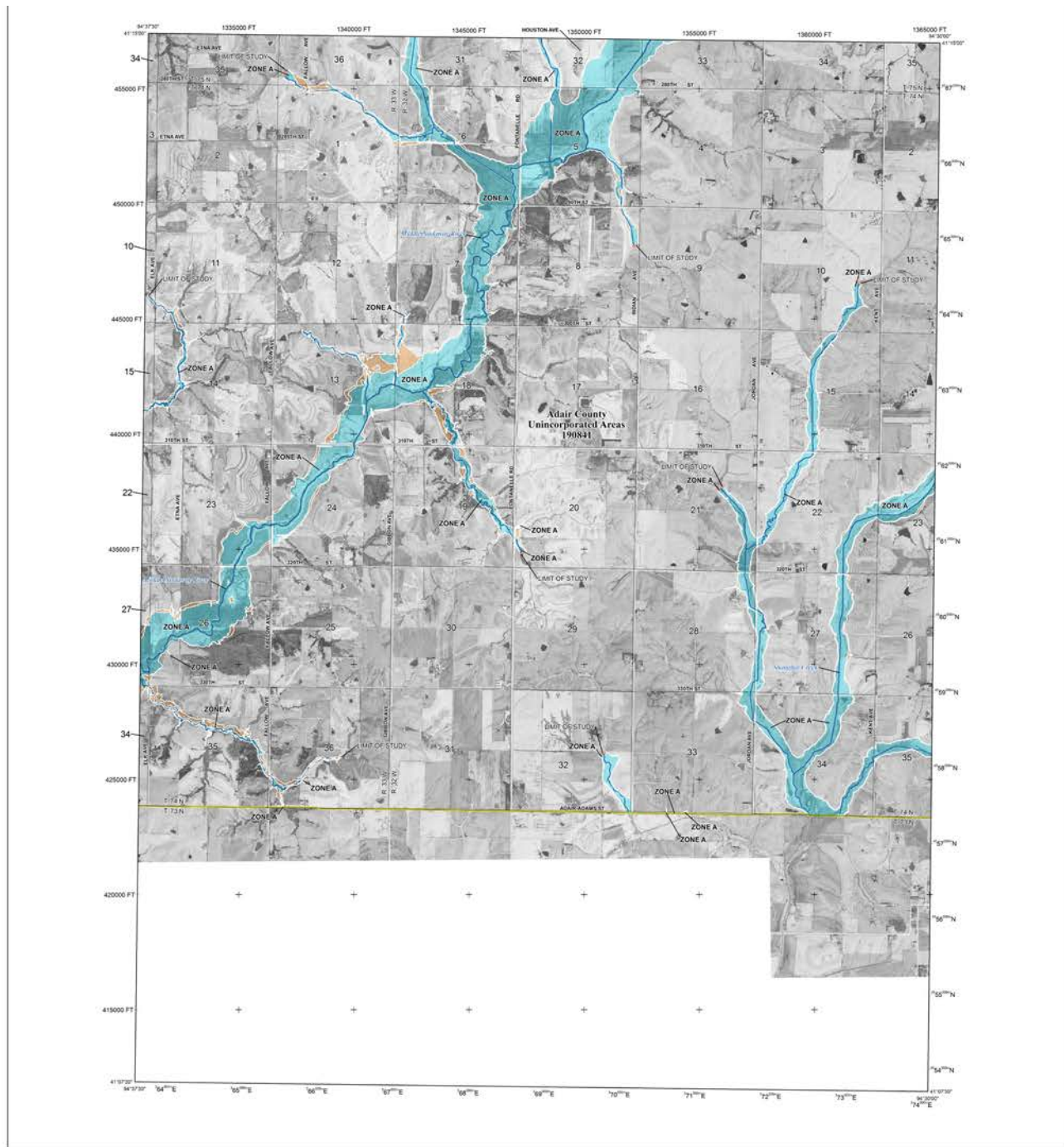
VERSION NUMBER 2.3.3.0

MAP NUMBER 19001C0381A

EFFECTIVE DATE APRIL 5, 2017







## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth (Zone AE, AO, AH, VE, VE1)
		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile (Zone X)
OTHER AREAS OF FLOOD HAZARD		Future Conditions 1% Annual Chance Flood Hazard (Zone X)
		Area with Reduced Flood Risk due to Levee (Zone X)
		NO SCREEN Area of Minimal Flood Hazard (Zone X)
		Area of Undetermined Flood Hazard (Zone D)
OTHER AREAS		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
GENERAL STRUCTURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

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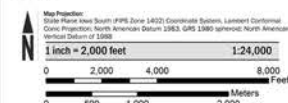
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 425 OF 500



Panel Contents:

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0425 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0425A  
EFFECTIVE DATE  
APRIL 5, 2017





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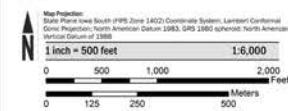
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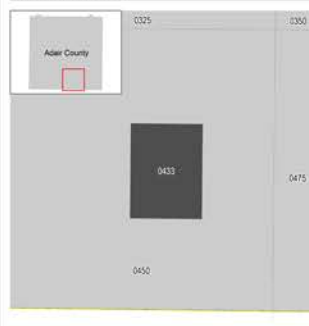
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 433 or 500

Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX

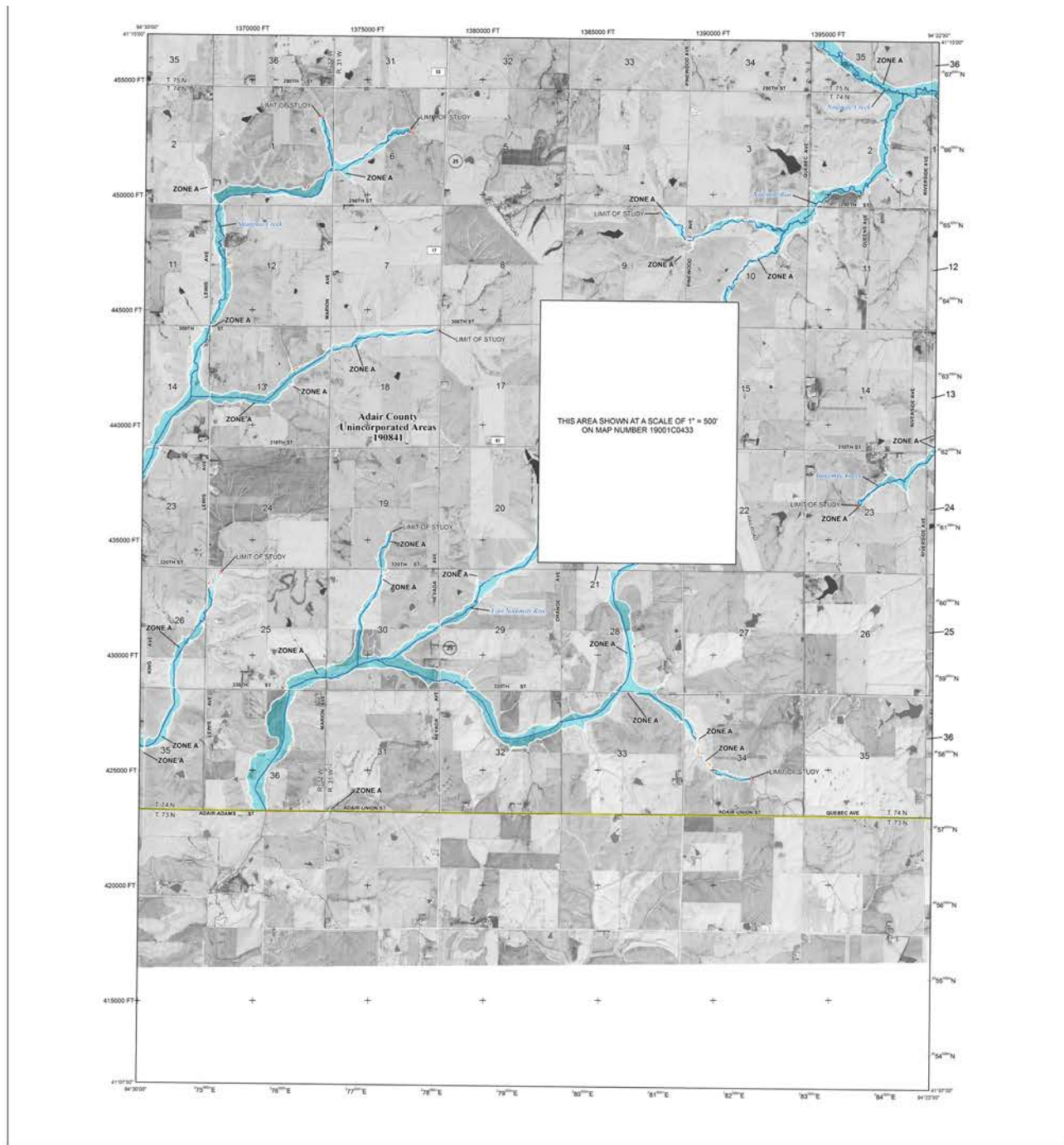
ADAIR COUNTY 190841 0433 A

ORIENT, CITY OF 190792 0433 A

VERSION NUMBER 2.3.3.0

MAP NUMBER 19001C0433A

EFFECTIVE DATE APRIL 5, 2017



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[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, AD, AH, VE, AE
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS		Area with Reduced Flood Risk due to Levee See Notes Zone X
		Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
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		Profile Baseline
		Hydrographic Feature
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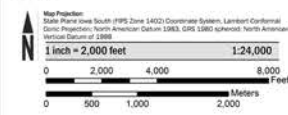
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 450 of 500



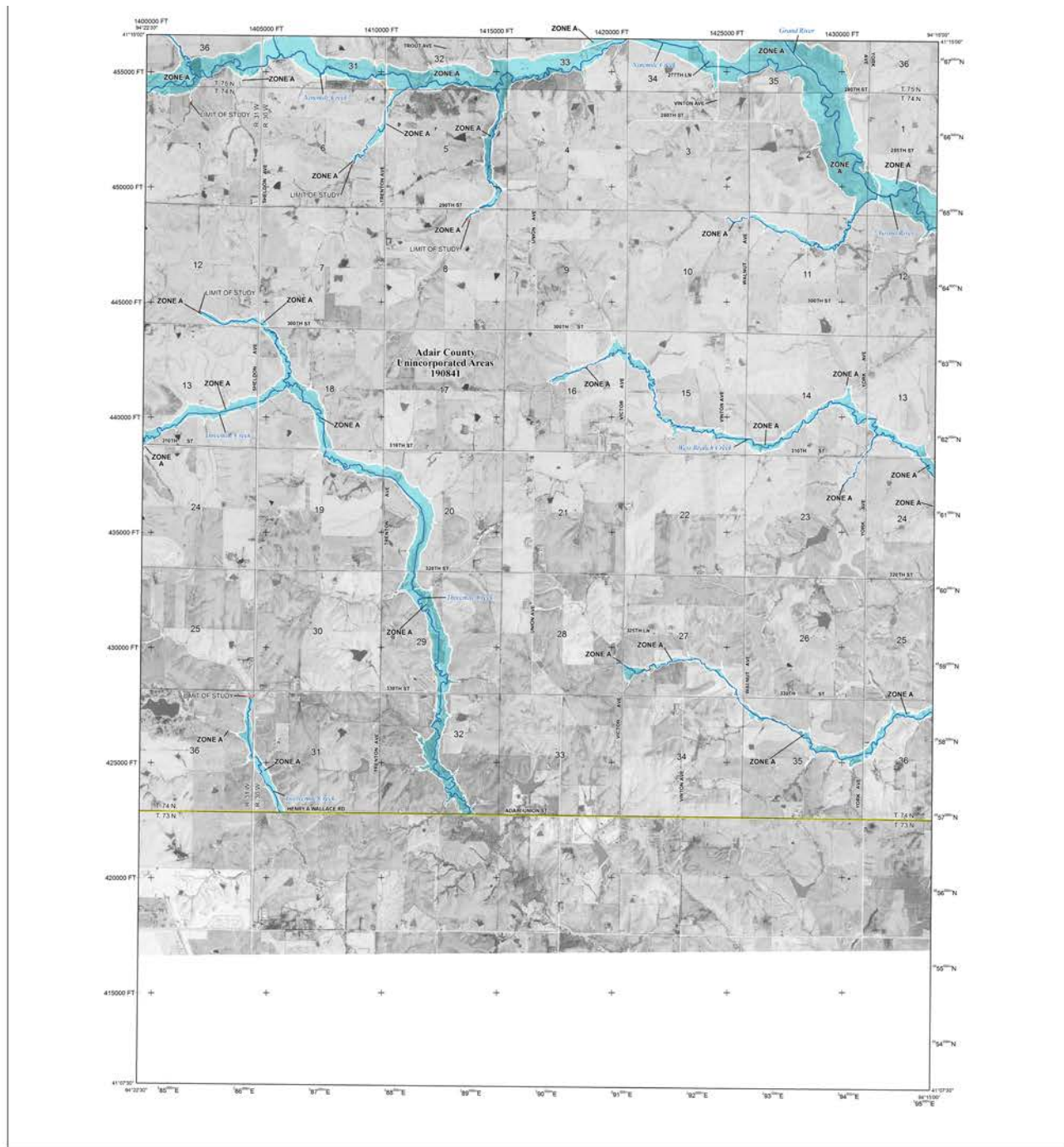
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COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0450 A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0450A  
EFFECTIVE DATE  
APRIL 5, 2017





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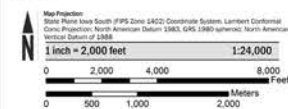
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 475 OF 500

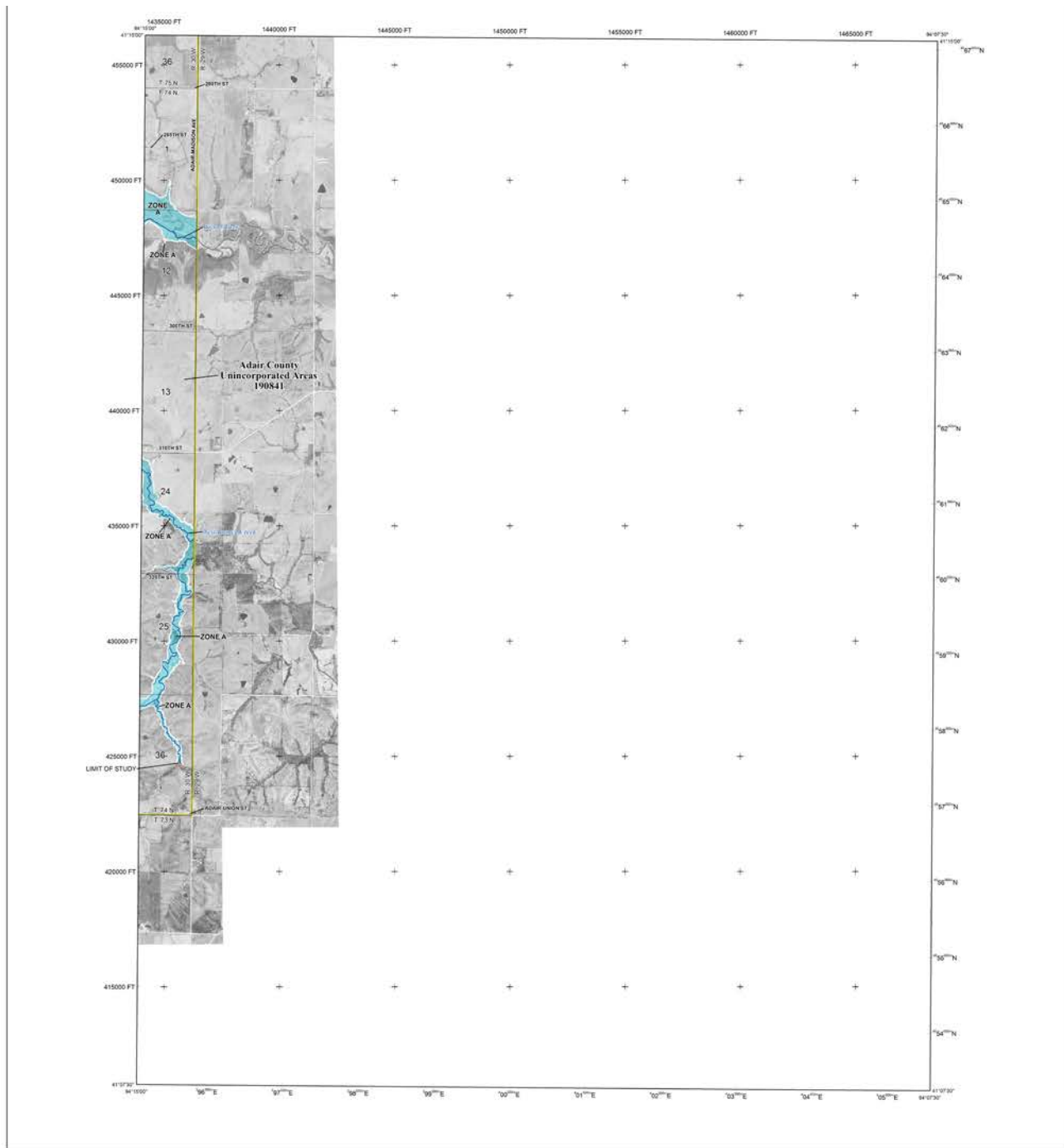


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COMMUNITY NUMBER PANEL SUFFIX

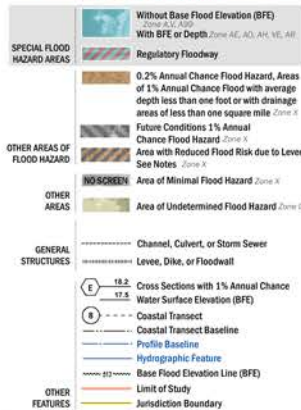
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VERSION NUMBER  
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MAP NUMBER  
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EFFECTIVE DATE  
APRIL 5, 2017



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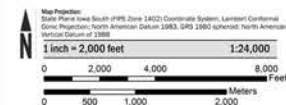
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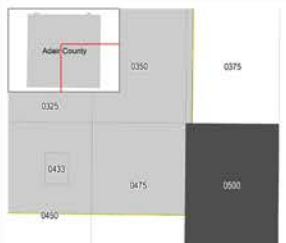
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 500 OF 500



Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0500 A

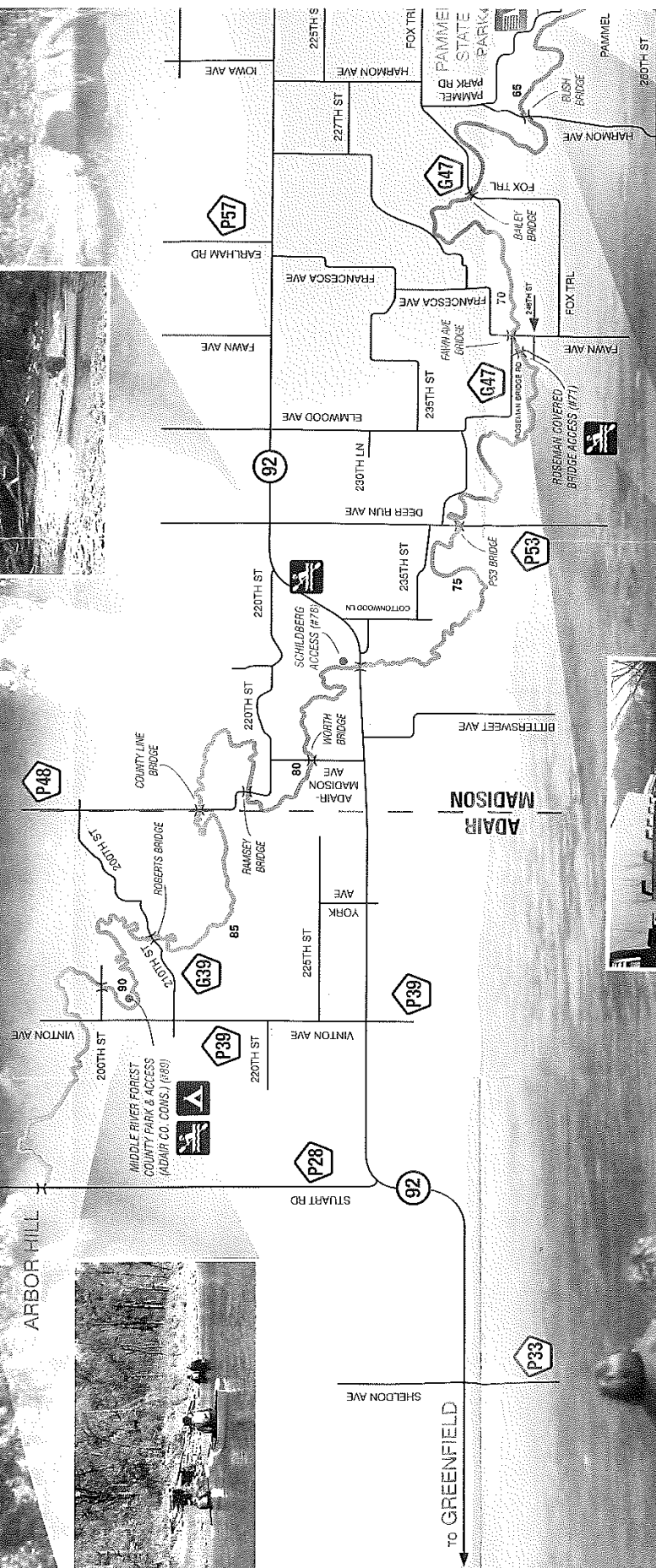
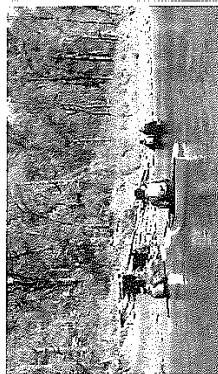
VERSION NUMBER  
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MAP NUMBER  
19001C0500A  
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# Appendix B: City of Adair

## Community Profile

### *History*

The city was founded along the summit of the great watershed of the state by George O. Tallman, of Brooklyn, New York, in 1872 and the plat was filed with the County Recorder that year. This, which is the highest point on the railroad, seemed to be a natural point for a town. The Tallman land, where the town was first laid out, was not used to any extent for several years. The Tallman plat was called West Adair, and is composed principally of residences. Nothing was done toward building the town, until in the summer following, when the railroad put in a station and a lumberyard was built. Since that time the town has grown rapidly. In 1874, Adair had grown to 84 and to 150 in 1875. By the mid 1880s the population was 500 and steadily increasing.

Adair may be most famous for the smiley water tower adjacent to the Interstate and an incident that occurred near the town over 140 years ago. The notorious robbery of a train on the Chicago, Rock Island and Pacific railroad, on the 21st of July, 1873, occurred about two miles west of Adair. Loosening the rails and using a simple rope, the notorious Jesse James gang pulled the tracks in such a way to cause a derailment, which killed the engineer and injured the conductor. From there, they attacked the train and made off with thousands of dollars of cash and property. A historical marker is found today near the robbery site. To this date, Adair hosts annual "Jesse James Chuckwagon Days" to "celebrate" the contribution this event has on the town's history.

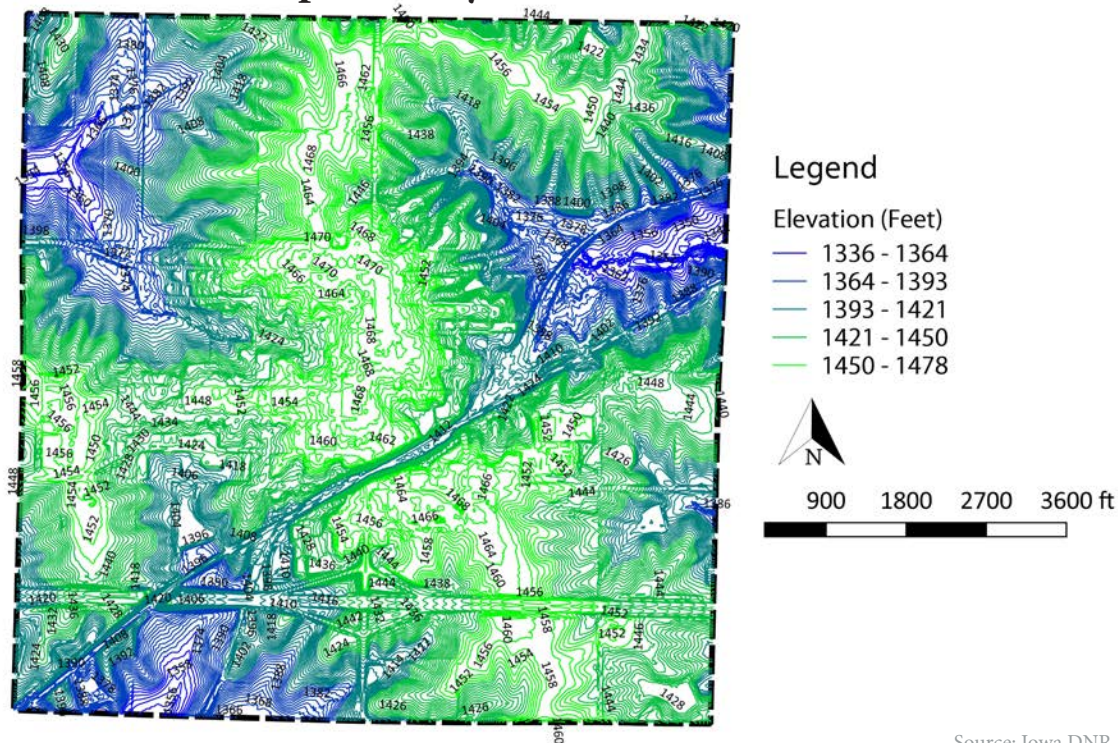
The early town had many of the things commonly found in a self-sufficient community at that time: banks, grocers, hotels, blacksmiths, stables, lumber stores, and mills. Many of these remain today even though the economy has changed because the Interstate's arrival fifty years ago has caused redevelopment of hospitality and convenience businesses on the south side of the town. Today, the city is making significant investments in the downtown, recreation, and infrastructure in order to reverse population declines that have occurred for the past 75 years.

### *Geography and Environment*

Adair is 23 miles northwest of Greenfield in the northwest corner of Adair County and occupies approximately 2.2 square miles, entirely of land. Nearly 30% of the city's area (3% of the city's population) is located in Guthrie County. Approximately 25% of the land within the city is residential developed, with another 10% commercial/industrial, 5% recreation/open space, 10% transportation, 0% education, 5% other public uses, and 45% agriculture.

The city's topography is rolling hills with a mean elevation of approximately 1,400 feet. A few very small streams originate in or near the city, none of which have a flood history. The city's elevation map can be found on Map B.1.

**Map B.1: City of Adair Elevation**



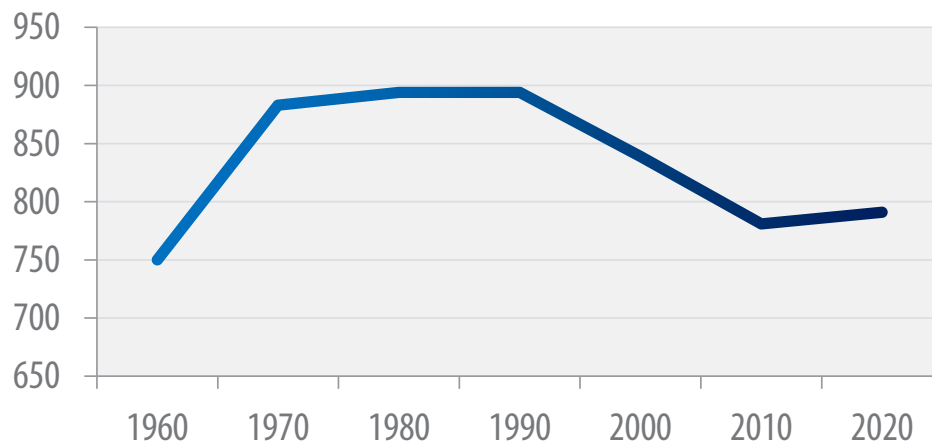
Source: Iowa DNR

## Demographics

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Over the past fifty-six years, Adair's population has experienced periods of increase and periods of decrease with the most recent trend being upward. In 2010, the city's population was 781, and the Decennial Census shows the city's population to be 791, an increase of just over 1%. The population trend from 1960-2020 can be seen in Figure B.1.

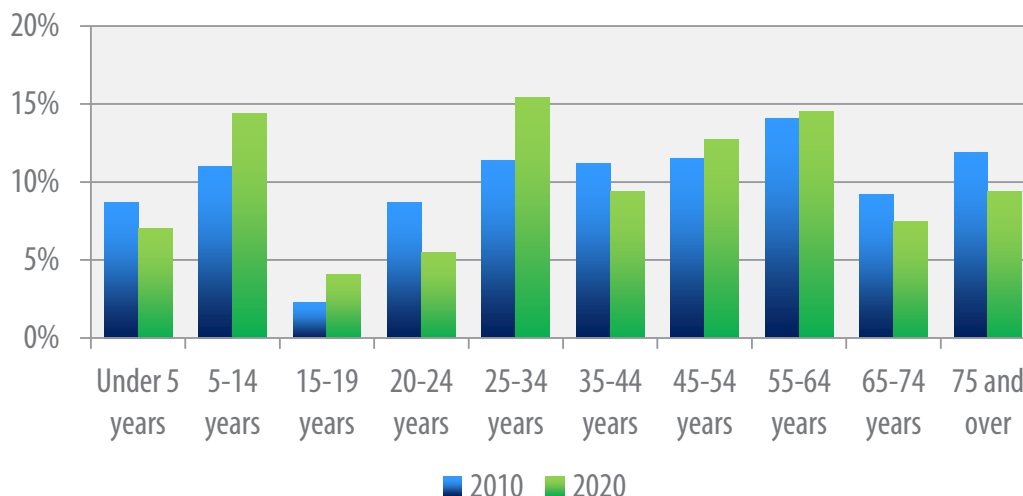
**Figure B.1: City of Adair Historic Population. 1960-2020**



Source: US Census Bureau, American Community Survey  
Adair - Guthrie Hazard Mitigation Plan **Appendix B- City of Adair**

Figure B.2 is a comparison of the age distribution for Adair from 2010 to 2020. The biggest population decrease occurred in the 20-24 age cohort which, in 2010 represented 8.7% of the city's population and in 2020 represented only 5.5%. Notable increases in population were seen in the 5-14 and 25-34 age groups. The age distribution shown is consistent with other rural Iowa communities. Many of these communities see an increase in school-aged children and a decrease in the 20-24 year old age group. This is due to a number of young adults leaving home for higher education and other employment opportunities. The "brain drain" is evened out by an increase in the age groups after college (25-34) as people look for places to settle into careers and start families.

**Figure B.2: City of Adair Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Since 2010, the city's housing stock has decreased by thirty-six units, according to the Decennial Census. During this time, the City saw an increase of 13 vacant units. This increase in vacancy has decreased the total number of owner occupied homes. Table B.1 shows a breakdown of the city's occupied and vacant housing units.

**Table B.1: City of Adair Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	393	91.0%	344	86.9%
<b>Owner Occupied</b>	289	73.5%	207	60.2%
<b>Renter Occupied</b>	104	26.5%	137	39.8%
<b>Vacant Housing Units</b>	39	9.0%	52	13.1%
<b>Total Housing Units</b>	432	100.0%	396	100.0%

Source: US Census Bureau

Adair's housing value increased from \$59,826 in 2017 to \$119,100 in 2020. The homes in Adair can be very affordable and can be used to attract new residents, but they may deteriorate faster and need a number of repairs and updates. According to the 2018 Adair & Guthrie County Assessors, over 41% of the homes in the City of Adair are valued less than \$50,000, and almost 43% are valued between \$50,000 to \$99,999. A complete breakdown of all the homes in the City of Adair can be found in Table B.2. Knowing information about the city's housing stock is useful after a disaster hits to determine how much damage was done, and how it will affect the city moving forward.



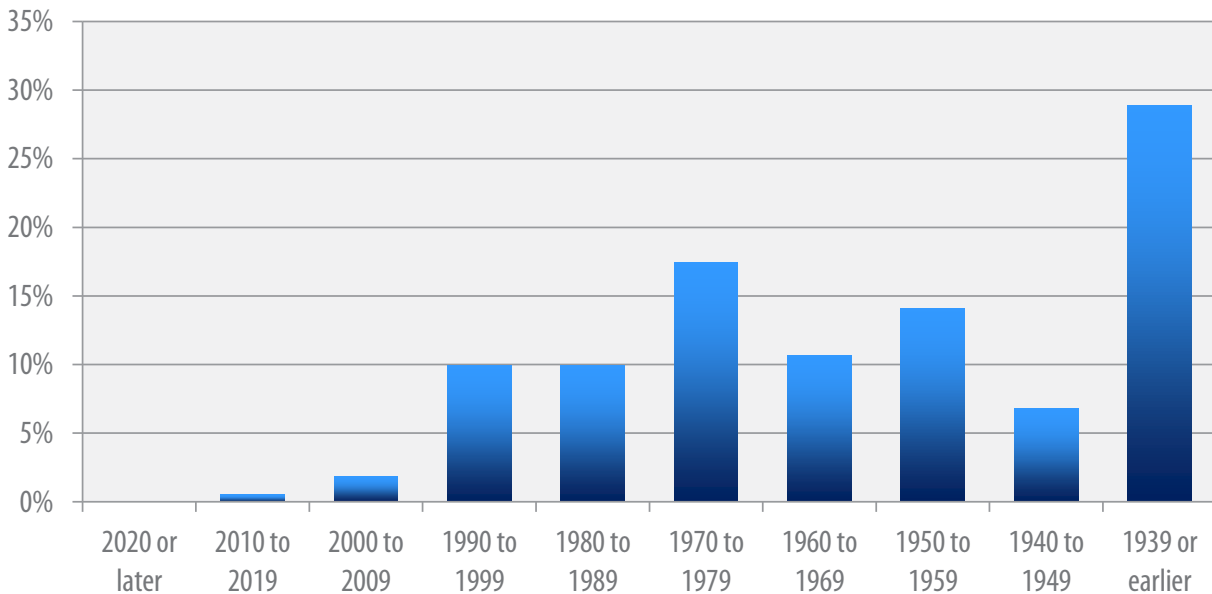
**Table B.2: City of Adair Value of Owner-Occupied Units, 2021**

Value of Housing Unit	Percent of Homes
Less than \$50,000	41.5%
\$50,000 to \$99,999	42.9%
\$100,000 to \$149,999	12.1%
\$150,000 to \$199,999	1.4%
\$200,000 to \$299,999	1.7%
\$300,000 to \$499,999	0.3%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: U.S. Census

Figure B.3 showcases the year housing units within the City of Adair were constructed. Like much of the county, Adair has a large number of homes constructed in 1939 or earlier. The city also saw a spike in construction during the 70s. The most recent American Community Survey Estimates estimate that there were no homes built within the City of Adair since the 2010 to 2019 time period, but since these are just estimates, may not be 100% correct. Older homes tend to be more susceptible to damage from hazards such as fires and serious storms. Building standards of today take into account the most recent hazard data, and homes are constructed to withstand these hazards, where homes built in earlier decades were built to different standards.

**Figure B.3: City of Adair Year Housing Units Constructed, 2020**



Source: American Community Survey

## *Economics*

Over one-quarter of the City of Adair's households make less than \$25,000 per year. In 2020, the city's median household income was \$49,423, \$16,177 less than the State of Iowa's median income (\$65,600). A complete breakdown of the city's household income can be found in Table B.3.

**Table B.3: City of Adair Household Income, 2020**

<b>Income (In 2016 Inflation Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	21	5.5%
\$10,000 - \$14,999	0	0.0%
\$15,000 - \$24,999	33	8.7%
\$25,000 - \$34,999	54	14.0%
\$35,000 - \$49,999	51	22.7%
\$50,000 - \$74,999	78	20.3%
\$75,000 - \$99,999	57	12.2%
\$100,000 - \$149,999	25	9.9%
\$150,000 - \$199,999	7	5.8%
\$200,000 or more	5	0.9%
Median Household Income	\$49,423	-
Mean Household Income	\$64,965	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural Iowa cities primarily serve as agricultural service centers and retail trade centers, but manufacturing and construction activities are also present. Many residents of Adair may travel to nearby towns to find employment. The breakdown of employment by industry for residents aged 16 and over can be found in Table B.4. There are 74 residents of the City of Adair that work in the educational, health care, and social assistance industry. This industry is the largest cohort within the city, followed by manufacturing and then the arts, entertainment, recreation, accommodation, and food service industry.

**Table B.4: City of Adair Employment by Industry, 2016**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	415	100.00%
Agriculture, Forestry, Fishing, Hunting, Mining	16	3.8%
Construction	34	8.2%
Manufacturing	68	16.3%
Wholesale Trade	29	5.6%
Retail Trade	59	7.0%
Transportation and warehousing and utilities	14	3.3%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	35	8.4%
Professional, scientific, management, administrative, and waste management services	20	4.8%
Educational, health care, and social assistance	74	17.8%
Arts, entertainment, recreation, accommodation, and food services	43	10.4%
Other services, except public administration	19	4.6%
Public Administration	4	1.0%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table B.5 provides a compilation of the current planning and regulatory documents in place for the City of Adair, the table also shows the last time the documents were last updated.

**Table B.5: City of Adair Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2000
Building Code	Yes	Various
Zoning Ordinance	No	-
Strategic Plan	Yes	2011
Housing Needs Assessment	No	-
NFIP Participant	Yes	1975
Floodplain Regulations	Limited	-

## NFIP Participation

A large number of Adair County's FEMA Flood maps were approved in April of 2017. The City of Adair has been deemed an Area of Minimal Flood Hazard, and because of this, has not been mapped. The city does participate in NFIP due to previous flooding incidents.

## Outlook and Future Development

The population of Adair is likely to continue a slow decline, as has been the case in recent years. The future of the population is most likely to be affected by the continued sustainability of the school district and strength of the construction, retail, and transportation sectors of the economy. The city should expect most new development to be residential, with a few small businesses possible. Conversion of farmland on a very modest scale is likely, but development is not likely in flood hazard areas.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. The critical facilities for the City of Adair can be found in Map 2.5.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table B.6.

**Table B.6: City of Adair Essential Infrastructure and Services**

<b>Major Arterials</b>	Interstate 80	<b>Air Service</b>	Greenfield Airport/Atlantic Airport
<b>Water Service</b>	Municipal	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	Black Hills Energy
<b>Sanitation/Solid Waste</b>	City, Local Haulers	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Casey Mutual Telco, Wireless	<b>Law Enforcement</b>	Adair Police; supported by Sheriff
<b>Fire Service</b>	Adair Fire (Volunteer)	<b>Ambulance Service</b>	Adair Co. Health System, Adair Fire



# Map B.2: City of Adair Critical Facilities





**Table B.7: City of Adair Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Adair Community Center	308 Stuart Street	Essential Facility
2	Adair Police Department	320 Audubon Street	Essential Facility
3	Adair Post Office	317 Audubon Street	Essential Facility
4	Adair United Methodist Church	403 Cass Street	Vulnerable Population
5	Adair Water Tower	Hillcrest Street	Utilities
6	City Hall	320 Audubon Street	Essential Facility
7	First Presbyterian Church	405 5th Street	Vulnerable Population
8	Good Shepherd Lutheran Church	1107 Broad Street	Vulnerable Population
9	Dollar General	109 5th Street	Vulnerable Population
10	Iowa DOT Facility	300 Hillcrest	Essential Facility
11	Saint John's Catholic Church	501 Adair Street	Vulnerable Population
12	Kum & Go	109 5th Street	HAZMAT
13	Casey's	110 5th Street	HAZMAT
14	Adair Fire Department	505 5th Street	Essential Facility
15	Planned Public Safety Building	402 5th Street	Essential Facility
16	Water Treatment Facility	1000 Guthrie Street	Utility
17	Wastewater Treatment Facility	2000 Audubon Street	Utility
18	City Maintenance Shed	115 Hillcrest	Essential Facility
19	City Park/Campground	400 5th Street	Vulnerable Population

## Hazard Scores

**Table B.8: City of Adair Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Adair is used for agriculture, and most of that is row crop farming. There have been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city, which had to be removed at a cost to Adair.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Adair has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The City of Adair Public Works Director reports that the wells feeding the water plant are stable and that the drought currently underway has had virtually no effect. He stated that Adair is an anomaly, as other towns regionally are suffering much worse.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Adair. The committee feels there will be no instances during the life of this plan.

<b>Expansive Soils</b>	Expansive soils are not uncommon in this area, due to high clay content and dramatic changes in soil moisture and temperature. This hazard has the greatest impact on individual properties, especially those not engineered to withstand the hazard. This is a very localized hazard (e.g., individual home) and not a major priority for public response. The City of Adair's leaders have no knowledge of problems affecting city infrastructure, city facilities, or their personal homes and property.
<b>Extreme Heat</b>	Extreme heat events continue to impact Adair. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Adair's leaders are contemplating adding cots and cooling systems to its community center and then naming it a designated cooling shelter for public use during extreme heat.
<b>Flash Flood</b>	Adair sits atop a ridge and most of the town is flat or gently sloping. While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. The only time local leaders can recall major stormwater damage was in 2008, when extreme rains affected all of Iowa. Storm water management actions can mitigate this hazard.
<b>Grass/Wild Land Fire</b>	About a third of the land in the city is used for farmland or timberland. Most of the land surrounding town is the same. In normal conditions, Adair is not at risk. However, during prolonged dry seasons and when it is windy, a wildland fire or controlled burn can turn into a deadly fire and impact the town, even if it starts outside of town. The fire department reports an average of ten grass/wildland calls per year, all of them outside of the city boundary in rural Adair or Guthrie Counties.
<b>HAZMAT Incident</b>	The IDNR has reported minor incidents of HAZMAT in the city. The committee reported that the Casey's and Kum & Go stores in town have experienced gasoline spills and a somewhat regular basis. Further, there are many trucks and farm vehicles that travel through town on Interstate 80 and secondary roads. The Iowa Interstate Railroad handles large quantities of chemicals. Hundreds can be impacted due to this hazard. No part of the town is exempt from its impacts.
<b>Human Disease</b>	Adair is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Adair, mostly due to the lack of employees. One popular local restaurant closed its brick-and-mortar location due to the lack of ability to find workers. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. Other human disease incidents continue to affect Adair, especially major employers, with sick people, which hurts their operations.
<b>Infrastructure Failure</b>	Infrastructure failure can occur with little or no warning and can cause major damage and disruptions. It is important to prevent these hazards through infrastructure investment and also to have the capacity to respond to them if they occur. Adair has aging homes and properties. Resources are limited for property owners to make structural improvements. Some utilities are outside of the authority of the city and implement their own measures. Windstream was continuing to have communications infrastructure problems, but the situation has improved in the past few years. Water and sewer systems have been improved. The greatest issues impacting Fontanelle are likely aging streets, sewer systems, and above-ground electrical power. The city mentioned that it would like to have the remaining portions of electrical wires buried, but this cannot be forced because Alliant operates the system.

<b>Levee/Dam Failure</b>	There are no dams or levees in the city or in the immediate vicinity of the city.
<b>Radiological</b>	There is no history of this hazard in Adair. There is a small medical office that may have equipment that could release radiological materials, but the release would be small and not a threat to the general public. Incidents involving vehicles on I-80 hauling spent nuclear fuel or other radiological material are possible but very unlikely.
<b>River Flooding</b>	River flooding has not been reported in Adair. The most recent FIRM maps adopted in 2017 show no flood hazard areas in the city. Despite this, the City joined the NFIP in 1975 and historically there have been people buying flood insurance through the program. Because there is no past history of flooding and current maps show only minor areas of risk in the city, the committee has determined that the risk is very low.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Adair. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage. The committee reported 23" of snow in Adair during the January 2024 series of back-to-back storms. The city reported lots of manpower and equipment usage and a few people were stranded. Sometimes, although not in January 2024, the Interstate is closed due to heavy snow. Some winters the city struggles with finding enough beds for those who are stranded while traveling, which can quickly fill up local hotels.
<b>Terrorism</b>	Adair has no history terrorism. The committee feels this hazard is not very likely but that the community must remain vigilant. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Adair, but most of them do not have major impact to life and property, and only a few storms are year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Adair has suffered from two major hailstorms in the past ten years, which damaged siding, trees, roofs, windows, and cars throughout town. One incident was so memorable that the committee-member cited the day as June 30, 2014. This event helped spur the City of Adair to invest in a program to renovate exterior facades of its downtown buildings.
<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Adair directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the size of Adair, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter.
<b>Transportation Incident</b>	Speed limits in Adair are relatively low, so any transportation incident is likely going to be isolated in size and damage, and loss of life is unlikely. No airports are within 15 miles of the city. The Iowa Interstate Railroad passes through the city, but traffic is modest, and a derailment is unlikely in the city boundary. The committee anticipates that this hazard will affect the community in varying degrees but will not a widespread impact.
<b>Windstorm</b>	Recent windstorms have caused damage to the Adair area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude. The committee indicated that derechos (most recently in 2023) that have hit the region did not do notable damage within the city.

# Loss Estimates

**Table B.9: City of Adair Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	5	\$843,422	791
<b>Commercial</b>	56	\$18,661,708	
<b>Industrial</b>	2	\$2,099,350	
<b>Residential</b>	402	\$36,044,532	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table B.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table B.10: City of Adair Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$118,497	71
<b>Commercial</b>	5	\$1,194,261	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	36	\$2,213,682	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table B.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table B.11: City of Adair Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$329,157	198
<b>Commercial</b>	14	\$3,317,393	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	101	\$6149,117	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table B.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table B.12: City of Adair Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	3	\$658,315	396
<b>Commercial</b>	28	\$6,634,786	
<b>Industrial</b>	1	\$573,220	
<b>Residential</b>	201	\$12,298,233	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table B.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.



# Flood Maps

The City of Adair is in an Area of Minimal Flood Hazard, and has not been mapped.

## Status of Previous Mitigation Actions

**Table B.13: City of Adair Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Acquire and demolish or relocated buildings and infrastructure in high-risk areas		X			
Adopt State fire codes.	X				
Annually, train key local leaders about hazard mitigation and review the plan.			X		
Bury existing overhead utility lines.		X			
Business and residential preparedness programs.			X		
Clear and deepen ditches on right of ways (ROWS).	X				
Conduct study on possible illegal use of sump pumps and sewer lines	X				
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Construct storm water drainage (underground, culverts, curb & gutter, etc.); improve capacity of existing systems	X				
Continue hazardous materials agreements, support OSHA regulations, and support regional hazardous material teams			X		
Create and maintain a special needs/oxygen user registration program or inventory					X
Create continuity of operations & succession plan for jurisdiction					X
Designate/enforce area HAZMAT transportation routes				X	
Develop a vegetation maintenance plan	X				
Develop/update/publicize local evacuation and shelter-in-place plans					X
Elevate, raise grade, or relocate roads, bridges, sewer lift stations, water pumps, and other infrastructure and critical assets					X
Employ construction measures that direct water away from structures					X

	Status				
Previous Actions	Complete	Underway	Ongoing	Future	Not Implemented
Encourage citizen purchase/use of smoke detectors and fire extinguishers with an incentive program					X
Encourage property insurance purchase					X
Encourage the use of non-combustible materials for structures in wildfire hazard areas					X
Encourage/install sustainable storm water control and water quality practices such as buffer strips, bioswales, rain gardens, porous pavement, vegetative buffers, and parking area islands					X
Flood proof critical assets in the community					X
Formally designate and stock community post disaster shelters; maintain and publicize shelter location list				X	
Full review of policy, procedure, and codes to include mitigation					X
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps	X				
Implement intensive local and regional intelligence, drills, and scenarios			X		
Implement sanitary sewer system inflow and infiltration projects, including new mains and impervious manhole covers				X	
Improve capital communications technology, such as cell towers and fiber cable lines, to better withstand hazards	X				
Improve storm water drainage system capacity					X
Improve transportation infrastructure and replace deteriorated infrastructure			X		
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms					X
Increase production capacity- redundant systems and looping (water, sewer, electric, gas)					X
Install quick-connect emergency generator hook-ups for facilities					X
Install windbreaks (permanent and seasonal). Use snow fences or "living snow fences" to limit wind effects					X
Integrate tornado safe room retrofits into critical assets/facilities					X

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Investigate alternative water sources for fire suppression					X
Involve more groups in hazard mitigation					X
Make public buildings handicap accessible			X		
Promote the construction of private in-home tornado safe rooms	X				
Promote tree and vegetation maintenance on private properties					X
Provide additional permanent overnight accommodations to house travelers who are stranded by severe winter weather			X		
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radio and other notification tools available to the public					X
Purchase/install backup fixed power generators and pumps					X
Repair and weatherize old and/or structurally weak homes					X
Require burial of power lines in new development					X
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.					X
Retrofit/harden existing overhead utility lines					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table B.14: City of Adair Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.



**Table B.15: City of Adair Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Acquire and demolish or relocated buildings and infrastructure in high-risk areas	Infrastructure failure, River Flood	Low	City elected/ admin. officials, flood manager, public works	Low	Local, State, FEMA	Property Protection	Long
Bury existing overhead utility lines.	Infrastructure Failure, Severe winter storm	High	Utility providers	Moderate	Local, Utility Provider, USDA/ FEMA grants, loans	Prevention, Property Protection	Long
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Mod.	City elected/ admin officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Mid
Construct storm water drainage (underground, culverts, curb & gutter, etc.); improve capacity of existing systems	Flash Flood	Mod.	City elected/ admin. officials, engineering firm	Moderate	FEMA/State, USDA, Iowa SRF Program, CDBG	Property Protection	Short
Create and maintain a special needs/oxygen user registration program or inventory	Infrastructure Failure, Severe Winter Storm	Low	Utility providers, EMA, Fire Department, ACHS, public health	Minimal	Local, State, FEMA	Property Protection	Long
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	Mod.	City elected/ admin. officials, EMA	Minimal	EMA, State, Local, grants	Prevention	Short
Designate/enforce area HAZMAT transportation routes	HAZMAT Incident, Infrastructure Failure	Mod.	City elected/ admin. officials	Minimal	Local, IDOT	Property Protection	Short
Develop/update/publicize local evacuation and shelter-in-place plans	HAZMAT Incident, Transportation Incident	Mod.	City elected/ admin. officials, EMA	Minimal	Local	Property Protection, Public Education and Awareness	Mid.

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Elevate, raise grade, or relocate roads, bridges, sewer lift stations, water pumps, and other infrastructure and critical assets	Transportation Incident, Flash Flood	Mod.	City elected/ admin. officials, engineering firm	Moderate to High	Local, FEMA/ State, Iowa DOT, Federal Transportation Funding, USDA, Iowa SRF, CDBG	Structural Project	Short
Employ construction measures that direct water away from structures	Flash Flood, River Flood	Mod.	City elected/ admin. officials	Low	Local, FEMA, State, USDA	Property Protection, Structural Project	Short
Encourage citizen purchase/ use of smoke detectors and fire extinguishers with an incentive program	Infrastructure Failure, HAZMAT Incident	Mod.	City, Fire Department	Minimal	Local, FEMA AFG, Local Foundations, Private Sources	Public Education and Awareness	Short
Encourage property insurance purchase	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/ Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/ Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/ Hail, Tornado, Transportation Incident, Windstorm	Low	City, EMA, Insurance Companies	Minimal	Local, Insurance Companies	Public Education and Awareness	Mid
Encourage the use of non-combustible materials for structures in wildfire hazard areas	Grass/Wild Land Fire, Infrastructure Failure	Low	City elected/ admin. officials, Zoning Official	Minimal	Local, Sustainability Groups/ Foundations	Prevention, Property Protection	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Encourage/install sustainable storm water control and water quality practices such as buffer strips, bioswales, rain gardens, porous pavement, vegetative buffers, and parking area islands	Flash Flood, Infrastructure Failure	Mod.	City elected/ admin. officials	Low to Moderate	USDA, IA Dept. of Ag., ISU Extension, Private Foundations, CDBG, Iowa SRF Program	Natural Resource Protection	Mid
Flood proof critical assets in the community	River Flood, Flash Flood	Mod.	City elected/ admin. officials	Low	Local, FEMA/ State, Local Foundations, USDA, Facility Owners	Property Protection, Emergency Services	Mid
Formally designate and stock community post disaster shelters; maintain and publicize shelter location list	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/ Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/ Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/ Hail, Tornado, Transportation Incident, Windstorm	Mod.	City elected/ admin. officials, Red Cross	Minimal	Local, Red Cross, FEMA/ State, Local Foundations	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Full review of policy, procedure, and codes to include mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	City/Mayor, EMA, IHSEMD	Minimal	Local, County, State, Federal	Prevention	Long
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	Low	County GIS provider, EMA, SICO, city	Low	Local, Grants	Emergency Services	Short
Implement sanitary sewer system inflow and infiltration projects, including new mains and impervious manhole covers	Infrastructure Failure, Flash Flooding	Mod.	City elected/admin. officials, engineering firm	Moderate	Local, FEMA/State, USDA, SRF Program, CDBG	Property Protection, Natural Resource Protections	Long
Improve storm water drainage system capacity	Flash Flood, Transportation Incident	Mod.	City elected/admin officials, street department/public works	Moderate	Local, State, FEMA, USDA, Iowa SRF Program, CDBG	Property Protection, Structural Project	Mid
Improve transportation infrastructure and replace deteriorated infrastructure	Transportation Incident, Flash Flood	High	City elected/admin. officials, engineering firm	High	Local, RUTF, Iowa DOT, Federal Highway Funding, Bonding, TIF, Special Assessments	Property Protection, Structural Project	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm All	High	City/City Council, SISCOG, EMA	Minimal	Local, FEMA/State, Grants	Prevention, Public Education and Awareness	Mid
Increase production capacity- redundant systems and looping (water, sewer, electric, gas)	Drought, Infrastructure Failure	Mod.	Utility Providers, City	Moderate	Local, Energy/Utility Providers, USDA, Iowa SRF, CDBG, Bonding, TIF, Federal EDA	Structural Project	Long
Install quick-connect emergency generator hook-ups for facilities	Energy Failure	High	City elected/ admin. officials, engineering firm	Low	Local, USDA, Energy and Utility Providers, Property Owners	Emergency Services	Short
Install windbreaks (permanent and seasonal). Use snow fences or "living snow fences" to limit wind effects	Severe Winter Storm, Grass and Wild Land Fire	Low	City elected/ admin. officials, engineering firm, property owners	Minimal	Local, USDA, Conservation Partners, Property Owners, Tree Grants, Cost-Share Programs	Property Protection	Long
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/Windstorm	Mod.	Local Governments, Property Owners	High	FEMA/State, Local	Property Protection, Structural Project	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Investigate alternative water sources for fire suppression	Grass and Wild Land Fire	Mod.	City elected/ admin. officials, Fire Department, Regional Water Supplier	Low	Local, State, USDA, Federal Programs, Grants, CDBG, Iowa SRF Program	Property Protection	Mid
Promote the construction of private in-home tornado safe rooms	Tornado/Windstorm	Mod.	City, EMA, IHSEMD	Minimal	EMA, FEMA/ State, Local, engaged property owners	Property Protection, Structural Project	Mid
Provide additional permanent overnight accommodations to house travelers who are stranded by severe winter weather	Severe Winter Storm, Transportation Incident	Low	City Support of efforts by RIADA, Midwest Partnership, others	Minimal	Local, Property Owners	Property Protection	Long
Purchase/install backup fixed power generators and pumps	Energy Failure, Thunder- storm/Lightning/Hail	High	City elected/ admin. officials	Low	Local, FEMA/ State, USDA, CDBG, Iowa SRF Program, Grants, Property Owners	Property Protection, Emergency Services	Short
Repair and weatherize old and/or structurally weak homes	Infrastructure Failure, Severe Winter Storm	Mod.	City elected/ admin. officials	Low	SCICAP, USDA, CDBG, Grants	Property Protection	Mid
Require burial of power lines in new development	Infrastructure Failure, Tornado/Windstorm	High	City elected/ admin. officials, zoning official	Minimal	Local	Prevention, Property Protection	Mid
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.	Tornado/Windstorm, Infrastructure Failure	Mod.	City elected/ admin. officials, Zoning Official	Minimal	Local, State/ FEMA, In-Kind	Property Protection	Long
Retrofit/harden existing overhead utility lines	Infrastructure Failure, Severe Winter Storm	High	Utility Provider	High	FEMA/State, Local, Utility Providers, Property Owners, USDA	Property Protection	Long

# Incorporation into Other Planning Mechanisms

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Where possible, Adair will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Comprehensive Plan
- Building Code
- Strategic Plan
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Housing Needs Assessment
- Zoning Ordinance







# Appendix C: City of Bridgewater

## Community Profile

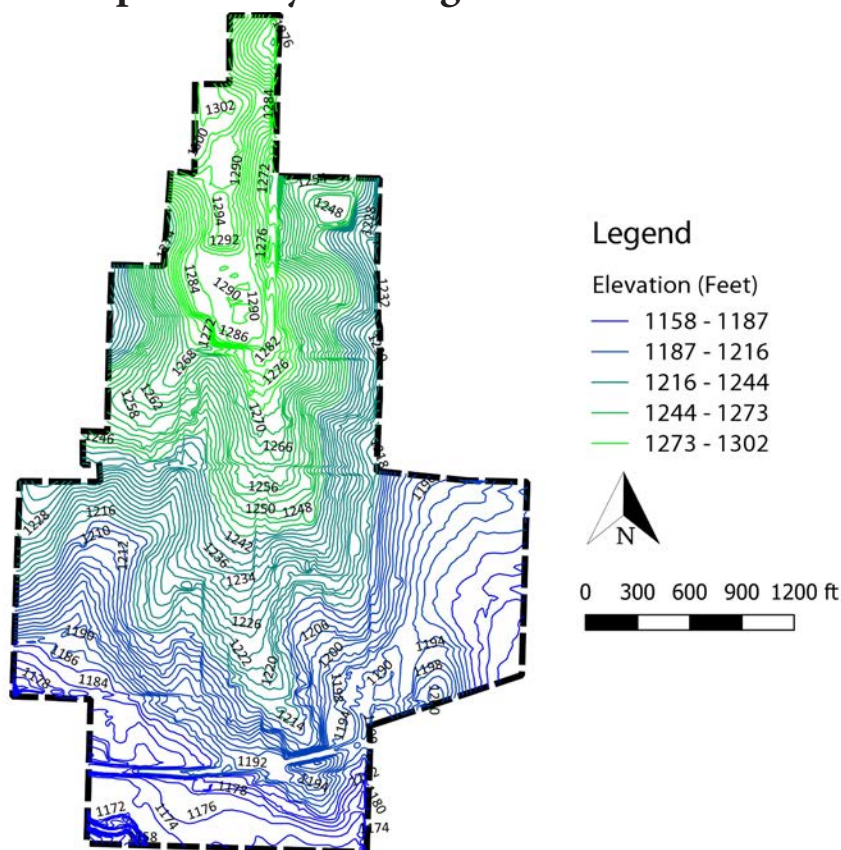
### *History*

The City of Bridgewater was founded in 1885 when the Chicago, Burlington, and Quincy Railroad was built through the area. The community grew to around 400 people at around 1900 and the early part of the 20th Century, but has slowly declined to under 200 people in the recent past.

### *Geography and Environment*

Bridgewater is 12 miles west/southwest of Greenfield in the west central part of Adair County and occupies approximately 0.3 square miles, entirely of land. Approximately 40% of the land within the city is residential developed, with another 5% commercial/industrial, 5% recreation/open space, 10% transportation, 0% education, 5% other public uses, and 35% agriculture. Topography is rolling hills with a mean elevation of approximately 1,200 feet. An unnamed tributary of the West Branch of the Middle Nodaway River flows through the southern part of town and has had modest flood history. The city's elevation map can be found in Map C.1.

**Map C.1: City of Bridgewater Elevation**



Source: Iowa DNR

## Demographics

The size and composition of a community's population can exert influence on its development. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Over the past fifty-six years, Bridgewater's population has experienced periods of slight increase and more periods of both significant and minor decrease with the most recent trend being downward. In 2010, the city's population was 182, and the most recent Decennial Census showed the city has a population of 148, a decrease of 18%. The population trend from 1960-2020 can be seen in Figure C.1.

**Figure C.1: City of Bridgewater Historic Population, 1960-2020**

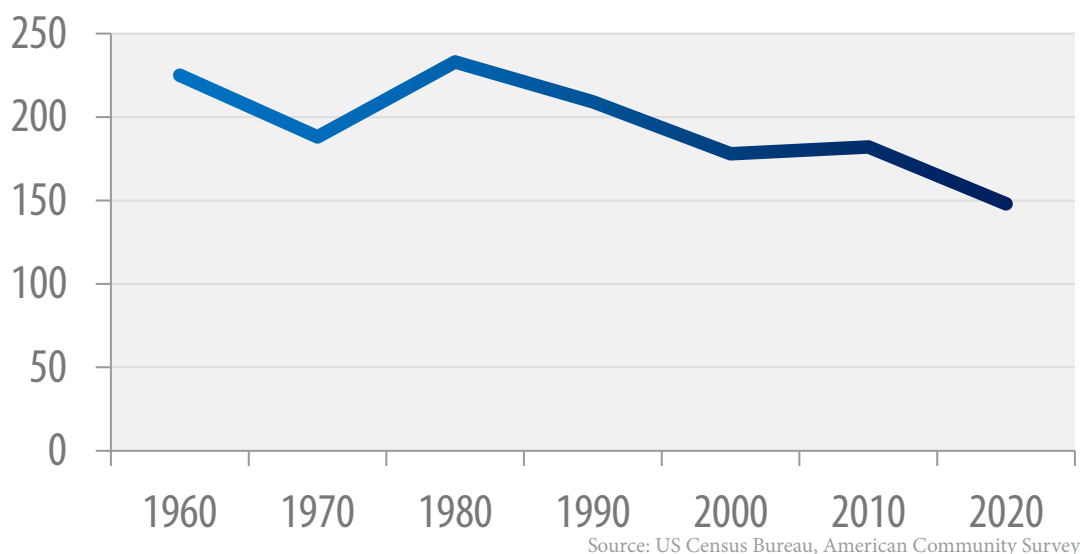
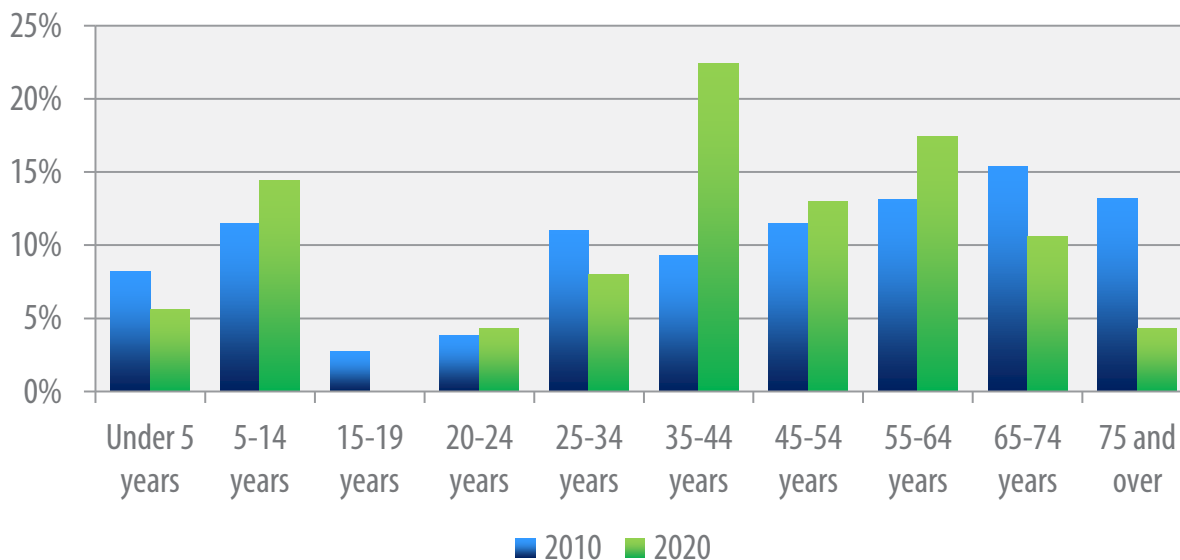


Figure C.2 is a comparison of the age distribution for Bridgewater from 2010 to 2020. The biggest population decrease occurred in the 75 and over age cohort which, in 2010 represented 13.2% of the city's population and in 2020 represented only 4.3%. A noticeable increase in population was seen in the 35-44 (where the chart rose over 13%). The age distribution shown is consistent with other rural Iowa communities.

**Figure C.2: City of Bridgewater Age Distribution, 2010 & 2020**



## Housing

A community's ability to attract new residents is important. One of the more essential aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Since 2010, the American Community Survey estimates that the city's housing stock has decreased by 24 units. These estimates also show that currently just over 1% of the city's housing units are vacant. A complete breakdown of the estimates can be found in Table C.1.

Bridgewater, like many small rural towns in Iowa, has a lower median housing value of \$48,600. The city's homes can be very affordable and can be used to attract new residents, but they may deteriorate faster and will need a number of repairs and updates. According to the American Community Survey Estimates, over 50% of the homes in the City of Bridgewater are valued less than \$50,000. A complete breakdown of all the homes in the City of Bridgewater can be found in Table C.2. Knowing information about the city's housing stock is useful after a disaster hits to determine how much damage was done, and how it will affect the city moving forward.

**Table C.1: City of Bridgewater Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	93	93.0%	72	98.6%
<b>Owner Occupied</b>	64	68.8%	64	88.9%
<b>Renter Occupied</b>	29	31.2%	8	11.1%
<b>Vacant Housing Units</b>	4	4.1%	1	1.4%
<b>Total Housing Units</b>	97	100.0%	73	100.0%

Source: US Census Bureau, American Community Survey

**Table C.2: City of Bridgewater Value of Owner-Occupied Units, 2020**

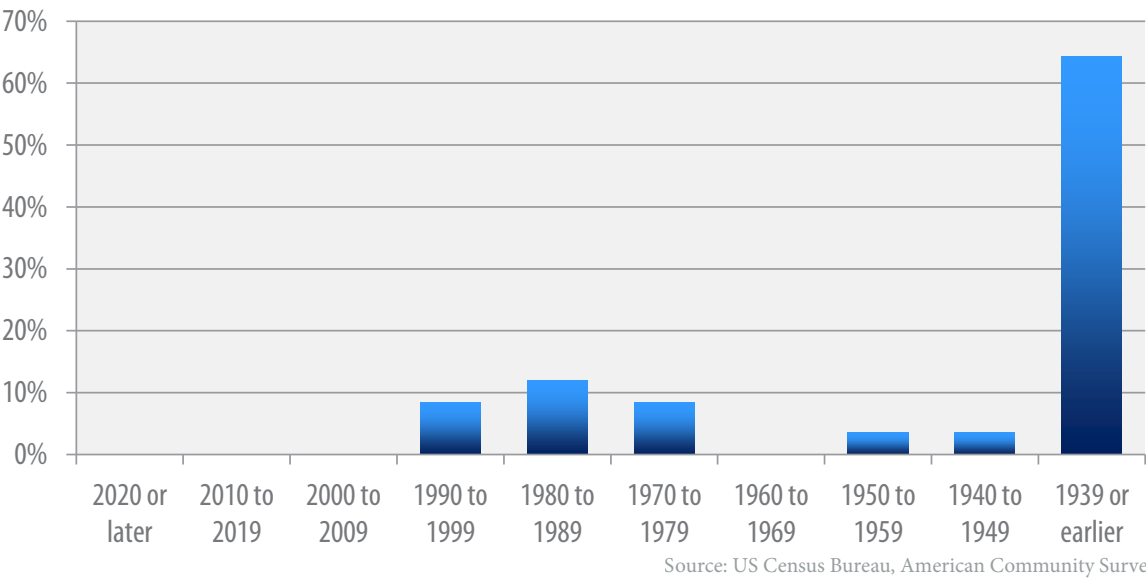
<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	54.0%
\$50,000 to \$99,999	44.0%
\$100,000 to \$149,999	2.0%
\$150,000 to \$199,999	0.0%
\$200,000 to \$299,999	0.0%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Adair County Assessor



Figure C.3 showcases the year housing units within the City of Bridgewater were constructed. Like much of the county, Bridgewater has a large number (64.3%) of homes constructed in 1939 or earlier. The city also saw an uptick in construction during the 1980s with 11.9% of the city’s housing stock being constructed during this decade. The most recent American Community Survey Estimates estimate that there were no homes built within the City of Bridgewater since 2000, but since these are just estimates, that number may not be 100% correct. Building standards of today utilize the most recent construction materials and safety features, ensuring that the new residential structures are as safe as possible. This does not mean that older homes are more unsafe, just that they may be more susceptible to hazard damage.

**Figure C.3: City of Bridgewater Year Housing Units Constructed: 2018**



*Economics*

Over one-quarter of the City of Bridgewater’s households make less than \$25,000 per year. In 2020, the city’s median household income was \$49,063 \$16,537 less than the State of Iowa’s median income (\$65,600). A complete breakdown of the city’s household income can be found in Table C.3.

**Table C.3: City of Bridgewater Household Income, 2020**

Income (In 2020 Inflation Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	4	5.6%
\$10,000 - \$14,999	3	4.2%
\$15,000 - \$24,999	12	16.7%
\$25,000 - \$34,999	5	6.9%
\$35,000 - \$49,999	15	20.8%
\$50,000 - \$74,999	15	20.8%
\$75,000 - \$99,999	0	0.0%
\$100,000 - \$149,999	18	25.0%
\$150,000 - \$199,999	0	0.0%
\$200,000 or more	0	0.0%
Median Household Income	\$49,063	-
Mean Household Income	\$59,497	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural Iowa cities primarily serve as agricultural service centers and retail trade centers, but manufacturing and construction activities are also present. Residents of Bridgewater may travel to nearby towns to find employment. The breakdown of employment by industry for residents aged 16 and over can be found in Table C.4. There are 19 residents of the City of Bridgewater that work in the educational, health care, and social assistance industry which accounts for 26% of the city's working population. This industry is the largest cohort within the city, followed by construction and then manufacturing.

**Table C.4: City of Bridgewater Employment by Industry, 2016**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	73	100.0%
Agriculture, Forestry, Fishing, Hunting, Mining	2	2.7%
Construction	13	17.8%
Manufacturing	10	13.7%
Wholesale Trade	0	0.0%
Retail Trade	7	9.6%
Transportation and warehousing and utilities	8	11.0%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	2	2.7%
Professional, scientific, management, administrative, and waste management services	2	2.7%
Educational, health care, and social assistance	19	26.0%
Arts, entertainment, recreation, accommodation, and food services	4	5.5%
Other services, except public administration	6	8.2%
Public Administration	0	0.0%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table C.5 provides a compilation of the current planning and regulatory documents in place for the City of Bridgewater. It also shows the last time the documents were last updated.

**Table C.5: City of Bridgewater Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	No	-
Zoning Ordinance	No	-
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	Yes	2020
Floodplain Regulations	Yes	2020

## *NFIP Participation*

The City of Bridgewater's flood maps were approved in 2017 and can be found later in this appendix. There is a tributary of the West Nodaway River in the southern portion of the city and has a history of minor flooding. The city joined the NFIP in 2020 after the approval of the most recent maps was official.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. The critical facilities for the City of Bridgewater can be found on Map C.2 and listed in table C.7.

## *Outlook and Future Development*

The population of Bridgewater is likely to continue a slow decline, as has been the case in recent years. The future population is most likely to be affected by housing costs and conditions. With the closure of the elementary school about six years ago, the local population has aged and few new families move into town. New development is very unlikely. If any development occurs, it might be a business occupying a vacant Main Street business space or a new or brought-in manufactured home on an infill lot. The city is now working to build a new community center and improve the city park on North Main Street. Conversion of farmland on a very modest scale is possible but unlikely, and development is not likely in possible flood hazard areas.

## *Essential Infrastructure and Services*

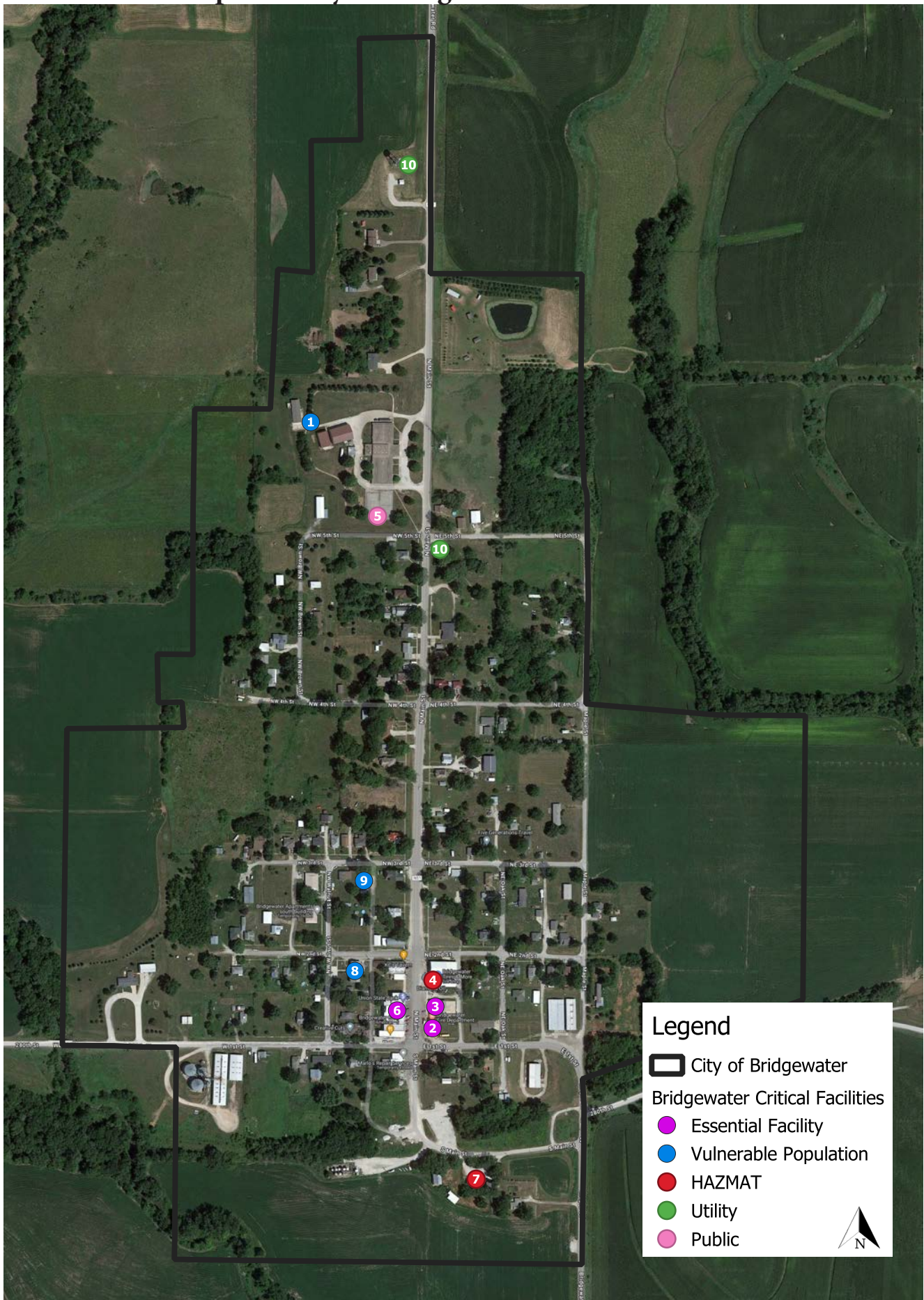
Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table C.6.

**Table C.6: City of Bridgewater Essential Infrastructure and Services**

<b>Major Arterials</b>	Iowa Highway 92	<b>Air Service</b>	Greenfield Airport
<b>Water Service</b>	Purchased from SIRWA	<b>Sewer Service</b>	Provided by SIRWA
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	None; individual propane dealers
<b>Sanitation/Solid Waste</b>	Local Haulers (2)	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Cumberland Telco, Wireless	<b>Law Enforcement</b>	Adair County Sheriff
<b>Fire Service</b>	Bridgewater Fire (Volunteer)	<b>Ambulance Service</b>	Adair Co. Health System



# Map C.2: City of Bridgewater Critical Facilities





**Table C.7: City of Bridgewater Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Bridgewater Activity Center	502 N Main Street	Vulnerable Population
2	Bridgewater City Hall	105 Main Street	Essential Facility
3	Bridgewater Fire Station	109 Main Street	Essential Facility
4	Bridgewater Tires and More	117 N Main Street	HAZMAT
5	Bridgewater Park	415 N Main Street	Public
6	Bridgewater Post Office	114 N. Main Street	Essential Facility
7	Diamond Oil	120 S. Main Street	HAZMAT
8	Trinity Christian Church	110 NW 2nd Street	Vulnerable Population
9	United Methodist Church	205 NW 3rd Street	Vulnerable Population
10	Water Tower	608 N. Main Street	Utility

# Hazard Scores

**Table C.8: City of Bridgewater Risk Assessment**

Hazard	Comments
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Bridgewater is used for agriculture, and most of that is row crop farming. There have been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city, which had to be removed at a cost to Bridgewater. One tree that did fell into the road before it could be removed; fortunately, no damage was reported.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Bridgewater has been affected. This hazard can cause both direct and indirect issues for the city and its residents. City leaders report that the city water supply through SIRWA has not been threatened during the current drought being experienced in the region.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Bridgewater. The committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	Expansive soils are not uncommon in this area, due to high clay content and dramatic changes in soil moisture and temperature. This hazard has the greatest impact on individual properties, especially those not engineered to withstand the hazard. This is a very localized hazard (e.g., individual home) and not a major priority for public response. The city leaders indicated that two downtown buildings have had to be repaired in recent years due to foundation problems that could be related to this hazard.
<b>Extreme Heat</b>	Extreme heat events continue to impact Bridgewater. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Bridgewater's fire station is a designated cooling shelter and is opened during extreme heat. It also has backup emergency power and central air cooling.
<b>Flash Flood</b>	While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Because the town sits on a somewhat steep slope, some streets and ditches have washed out and some basements have flooded. Bridgewater has received FEMA PA for road repairs and ditch deepening after some events. This hazard is one of more damaging ones in Bridgewater's history.
<b>Grass/Wild Land Fire</b>	About a third of the land in the city is used for farmland or timberland. Most of the land surrounding town is the same. In normal conditions, Bridgewater is not at risk. However, during prolonged dry seasons and when it is windy, a wildland fire or controlled burn can turn into a deadly fire and impact the town, even if it starts outside of town.
<b>HAZMAT Incident</b>	The city knows of no incidents and the risk is very low for fixed hazardous materials spills. There are some trucks and farm vehicles that travel through town on secondary roads, but the risk is very low of a major spill. Most of the town can be impacted due to this hazard if it were to occur. No part of the town is exempt from its impacts.

<b>Human Disease</b>	Bridgewater is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Bridgewater. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. Other human diseases are not of a major concern of city leaders, as there are no mass gathering places, such as schools, in town.
<b>Infrastructure Failure</b>	Infrastructure failure can occur with little or no warning and can cause major damage and disruptions. It is important to prevent these hazards through infrastructure investment and also to have the capacity to respond to them if they occur. Bridgewater has aging homes and properties and several homes have been abandoned. City officials have targeted these through various nuisance regulations and public funds to demolish properties, but need remains. Resources are limited for property owners to make structural improvements. Some utilities are outside of the authority of the city and implement their own measures. The greatest issues impacting Bridgewater are likely aging streets, water, storm water, and sewer systems.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city or in the immediate vicinity of the city.
<b>Radiological</b>	There is no history of this hazard in Bridgewater and no properties (such as medical or dental offices) have equipment that could release radiological materials.
<b>River Flooding</b>	River flooding has not been reported in the city boundary, but this hazard has impacted city property, namely the wastewater lagoons just southeast of the city (now owned by SIRWA). The most recent FIRM maps adopted in 2017 show the southern tenth of the city is in a SFHA. Most of this area is agricultural and timberland. The south end of Main Street and part of Bridgewater Road pass through the floodplain. When a flood occurs, access to and from town southward is cut off. As a result of working with FEMA's PA program for flash flooding problems, the City has begun updating its flood mitigation efforts. According to the FEMA NFIP Status Book for Iowa, Bridgewater joined the NFIP on 4/6/2020.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Bridgewater. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage. The City of Bridgewater mentions it lacks the equipment and manpower to keep up with storms of the magnitude experienced in January 2024. The town relies on volunteers and volunteer equipment to meet these needs. The city is currently applying for USDA funds to purchase a multi-purpose city public works truck that will have a blade for snow removal.
<b>Terrorism</b>	Bridgewater has no history terrorism. The committee feels this hazard is not very likely but that the community must remain vigilant. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Bridgewater, but most of them do not have major impact to life and property, and only a few storms per year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage.

<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Bridgewater directly (long-time residents recalled a tornado passing just northwest of town ~20 years ago). Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the size/area of Bridgewater, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter.
<b>Transportation Incident</b>	Speed limits in Bridgewater are relatively low, so any transportation incident is likely going to be isolated in size and damage, and loss of life is unlikely. No airports are within 14 miles of the city. The committee anticipates that this hazard will affect the community in varying degrees but will not have a widespread impact.
<b>Windstorm</b>	Recent windstorms have caused damage to the Bridgewater area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude. A storm (possible derecho) in 2023 damaged several properties and knocked down some local utility poles.



# Loss Estimates

**Table C.9: City of Bridgewater Maximum Building and Population Exposure**

Type of Structure	Number of Structures in Hazard Area	Value of Structures In Hazard Area	Number of People in Hazard Area
Agricultural	0	\$0	148
Commercial	10	\$445,946	
Industrial	0	\$0	
Residential	100	\$2,650,827	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table C.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table C.10: City of Bridgewater Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	13
<b>Commercial</b>	1	\$40,135	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	9	\$238,574	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table C.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table C.11: City of Bridgewater Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	37
<b>Commercial</b>	3	\$111,486	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	25	\$662,706	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table C.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

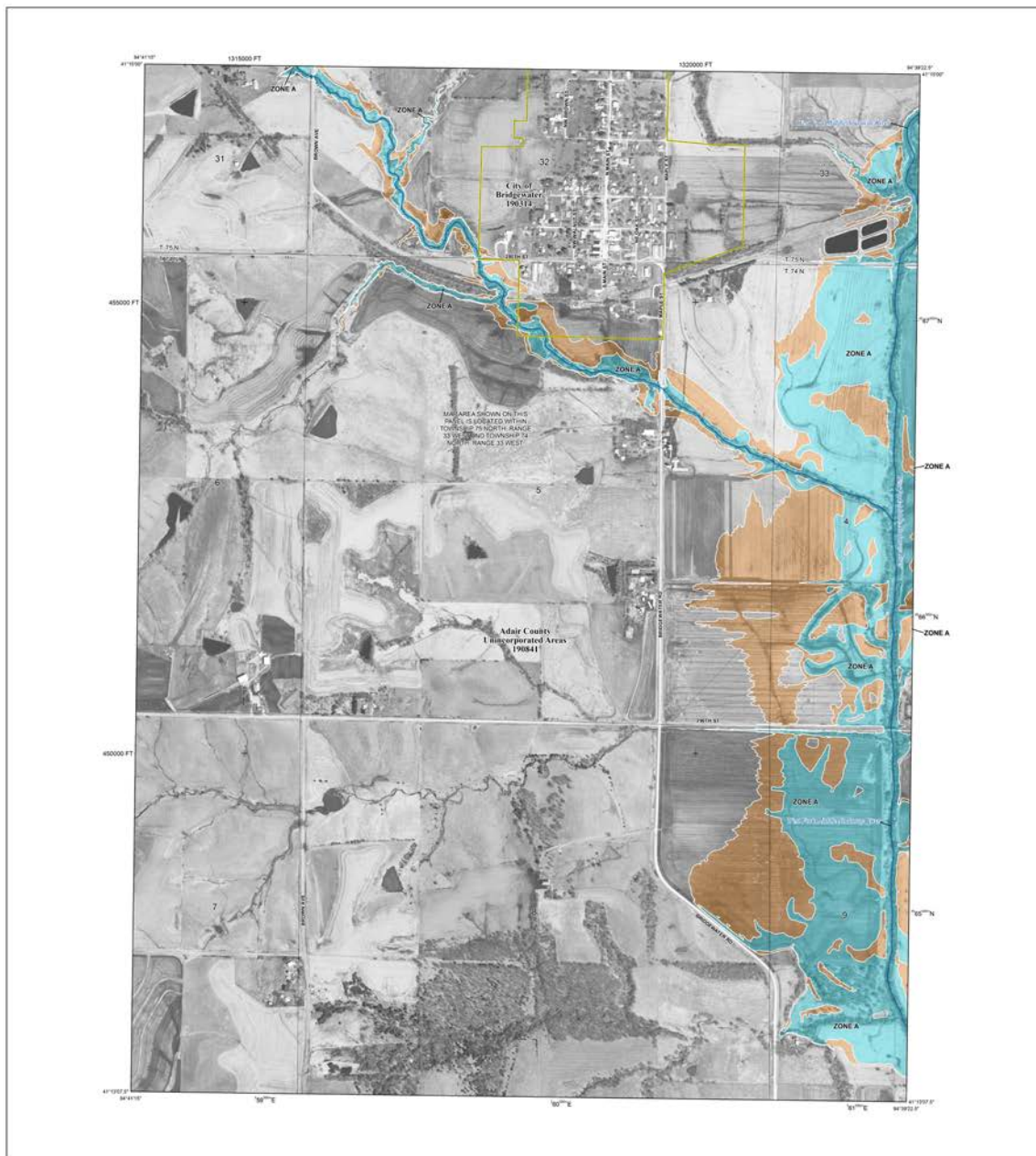
**Table C.12: City of Bridgewater Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	74
<b>Commercial</b>	5	\$222,973	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	50	\$1,325,413	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table C.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Map

Source: FEMA Flood Map Service Center



**FLOOD HAZARD INFORMATION**

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

**SPECIAL FLOOD HAZARD AREAS**

- Without Base Flood Elevation (BFE) Zone A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with discharge areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes Zone X
- Area of Minimal Flood Hazard Zone X
- Area of Undetermined Flood Hazard Zone D

**OTHER AREAS OF FLOOD HAZARD**

**OTHER AREAS**

**GENERAL STRUCTURES**

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall
- Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- Coastal Transport
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

**OTHER FEATURES**

**NOTES TO USERS**

For information and questions about this map, available products associated with the FIRM including hydrographic data, or for more information about the National Flood Insurance Program, in general, please call the FEMA Map Information Center at 1-877-FEMA-6000 (1-877-362-6271) or visit the FEMA Map Service Center website at <http://MSC.FEMA.GOV>. Available products may include electronic versions of Map Change, Flood Insurance Study Report, and digital versions of this map. Many of these products can be obtained or downloaded directly from the website. Users may experience the current map data for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information Center.

Communities receiving flood or adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-438-6020.

Base map information shown on the FIRM was provided in digital format to the Iowa Department of Natural Resources. This information was derived from digital orthophotography as a best ground resolution from Imagery from April 2009.

**SCALE**

Map Projection: State Plane Iowa South (FIPS Zone 1420) Coordinate System, Lambert Conformal Conic Projection, North American Datum 1983, 500,000 meters North American Vertical Datum of 2005

1 inch = 500 feet

0 500 1,000 1,500 2,000 Feet

0 125 250 500 Meters

**PANEL LOCATOR**

Adair County

0268 0271 0300

0301 0400 0425

**FEMA**

**National Flood Insurance Program**

**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP  
ADAIR COUNTY, IOWA  
FIRM NUMBER 19001C0381A  
PANEL 381 of 500

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
ADAIR COUNTY	0381A	0381	A

VERSION NUMBER 2.3.3.0  
MAP NUMBER 19001C0381A  
EFFECTIVE DATE APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table C.13: City of Bridgewater Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Acquire flood prone buildings and convert to open space/green space or elevate to or above base flood elevation or above flash flood reach					X
Adopt the current DRAFT FIRM maps as applicable to each jurisdiction	X				
Annually, train key local leaders about hazard mitigation and review the plan		X			
Bury existing overhead utility lines					X
Clear and deepen ditches on ROWs	X				
Complete storm water drainage or watershed studies of known flood areas					X
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Construct storm water drainage (underground, culverts, curb & gutter); improve capacity of existing systems	X				
Create continuity of operations & succession plan for jurisdiction				X	
Demolish abandoned properties	X				
Discourage/prohibit development in flood plan areas; join or continue participation in NFIP	X				
Elevate, raise grade, or relocate roads, bridges, sewer lift stations, water pumps, and other infrastructure and critical assets					X
Employ construction measures that direct water away from structures					X
Encourage property insurance purchase					X
Encourage property owners to install sewer system back flow devices	X				
Encourage/Install sustainable storm water control and water quality practices such as buffer strips, bioswales, rain gardens, porous pavement, vegetative buffers, and parking area islands					X
Formally designate and stock community post-disaster shelters; maintain and publicize shelter location list	X				

	Status				
Previous Actions	Complete	Underway	Ongoing	Future	Not Implemented
Full review of policy, procedure, and codes to include mitigation					X
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Improve storm water drainage system capacity					X
Improve transportation infrastructure (resurface, pave, widen roads, increase bridge capacity, etc.), and replace deteriorated infrastructure		X			
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms					X
Install quick-connect emergency generator hook-ups for facilities					X
Involve more groups in hazard mitigation			X		
Obtain sand and salt supplies well in advance of winter	X				
Participate in the FEMA Community Ratings Service Program					X
Preserve floodplains as open space through open space acquisition and other property restrictions					X
Promote tree and vegetation maintenance on private properties			X		
Purchase snow trucks, plows, sanders		X			
Purchase stand-by portable pumps and generators					X
Repair and weatherize old and/or structurally weak homes					X
Replace deteriorated bridges and culverts	X				
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		



# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table C.14: City of Bridgewater Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

**Table C.15: City of Bridgewater Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Acquire flood prone buildings and convert to open space/green space or elevate to or above base flood elevation or above flash flood reach	River Flood, Flash Flood	Low	City elected/ admin. officials, Flood Manager, EMA, IDNR	Low	Local, FEMA, State	Property Protection	Long
Bury existing overhead utility lines	Infrastructure Failure, Severe Winter Storm	Low	Utility Providers	Moderate	Local, Utility Provider, USDA/ FEMA grants, loans	Prevention, Property Protection	Long
Clear and deepen ditches on ROWs	Flash Flood, Infrastructure Failure	High	City elected/ admin. officials, Department/ Public Works	Low	Local, FEMA/ State, Property Owners, USDA, Iowa SRF Program	Property Protection	Short
Complete storm water drainage or watershed studies of known flood areas	Flash Flood, River Flood	High	City elected/ admin. officials, engineer, flood manager, SWCD/ NCRS	Minimal	USDA, Iowa SRF program, local	Prevention, Natural Resource Protection	Short
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Mod.	City elected/ admin. officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Mid
Construct storm water drainage (underground, culverts, curb & gutter); improve capacity of existing systems	Flash Flood	High	City elected/ admin. officials, engineering firm	Moderate	FEMA/State, USDA, Iowa SRF Program, CDBG	Property Protection	Short
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	High	City elected/ admin. officials, EMA	Minimal	EMA, State, Local, grants	Prevention	Short
Demolish abandoned properties	Windstorm, Structure Failure	High	City elected/ admin. officials	Low	Local, grants	Prevention, Property Protection	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Elevate, raise grade, or relocate roads, bridges, sewer lift stations, water pumps, and other infrastructure and critical assets	Transportation Incident, Flash Flood	Mod.	City elected/ admin. officials, engineering firm	Moderate to High	Local, FEMA/ State, Iowa DOT, Federal Transportation Funding, USDA, Iowa SRF, CDBG	Structural Project	Short
Employ construction measures that direct water away from structures	Flash Flood, River Flood	Mod.	City elected/ admin. officials	Low	Local, FEMA, State, USDA	Property Protection, Structural Project	Ongoing
Full review of policy, procedure, and codes to include mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/ Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/ Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City/Mayor, EMA, IHSEMD	Minimal	Local, Red Cross, FEMA/ State, Local Foundations	Prevention	Long
Improve storm water drainage system capacity	Flash Flood, Transportation Incident	High	City elected/ admin. officials, Street Department/ Public Works	Moderate	Local, State, FEMA, USDA, Iowa SRF Program, CDBG	Property Protection, Structural Project	Short
Improve transportation infrastructure (resurface, pave, widen roads, increase bridge capacity, etc.), and replace deteriorated infrastructure	Transportation Incident, Flash Flood	High	City elected/ admin. officials, engineering firm	High	Local, RUTF, Iowa DOT, Federal Highway Funding, Bonding, TIF, Special Assessments	Property Protection, Structural Project	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	City/Council, SICOG, EMA	Minimal	Local, FEMA/State, Grants	Prevention, Public Education and Awareness	Mid
Install quick-connect emergency generator hook-ups for facilities	Energy Failure	Mod.	City elected/ admin. officials, engineering firm	Low	Local, USDA, Energy and Utility Providers, Property Owners	Emergency Services	Short
Participate in the FEMA Community Ratings Service Program	River Flood, Infrastructure Failure	Low	City elected/ admin. officials, flood manager, public works	Minimal	FEMA/State, Local in-kind	Property Protection	Long
Purchase snow trucks, plows, sanders	Transportation Incident, Severe Winter Storm	High	City elected/ admin. officials	Low	Local, USDA, Local and Regional Foundations	Property Protection, Emergency Services	Short
Purchase stand-by portable pumps and generators	Infrastructure Failure, Flash Flood	Mod.	City elected/ admin. officials	Low	Local, USDA, CDBG, Grants, Utility Partners	Property Protection, Emergency Services	Short
Repair and weatherize old and/or structurally weak homes	Infrastructure Failure, Severe Winter Storm	High	City elected/ admin. officials, SICOG	Low	SCICAP, USDA, CDBG, Grants	Property Protection	Mid



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Replace deteriorated bridges and culverts	Transportation Incident, Flash Flood	High	City elected/ admin. officials, engineering firm	High	Local, FEMA/ State, Iowa DOT, Federal Highway Funds, TIP, RUTF, CDBG, USDA	Property Protection, Structural Project	Short
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.	Tornado/Windstorm, Infrastructure Failure	Low	City elected/ admin. officials, Zoning Official	Minimal	Local, State/ FEMA, In-Kind	Property Protection	Long

# Incorporation into Other Planning Mechanisms

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Where possible, Bridgewater will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Housing Needs Assessment
- Zoning Ordinance
- Comprehensive Plan
- Building Code
- Strategic Plan



# Appendix D: City of Fontanelle

## Community Profile

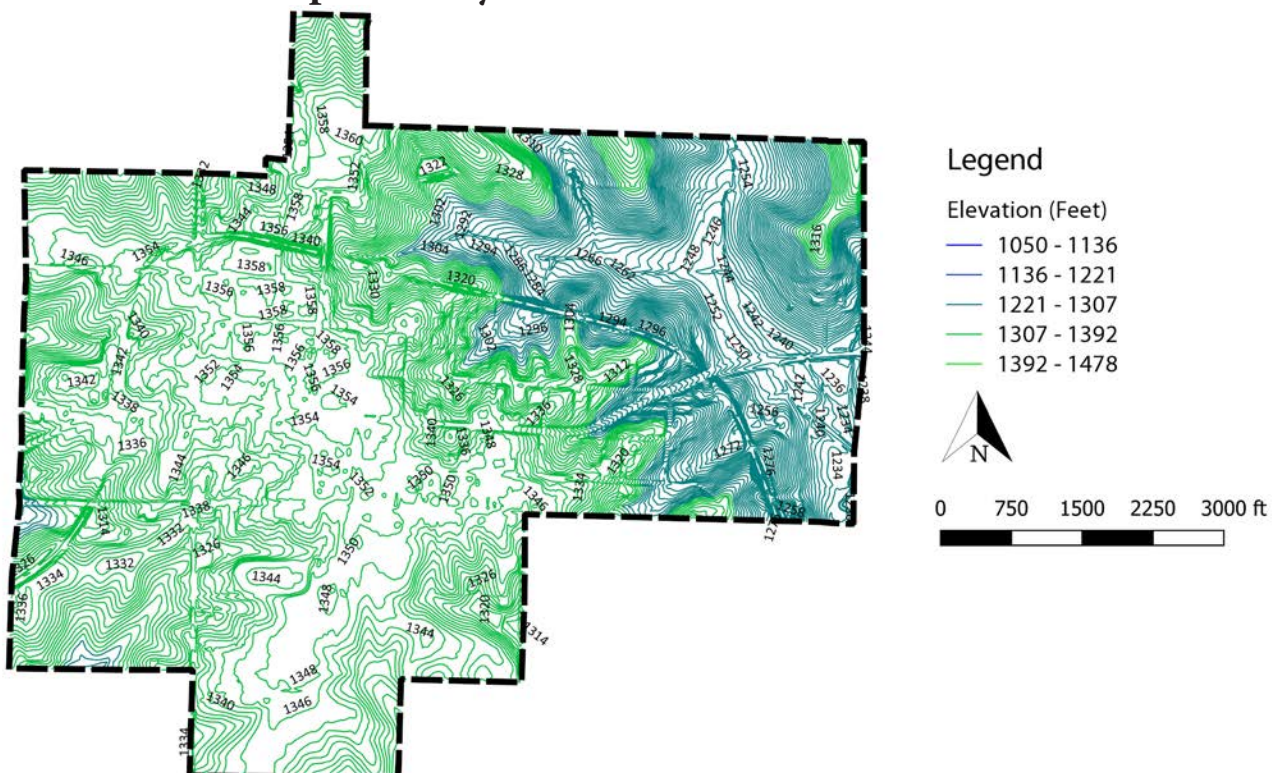
### *History*

Fontanelle was founded and platted in 1855. It was originally built around the square that was designed as the original courthouse square in the county. Two decades later, the county seat was moved to Greenfield. The town was originally named Summerset but in 1856, by an act of the Iowa Legislature, the name was changed to Fontanelle. Among the other firsts for Fontanelle was that it hosted the county's first school and church. The courthouse square remains today and is used for a park and public open space. Numerous businesses surround the square.

### *Geography and Environment*

Fontanelle is 6 miles west of Greenfield in the west-center part of Adair County and occupies approximately 0.96 square miles, entirely of land. Approximately 50% of the land within the city is residential developed, with another 10% commercial/industrial, 5% recreation/open space, 10% transportation, 3% education, 5% other public uses, and 17% agriculture. Topography is mainly flat to slightly sloping with a mean elevation of approximately 1,345 feet. A few very small streams originate in or near the city, none of which have a flood history. The city's elevation can be found in Map D.1.

**Map D.1: City of Fontanelle Elevation**



Source: Iowa DNR

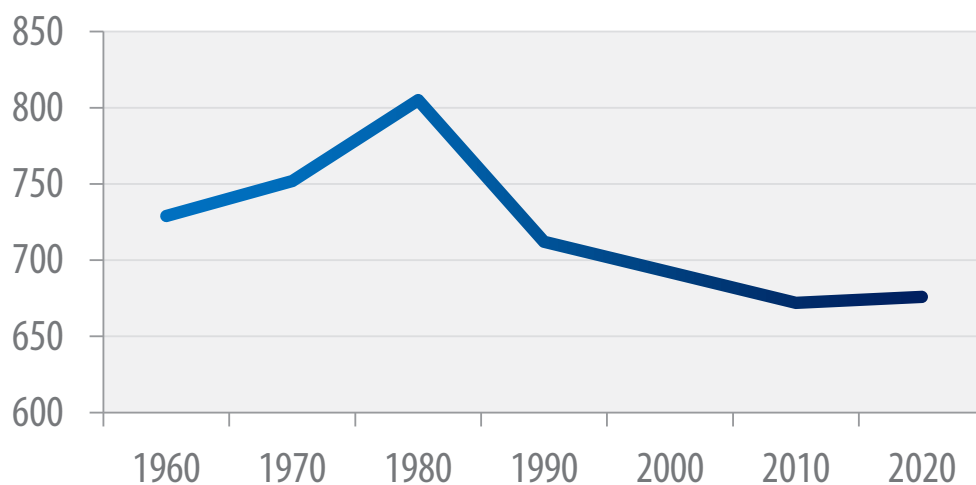


## Demographics

A city's population can influence a large number of things within the city from housing to development. The details about the people who live there mold the community by giving community leaders and elected officials information about what kind of services need to be provided. Population trends offer potential employers an overview of the current laborforce, and trends which could affect a company if they were to located there.

Fontanelle's population has stayed fairly stagnant since the 1960s. In the past 56 years, the City's population peaked at 805. The City's population hit it's most recent low in 2010 when the population dipped to 672 residents. Since 2010, there has been a slight increase in population with the 2020 Decennial Census recording 676 residents living in Fontanelle. A complete breakdown of Fontanelle's historic population can be seen in Figure D.1.

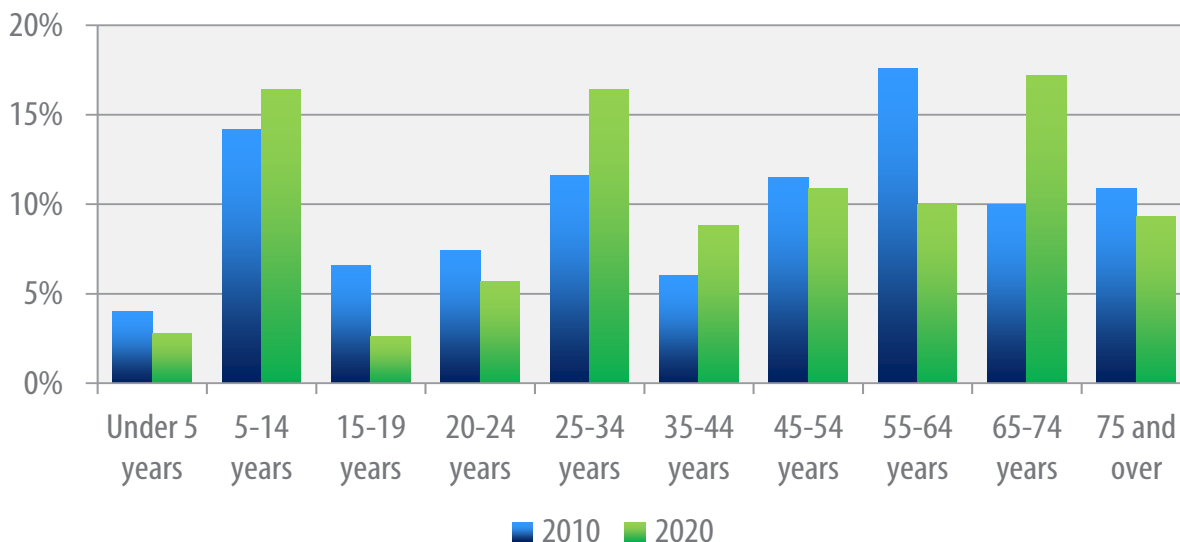
**Figure D.1: City of Fontanelle Historic Population, 1960-2020**



Source: US Census Bureau, American Community Survey

Fontanelle's population saw some changes in the age distribution from 2010 to 2016. There were decreases in six of the city's cohorts. The largest decrease happened in the 55-64 year old cohort where there was a 7.6% change. The 15-19 year old cohort saw a change of 4%. The 65-74 year old cohort saw an increase of 7.2% over the six-year period. A complete breakdown in shown in Figure D.2.

**Figure D.2: City of Fontanelle Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most essential aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors as to whether new residents consider moving to the city or not.

Since 2010, the American Community Survey estimates that the city's housing stock has increased by 18 units. Since the 2010 Census, owner occupied housing units have decreased by 5%, leading to an increase in renter-occupied units by 5%. A complete breakdown of the estimates can be found in Table D.1.

**Table D.1: City of Fontanelle Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	307	94.2%	306	89.5%
<b>Owner Occupied</b>	235	76.5%	218	71.2%
<b>Renter Occupied</b>	72	23.5%	88	28.8%
<b>Vacant Housing Units</b>	19	5.8%	36	10.5%
<b>Total Housing Units</b>	326	100.0%	342	100.0%

Source: US Census Bureau, American Community Survey

Fontanelle has a median housing value of \$78,200. The city's homes can be very affordable and can be used to attract new residents, but they may deteriorate faster and will need a number of repairs and updates. According to the 2020 American Community Survey Estimates less than a quarter of the city's homes are valued at less than \$50,000. A complete breakdown of all the homes in the City of Fontanelle can be found in Table D.2. Knowing information about the city's housing stock is useful after a disaster hits to determine how much damage was done, and how it will affect the city moving forward.

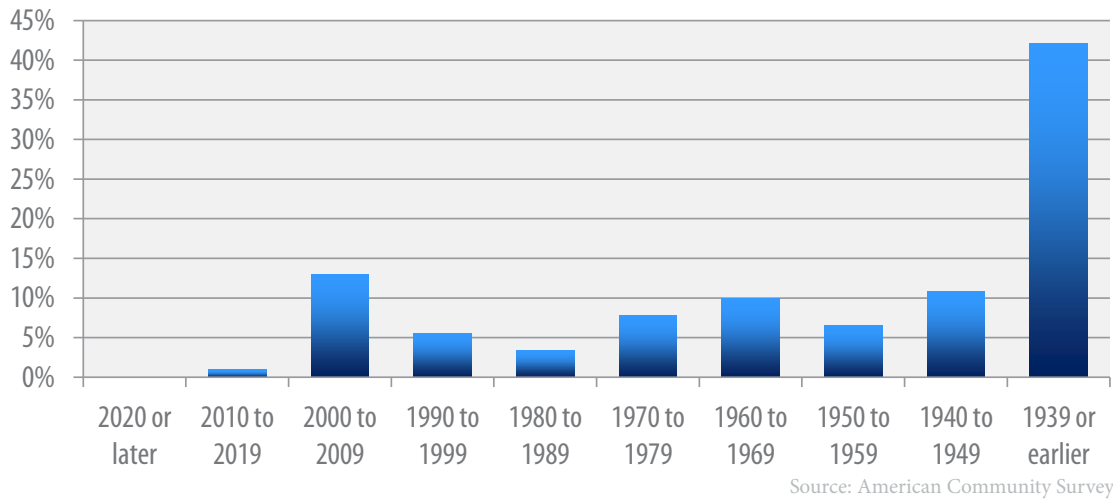
**Table D.2: Fontanelle Value of Owner-Occupied Units, 2020**

<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	21.5%
\$50,000 to \$99,999	58.0%
\$100,000 to \$149,999	7.8%
\$150,000 to \$199,999	4.9%
\$200,000 to \$299,999	6.3%
\$300,000 to \$499,999	0.5%
\$500,000 to \$999,999	1.0%
\$1,000,000 or more	0.0%

Source: American Community Survey

Figure D.3 showcases the year housing units within the City of Fontanelle were constructed. Like much of the county, Fontanelle has a large number (42%) of homes constructed in 1939 or earlier. The city also saw a slight increase in construction from 2000-2009 with 13% of the city's housing stock being constructed during this decade. The most recent American Community Survey Estimates estimate that there were no homes built within the City of Fontanelle since 2019. Building standards of today utilize the most recent construction materials and safety features, ensuring that the new residential structures are as safe as possible. This does not mean that older homes are more unsafe, just that they may be more susceptible to hazard damage.

**Figure D.3: City of Fontanelle Year Housing Unit Constructed, 2020**



## *Economics*

In 2020, the City of Fontanelle's median household income was \$50,313, which was \$15,287 less than the State of Iowa's median household income (\$65,600). Households that made less than \$10,000 per year account for 5% of the city's households. Approximately 10% of the city's population brings in \$100,000 or more per year. A complete breakdown of the city's household incomes can be found in Table D.3.

**Table D.3: City of Fontanelle Household Income, 2020**

Income (In 2020 Inflation Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	17	6.0%
\$10,000 - \$14,999	15	5.3%
\$15,000 - \$24,999	26	9.3%
\$25,000 - \$34,999	31	11.0%
\$35,000 - \$49,999	51	18.1%
\$50,000 - \$74,999	57	20.3%
\$75,000 - \$99,999	35	12.5%
\$100,000 - \$149,999	32	11.4%
\$150,000 - \$199,999	13	4.6%
\$200,000 or more	4	1.4%
Median Household Income	\$50,313	-
Mean Household Income	\$74,311	-

Source: US Census Bureau, American Community Survey

Many of the small urban communities, Fontanelle included, primarily serve as agriculture service centers and retail trade centers with some manufacturing and construction activities also present. Fontanelle residents may travel outside the city to find employment opportunities which fit their wants and needs. The city's employments by industry for those aged 16 and over can be found in Table D.4. Of the 265 residents who are employed, 72 are employed in the manufacturing industry. This is the largest percentage of citizens employed by one industry. The next largest industry is the educational, health care, and social assistance industry with 22.6% of the population, this is followed by the construction (9.4%) and agriculture, forestry, fishing, hunting and mining industries (9.1%).

**Table D.4: City of Fontanelle Employment by Industry, 2020**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	265	100.0%
Agriculture, Forestry, Fishing, Hunting, Mining	24	9.1%
Construction	25	9.4%
Manufacturing	72	27.2%
Wholesale Trade	12	4.5%
Retail Trade	13	4.9%
Transportation and warehousing and utilities	14	5.3%
Information	7	2.6%
Finance and insurance, and real estate and rental and leasing	13	4.9%
Professional, scientific, management, administrative, and waste management services	19	7.2%
Educational, health care, and social assistance	60	22.6%
Arts, entertainment, recreation, accommodation, and food services	2	0.8%
Other services, except public administration	3	1.1%
Public Administration	1	0.4%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table D.5 provides a compilation of the current planning and regulatory documents in place for the City of Fontanelle, as well as when the last time the documents were last updated.

**Table D.5: City of Fontanelle Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	No	-
Zoning Ordinance	No	-
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	No	-
Floodplain Regulations	Yes	-

## *NFIP Participation*

The City of Fontanelle's flood maps were approved in 2017. The maps can be found later in this appendix. Since the adoption of the city's FIRMS, the city has joined the NFIP program.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. The critical facilities for the City of Fontanelle can be found on Map D.2.



## Outlook and Future Development

The population of Fontanelle is likely to continue a slow decline, as has been the case in recent years. The future population is most likely to be affected by the continued sustainability of the school district (particularly the Fontanelle School itself) and strength of the senior services sector. If the school can withstand consolidation and the employment increases in the area, the town will likely grow and some new housing, likely on the northwest side of town, is probable. Most new development, if any, will be residential, with a few small businesses possible. Conversion of farmland on a very modest scale is possible but not likely, and development is not likely in possible flood hazard areas. No zoning and land use planning exist to guide development where it makes sense. There are no mitigation considerations given when development issues are discussed.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table D.6.

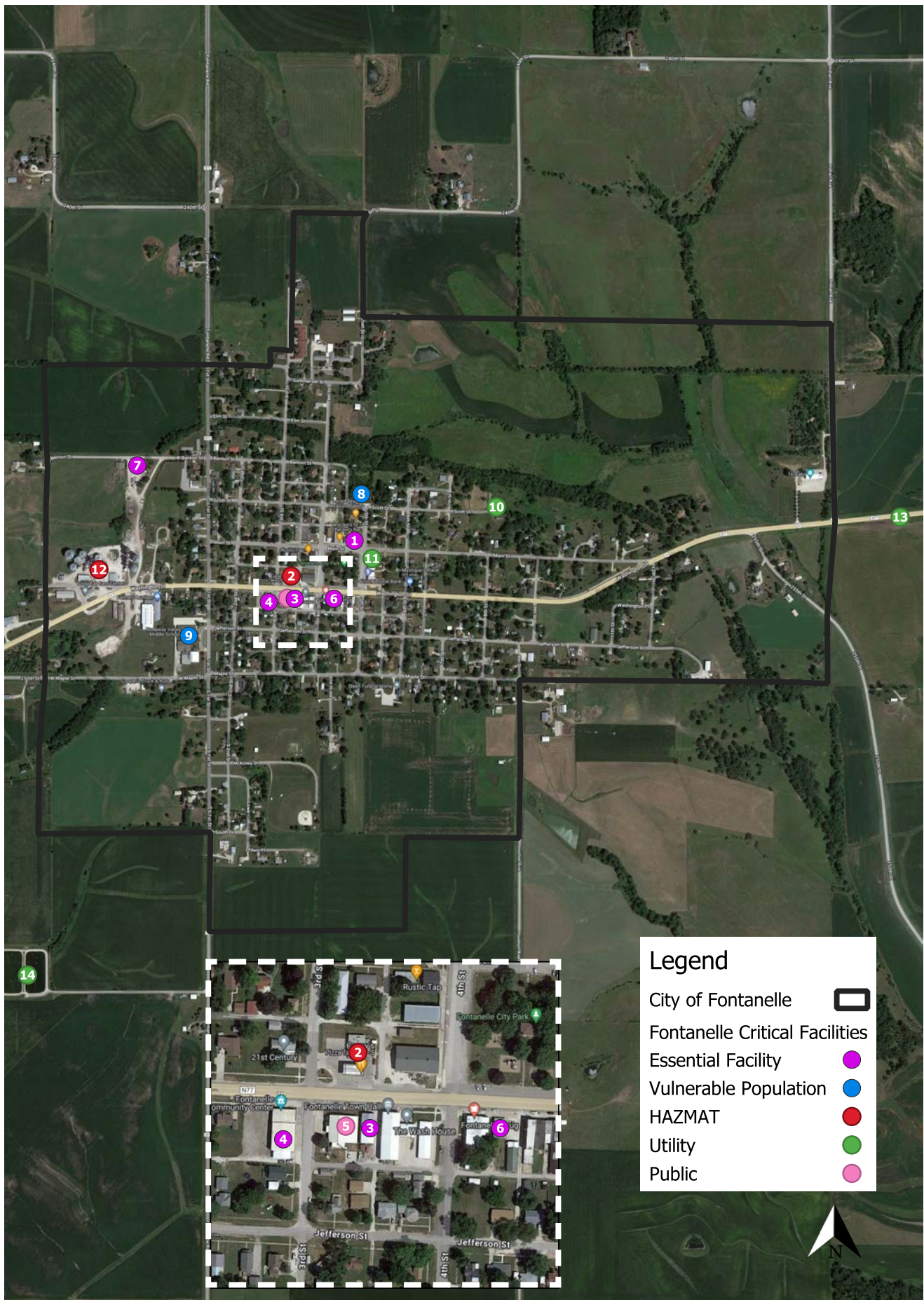
**Table D.6: City of Fontanelle Essential Infrastructure and Services**

<b>Major Arterials</b>	Iowa Highway 92	<b>Air Service</b>	Greenfield Airport
<b>Water Service</b>	Greenfield Municipal Utilities, Greenfield Lake	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Fontanelle Municipal Utilities	<b>Gas Service</b>	Alliant Energy
<b>Sanitation/Solid Waste</b>	City, local haulers	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Mediacom, Cumberland Telco, wireless	<b>Law Enforcement</b>	Fontanelle Police, supported by Sheriff
<b>Fire Service</b>	Fontanelle Fire (volunteer)	<b>Ambulance Service</b>	Adair Co. Health System, Fontanelle Fire & Rescue

**Table D.7: City of Fontanelle Critical Facilities**

Number on Map	Name	Address	Type
1	Adair County Health Medical Clinic	406 5th Street	Essential Facility
2	Casey's	306 Washington Street	HAZMAT
3	City Hall, Police Station, Utilities	313 Washington Street	Essential Facilities
4	Fire Station	224 3rd Street	Essential Facility
5	Library	303 Washington Street	Public
6	Post Office	407 Washington Street	Essential Facility
7	City Shop	211 W. Benton Street	Essential Facility
8	Good Samaritan Center	326 Summerset Street	Vulnerable Population
8	Emmanuel Lutheran Church	424 Scott Street	Vulnerable Population
9	Nodaway Valley Middle School	112 1st Street	Vulnerable Population
10	Wastewater Lift Station	Scott Street	Utility
11	Water Tower	5th Street	Utility
12	21st Century Co-op Gas Station	220 Washington Street	HAZMAT
13	Water Meter Pit	Highway 92	Utility
14	Wastewater Treatment Lagoons	Fontanelle Road	Utility <sup>14</sup>

# Map D.2: City of Fontanelle Critical Facilities



# Hazard Scores

**Table D.8: City of Fontanelle Risk Assessment**

Hazard	Comments
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Fontanelle is used for agriculture, and most of that is row crop farming. There has been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city and had to be removed at a cost to Fontanelle.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Fontanelle has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The greatest impact is to water supplies. The City of Fontanelle has closed its water plant and now purchases water from Greenfield. Therefore, the City is concerned when droughts affect Greenfield's supplies, as that city may reduce supply to Fontanelle. Fontanelle has a water conservation plan but is not currently enforcing it, as Greenfield has not indicated supplies are dangerously low.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Fontanelle. The committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	Expansive soils are not uncommon in this area, due to high clay content and dramatic changes in soil moisture and temperature. This hazard has the greatest impact on individual properties, especially those not engineered to withstand the hazard. This is a very localized hazard (e.g., individual home) and not a major priority for public response. The City of Fontanelle stated that stormwater infiltration into the sewer mains is a problem, but they are unsure if any of that issue is caused by expansive soils-caused main breaks and cracks.
<b>Extreme Heat</b>	Extreme heat events continue to impact Fontanelle. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Fontanelle's community center is a designated cooling shelter and is opened during extreme heat.
<b>Flash Flood</b>	Fontanelle sits atop a ridge and most of the town is flat or gently sloping. While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Storm water management actions can mitigate this hazard.
<b>Grass/Wild Land Fire</b>	About a third of the land in the city is used for farmland or timberland. Most of the land surrounding town is the same. In normal conditions, Fontanelle is not at risk. However, during prolonged dry seasons and when it is windy, a wildland fire or controlled burn can turn into a deadly fire and impact the town, even if it starts outside of town.
<b>HAZMAT Incident</b>	The IDNR has reported minor incidents of HAZMAT in the city. Further, there are many trucks and farm vehicles that travel through town on Highway 92 and secondary roads. Hundreds can be impacted due to this hazard. No part of the town is exempt from its impacts.



<b>Human Disease</b>	Fontanelle is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Fontanelle. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. Other human disease incidents continue to affect Fontanelle, especially major population centers, such as the middle school, with sick people, which hurts their operations.
<b>Infrastructure Failure</b>	Infrastructure failure can occur with little or no warning and can cause major damage and disruptions. It is important to prevent these hazards through infrastructure investment and also to have the capacity to respond to them if they occur. Fontanelle has aging homes and properties and no formal building codes to address improvements. Resources are limited for property owners to make structural improvements. Some utilities are outside of the authority of the city and implement their own measures. The greatest issues impacting Fontanelle are likely aging streets, water, storm water, and sewer systems.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city or in the immediate vicinity of the city.
<b>Radiological</b>	There is no history of this hazard in Fontanelle and no properties (such as medical or dental offices) have equipment that could release radiological materials.
<b>River Flooding</b>	River flooding has not been reported in Fontanelle. The most recent FIRM maps adopted in 2017 show one flood hazard area on the east edge of the city, impacting one bridge and some farmland. Consequently, the City has not joined the NFIP and there is no public interest to participate. Because there is no past history of flooding and current maps show only minor areas of risk in the city, the committee has determined that the risk is very low.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Fontanelle. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage. The City of Fontanelle mentions it lacks the equipment and manpower to keep up with storms of the magnitude experienced in January 2024.
<b>Terrorism</b>	Greenfield has no history terrorism. The committee feels this hazard is not very likely but that the community must remain vigilant. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Fontanelle, but most of them do not have major impact to life and property, and only a few storms are year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage.
<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Fontanelle directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the site of Fontanelle, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter.



<b>Transportation Incident</b>	Speed limits in Fontanelle are relatively low, so any transportation incident is likely going to be isolated in size and damage, and loss of life is unlikely. No airports are within eight miles of the city. The committee anticipates that this hazard will affect the community in varying degrees but will not a widespread impact.
<b>Windstorm</b>	Recent windstorms have caused damage to the Fontanelle area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude. The committed indicated that derechos that have hit the region did not do notable damage to Fontanelle.

# Loss Estimates

**Table D.9: City of Fontanelle Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$283,714	676
<b>Commercial</b>	25	\$2,374,707	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	336	\$18,157,738	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table D.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table D.10: City of Fontanelle Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	61
<b>Commercial</b>	2	\$213,724	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	31	\$1,634,196	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table D.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table D.11: City of Fontanelle Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	169
<b>Commercial</b>	6	\$593,676	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	84	\$4,539,434	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table D.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table D.12: City of Fontanelle Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	338
<b>Commercial</b>	13	\$1,187,353	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	168	\$9,078,869	

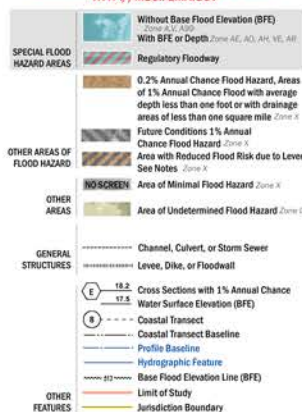
If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table D.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.





## FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical versions of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Service Center at 1-877-FEMA-8087 or visit <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of the map. None of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

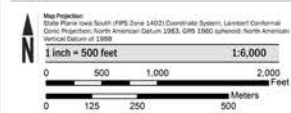
Communities answering land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery from April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

And Incorporated Areas

Panel 291 of 500

COMMUNITY NUMBER PANEL SUFFIX

ADAIR COUNTY 190841 0291 A

FONTANELLE, CITY OF 190879 0291 A

Version Controls:

190841 0291 A

190879 0291 A

VERSION NUMBER

2.3.3.0

MAP NUMBER

19001C0291A

EFFECTIVE DATE

APRIL 5, 2017



# Status of Previous Mitigation Actions

**Table D.13: City of Fontanelle Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt the current DRAFT FIRM maps as applicable to each jurisdiction	X				
Adopt/update and enforce zoning and land use regulations and building codes that regulate construction					X
Annually, train key local leaders about hazard mitigation and review the plan	X				
Business and residential preparedness programs			X		
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Construct storm water drainage (underground, culverts, curb & gutter, etc.); improve capacity of existing systems					X
Create continuity of operations & succession plan for jurisdiction					X
Demolish abandoned properties				X	
Discourage/prohibit development in flood plain areas; join or continue participation in the NFIP					X
Encourage property insurance purchase					X
Encourage/install sustainable storm water control and water quality practices such as buffer strips, bioswales, rain gardens, porous pavement, vegetative buffers, and parking area islands					X
Full review of policy, procedure, and codes to include mitigation					X
Harden public buildings					X
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Improve capital communications technology, such as cell towers and fiber cable lines, to better withstand hazards		X			
Improve storm water drainage system capacity					X

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms					X
Increase production capacity- redundant systems and looping (water, sewer, electric, gas)		X			
Integrate tornado safe room retrofits into critical assets/facilities					X
Involve more groups in hazard mitigation			X		
Obtain sand and salt supplies well in advance of winter			X		
Promote the construction of private in-home tornado safe rooms					X
Promote tree and vegetation maintenance on private properties			X		
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radio and other notification tools available to the public					X
Repair and weatherize old and/or structurally weak homes	X				
Replace deteriorated bridges and culverts				X	
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table D.14: City of Fontanelle Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

**Table D.15: City of Fontanelle Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt the current DRAFT FIRM maps as applicable to each jurisdiction	River Flood, Flash Flood	High	City elected/ admin. officials	Minimal	FEMA, State Contract	Prevention	Short
Adopt/update and enforce zoning and land use regulations and building codes that regulate construction	Grass/Wild Land Fire, Infrastructure Failure	Mod.	City elected/ admin. officials Zoning Official, SICOG, County	Minimal	Local	Prevention	Mid
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Low	City elected/ admin. officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Mid
Construct storm water drainage (underground, culverts, curb & gutter, etc.); improve capacity of existing systems	Flash Flood	Low	City elected/ admin. officials, Engineering Firm	Moderate	FEMA/State, USDA, Iowa SRF Program, CDBG	Property Protection	Mid
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	High	City elected/ admin. officials, EMA	Minimal	EMA, State, Local, Grants	Prevention	Short
Demolish abandoned properties	Windstorm, Structure Failure	Mod.	City elected/ admin. officials	Low	Local, grants	Prevention, Property Protection	Short
Discourage/prohibit development in flood plain areas; join or continue participation in the NFIP	River Flood, Infrastructure Failure	High	City elected/ admin. officials, EMA, IDNR	Minimal	Local, FEMA, IDNR	Prevention, Property Protection	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Full review of policy, procedure, and codes to include mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	City/Mayor, EMA, IHSEMD	Minimal	Local, Red Cross, FEMA/State, Local Foundations	Prevention	Short-Mid
Harden public buildings	Tornado/Windstorm	Mod.	City, State/FEMA	High	FEMA/State, Local, CDBG, USDA, Iowa SRF Program	Property Protection	Long
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	Low	County GIS provider, EMA, SICOG, City	Low	Local, Grants	Emergency Services	Short
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	City/Council, SICOG, EMA	Minimal	Local, FEMA/State, Grants	Prevention, Public Education and Awareness	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Increase production capacity-redundant systems and looping (water, sewer, electric, gas)	Drought, Infrastructure Failure	Mod.	Utility Providers, City	Moderate	Local, Energy/Utility Providers, USDA, Iowa SRF, CDBG, Bonding, TIF, Federal EDA	Structural Project	Long
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/Windstorm	High	Local Governments, Property Owners	High	FEMA/State, Local	Property Protection, Structural Project	Long
Obtain sand and salt supplies well in advance of winter	Transportation Incident, Severe Winter Storm	Mod.	City elected/admin. officials, County	Minimal	Local	Emergency Services	Short
Promote the construction of private in-home tornado safe rooms	Tornado/Windstorm	Low	City, EMA, IHSEMD	Minimal	EMA, FEMA/State, Local, engaged property owners	Property Protection, Structural Project	Mid
Repair and weatherize old and/or structurally weak homes	Infrastructure Failure, Severe Winter Storm	Mod.	City elected/admin. officials, SIOG	Low	SCICAP, USDA, CDBG, Grants	Property Protection	Mid
Replace deteriorated bridges and culverts	Transportation Incident, Flash Flood	Mod.	City elected/admin. officials, Engineering Firm	High	Local, FEMA/State, Iowa DOT, Federal Highway Funds, TIF, RUTF, CDBG, USDA	Property Protection, Structural Project	Short
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.	Tornado/Windstorm, Infrastructure Failure	Low	City elected/admin. officials, Zoning Official	Minimal	Local, State/FEMA, In-Kind	Property Protection	Long
Test warning sirens more regularly	Tornado/Windstorm, Thunderstorm/Lightning/Hail	High	City	Minimal	City	Prevention, Public Education and Awareness	Ongoing
Salvage the bandstand in the park	Thunderstorm/Lightning/Hail	High	City	Low	FEMA/State, Local	Structural Project	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Improve structural condition of downtown buildings	Infrastructure Failure, Windstorm/Tornado	High	City	High	City, FEMA/State, Other grants	Structural Project	Mid

# Incorporation into Other Planning Mechanisms

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Where possible, Fontanelle will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Housing Needs Assessment
- Zoning Ordinance
- Comprehensive Plan
- Building Code
- Strategic Plan





# Appendix E: City of Greenfield

## Community Profile

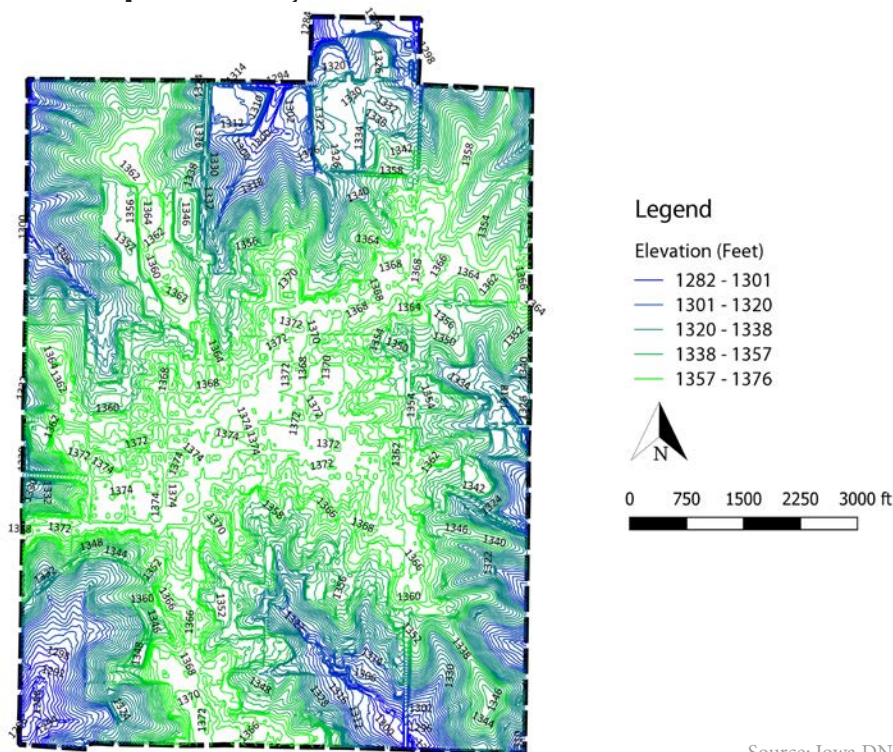
### *History*

Greenfield is unique in Adair County because it was and remains part of a small township with the same name. The town occupies a part of the township, located along the Mississippi-Missouri Divide and what was once the CB&Q Railroad. It was first settled by two families in 1854. Platted two years later, the city quickly developed stores and other commercial operations. It was not formally incorporated until 1876. Over time, as the town developed and the courthouse was moved in the 1870s from Fontanelle to Greenfield, the city developed a thriving courthouse square that thrives even today along with numerous historical buildings, including the famous E.E. Warren Opera House. The culture is rich today in Greenfield, including a historic square district, numerous programs at the opera house, and many other attractions in the immediate area.

### *Geography and Environment*

Greenfield is centrally located in Adair County and occupies approximately 1.8 square miles, entirely of land. Approximately 40% of the land within the city is residential developed, with another 10% commercial/industrial, 5% recreation/open space, 10% transportation, 5% education, 5% other public uses, and 25% agriculture. Topography is mostly flat with rolling hills along the perimeters with a mean elevation of approximately 1,371 feet. A few very small streams originate in or near the city, none of which have a flood history. The City's elevation map can be found in Map E.1.

**Map E.1: City of Greenfield Elevation**



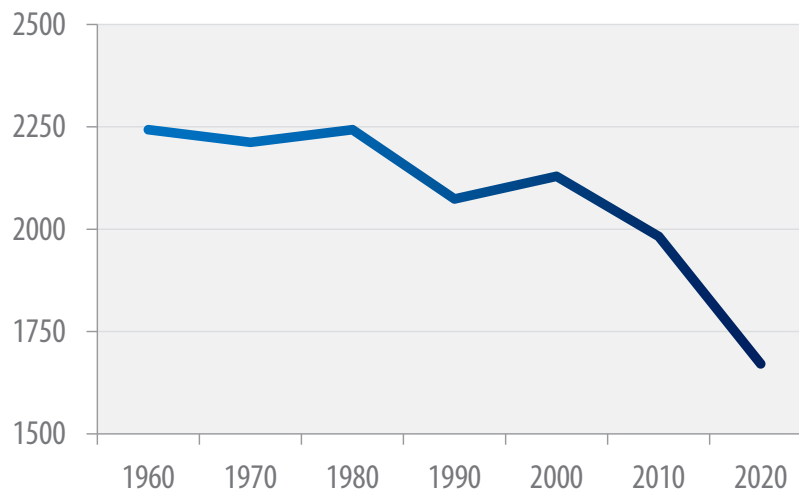
Source: Iowa DNR

## Demographics

A city's population can influence a large number of things within the city from housing to development. The details about the people who live there mold the community by giving community leaders and elected officials information about what kind of services need to be provided. Population trends offer potential employers an overview of the current laborforce, and trends which could affect a company if they were to located there.

Greenfield's population has seen an overall decrease in population since 1960. There were two periods of population increase (1970-1980 and 1990 to 2000), but the general trend has been downward. Over the past 60 years, the city has lost 572 residents or 25% of the city's 1960 population. A complete breakdown is found in Figure E.1.

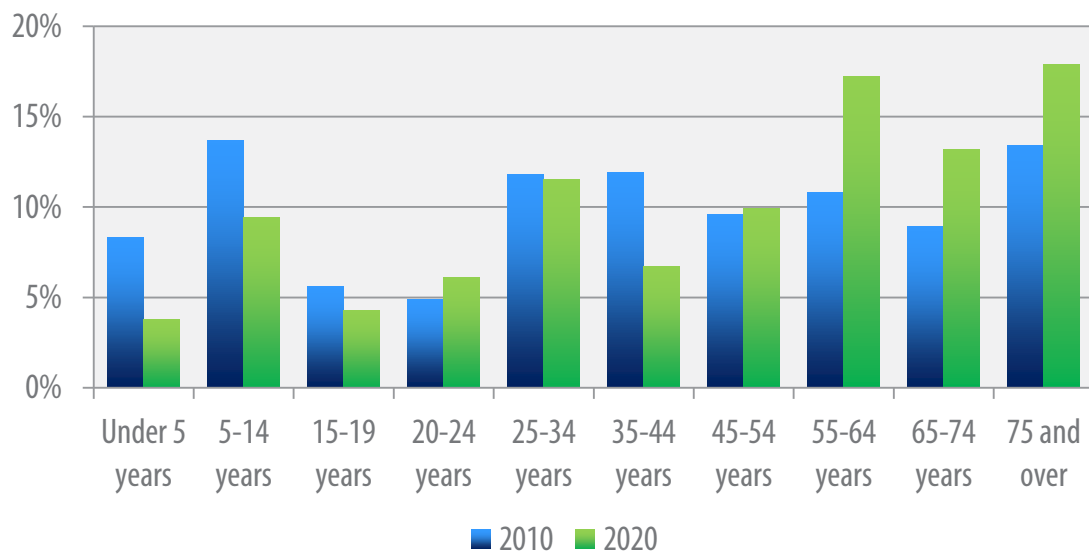
**Figure E.1: City of Greenfield Historic Population, 1960-2020**



Source: US Census Bureau, American Community Survey

Greenfield has noticed some shifts in the makeup of the population since 2010. The biggest change happened in the 55-64 years age cohort where in 2010 the cohort accounted for 10.8% of the City's population and in 2020, that number grew to 17.2%. The complete breakdown can be found in Figure E.2.

**Figure E.2: City of Greenfield Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors as to whether new residents consider moving to the city or not.

Since 2010, there has not been much change in the makeup of the city's housing stock. American Community Survey Estimates estimate that 6.7% of Greenfield's housing stock is currently vacant. The city has seen an decrease of 40 housing units since 2010. Since 2010 the makeup of owner vs renter occupied units has shifted a noticable deal with a 10% change. Table E.1 shows the breakdown of the housing units from 2010 and 2020.

**Table E.1: City of Greenfield Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	894	88.9%	901	93.3%
<b>Owner Occupied</b>	633	70.8%	533	59.2%
<b>Renter Occupied</b>	261	29.2%	368	40.8%
<b>Vacant Housing Units</b>	112	11.1%	65	6.7%
<b>Total Housing Units</b>	1006	100.0%	966	100.0%

Source: US Census Bureau, American Community Survey

Greenfield has a median housing value of \$101,200, higher than other regional cities, but still lower than the average median housing value. The city's homes can be very affordable and used to attract new residents, but may pose safety concerns and may need updates. Although the city's median housing value is slightly higher than the regional average, the city still has 14.4% of homes valued under \$50,000. An additional 34.5% of the city's homes are valued between \$50,000 and \$99,999. The breakdown can be found in Table E.2.

**Table E.2: City of Greenfield Value of Owner-Occupied Housing Units, 2020**

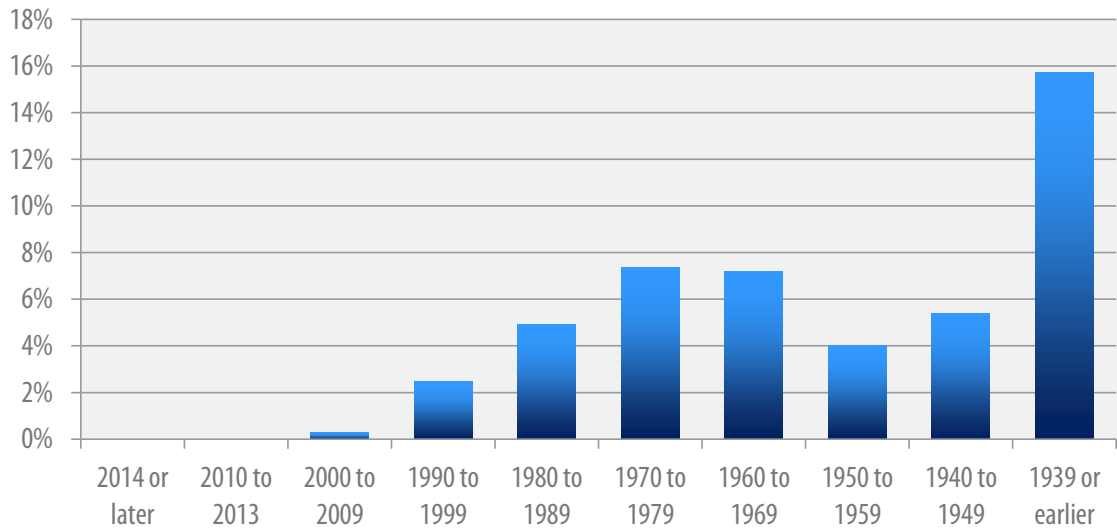
<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	14.4%
\$50,000 to \$99,999	34.5%
\$100,000 to \$149,999	31.5%
\$150,000 to \$199,999	11.8%
\$200,000 to \$299,999	7.1%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.6%

Source: US Census Bureau, American Community Survey

Figure E.3 shows the year housing units within the City of Greenfield were constructed. The city's housing stock has a large number of homes constructed in 1939 or earlier. The most recent American Community Survey Estimates estimate that there were no homes built within the City of Greenfield since 2010, but since these are just estimates, that number may not be completely correct. Building standards of today utilize the most recent construction materials and safety features, ensuring that the new residential structures are as safe as possible. This does not mean that older homes are more unsafe, just that they may be more susceptible to hazard damage.



**Figure E.3: City of Greenfield Year Housing Units Built, 2020**



Source: US Census Bureau, American Community Survey

## Economics

In 2020, the City of Greenfield's median household income was \$43,832, \$21,768 less than the State of Iowa's median household income (\$65,600). Households that made less than \$10,000 per year account for 9.3% of the city's households. Approximately 15% of the city's population brings in \$100,000 or more per year. A complete breakdown of the city's household incomes can be found in Table E.3.

**Table E.3: City of Greenfield Household Income, 2020**

Income (In 2020 Inflation Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	71	9.3%
\$10,000 - \$14,999	65	4.7%
\$15,000 - \$24,999	118	15.9%
\$25,000 - \$34,999	94	9.5%
\$35,000 - \$49,999	171	16.4%
\$50,000 - \$74,999	148	15.2%
\$75,000 - \$99,999	118	13.8%
\$100,000 - \$149,999	77	9.5%
\$150,000 - \$199,999	12	4.6%
\$200,000 or more	21	1.1%
Median Household Income	\$44,931	-
Mean Household Income	\$55,883	-

Source: US Census Bureau, American Community Survey

Greenfield's employment is not unlike the other cities in the county. The largest cohort (18.8%) of workers work in the educational, health care, and social assistance industry, followed by the manufacturing industry (16.0%) and the manufacturing industry (12.2%). Since the 2010 Census, the industry in which Greenfield residents has worked has become more diversified. The complete breakdown according to the American Community Survey 2020 estimates can be found in Table E.4.

**Table E.4: City of Greenfield Employment by Industry, 2020**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	773	100.0%
Agriculture, Forestry, Fishing, Hunting, Mining	63	8.2%
Construction	65	8.4%
Manufacturing	124	16.0%
Wholesale Trade	6	0.8%
Retail Trade	94	12.2%
Transportation and warehousing and utilities	27	3.5%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	32	4.1%
Professional, scientific, management, administrative, and waste management services	46	6.0%
Educational, health care, and social assistance	145	18.8%
Arts, entertainment, recreation, accommodation, and food services	78	10.1%
Other services, except public administration	51	6.6%
Public Administration	42	5.4%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table E.5 provides a compilation of the current planning and regulatory documents in place for the City of Greenfield, the table also shows the last time the documents were last updated.

**Table E.5: City of Greenfield Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2017
Comprehensive Plan	Yes	1996
Building Code	Yes	1994
Zoning Ordinance	Yes	-
Strategic Plan	Yes	Within 5 years
Housing Needs Assessment	Yes	2018
NFIP Participant	No	-
Floodplain Regulations	No	-

## *NFIP Participation*

While small streams exist, river flooding has never been reported within the city boundaries, FEMA has not mapped the city, and no Special Flood Hazard Areas exist. According to the Iowa NFIP Status Book, the City of Greenfield is "unmapped," and not participating in the program. The areas surrounding the city were mapped and approved in 2017 and can be found later in this appendix.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Greenfield's critical facilities can be found on Map 2.11.

## Outlook and Future Development

The population of Greenfield is likely to continue a very slow decline, as has been the case in recent decades. It is possible that the population will grow modestly. The factors that will most likely influence future development include the stability of the manufacturing sector and growth of the health care sector. The existing schools and hospital are not likely to be consolidated or lost. With its county seat location and relatively strong array of retail and services in the county, Greenfield should become the county's most likely destination for seniors and retired farmers if housing and skilled nursing care are available. Most new development will be residential, commercial, and industrial, mostly in existing areas of similar development.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table E.6.

**Table E.6: City of Greenfield Essential Infrastructure and Services**

<b>Major Arterials</b>	Iowa Highways 25 and 92	<b>Air Service</b>	Greenfield Airport
<b>Water Service</b>	Municipal; Greenfield Lake	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Greenfield Municipal Utilities	<b>Gas Service</b>	Greenfield Municipal Utilities
<b>Sanitation/Solid Waste</b>	City, local haulers	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Mediacom, Raccoon Valley, wireless	<b>Law Enforcement</b>	Greenfield police, supported by Sheriff
<b>Fire Service</b>	Greenfield Fire (volunteer)	<b>Ambulance Service</b>	Adair Co. Health System

## Nodaway Valley Community Schools

The main campus buildings are located in northwest Greenfield and southwest Fontanelle. The High School is located at 410 NW Second Street in Greenfield. The Middle School is located at 112 South First Street, Fontanelle. The elementary School is located at 324 NW Secondary Street in Greenfield. As stated on the Nodaway Valley Community Schools Website, "The district encompasses 283 square miles, serves approximately 700 students and employs 65 teachers. Elementary students in Grades PK-4 attend classes in Greenfield, middle school students (Grades 5-8) are located in Fontanelle and high school students are located in Greenfield." Towns served include Bridgewater, Fontanelle, and Greenfield.

**Table E.7: Nodaway Valley Enrollment**

School Year	Facility	Enrollment	Facility	Enrollment	Facility	Enrollment	Total Enrollment
<b>2018-19</b>	High School	211	Jr. High	148	Elementary	293	652
<b>2019-20</b>	High School	190	Jr. High	157	Elementary	293	640
<b>2020-21</b>	High School	201	Jr. High	143	Elementary	277	621
<b>2021-22</b>	High School	196	Jr. High	129	Elementary	286	611
<b>2022-23</b>	High School	193	Jr. High	132	Elementary	296	618

Source: Iowa Department of Education, Bureau of Information and Analysis

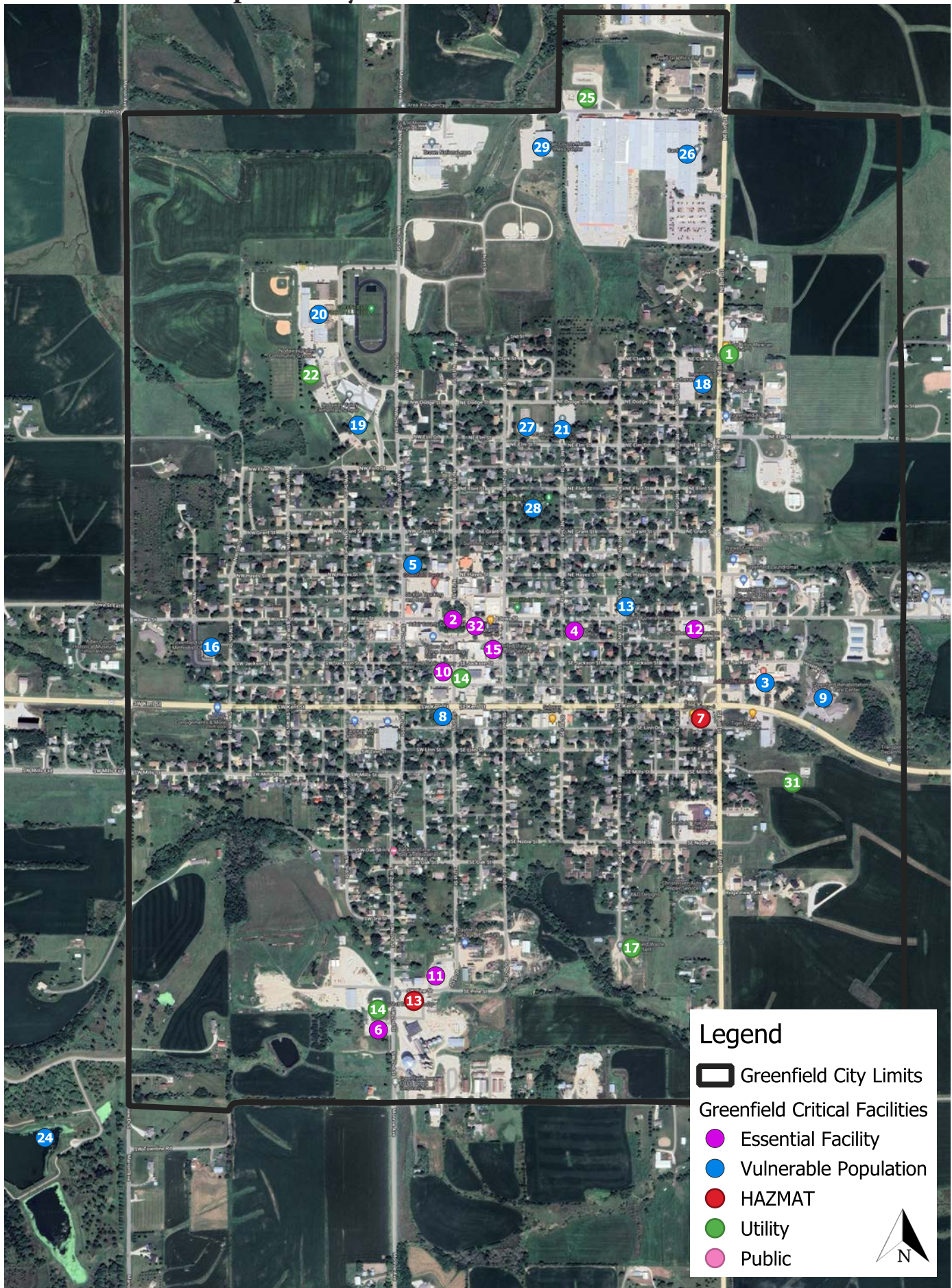
All three of the major school buildings are designated as official certified emergency shelters, and they can and have been used during and after emergencies because of the firm building construction, adequate space for housing people, and kitchen facilities. The District does not have fixed or portable emergency generators, but all have fixed NOAA weather radios. The High School building is sprinkled. Students and staff participate in drills and educational programs related to hazards and the mitigation of them. No District facilities are designated as tornado safe rooms capable of withstanding 250 MPH winds. All buildings are located within a half mile of an outdoor warning siren. The District maintains its own equipment and supplies to maintain roads and walkways on campus.

**Table E.8: City of Greenfield Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Adair County Conservation Board Office USDA Farm Service Center	705 NE 6th Street	Utility
2	Adair County Courthouse	400 Public Square #2	Essential Facility
3	Adair County Health System	609 SE Kent Street	Vulnerable Population
4	Adair County Law Enforcement Center	302 E Iowa Street	Essential Facility
6	Adair County Shop	620 SW 2nd Street	Essential Facility
7	Caseys	302 SE 6th Street	HAZMAT
8	The Gathering	102 SW Kent Street	Vulnerable Population
9	Greenfield Care Center	615 Kent Street	Vulnerable Population
10	Greenfield City Hall/Library	202 S 1st Street	Essential Facility
11	Greenfield City Shop	101 SW Pine Street	Essential Facility
12	Greenfield Fire Station	103 SE 5th Street	Essential Facility
13	Greenfield Gospel Chapel	401 E Iowa Street	Vulnerable Population
14	Greenfield Municipal Utilities	203 S 1st Street 608 SW 2nd Street	Utility
15	Greenfield Post Office	119 SE Jackson Street	Essential Facility
16	Greenfield United Methodist Church	108 SW 5th Street	Vulnerable Population
17	Greenfield WWTP	SE Corner of City	Utility
18	Emmanuel Lutheran Church	505 NE Dodge Street	Vulnerable Population
19	Nodaway Valley Elementary School	140 NW 2nd Street	Vulnerable Population
20	Nodaway Valley High School	410 NW 2nd Street	Vulnerable Population
21	St. John's Catholic Church	303 NE Elm Street	Vulnerable Population
22	Water Tower	NW 2nd Street	Utility
23	21st Century Co-Op	601 SW 2nd Street	HAZMAT
24	Greenfield Lake	2443 S Lakeview Drive	Vulnerable Population
25	Greenfield Municipal Utilities Electric Generation Plant	North Townline Road	Utility
26	Cardinal Glass	716 NE 6th Street	Vulnerable Population
27	Park and Swimming Pool	207 NE Elm Street	Vulnerable Population
28	City Park	South part of town	Vulnerable Population
29	Fitness Center	N. Townline Road	Vulnerable Population



### Map E.2: City of Greenfield Critical Facilities





Number on Map	Name	Address	Type
30	Water Treatment Facility	SW Mill Street Extension	Utility
31	Cell Towers	Various	Utility
32	Warren Cultural Center	154 Public Square	Essential Facility

## Hazard Scores

**Table E.9: City of Greenfield Risk Assessment**

Hazard	Comments
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Greenfield is used for agriculture, and most of that is row crop farming. There has been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city and creating a cost to Greenfield to remove them.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Greenfield has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The greatest impact is to water supplies. Since Greenfield has its own water plant and water source lake, it can regulate its water. This also means that, if the water runs low, the City has no reliable source. SIRWA can provide additional water, but the same drought affecting Greenfield will also affect SIRWA. The current drought has diminished the lake's capacity, but it is not to the point where conservation measures are required.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Greenfield. The committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	Expansive soils is not uncommon in this area, due to high clay content and dramatic changes in soil moisture and temperature. This hazard has the greatest impact on individual properties, especially those not engineered to withstand the hazard. This is a very localized hazard (e.g., individual home) and not a major priority for public response.
<b>Extreme Heat</b>	Extreme heat events continue to impact Greenfield. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break.
<b>Flash Flood</b>	Greenfield sits atop a ridge and most of the town is flat or gently sloping. While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Storm water management actions can mitigate this hazard.
<b>Grass/Wild Land Fire</b>	About a third of the land in the city is used for farmland or timberland. Most of the land surrounding town is the same. In normal conditions, Greenfield is not at risk. However, during prolonged dry seasons and when it is windy, a wildland fire or controlled burn can turn into a deadly fire and impact the town, even if it starts outside of town.

<b>HAZMAT Incident</b>	The IDNR has reported minor incidents of HAZMAT in the city. Further, there are many trucks and farm vehicles that travel through town on Highways 25 and 92. Finally, there are two manufacturers in the city, a window plant and an ink plant, that produce and use chemicals and gases, which can be released. Hundreds can be impacted due to this hazard. No part of the town is exempt from its impacts.
<b>Human Disease</b>	Greenfield is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Greenfield. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. Other human disease incidents continue to affect Greenfield, especially major population centers, such as the school, Cardinal Glass plant, and hospital, with sick people, which hurts their operations.
<b>Infrastructure Failure</b>	Infrastructure failure can occur with little or no warning and can cause major damage and disruptions. It is important to prevent these hazards through infrastructure investment and also to have the capacity to respond to them if they occur. Greenfield has aging homes and properties and no formal building codes to address improvements. Resources are limited for property owners to make structural improvements. Some utilities are outside of the authority of the city and implement their own measures. The greatest issues impacting Greenfield are likely aging streets, water, storm water, and sewer systems. One building in downtown on the square also may collapse and impact those in the immediate area.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city. However, Greenfield is indirectly impacted if Greenfield Lake and Nodaway Lake fail, as these lakes provide water for the city and are a source of recreation. Local residents using the lakes, while outside of town, can be injured or killed if caught below the dam or on the dam when it fails.
<b>Radiological</b>	There is no history of this hazard in Greenfield. Small, localized incidents are possible, mostly likely related to use of radiological equipment at Adair County Health System or a small medical/dental clinic in town. The committee feels that, if an incident were to occur, it would be isolated to a small area and contained and would not have an impact on Greenfield as a whole.
<b>River Flooding</b>	River flooding has not been reported in Greenfield. The most recent FIRM maps adopted in 2017 show no flood hazard areas in the city. Consequently, the City has not joined the NFIP and there is not public interest to participate. Because there is no past history of flooding and current maps do not show hazard areas in the city, the committee has determined that the risk is very low.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Greenfield. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage.
<b>Terrorism</b>	Greenfield has no history terrorism. There have been, although rare, threats against the school or involving students, but no actual events have occurred. The committee feels this hazard is not very likely but that the community must remain vigilant. During the community meeting for this plan, some risks were mentioned, especially related to the school and airport. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.

<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Greenfield, but most of them do not have major impact to life and property, and only a few storms are year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage.
<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Greenfield directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the site of Greenfield, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter.
<b>Transportation Incident</b>	Speed limits in Greenfield are relatively low, so any transportation incident is likely going to be isolated in size and damage, and loss of life is unlikely. The airport close to town has minimal traffic and that traffic is limited to small private planes. The committee anticipates that this hazard will affect the community in varying degrees but will not a widespread impact.
<b>Windstorm</b>	Recent windstorms have caused damage to the Greenfield area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude. Two derechos in the past five years have caused some damage in the city and has prompted the community to prepare more effectively for these hazards.



# Loss Estimates

**Table E.10: City of Greenfield Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$618,542	2,062
<b>Commercial</b>	100	\$16,626,452	
<b>Industrial</b>	10	\$8,477,682	
<b>Residential</b>	1,000	\$67,233,035	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table E.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table E.11: City of Greenfield Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	186
<b>Commercial</b>	9	\$1,496,380	
<b>Industrial</b>	1	\$762,991	
<b>Residential</b>	90	\$6,050,973	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table E.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table E.12: City of Greenfield Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	516
<b>Commercial</b>	25	\$4,156,613	
<b>Industrial</b>	3	\$2,119,420	
<b>Residential</b>	250	\$16,808,259	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table E.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

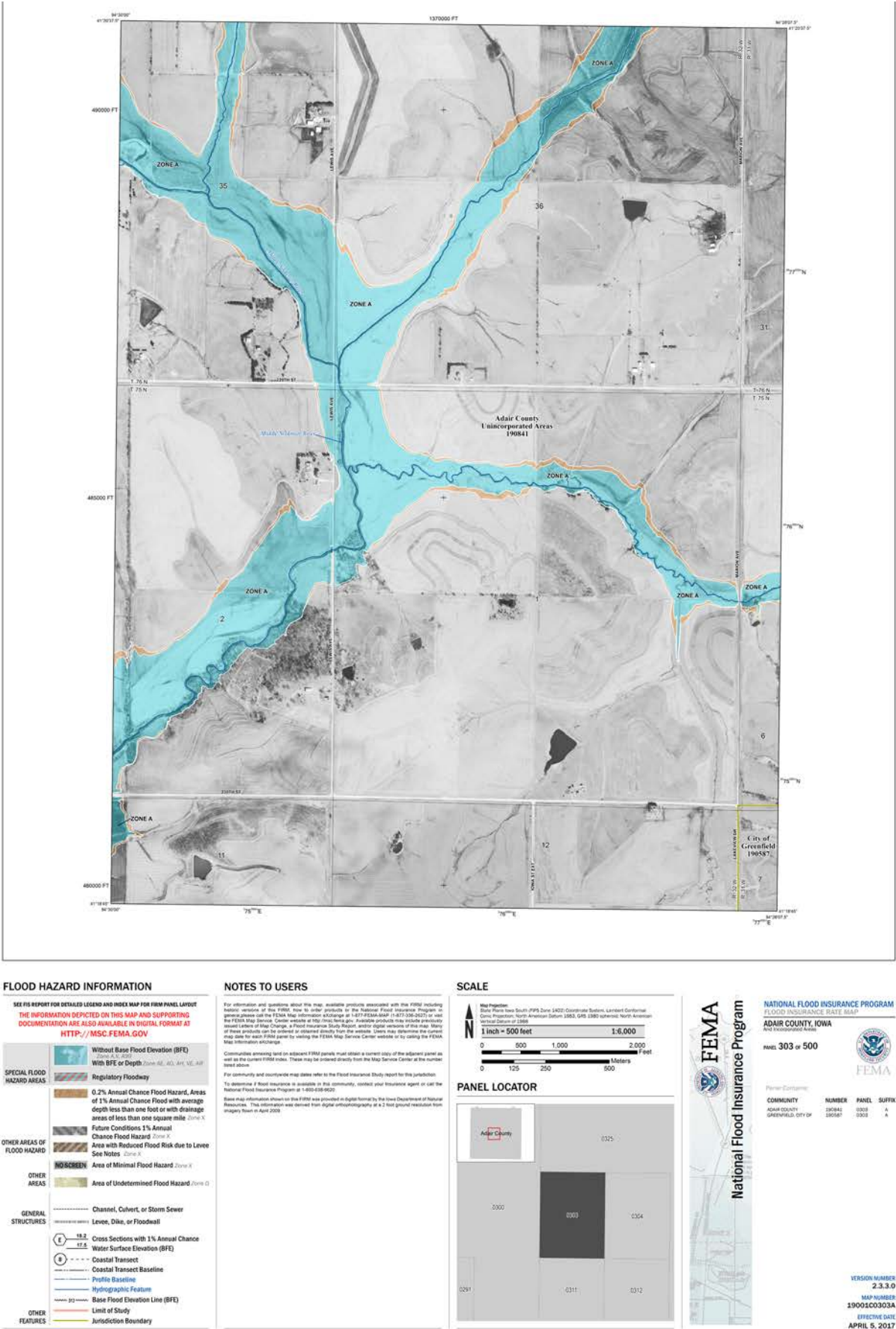
**Table E.13: City of Greenfield Critical Hazard Impact**

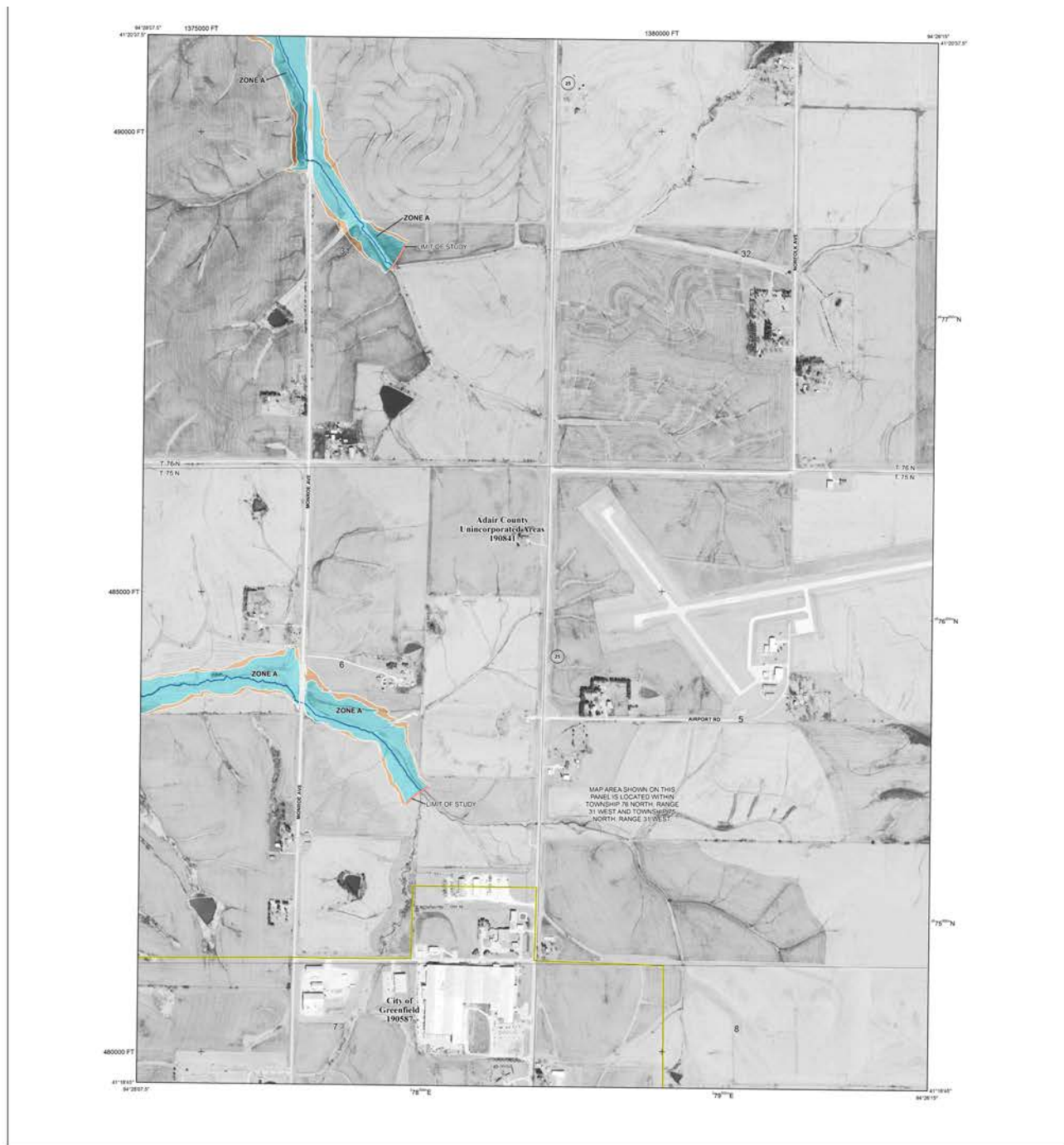
Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	1,031
<b>Commercial</b>	50	\$8,313,226	
<b>Industrial</b>	5	\$4,238,841	
<b>Residential</b>	500	\$33,616,517	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table E.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Maps

Source: FEMA Flood Map Service Center





# FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VE1, VE2
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

# NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical editions, of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-8468 (1-877-368-2627) or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued editions of the map, a Flood Insurance Study Report, and/or digital editions of the map. None of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

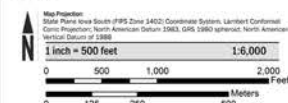
Communities appearing on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

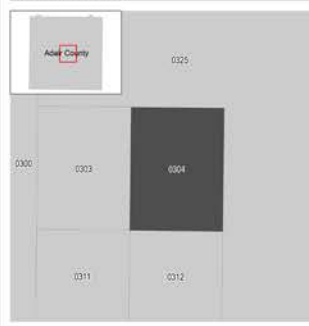
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectified aerial at a 2 foot ground resolution from imagery flown in April 2008.

# SCALE



# PANEL LOCATOR



# NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE STATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 304 OF 500



Project Contacts:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0304 A  
GREENFIELD, IOWA 190587 0304 A

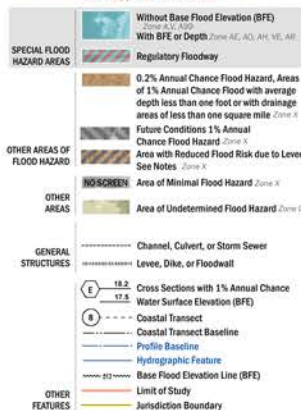
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0304A  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE FIG REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
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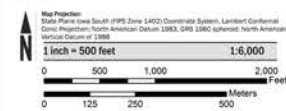
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

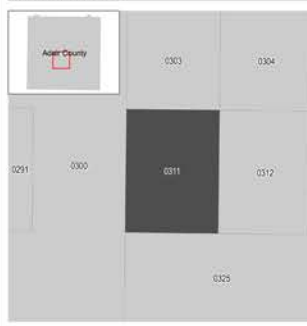
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Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

PANEL 311 OF 500



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 190841 0311 A  
GREENFIELD, CITY OF 190887 0311 A

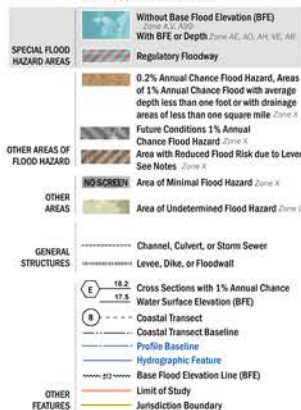
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0311A  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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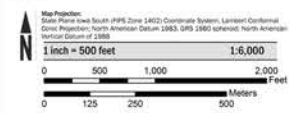
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

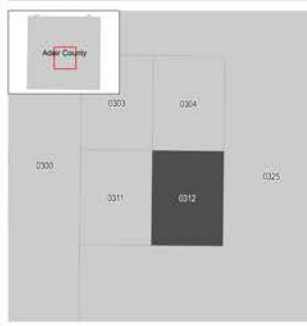
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the local Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
 And Incorporated Areas

PANEL 312 OF 500



Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX  
 ADAIR COUNTY 190841 0312 A  
 GREENFIELD, CITY OF 190887

VERSION NUMBER  
 2.3.3.0  
 MAP NUMBER  
 19001C0312A  
 EFFECTIVE DATE  
 APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table E.14: City of Greenfield Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt state fire codes					X
Annually, train key local leaders about hazard mitigation and review the plan			X		
Business and residential preparedness programs			X		
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Demolish abandoned properties		X			
Encourage property insurance purchase			X		
Encourage property owners to install sewer system back flow devices			X		
Establish alert systems and specific outreach efforts for vulnerable populations			X		
Harden public buildings					X
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Implement sanitary sewer system inflow and infiltration projects, including new mains and impervious manhole covers		X			
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan CIP, strategic plan, or other planning mechanisms				X	
Install sprinkler systems in public buildings	X				
Install windbreaks (permanent and seasonal). Use snow fences or "living snow fences" to limit wind effects					X
Integrate tornado safe room retrofits into critical assets/facilities					X
Involve more groups into hazard mitigation			X		
Obtain sand and salt supplies well in advance of winter	X				

	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Promote the construction of private in-home tornado safe rooms					X
Provide additional permanent overnight accommodations to house travelers who are stranded by severe winter weather					X
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radios and other notification tools available to the public			X		
Repair and weatherize old and/or structurally weak homes		X			
Replace deteriorated bridges and culverts	X				
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table E.15: City of Greenfield Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.



**Table E.16: City of Greenfield Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt state fire codes	Structure Fire, Grass/Wild Land Fire	Mod.	City elected/ admin. officials	Minimal	Local	Property Protection	Mid
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Mod.	City elected/ admin. officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Long
Demolish abandoned properties	Windstorm, Structure Failure	High	City elected/ admin officials	Low	Local, grants	Prevention, Property Protection	Short
Harden public buildings	Tornado/Windstorm	Low	City elected/ admin. officials, Engineering Firm	High	FEMA/State, Local, CDBG, USDA, Iowa SRF Program	Property Protection	Long
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	Low	County GIS Provider, EMA, SICOG, City	Low	Local, Grants	Emergency Services	Short
Implement sanitary sewer system inflow and infiltration projects, including new mains and impervious manhole covers	Infrastructure Failure, Flash Flooding	High	City elected/ admin. officials, Engineering Firm	Moderate	Local, FEMA/ State, USDA, SRF Program, CDBG	Property Protection, Natural Resource Protections	Short
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City/Council, SICOG, EMA	Minimal	Local, FEMA/ State, Grants	Prevention, Public Education and Awareness	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Install sprinkler systems in public buildings	Infrastructure Failure, HAZMAT Incident	Low	City elected/ admin. officials, Public Works, Building Owners	Moderate	Building Owners, State/Federal grants, Local grants	Property Protection	Long
Install windbreaks (permanent and seasonal). Use snow fences or "living snow fences" to limit wind effects	Severe Winter Storm, Grass and Wild Land Fire	Low	City elected/ admin. officials, Engineering Firm, Property Owners	Minimal	Local, USDA, Conservation Partners, Property Owners, Tree Grants, Cost-Share Programs	Property Protection	Mid
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/Windstorm	Mod.	Local Governments, Property Owners	High	FEMA/State, Local	Property Protection, Structural Project	Long
Obtain sand and salt supplies well in advance of winter	Transportation Incident, Severe Winter Storm	High	City elected/ admin. officials, County	Minimal	Local	Emergency Services	Short
Promote the construction of private in-home tornado safe rooms	Tornado/Windstorm	Mod.	City, EMA, IHSEMD	Minimal	EMA, FEMA/ State, Local, engaged property owners	Property Protection, Structural Project	Mid
Provide additional permanent overnight accommodations to house travelers who are stranded by severe winter weather	Severe Winter Storm, Transportation Incident	High	City support of efforts by Greenfield Dev. Corp. Midwest Partnership, others	Minimal	Local, Property Owners	Property Protection	Mid
Repair and weatherize old and/or structurally weak homes	Infrastructure Failure, Severe Winter Storm	Mod.	City elected/ admin. officials, SICOG	Low	SCICAP, USDA, CDBG, Grants	Property Protection	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Replace deteriorated bridges and culverts	Infrastructure Failure, Flash Flood	Mod.	City elected/ admin. officials, Engineering Firm	High	Local, FEMA/ State, Iowa DOT, Federal Highway Funds, TIP, RUTF, CDBG, USDA	Property Protection, Structural Project	Short
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.	Tornado/Windstorm, Infrastructure Failure	Mod.	City elected/ admin. officials, Zoning Official	Minimal	Local, State/ FEMA, In-Kind	Property Protection	Long
Hire an SRO for Nodaway Valley School	Terrorism	High	School Board	Moderate	Local, State, FEMA	Prevention, Property Protection	Short
Add terrorism barriers at airport	Terrorism	Low	Aiport Commission	Minimal	Local, State, Federal	Property Protection	Long
Install fixed backup power generators at targeted locations: Cardinal Glass, Fitness Center, WWTF, City Hall	Infrastructure Failure, Severe Winter Storm, Tornado/ Windstorm	High	City, GMU, Cardinal Glass, Fitness Center Board	Moderate	Local, State, Federal, FEMA	Property Protection, Structural Project	Mid
Replace aging warning sirens	Tornado/Windstorm, Thunderstorm/Lightning/Hail, Severe Winter Storm	Mod.	City	Minimal	Local, State, Federal, FEMA	Property Protection	Ongoing
Build New Water Plant	Infrastructure Failure	High	GMU	High	Local, State, Federal	Structural Project	Mid
Replace transformer/electric substation	Infrastructure Failure	High	GMU	High	Local, State, Federal	Structural Project	Mid
Replace aerators at water source lakes	Infrastructure Failure	Mod.	GMU	Minimal	Local, State, Federal	Structural Project	Mid
Implement stormwater infrastructure and "green" stormwater pre-treatment projects	Flash Flood, River Flooding, Infrastructure Failure	High	City	Minimal	Local, State, Federal	Structural Project	Mid

# Adair County Health System Previous Mitigation Actions

**Table E.18: Adair County Health System  
Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt state fire codes			X		
Annually, train key local leaders about hazard mitigation and review the plan			X		
Business and residential preparedness programs			X		
Create and maintain a special needs/oxygen user registration program or inventory					X
Educate the public about the interconnected efforts needed to prevent and control infectious diseases and their role in protecting health			X		
Full review of policy, procedure, and codes to include mitigation			X		
Help community leaders and businesses to improve local human disease response readiness			X		
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Improve capital communications technology, such as cell towers and fiber cable lines to better withstand hazards			X		
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms			X		
Increase community and individual engagement in disease prevention efforts			X		
Install air monitors				X	
Install sprinkler systems in public buildings	X				
Integrate tornado safe room retrofits into critical assets/facilities			X		
Investigate and implement alternative energy sources			X		
Involve more groups in hazard mitigation					X
Reduce disease transmitted by animals and insects and food borne infections			X		



	Status				
Previous Actions	Complete	Underway	Ongoing	Future	Not Implemented
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Adair County Health System Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table E.19: Adair Co. Health System Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

## E.20: Adair Co. Health System Mitigation Actions

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt state fire codes	Structure Fire, Grass/Wild Land Fire	Low	Administration, Staff	Low	Local	Property Protection	Ongoing
Annually, train key local leaders about hazard mitigation and review the plan	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	Admin Officials, Staff, EMA, SISCOG	Minimal	Local	Prevention	Ongoing
Business and residential preparedness programs	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod.	Staff, EMA, IHSEMD	Minimal	Local, Federal/State/Non-Profit Grants	Prevention, Property Protection	Ongoing
Create and maintain a special needs/oxygen user registration program or inventory	Infrastructure Failure, Severe Winter Storm	Low	Utility providers, EMA, Fire Departments, ACHS, Public Health	Minimal	Local, State, FEMA	Property Protection	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Educate the public about the interconnected efforts needed to prevent and control infectious diseases and their role in protecting health	Human Disease, Terrorism	Mod.	Admin Officials, Staff, County, State	Minimal	Local, FEMA/ State, associated agencies and foundation grants	Property Protection, Public Education and Awareness	Ongoing
Full review of policy, procedure, and codes to include mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Staff, Administration, EMA, IHSEMD	Minimal	Local, Red Cross, FEMA/ State, Local Foundations	Prevention	Ongoing
Help community leaders and businesses to improve local human disease response readiness	Human Disease, Most Others	Mod.	Staff, Administration, EMA, State, Public Health	Minimal	Local, FEMA/ State, CDC, IDPH, Grants	Public Education and Awareness	Ongoing
Implement a comprehensive multi-media public education campaign for multiple hazards	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	EMA, Staff	Minimal	EMA, State/ FEMA, Volunteers, Public	Property Protection, Public Education and Awareness	Ongoing



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Improve capital communications technology, such as cell towers and fiber cable lines to better withstand hazards	Infrastructure Failure, Terrorism	Mod.	Providers, Staff, County E911	Low	Local, FEMA/ State, USDA, Other Federal Funding	Property Protection	Short
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Staff, Administration, SICOG, EMA	Moderate	Local, FEMA/ State, Grants	Prevention, Public Education and Awareness	Ongoing
Increase community and individual engagement in disease prevention efforts	Human Disease	Mod.	Staff, Administration, Public Health	Minimal	Local, FEMA/ State, Grants	Public Education and Awareness	Ongoing
Install sprinkler systems in public buildings	Infrastructure Failure, HAZMAT Incident	Low	Administration, Staff	Moderate	Building Owners, State/Federal grants, Local grants	Property Protection	Ongoing
Integrate tornado safe room retrofits into critical assets/ facilities	Tornado/Windstorm	High	Administration, Staff	High	FEMA/State, Local	Property Protection, Structural Project	Long
Investigate and implement alternative energy sources	Infrastructure Failure, Severe Winter Storm	Low	Administration, Staff	Moderate	Local, State, USDA, Federal Programs, Grants	Emergency Services	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Involve more groups in hazard mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Staff, EMA	Minimal	Local	Prevention, Public Education and Awareness	Ongoing
Reduce disease transmitted by animals and insects and food borne infections	Human Disease	Mod.	Administration, Staff, USDA, Public Health	Minimal	Local, FEMA/ State, USDA, IA Dept. of Ag., Grants	Property Protection	Ongoing
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Staff, EMA	Minimal	Local, In-Kind	Prevention, Public Education and Awareness	Ongoing

# Nodaway Valley Community School District

**Table E.22: Nodaway Valley Community School District Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Greenfield is used for agriculture, and most of that is row crop farming. There has been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city and creating a cost to Greenfield to remove them.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Greenfield has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The greatest impact is to water supplies. Since Greenfield has its own water plant and water source lake, it can regulate its water. This also means that, if the water runs low, the City has no reliable source. SIRWA can provide additional water, but the same drought affecting Greenfield will also affect SIRWA. The current drought has diminished the lake's capacity, but it is not to the point where conservation measures are required.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Greenfield. The committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	This hazard has had no major impact on the school building, parking areas, or other assets. As buildings age, this hazard could become more prevalent
<b>Extreme Heat</b>	Extreme heat events continue to impact Greenfield. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Over time the Nodaway Valley School has been modernized to be a cooling center that can be opened to the public during summer extreme heat when school is not in session.
<b>Flash Flood</b>	Greenfield sits atop a ridge and most of the town is flat or gently sloping. While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Storm water management actions can mitigate this hazard.
<b>Grass/Wild Land Fire</b>	Grass and wildland areas are west of the Greenfield and Fontanelle campuses. If a fire starts in that area, it can impact school property. There is no history of grass/wildland fire.
<b>HAZMAT Incident</b>	The IDNR has reported minor incidents of HAZMAT in the city. Further, there are many trucks and farm vehicles that travel through town on Highways 25 and 92. Finally, there are two manufacturers in the city, a window plant and an ink plant, that produce and use chemicals and gases, which can be released. Hundreds can be impacted due to this hazard. No part of the town is exempt from its impacts.

<b>Human Disease</b>	Greenfield is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Greenfield. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. Other human disease incidents continue to affect Greenfield, especially major population centers, such as the school, Cardinal Glass plant, and hospital, with sick people, which hurts their operations.
<b>Infrastructure Failure</b>	Parts of the school campus building stock are aging and at a greater risk of failure. However, overall, the school is strongly built and well maintained. The chance of major failure is low. Utilities serving the school are also at risk, which affects the school's operation.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city. However, Greenfield is indirectly impacted if Greenfield Lake and Nodaway Lake fail, as these lakes provide water for the city and are a source of recreation. Local residents using the lakes, while outside of town, can be injured or killed if caught below the dam or on the dam when it fails.
<b>Radiological</b>	There is no history of this hazard in Greenfield. Small, localized incidents are possible, mostly likely related to use of radiological equipment at Adair County Health System or a small medical/dental clinic in town. The committee feels that, if an incident were to occur, it would be isolated to a small area and contained and would not have an impact on Greenfield as a whole.
<b>River Flooding</b>	River flooding has not been reported in Greenfield. The most recent FIRM maps adopted in 2017 show no flood hazard areas in the city. Consequently, the City has not joined the NFIP and there is not public interest to participate. Because there is no past history of flooding and current maps do not show hazard areas in the city, the committee has determined that the risk is very low.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Greenfield. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage.
<b>Terrorism</b>	Greenfield has no history terrorism. There have been, although rare, threats against the school or involving students, but no actual events have occurred. The committee feels this hazard is not very likely but that the community must remain vigilant. During the community meeting for this plan, some risks were mentioned, especially related to the school and airport. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Greenfield, but most of them do not have major impact to life and property, and only a few storms are year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Little damage has occurred to the school. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage.



<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Greenfield directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the site of Greenfield, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter.
<b>Transportation Incident</b>	Risk to school property is low and damage due to crashes on school grounds is likely to be modest, due to slow speeds and adequate signage. Children crossing the street can be hit if people are not paying attention. Rural bus routes pose greater risk, especially during winter weather.
<b>Windstorm</b>	Recent windstorms have caused damage to the Greenfield area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude. Two derechos in the past five years have caused some damage in the city and has prompted the community to prepare more effectively for these hazards. The school has recieved little damage from these events.

# Nodaway Valley Community School District Status of Previous Mitigation Actions

**Table E.22: Nodaway Valley Community School District  
Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt state fire codes	X				
Annually, train key local leaders about hazard mitigation and review the plan			X		
Business and residential preparedness programs			X		
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Create continuity of operations & succession plan for jurisdiction			X		
Develop/maintain security at applicable critical assets		X			
Educate the public about the interconnected efforts needed to prevent and control infectious diseases and their role in protecting health			X		
Encourage property insurance purchase			X		
Establish alert systems and specific outreach efforts for vulnerable populations	X				
Full review of policy, procedure, and codes to include mitigation					X
Help community leaders and businesses to improve local human disease response readiness			X		
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Improve capital communications technology, such as cell towers and fiber cable lines to better withstand hazards	X				
Increase community and individual engagement in disease prevention efforts			X		
Install air monitors					X
Install quick-connect emergency generator hook-ups for facilities					X
Install sprinkler systems in public buildings					X
Integrate tornado safe room retrofits into critical assets/facilities					X

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Investigate and implement alternative energy sources					X
Involve more groups in hazard mitigation			X		
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radios and other notification tools available to the public					X
Provide safe room education for builders and developers					X
Purchase/install backup fixed power generators and pumps					X
Reduce disease transmitted by animals and insects and food borne infections					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Nodaway Valley Community School District Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table E.23: Nodaway Valley Community School District Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.



**Table E.24: Nodaway Valley Community School District Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Mod.	School elected/ admin officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Short
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	Low	School elected/ admin officials, EMA	Minimal	EMA, State, Local, Grants	Prevention	Short
Develop/maintain security at applicable critical assets	Terrorism, Human Disease	Low	Law Enforcement, School Staff	Minimal	Local, USDA, State and Federal Grants	Property Protection	Mid
Full review of policy, procedure, and codes to include mitigation	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/ Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/ Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	School Board/ Staff, EMA, IHSEMD	Minimal	Local, Red Cross, FEMA/ State, Local Foundations	Prevention	Mid
Help community leaders and businesses to improve local human disease response readiness	Human Disease, Most Others	Low	School, EMA, State Education Agencies, Public Health	Minimal	Local, FEMA/ State, CDC, IDPH, Grants	Public Education and Awareness	Mid
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	Low	County GIS Provider, EMA, SICOG, School	Low	Local, Grants	Emergency Services	Short
Increase community and individual engagement in disease prevention efforts	Human Disease	Low	School, EMA, State Education Agencies, Public Health	Low	Local, FEMA/ State, Grants	Public Education and Awareness	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Install air monitors	Terrorism, HAZMAT Incident	Low	School elected officials, Staff	Low	Local, State and Federal Grants, Private Grants	Property Protection	Long
Install quick-connect emergency generator hook-ups for facilities	Energy Failure	Mod.	School elected/admin officials, Engineering Firm	Low	Local, USDA, Energy and Utility Providers, Property Owners	Emergency Services	Short
Install sprinkler systems in public buildings	Infrastructure Failure, HAZMAT Incident	Low	School elected officials, Staff	Moderate	Building Owners, State/Federal grants, Local grants	Property Protection, Structural Project	Long
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/Windstorm	Mod.	School officials	High	FEMA/State, Local	Property Protection, Structural Project	Long
Investigate and implement alternative energy sources	Infrastructure Failure, Severe Winter Storm	Low	School elected officials, Staff, Local Utility Providers	Moderate	Local, State, USDA, Federal Programs, Grants	Emergency Services	Long
Purchase/install backup fixed power generators and pumps	Energy Failure, Thunderstorm/Lightning/Hail	Mod.	School elected/admin officials	Low	Local, FEMA/State, USDA, CDBG, Iowa SRF Program, Grants, Property Owners	Property Protection, Emergency Services	Short

## Incorporation into Other Planning Mechanisms - City of Greenfield

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Where possible, Greenfield will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Comprehensive Plan
- Building Code
- Zoning Ordinance
- Strategic Plan
- Housing Needs Assessment

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Floodplain Regulations

## Incorporation into Other Planning Mechanisms - Adair County Health System

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The update of the mitigation strategy will be provided to the Hospital Administrator for consideration in the next update cycle of the capital improvement plan.

## Incorporation into Other Planning Mechanisms - Nodaway Valley Community School District

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The update of the mitigation strategy will be provided to the School Superintendent for consideration in the next update cycle of the capital improvement plan.











# Appendix F: City of Orient

## Community Profile

### *History*

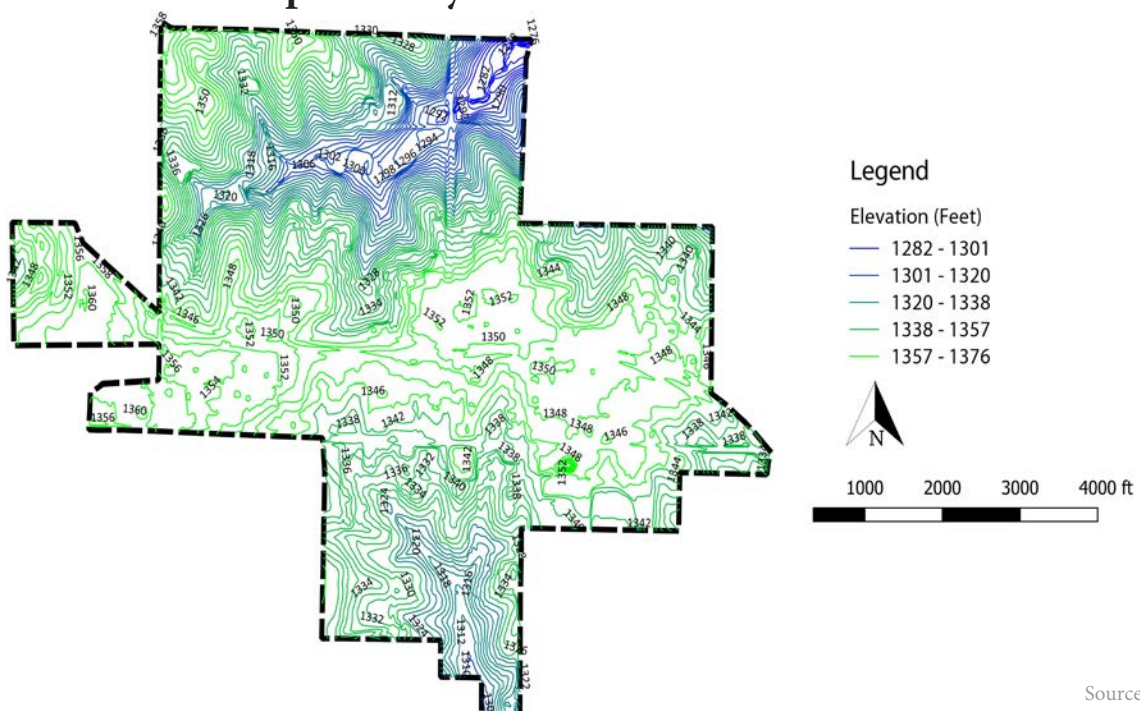
Orient was platted in 1879, with the building of the railroad from Creston to Greenfield and beyond. Orient is well known as the hometown of Henry A. Wallace, a former US Secretary of Agriculture and Vice President, who also founded Pioneer Hi-Bred Company and was a publisher and key figure in America's mobilization for World War II. It is notable that he was born and raised in a farmstead five miles northeast of Orient. In 1999 the Des Moines Register named him "Most Influential Iowan of the 20th Century."

The city is approximately halfway between Greenfield and Creston, which is reflective in its history and development. Because of the development of the two larger towns, Orient is an important midpoint transportation route making Orient somewhat of a bedroom community.

### *Geography and Environment*

Orient is 9 miles south of Greenfield in the south-central part of Adair County and occupies approximately 0.45 square miles, entirely of land. Approximately 50% of the land within the city is residential developed, with another 10% commercial/industrial, 5% recreation/open space, 10% transportation, 5% education, 5% other public uses, and 15% agriculture. Topography is mainly flat with a mean elevation of approximately 1,352 feet. Orient is located on the Mississippi-Missouri Divide. A few very small streams originate in or near the city, none of which have a flood history. Orient's elevation map can be found in Map F.1.

**Map F.1: City of Orient Elevation**



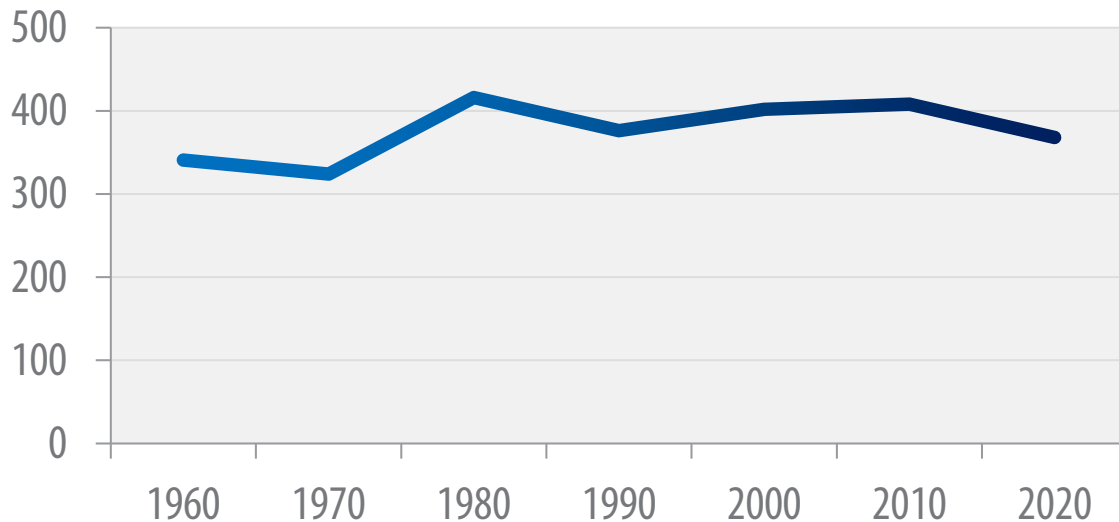
Source: Iowa DNR



## Demographics

The population of a city can be a major influence for anything within a city from housing to development. The demographics of a city offer potential employers an overview of the current laborforce, and trends that could affect a company if they were to locate there. Orient's population is one of the few within the county that has increased overall in the past 60 years. In 2020, the Decennial Census stated that Orient's population was 368, an 8% increase since 1960. The complete breakdown can be found in Figure F.1.

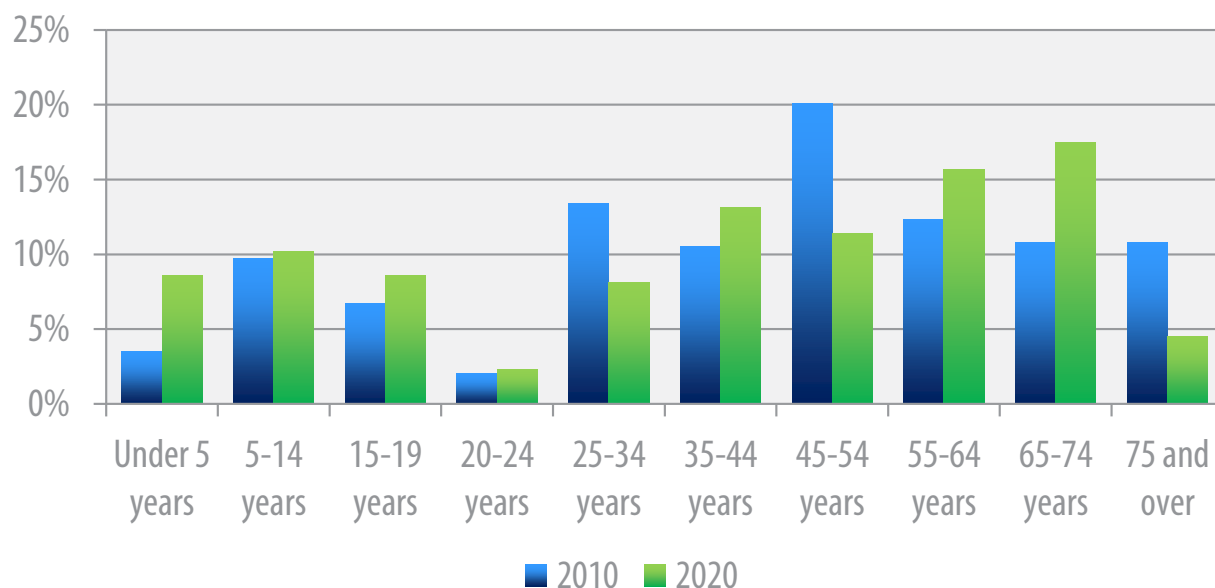
**Figure F.1: City of Orient Historic Population, 1960-2020**



Source: US Census Bureau, American Community Survey

Orient has noticed some shifts in the makeup of the population since 2010. There were noticeable increases in the under 5 years, 55-64 years, and the 65-74 year old cohorts. The 25-34, 45-54 and 75 and over age cohorts saw noticeable decreases over the six year span. The complete breakdown is found in Figure F.2.

**Figure F.2: City of Orient Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

Since 2010, the City of Orient has seen a decrease of ten housing units within the city. The 2020 American Community Survey Estimates estimate that 12.2% of the city's housing stock is currently vacant. The planning committee feels this is a high estimate, but accepts that it is the only estimate available. Over the span of the comparison, the number of owner-occupied housing units has increased, but the number of renter occupied units has decreased. The overall occupied housing units number has risen and the vacant housing units has fallen. Table F.1 shows the breakdown of the housing units from 2010 and 2020.

**Table F.1: City of Orient Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	159	80.3%	165	87.8%
<b>Owner Occupied</b>	132	83.0%	141	85.5%
<b>Renter Occupied</b>	27	17.0%	24	14.5%
<b>Vacant Housing Units</b>	39	19.7%	23	12.2%
<b>Total Housing Units</b>	198	100.0%	188	100.0%

Source: US Census Bureau, American Community Survey

Greenfield has a median housing value of \$84,000. The city's homes are affordable and can be used to attract new residents, but with a lower price may come necessary repairs to make the home safe and energy efficient. With a median housing value of \$84,000, the city still has a large number (24.8%) of homes valued under \$50,000. An additional 41.1% of the city's homes are valued between \$50,000 and \$99,999. The breakdown can be found in Table F.2.

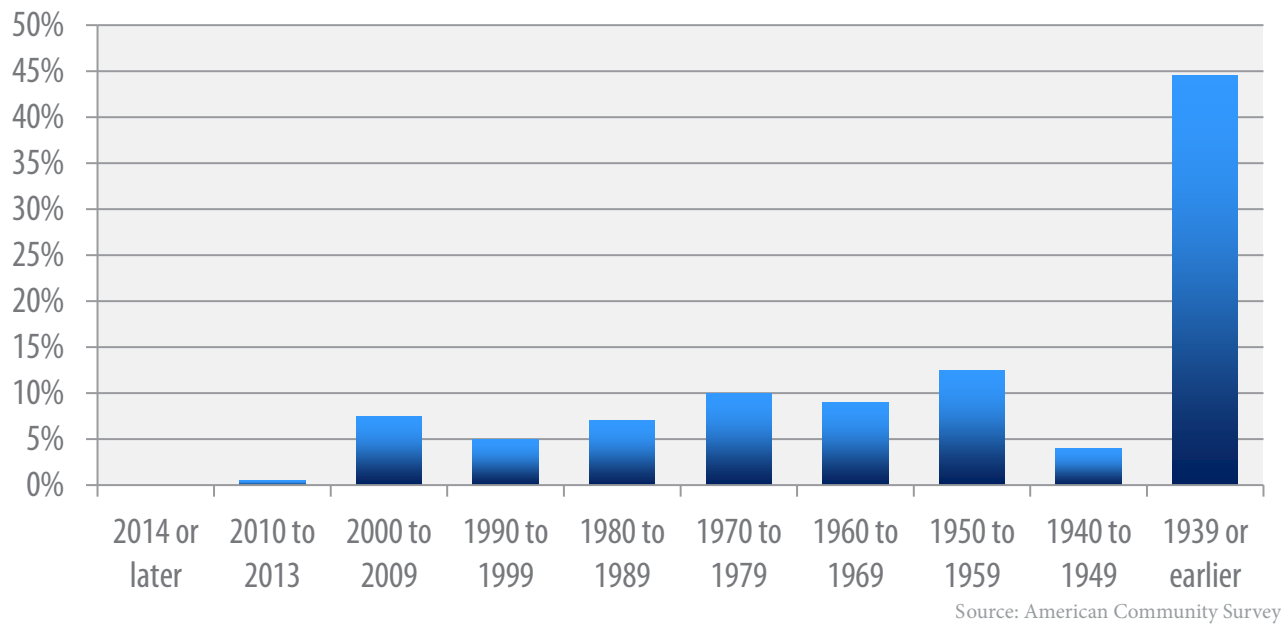
**Table F.2: City of Orient Value of Owner-Occupied Units, 2020**

<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	24.8%
\$50,000 to \$99,999	41.1%
\$100,000 to \$149,999	27.7%
\$150,000 to \$199,999	5.0%
\$200,000 to \$299,999	1.4%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: American Community Survey

Figure F.3 shows the year housing units within the City of Orient were constructed. The city's housing stock has a large number (44.5%) of homes constructed in 1939 or earlier. The most recent American Community Survey Estimates estimate that there were no homes built within the City of Orient since 2014. Building standards of today utilize the most recent construction materials and safety features, ensuring that the new residential structures are as safe as possible. This does not mean that older homes are more unsafe, just that they may be more susceptible to hazard damage.

**Figure F.3: City of Orient Year Housing Units Constructed, 2020**



## Economics

In 2020, the City of Orient's median household income was \$58,125, \$7,475 less than the State of Iowa's median household income (\$65,600). Households that made less than \$10,000 per year account for 3% of the city's total households, a decrease from 6% in 2016. Just over half of the city's households have an income between \$35,000 and \$99,999 annually. In 2020, 20.5% of the households brought home more than \$100,000, up from 4% in 2016. A complete breakdown of the city's household incomes can be found in Table F.3.

**Table F.3: City of Orient Household Income, 2020**

Income (In 2020 Inflation Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	5	3.0%
\$10,000 - \$14,999	6	3.6%
\$15,000 - \$24,999	14	8.5%
\$25,000 - \$34,999	23	13.9%
\$35,000 - \$49,999	20	12.1%
\$50,000 - \$74,999	36	21.8%
\$75,000 - \$99,999	27	16.4%
\$100,000 - \$149,999	33	20.0%
\$150,000 - \$199,999	1	0.6%
\$200,000 or more	0	0.0%
Median Household Income	\$58,125	-
Mean Household Income	\$63,176	-

Source: US Census Bureau, American Community Survey

Orient's employment is slightly different than other cities within the county. In other cities, the educational, health care, and social assistance industry is the largest, but in Orient, the largest industry is retail trade which employs 20.5% of the city's working residents. The second and third largest industries are the construction and manufacturing which both employ 17.7% of the working population. The complete breakdown according to the American Community Survey 2020 estimates can be found in Table F.4.

**Table F.4: City of Orient Employment by Industry, 2020**

<b>Industry</b>	<b>Number</b>	<b>Percent</b>
Total civilian non-farm employment, 16 years and over	220	100.0%
Agriculture, Forestry, Fishing, Hunting, Mining	23	10.5%
Construction	39	17.7%
Manufacturing	39	17.7%
Wholesale Trade	2	0.9%
Retail Trade	45	20.5%
Transportation and warehousing and utilities	9	4.1%
Information	2	0.9%
Finance and insurance, and real estate and rental and leasing	4	1.8%
Professional, scientific, management, administrative, and waste management services	7	3.2%
Educational, health care, and social assistance	37	16.8%
Arts, entertainment, recreation, accommodation, and food services	4	1.8%
Other services, except public administration	7	3.2%
Public Administration	2	0.9%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table F5 provides a compilation of the current planning and regulatory documents in place for the City of Orient.

**Table F.5: City of Orient Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	Yes	-
Zoning Ordinance	Yes	-
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	No	-
Floodplain Regulations	No	-

## *NFIP Participation*

While small streams exist, river flooding has never been reported within the city boundaries, FEMA has not mapped the city, and no Special Flood Hazard Areas exist. According to the Iowa NFIP Status Book, the City of Orient is “unmapped,” and not participating in the program. The areas surrounding the city were mapped and approved in 2017 and can be found in the city’s appendix.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Orient’s critical facilities can be found in Map 2.13.



## Outlook and Future Development

The population of Orient is likely to remain stable. The future population is most likely to be affected by the continued sustainability of the school district. If the school can withstand consolidation and other businesses continue to survive, the town will likely to remain stable and might even grow slightly, with some infill housing. Most new development will be residential, with a few small businesses possible. Conversion of farmland on a very modest scale is possible but not likely, and development is not likely in possible flood hazard areas.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table F.6

**Table F.6: Essential Infrastructure and Services**

<b>Major Arterials</b>	Iowa Highway 25	<b>Air Service</b>	Greenfield & Creston Airports
<b>Water Service</b>	SIRWA	<b>Sewer Service</b>	SIRWA
<b>Electric Service</b>	Orient Municipal Utilities	<b>Gas Service</b>	Alliant Energy
<b>Sanitation/Solid Waste</b>	City, local haulers	<b>Landfill</b>	Adair County Landfill
<b>Phone and Internet</b>	Windstream, Coon Valley, Wireless	<b>Law Enforcement</b>	Adair County Sheriff
<b>Fire Service</b>	Orient Fire (volunteer)	<b>Ambulance Service</b>	Adair Co. Health System

## Orient-Macksburg Community Schools

The main campus buildings are located in southeast Orient. All school buildings assets are on one 15-acre campus at 201 S. School Street. The elementary school includes Pre-K through 6th grade and the High School includes 7th grade through 12th grade. The school district includes the towns of Orient in Adair County and Macksburg in Madison County. The district includes portions of Adair, Madison, and Union Counties, with about 100 square miles in Adair County.

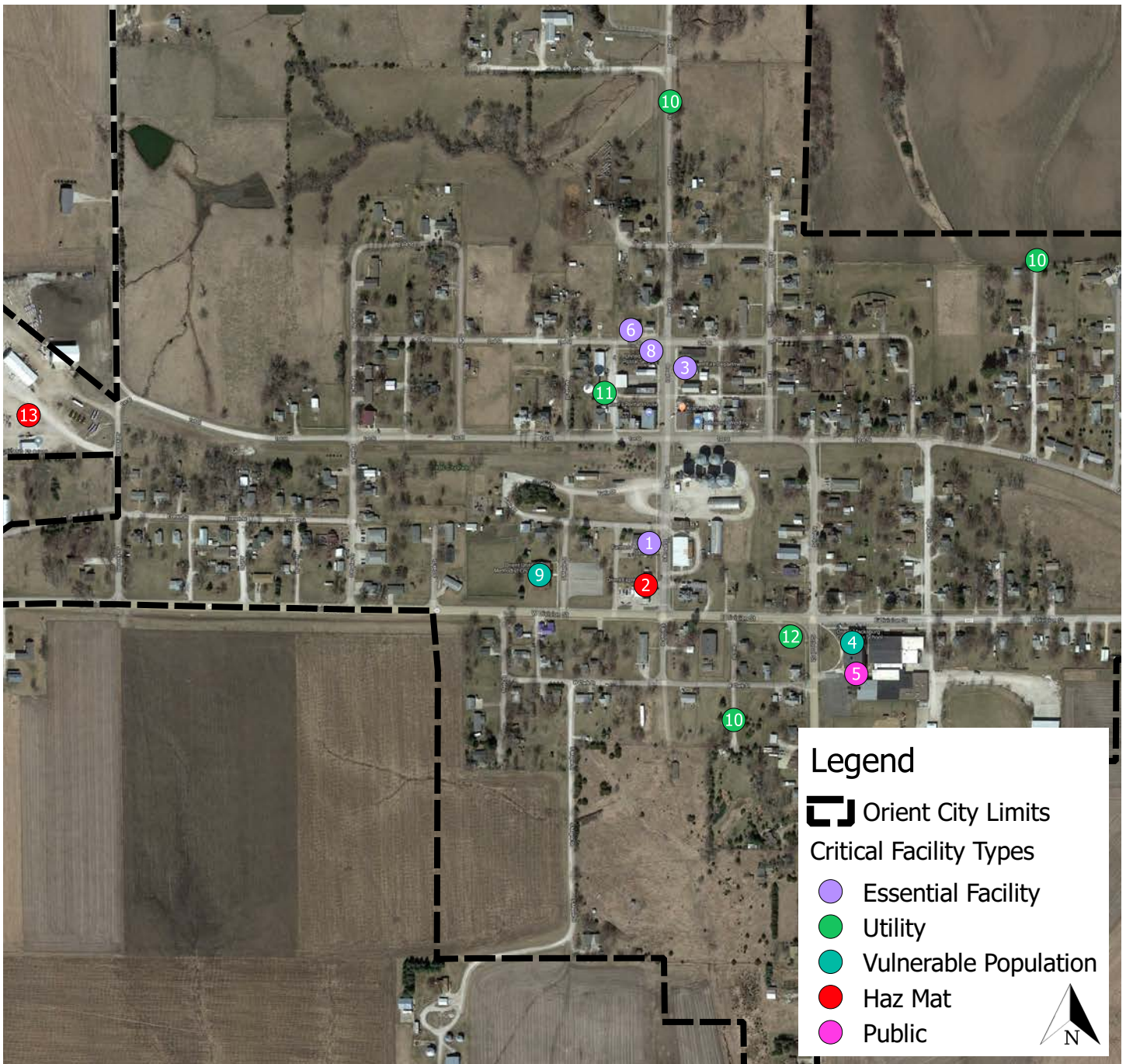
**Table F.7: Orient-Macksburg Enrollment**

<b>School Year</b>	<b>Facility</b>	<b>Enrollment</b>	<b>Facility</b>	<b>Enrollment</b>	<b>Total Enrollment</b>
<b>2018-19</b>	High School	81	Elementary	98	179
<b>2019-20</b>	High School	68	Elementary	93	161
<b>2020-21</b>	High School	73	Elementary	91	164
<b>2021-22</b>	High School	65	Elementary	84	149
<b>2022-23</b>	High School	66	Elementary	84	150

Source: Iowa Department of Education, Bureau of Information and Analysis

Neither the District or its assets are designated as official certified emergency shelters, but they can and have been used during and after emergencies because of the firm building construction, adequate space for housing people, and kitchen facilities. The District does not have fixed or portable emergency generators. Students participate in drills and educational programs related to hazards and the mitigation of them. No District facilities are designated as tornado safe rooms capable of withstanding 250 MPH winds.

Map F.2: City of Orient Critical Facilities



**Table F.8: City of Orient Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Orient City Hall	114 S Broad Street	Essential Facility
2	The HUB	130 S Broad Street	HAZMAT
3	Orient Fire Station	117 N Broad Street	Essential Facility
4	Orient-Macksburg School	201 School Street	Vulnerable Population
5	City Library	201 School Street	Public
6	Orient Maintenance Shop	W 2nd Street	Essential Facility
7	Orient Sewer Lagoons	North end of town	Utilities
8	Orient Post Office	N Broad Street	Essential Facility
9	Orient United Methodist Church	124 S Maple Street	Vulnerable Population
10	Sewer Lift Station	S Ohio Street N Eugene Street N Broad Street	Utility
11	Water Tower	Central Orient	Utility
12	Windstream and Telecom Office	Corner of School and Division Street	Utility
13	Agriland FS Orient	108 Jackson Road	HAZMAT

## Hazard Scores

**Table F.9: City of Orient Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Orient is used for agriculture, and most of that is row crop farming. There have been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city, which had to be removed at a cost to Orient.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Orient has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The water supply through SIRWA has not been threatened during the current drought being experienced in the region.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Orient.
<b>Expansive Soils</b>	Expansive soils are not uncommon in this area, due to high clay content and dramatic changes in soil moisture and temperature. This hazard has the greatest impact on individual properties, especially those not engineered to withstand the hazard. This is a very localized hazard (e.g., individual home) and not a major priority for public response. The downtown has deteriorating buildings that may be subject to this hazard.

<b>Extreme Heat</b>	Extreme heat events continue to impact Orient. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Over time the Orient-Macksburg School has been modernized to be a cooling center that can be opened to the public during summer extreme heat when school is not in session.
<b>Flash Flood</b>	While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Orient sits on the top of a ridge and is fairly flat. Flooding mostly comes in the form of ponding on roads and in yards. Basements have also flooded.
<b>Grass/Wild Land Fire</b>	About a third of the land in the city is used for farmland or timberland. Most of the land surrounding town is the same. In normal conditions, Orient is not at risk. However, during prolonged dry seasons and when it is windy, a wildland fire or controlled burn can turn into a deadly fire and impact the town, even if it starts outside of town.
<b>HAZMAT Incident</b>	The risk is very low for fixed hazardous materials spills. There are many trucks and farm vehicles that travel through town on secondary roads, but the risk is somewhat low of a major spill. The Creston newspaper (Creston News Advertiser, 10/17/23 issue) reported an example of a larger spill. In October 2023, an acetylene tank being pulled by a truck exploded near a few homes and school. Two homes suffered window damage. The road was blocked for 2.5 hours, and a large group of responders had to contain the site and clean the chemicals. No one was injured. According to bystanders, the blast could be felt throughout Orient. Most of the town can be impacted due to this hazard if it were to occur. No part of the town is exempt from its impacts.
<b>Human Disease</b>	Orient is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Orient. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. With the school being a large gathering place, other human disease incidents are sources of concern.
<b>Infrastructure Failure</b>	Infrastructure failure can occur with little or no warning and can cause major damage and disruptions. It is important to prevent these hazards through infrastructure investment and also to have the capacity to respond to them if they occur. Orient has aging homes and properties and several homes have been abandoned. City officials have targeted these through various nuisance regulations and public funds to demolish properties, but need remains. Resources are limited for property owners to make structural improvements. Some utilities are outside of the authority of the city and implement their own measures. The greatest issues impacting Orient are likely aging streets, water, storm water, and sewer systems.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city or in the immediate vicinity of the city.
<b>Radiological</b>	There is no history of this hazard in Orient and no properties (such as medical or dental offices) have equipment that could release radiological materials.
<b>River Flooding</b>	River flooding has not been reported in the city boundary. The most recent FIRM maps adopted in 2017 show no parts of the city in a SFHA.



<b>Severe Winter Storm</b>	Severe winter storms continue to impact Orient. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage.
<b>Terrorism</b>	Orient has no history terrorism. The committee feels this hazard is not very likely but that the community must remain vigilant. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Orient, but most of them do not have major impact to life and property, and only a few storms per year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage. However, two hail events have impacted Orient in the past five to seven years. The most recent was the March 2022 storm system that spawned the EF4 tornado (that eventually killed 6 people in Madison County to the east) after it passed Orient. While in Orient, large hail damaged dozens of homes, cars, and trees. No major injuries were reported.
<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Orient directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the size/area of Orient, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter. The EF4 tornado that damaged Madison County in 2022 started just east of Orient.
<b>Transportation Incident</b>	Speed limits in Orient are relatively low, so any transportation incident is likely going to be isolated in size and damage, and loss of life is unlikely. No airports are within 14 miles of the city. The committee anticipates that this hazard will affect the community in varying degrees but will not have a widespread impact.
<b>Windstorm</b>	Recent windstorms (as recent as 2023) have caused damage to the Orient area, mostly to private properties but also to some utilities. These hazard events continue to build in magnitude.

# Loss Estimates

**Table F.10: City of Orient Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	368
<b>Commercial</b>	15	\$947,017	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	186	\$9,438,387	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table F.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table F.11: City of Orient Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	33
<b>Commercial</b>	1	\$85,231	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	17	\$849,454	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table F.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table F.12: City of Orient Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	92
<b>Commercial</b>	4	\$236,854	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	47	\$2,359,596	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table F.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.












**Table F.13: City of Orient Critical Hazard Impact**

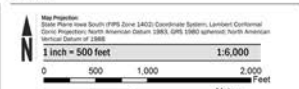
Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	184
<b>Commercial</b>	8	\$473,508	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	93	\$4,719,193	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table F.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

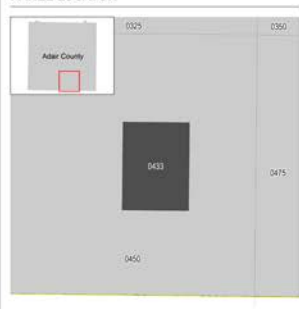
Source: FEMA Flood Map Service Center



		<b>Without Base Flood Elevation (BFE)</b> Zone A, BFD
		<b>With BFE or Depth</b> Zone AE, AH, VE, VE1
<b>SPECIAL FLOOD HAZARD AREAS</b>		<b>Regulatory Floodway</b>
		<b>0.2% Annual Chance Flood Hazard, Area of 1% Annual Chance Flood with average depth less than one foot and with drainage areas of less than one square mile</b> Zone X
		<b>Future Conditions 1% Annual Chance Flood Hazard</b> Zone X
<b>OTHER AREAS OF FLOOD HAZARD</b>		<b>Area with Reduced Flood Risk due to Levees</b> See Note 1
		<b>NO SCREEN</b> Area of Minimal Flood Hazard Zone X
<b>OTHER AREAS</b>		<b>Area of Undetermined Flood Hazard</b> Zone D
<b>GENERAL STRUCTURES</b>		Channel, Culvert, or Storm Sewer Levee, Dike, or Floodwall
		<b>Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)</b>
		<b>Coastal Transect</b>
		<b>Profile Baseline</b>
		<b>Hydrographic Feature</b>
		<b>Base Flood Elevation Line (BFE)</b>
<b>OTHER FEATURES</b>		Limit of Study Jurisdiction Boundary

[illegible]

### PANEL LOCATOR



**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP  
**ADAIR COUNTY, IOWA**  
And Incorporated Areas

PAGE 433 OF 500

COMMUNITY	NUMBER	PANEL	SUFFIX
ADAIR COUNTY	190841	0433	A

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0433A  
EFFECTIVE DATE  
APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table E.14: City of Orient Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt state fire codes					X
Adopt/update and enforce zoning and land use regulations and building codes that regulate construction					X
Annually, train key local leaders about hazard mitigation and review the plan			X		
Business and residential preparedness programs			X		
Conduct study on possible illegal use of sump pumps and sewer lines			X		
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Create continuity of operations & succession plan for jurisdiction					X
Demolish abandoned proprietress			X		
Designate/enforce area HAZMAT transportation routes					X
Develop/maintain security at applicable critical assets					X
Distribute tornado shelter location information					X
Encourage property insurance purchase			X		
Encourage property owners to install sewer system back flow devices			X		
Establish alert systems and specific outreach efforts for vulnerable populations			X		
Formally designate and stock community post-disaster shelters; maintain and publicize shelter location list			X		
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Implement intensive local and regional intelligence, drills, and scenarios			X		
Improve capital communications technology, such as cell towers and fiber cable lines, to better withstand hazards		X			
Improve transportation infrastructure and replace deteriorated infrastructure		X			



Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms					X
Increase production capacity redundant systems and looping (water, sewer, electric, gas)					X
Install quick-connect emergency generator hook-ups for facilities					X
Integrate tornado safe room retrofits into critical assets/facilities					X
Investigate and implement alternative energy sources					X
Involve more groups in hazard mitigation			X		
Make public buildings handicap accessible	X				
Obtain sand and salt supplies well in advance of winter	X				
Promote tree and vegetation maintenance on private properties			X		
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radios and other notification tools available to the public					X
Purchase road closure barricades					X
Purchase snow trucks, plow, and sanders					X
Purchase stand-by portable pumps and generators					X
Purchase/install backup fixed power generators and pumps					X
Repair and weatherize old and/or structurally weak homes					X
Replace deteriorated bridges and culverts					X
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.					X
Retrofit/harden existing overhead utility lines					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# City of Orient Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table F.15: City of Orient Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

**Table F.16: City of Orient Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt state fire codes	Structure Fire, Grass/Wild Land Fire	High	City elected/ admin. officials	Low	Local	Property Protection	Short
Adopt/update and enforce zoning and land use regulations and building codes that regulate construction	Grass/Wild Land Fire, Infrastructure Failure	Mod.	City elected/ admin. officials, SICOG, EMA	Minimal	Local	Prevention	Short
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	Mod.	City elected/ admin. officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Mid
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	Mod.	City elected/ admin. officials, EMA	Minimal	EMA, State, Local, Grants	Prevention	Short
Demolish abandoned proprietress	Windstorm, Structure Failure	High	City elected/ admin. officials	Low	Local, Grants	Prevention, Property Protection	Short
Designate/enforce area HAZMAT transportation routes	HAZMAT Incident, Infrastructure Failure	Low	City elected/ admin. officials	Minimal	Local, IDOT	Property Protection	Short
Develop/maintain security at applicable critical assets	Terrorism, Human Disease	Low	City elected/ admin. officials, Sheriff's Office	Minimal	Local, USDA, State and Federal Grants	Property Protection	Short
Distribute tornado shelter location information	Tornado/Windstorm	Low	City admin. officials, EMA	Minimal	Local, FEMA, Grants	Property Protection, Public Education and Awareness	Long
Encourage property owners to install sewer system back flow devices	Flash Flood, Infrastructure Failure	Mod.	City elected/ admin. officials	Minimal	Local, Sewer Utility Providers, Federal Grants	Property Protection	Long
Establish alert systems and specific outreach efforts for vulnerable populations	Severe Winter Storm, Extreme Heat	Mod.	City, Fire Department, County Officials, Health Agencies	Minimal	In-kind by EMA & CERT, Volunteers	Public Education and Awareness	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	Mod.	County GIS Provider, EMA, SICOG, City	Low	Local, Grants	Emergency Services	Short
Implement intensive local and regional intelligence, drills, and scenarios	Terrorism, HAZMAT Incident	Low	City, EMA, IHSEMD	Minimal	Local, FEMA/ State, USDA, Other Federal Funding, Grants	Public Education and Awareness	Long
Improve capital communications technology, such as cell towers and fiber cable lines, to better withstand hazards	Infrastructure Failure, Terrorism	Mod.	Providers, Zoning Official, County E911, City, Fire Department	Low	Local, FEMA/ State, USDA, Other Federal Funding	Property Protection	Long
Improve transportation infrastructure and replace deteriorated infrastructure	Transportation Incident, Flash Flood	High	City elected/ admin. officials, Engineering Firm	High	Local, RUTF, Iowa DOT, Federal Highway Funding, Bonding, TIF, Special Assessments	Property Protection, Structural Project	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Incorporate stand-alone elements for hazard mitigation into the local comprehensive plan, CIP, strategic plan, or other planning mechanisms	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City/Council, SICOG, EMA	Minimal	Local, FEMA/ State, Grants	Prevention, Public Education and Awareness	Mid
Increase production capacity redundant systems and looping (water, sewer, electric, gas)	Drought, Infrastructure Failure	Mod.	Utility Providers, City	Moderate	Local, Energy/ Utility Providers, USDA, Iowa SRF, CDBG, Bonding, TIF, Federal EDA	Structural Project	Short
Install quick-connect emergency generator hook-ups for facilities	Energy Failure	Mod.	City elected/ admin. officials, Engineering Firm, Fire Department	Low	Local, USDA, Energy and Utility Providers, Property Owners	Emergency Services	Short
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/Windstorm	Mod.	Local Governments, Property Owners	High	FEMA/State, Local	Property Protection, Structural Project	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Investigate and implement alternative energy sources	Infrastructure Failure, Severe Winter Storm	Mod.	City elected/ admin. officials, OMU, Other suppliers	Moderate	Local, State, USDA, Federal Programs, Grants	Emergency Services	Long
Purchase road closure barricades	Transportation Incident, Infrastructure Failure	Mod.	City admin. officials, county/ regional transportation officials	Low	Local, USDA, Grants	Property Protection, Emergency Services	Short
Purchase snow trucks, plow, and sanders	Transportation Incident, Severe Winter Storm	Low	City elected/ admin. officials	Low	Local, USDA, Local and Regional Foundations	Property Protection, Emergency Services	Long
Purchase stand-by portable pumps and generators	Infrastructure Failure, Flash Flood	Mod.	City elected/ admin. officials	Minimal	Local, USDA, CDBG, Grants, Utilit Providers	Property Protection, Emergency Services	Mid
Purchase/install backup fixed power generators and pumps	Energy Failure, Thunderstorm/Lightning/Hail	High	City elected/ admin. officials	Low	Local, FEMA/ State, USDA, CDBG, Iowa SRF Program, Grants, Property Owners	Property Protection, Emergency Services	Short
Repair and weatherize old and/or structurally weak homes	Infrastructure Failure, Severe Winter Storm	Mod.	City elected/ admin. officials, SICOG	Low	SCICAP, USDA, CDBG, Grants	Property Protection	Mid
Require or encourage wind engineering and construction techniques: anchor bolts, interlocking roof shingles, etc.	Tornado/Windstorm, Infrastructure Failure	Mod.	City elected/ admin. officials, Zoning Official	Minimal	Local, State/ FEMA, In-Kind	Property Protection	Long
Retrofit/harden existing overhead utility lines	Infrastructure Failure, Severe Winter Storm	Mod.	Orient Municipal Utilities	High	FEMA/State, Local, Utility Providers, Property Owners, USDA	Property Protection	Long

# Orient-Macksburg Community School District

**Table F.17: Orient-Macksburg Community School District Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	About a third of the land within Orient is used for agriculture, and most of that is row crop farming. There have been no reported agricultural animal/plant/crop diseases within the city in known history. Generally, this hazard has only impacted the city indirectly. The exceptions are tree diseases, most recently the Emerald Ash Borer, which has killed trees in the city, which had to be removed at a cost to Orient.
<b>Drought</b>	Drought occurrences have increased in the past ten years and Orient has been affected. This hazard can cause both direct and indirect issues for the city and its residents. The water supply through SIRWA has not been threatened during the current drought being experienced in the region.
<b>Earthquake</b>	There have been no instances of damaging earthquakes in the City of Orient.
<b>Expansive Soils</b>	This hazard has had no major impact on the school building, parking areas, or other assets. As buildings age, this hazard could become more prevalent.
<b>Extreme Heat</b>	Extreme heat events continue to impact Orient. Education may be one of the best action tools to combat this hazard's impact on the human body. Given current conditions and resources available, there is no risk of widespread losses due to this hazard, although power lines and other infrastructure can be damaged or can break. Over time the Orient-Macksburg School has been modernized to be a cooling center that can be opened to the public during summer extreme heat when school is not in session.
<b>Flash Flood</b>	While flash flooding can occur and has occurred, the greatest risk is very localized, such as ponding on a street, in a yard, or in a basement. No widespread damage has occurred, and none is likely. Orient sits on the top of a ridge and is fairly flat. Flooding mostly comes in the form of ponding on roads and in yards. Basements have also flooded.
<b>Grass/Wild Land Fire</b>	Grass and wildland areas are east and south of the school. If a fire starts in that area, it can impact school property. There is no history of grass/wildland fire.
<b>HAZMAT Incident</b>	The risk is very low for fixed hazardous materials spills. There are many trucks and farm vehicles that travel through town on secondary roads, but the risk is somewhat low of a major spill. The Creston newspaper (Creston News Advertiser, 10/17/23 issue) reported an example of a larger spill. In October 2023, an acetylene tank being pulled by a truck exploded near a few homes and school. Two homes suffered window damage. The road was blocked for 2.5 hours, and a large group of responders had to contain the site and clean the chemicals. No one was injured. According to bystanders, the blast could be felt throughout Orient. Most of the town can be impacted due to this hazard if it were to occur. No part of the town is exempt from its impacts.
<b>Human Disease</b>	Orient is still feeling the effects of COVID-19. While things seem to be returned to normal, the economy has changed to the detriment of Orient. The pandemic has reignited the need to plan for future outbreaks and review current practices. The pandemic also reminded the public of the need to remain informed and vigilant. With the school being a large gathering place, other human disease incidents are sources of concern.

<b>Infrastructure Failure</b>	The school is aging and at a greater risk of failure. However, overall, the school is strongly built and well maintained. The chance of major failure is low. Utilities serving the school are also at risk, which affects the school's operation.
<b>Levee/Dam Failure</b>	There are no dams or levees in the city or in the immediate vicinity of the city.
<b>Radiological</b>	There is no history of this hazard in Orient and no properties (such as medical or dental offices) have equipment that could release radiological materials.
<b>River Flooding</b>	River flooding has not been reported in the city boundary. The most recent FIRM maps adopted in 2017 show no parts of the city in a SFHA.
<b>Severe Winter Storm</b>	Severe winter storms continue to impact Orient. While meteorological advances can warn people in advance, there is always a segment of the population caught in a storm. Heavy snow and the winds associated with storms can cause tremendous damage. Severe cold can cause fatalities. Thawing pipes and roadways can crack, break, and fail, causing considerable damage.
<b>Terrorism</b>	Orient has no history terrorism. The committee feels this hazard is not very likely but that the community must remain vigilant. The committee feels that any incident would be very targeted and would not likely have a communitywide impact.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm, lighting, and hail events are common in Orient, but most of them do not have major impact to life and property, and only a few storms per year would be considered severe. A single building may be damaged by lighting and power may be disrupted in parts of town for a few minutes to a few hours. The school has received little damage from these events. Hail can damage buildings and property throughout the city, which has occurred. Strong thunderstorm winds also damage property. Rarely will a non-tornadic storm cause serious widespread damage. However, two hail events have impacted Orient in the past five to seven years. The most recent was the March 2022 storm system that spawned the EF4 tornado (that eventually killed 6 people in Madison County to the east) after it passed Orient. While in Orient, large hail damaged dozens of homes, cars, and trees. No major injuries were reported.
<b>Tornado</b>	While tornadoes have touched down in the county, there is no report of past tornadoes damaging Orient directly. Although the city has been spared major tornado damage, vigilance is important, as there is no way to know where one will occur. Based on the size/area of Orient, the chances are low in any given year. Meteorological warnings have improved, but storms can still spawn tornadoes with no notice. It is vital that the public is prepared for this hazard and that there are places for people to shelter. The EF4 tornado that damaged Madison County in 2022 started just east of Orient.
<b>Transportation Incident</b>	Risk to school property is low and damage due to crashes on school grounds is likely to be modest, due to slow speeds and adequate signage. Children crossing the street can be hit if people are not paying attention. Rural bus routes pose greater risk, especially during winter weather.
<b>Windstorm</b>	Recent windstorms (as recent as 2023) have caused damage to the Orient area, mostly to private properties but also to some utilities. The school has received little damage from these events. These hazard events continue to build in magnitude.



# Status of Previous Mitigation Actions

**Table F.18: Orient-Macksburg Community School District Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Adopt state fire codes	X				
Annually, train key local leaders about hazard mitigation and review the plan			X		
Business and residential preparedness programs			X		
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.					X
Create continuity of operations & succession plan for jurisdiction			X		
Develop/maintain security at applicable critical assets					X
Educate the public about the interconnected efforts needed to prevent and control infectious diseases and their role in protecting health			X		
Establish backup communication center or facilities					X
Full review of policy, procedure, and codes to include mitigation					X
Help community leaders and businesses to improve local human disease response readiness			X		
Implement a comprehensive multi-media public education campaign for multiple hazards			X		
Implement GIS mapping system and utilize digital hazard maps					X
Improve capital communications technology, such as cell towers and fiber cable lines to better withstand hazards	X				
Increase community and individual engagement in disease prevention efforts			X		
Install air monitors					X
Install quick-connect emergency generator hook-ups for facilities					X
Install sprinkler systems in public buildings					X
Integrate tornado safe room retrofits into critical assets/facilities					X

	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Investigate and implement alternative energy sources					X
Involve more groups in hazard mitigation			X		
Provide more NOAA weather radios to the public if more grant funds can be obtained and promote the use of weather radios and other notification tools available to the public					X
Provide safe room education for builders and developers					X
Purchase/install backup fixed power generators and pumps					X
Reduce disease transmitted by animals and insects and food borne infections					X
Retrofit/harden existing overhead utility lines					X
To the extent possible, collaborate and coordinate processes to strengthen interagency cooperation as a means to enhance collaborative planning and response			X		

# Orient-Macksburg Community School District Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table F.19: Orient-Macksburg Community School District Action Plan**

<b>Goal 1</b>	<b>Reduce the extent of fatalities and injuries due to hazards</b>
Objective 1	Improve warning capabilities against hazards.
Objective 2	Increase efforts to educate the public about hazards.
Objective 3	Implement structural and property improvement projects that will result in protection of life and safety.
<b>Goal 2</b>	<b>Ensure local government/other entities can continue to operate during and after a hazard event.</b>
Objective 1	Provide backup or redundancy systems for critical infrastructure and assets.
Objective 2	Improve local planning and organizational efficiency and gain understanding into mitigation needs.
<b>Goal 3</b>	<b>Be as efficient as possible with public funds.</b>
Objective 1	Become and remain compliant with state and federal mitigation requirements and programs.
Objective 2	Enhance and improve relations and communications with partner agencies.
Objective 3	Maximize the use of technology in hazard mitigation.
<b>Goal 4</b>	<b>Protect public property from hazards.</b>
Objective 1	Improve infrastructure and critical facilities.
Objective 2	Set aside funding for mitigation projects and apply for mitigation funds.
<b>Goal 5</b>	<b>Protect private property from hazards.</b>
Objective 1	Engage to a much greater level the private sector to address hazard mitigation.
Objective 2	Improve local codes and laws to ensure mitigation is considered in development and land use.

**Table F.20: Orient-Macksburg Community School District Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Construct public safe rooms in or near existing and future community assets and parks, schools, etc.	Tornado	High	School elected/admin officials, EMA, SICOG	High	FEMA, State, Local	Structural Project	Short
Create continuity of operations & succession plan for jurisdiction	Tornado, Terrorism	Mod.	School elected/admin officials, EMA	Minimal	EMA, State, Local, Grants	Prevention	Short
Develop/maintain security at applicable critical assets	Terrorism, Human Disease	Mod.	School elected officials, Staff	Minimal	Local, USDA, State and Federal Grants	Property Protection	Long
Establish backup communication center or facilities	All	Mod.	School elected/admin officials, EMA, County E911, Emergency Response Officials	Moderate	Local, State/FEMA, USDA, DHS	Emergency Services	Mid
Full review of policy, procedure, and codes to include mitigation	All	Mod.	School Board, EMA, IHSEMD	Minimal	Local, Red Cross, FEMA/State, Local Foundations	Prevention	Mid
Help community leaders and businesses to improve local human disease response readiness	Human Disease, Most Others	Mod.	School, EMA, State Education Agencies, Public Health	Minimal	Local, FEMA/State, CDC, IDPH, Grants	Public Education and Awareness	Mid
Implement GIS mapping system and utilize digital hazard maps	Infrastructure Failure, River Flooding	High	County GIS Provider, EMA, SICOG, School	Low	Local, Grants	Emergency Services	Short
Increase community and individual engagement in disease prevention efforts	Human Disease	Mod.	School, EMA, State Education Agencies, Public Health	Minimal	Local, FEMA/State, Grants	Public Education and Awareness	Mid
Install air monitors	Terrorism, HAZMAT Incident	Low	School elected officials, Staff	Low	Local, State and Federal Grants, Private Grants	Property Protection	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Install quick-connect emergency generator hook-ups for facilities	Energy Failure	High	School elected/ admin officials, Engineering Firm	Low	Local, USDA, Energy and Utility Providers, Property Owners	Emergency Services	Short
Install sprinkler systems in public buildings	Infrastructure Failure, HAZMAT Incident	High	School elected officials, Staff	Moderate	Building Owners, State/Federal grants, Local grants	Property Protection	Long
Integrate tornado safe room retrofits into critical assets/facilities	Tornado/ Windstorm	High	School officials	High	FEMA/State, Local	Property Protection, Structural Project	Long
Investigate and implement alternative energy sources	Infrastructure Failure, Severe Winter Storm	Low	School elected officials, Staff, Local Utility Providers	Moderate	Local, State, USDA, Federal Programs, Grants	Emergency Services	Long
Purchase/install backup fixed power generators and pumps	Energy Failure, Thunderstorm/ Lightning/Hail	High	School elected/ admin officials	Low	Local, FEMA/ State, USDA, CDBG, Iowa SRF Program, Grants, Property Owners	Property Protection, Emergency Services	Short
Retrofit/harden existing overhead utility lines	Infrastructure Failure, Severe Winter Storm	High	Utility provider	High	FEMA/State, Local, Utility Providers, Property Owners, USDA	Property Protection	Long



# Incorporation into Other Planning Mechanisms-

## City of Orient

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Where possible, Greenfield will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Building Code
- Zoning Ordinance

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Floodplain Regulations
- Comprehensive Plan
- Strategic Plan
- Housing Needs Assessment

# Incorporation into Other Planning Mechanisms-

## Orient-Macksburg Community School District

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The update of the mitigation strategy will be provided to the School Superintendent for consideration in the next update cycle of the capital improvement plan.







# Appendix G: Rural Guthrie County

## Hazard Scores

**Table G.1: Rural Guthrie County Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	Rural Guthrie County is predominately agricultural land. While this land use represents the majority, there have been limited reported losses from animal/plant/crop disease throughout the county in general. Some specialized industries, like the bird farmers have had large impacts due to the bird flu that has impacted large portions of the bird populations. The Ash Borer has caused a large amount of trees to become diseased and die, causing the county conservation to begin to cut these trees down and will need to replace them in the future.
<b>Drought</b>	Drought occurrences have increased across the state, and Guthrie County has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the county and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in Guthrie County, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in Guthrie County, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact Guthrie County. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, one instance of flash flooding in Guthrie County was reported in Jamaica. While flash floods have little to no warning time, with no instances within the last planning period, the committee has determined this hazard is not a high priority hazard to address, but will consider mitigation actions to prepare the county for response to an event.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand. This hazard can pose a large threat to the county as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control in a matter of minutes and can pose a threat to life.



<b>HAZMAT Incident</b>	Guthrie County reported fifteen hazardous spills within the last reporting period. Nine of the spills posed no threat to humans or the environment. There were three reported spills that threatened the soil, two that posed threats to the soil and groundwater and one spill that threatened people, soil, surface water, and groundwater. With this many instances within five years, the committee feels that this hazard poses a threat to the county and mitigation actions should be strongly considered and implemented to prevent any further instances.
<b>Human Disease</b>	Iowa and more specifically Guthrie County are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the county's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the county to protect lives and property. The most likely infrastructure failure within Guthrie County would be structural failure of either bridges or roadways. As these instances have no warning time, planning must be completed prior to an event happening to be able to respond in a quick manner.
<b>Levee/Dam Failure</b>	Of the fifty-six Guthrie dams in the inventory, six are considered to be significant hazard dams. The dams that are classified as significant are located near Guthrie County's two large lakes, Lake Panorama and Diamondhead Lake. There have been no known occurrences of dam failure in Guthrie County. Sound design, quality construction, and continued inspections and repairs reduce the probability of dam failure. While there have been no instances of failure in the past, with the age and classifications of the dams in the county, this hazard should be high priority.
<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Guthrie County, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the county as a whole.
<b>River Flooding</b>	Large portions of Guthrie County are located within flood zones. While there is a large amount of land in the flood zones, the only flooding instance since 2018 was recorded in Bagley and no damage was reported. While there have been limited instances of river flooding in the last reporting period, it is important that the County stay vigilant and plan for river flooding instances.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact Guthrie County. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within Guthrie County. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the county.
<b>Terrorism</b>	There have been no instances of terrorism in Guthrie County during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the county. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in the county but is normally not severe in nature.

<b>Tornado</b>	Guthrie County has experienced a number of tornadoes in the recent past. While damage from these tornadoes was limited, it is important for the county to continue to plan for the response to tornadoes as storms within Iowa continue to grow in strength. Preparing the public and county is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits on the majority of Guthrie County's paved roads is set to 55 miles per hour and traffic incidents at these speeds can cause damage to property and life. The committee anticipates that this hazard will effect the county in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Guthrie County prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table G.2: Rural Guthrie County Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1,366	\$16,039,600	4,306
<b>Commercial</b>	66	\$13,462,943	
<b>Industrial</b>	5	\$22,447,824	
<b>Residential</b>	1,929	\$321,447,824	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire county,, the numbers in table G.2 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table G.3: Rural Guthrie County Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	342	\$4,009,900	1,077
<b>Commercial</b>	17	\$3,365,735	
<b>Industrial</b>	2	\$5,611,956	
<b>Residential</b>	482	\$80,361,956	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table G.3. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the county would be impacted.

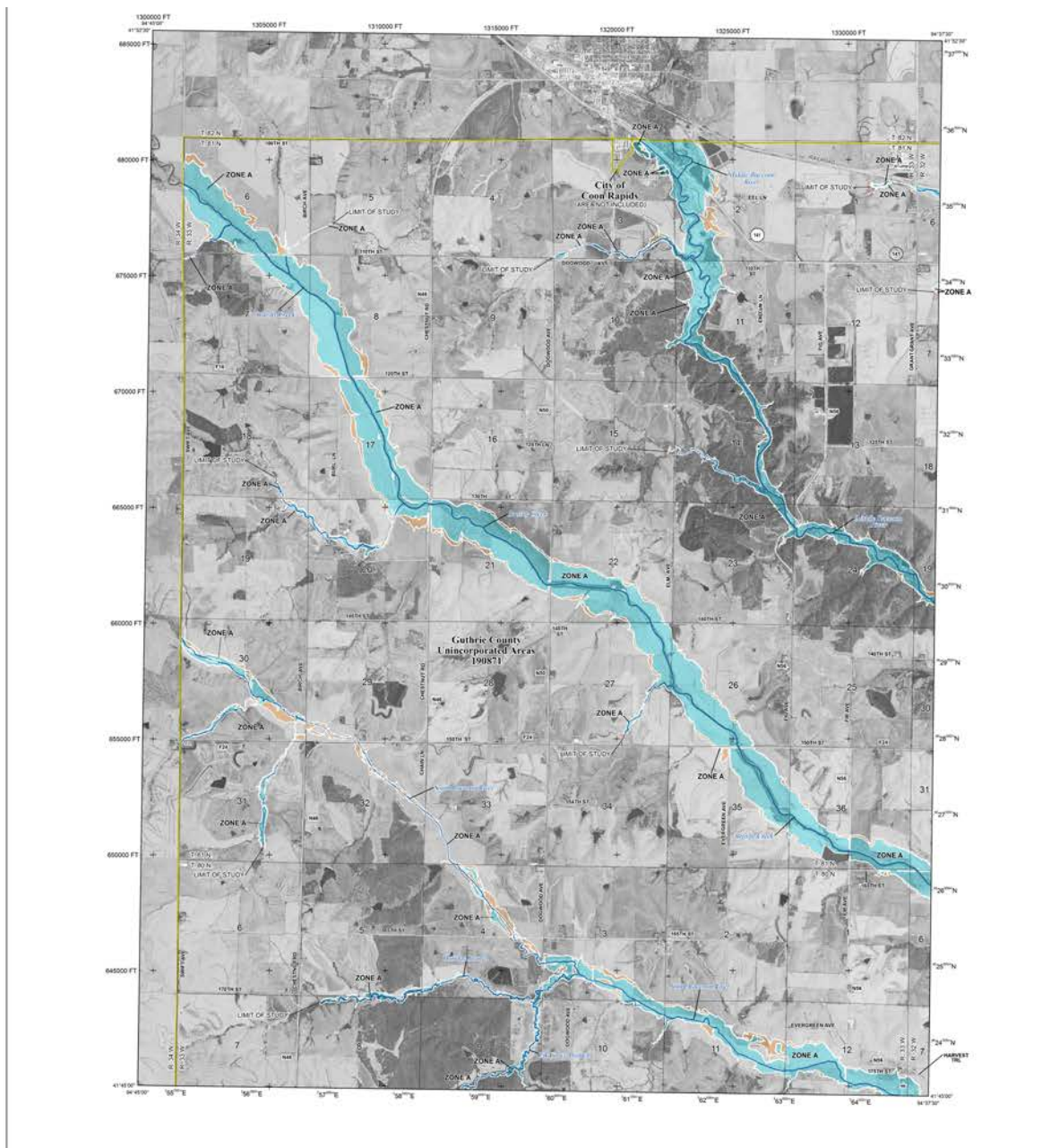
**Table G.4: Rural Guthrie County Critical Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	683	\$8,019,800	2,153
<b>Commercial</b>	33	\$6,731,471	
<b>Industrial</b>	3	\$11,223,912	
<b>Residential</b>	965	\$160,723,912	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table G.4.. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the county would be impacted.

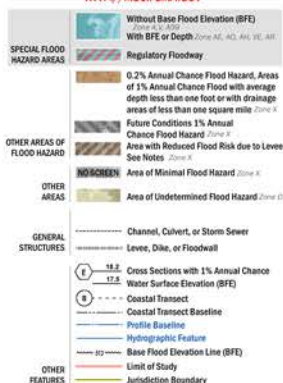
# Flood Maps

Source: FEMA Flood Map Service Center



## FLOOD HAZARD INFORMATION

SEE US REPORT FOR DETAILED LEGEND AND PANEL MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)



## NOTES TO USERS

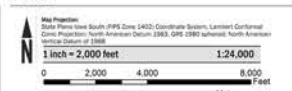
For information and questions about this map, available products, associated with this FIRM including  
historic versions of this FIRM, how to order products or the National Flood Insurance Program or  
general information on the FIRM Map Information Center, call 1-800-424-6463 or visit the  
FEMA Map Service Center website at [msc.fema.gov](http://msc.fema.gov). Available products may include previously  
issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of the map. Many  
of these products can be ordered or obtained directly from the website. Users may determine the current  
map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA  
Map Information Exchange.

Communities entering land in adjacent FIRM panels must obtain a current copy of the adjacent panel as  
well as the current FIRM data. These may be obtained directly from the Map Service Center or the number  
listed above.

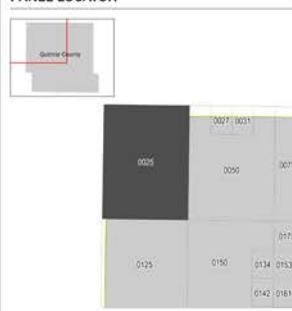
For community and countywide map data refer to the Flood Insurance Study report for the jurisdiction.  
To determine if flood insurance is available in this community, contact your insurance agent or call the  
National Flood Insurance Program at 1-800-424-6463.

Base map information shown on this FIRM was provided in digital format by the Department of Natural  
Resources. This information was derived from digital photography at a 2 foot ground resolution from  
imagery taken in April 2008.

## SCALE



## PANEL LOCATOR



**National Flood Insurance Program**

**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 25 OF 325

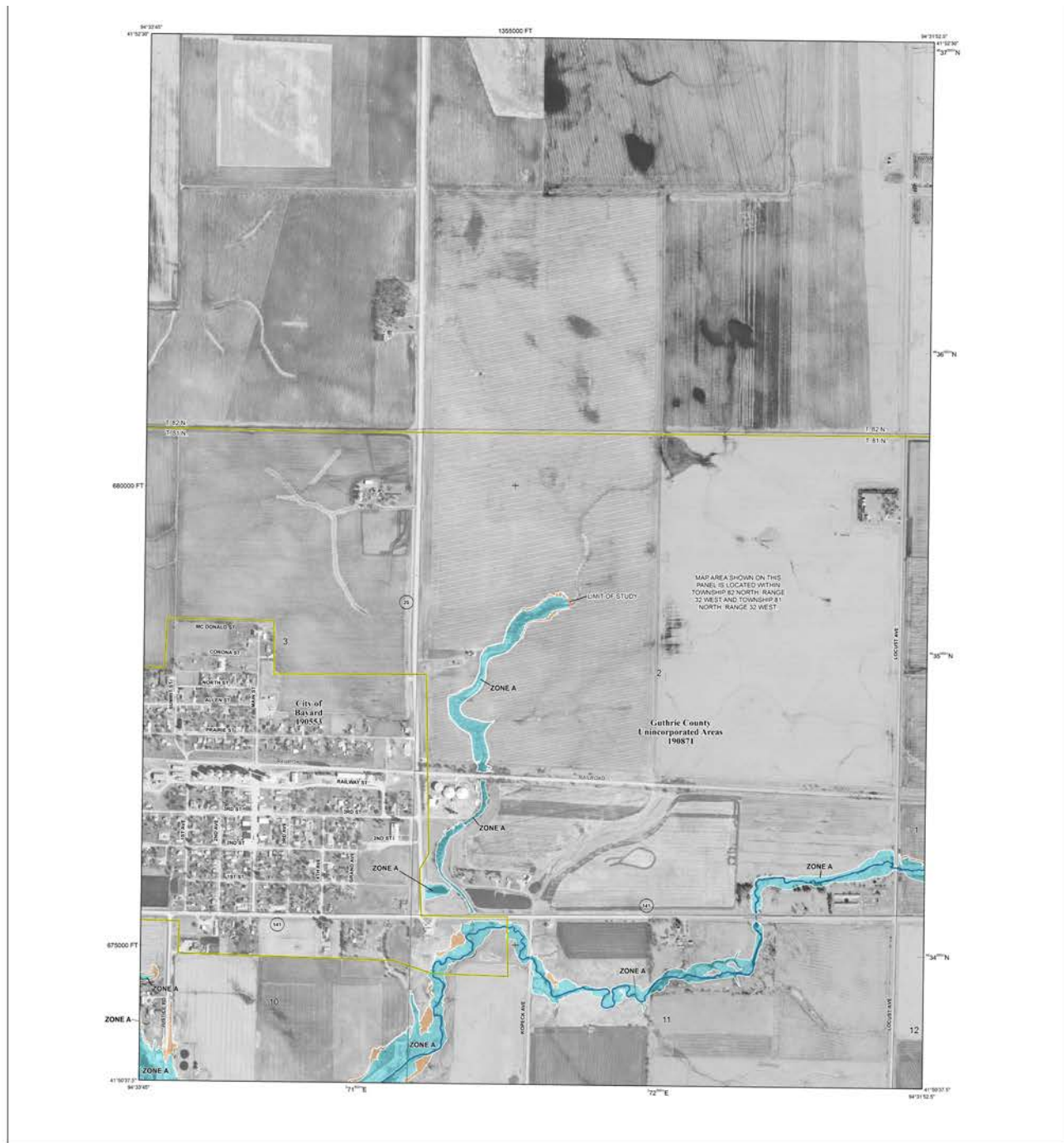
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COMMUNITY: GUTHRIE COUNTY  
NUMBER: 19077  
PANEL: 0025  
SUFFIX: 0

VERSION NUMBER:  
2.3.3.0  
MAP NUMBER:  
19077C00250  
EFFECTIVE DATE:  
APRIL 5, 2017









## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, or for FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mfc.fema.gov>. Available products may include previously issued editions of the FIRM Map Information Exchange at 1:50,000 scale (1:50,000) or 1:100,000 scale. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information Exchange.

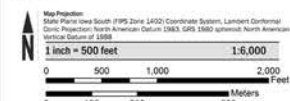
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

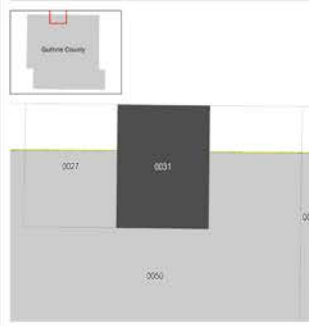
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

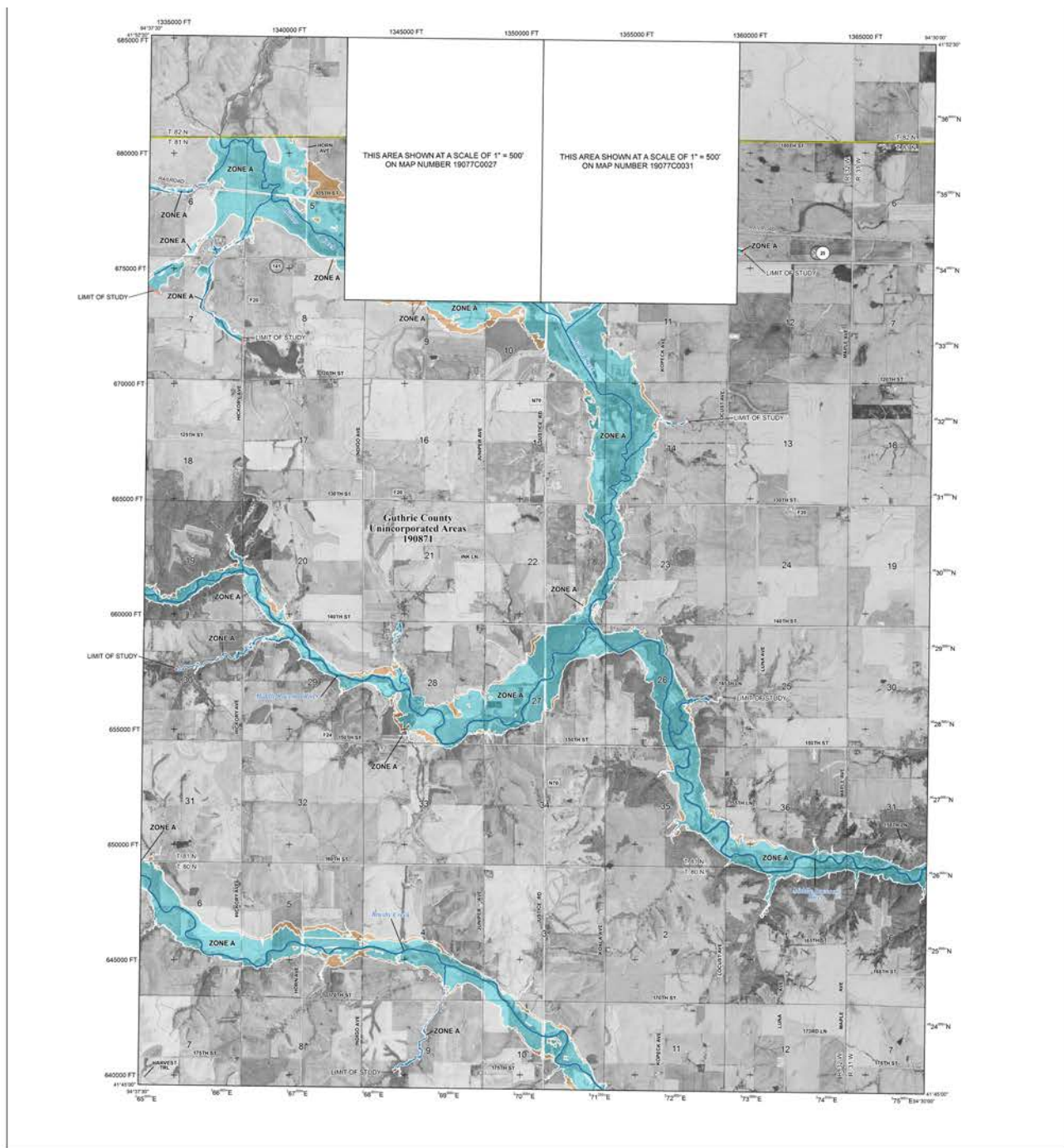
GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 31 OF 325



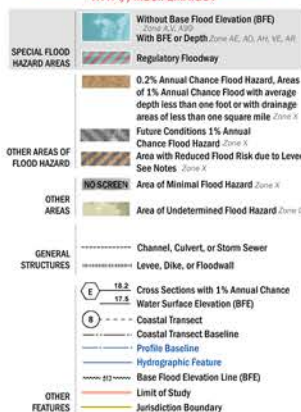
COMMUNITY	NUMBER	PANEL	SUFFIX
BAVARD, CITY OF GUTHRIE COUNTY	190553	0031	D
	190871	0031	D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700031D  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA, how to order products or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously unissued editions of the FEMA Map Information eXchange (FIRM) and/or other digital versions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information eXchange.

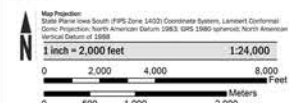
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

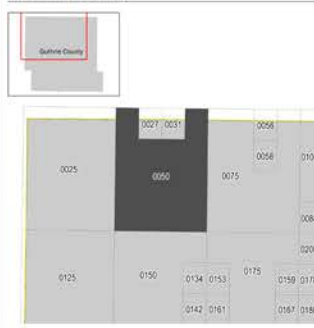
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 50 of 325

Community: GUTHRIE COUNTY

Number: 190871

Panel: 0050

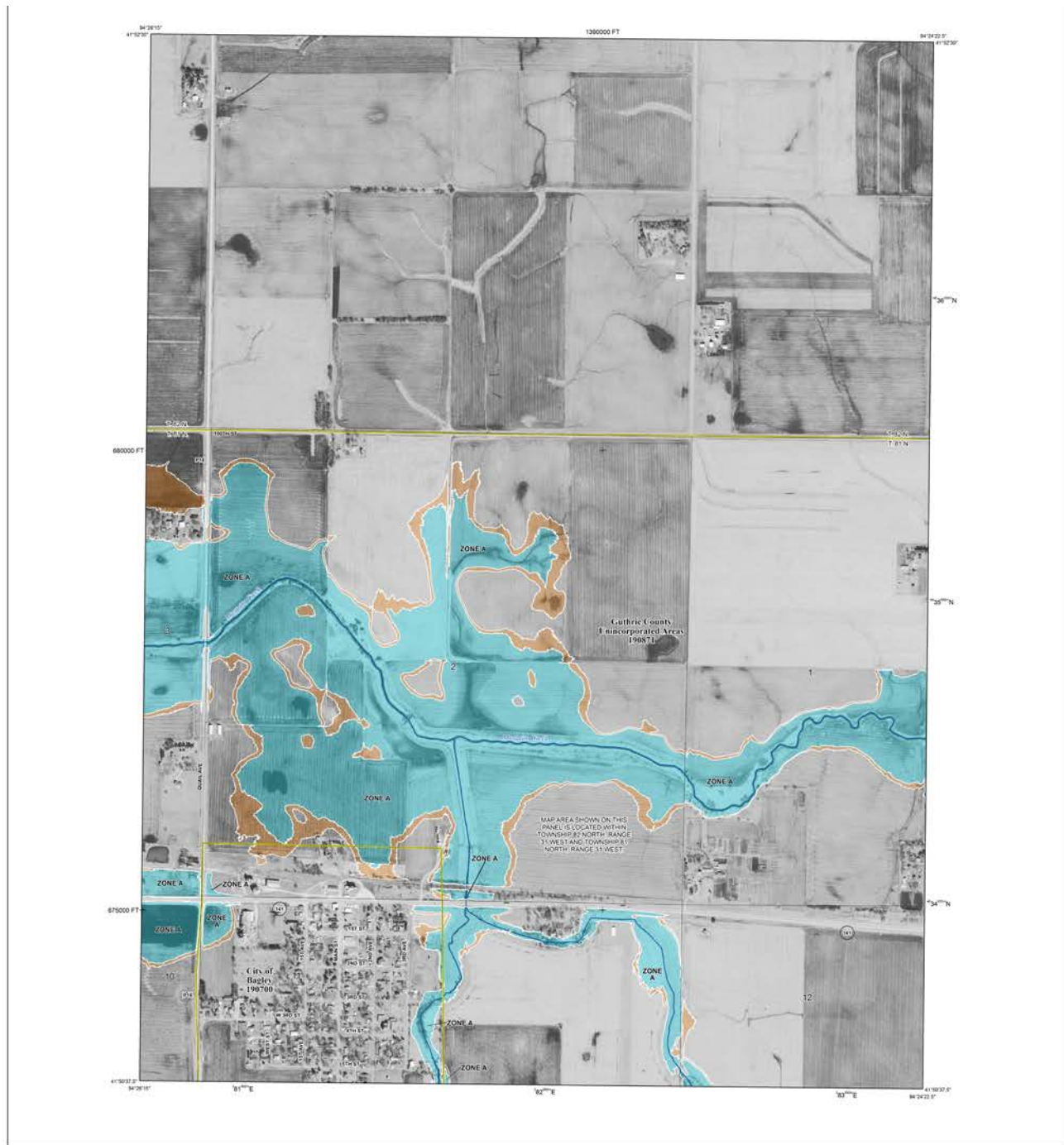
Suffix: D

Version: 2.3.3.0

Map Number: 19077C00050D

Effective Date: APRIL 5, 2017





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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, B, C, D
	With BFE or Depth Zone A, B, C, D, AE, AH, VE, VE-AR
OTHER AREAS OF FLOOD HAZARD	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	Coastal Transect Baseline
OTHER FEATURES	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

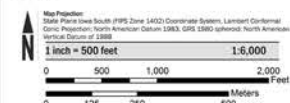
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

Panel 56 of 325



COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE CITY OF GUTHRIE COUNTY	190700	0056	B

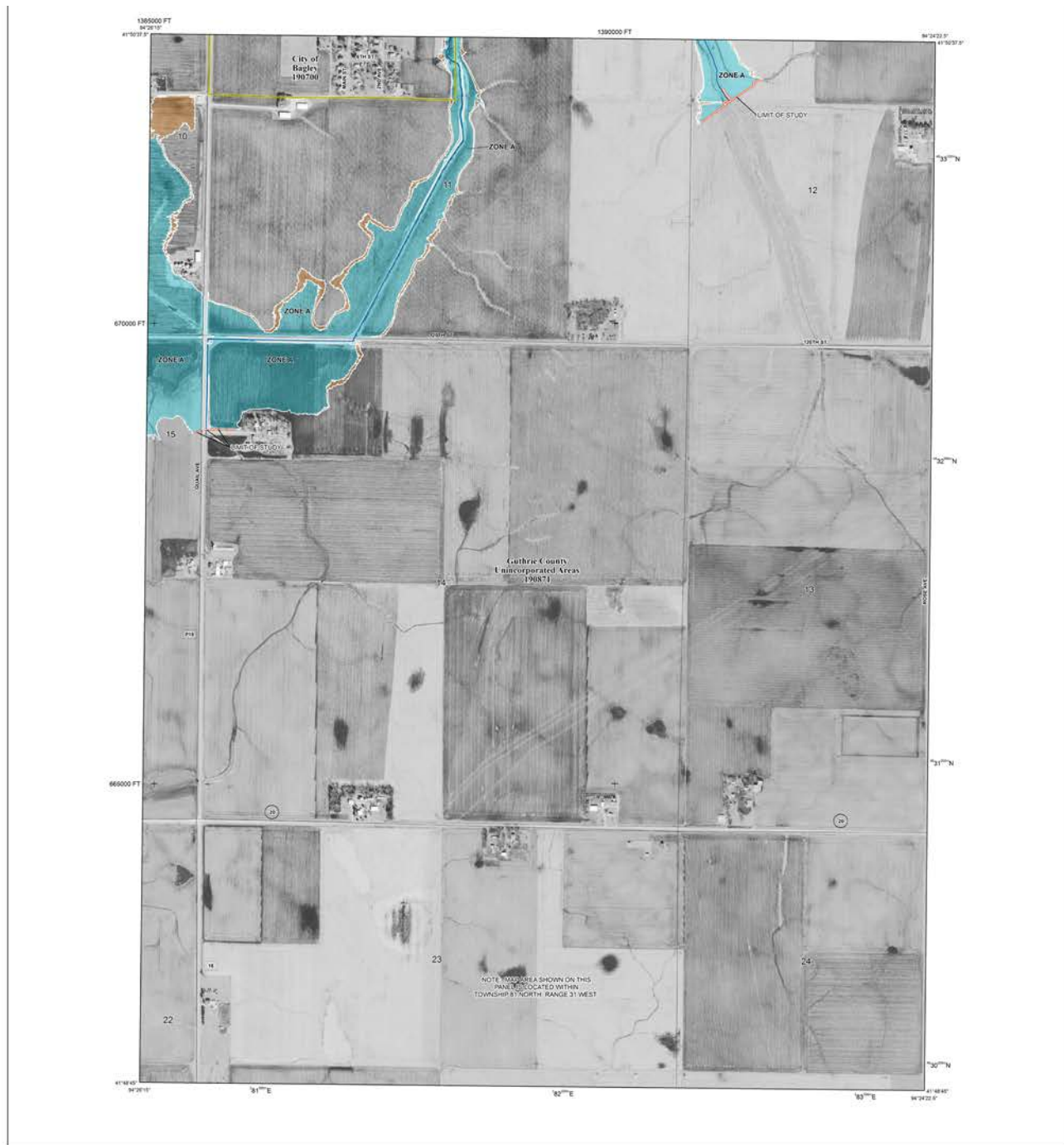
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190700 0056 B

VERSION NUMBER  
2.3.3.0

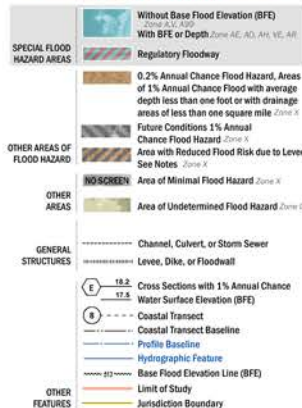
MAP NUMBER  
1907700056D

EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

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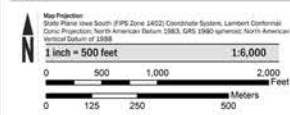
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

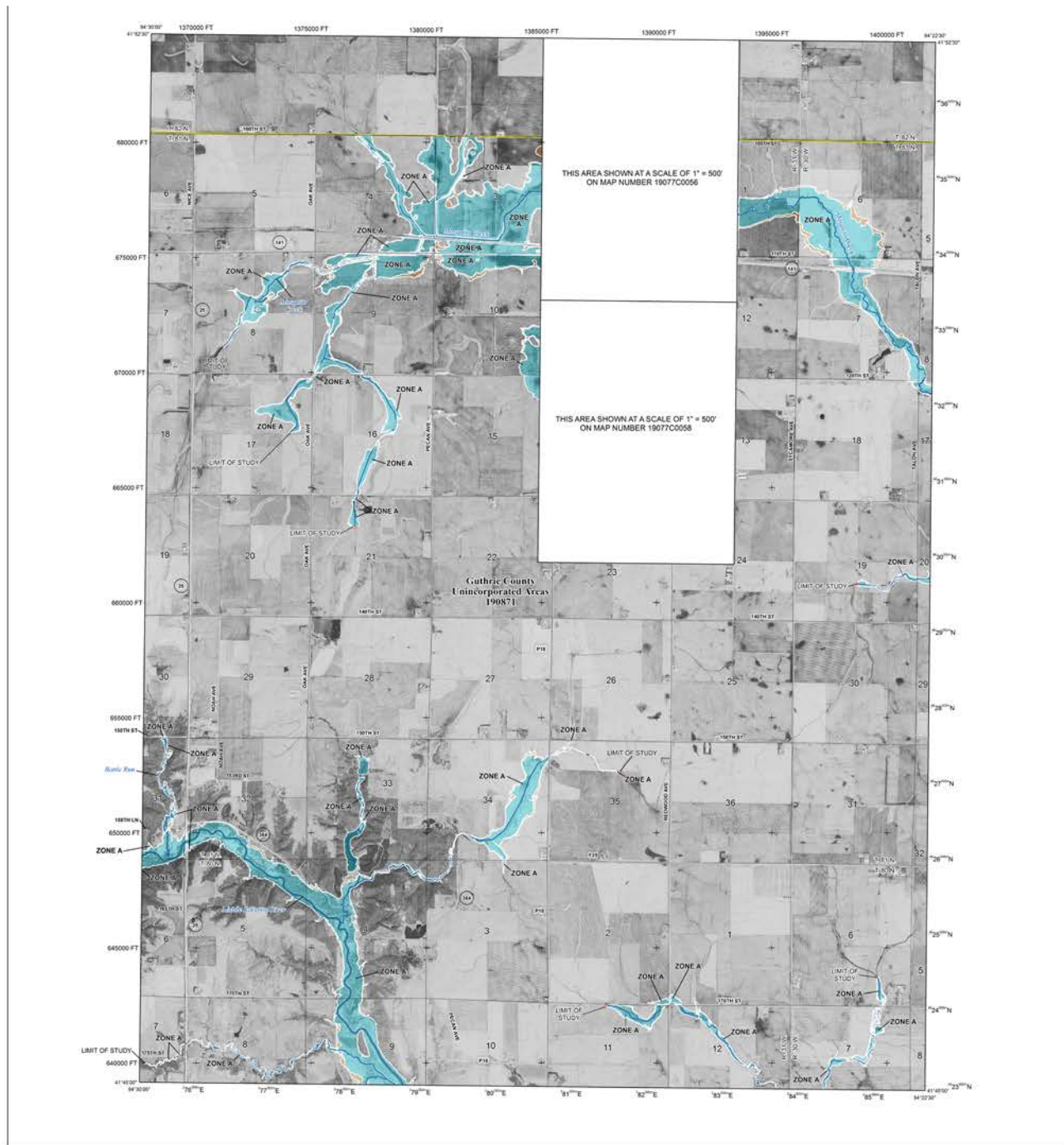
Panel 58 of 325



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
BAGLEY CITY OF 190700 0058 D  
GUTHRIE COUNTY 190871 0056 D

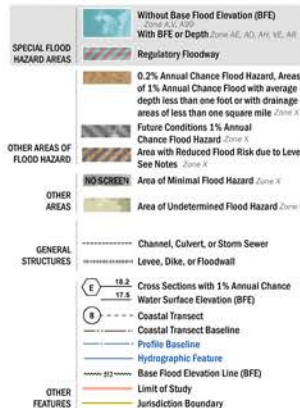
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700058D  
EFFECTIVE DATE  
APRIL 5, 2017





#### FLOOD HAZARD INFORMATION

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#### NOTES TO USERS

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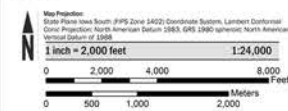
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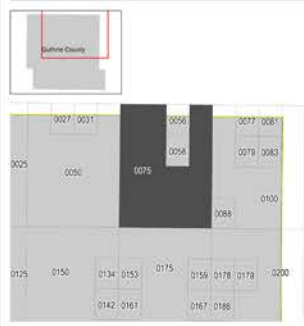
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#### SCALE



#### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

Panel 75 of 325



Panel Contents:

COMMUNITY: GUTHRIE COUNTY

NUMBER: 190871

PANEL: 0075

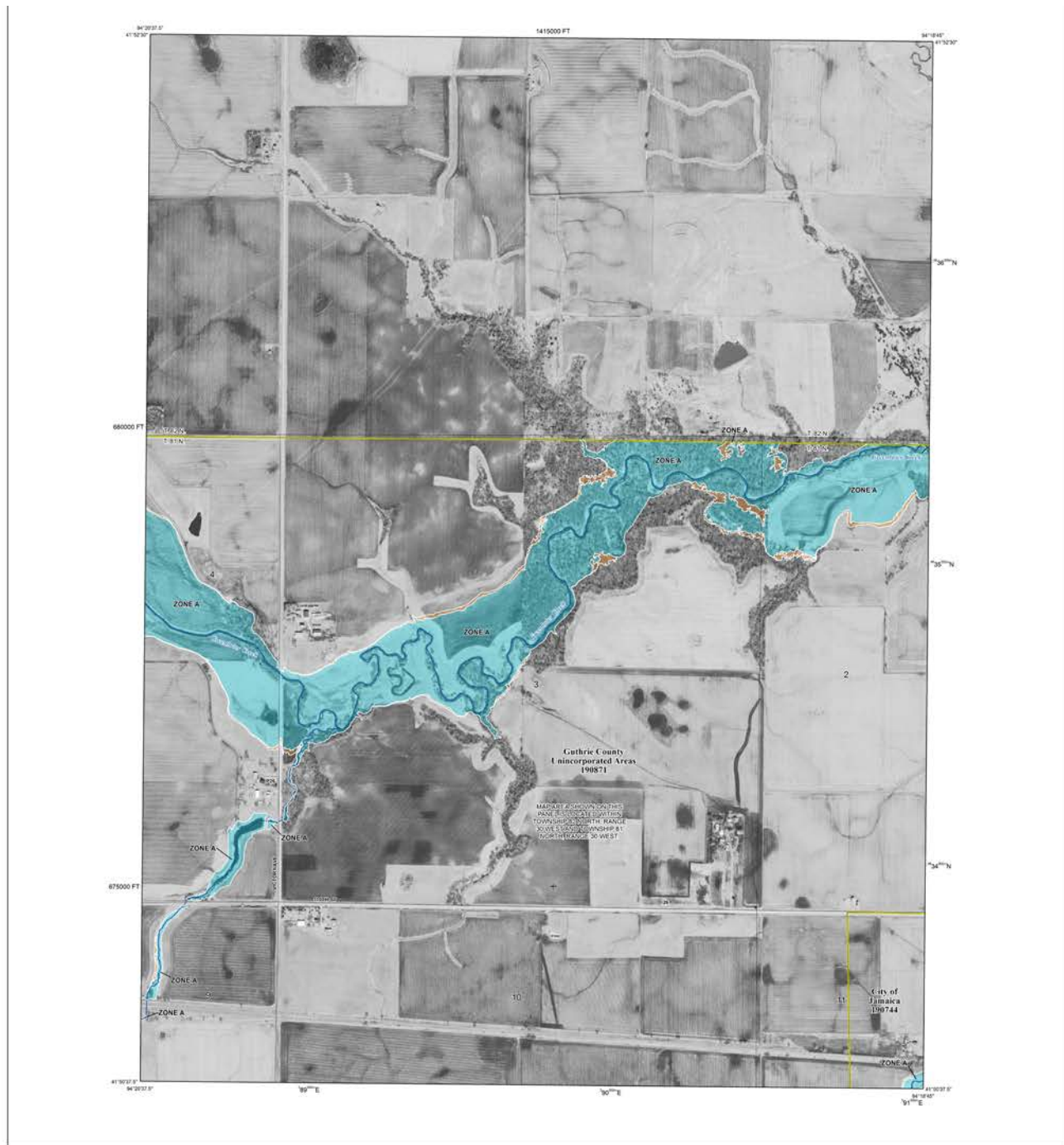
SUFFIX: D

VERSION NUMBER: 2.3.0

MAP NUMBER: 19077C00750

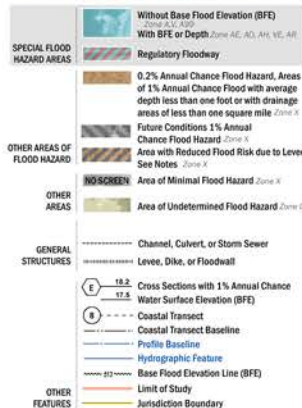
EFFECTIVE DATE: APRIL 5, 2017





## FLOOD HAZARD INFORMATION

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## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-8080 or visit the FEMA Map Information Exchange at <http://mief.fema.gov>. Available products may include previously issued editions of the FIRM, Flood Insurance Study Report, and digital versions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

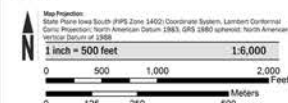
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

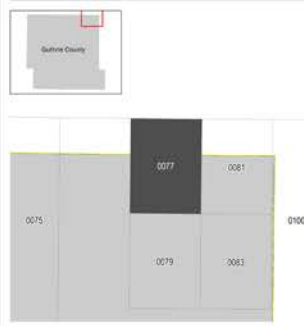
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

And Incorporated Areas

PANEL 77 of 325

Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX

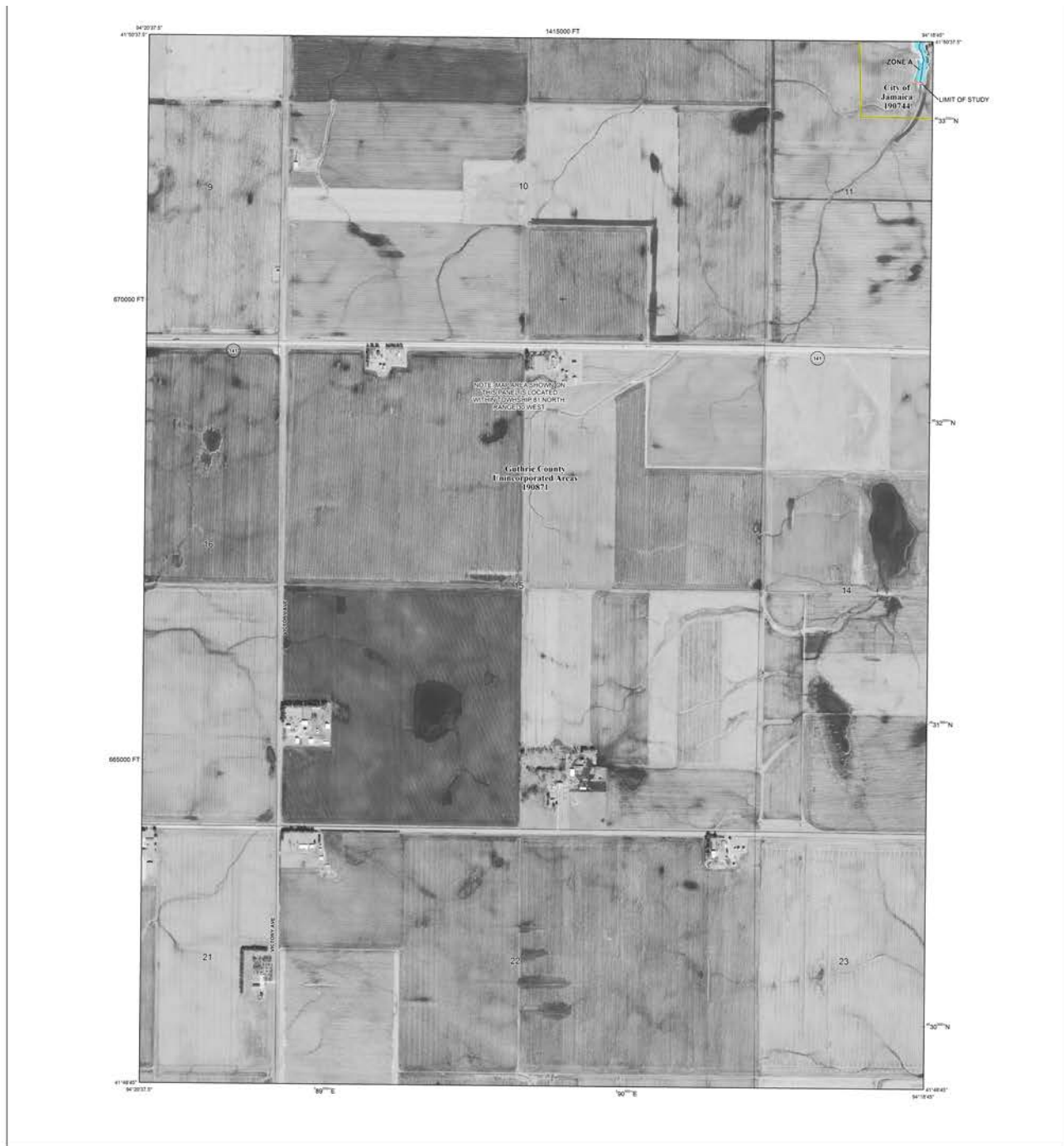
GUTHRIE COUNTY 190871 0077 B D

JEWELL CITY OF 190744 0077 B D

Version 2.3.3.0

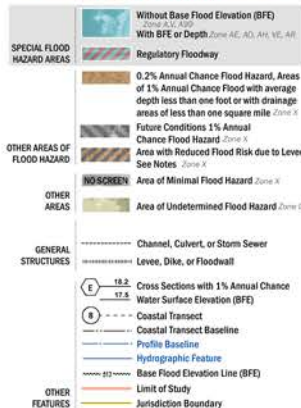
MAP NUMBER 19077C0077D

EFFECTIVE DATE APRIL 5, 2017



## FLOOD HAZARD INFORMATION

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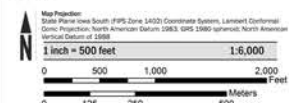
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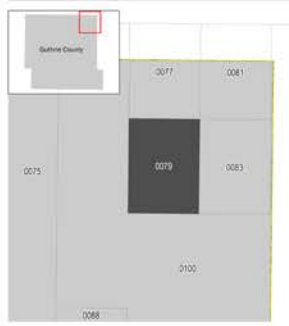
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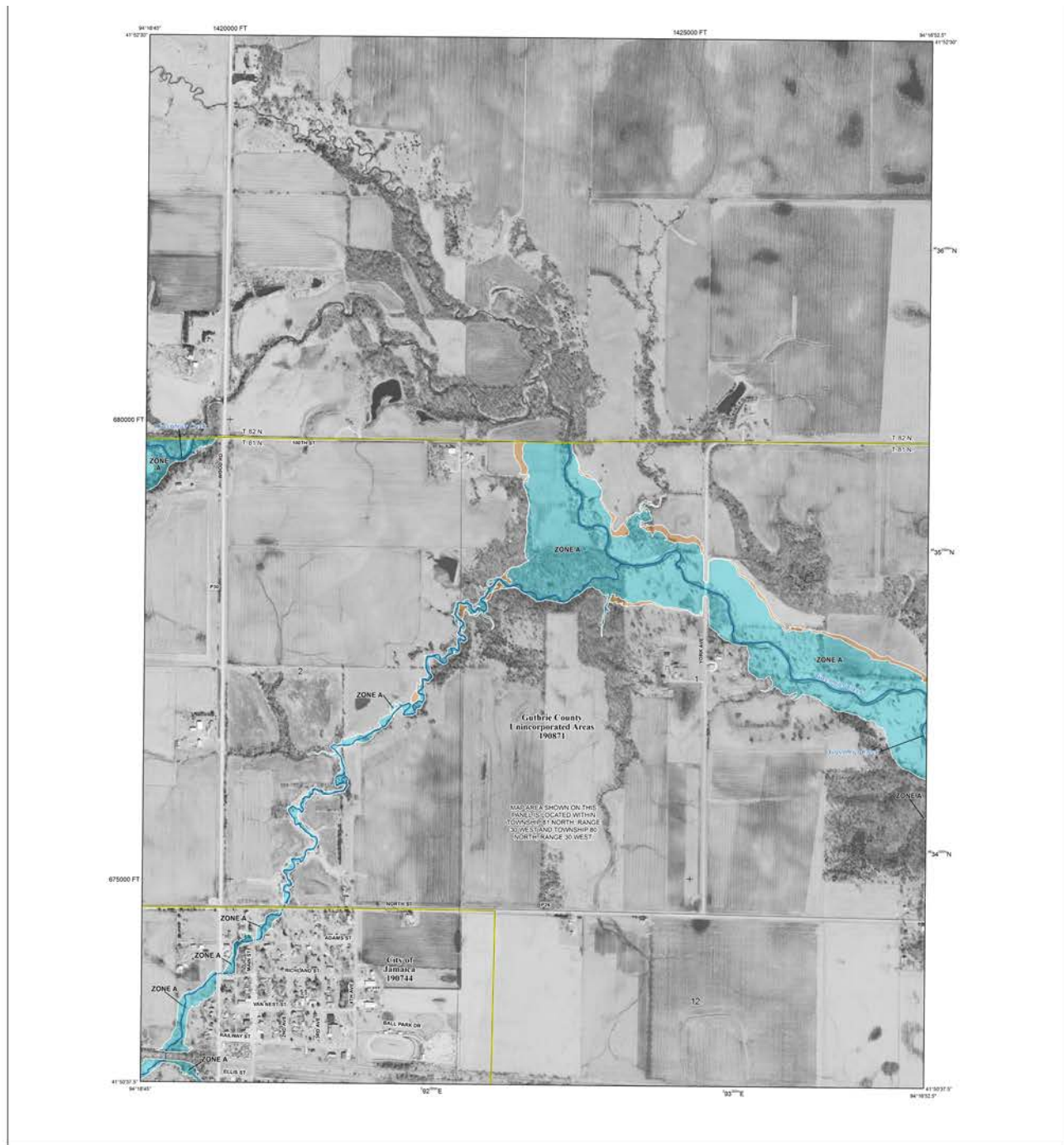
## SCALE



## PANEL LOCATOR

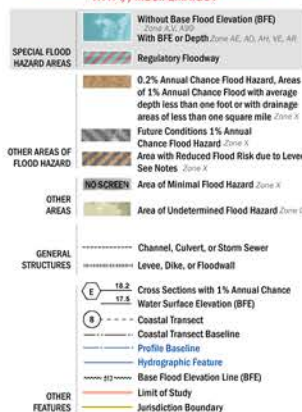






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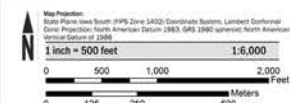
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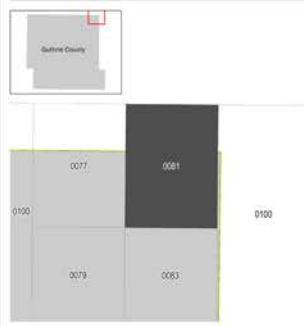
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

### FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

Panel 81 of 325

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Panel 81 of 325

Panel 81 of 325

Panel 81 of 325

Panel 81 of 325

Panel 81 of 325

Panel 81 of 325

VERSION NUMBER

2.3.3.0

MAP NUMBER

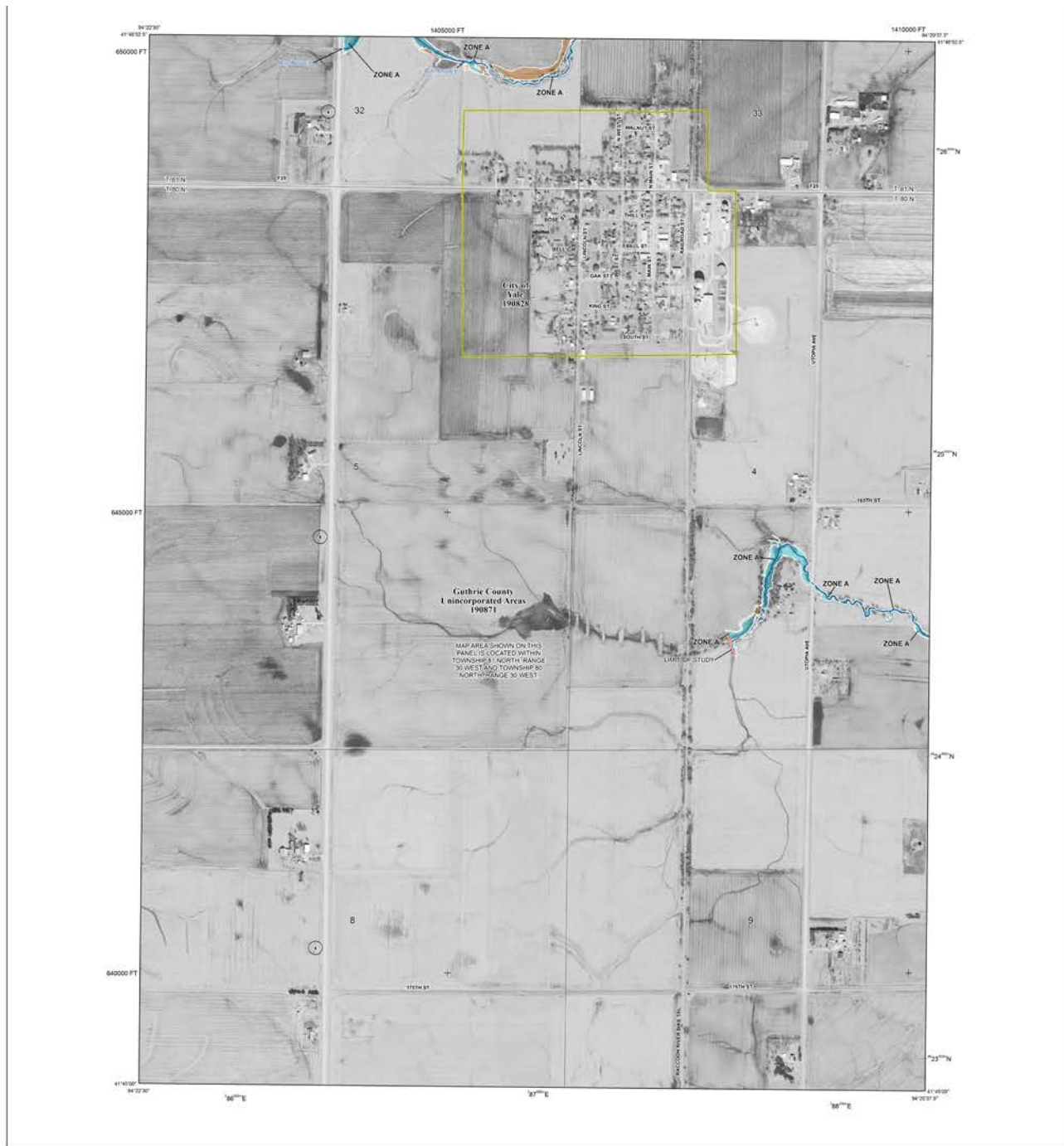
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EFFECTIVE DATE

APRIL 5, 2017

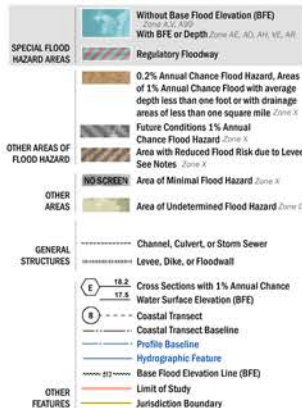






#### FLOOD HAZARD INFORMATION

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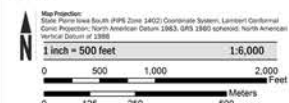
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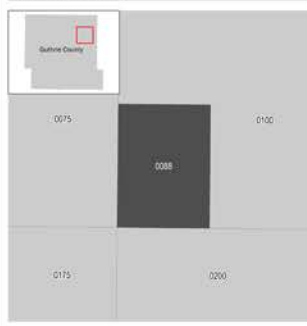
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#### SCALE



#### PANEL LOCATOR



#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

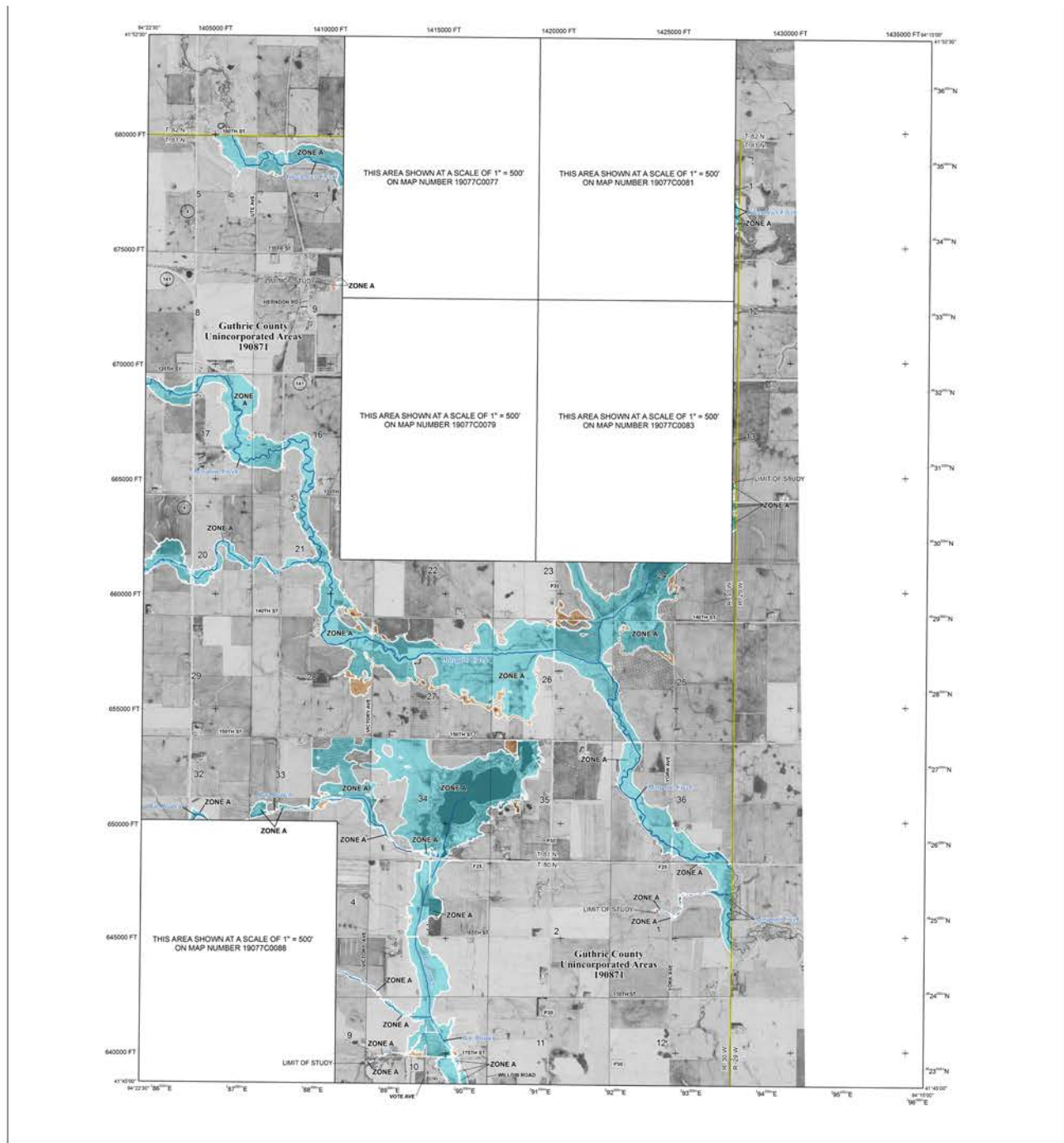
PANEL 88 OF 325



COMMUNITY NUMBER PANEL SUFFIX  
GUTHRIE COUNTY 190871 0088 0  
W.E. CITY OF 190828 0088 0

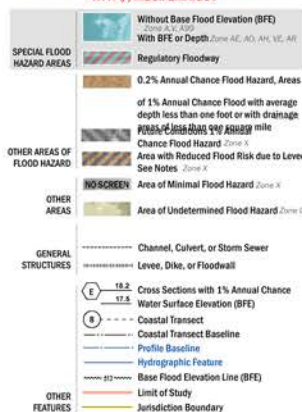
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C0088D  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

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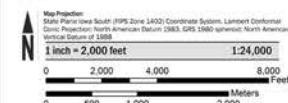
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

And Incorporated Areas

PANEL 100 of 325

Community: GUTHRIE COUNTY

Number: 190871

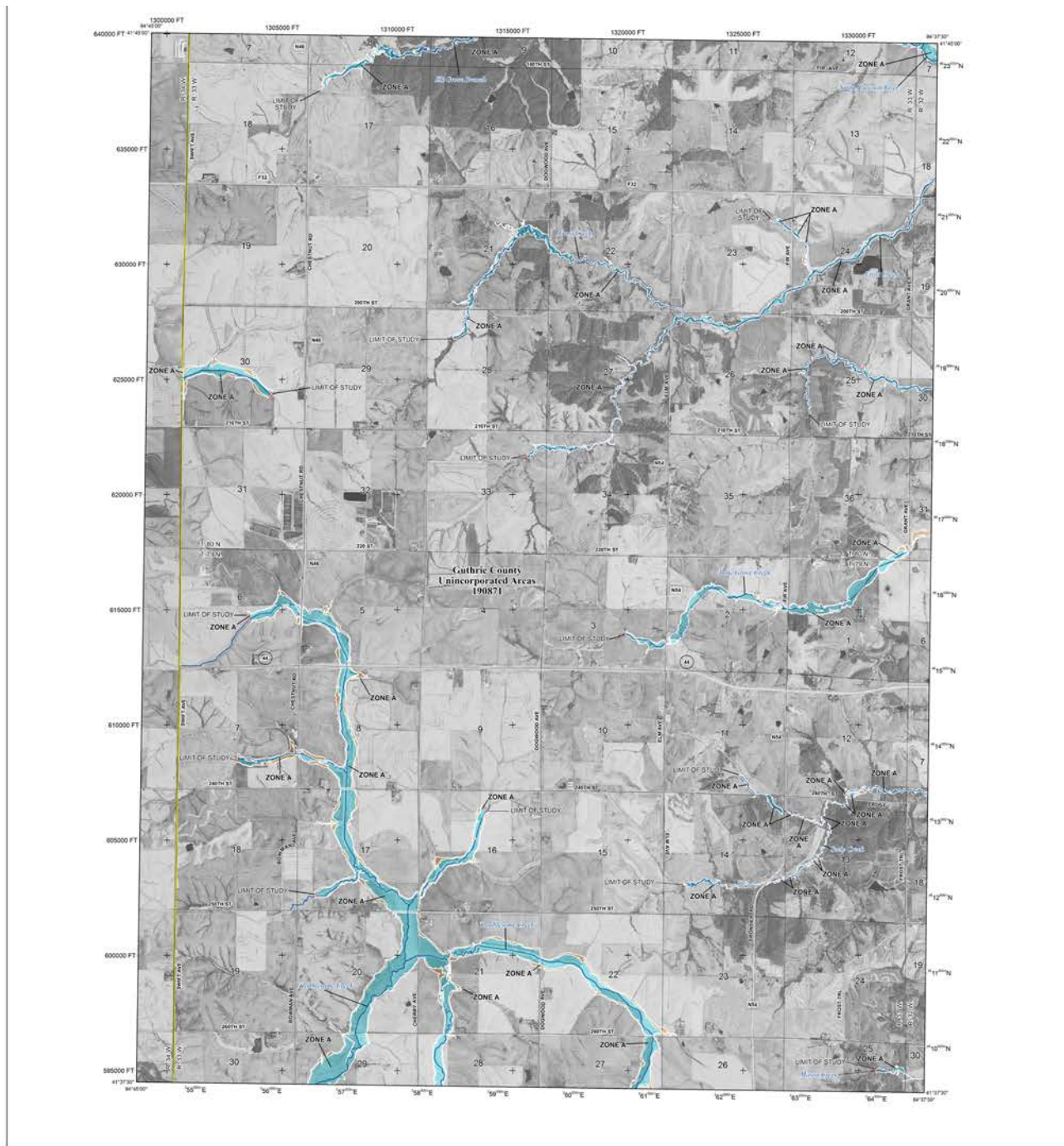
Panel: 0100

Suffix: D

Version: 2.3.3.0

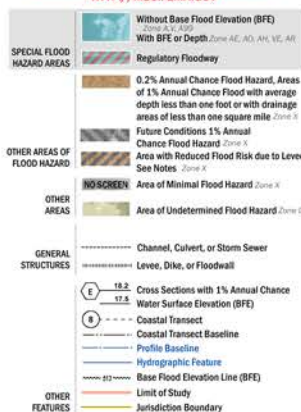
Map Number: 19077C0100D

Effective Date: APRIL 5, 2017



#### FLOOD HAZARD INFORMATION

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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



#### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historical versions, or for FEMA, please visit the National Flood Insurance Program website at <http://www.fema.gov>. Center website at <http://www.fema.gov>. Available products may include previously approved versions of the FIRM Map Information Exchange at 1:62,500 scale (1:62,500 or 1:125,000) or the FIRM Map Information Exchange at 1:62,500 scale (1:62,500 or 1:125,000). Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information Exchange.

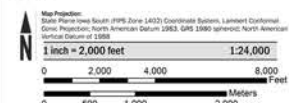
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery flown in April 2008.

#### SCALE



#### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

#### NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 125 of 325

Panel 125 of 325

COMMUNITY NUMBER PANEL SUFFIX

GUTHRIE COUNTY 190871 0125 D

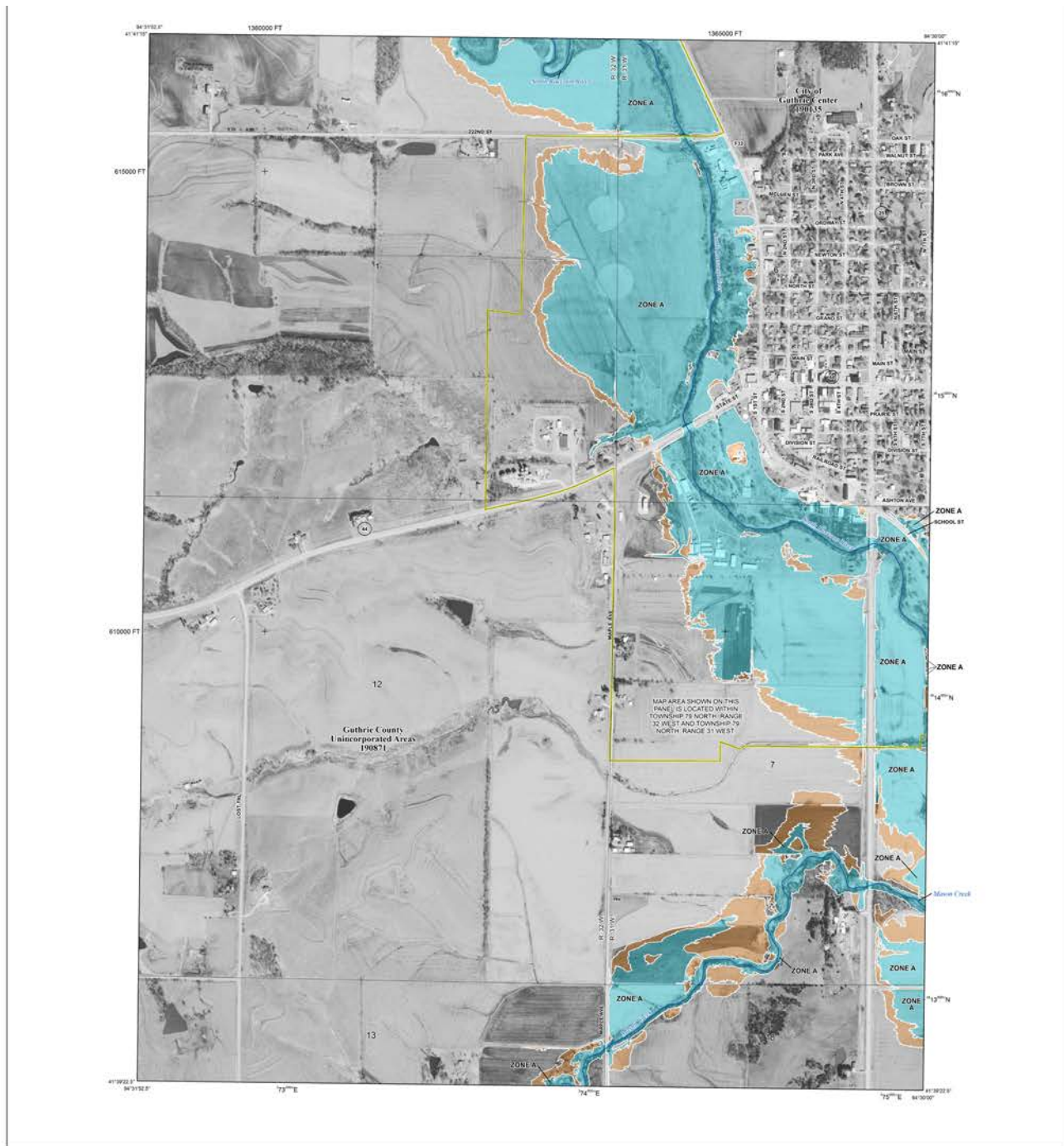
Version Number 2.3.3.0

Map Number 19077001250

Effective Date APRIL 5, 2017







### FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone AE, AO, AH, VE, VE-1
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	Coastal Transect Baseline
OTHER FEATURES	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA Flood Insurance Study (FIS) or the National Flood Insurance Program in the FEMA Map Service Center website at <http://mfc.fema.gov>. Available products may include previously issued editions of the Flood Insurance Study Report, which digital editions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

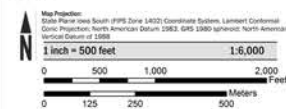
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

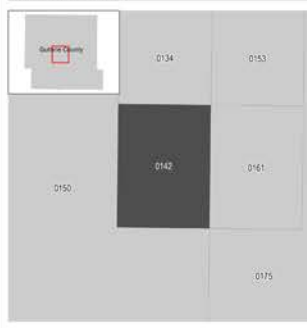
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from April 2008.

### SCALE



### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

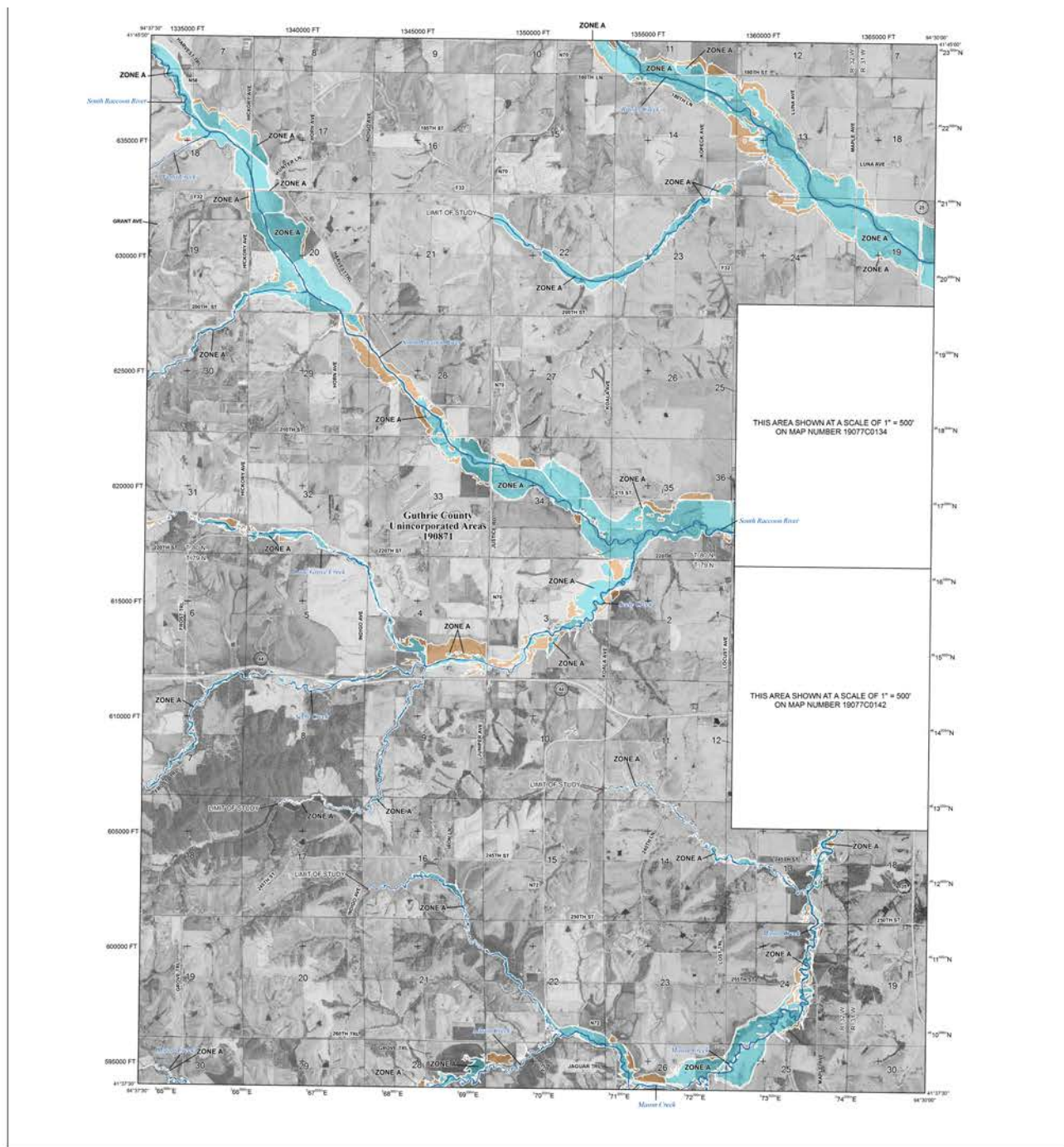
Panel 142 of 325



Community	NUMBER	PANEL	SUFFIX
GUTHRIE COUNTY, IOWA	190139	0142	D
OF GUTHRIE COUNTY	190671	0142	D

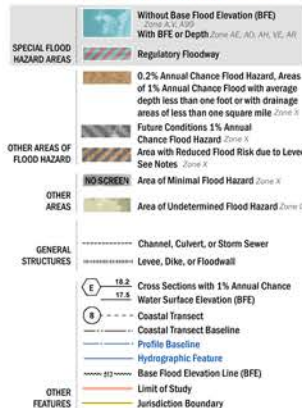
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700142D  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FIRM, how to order products or the National Flood Insurance Program in general, please contact the FEMA Map Service Center at 1-877-FEMA-8087 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued editions of the FIRM, Flood Insurance Study (FIS) Reports, and other digital products of the FIRM. Maps of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

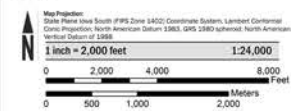
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from 1999 to 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
AND INCORPORATED AREAS

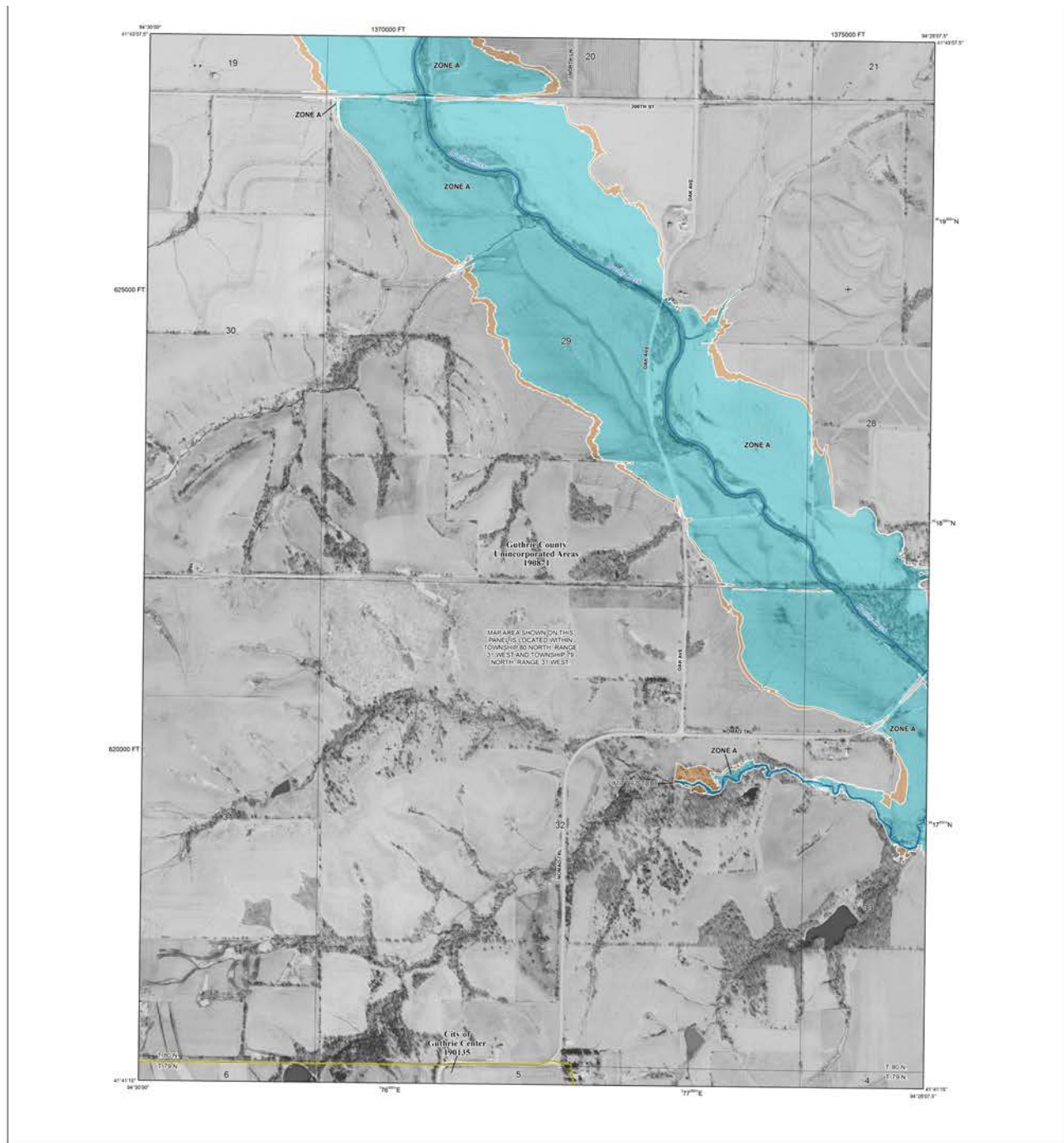
PANEL 150 OF 325



Panel Contains:  
COMMUNITY NUMBER PANEL SUFFIX  
GUTHRIE COUNTY 190871 0150 0

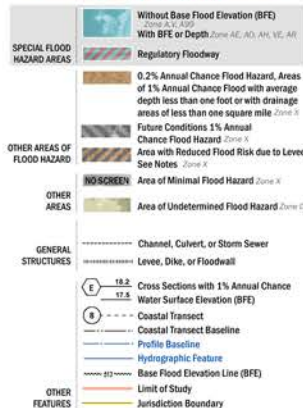
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C01500  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INFO MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-911 or 1-877-338-2627 or visit the FEMA Map Information Exchange at <http://mex.fema.gov>. Available products may include previously unincorporated data for the Flood Insurance Study Report, which digital editions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

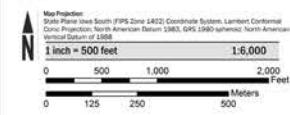
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

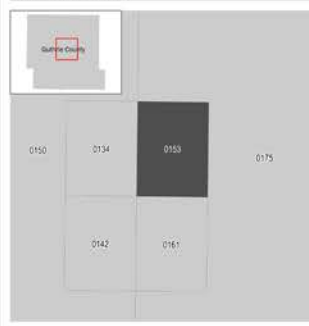
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

### FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

Panel 153 of 325

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE CENTER, CITY OF GUTHRIE COUNTY	190135	0153	D
	190871	0153	D

VERSION NUMBER

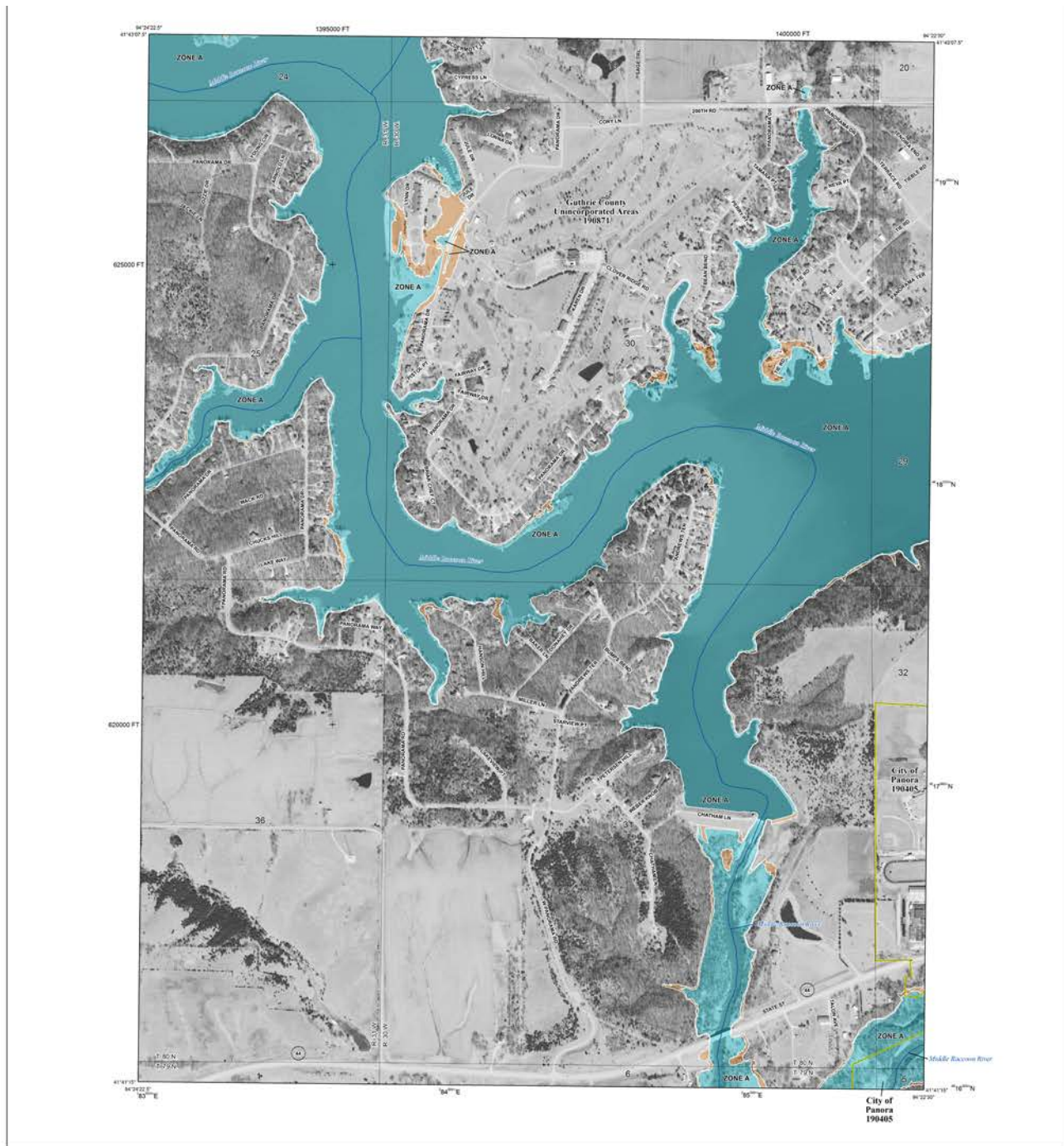
2.3.3.0

MAP NUMBER

1907700153D

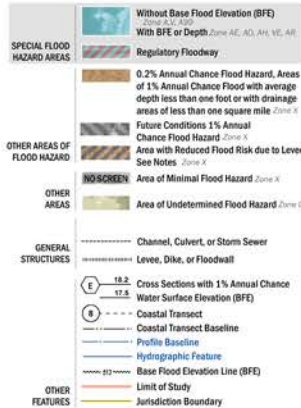
EFFECTIVE DATE

APRIL 5, 2017



#### FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



#### NOTES TO USERS

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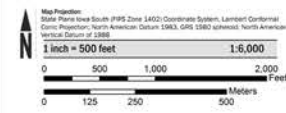
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

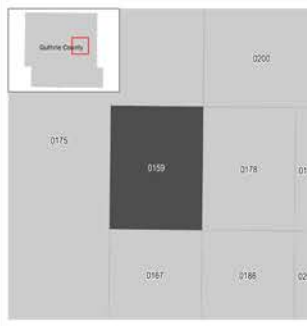
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

#### SCALE



#### PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

Panel 159 of 325

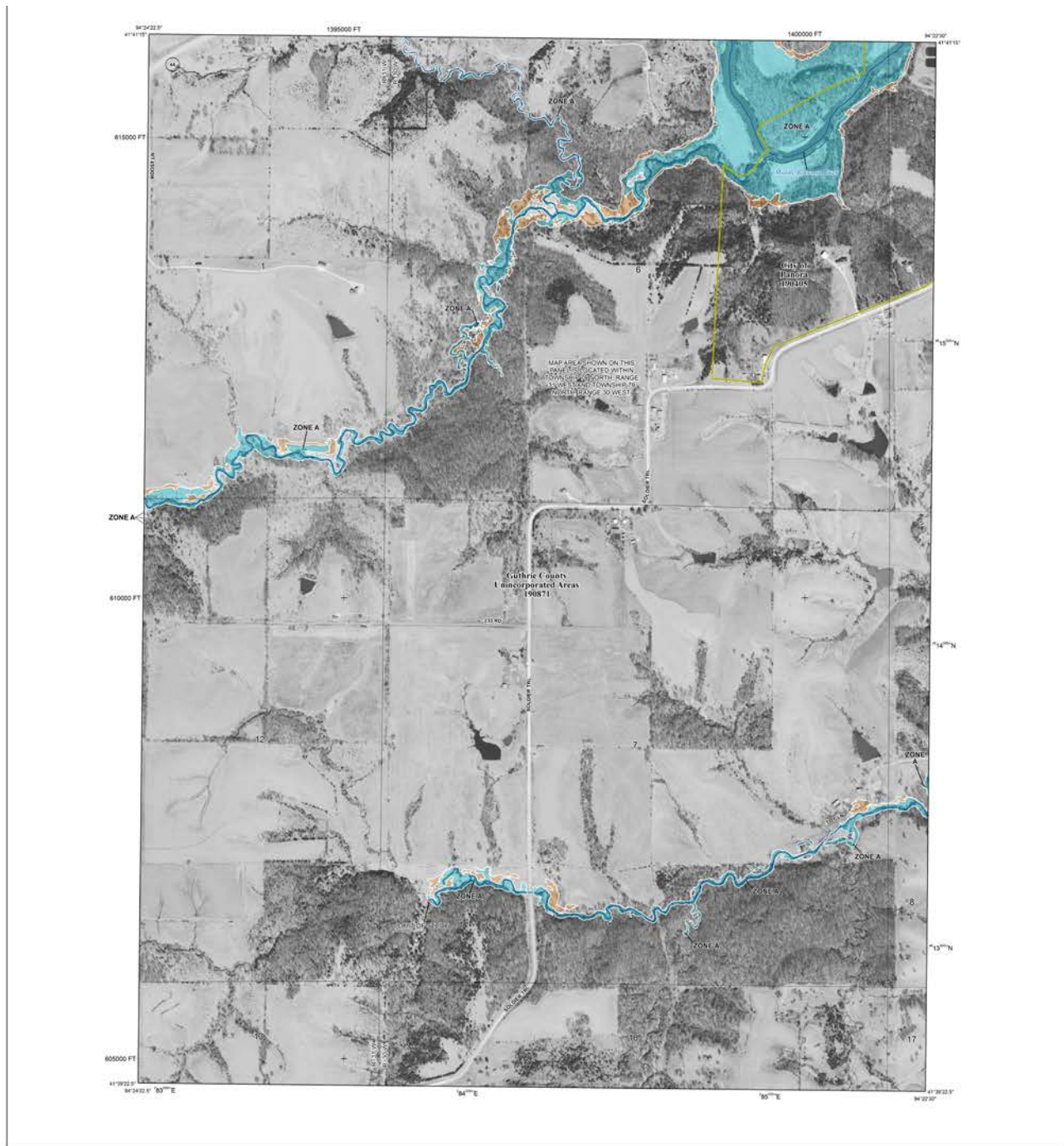


Panel Contents:  
COMMUNITY: GUTHRIE COUNTY  
PANEL: 159 OF 325  
SUFFIX: B

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700159D  
EFFECTIVE DATE  
APRIL 5, 2017

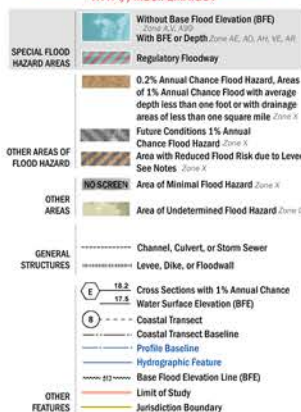






## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



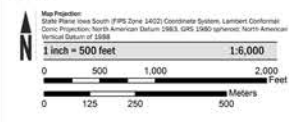
## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FIRM, how to order products or the National Flood Insurance Program or the FEMA Map Service Center website at <http://mms.fema.gov>. Available products may include previously issued editions of the FIRM, Flood Insurance Study, Flood Insurance Study Report, and other products. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

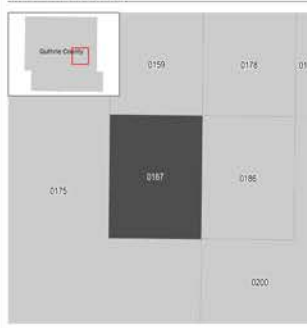
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

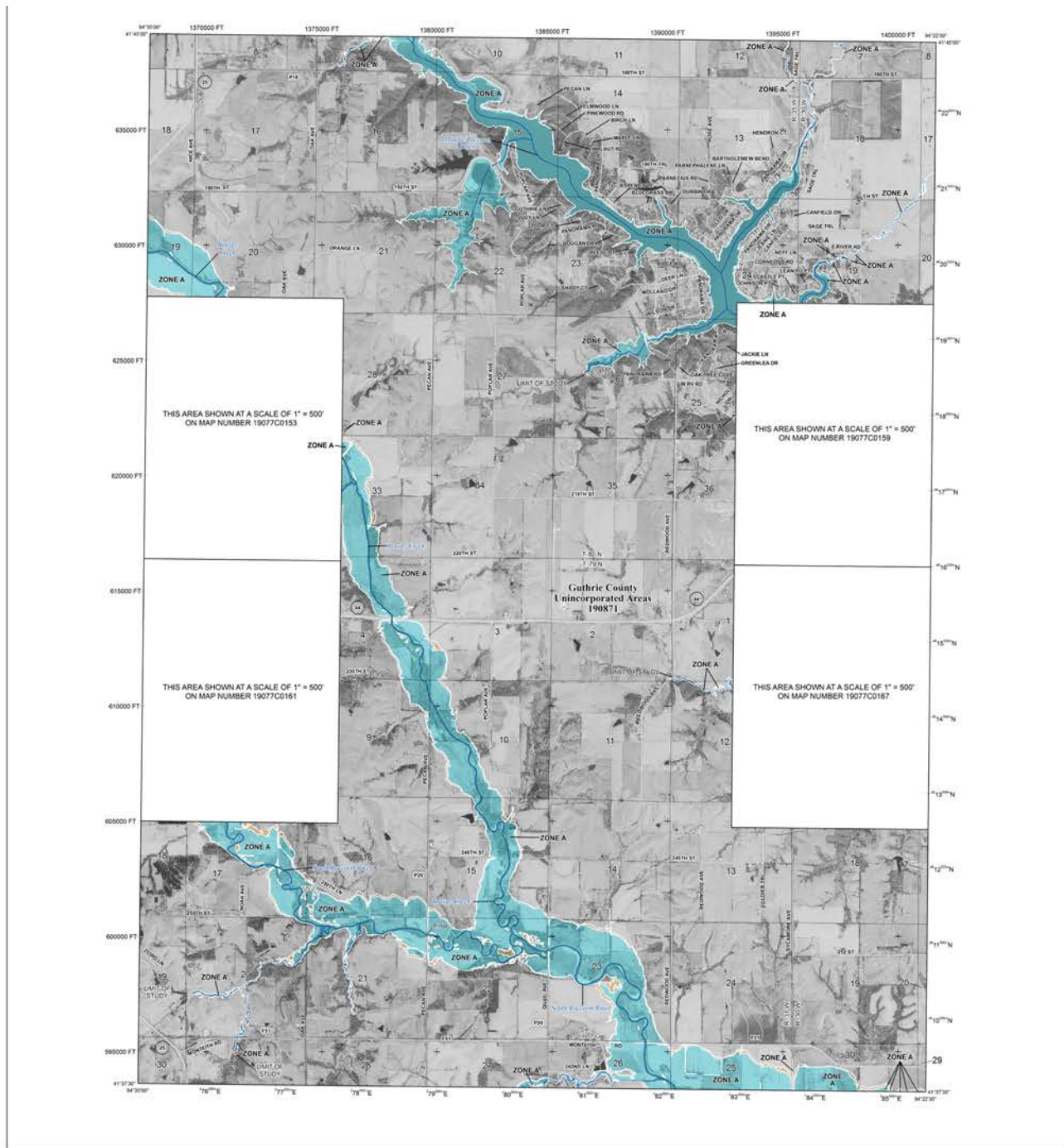
GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 167 of 325

Panel Contains:  
COMMUNITY 190871 0367 B  
POLYNO CITY OF 190426 0367 B

VERSION NUMBER 2.3.3.0  
MAP NUMBER 19077C0167D  
EFFECTIVE DATE APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE)
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
OTHER AREAS OF FLOOD HAZARD	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
OTHER AREAS	
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	Coastal Transect Baseline
OTHER FEATURES	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA Flood Insurance Study (FIS) or the National Flood Insurance Program (NFIP) Map Service Center website at <http://mfc.fema.gov>. Available products may include previously unincorporated data for the FEMA Flood Insurance Study (FIS) or the National Flood Insurance Program (NFIP) Map Service Center website at <http://mfc.fema.gov>. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by using the FEMA Map Information eXchange.

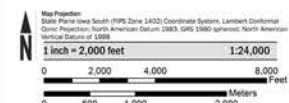
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

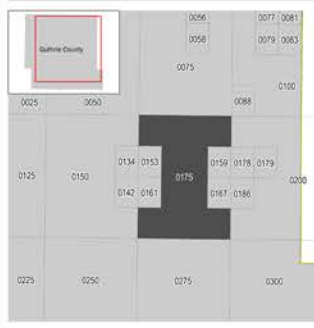
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 175 OF 325



Panel Contains:

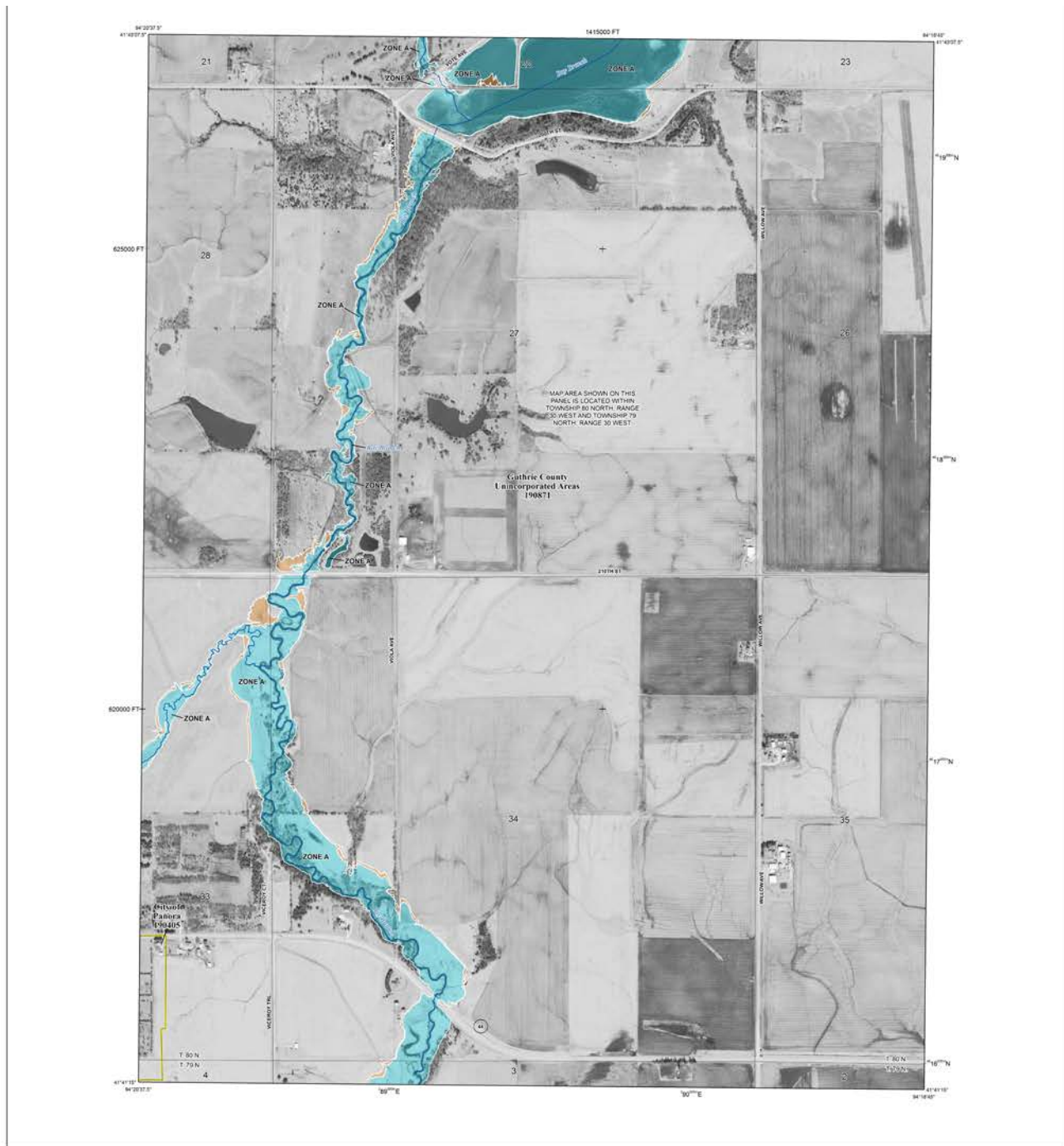
COMMUNITY NUMBER PANEL SUFFIX

GUTHRIE COUNTY 190871 0175 D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C01750  
EFFECTIVE DATE  
APRIL 5, 2017

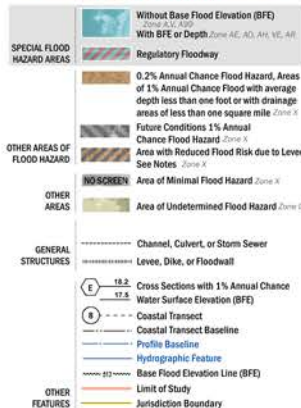






#### FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



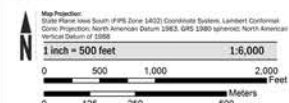
#### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic editions, of the FEMA Flood Insurance Study (FIS) or the National Flood Insurance Program (NFIP) map products, contact the FEMA Map Information Center at 1-877-FEMA-Map (1-877-362-6271) or visit the FEMA Map Information Center at <http://www.fema.gov>. Available products may include previously issued editions of the FIS, Flood Insurance Study Report, and other digital editions of the FIS. None of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Center.

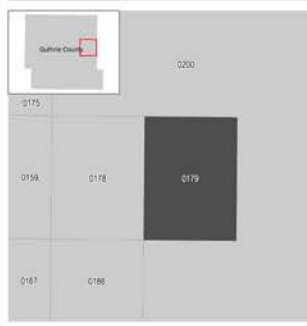
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

#### SCALE



#### PANEL LOCATOR



#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

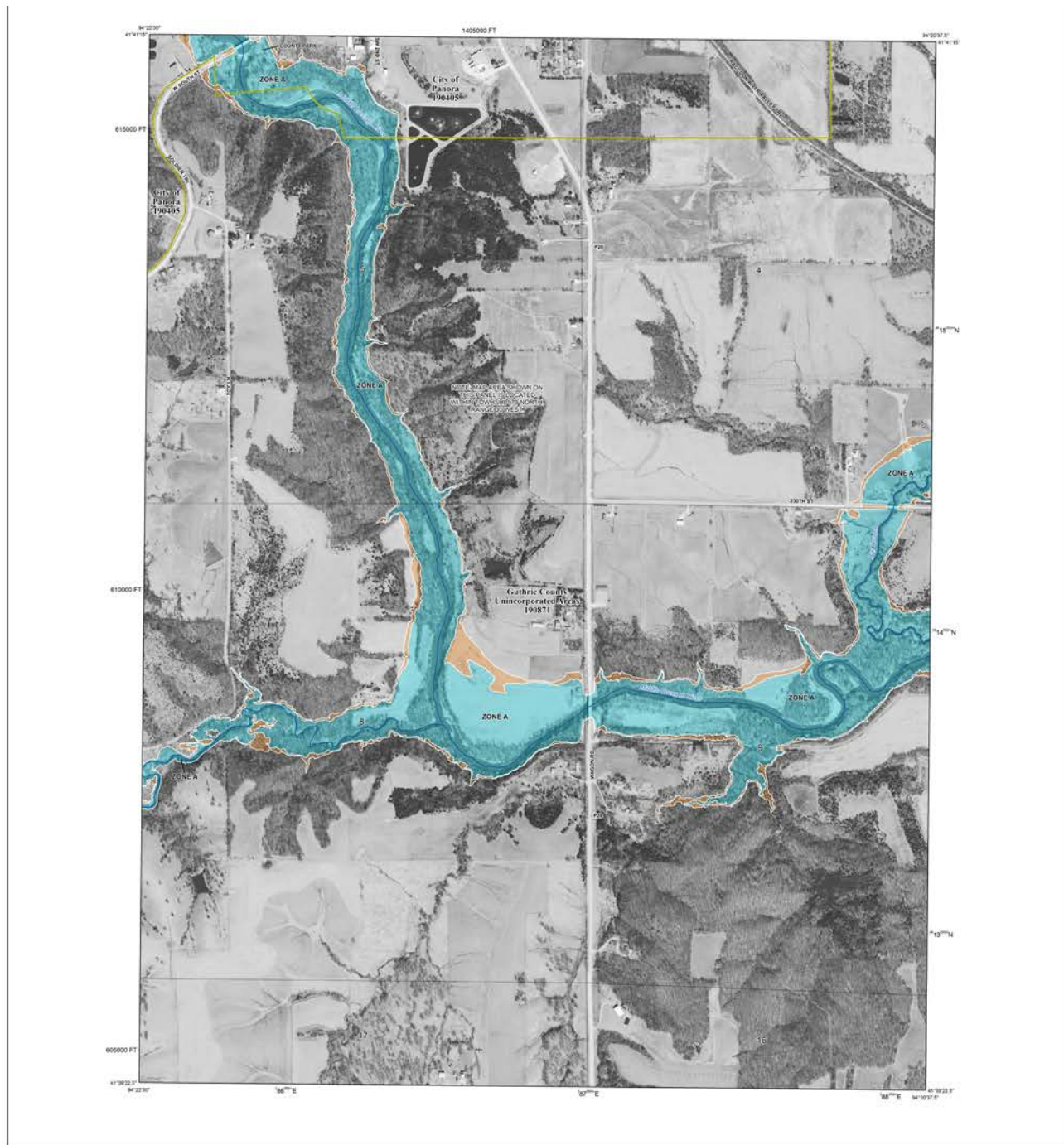
PANEL 179 of 325



Panel Contains:  
COMMUNITY: GUTHRIE COUNTY  
FIRMAL CITY OF: PRAIRIE CITY, IOWA  
NUMBER: 150871  
SUFFIX: 0179  
DATE: 01/19/08

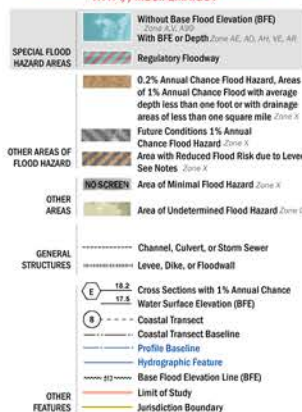
VERSION NUMBER: 2.3.3.0  
MAP NUMBER: 15077C01790  
EFFECTIVE DATE: APRIL 5, 2017





# FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
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# NOTES TO USERS

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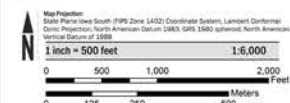
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

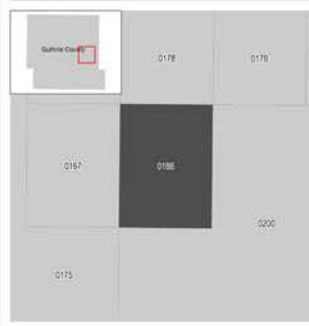
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-626-4629.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

# SCALE



# PANEL LOCATOR



# NATIONAL FLOOD INSURANCE PROGRAM

## FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 186 OF 325

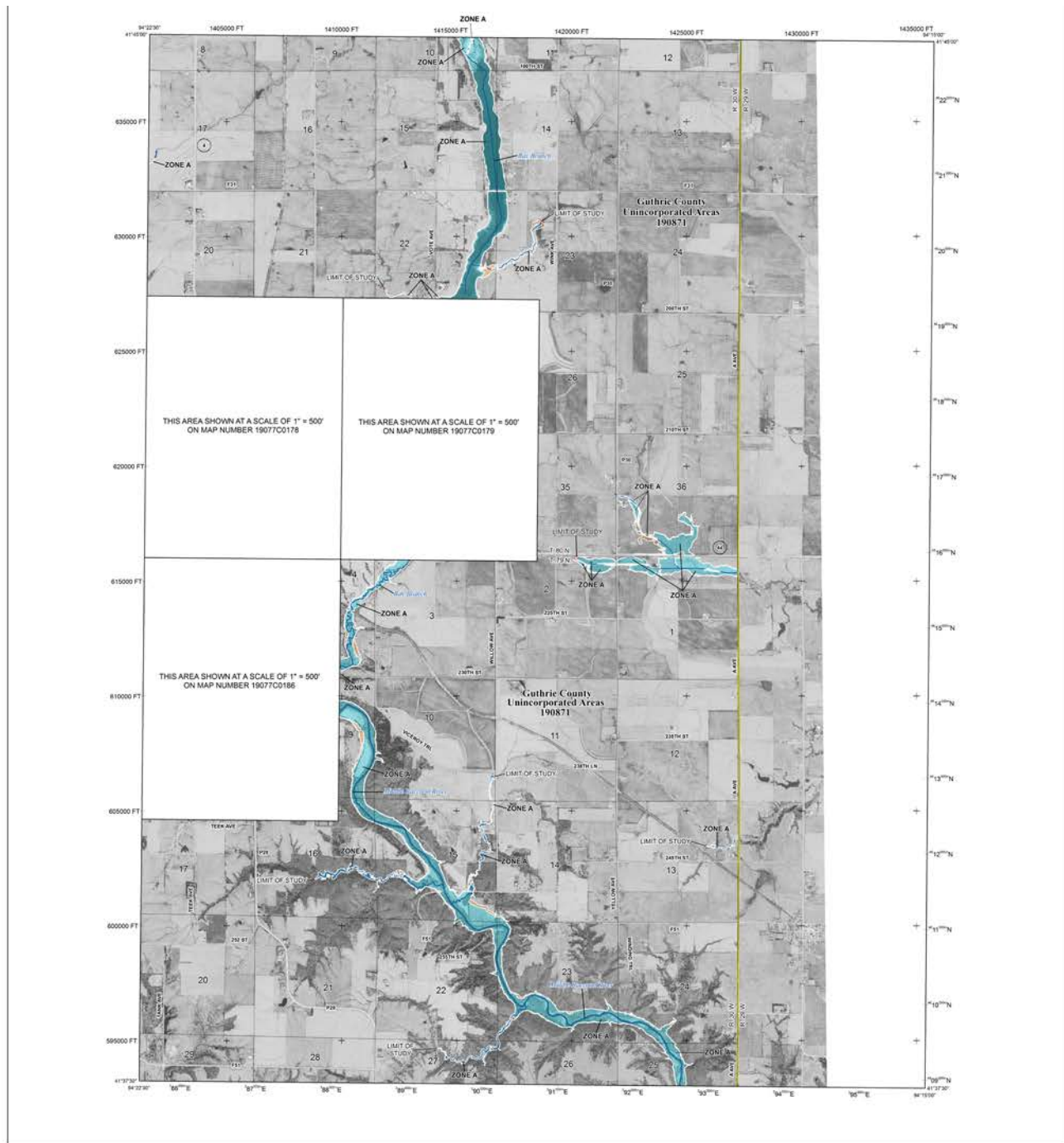
Panel Contents:

COMMUNITY 190871 0186 0186 0186

MAP NUMBER 19077001860

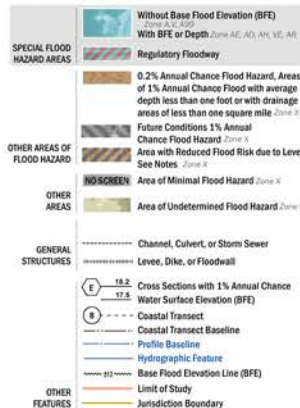
EFFECTIVE DATE APRIL 5, 2017

VERSION NUMBER 2.3.3.0



## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

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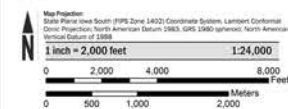
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

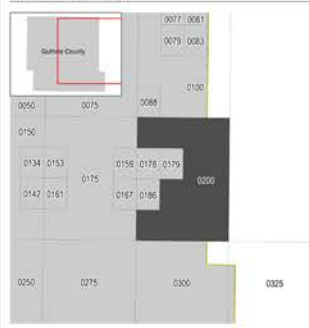
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
AND INCORPORATED AREAS

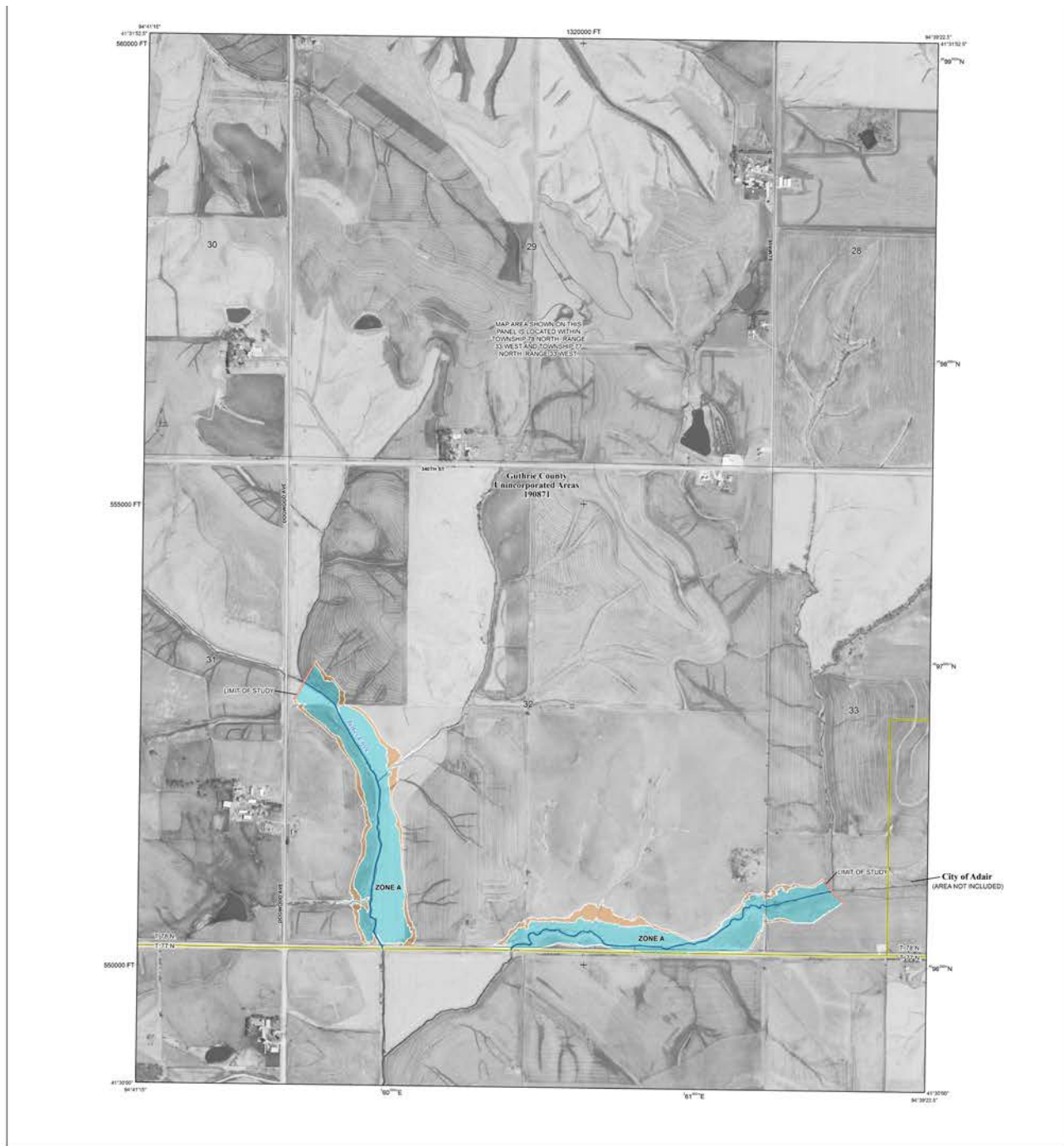
PANEL 200 OF 325



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
GUTHRIE COUNTY 190871 0200 D

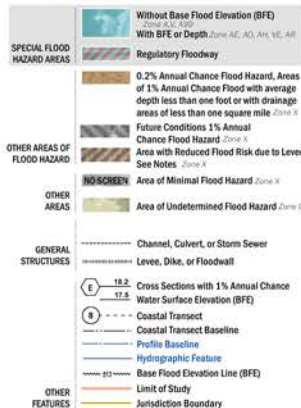
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MAP NUMBER  
19077C0200D  
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THE REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
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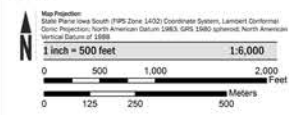
Communities answering land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

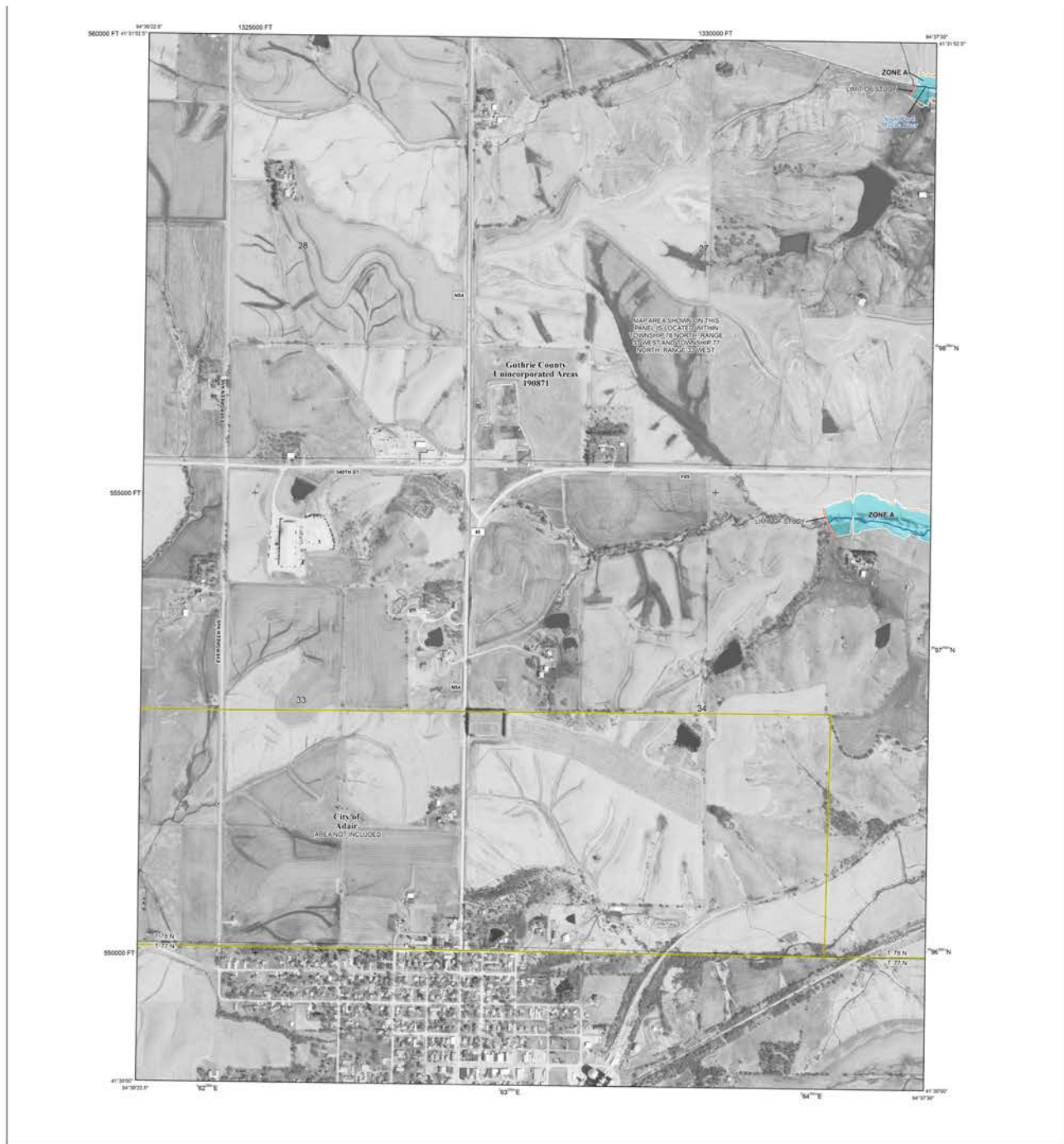
GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 218 OF 325



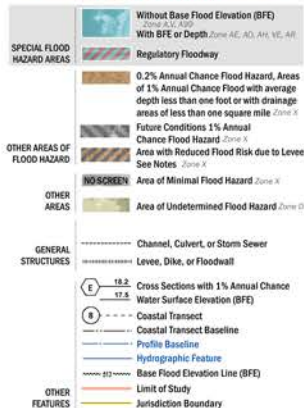
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GUTHRIE COUNTY 19071 0218 D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077002180  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

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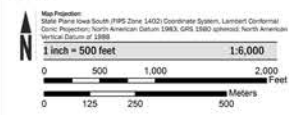
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To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-626-4629.

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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 219 OF 325



Panel Contents:

COMMUNITY NUMBER PANEL SUFFIX

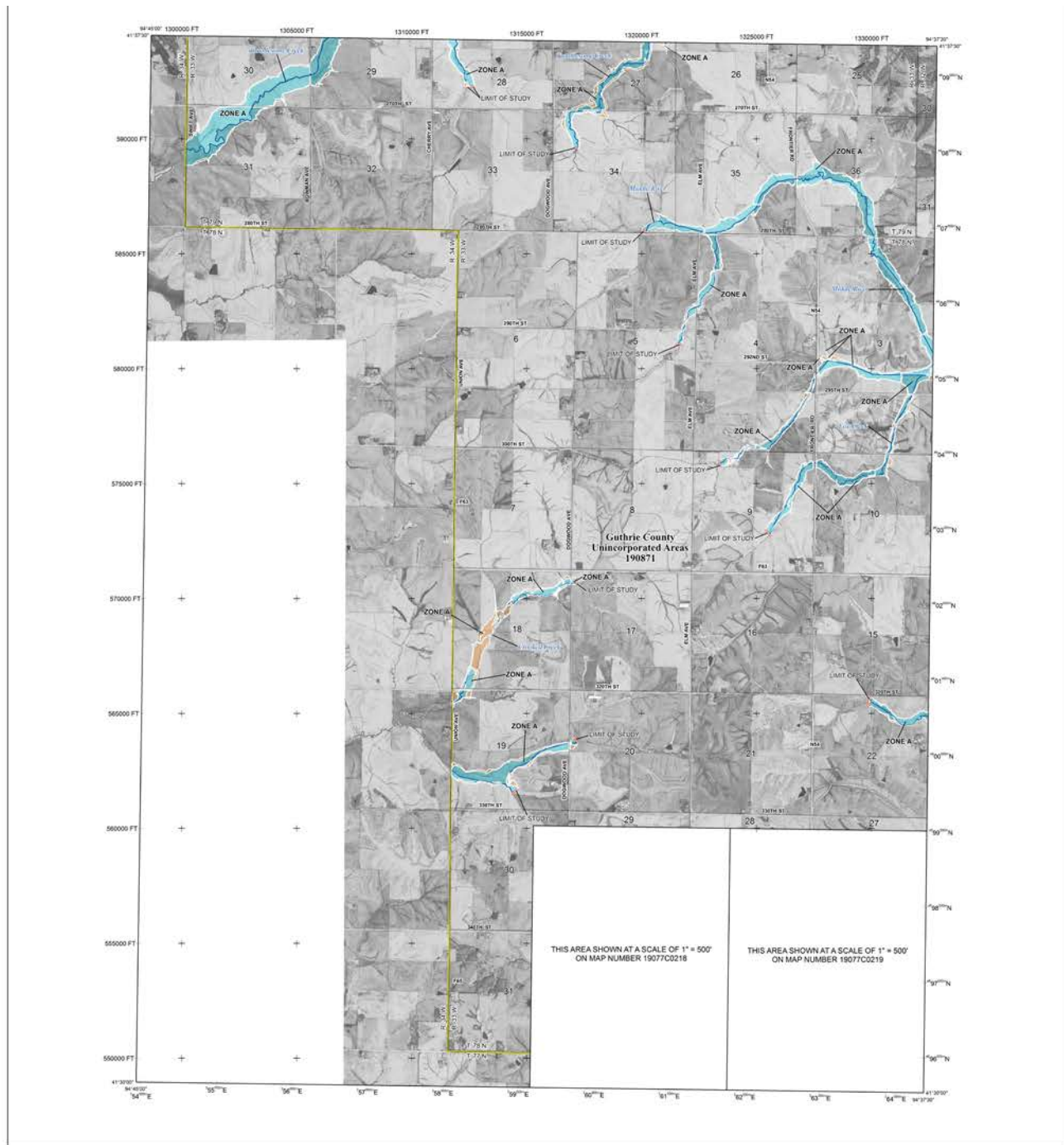
GUTHRIE COUNTY 190871 0219 D

VERSION NUMBER  
2.3.3.0

MAP NUMBER  
19077002190

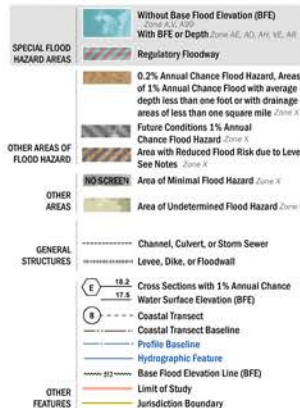
EFFECTIVE DATE  
APRIL 5, 2017





## FLOOD HAZARD INFORMATION

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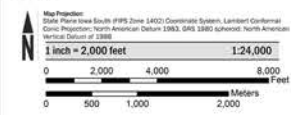
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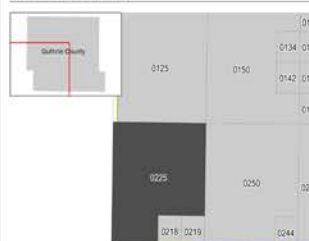
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 225 of 325

COMMUNITY NUMBER PANEL SUFFIX

GUTHRIE COUNTY 190871 0225 D

VERSION NUMBER 2.3.3.0

MAP NUMBER 19077002250

EFFECTIVE DATE APRIL 5, 2017



# FLOOD HAZARD INFORMATION

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DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
OTHER AREAS OF FLOOD HAZARD		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
		NO SCREEN Area of Minimal Flood Hazard Zone X
OTHER AREAS		Area of Undetermined Flood Hazard Zone D
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

# NOTES TO USERS

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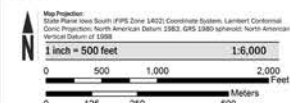
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# SCALE



# PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

# NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 244 of 325

Panel Contains:

COMMUNITY NUMBER PANEL SUFFIX

CASEY CITY OF 190134 0244 D

1907700244D

EFFECTIVE DATE

APRIL 5, 2017

VERSION NUMBER

2.3.3.0

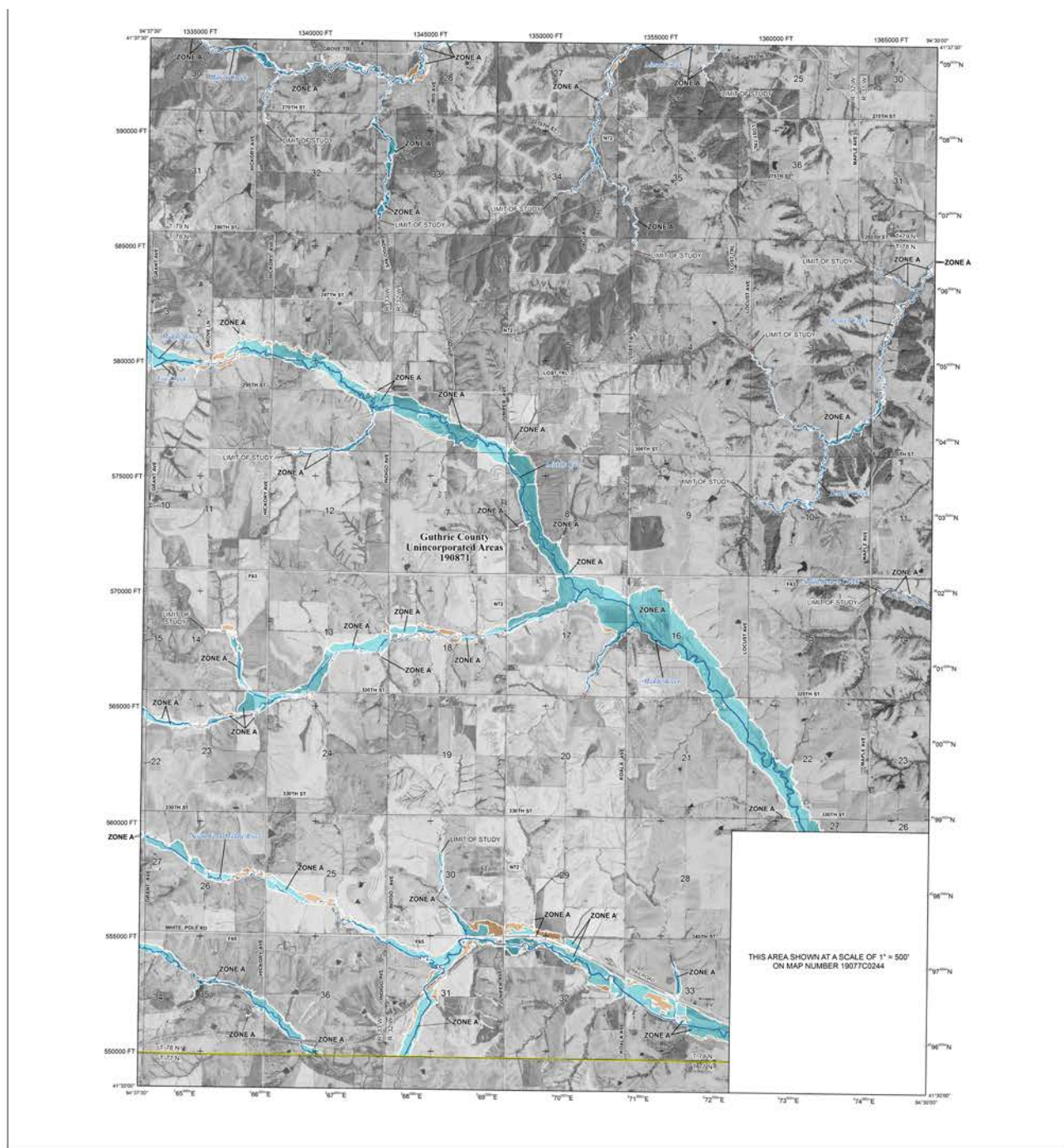
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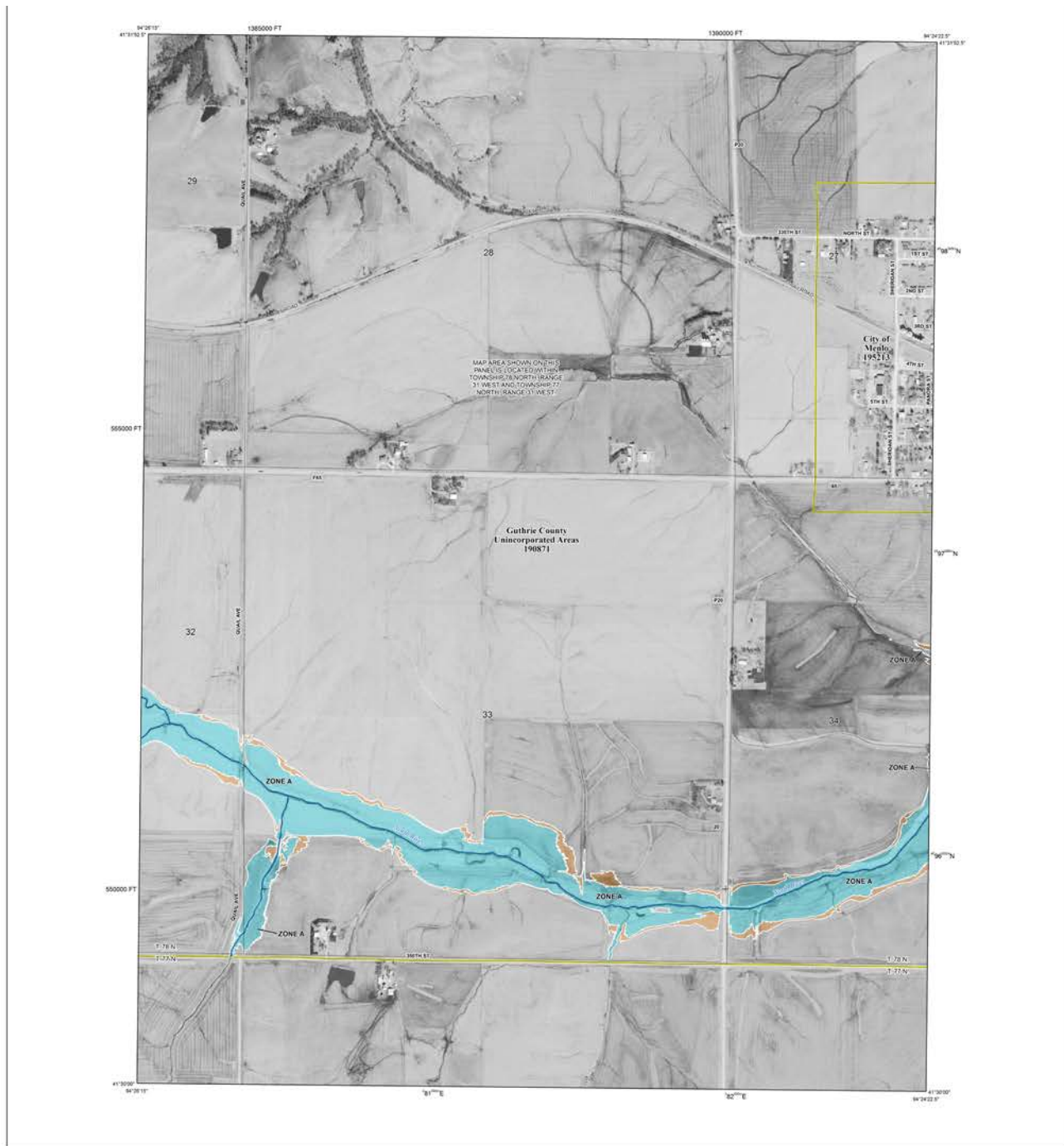
1907700244D

EFFECTIVE DATE

APRIL 5, 2017







## FLOOD HAZARD INFORMATION

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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth (Zone AE, AO, AH, VE, AF)
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile (Zone X)
OTHER AREAS		Future Conditions 1% Annual Chance Flood Hazard (Zone X)
		Area with Reduced Flood Risk due to Levee (Zone X)
GENERAL STRUCTURES		Area of Minimal Flood Hazard (Zone X)
		Area of Undetermined Flood Hazard (Zone D)
OTHER FEATURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect Baseline
OTHER FEATURES		Profile Baseline
		Hydrographic Feature
OTHER FEATURES		Base Flood Elevation Line (BFE)
		Limit of Study
OTHER FEATURES		Jurisdiction Boundary

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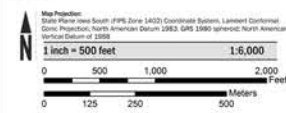
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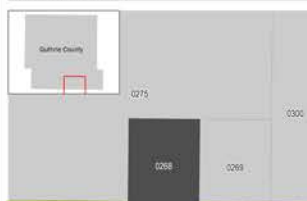
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

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Panel 268 of 325

Panel 268 of 325

Panel 268 of 325

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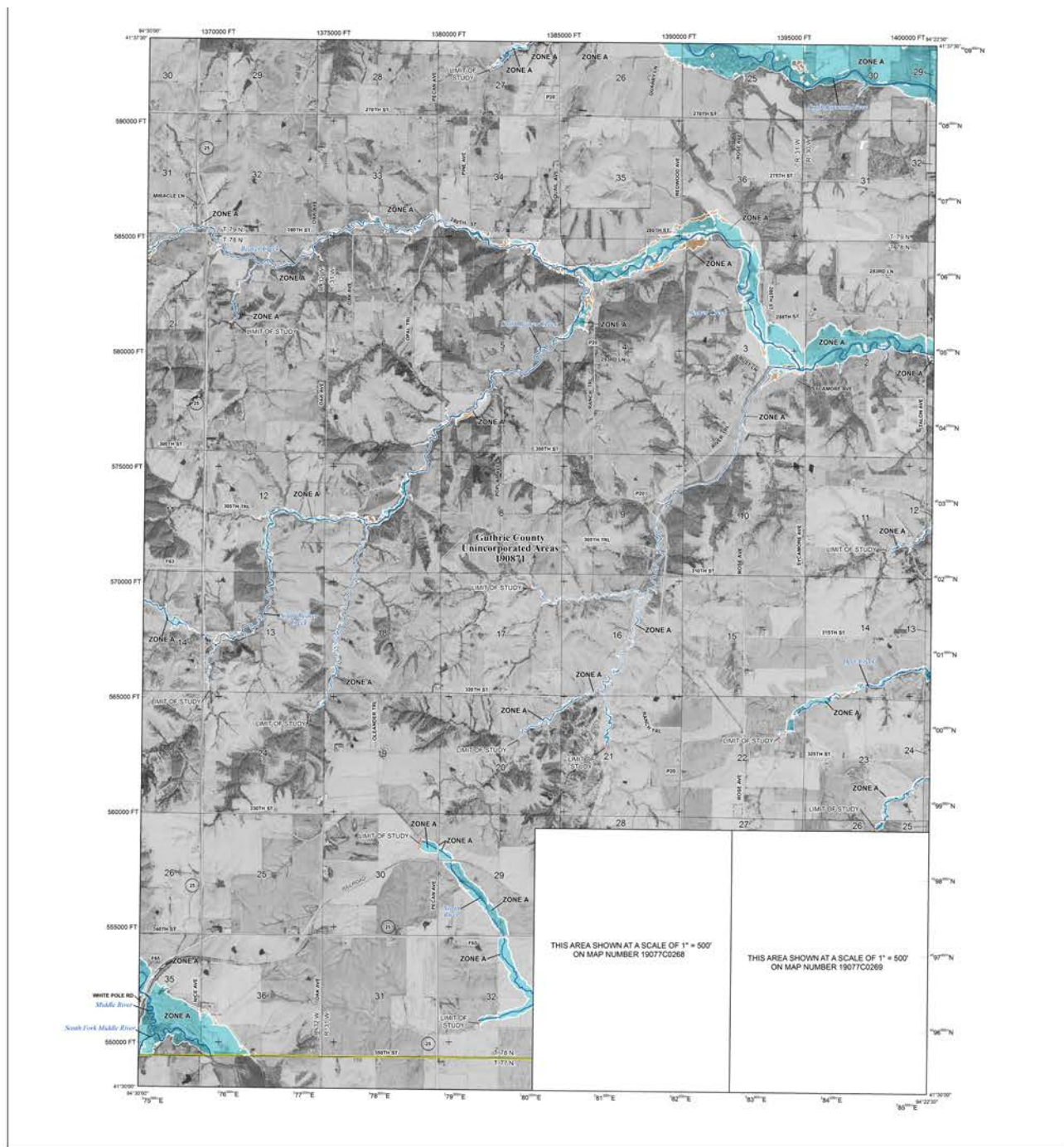
Panel 268 of 325

Panel 268 of 325

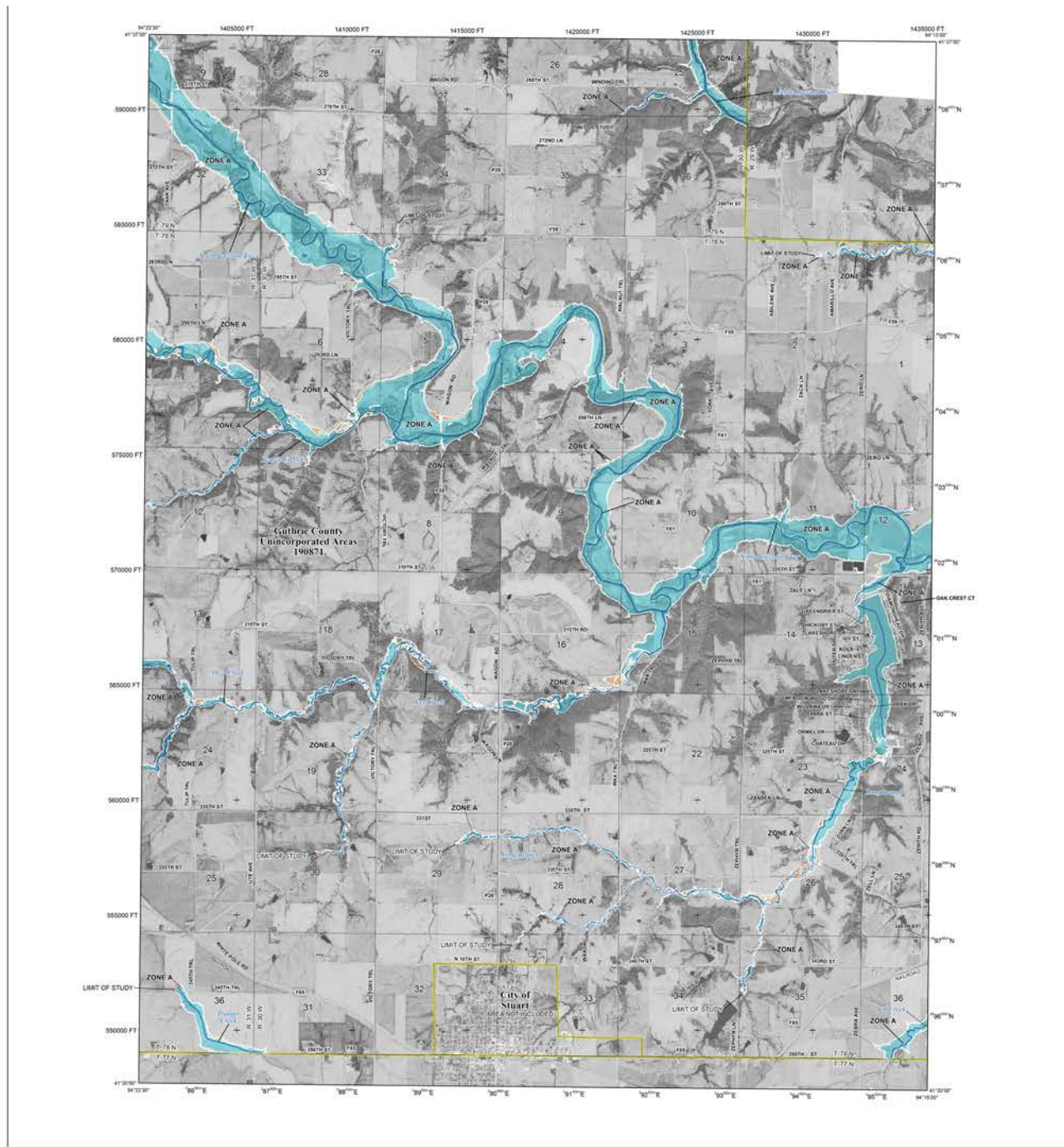
Panel 268 of 325





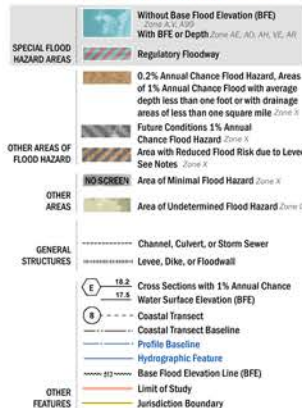






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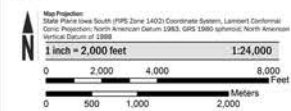
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
AND INCORPORATED AREAS

PANEL 300 or 325

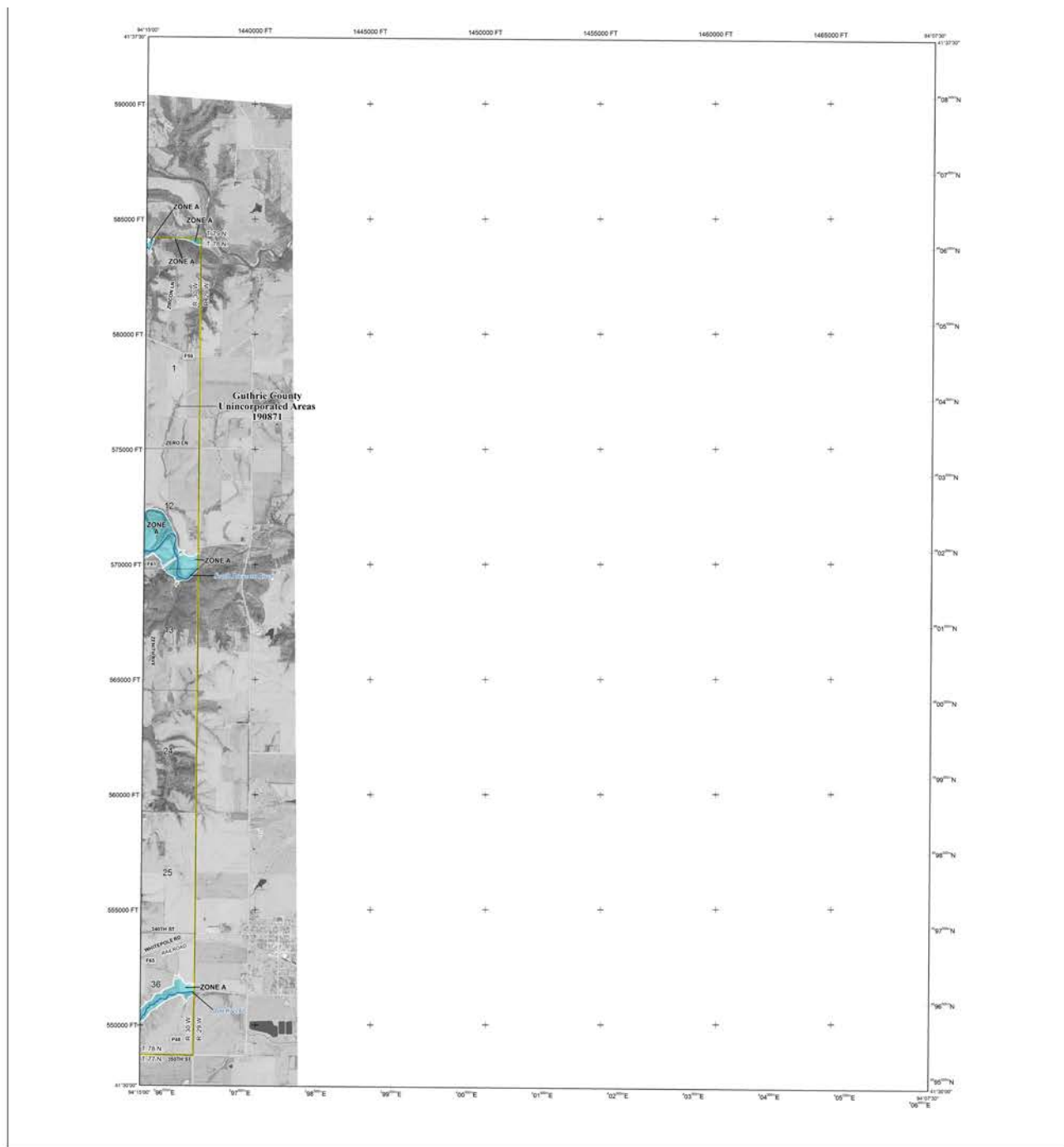


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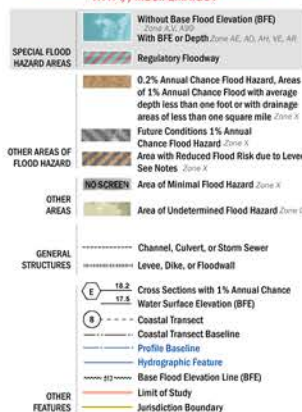
GUTHRIE COUNTY 190871 0300 D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077003000  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

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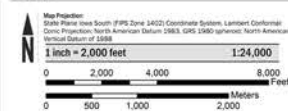
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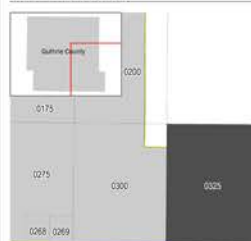
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 325 OF 325



Panel Contents:

COMMUNITY NUMBER PANEL SUFFIX

GUTHRIE COUNTY 190871 0325 D

VERSION NUMBER

2.3.3.0

MAP NUMBER

1907700325D

EFFECTIVE DATE

APRIL 5, 2017



# HIGHWAY AND TRANSPORTATION MAP GUTHRIE COUNTY

# IOWA



**Iowa Department  
of Transportation**

**Prepared By**

Phone (515) 239-1282  
In Cooperation With

**United States  
Department of Transportation**

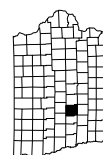
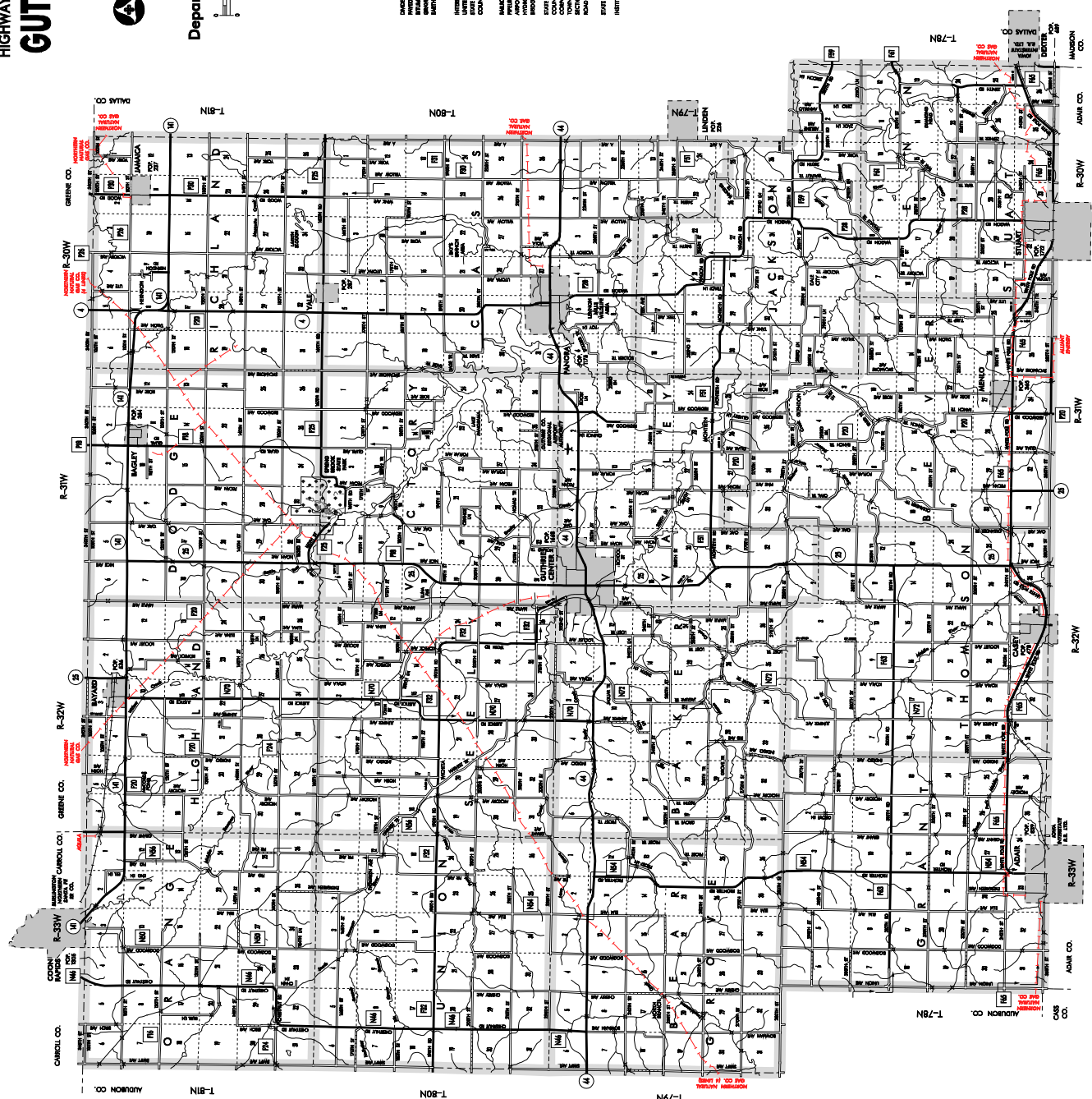
**United States  
Department of Transportation**

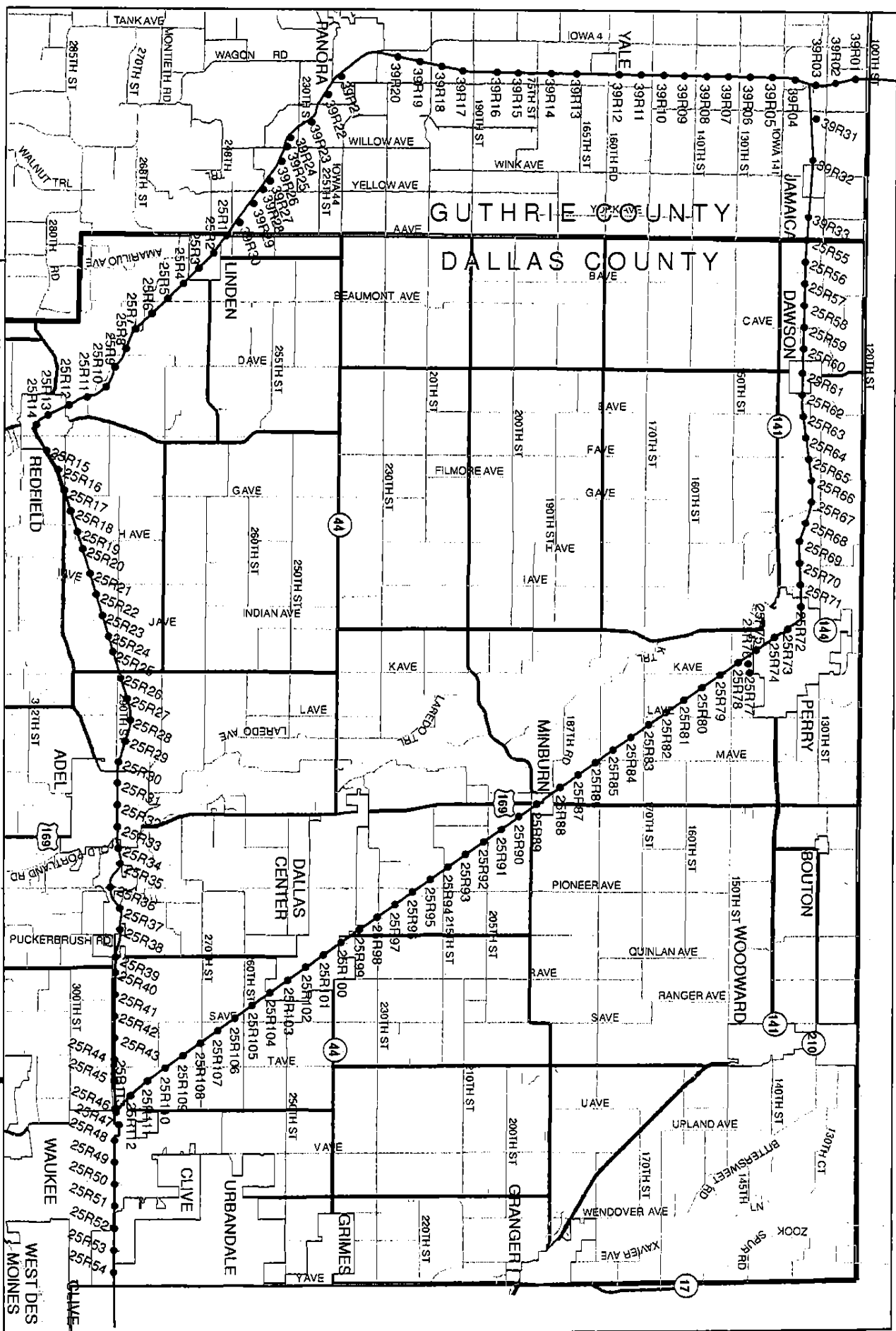
JANUARY 1, 2005



## LEGEND

03 - 17 - 05

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# Appendix H: City of Bagley

## Community Profile

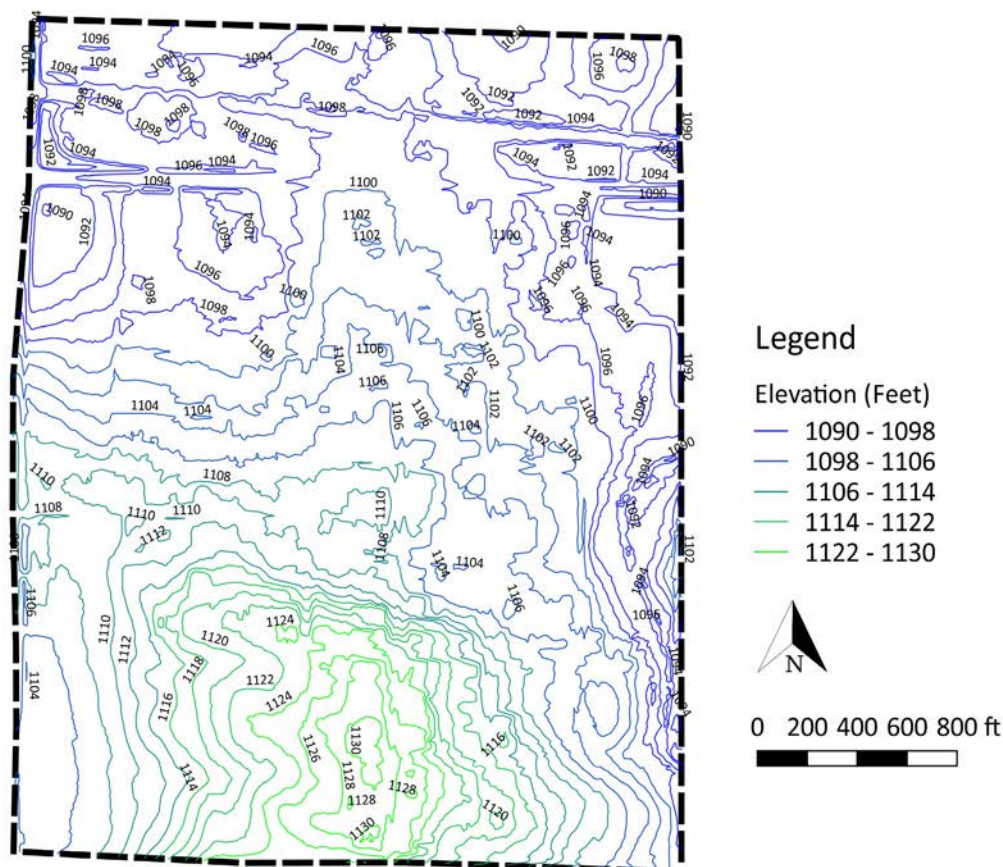
### *History*

Bagley began the same way as many other cities in the area did, as a railroad town. In 1881, the Milwaukee Railroad was built through the northern part of Guthrie County. The town was laid out in that year by the Milwaukee town lot company. The town was named for Mr. Bagley, one of the early saloon keepers in town. Mr. Bagley experienced an unfortunate death caused by the contagious and deadly diphtheria. Since it was so contagious, a small building was built on top of a hill, which is now the end of Main Street. Here, two men cared for him until his death.

### *Geography and Environment*

Bagley is located in the northeastern part of Guthrie County. IA 141 intersects the north portion of the community. The junction of IA 141 and IA 4 is located three miles to the east of town. Bagley is 14.3 miles from Panora, 15.5 miles from the county seat, Guthrie Center, 15.7 miles from Jefferson, 18.2 miles from Perry, and 57.6 miles from Des Moines.

**Map H.1: City of Bagley Elevation**



Source: Iowa DNR

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. Bagley however, is located in the lower portion of the county and has a high point of 1,130 feet. For the most part, Bagley is a relatively flat community with the lowest point hovering around 1,088 feet. Map H.1 displays Bagley's elevation in relation to the rest of Guthrie County.

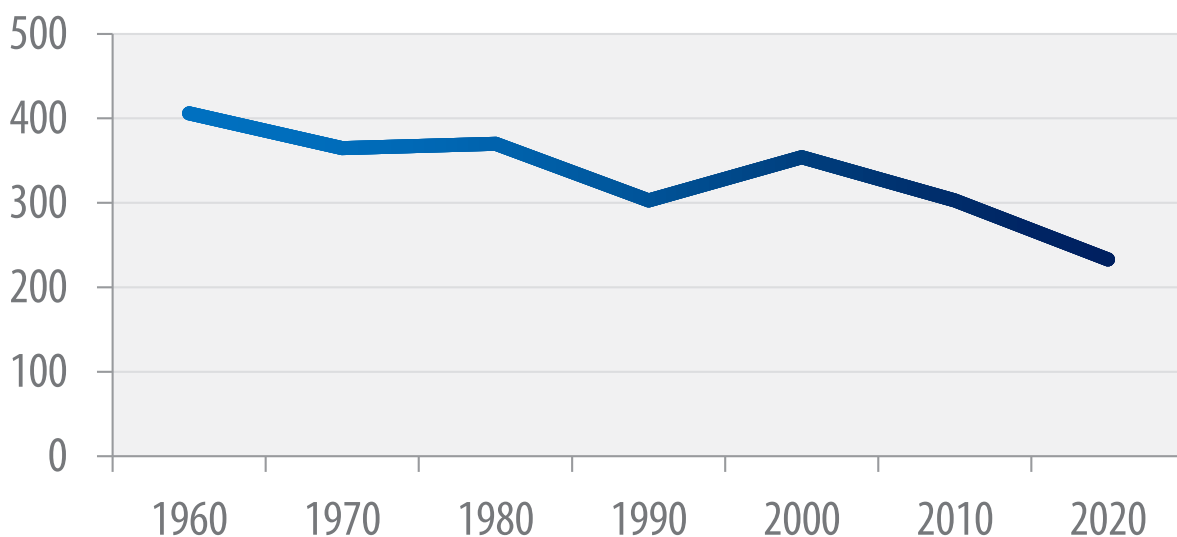
## Demographics

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Bagley's population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Over the past fifty-six years, Bagley's population has steadily declined, losing 173 individuals during that span. From 1990 to 2000, Bagley experienced an increase of 51 individuals, but totals declined by 70 from 2010 to 2020. As of the 2020 Decennial Census, the total population of Bagley was 233 residents. Figure H.1 displays the population trend from 1960 to 2020.

**Figure H.1: City of Bagley Population, 1960-2020**



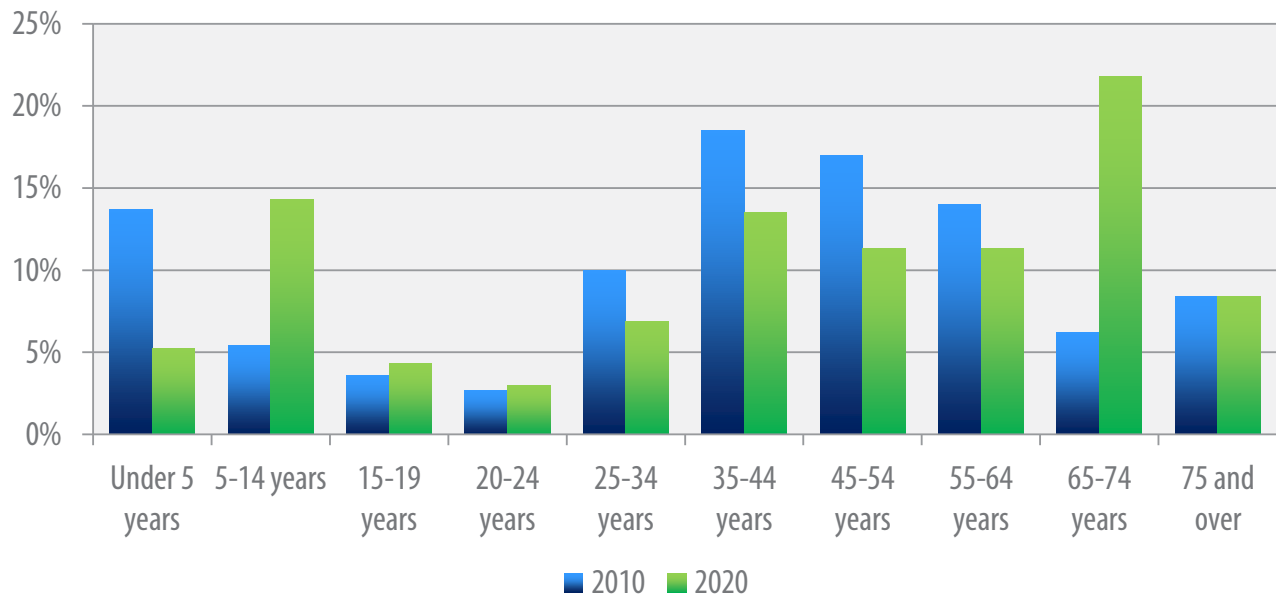
Source: US Census Bureau, American Community Survey

Figure H.2 is a comparison of the age distribution for Bagley from 2010 to 2020. The biggest population decrease occurred in under 5 age cohort which, in 2010, represented 13.7% of the total population, but only 5.2% in 2020. Other significant losses came in the 35-44 and 45-54 age groups. Notable increases in population were seen in the 5-14 and 65-74 age groups.

The age distribution is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as "brain drain."



**Figure H.2: City of Bagley Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most essential aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

From 2010 to 2020, the number of total housing units in Bagley decreased by thirty-five. During the same time, the vacancy rate increased by 11 units. This is mostly due to the loss of population in the last ten years. The number of owner-occupied housing units decreased during this period by 46. As populations continue to decline, these trends are likely to carry on. Table H.1 shows the housing trends for Bagley from 2010 to 2022.

**Table H.1: City of Bagley Housing Units, 2010 & 2022**

	2010		2022	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	158	84.5%	112	73.6%
<b>Owner Occupied</b>	107	67.7%	95	84.8%
<b>Renter Occupied</b>	51	32.3%	17	15.2%
<b>Vacant Housing Units</b>	29	15.5%	40	26.3%
<b>Total Housing Units</b>	187	100.0%	152	100.0%

Source: US Census Bureau, American Community Survey

Based on the Guthrie County Assessor's parcel data, 23.2% of Bagley's owner-occupied homes are valued below \$50,000. Only 20% of homes are valued at more than \$100,000. The estimated median value in 2022 was \$80,200. Homes of lesser value are most likely older homes that may be more susceptible to hazards such as fires, serious storms and other weather related hazards. Since the population has been declining, it will be important to invest in the rehabilitation of existing housing. This will improve the safety of homes and reduce their susceptibility to numerous hazards. Table H.2 displays the value of housing units in Bagley in 2022.

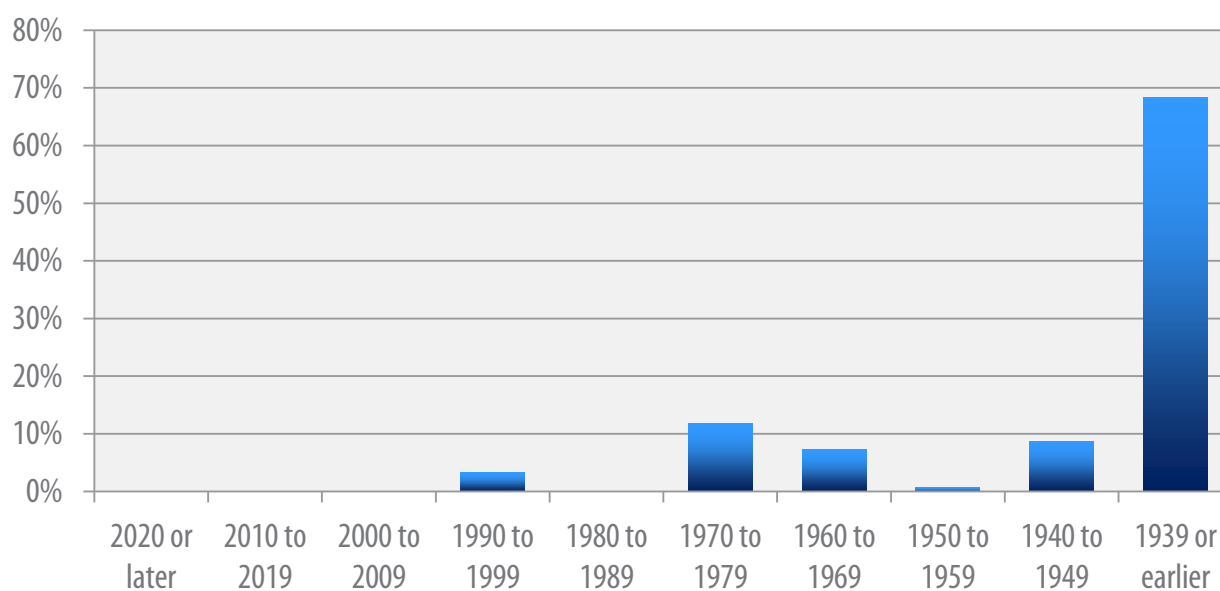
**Table H.2: City of Bagley Value of Owner-Occupied Housing Units, 2022**

Value of Housing Unit	Percent of Homes
Less than \$50,000	23.2%
\$50,000 to \$99,999	56.8%
\$100,000 to \$149,999	14.7%
\$150,000 to \$199,999	5.3%
\$200,000 to \$299,999	0.0%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

As previously stated, aging housing stock is more susceptible to storm damage and other related events. Over 68% of the current housing stock in Bagley was constructed prior to 1940. Housing construction has slowed down considerably since then, but saw an increase in the 1970s and again in the 1990s. Since 1990, 3.3% of homes have been constructed. Figure H.3 shows the distribution of housing unit construction in Bagley.

**Figure H.3: City of Bagley Year Housing Unit Constructed, 2022**



Source: Guthrie County Assessor

## *Economics*

Table H.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$43,929 and the mean household income was \$56,166. According to the 2022 American Community Survey 5-Year Estimates, 52% of Bagley's households had incomes below \$49,000 and 17% had incomes above \$100,000. This is consistent with the city's housing values.

Bagley is typical of many smaller rural Iowa cities due to its dependence on regional employment opportunities. Many residents are required to commute to surrounding communities such as Guthrie Center or Jefferson. The employment by industry statistics are shown in Table H.4. The industries with the highest percentage employed include Educational Services, and Health Care and Social Assistance (21.4%), Retail Trade (16.7%), and Manufacturing and Public Administration (14.3% each). These percentages are based on the total number of individuals 16 years and older that are from Bagley and are employed.

**Table H.3: City of Bagley Household Income, 2022**

<b>Income (In 2022 Inflation-Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	6	5.4%
\$10,000-\$14,999	8	7.1%
\$15,000-\$24,999	18	16.1%
\$25,000-\$34,999	12	10.7%
\$35,000-\$49,999	15	13.4%
\$50,000-\$74,999	18	16.1%
\$75,000-\$99,999	16	14.3%
\$100,000-\$149,999	19	17.0%
\$150,000-\$199,999	0	0.0%
\$200,000 or more	0	0.0%
Median Household Income	\$43,929	-
Mean Household Income	\$56,166	-

Source: US Census Bureau, American Community Survey

**Table H.4: City of Bagley Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	84	100.0%
Agriculture, forestry, fishing and hunting, and mining	2	2.4%
Construction	6	7.1%
Manufacturing	12	14.3%
Wholesale trade	0	0.0%
Retail trade	14	16.7%
Transportation and warehousing, and utilities	8	9.5%
Information	1	1.2%
Finance and insurance, and real estate and rental and leasing	2	2.4%
Professional, scientific, and management, and administrative and waste management services	2	2.4%
Educational services, and health care and social assistance	18	21.4%
Arts, entertainment, and recreation, and accommodation and food services	3	3.6%
Other services, except public administration	4	4.8%
Public administration	12	14.3%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table H.5 provides a compilation of the current planning and regulatory documents for the City of Bagley.

**Table H.5: City of Bagley Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	No	-
Zoning Ordinance	Yes	2009
Strategic Plan	Yes	1999
Housing Needs Assessment	Yes	1994
NFIP Participant	Yes	1987
Floodplain Regulations	Yes	2017

### *NFIP Participation*

In the past, there have been instances of significant flooding within the city limits of Bagley. Bagley started participating in the NFIP in 1987, and the flood map was updated in 2017. The city's FIRMs can be found in the later in this appendix.

### *Outlook and Future Development*

Bagley's population is likely to continue decline slowly. Since the last plan update, there has been no new development within the town. There is no future development planned within the city limits.

### *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Bagley's critical facilities can be found on map H.2.

### *Essential Infrastructure and Services*

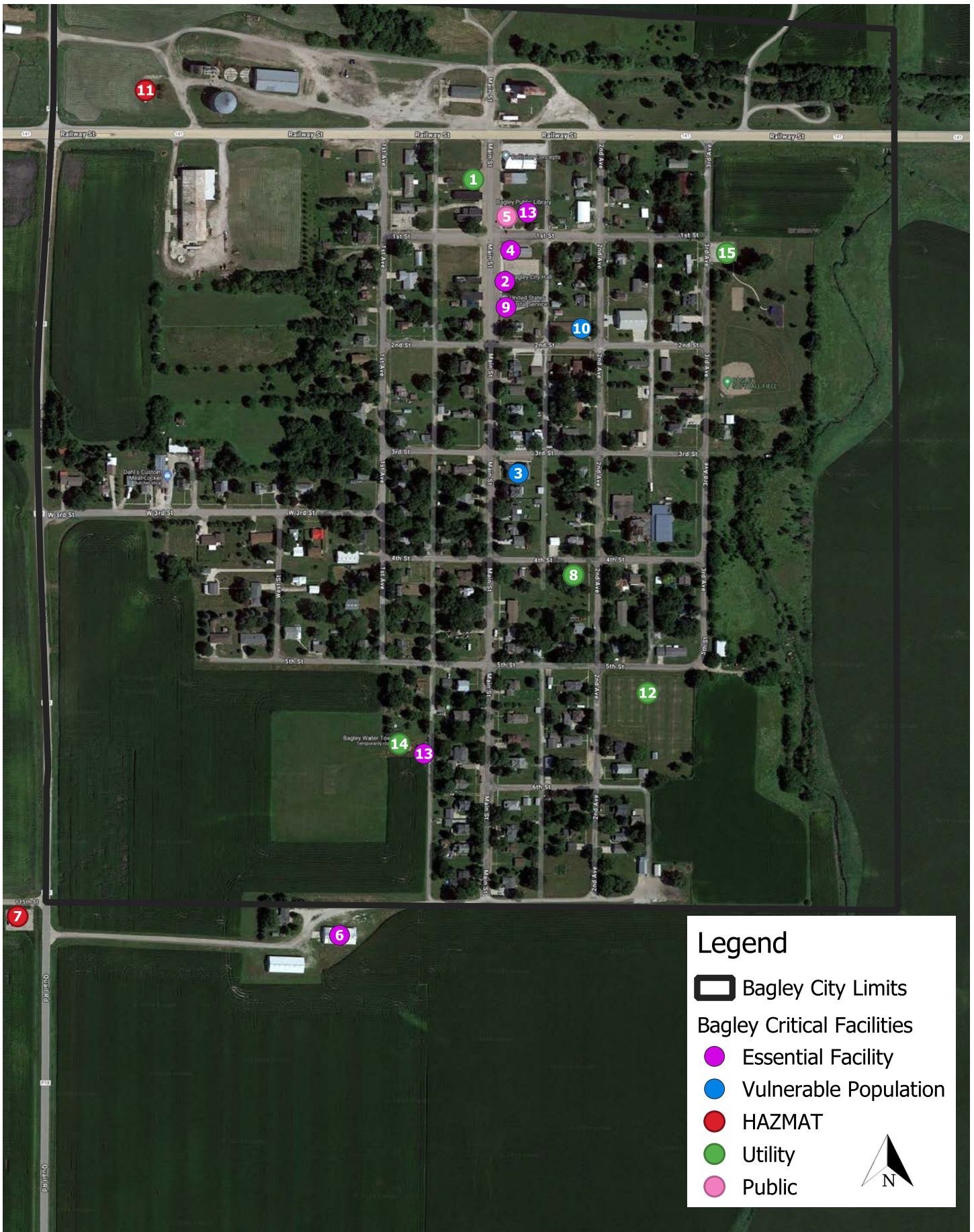
Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in table H.6.

**Table H.6: City of Bagley's Essential Infrastructure and Services**

<b>Major Arterials</b>	IA Highway 141	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Xenia Rural Water	<b>Sewer Service</b>	Septic
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Guthrie County Transfer Station
<b>Phone and Internet</b>	Windstream, Panora Fiber	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Bagley Fire Department	<b>Ambulance Service</b>	Panora EMS



## Map H.2: City of Bagley Critical Facilities



**Table H.7: City of Bagley Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Windstream Telephone Building	Main Street	Utility
2	City Hall	207 Main Street	Essential Facility
3	Bagley United Methodist Church	407 Main Street	Vulnerable Population
4	Fire Station/Community Building	200 Main Street	Essential Facility
5	Library	117 Main Street	Public
6	Maintenance Building	E 7th Street	Essential Facility
7	MidAmerican Natural Gas Supply	Corner of 115th & Quail	HAZMAT
8	North Well	North of 5th Street	Utility
9	Post Office	213 Main Street	Essential Facility
10	Retirement Apartments	223 2nd Street	Vulnerable Population
11	New Century FS	Railway Street (IA 141)	HAZMAT
12	South Well	South of 5th Street	Utility
13	Storm Sirens	N of 1st Street & E of Main S of 5th Street & W of Main	Essential Facility
14	Water Tower	S of 5th Street W of Main	Utility
15	Pump Station	S of 5th Street W of Main	Utility

# Hazard Scores

**Table H.8: City of Bagley Risk Assessment Scoring**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	The City of Bagley contains a large amount of agricultural land. Although this land represents a large portion of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Bagley has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Bagley, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Bagley, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact Bagley. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding in the City of Bagley. While flash floods have little to no warning time, with no instances within the last planning period, the committee has determined this hazard is not a high priority hazard to address, but will consider mitigation actions to prepare the community for response to an event.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand ion and immediately surrounding the city. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control in a matter of minutes and can pose a threat to life.
<b>HAZMAT Incident</b>	Within the most recent planning period, there were two instances of HAZMAT spills within Bagley. One spill did not threaten any life or resources, the other threatened people, soil, surface water, and groundwater. With two instances in five years, the committee feels this hazard poses a threat to the community and mitigation actions should be strongly considered and implemented to prevent any further instances.
<b>Human Disease</b>	Iowa and more specifically the City of Bagley are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Bagley would be structural failure of either bridges or roadways. As these instances have no warning time, planning must be completed prior to an event happening to be able to respond in a quick manner.



<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Bagley. It is unlikely that levee or dam failure will impact the city, although the city feels that planning for river flooding and planning for dam/levee failure are similar in nature.
<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Bagley, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	Portions of the City of Bagley are located within a flood zone. Since 2018, there was one instance of reported flooding within Bagley. This hazard has a medium probability of effecting the community, and has historically caused sizeable damage within the community. Primary mitigation actions for this hazard would include limitations on construction in the flood zone.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Bagley. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within Bagley. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Bagley during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Bagley but is normally not severe in nature.
<b>Tornado</b>	Guthrie County has experienced a number of tornadoes in the recent past, and Bagley has been in the direct path of two of the tornadoes. Both tornadoes caused reported damage. While the damage reported was limited, it is important for the city to continue to plan for the response to tornadoes as storms within Iowa continue to grow in strength. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the majority of the City of Bagley are relatively low, but portions of the community have higher speed limits. With the majority of the community having lower speed limits, it is likely that any transportation incident between vehicles is likely to cause little damage to property or humans, but there is a chance of an incident which can cause extensive damage. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Bagley prompting the community to prepare more effectively for these hazards.



# Loss Estimates

**Table H.9: City of Bagley Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
Agricultural	5	\$91,800	233
Commercial	13	\$422,100	
Industrial	0	\$0	
Residential	147	\$6,403,900	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table H.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table H.10: City of Bagley Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
Agricultural	0	\$0	21
Commercial	1	\$3,789	
Industrial	0	\$0	
Residential	13	\$576,351	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table H.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table H.11: City of Bagley Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
Agricultural	1	\$22,950	58
Commercial	3	\$105,525	
Industrial	0	\$0	
Residential	37	\$1,600,975	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table H.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table H.12: City of Bagley Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
Agricultural	3	\$45,900	117
Commercial	7	\$211,050	
Industrial	0	\$0	
Residential	74	\$3,201,950	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table H.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Maps

Source: FEMA Flood Map Service Center



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

**SPECIAL FLOOD HAZARD AREAS**

- Without Base Flood Elevation (BFE)  
Zone A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
- Regulatory Floodway
- 0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
- Future Conditions 1% Annual Chance Flood Hazard Zone X
- Area with Reduced Flood Risk due to Levee See Notes Zone X
- Area of Minimal Flood Hazard Zone X
- Area of Undetermined Flood Hazard Zone D

**OTHER AREAS OF FLOOD HAZARD**

- NO SCREEN

**OTHER AREAS**

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall
- Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

**GENERAL STRUCTURES**

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

**OTHER FEATURES**

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

## NOTES TO USERS

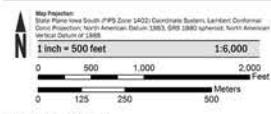
For information and questions about this map, available products associated with the FIRM including historic versions of the FIRM, how to order products or the National Flood Insurance Program in general please call the FEMA Map Information Exchange at 1-877-FEMA-8087 or visit the FEMA Map Service Center website at [fema.gov](http://fema.gov). Available products may include preliminary, revised, or final versions of the map. Many of these products may be ordered directly from the website. Users may determine the correct map date for each FIRM panel by visiting the FEMA Map Service Center website or by visiting the FEMA Map Information Exchange.

For community and countywide map dates refer to the Flood Insurance Study report for the jurisdiction.

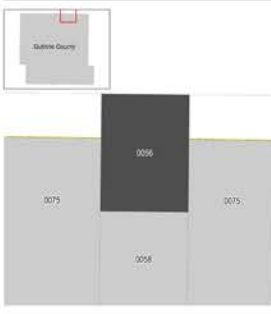
To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-368-6622.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2-foot ground resolution from imagery taken in April 2005.

## SCALE



## PANEL LOCATOR



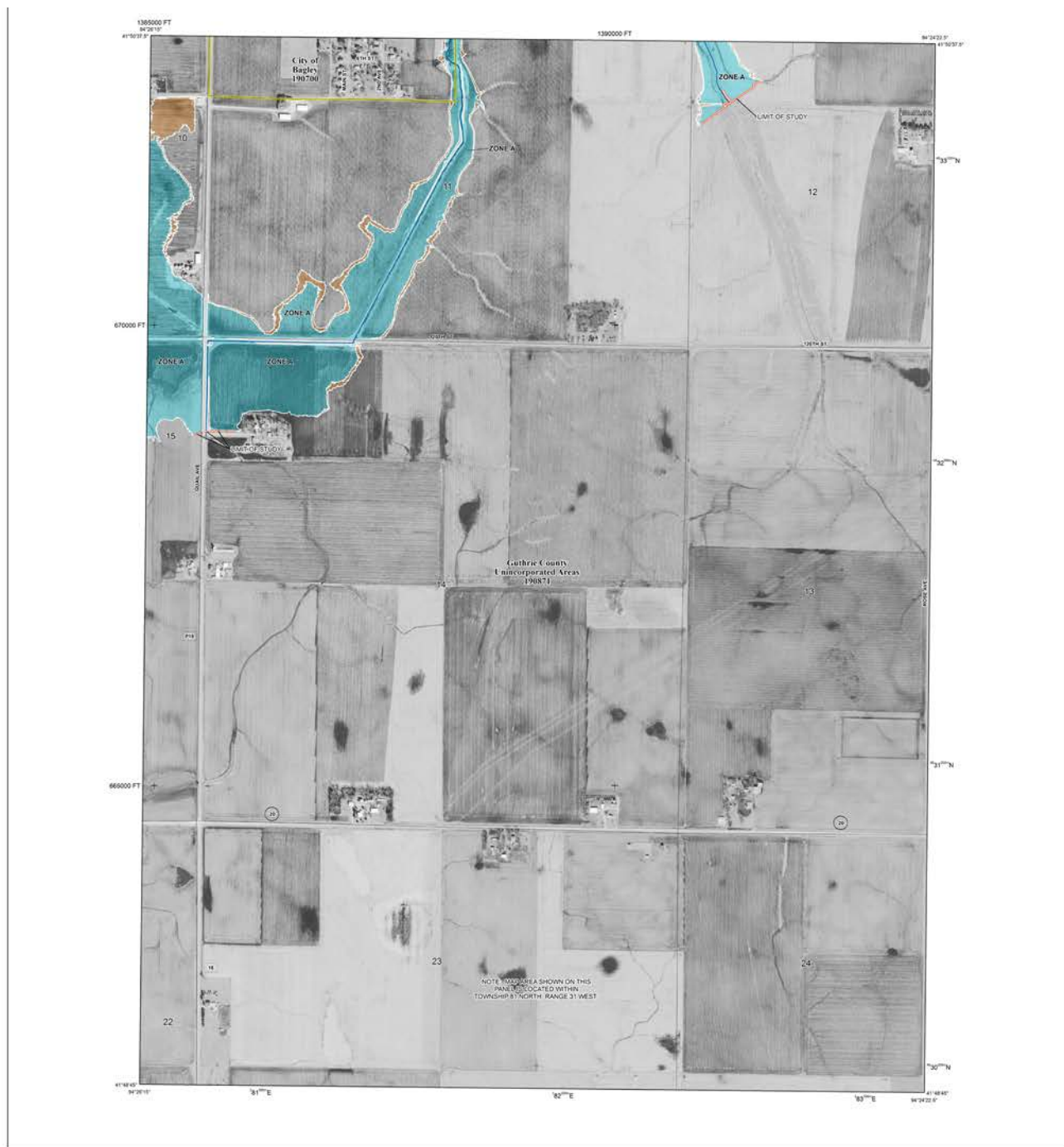
**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
AND TOWNSHIP 87 NORTH  
RANGE 11 WEST

PANEL 56 OF 325

Revised Contents:

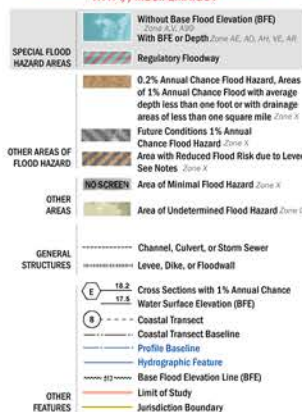
COMMUNITY	NUMBER	PANEL	SUFFIX
BAGLEY, CITY OF	190700	0096	0
GUTHRIE COUNTY	190700	0096	0

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700056D  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic editions of the FIRM, how to order products of the National Flood Insurance Program in general please call the FEMA Map Information Exchange at 1-877-FEMA-8287 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

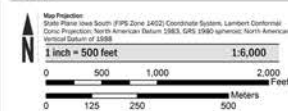
Communities requesting land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
AND INCORPORATED AREAS

PANEL 58 OF 325



COMMUNITY  
SINGLE CITY OF  
GUTHRIE COUNTY

NUMBER  
190700  
190871

PANEL  
0056  
0058

SUFFIX  
B  
D

VERSION NUMBER

2.3.3.0

MAP NUMBER

1907700580

EFFECTIVE DATE

APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table H.13: City of Bagley Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Create a list of special needs residents			X		
Continually train and equip first responders, emergency volunteers, and firefighters			X		
Prepare adequate shelter in case of emergency			X		
Reduce the impact of power outages			X		
Maintain and improve the City's storm warning system			X		
Continue to provide availability of flood insurance			X		

## Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*



**Table H.14: City of Bagley Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public warning capabilities
Objective 2	Improve public infrastructure and critical assets in hazard impact areas
Objective 3	Provide back-up systems for all critical systems and assets
Objective 4	Develop plans to become less vulnerable to hazards
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 3	Account for vulnerable populations
Objective 4	Develop plans to become less vulnerable to hazards
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Provide educations and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Improve first responder resources and capabilities
Objective 2	Account for vulnerable populations
Objective 3	Develop plans to become less vulnerable to hazards
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Develop plans to become less vulnerable to hazards
Objective 3	Improve first responder resources and capabilities

**Table H.15: City of Bagley Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Siren/Generator testing practices	Tornado, Windstorm	Mod	Fire Department	Minimal	Local	Emergency Services	Mid
Adopt a tree trimming ordinance	Tornado, Windstorm, Severe Winter Storm	Mod	City Council	Minimal	Local	Prevention	Mid
Make all public facilities handicap accessible	Tornado, Severe Winter Storms, Extreme Heat	Low	City Council	Minimal	Local, State, Federal	Structural Project	Mid
Install and/or update anti-virus software	Terrorism, Infrastructure Failure	Low	City Clerk	Minimal	Local	Prevention	Ongoing
Develop a water protection plan	Drought, Terrorism, Infrastructure Failure	Mod	Public Works, City Council	Minimal	Local	Prevention	Mid
Regularly update Emergency Operations Plans and strategies	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	County Emergency Management	Minimal	Local	Emergency Services	Ongoing
Upgrade warning sirens	Tornado, Windstorm	Mod	City Council	Low	Local, State, Federal	Emergency Services	Mid
Promote NOAA weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, Hailstorm, River Flooding, Severe Winter Storms, Thunderstorm and Lightning	Low	Fire Department	Minimal	Local	Emergency Services	Mid
Adopt building codes to address various hazards	Hazard Mitigation, Infrastructure Failure	Low	City Council	Minimal	Local	Property Protection	Long
Continue NFIP	Flash Flood, River Flooding	Low	City Council	Minimal	Local	Property Protection	Ongoing
Zoning ordinance implementation/enforcement	Infrastructure Failure	Low	City Council	Minimal	Local	Prevention	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Develop a plan to get to homebound people during severe weather events	Flash Flood, Tornado, Windstorm, Severe Winter Storms, River Flooding	Low	Fire Department	Minimal	Local	Emergency Services	Ongoing
Special needs/oxygen user registration program (voluntary)	Flash Flood, Tornado, Windstorm, Severe Winter Storms, River Flooding	Low	Emergency Medical Services	Minimal	Local	Emergency Services	Short
Ensure shelters are stocked to support people for extended periods of time	Flash Flood, Tornado, Extreme Heat, Severe Winter Storms	Mod	Fire Department	Minimal	Local	Emergency Services	Ongoing
Assure local plans are in place and current	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	County Emergency Management	Minimal	Local	Prevention	Ongoing
Establish alert systems for vulnerable populations	Flash Flood, River Flooding, Tornado, Extreme Heat, Severe Winter Storms, Hazardous Material	Low	Fire Department	Minimal	Local	Emergency Services	Mid
Promote Hazard Mitigation Plan to the public	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Establish hazards and mitigation section in library	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Short
Educate the public regarding communications failure	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Minimal	Local	Public Education and Awareness	Short
Purchase sandbags/maintain sandbags in dry storage	Flash Flood, River Flooding	Low	City Council	Minimal	Local	Emergency Services	Mid
Create a database of elderly residents	Tornado, Severe Winter Storms, Windstorm, Flash Flood, River Flooding	Mod	Fire Department	Minimal	Local	Emergency Services	Short
Install surge protectors on critical equipment	Thunderstorm and Lightning	Low	City Council	Minimal	Local	Property Protection	Short
Construct a community safe room	Tornado, Severe Winter Storms, Windstorm	Low	City Council	Moderate	Local, State, Federal	Structural Project	Long
Annually train key local leaders on hazard mitigation issues	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Update emergency dispatch systems	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	County Emergency Management	Moderate	Local, State, Federal	Emergency Services	Long
Continue to monitor and upgrade E911 system	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	County Emergency Management	Moderate	Local, State, Federal	Emergency Services	Long
Purchase essential vehicles and equipment	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Moderate	Local, State, Federal	Emergency Services	Long
Install GPS units in emergency vehicles	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Moderate	Local	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Purchase vehicle extraction equipment	Tornado, Windstorm, Severe Winter Storm, Infrastructure Failure, Flash Flood, River Flooding, Hazardous Material, Transportation Incident	Mod	Fire Department	Minimal	Local, State, Federal	Emergency Services	Long
Purchase SCBAs for emergency responders	Tornado, Grass or Wild Land Fire, Human Disease, Hazardous Material, Terrorism, Transportation Incident, Infrastructure Failure, Radiological	Mod	Fire Department	Low	Local, State, Federal	Emergency Services	Long

# Incorporation into Other Planning Mechanisms

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Where possible, Bagley will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Strategic Plan
- Housing Needs Assessment

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Comprehensive Plan
- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Building Code
- Zoning Ordinance





# Appendix I: City of Bayard

## Community Profile

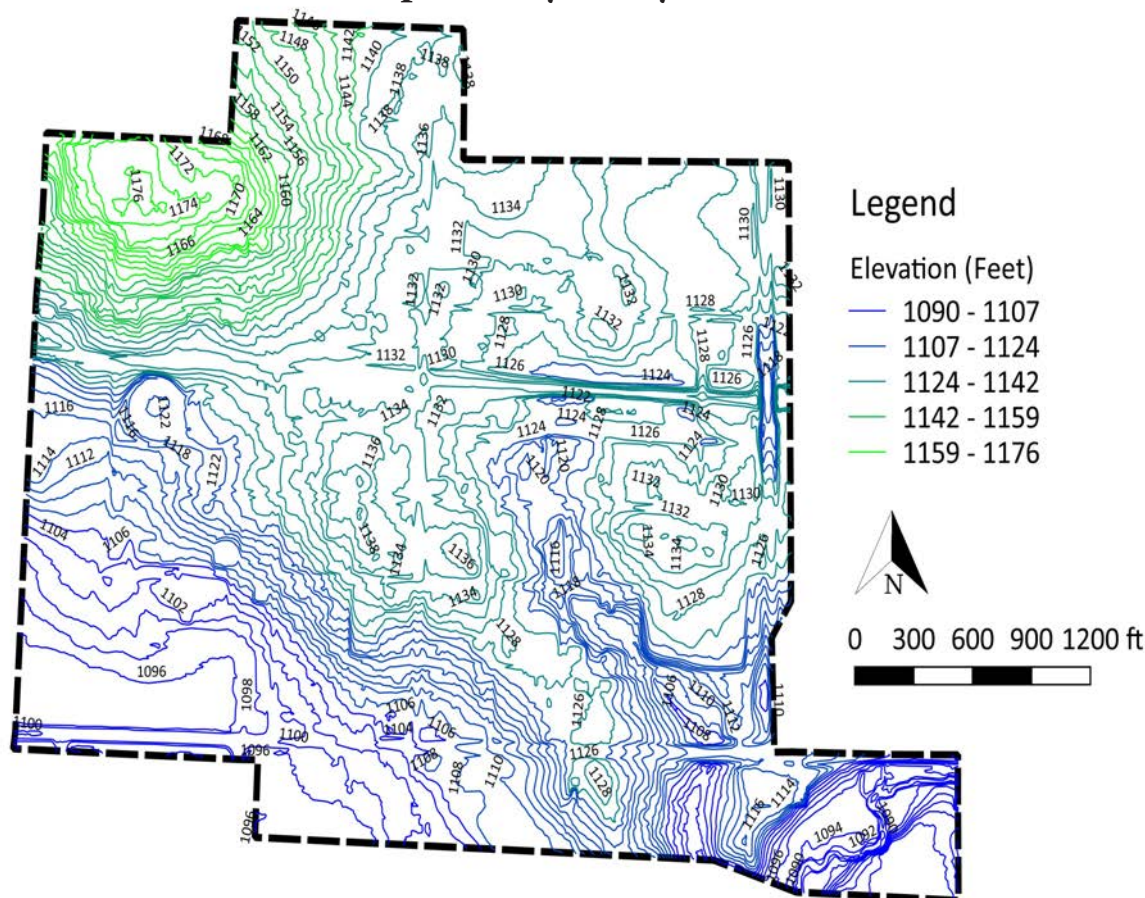
### *History*

In February of 1882, the plat of Bayard was filed by the Milwaukee Land Company. The city was constructed in anticipation of the railroad which would soon be constructed in northern Guthrie County. That same year, M.M. Allen laid out part of the town in which he called Allenville. This was later accepted as an addition to the original plat. The first building was constructed in October of 1881 along with the pioneer drugstore in November. Bayard was officially incorporated as a city in May of 1883.

### *Geography and Environment*

Bayard is located in the northern part of Guthrie County. IA 144 extends along the south side of town, while IA 25 runs along the east side of town. Bayard is 7.4 miles from Coon Rapids, 15.7 miles from Guthrie Center, 20.8 miles from Panora, 34.2 miles from Audubon and 64.1 miles from Des Moines.

Map I.1: City of Bayard Elevation



Source: Iowa DNR

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. Bayard however, is located in the northern part of the county, which has lower elevations. The highest point in Bayard is roughly 1,174 feet. The lowest part of town is located in the southwest corner of town with an elevation of 1,096 feet. Map I.1 shows the city of Bayard's elevation.

## Demographics

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Bayard's population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

The population of Bayard has experienced periods of growth and decline since 1960. Between 1960 and 1980 the population increased from 567 to 637. A significant loss of 126 residents occurred in the 1980s. Bayard then grew by 25 residents the next decade only to experience another notable decline of 131 residents from 2000 to 2020. Figure I.1 below shows the population trend from 1960 to 2020.

**Figure I.1: City of Bayard Population, 1960-2020**

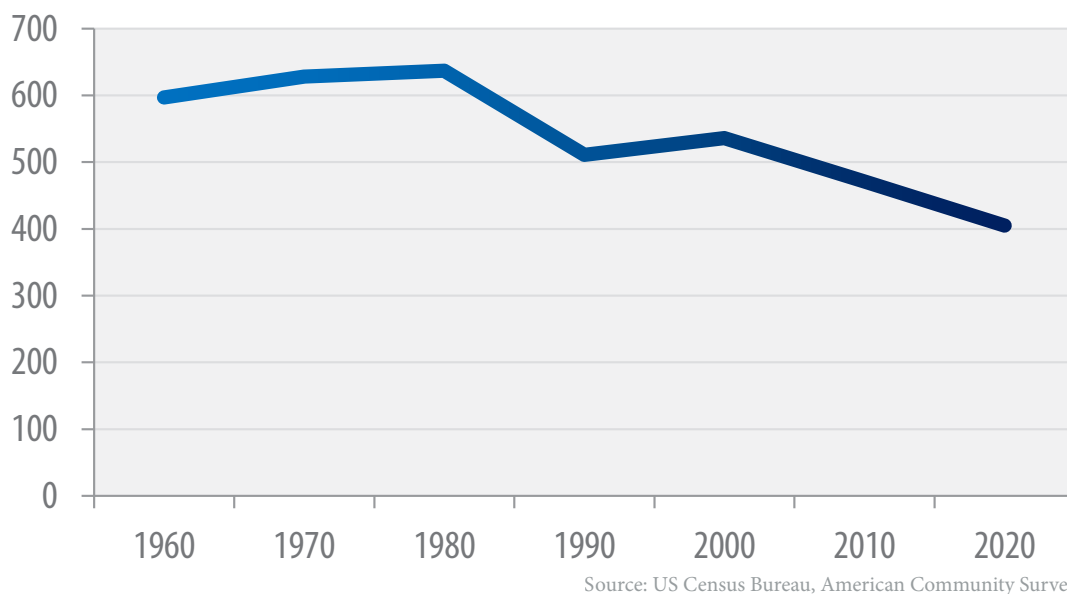
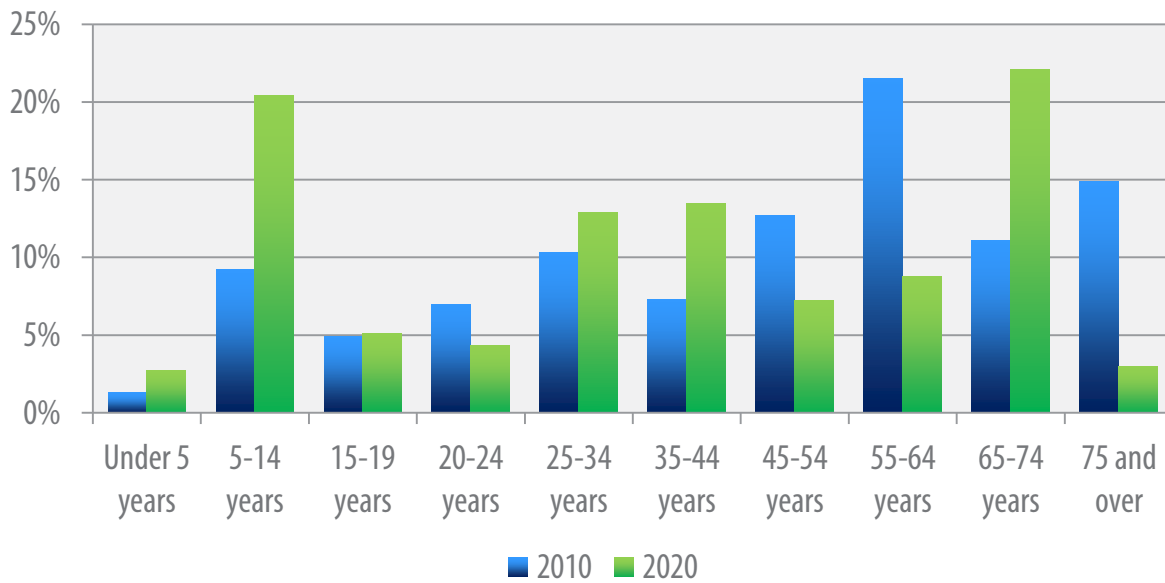


Figure I.2 is a comparison of the age distribution for Bayard from 2010 to 2020. The largest population decrease occurred in the 55-64 age cohort. Other significant losses came in the 55-64 and 75 and over age groups. A significant increases in population were seen in the 5-14 and 65-74 age groups.

The age distribution in Figure 2.26 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as "brain drain."

**Figure I.2: City of Bayard Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

From 2010 to 2022, the number of total housing units decreased by 22. During the same time, the vacant units increased by 4 units, which can be attributed to the decrease in population. The number of owner-occupied housing units decreased by 28 while the number of renter-occupied housing units increased by two. As populations continue to decline, these trends are likely to carry on. Table I.1 shows Bayard's housing trends from 2010 to 2022.

**Table I.1: City of Bayard Housing Units, 2010 & 2022**

	2010		2022	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	192	81.4%	166	75.1%
<b>Owner Occupied</b>	159	82.2%	131	78.9%
<b>Renter Occupied</b>	33	17.2%	35	18.2%
<b>Vacant Housing Units</b>	44	18.6%	48	24.9%
<b>Total Housing Units</b>	236	100.0%	214	100.0%

Source: US Census Bureau, American Community Survey

Bayard, like many small rural towns in Iowa, has a large majority of housing units (40.5%) valued under \$50,000. Although these homes are extremely affordable and can be used to attract many residents to the community, they may be deteriorating and will be in need of repair. These homes are most likely older homes that may be more susceptible to hazards such as fires, serious storms, and other weather related hazards. Only 7.6% of homes were valued at more than \$100,000. Table I.2 shows the value of housing units in Bayard in 2022.

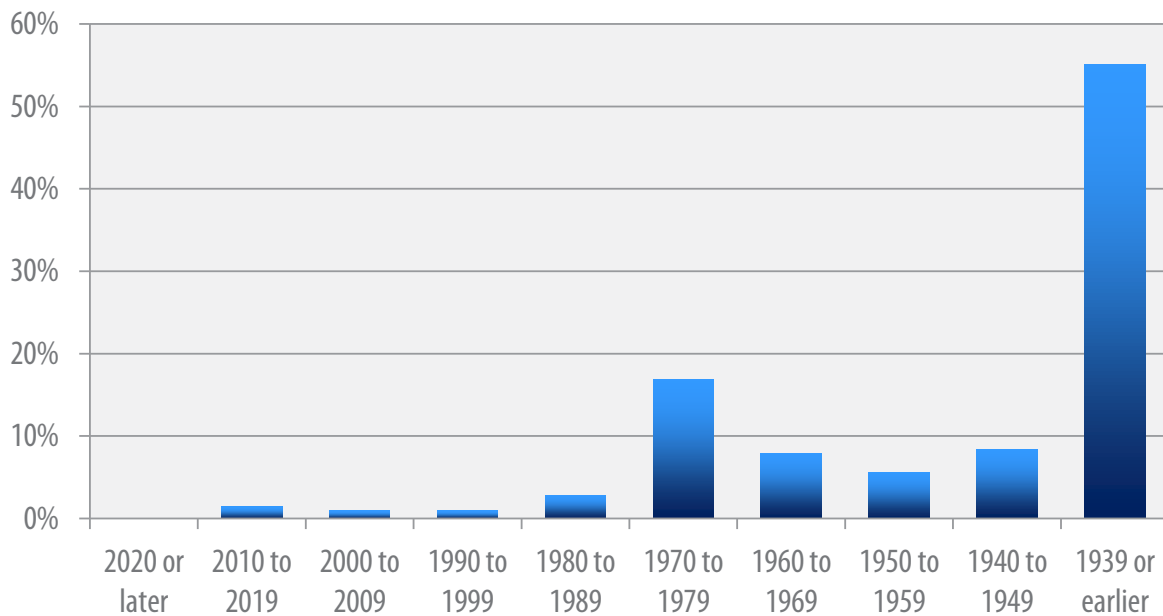
As previously stated, aging housing stock is more susceptible to storm damage and other related events. Over 55% of the homes in Bayard were constructed prior to 1940. Housing construction has slowed down considerably since then, but saw an increase between 1970 and 1979 when 16% of the homes in Bayard were constructed. Only an estimated 2.3% of current homes have been constructed since 2000. Figure I.3 shows the distribution of housing unit construction in Bayard.

**Table I.2: City of Bayard Value of Owner-Occupied Housing Units, 2022**

Value of Housing Unit	Percent of Homes
Less than \$50,000	40.5%
\$50,000 to \$99,999	51.9%
\$100,000 to \$149,999	6.1%
\$150,000 to \$199,999	0.0%
\$200,000 to \$299,999	1.5%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

**Figure I.3: City of Bayard Year Housing Unit Constructed**



Source: Guthrie County Assessor

## *Economics*

Table I.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$45,000 and the mean household income was \$48,443. According to the 2022 American Community Survey 5-Year Estimates, 58.5% of Bayard's households had incomes below \$49,000 and only 7.8% had incomes above \$100,000. This is consistent with the city's housing values.

Due to a primary reliance on agriculture, with over 97% of the land being farmland, the economies that diversified have been impacted less by a downturn in the market. Bayard is typical of many smaller rural Iowa cities due to its dependence on regional employment opportunities. Many residents are required to commute to surrounding communities such as Guthrie Center or Jefferson. The employment by industry statistics are shown in Table I.4. The industries with the highest percentage employed include Educational Services, and Health Care, and Social Assistance (14.1%), Manufacturing (13.5%), and Retail Trade (13.5%). These percentages are based on the total number of individuals 16 years and older that are from Bayard and are employed.



**Table I.3: City of Bayard Household Income, 2022**

<b>Income (In 2022 Inflation-Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	12	7.2%
\$10,000-\$14,999	10	6.0%
\$15,000-\$24,999	24	14.5%
\$25,000-\$34,999	24	14.5%
\$35,000-\$49,999	27	16.3%
\$50,000-\$74,999	41	24.7%
\$75,000-\$99,999	15	9.0%
\$100,000-\$149,999	9	5.4%
\$150,000-\$199,999	4	2.4%
\$200,000 or more	0	0.0%
Median Household Income	\$45,000	-
Mean Household Income	\$48,443	-

Source: US Census Bureau, American Community Survey

**Table I.4: City of Bayard Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	185	100.0%
Agriculture, forestry, fishing and hunting, and mining	22	11.9%
Construction	10	5.4%
Manufacturing	25	13.5%
Wholesale trade	17	9.2%
Retail trade	23	12.4%
Transportation and warehousing, and utilities	21	11.4%
Information	1	0.5%
Finance and insurance, and real estate and rental and leasing	12	6.5%
Professional, scientific, and management, and administrative and waste management services	14	7.6%
Educational services, and health care and social assistance	26	14.1%
Arts, entertainment, and recreation, and accommodation and food services	2	1.1%
Other services, except public administration	7	3.8%
Public administration	5	2.7%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table I.5 provides a compilation of the current planning and regulatory documents in place for the City of Bayard.

**Table I.5: Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	1998
Building Code	No	-
Zoning Ordinance	Yes	1978
Strategic Plan	Yes	1996
Housing Needs Assessment	No	-
NFIP Participant	No	-
Floodplain Regulations	Yes	2017

## *NFIP Participation*

In the past, there have been instances of significant flooding within the city limits of Bayard. Recently, the city began participating in the NFIP. The flood map was updated in 2017 and the city's FIRM's can be found later in this appendix.

## *Outlook and Future Development*

Bayard has seen limited growth since the last plan update. This growth has primarily occurred in residential development. There is the option for the cooperative to expand within the city, and this development would occur primarily in the north portion of the city.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Bayard's critical facilities can be found on Map I.2.

## *Essential Infrastructure and Services*

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table I.6.

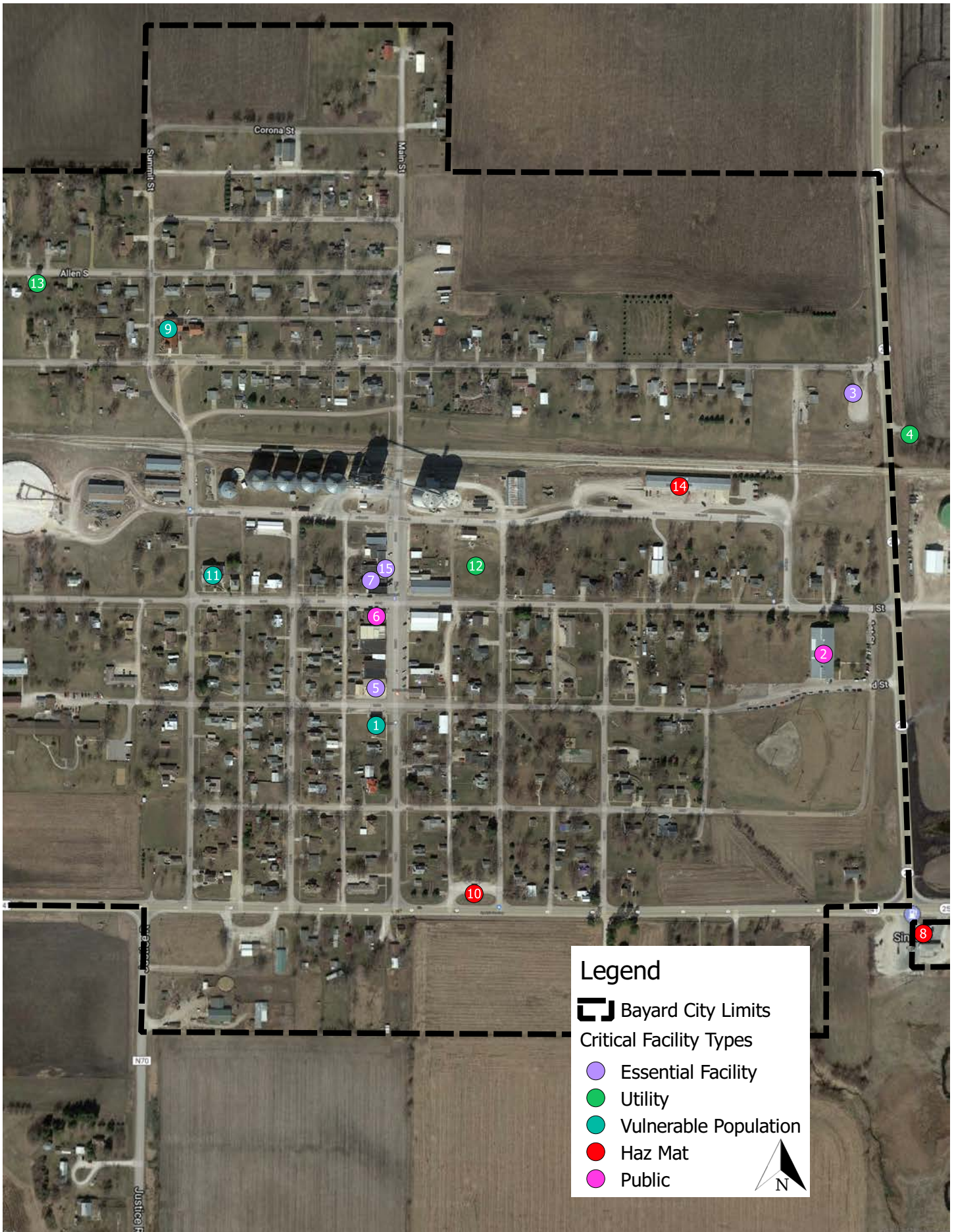
**Table I.6: Essential Infrastructure and Services**

<b>Major Arterials</b>	IA Highway 25 & 141	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Municipal	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Alliant Energy, Black Hills Energy	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Windstream, Panora Telco, wireless	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Bayard Fire & Ambulance	<b>Ambulance Service</b>	Bayard Fire & Ambulance; Panora EMS

**Table I.7: City of Bayard Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Church of Christ	401 2nd Street	Vulnerable Population
2	Community Center	301 3rd Street	Public
3	County Maintenance Shed	East Prairie Street	Essential Facility
4	Electric Substation	NE Bayard on IA 25	Utility
5	Fire Station/EMS	303 Main Street	Essential Facility
6	Library	315 Main Street	Public
7	Post Office	213 Main Street	Essential Facility
8	Sinclair	101 IA 141	HAZMAT
9	St. Patrick's Church	214 Prairie Street	Vulnerable Population
10	Star Energy	300 IA 141	HAZMAT
11	United Methodist Church	500 3rd Street	Vulnerable Population
12	Water Plant Well	Corner of 3rd Street & 3rd Avenue	Utility
13	Water Tower	Allen Street	Utility
14	Landus Cooperative	100 Railway Street	HAZMAT
15	City Hall	403 Main Street	Essential Facility

Map I.2: City of Bayard Critical Facilities





# Hazard Scores

**Table I.8: City of Bayard Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	The City of Bayard contains a large amount of agricultural land. Although this land represents a large portion of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Bayard has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Bayard, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Bayard, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact Bayard. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding in the City of Bayard. While flash floods have little to no warning time, with no instances within the last planning period, the committee has determined this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand ion and immediately surrounding the City of Bayard. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control in a matter of minutes and can pose a threat to life.
<b>HAZMAT Incident</b>	While there have been no reported instances of HAZMAT incidents in Bayard in the recent past, this hazard can occur with no warning and impact the entire community. The committee feels that this hazard should not be discarded and mitigation actions should be examined to decrease the impact a hazard of this category would have on the community.
<b>Human Disease</b>	Iowa and more specifically the City of Bayard are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Bayard would be structural failure of either bridges or roadways. As these instances have no warning time, planning must be completed prior to an event happening to be able to respond in a quick manner.
<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Bayard. It is unlikely that levee or dam failure will impact the city, although the city feels that planning for river flooding and planning for dam/levee failure are similar in nature.

<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Bayard, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	No portions of the City of Bayard are located within a flood zone. Although no land within the community is in the floodplain, there is some flood zones right outside the city limits. This hazard may effect the community, and if it were to happen, little property damage is anticipated. Primary mitigation actions for this hazard would include limitations on construction in the flood zone.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Bayard. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within Bayard. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Bayard during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Bayard but is normally not severe in nature.
<b>Tornado</b>	While Guthrie County has experienced a number of tornadoes in the recent past, Bayard has not had a tornado hit the city directly in the recent past. Although these events have historically not hit Bayard, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Bayard are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Bayard prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table I.9: City of Bayard Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	405
<b>Commercial</b>	37	\$7,540,900	
<b>Industrial</b>	1	\$13,800	
<b>Residential</b>	217	\$7,577,600	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table I.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table I.10: City of Bayard Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	36
<b>Commercial</b>	3	\$678,681	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	19	\$681,984	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table I.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table I.11: City of Bayard Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	101
<b>Commercial</b>	9	\$1,885,225	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	54	\$1,894,400	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table I.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

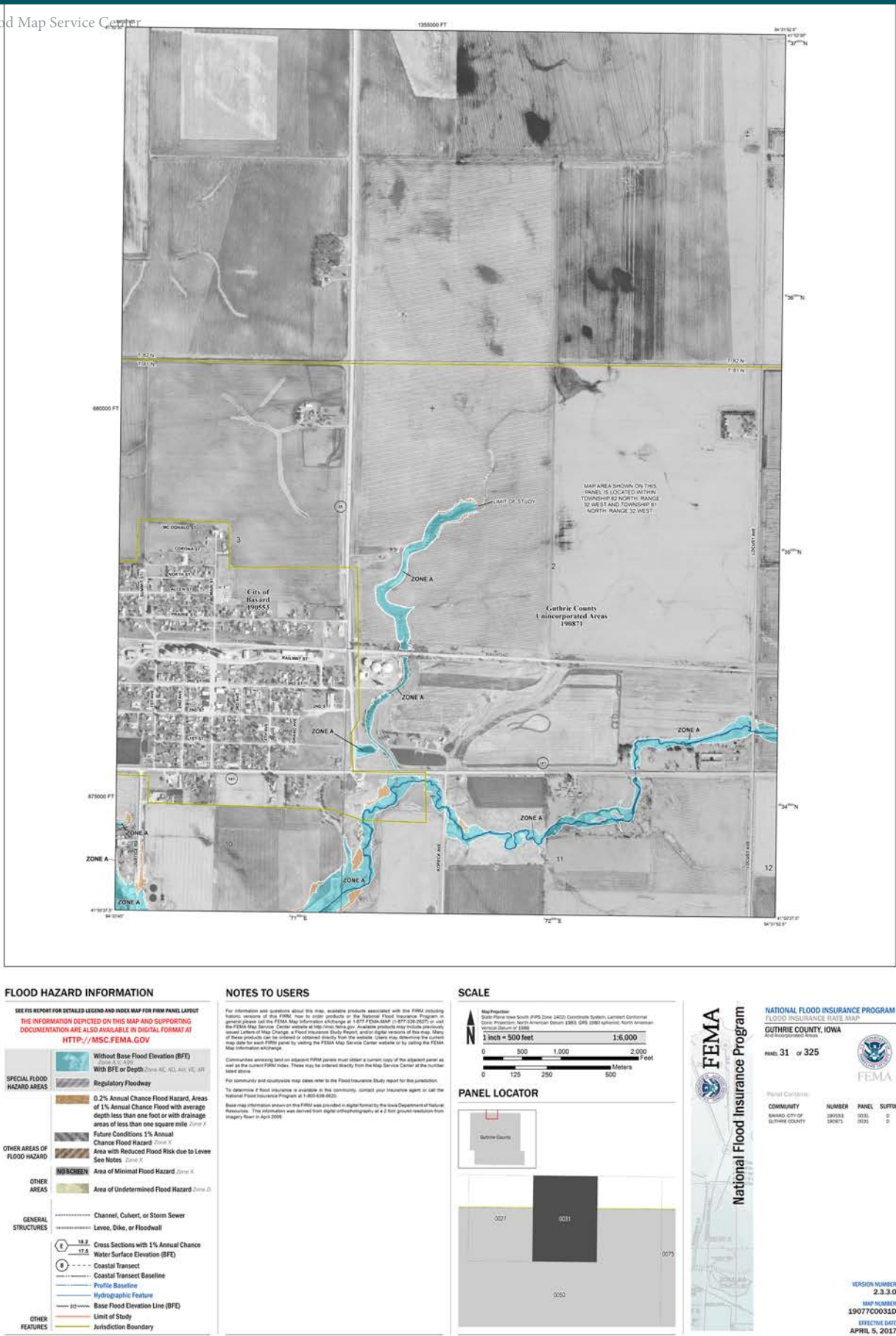
**Table I.12: City of Bayard Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	203
<b>Commercial</b>	18	\$3,770,450	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	108	\$3,788,800	

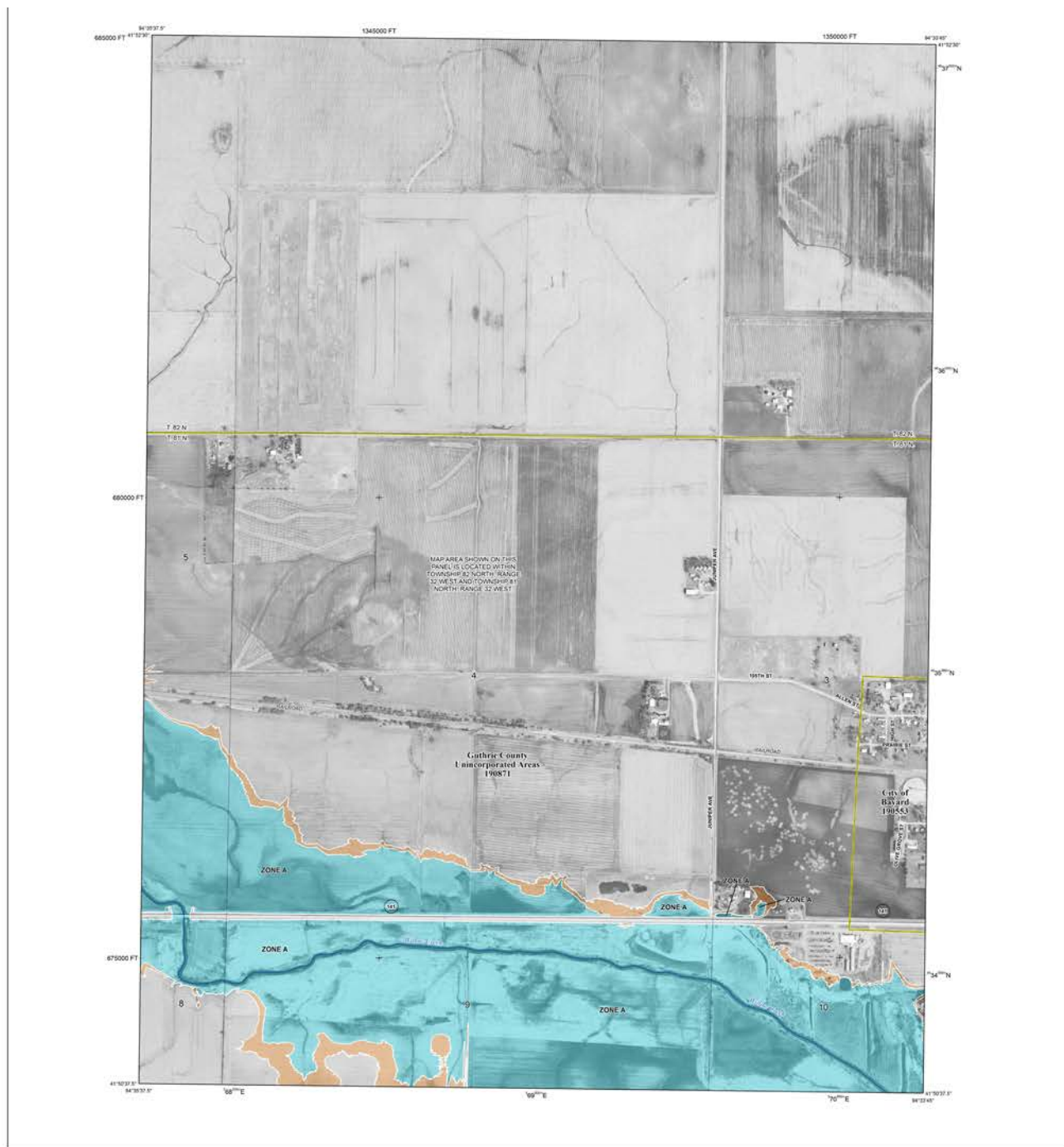
If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table I.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Maps

Source: FEMA Flood Map Service Center







## FLOOD HAZARD INFORMATION

SEE FIG REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE)
	With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard Zone X
	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	Coastal Transect Baseline
OTHER FEATURES	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic editions of the FEMA, how to order products or the National Flood Insurance Program in general please call the FEMA Map Information Exchange at 1-877-FEMA-8287 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

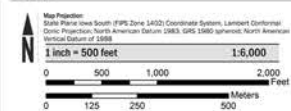
Communities requesting land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

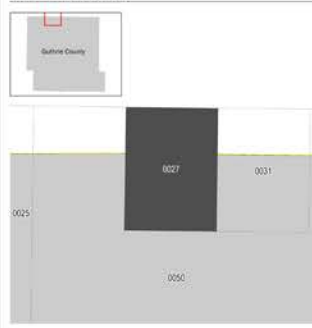
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on this FEMA was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectified photography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 27 OF 325



COMMUNITY NUMBER PANEL SUFFIX  
BAYARD, CITY OF 390553 0027 B  
GUTHRIE COUNTY 390871 0037 D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C0027D  
EFFECTIVE DATE  
APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table I.13: City of Bayard Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Reduce the amount of surface runoff and accompanying debris throughout the city			X		
Provide an adequate supply of water for the residents of Bayard during dry periods of time			X		
Continue to provide quality fire protection to Bayard and the surrounding area			X		
Identify areas that may contain hazardous materials			X		
Remove any abandoned or unused hazardous containers			X		
Educate citizens on how to react during times of severe weather			X		
Educate citizens on tornado safety			X		
Remove snow in a timely manner			X		
Provide shelter for citizens during power outages			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table I.14: City of Bayard Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public warning capabilities
Objective 2	Improve public infrastructure and critical assets in hazard impact areas
Objective 3	Provide back-up systems for all critical systems and assets
Objective 4	Develop plans to become less vulnerable to hazards
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 3	Account for vulnerable populations
Objective 4	Develop plans to become less vulnerable to hazards
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Provide education and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Improve first responder resources and capabilities
Objective 2	Account for vulnerable populations
Objective 3	Develop plans to become less vulnerable to hazards
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Develop plans to become less vulnerable to hazards
Objective 3	Improve first responder resources and capabilities

**Table I.15: City of Bayard Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Develop a water protection plan	Drought	High	Public Works	Minimal	Local	Natural Resource Protection	Short
Develop Drought Emergency Plan	Drought	Low	Public Works	Minimal	Local	Prevention	Mid
Continue participating in the NFIP	River Flooding	Mod	City Council	Minimal	Local	Property Protection	Short
Continue siren and generator testing practices	Tornado, Infrastructure Failure	High	Fire Department	Minimal	Local	Emergency Services	Ongoing
Adopt a tree trimming ordinance	Tornado, Windstorm, Severe Winter Storm	Low	City Council	Minimal	Local	Property Protection	Short
Upgrade anti-virus software	Infrastructure Failure	High	City Clerk	Minimal	Local	Property Protection	Ongoing
Regularly update emergency operations plans and strategies	River Flood, Flash Flood, Severe Winter Storm, Tornado, Drought, HAZMAT Incident	High	Fire Department	Minimal	Local	Emergency Services	Ongoing
Install warning sirens	Tornado, Infrastructure Failure	Mod	Fire Department	Minimal	Local, State, Federal	Emergency Services	Short
Assure local plans are in place and current	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council	Minimal	Local	Public Education and Awareness	Short
Develop agreements for Secondary Water Sources	Drought, Infrastructure Failure	High	Public Works	Low	Local	Prevention	Mid



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Establish alert systems for vulnerable populations	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Minimal	Local	Public Education and Awareness	Short
Promote hazard mitigation plan to the public	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council, Fire Department	Minimal	Local	Public Education and Awareness	Short
Establish hazards and mitigation section in the library	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council	Minimal	Local	Public Education and Awareness	Short
Educate the public regarding communications failure	Infrastructure Failure	Low	Fire Department	Minimal	Local	Public Education and Awareness	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Create a database of elderly residents	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City Clerk	Minimal	Local	Emergency Services	Mid
Install surge protectors on Critical Equipment	Infrastructure Failure	High	Public Works	Minimal	Local	Prevention	Short
Annually train key local leaders on hazard mitigation issues	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council, Fire Department, Emergency Services	Minimal	Local	Public Education and Awareness	Ongoing
Update emergency dispatch systems	Infrastructure Failure	High	EMA	High	Local, State	Emergency Services	Ongoing
Continue to monitor and upgrade E911 system	Infrastructure Failure	High	EMA	High	Local, State	Emergency Services	Ongoing
Upgrade, replace, or expand water and sewer lines	Flash Flood, Drought	High	Public Works	High	Local, State	Structural Project	Long
Make all public facilities handicap accessible	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Planning and Zoning	Minimal	Local, State, Federal	Structural Project	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt building codes to address various hazards	Infrastructure Failure	High	Planning and Zoning	Minimal	Local	Property Protection	Mid
Update zoning ordinances and enforce	Infrastructure Failure	High	Planning and Zoning	Minimal	Local	Property Protection	Ongoing
Develop a plan to get to homebound people during severe weather events	Flash Flood, Tornado, Windstorm, Extreme Heat, Thunderstorm/Lightning/Hail, River Flood, Severe Winter Storms, HAZMAT Incident, Radiological, Terrorism	Mod	Fire Department	Minimal	Local	Emergency Services	Mid
Ensure shelters are stocked to support people for extended periods of time	Tornado, Severe Winter Storms	Mod	City Council	Minimal	Local, State	Emergency Services	Mid
Ensure first responder training and equipment is up to date	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Emergency Services	Low	Local	Emergency Services	Ongoing
Promote NOAA Weather Radios	Flash Flood, Tornado, Windstorm, Extreme Heat, Thunderstorm/Lightning/Hail, River Flood, Severe Winter Storms	Low	Fire Department	Minimal	Local, State	Public Education and Awareness	Short
Special needs/oxygen user registration program (voluntary)	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Emergency Services	Minimal	Local	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Construct a community safe room	Tornado	Low	City Council	High	Local, State, Federal	Structural Project	Long
Purchase essential vehicles and equipment	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Moderate	Local, State, Federal	Emergency Services	Ongoing
Install GPS units in Emergency Vehicles	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Fire Department, Emergency Services	Minimal	Local, State, Federal	Emergency Services	Short
Purchase vehicle extraction equipment	Transportation Incident	Low	City Council, Fire Department	Low	Local, State, Federal	Emergency Services	Long
Purchase generators and pumps	River Flood	High	City Council	Low	Local, State, Federal	Property Protection	Mid
Purchase SCBAs for Emergency Responders	HAZMAT Incident	High	Fire Department	Low	Local, State	Emergency Services	Mid



# Incorporation into Other Planning Mechanisms

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Where possible, Bayard will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Strategic Plan
- Comprehensive Plan
- Zoning Ordinance
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Building Code
- Housing Needs Assessment



# Appendix J: City of Casey

## Community Profile

### *History*

The City of Casey was founded in January of 1868 by Patrick Casey, an Irish Railroad foreman with the emergence of the Rock Island Railroad. Mr. Casey eventually lost his life in a railroad accident. Casey was originally used as a “waiting” place for those who wanted to live in the new, but not officially designated, county seat, Dalmanutha. Dalmanutha was never incorporated as it never really took off. This caused many people to remain or locate in Casey. Casey wasted no time becoming a legitimate community, growing to be over 1,000 people. Since then, the community has declined and currently sits at 426 residents. Many of the first settlers in Casey established their residences with the aid of military warrants or scripts, which were given to officers and soldiers who served in the war of 1812 under an act of Congress.

The surrounding region is historically known as one of the first locations for one of the notorious Jesse James train robberies. In fact, it is said that Mr. James and his crew purchased the rope they used to derail the train at “Valentine’s Hardware” in Casey. They also requested the services from the local blacksmith livery stable to care for their horses. Casey is now known for its unique downtown, which has led it to be called, “Antique Country”.

### *Geography and Environment*

Casey is located in the south central part of Guthrie County. Casey sits right off of Interstate 80. This provides the community with significant interstate traffic. It also provides its residents with easy access and transportation to all parts of the state. IA 925 also intersects the community from east/west. Casey is 11.3 miles from Stuart, 13.4 miles from Guthrie Center, 20.8 miles from Panora and 50.3 miles from Des Moines.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. Casey is located near that portion of the county and its highest elevation is roughly 1,356 feet, toward the northern part of town. The lowest elevation in town is located to the southeast with an elevation of 1,214. Map J.1 displays Casey’s elevation.

### *Demographics*

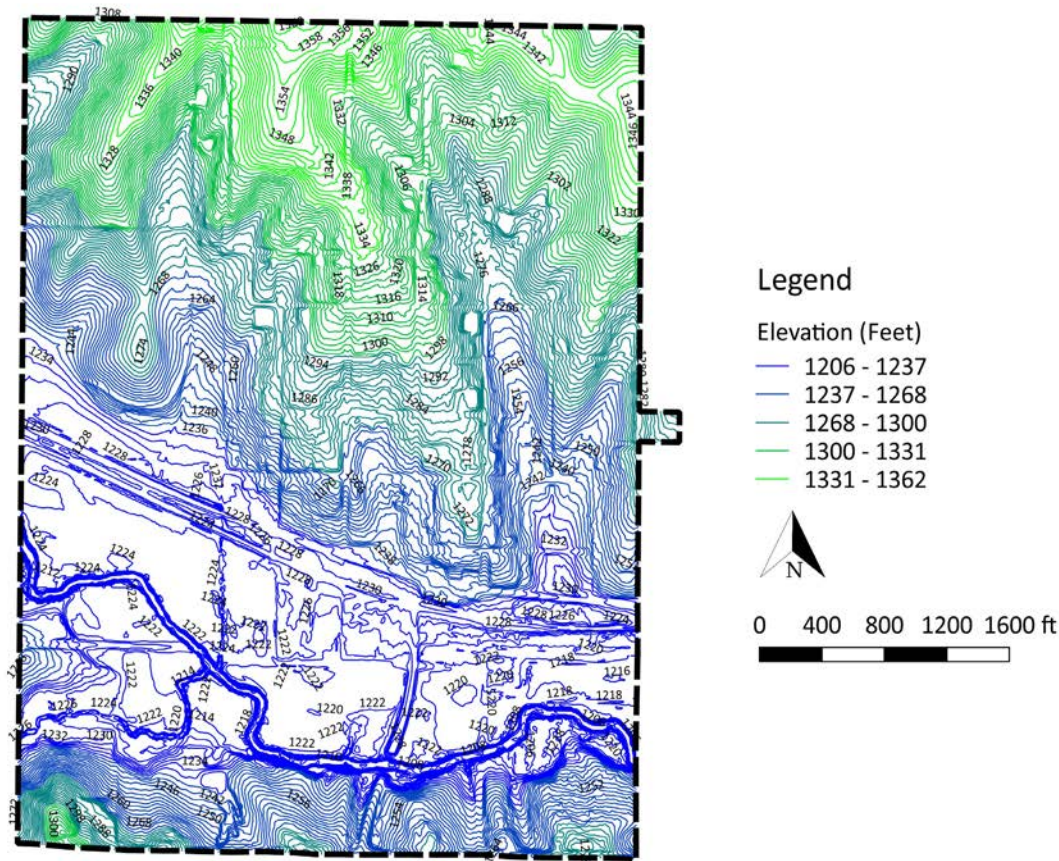
The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Casey’s population through past, present and future trends of the region.

The size and composition of a community’s population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population’s age distribution, income levels, ancestry and educational

attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

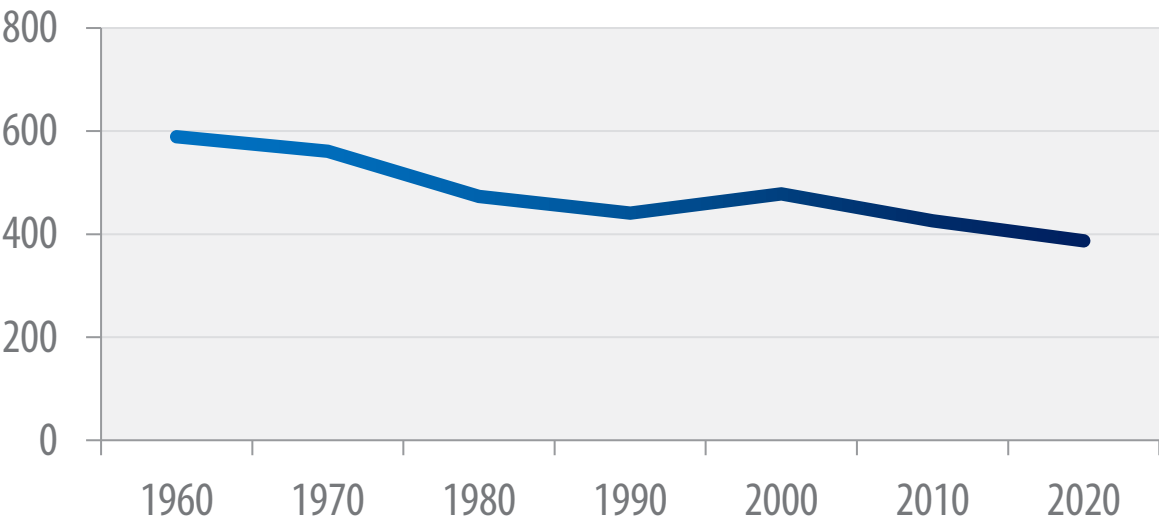
Since 1960, the population of Casey has gradually declined. A total loss of 202 individuals has occurred in that time period. The largest decrease came between 1970 and 1980 when a loss of 88 people transpired. Population increased slightly between 1990 and 2000, by a total of 32 people. Figure J.1 shows Casey's population trends from 1960 to 2020.

Map J.1: City of Casey Elevation



Source: Iowa DNR

Figure J.1: City of Casey Historic Population, 1960-2020



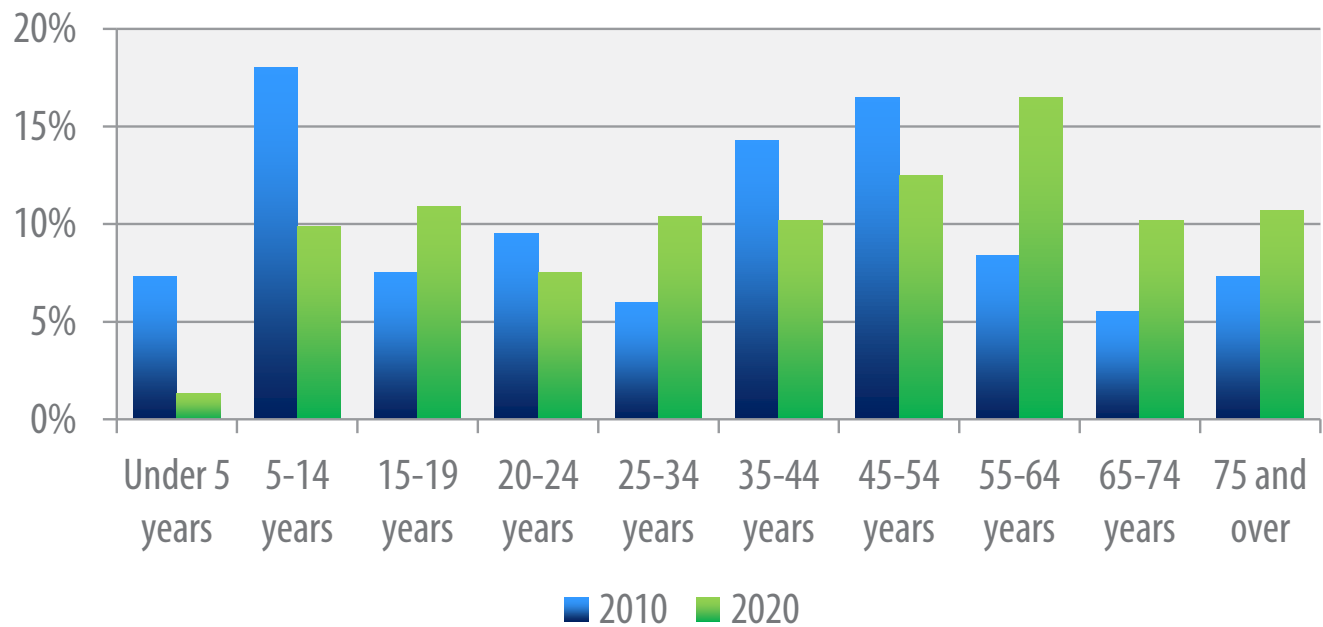
Source: US Census Bureau, American Community Survey



Figure J.2 is a comparison of the age distribution for Casey from 2010 to 2020. The biggest population decrease occurred in the 5-14 age cohort which, in 2010, represented 18% of the total population, but only 9.9% in 2020. Other significant losses came in the 45-54 and 35-44 age groups. The largest population increase was seen in the 55-64 age cohort, which increased from representing 8.4% of the population in 2010 to 16.5% in 2020.

The age distribution in Figure J.2 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as “brain drain.”

Figure J.2: City of Casey Age Distribution, 2010 & 2020



Source: US Census Bureau, American Community Survey

Housing

A community’s ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community’s housing stock, type of households, and housing availability and affordability are determining factors.

From 2010 to 2022, the total number of housing units decreased by sixty-four units and the vacancy rate dropped from thirty-eight to eight houses, accounting for 4.9% of all units in 2022. Renter-occupied units have stayed relatively stable while owner-occupied units decreased by 25 units. Table J.1 shows the housing trends for Casey from 2010 to 2022.

Table J.1: City of Casey Housing Units, 2010 & 2022

	2010		2022	
	Number	Percent	Number	Percent
Occupied Housing Units	189	83.3%	155	95.1%
Owner Occupied	147	77.8%	122	78.7%
Renter Occupied	42	22.2%	33	21.3%
Vacant Housing Units	38	16.7%	8	4.9%
Total Housing Units	227	100.0%	163	100.0%

Source: US Census Bureau, American Community Survey

The median value of owner-occupied homes in Casey (\$84,600) is a littler higher than other communities in Guthrie County. In Casey, 14.8% of homes are valued below \$50,000, while 25.4% of homes are valued at \$100,000 or above. Homes of lesser value are most likely older homes that may be more susceptible to hazards such as fires, serious storms and other weather related hazards. Since the population has been declining, it will be important to invest in the rehabilitation of existing housing. This will improve the safety of homes and reduce their susceptibility to numerous hazards. Table J.2 displays the value of housing units in Casey in 2022.

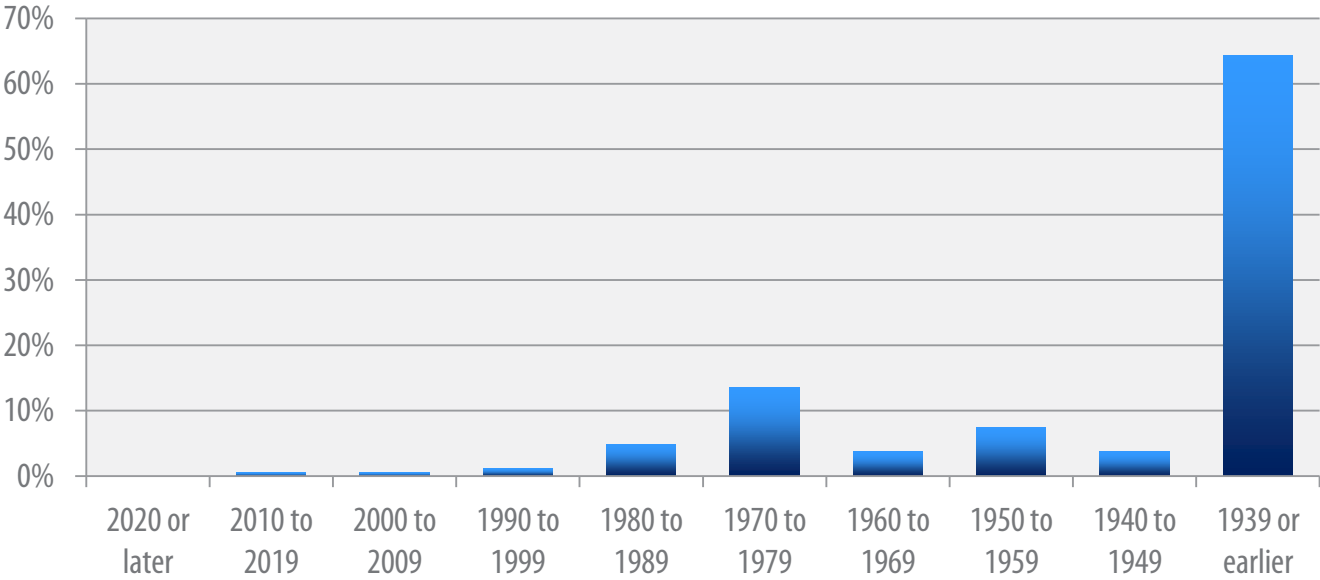
**Table J.2: City of Casey Value of Owner-Occupied Housing Units, 2022**

Value of Housing Unit	Percent of Homes
Less than \$50,000	14.8%
\$50,000 to \$99,999	59.8%
\$100,000 to \$149,999	18.9%
\$150,000 to \$199,999	5.7%
\$200,000 to \$299,999	0.8%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Adair &Guthrie County Assessor

As previously stated, aging housing stock is more susceptible to storm damage and other related events. Well over half of all homes in Casey were constructed prior to 1940. Housing construction has since dropped significantly. This trend is consistent with other Guthrie County communities and rural Iowa communities in general. Figure J.3 shows the distribution of housing unit construction in Casey.

**Figure J.3: City of Casey Year Housing Unit Constructed**



Source: Adair & Guthrie County Assessor

*Economics*

Table J.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$51,750 and the mean household income was \$67,592. According to the 2022 American Community Survey 5-Year Estimates, 47.9% of Casey’s households had incomes below \$49,000 and 23.8% had incomes above \$100,000. This is consistent with the city’s housing values.

**Table J.3: City of Casey Household Income, 2022**

<b>Income (In 2022 Inflation-Adjusted Dollars)</b>	<b>Number of Households</b>	<b>Percent of Households</b>
Less than \$10,000	12	6.5%
\$10,000-\$14,999	17	5.2%
\$15,000-\$24,999	33	7.1%
\$25,000-\$34,999	12	12.3%
\$35,000-\$49,999	27	16.8%
\$50,000-\$74,999	34	17.4%
\$75,000-\$99,999	28	11.0%
\$100,000-\$149,999	6	18.7%
\$150,000-\$199,999	1	1.9%
\$200,000 or more	2	3.2%
Median Household Income	\$51,750	-
Mean Household Income	\$67,592	-

Source: US Census Bureau, American Community Survey

Casey is typical of many smaller rural Iowa cities due to its dependence on regional employment opportunities. Many residents are required to commute to surrounding communities such as Guthrie Center. The employment by industry statistics are shown in Table J.4. The industries with the highest percentage employed include Educational Services, and Health Care and Social Assistance (20.8%), Professional, scientific, and management, and administrative and waste management services (16.2%) and Arts, entertainment, and recreation, and accommodation and food services (9.8%). These percentages are based on the total number of individuals 16 years and older that are from Casey and are employed.

**Table J.4: City of Casey Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	173	100.0%
Agriculture, forestry, fishing and hunting, and mining	12	6.9%
Construction	13	7.5%
Manufacturing	8	4.6%
Wholesale trade	10	5.8%
Retail trade	12	6.9%
Transportation and warehousing, and utilities	14	8.1%
Information	2	1.2%
Finance and insurance, and real estate and rental and leasing	13	7.5%
Professional, scientific, and management, and administrative and waste management services	28	16.2%
Educational services, and health care and social assistance	36	20.8%
Arts, entertainment, and recreation, and accommodation and food services	17	9.8%
Other services, except public administration	6	3.5%
Public administration	2	1.2%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table J.5 provides a compilation of the current planning and regulatory documents in place for the City of Casey.

**Table J.5: City of Casey Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2017
Building Code	No	-
Zoning Ordinance	Yes	2016
Strategic Plan	Yes	2017
Housing Needs Assessment	No	-
NFIP Participant	Yes	1987
Floodplain Regulations	Yes	2017

## NFIP Participation

In the past, there have been instances of significant flooding within the city limits of Casey. Casey started participating in the NFIP in 1987, and the flood map was updated in 2017. The city's FIRMs can be found later in this appendix.

## Outlook and Future Development

Casey has seen limited growth since the last plan update, and there is no future growth planned.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Casey's critical facilities can be found on map J.2.

## Essential Infrastructure and Services

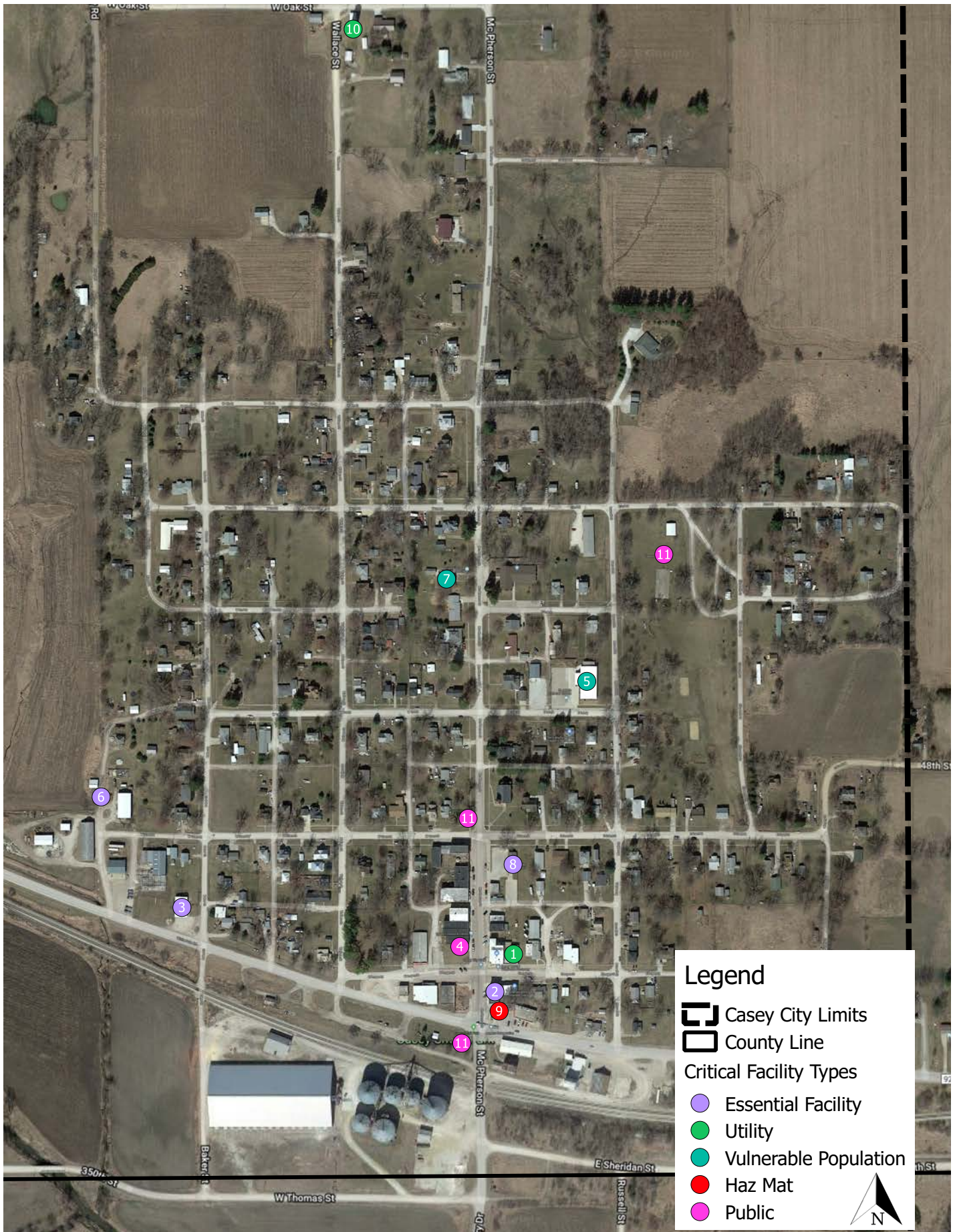
Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table J.6.

**Table J.6: City of Casey Essential Infrastructure and Services**

<b>Major Arterials</b>	IA Highway 925	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Municipal	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	Alliant Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Adair County Transfer Station
<b>Phone and Internet</b>	Casey Mutual Telephone Company, Coon Valley Cooperative Telephone, Windstream, Wireless	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Casey Fire Department	<b>Ambulance Service</b>	Stuart EMS & Adair Co. EMS



# Map J.2: City of Casey Critical Facilities



**Table J.7: City of Casey Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Casey Mutual Telephone	108 E Logan Street	Utility
2	City Hall/Community Center	503 McPherson Street	Essential Facility
3	Fire Station	300 W Sherman Street	Essential Facility
4	Library	604 Antique Country Drive	Public
5	Lutheran Church	104 E 1st Street	Vulnerable Population
6	Maintenance Shed	W 1st Street	Essential Facility
7	Methodist Church	100 E 2nd Street	Vulnerable Population
8	Post Office	101 E Grant Street	Essential Facility
9	Red's Service	104 E Sherman Street	HAZMAT
10	Water Tower	W Oak Street	Utility
11	City Parks	Various	Public

## Hazard Assessment

**Table J.8: City of Casey Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	The City of Casey contains a large amount of agricultural land. Although this land represents a large portion of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Casey has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Casey, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Casey, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact Casey. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding in the City of Casey. While flash floods have little to no warning time, with no instances within the last planning period, the committee has determined this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand ion and immediately surrounding the City of Casey. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control in a matter of minutes and can pose a threat to life.



<b>HAZMAT Incident</b>	While there have been no reported instances of HAZMAT incidents in Casey in the recent past, this hazard can occur with no warning and impact the entire community. The committee feels that this hazard should not be discarded and mitigation actions should be examined to decrease the impact a hazard of this category would have on the community.
<b>Human Disease</b>	Iowa and more specifically the City of Casey are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Casey would be structural failure of either bridges or roadways. As these instances have no warning time, planning must be completed prior to an event happening to be able to respond in a quick manner.
<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Casey. It is unlikely that levee or dam failure will impact the city, although the city feels that planning for river flooding and planning for dam/levee failure are similar in nature.
<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Casey, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	Portions of the City of Casey are located within a flood zone. Although there is some land in the flood zone, since 2018, there have been no reported river flooding instances within the community. This hazard has a medium probability of effecting the community, and if it were to happen, little property damage is anticipated. Primary mitigation actions for this hazard would include limitations on construction in the flood zone.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Casey. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within Casey. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Casey during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Casey but is normally not severe in nature.
<b>Tornado</b>	While Guthrie County has experienced a number of tornadoes in the recent past, Casey has not had a tornado hit the city directly in the recent past. Although these events have historically not hit Casey, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Casey are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Casey prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table J.9: City of Casey Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	2	\$864	387
<b>Commercial</b>	32	\$33,178,800	
<b>Industrial</b>	2	\$137,400	
<b>Residential</b>	197	\$9,610,903	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table J.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table J.10: City of Casey Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	35
<b>Commercial</b>	2	\$2,986,092	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	17	\$864,981	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table J.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table J.11: City of Casey Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	97
<b>Commercial</b>	8	\$8,294,700	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	49	\$2,402,725	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table J.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table J.12: City of Casey Critical Hazard Impact**

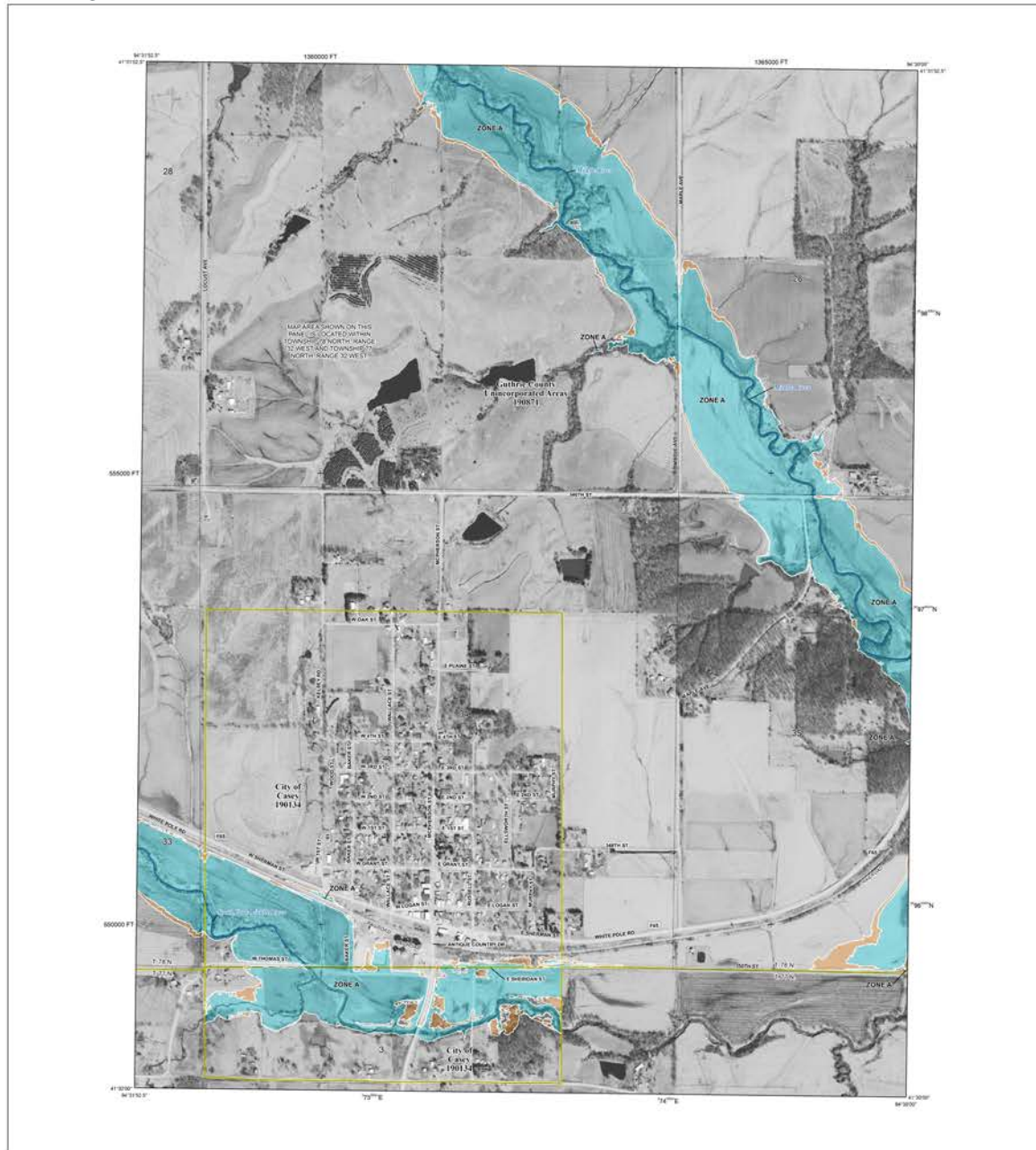
Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$432	194
<b>Commercial</b>	16	\$16,589,400	
<b>Industrial</b>	1	\$68,700	
<b>Residential</b>	98	\$4,805,451	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table J.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.



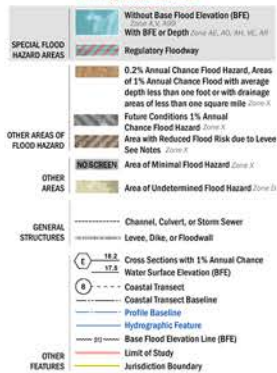
# Flood Maps

Source: FEMA Flood Map Service Center



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)



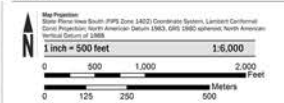
## NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program, a general phone call the FEMA Map Information Exchange at 1-877-FEMA-8087 or 1-877-338-2627 or visit the FEMA Map Service Center website at [www.fema.gov](http://www.fema.gov). Available products may include previously issued editions of this map, Flood Insurance Study (FIS) and/or Flood Insurance Rate Study (FIRS) maps. Many of these products can be ordered or obtained directly from the website. Users may determine the current map panel for their FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

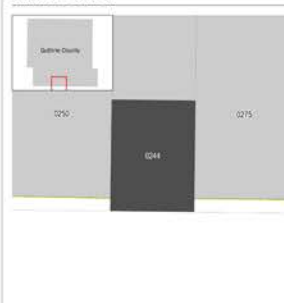
For community and county map data refer to the Flood Insurance Study report for this community. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-438-6020.

Recent map information shown on this FIRM was provided in digital format to the State Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2009.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY IOWA  
and Incorporated Areas

PANEL 244 or 325

COMMUNITY  
GUTHRIE COUNTY

NUMBER  
025024

PANEL  
025024

SUFFIX  
0

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C0244D  
EFFECTIVE DATE  
APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table J.13: City of Casey Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Continue participation in NFIP through Flood Plain Ordinance Enforcement					X
Build storm shelter at city park/campground				X	
Acquire generator for sewer plant				X	
Acquire generator for water wells				X	
Build community safe room at City Hall				X	
Promote weather radios			X		
Annually review the Hazard Mitigation Plan			X		
Purchase essential vehicles and equipment for first responders	X				
Seek funding for hazard material training			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table J.14: City of Casey Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Provide back-up systems for all critical systems and assets
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Improve public warning capabilities
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Provide education and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Improve first responder resources and capabilities

**Table J.15: City of Casey Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Continue participation in NFIP through Flood Plain Ordinance Enforcement	River Flooding	High	City Council	Minimal	Local	Property Protection	Ongoing
Build storm shelter at city park/campground	Tornado, Windstorm, Thunderstorm/Lightning/Hail	Mod	City Council	High	Local, State, Federal	Structural Project	Mid
Acquire generator for sewer plant	Infrastructure Failure	High	Public Works, Wastewater Department	Low	Local, State, Federal	Emergency Services	Short
Acquire generator for water wells	Infrastructure Failure	High	Public Works	Low	Local, State, Federal	Emergency Services	Short
Build community safe room at City Hall	Tornado, Windstorm, Severe Winter Storms, Thunderstorm/Lightning/Hail	Mod	City Council	High	Local, State, Federal	Structural Project	Mid
Promote weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, Thunderstorm/Lightning/Hail, River Flooding, Severe Winter Storms	Low	City Clerk	Minimal	Local	Emergency Services	Short
Annually review the Hazard Mitigation Plan	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Ongoing
Purchase essential vehicles and equipment for first responders	Flash Flood, River Flood, Severe Winter Storm	Low	Public Works	Low	Local, State, Federal	Emergency Services	Short
Seek funding for hazard material training	HAZMAT Incident	Low	Fire Department	Minimal	Local, State	Prevention	Short



# Incorporation into Other Planning Mechanisms

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Where possible, Casey will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Strategic Plan
- Comprehensive Plan
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Building Code
- Zoning Ordinance
- Housing Needs Assessment



# Appendix K: City of Guthrie Center

## Community Profile

### *History*

The land for Guthrie Center was purchased and platted in 1856 and was named after Mexican War hero, Captain William Guthrie. The location of Guthrie Center was chosen due to its central location in the county along with the abundant timber and prairie in the area. Guthrie Center was also located near the South Raccoon River which provided the community with drainage, power, and water. The first house was constructed by Charles Huxley in the spring of 1856. The community quickly began to grow with the construction of numerous homes, schools, and churches in the 1860s and 1870s. Guthrie Center was officially named the county seat in 1873. The original county seat was Panora; however, after many highly contested elections, the seat was ultimately moved to Guthrie Center.

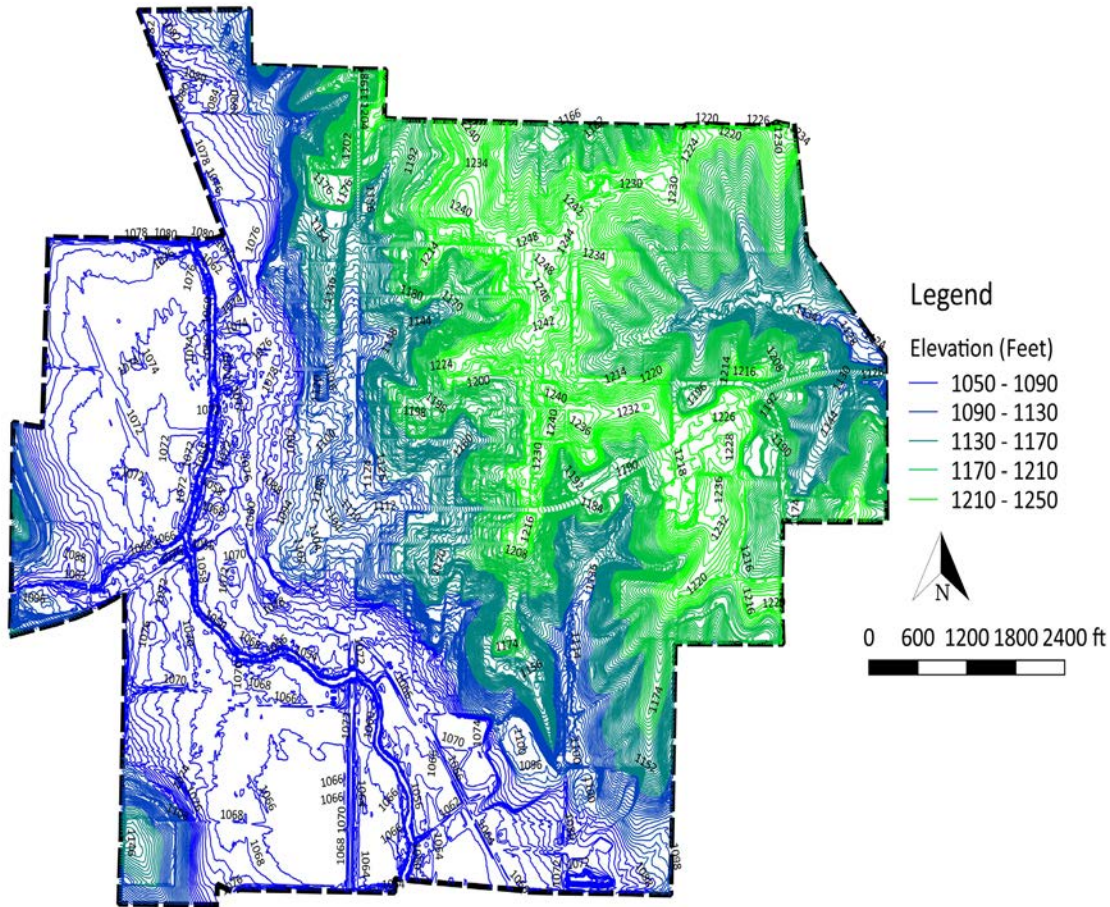
In the 1900s, development including the city waterworks and brick school house were constructed. The telephone exchange and the Guthrie Center Electric Light Company followed. Growth continued as many new industries and businesses located in Guthrie Center. However, over the past fifty years, the community has experienced overall population decline.

### *Geography and Environment*

Guthrie Center is located in the center of Guthrie County and is the main economic provider to the county. IA 25 intersects the community heading north/south through town while IA 44 intersects Guthrie Center heading east/west. This provides residents with easy access to Interstate 80 which is located roughly 14 miles south of town. Guthrie Center is 7.8 miles from Panora, 30.7 miles from Jefferson, 25 miles from Audubon, and 60.6 miles from Des Moines.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as high as 1,460 feet above sea-level. Guthrie Center is located in the central part of the county which has a lower elevation. Guthrie Center has a high point of 1,244 feet and a low point of 1,060 feet. Map K.1 shows Guthrie Center's elevation.

## Map K.1: City of Guthrie Center Elevation



Source: Iowa DNR

### *Demographics*

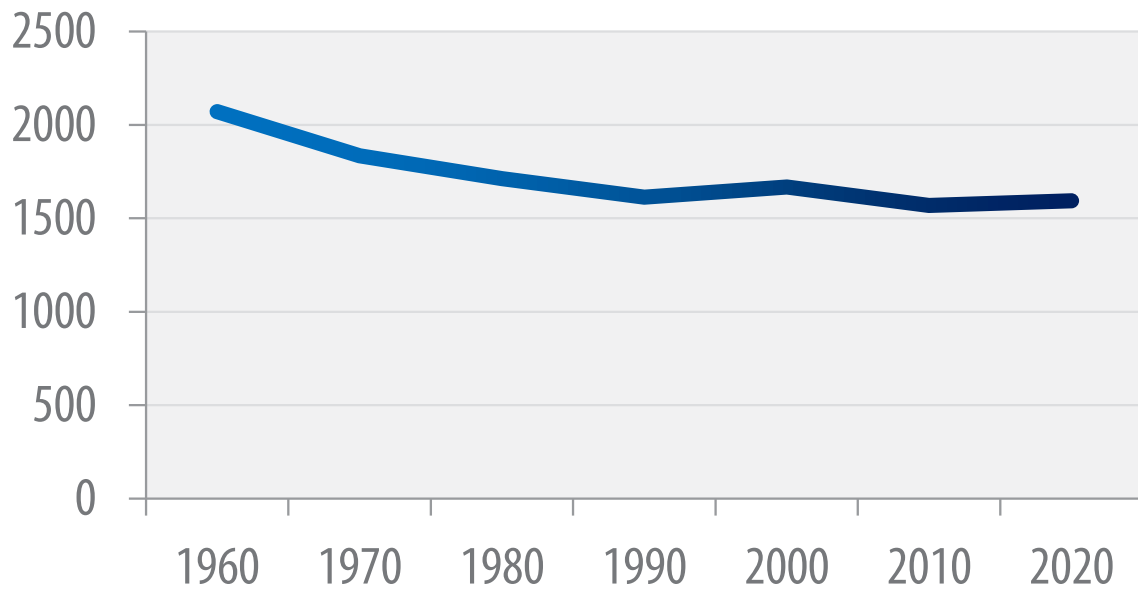
The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Guthrie Centers' population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Guthrie Center, the county seat, is the most populous town in Guthrie County; however, since 1960, the community's population has declined. In 1960, the total population was 2,071. Since then, the population has stayed well below the 2,000 mark and sits at 1,593 as of 2020. The biggest decline came between 1960 and 1970 when Guthrie Center lost 237 residents. The only decades showing an increase in population were the 1990s and 2010s. Figure K.1 shows the trend for total population from 1960 to 2020.



**Figure K.1: City of Guthrie Center Population, 1960-2020**

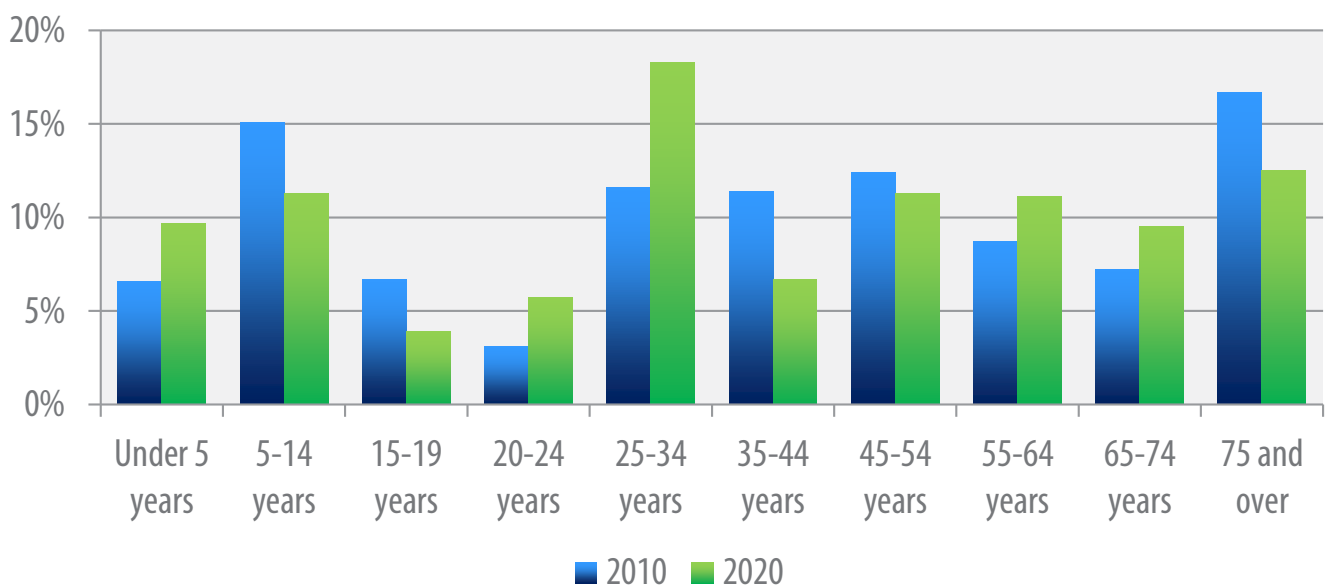


Source: US Census Bureau, American Community Survey

Figure K.2 is a comparison of the age distribution for Guthrie Center from 2010 to 2020. The biggest population decrease occurred in the 35-44 age cohort which, in 2010, represented 11.4% of the total population, but only 6.7% in 2020. Another significant loss came in the 75 and over age group. The largest population increase was seen in the 25-34 age cohort, which increased from representing 11.6% of the population in 2010 to 18.3% in 2020.

The age distribution in Figure K.2 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as “brain drain.”

**Figure K.2: City of Guthrie Center Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2020, Guthrie Center gained a total of 89 housing units. With that, the number of vacant homes increased by 108 units. These numbers are consistent with the slight population increase and the decrease in number of people per household the city has seen since 2010. The number of renter-occupied units increased by 13 units while owner-occupied units decreased by 32. Table K.1 shows the housing trends for Guthrie Center from 2010 to 2020.

**Table K.1: City of Guthrie Center Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	694	91.4%	675	79.6%
<b>Owner Occupied</b>	538	77.5%	506	75%
<b>Renter Occupied</b>	156	22.5%	169	25%
<b>Vacant Housing Units</b>	65	8.6%	173	20.4%
<b>Total Housing Units</b>	759	100.0%	848	100.0%

Source: US Census Bureau, American Community Survey

According to the Guthrie County Assessor's parcel data, half of all Guthrie Center homes were valued at less than \$100,000. Homes of lesser value are most likely older homes that may be more susceptible to hazards such as fires, serious storms, and other weather related hazards. Since the population has been increasing, it will be important to invest in the rehabilitation of existing housing. This will improve the safety of homes and reduce their susceptibility to numerous hazards. Table K.2 displays the value of housing units in Guthrie Center in 2022.

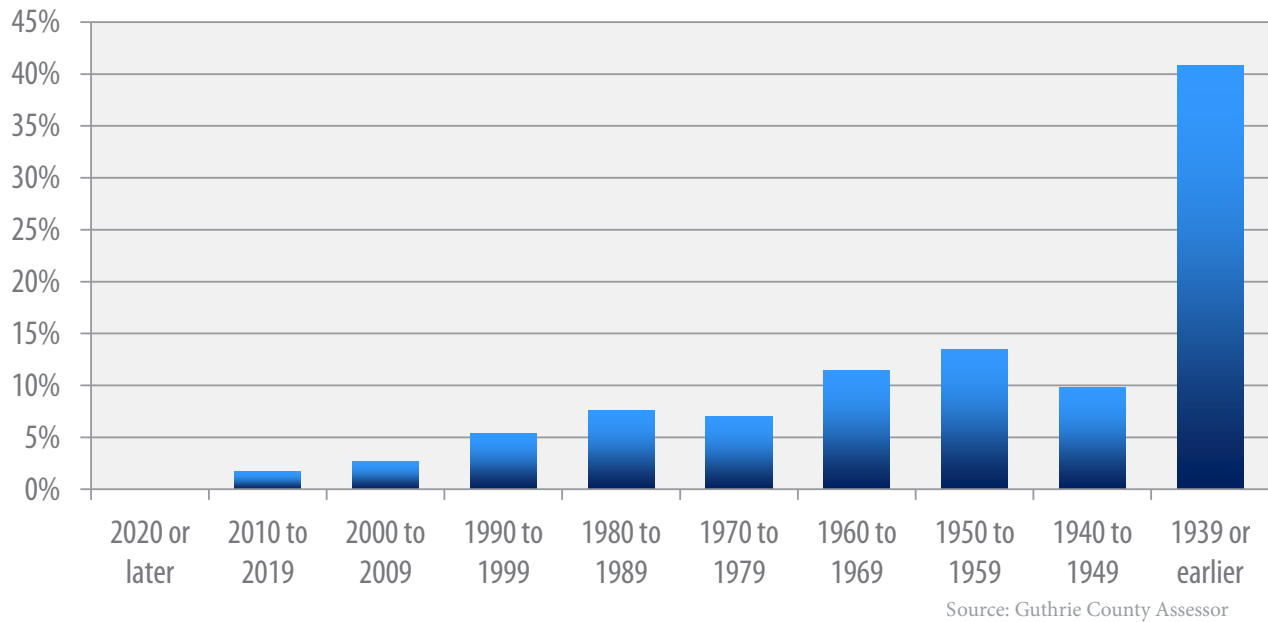
**Table K.2: City of Guthrie Center Value of Owner-Occupied Housing Units, 2022**

<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	14.0%
\$50,000 to \$99,999	36.0%
\$100,000 to \$149,999	23.7%
\$150,000 to \$199,999	11.1%
\$200,000 to \$299,999	12.5%
\$300,000 to \$499,999	2.8%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

As previously stated, aging housing stock is more susceptible to storm damage and other related events. Over 50% of housing units in Guthrie Center were constructed prior to 1950. Since then, construction has significantly declined. An estimated 4.4% of units have been erected since 2000. Figure K.3 shows the distribution of housing unit construction in Guthrie Center.

**Figure K.3: City of Guthrie Center Year Housing Unit Constructed, 2022**



## Economics

Table K.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$61,607 and the mean household income was \$78,492. According to the 2022 American Community Survey 5-Year Estimates, 41.6% of Guthrie Center's households had incomes below \$49,000 and 26.6% had incomes above \$100,000.

**Table K.3: City of Guthrie Center Household Income, 2022**

Income (In 2022 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	35	5.2%
\$10,000-\$14,999	34	5.0%
\$15,000-\$24,999	77	11.4%
\$25,000-\$34,999	32	4.7%
\$35,000-\$49,999	103	15.3%
\$50,000-\$74,999	122	18.1%
\$75,000-\$99,999	92	13.6%
\$100,000-\$149,999	136	20.1%
\$150,000-\$199,999	29	4.3%
\$200,000 or more	15	2.2%
Median Household Income	\$61,607	-
Mean Household Income	\$78,492	-

Source: US Census Bureau, American Community Survey

Guthrie Center is by far the leading employment provider in Guthrie County and has a strong economic base. The employment by industry statistics are shown in Table K.4. The leading industries in employment were Educational Services, and Health Care and Social Assistance (24.4%), Retail Trade (17.4%), and Manufacturing (8.3%). Taking advantage of regional strengths and industries will increase revenue generated in the community, resulting in increased income levels and housing values. These percentages are based on the total number of individuals 16 years and older that are from Guthrie Center and are employed.

**Table K.4: City of Guthrie Center Employment by Industry, 2020**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	812	100.0%
Agriculture, forestry, fishing and hunting, and mining	34	4.2%
Construction	44	5.4%
Manufacturing	67	8.3%
Wholesale trade	7	0.9%
Retail trade	141	17.4%
Transportation and warehousing, and utilities	61	7.5%
Information	8	1.0%
Finance and insurance, and real estate and rental and leasing	51	6.3%
Professional, scientific, and management, and administrative and waste management services	43	5.3%
Educational services, and health care and social assistance	198	24.4%
Arts, entertainment, and recreation, and accommodation and food services	58	7.1%
Other services, except public administration	52	6.4%
Public administration	48	5.9%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table K.5 provides a compilation of the current planning and regulatory documents in place for the City of Guthrie Center.

**Table K.5: City of Guthrie Center Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	1996
Building Code	Yes*	-
Zoning Ordinance	Yes	2018
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	Yes	1987
Floodplain Regulations	Yes	2017

\*State of Iowa Building Code

## *NFIP Participation*

In the past, there have been instances of significant flooding within the city limits of Guthrie Center. The city began participating in NFIP in 1987, and the flood map was updated in 2017. The City's FIRMs can be found later in this appendix.

## *Outlook and Future Development*

Guthrie Center has seen some commercial growth and some residential growth since the last plan update. Downtown Guthrie Center has seen some businesses expand, and some new businesses locate within the city. New homes have developed on the south side of the city, and the city expects these trends to continue into the near future.



## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Guthrie Center's critical facilities can be found on Map K.2.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table K.6.

**Table K.6: City of Guthrie Center Essential Infrastructure**

<b>Major Arterials</b>	IA Highways 25 & 44	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Guthrie Center Municipal Utilities	<b>Sewer Service</b>	City of Guthrie Center
<b>Electric Service</b>	Alliant Energy; Guthrie Center REC	<b>Gas Service</b>	Guthrie Center Municipal
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Windstream, wireless	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Guthrie Center Fire Department	<b>Ambulance Service</b>	Panora EMS

## Adair-Casey/Guthrie Center Schools

The City of Guthrie Center is in the Adair-Casey/Guthrie Center (AC/GC) school district. Two schools exist within city boundaries: Guthrie Center Elementary School and Guthrie Center High School. The Elementary School (for students Pre-K to 6th grade) is located at 900 N. 4th Street and, as seen on Map K.2, is located in the northwest part of the city. The High School (9th to 12th grade) is located at 906 School Street and is located, again on Map K.2, in the southeast portion of the city. Junior high students (7th and 8th grade) attend AC/GC Junior High in Adair. Over the past five years, enrollment has been decreasing, from 532 students in the 2018-2019 school year to 470 in the 2022-2023 school year. Table K.7 displays enrollment trends for the Guthrie Center Community Schools.

The Guthrie Center Community School district has at least one safe room. This safe room was installed using HMGP money and has been an asset to the community that the School District to use sparingly. Students and staff participate in drills and educational programs related to hazards and the mitigation of them. The District maintains its own equipment and supplies to maintain roads and walkways on campus.

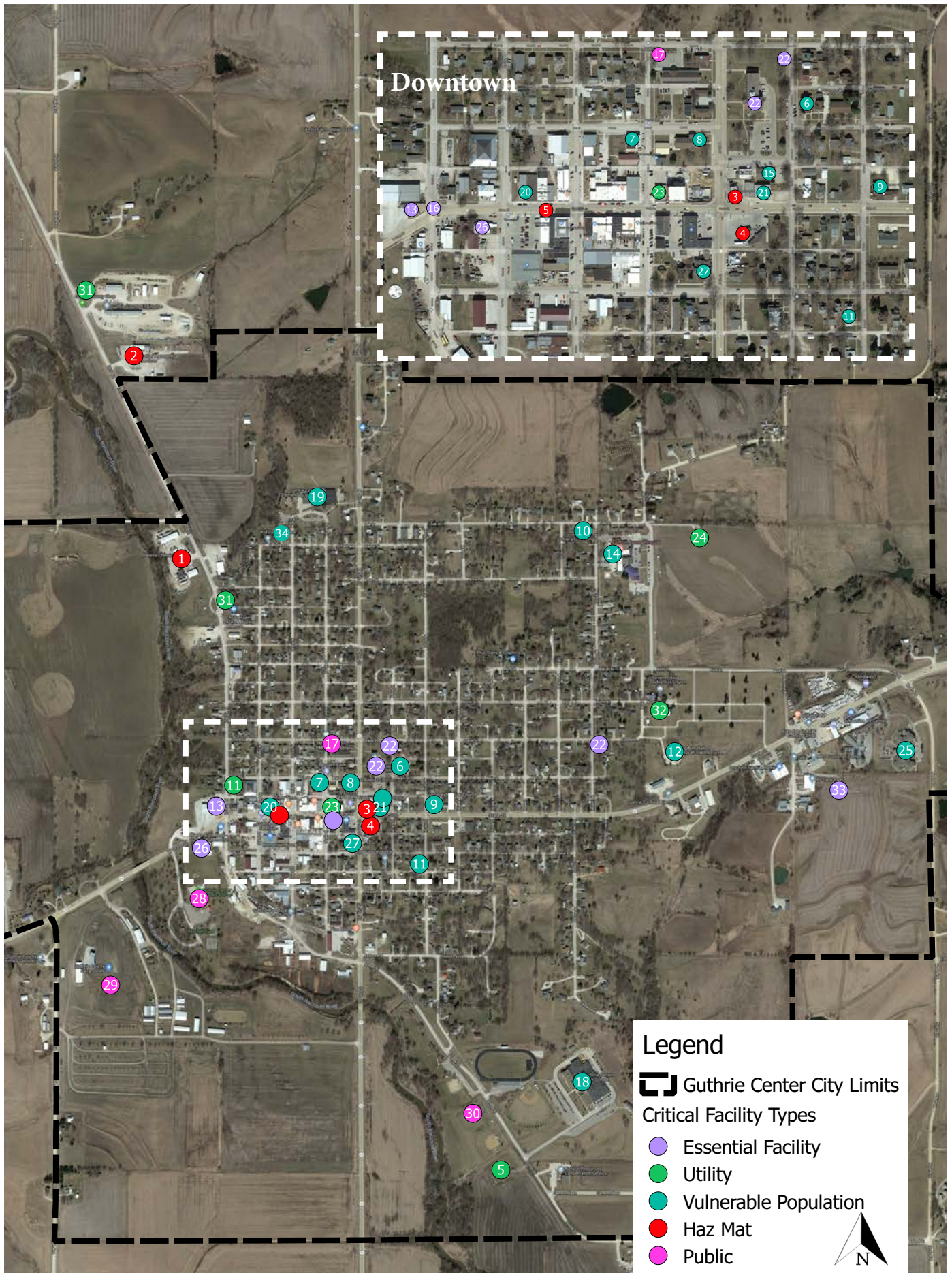
**Table K.7: School Buildings located in Guthrie Center Enrollment**

<b>School Year</b>	<b>Elementary Enrollment</b>	<b>High School Enrollment</b>	<b>Total Enrollment</b>
<b>2018-19</b>	291	241	532
<b>2019-20</b>	282	241	523
<b>2020-21</b>	253	230	483
<b>2021-22</b>	248	217	465
<b>2022-23</b>	255	215	470

Source: Iowa Department of Education, Bureau of Information and Analysis

\*Note: Junior High students (grades 7-8) are not accounted for in this table because they do not attend school in Guthrie Center.

## Map K.2 City of Guthrie Center Critical Infrastructure





**Table K.8: City of Guthrie Center Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Helena Chemical Company	705 N 1st Street	HAZMAT
2	Butler Ag.	702 N 1st Street	HAZMAT
3	Casey's	100 N 5th Street	HAZMAT
4	Sparky's One Stop	500 State Street	HAZMAT
5	Wastewater Pump	School Street	Utility
6	St. Mary's Catholic Church	603 Main Street	Vulnerable Population
7	First Christian Church	105 N 4th Street	Vulnerable Population
8	First Baptist Church	113 N 5th Street	Vulnerable Population
9	First Presbyterian Church	701 State Street	Vulnerable Population
10	Immanuel Lutheran Church	713 N 12th Street	Vulnerable Population
11	Alliant Substation	North of Old City Hall	Utility
12	Kingdom Hall	1300 Grand Street	Vulnerable Population
13	Fire Station	101 State Street	Essential Facility
14	Guthrie County Hospital	710 N 12th Street	Vulnerable Population
15	Guthrie Family Medicine Center	502 Main Street	Vulnerable Population
16	City Hall	102 N 1st Street	Essential Facility
17	Library	400 Grand Street	Public
18	Guthrie Center High School	900 School Street	Vulnerable Population
19	Guthrie Center Elementary School	900 N 4th Street	Vulnerable Population
20	Guthrie Activity Center	209 State Street	Vulnerable Population
21	Legion Hall	507 State Street	Vulnerable Population
22	Storm Sirens	Various	Essential Facility
23	Guthrie Communications	403 State Street	Utility
24	Cell Tower	1310 Oak Street	Utility
25	New Homestead	2306 State Street	Vulnerable Population
26	Water Treatment Plant	106 W State Street	Essential Facility
27	Methodist Church	405 Prairie Street	Vulnerable Population
28	Guthrie Center Aquatic Center	W State Street	Public
29	Guthrie County Fairgrounds	408 W State Street	Public
30	Ball Fields	School Street	Public
31	Gas Regulator Stations	Various	Utility
32	Water Towers	Corner of 13th and North Street	Utility
33	Guthrie County Sheriff's Radio Tower	S Industrial Road	Essential Facility
34	Little Charger Early Learning Center	207 Park Avenue	Vulnerable Population

# Hazard Scores

**Table K.8: City of Guthrie Center Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	The City of Guthrie Center contains a large amount of agricultural land. Although this land represents a large portion of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Guthrie Center has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Guthrie Center, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Guthrie Center, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Guthrie Center. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding in the City of Guthrie Center. While flash floods have little to no warning time, with no instances within the last planning period, the committee anticipates that this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand ion and immediately surrounding Guthrie Center. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control in a matter of minutes and can pose a threat to life.
<b>HAZMAT Incident</b>	While there have been no reported instances of HAZMAT incidents in Guthrie Center in the recent past, this hazard can occur with no warning and impact the entire community. The committee feels that this hazard should not be discarded and mitigation actions should be examined to decrease the impact a hazard of this category would have on the community.
<b>Human Disease</b>	Iowa and more specifically the City of Guthrie Center are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Guthrie Center would be structural failure of either bridges or roadways. As these instances have no warning time, planning must be completed prior to an event happening to be able to respond in a quick manner.



<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Guthrie Center. It is unlikely that levee or dam failure will impact the city, although the city feels that planning for river flooding and planning for dam/levee failure are similar in nature.
<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Guthrie Center, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	Portions of the City of Guthrie Center are located within a flood zone. Although there is some land in the flood zone, since 2018, there have been no reported river flooding instances within the community. This hazard has a medium probability of effecting the community, and if it were to happen, little property damage is anticipated. Primary mitigation actions for this hazard would include limitations on construction in the flood zone.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Guthrie Center. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within Guthrie Center. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Guthrie Center during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Guthrie Center, but is normally not severe in nature.
<b>Tornado</b>	While Guthrie County has experienced a number of tornadoes in the recent past, Guthrie Center has not had a tornado hit the city directly in the recent past. Although these events have historically not hit Guthrie Center and have not caused large amounts of damage within the county, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Guthrie Center are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. While speed limits are relatively low, there continue to be drivers who do not follow posted speed limits, which can increase the probability of and damage that a transportation incident would cause. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Guthrie Center prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table K.10: City of Guthrie Center Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	11	\$188,500	1,593
<b>Commercial</b>	109	\$7,743,170	
<b>Industrial</b>	3	\$213,700	
<b>Residential</b>	675	\$41,982,900	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table K.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table K.11: City of Guthrie Center Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$16,965	143
<b>Commercial</b>	10	\$696,885	
<b>Industrial</b>	0	\$19,233	
<b>Residential</b>	61	\$3,778,461	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table K.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table K.12: City of Guthrie Center Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	3	\$47,125	398
<b>Commercial</b>	27	\$1,935,792	
<b>Industrial</b>	1	\$53,425	
<b>Residential</b>	169	\$10,495,725	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table K.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

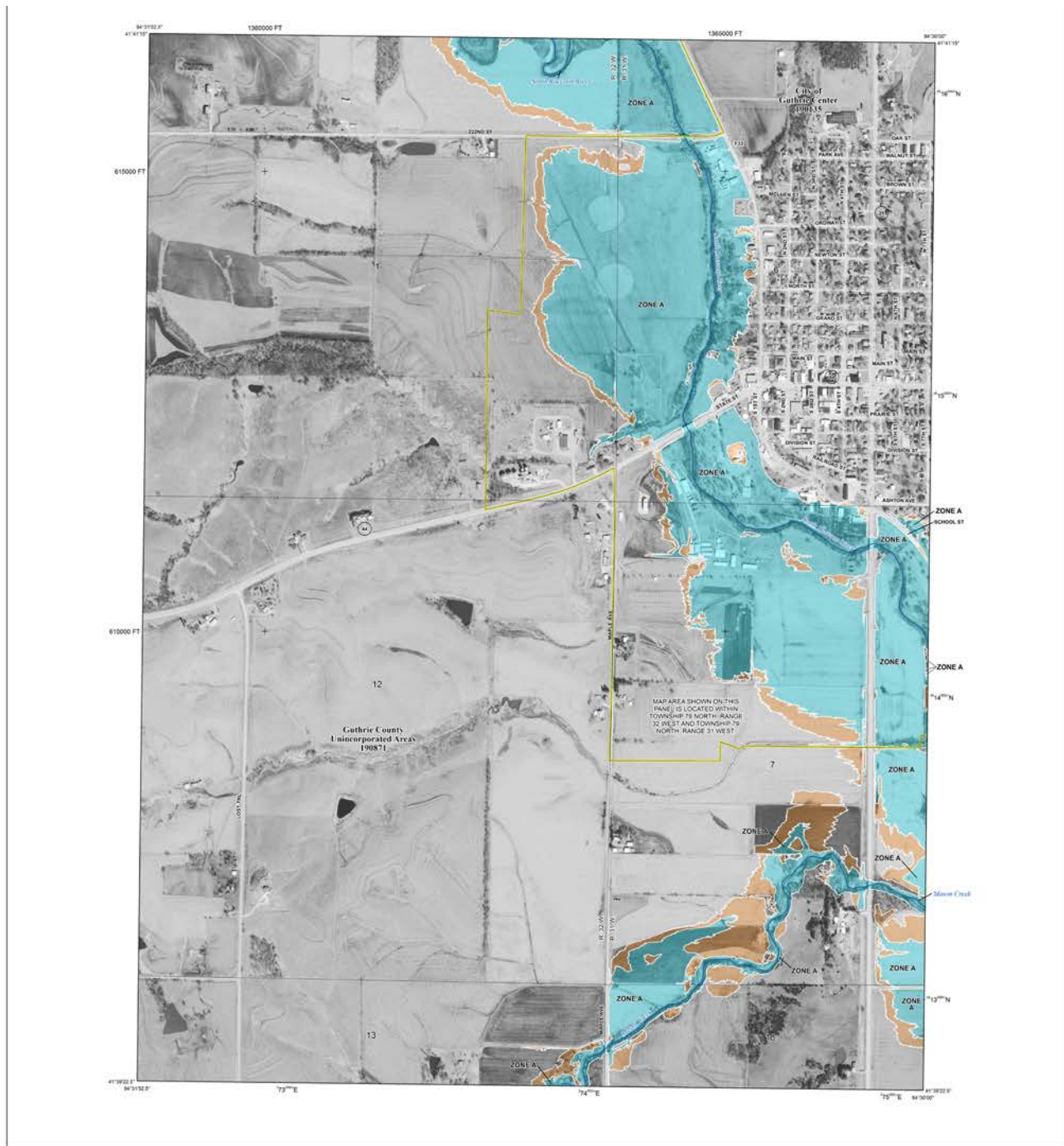
**Table K.13: City of Guthrie Center Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	6	\$94,250	797
<b>Commercial</b>	54	\$3,871,585	
<b>Industrial</b>	2	\$106,850	
<b>Residential</b>	338	\$20,991,450	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table K.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

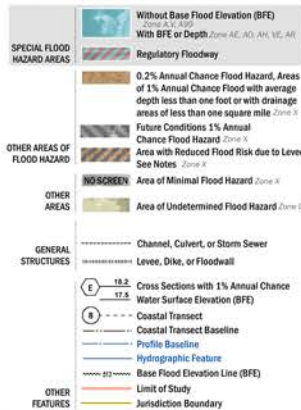






#### FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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 DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
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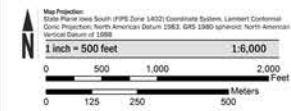
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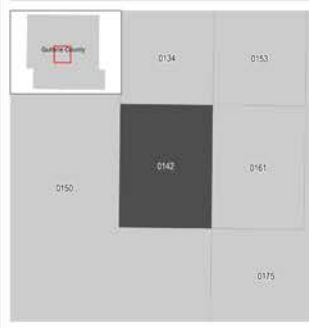
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

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#### SCALE



#### PANEL LOCATOR



**FEMA**  
 National Flood Insurance Program

#### NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 142 of 325

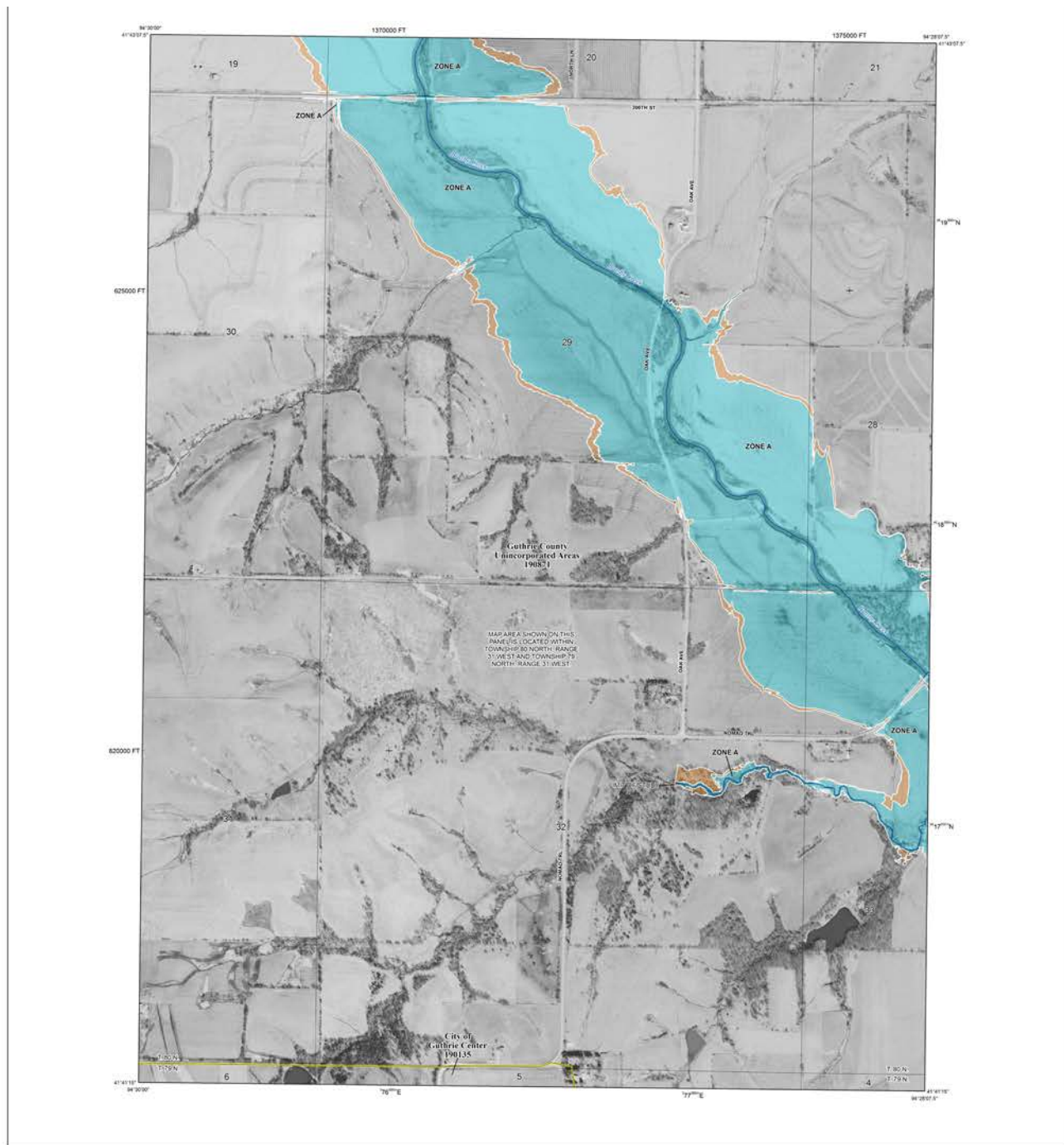


COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE CENTER, CITY OF GUTHRIE COUNTY	190139	0142	D
	190871	0142	D

Panel Contents:

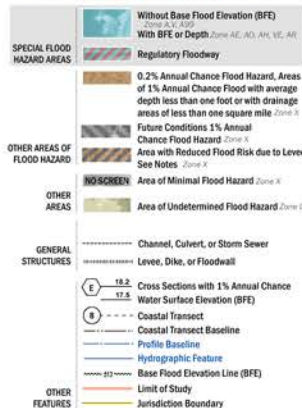
VERSION NUMBER  
 2.3.3.0  
 MAP NUMBER  
 1907700142D  
 EFFECTIVE DATE  
 APRIL 5, 2017





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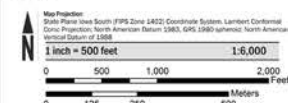
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

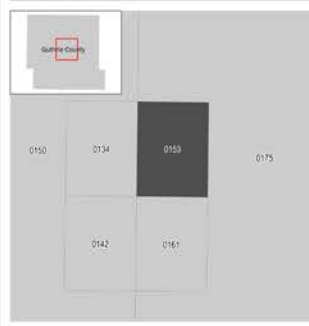
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

PANEL 153 of 325

Panel Contents:

COMMUNITY: GUTHRIE CENTER, CITY OF GUTHRIE COUNTY

NUMBER: 190139 0153

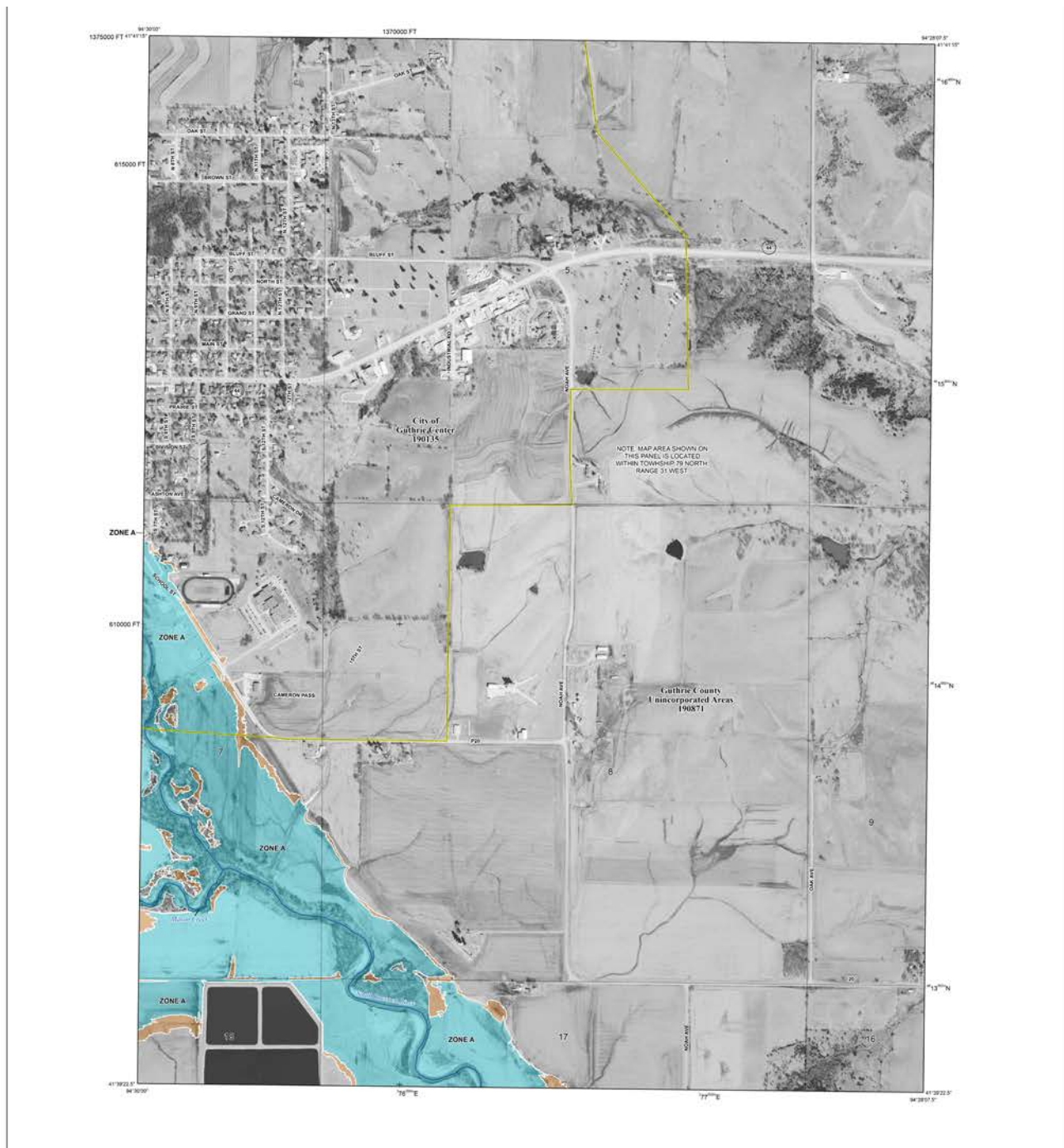
PANEL: 153 of 325

SUFFIX: D

VERSION NUMBER: 2.3.3.0

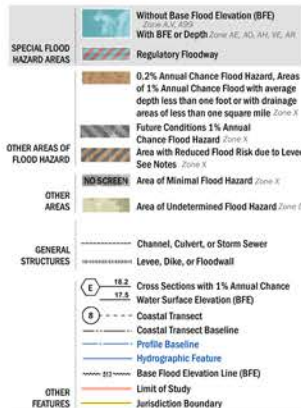
MAP NUMBER: 1907700153D

EFFECTIVE DATE: APRIL 5, 2017



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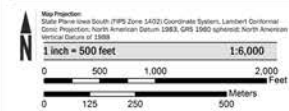
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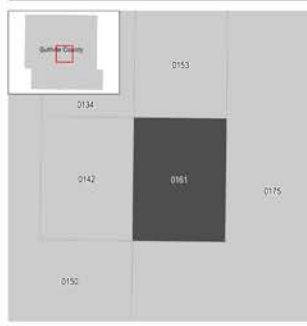
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## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

And Incorporated Areas

PANEL 161 of 325

Panel Contents:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE CENTER, CITY OF GUTHRIE COUNTY	190135	0161	D
	190871	0161	D

VERSION NUMBER

2.3.3.0

MAP NUMBER

19077C0161D

EFFECTIVE DATE

APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table K.14: City of Guthrie Center Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Elevate new aquatic center 18" above flood level	X				
Relocate the community building on the fairgrounds	X				
Promote, provide NOAA weather radios for properties located on the fringes of the warning siren coverage area					X
Install one or two new sirens in poor coverage areas	X				
Regularly test and maintain existing warning sirens			X		
Conduct engineering analysis of wastewater system			X		
Replace wastewater collection system in areas that are experiencing significant infiltration	X				
Investigate new recruitment methods for the Fire Department i.e., compensation, benefits		X			
Investigate establishing an automatic mutual aid agreement with a neighboring department	X				
Install generator for wastewater lift station	X				
Continued participation/good standing in NFIP			X		
Make duplicate copies of important electronic records and store in alternate locations	X				
Purchase a fire-proof file cabinet for important documents, files, and records	X				
Continue to send safety material to local contractors			X		
Purchase GPS locator to map exact location of buried utilities			X		
Update warning devices to treatment plants	X				



# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table K.15: City of Guthrie Center Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Improve public warning capabilities
Objective 3	Improve first responder resources and capabilities
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Provide education and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Improve warning system
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Improve first responder resources and capabilities



**Table K.16: City of Guthrie Center Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Conduct engineering analysis of wastewater system	Infrastructure Failure	High	Wastewater Department	Moderate	Local, State, Federal	Natural Resource Protection	Mid
Replace wastewater collection system in areas that are experiencing significant infiltration	Infrastructure Failure	High	Wastewater Department	High	Local, State, Federal	Natural Resource Protection	Long
Raise grades of wastewater facility	Infrastructure Failure	Low	City Council	High	Local, State, Federal	Property Protection	Long
More informational ads in the local paper	All Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City Council	Minimal	Local	Public Education and Awareness	Ongoing
Regularly test and maintain existing warning sirens	Flash Flood, Tornado, Windstorm, Extreme Heat, Thunderstorm/Lightning/Hail, River Flood, Severe Winter Storm	High	Public Works	Minimal	Local	Emergency Services	Ongoing
New wastewater collection systems	Infrastructure Failure	High	City Council	High	Local, State, Federal	Natural Resource Protection	Long
Flood prevention/river flooding	River Flooding	Mod	Army Corps of Engineers	High	Local, State, Federal	Property Protection	Long

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Monthly editorial from County EMA	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	EMA	Minimal	Local	Public Education and Awareness	Ongoing
More public awareness through training, editorials, and fliers	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Ongoing
Up-to-date rescue equipment funding/radios and pagers	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Low	Local, State, Federal	Emergency Services	Mid
Fire Department training funds	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Fire Department	Low	Local, State, Federal	Emergency Services	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Specialized equipment for fire department	Tornado, Windstorm, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	Fire Department	Low	Local, State, Federal	Emergency Services	Ongoing
Promote, provide NOAA weather radios for properties located on the fringes of the warning siren coverage area	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	EMA, City Council	Low	Local, State, Federal	Public Education and Awareness	Mid
Investigate new recruitment methods	Flash Flood, Tornado, Windstorm, Extreme Heat, Thunderstorm/Lightning/Hail, River Flood, Severe Winter Storm	Low	City Council	Minimal	Local	Prevention	Ongoing
Investigate establishing an automatic mutual aid agreement with a neighboring department	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Fire Department	Minimal	Local	Property Protection	Ongoing
Continued participation/good standing in the NFIP through flood plain management and zoning enforcement	River Flooding	Low	City Council	Minimal	Local	Prevention	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Signage	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	EMA	Minimal	Local	Public Education and Awareness	Ongoing
Sandbags for flood preparation	River Flooding	Low	EMA	Minimal	Local	Property Protection	Short
Tornado shelters/food bank	Tornado	Mod	EMA	High	Local, State	Emergency Services	Mid
Join Global Connect System	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	High	EMA, City Councils	Low	Local, State	Public Education and Awareness	Ongoing
Build a community safe room	Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, HAZMAT Incident, Terrorism, Radiological	Mod	City Council, Guthrie Center School Board	Moderate	Local, State, Federal	Structural Project	Long
Upgrade water clear wells	Infrastructure Failure	High	Public Works	High	Local, State, Federal	Property Protection	Mid
Phone Notification system for emergencies	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	County E911, City Council, Emergency Services	Minimal	Local, State, Federal	Public Education and Awareness	Mid



# Incorporation into Other Planning Mechanisms-

## City of Guthrie Center

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Where possible, Guthrie Center will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- City Codes
- Hazard Mitigation Plan
- Comprehensive Plan
- Zoning Ordinance

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Strategic Plan
- Housing Needs Assessment

# Incorporation into Other Planning Mechanisms-

## AC/GC Schools

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The update of the mitigation strategy will be provided to the School Superintendent for consideration in the next update cycle of the capital improvement plan.









# Appendix L: City of Jamaica

## Community Profile

### *History*

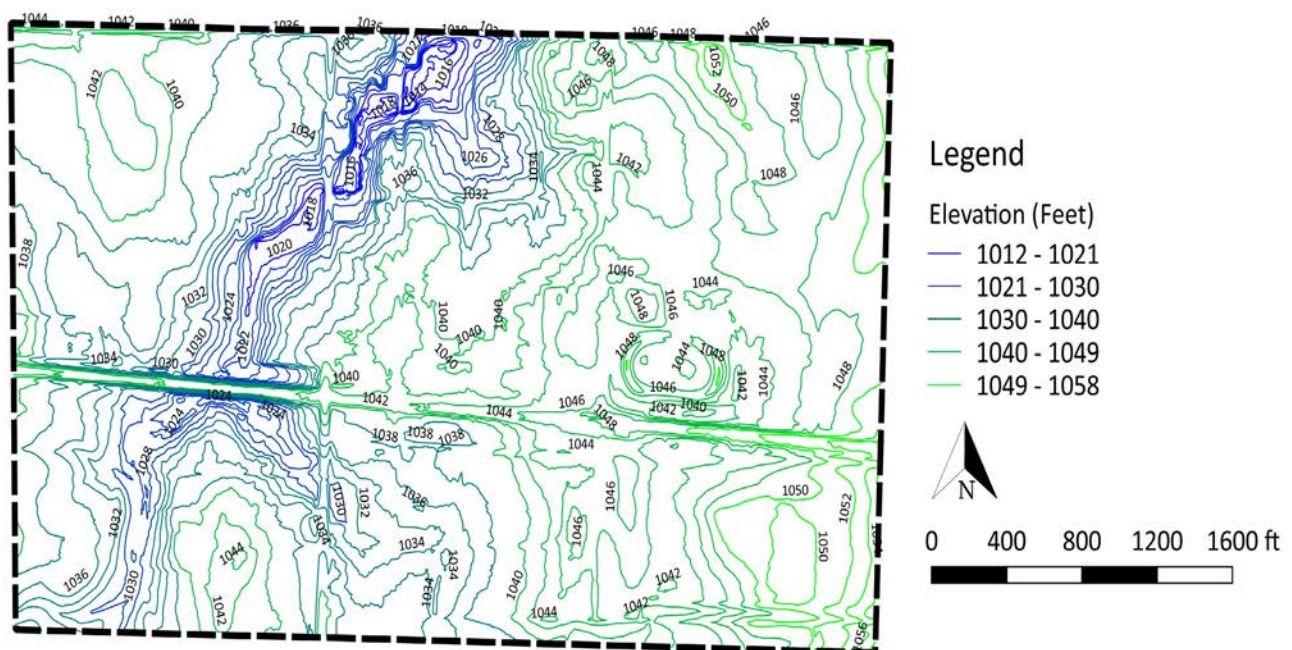
The City of Jamaica was platted in February of 1882. The town was originally called Sedalia, and then changed to Vanness, only to change the name again to Jamaica. Jamaica, like many other towns in Iowa, was developed when the Milwaukee Land Company bought the land for the use of the Chicago, Milwaukee and St. Paul Railway. The first building was erected by J.J. Quiggins, a two-story frame which was home to the first general store. Other businesses quickly began to locate in Jamaica and just a year later the town had a hardware store, furniture store, saddles hop, grocery store, drugstore, lumberyard and a feed store. Jamaica has always been a small town and has had relatively stable population totals.

### *Geography and Environment*

Jamaica is located in the far northeast corner of Guthrie County. IA 141 passes the community to the south of town and is the main road of travel for Jamaica residents. Perry is located 11.9 miles away, Jefferson 16.5 miles away, Guthrie Center 17.6 miles away, Coon Rapids 21.3 miles away and Des Moines 51.3 miles away.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. However, Jamaica is located in the opposite corner and is in the lowest part of the county. Jamaica has a maximum point of 1,050 feet. Jamaica is extremely flat as the lowest point is 1,014 feet. Map L.1 shows Jamaica's elevation.

**Map L.1: City of Jamaica Elevation**



Source: Iowa DNR

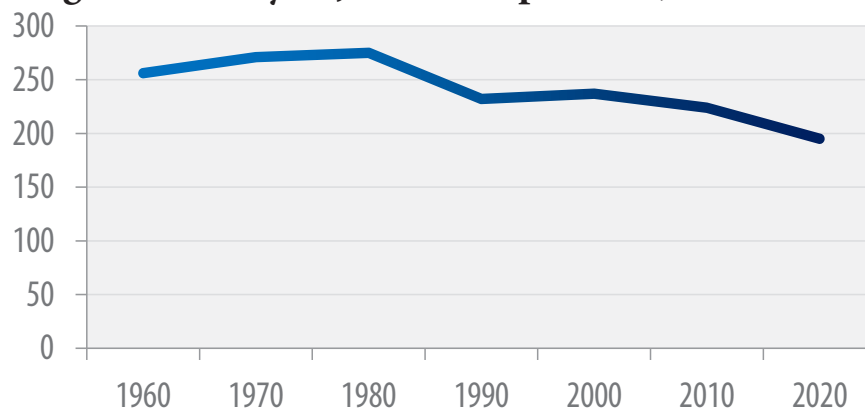
## Demographics

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Jamaica's population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

Though small, Jamaica's population has experienced periods of growth and decline throughout the previous fifty-six years. Between 1960, and 1980 Jamaica grew by 19 people. The 1980s resulted in a decline of 43 residents. Jamaica grew by five people in the 1990's, only to decline to 224 individuals in 2010. Since 2010, the City's population continues to decline and as of 2020 it sits at 195 individuals. Figure L.1 shows the population trend from 1960 to 2020.

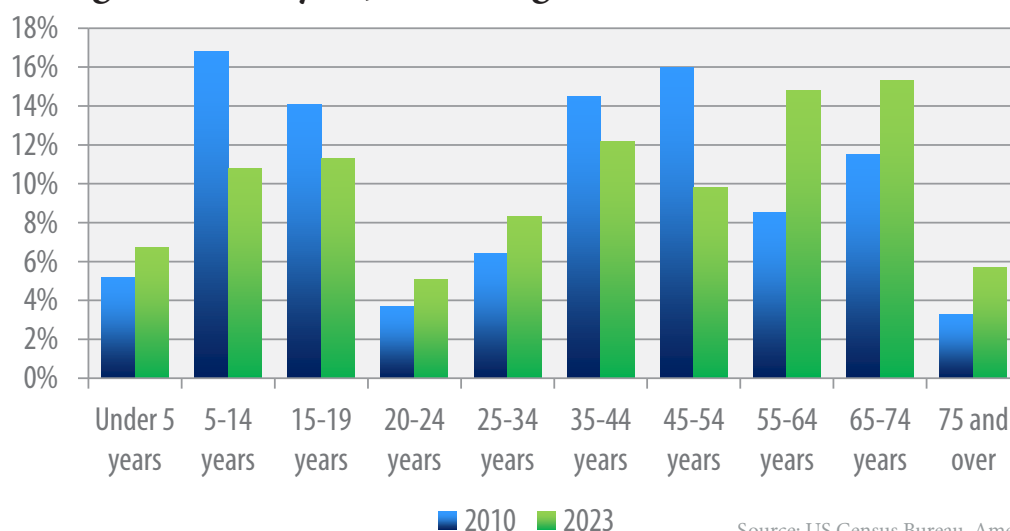
**Figure L.1: City of Jamaica Population, 1960-2020**



Source: US Census Bureau, American Community Survey

Figure L.2 is a comparison of the age distribution for Jamaica from 2010 to 2023. The biggest population decrease occurred in the 5-14 age cohort which, in 2010, represented 16.8% of the total population, but only

**Figure L.2: City of Jamaica Age Distribution, 2010-2016**



Source: US Census Bureau, American Community Survey

10.8% in 2023. Other significant losses came in 35-44 and 45-54 age groups. Notable increases in population were seen in the 55-64 and 65-74 age cohorts.

The age distribution in Figure L.2 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as “brain drain.”

## Housing

A community’s ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community’s housing stock, type of households, and housing availability and affordability are determining factors.

From 2010 to 2023, the number of total housing units decreased by 26. During the same time, the vacancy rate decreased from 15.9%, or 21 units to 9.4% or 10 units. The number of owner-occupied housing units decreased by fifteen while the number of renter-occupied housing units decreased by 11. Table L.1 shows Jamaica’s housing trends from 2010 to 2023.

Table L.1: City of Jamaica Housing Units, 2010-2023

	2010		2023	
	Number	Percent	Number	Percent
Occupied Housing Units	111	84.1%	96	90.6%
Owner Occupied	95	85.6%	77	80.2%
Renter Occupied	16	14.4%	19	19.8%
Vacant Housing Units	21	15.9%	10	9.4%
Total Housing Units	132	100.0%	106	100.0%

Source: US Census Bureau, American Community Survey

According to the Guthrie County Assessor’s, 28.6% of all homes in Jamaica are valued at less than \$50,000. Nearly half of the of homes have a value of \$50,000 - \$100,000. Homes of lesser value are most likely older homes that may be more susceptible to hazards such as fires, serious storms and other weather related hazards. Since the population has been declining, it will be important to invest in the rehabilitation of existing housing. This will improve the safety of homes and reduce their susceptibility to numerous hazards. Table L.2 displays the value of housing units in Jamaica in 2023.

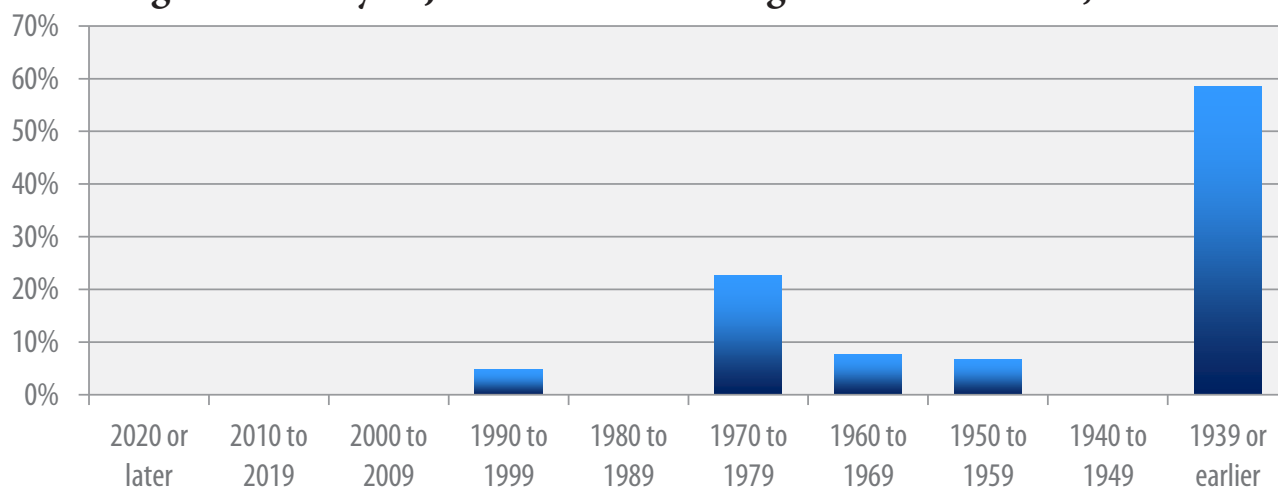
Table L.2: City of Jamaica Value of Owner-Occupied Housing Units, 2023

Value of Housing Unit	Percent of Homes
Less than \$50,000	28.6%
\$50,000 to \$99,999	45.4%
\$100,000 to \$149,999	16.9%
\$150,000 to \$199,999	9.1%
\$200,000 to \$299,999	0.0%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

As previously stated, aging housing stock is more susceptible to storm damage and other related events. Jamaica is no different than the rest of the county and State of Iowa when it comes to housing construction rates. Within the city, 58.5% of the units were constructed prior to 1940. An estimated 22.6% of homes were completed from 1970 to 1979. Figure L.3 explains this distribution below.

**Figure L.3: City of Jamaica Year Housing Unit Constructed, 2023**



Source: Guthrie County Assessor

## Economics

Table L.3 shows the household income in 2023 inflation-adjusted dollars. The median household income was \$53,333 and the mean household income was \$62,154. According to the 2023 American Community Survey 5-Year Estimates, 49% of Jamaica's households had incomes below \$49,000 and 25% had incomes above \$100,000.

**Table L.3: City of Jamaica Year Household Income**

Income (In 2023 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	5	5.2%
\$10,000-\$14,999	4	4.2%
\$15,000-\$24,999	13	13.5%
\$25,000-\$34,999	7	7.3%
\$35,000-\$49,999	18	18.8%
\$50,000-\$74,999	11	11.5%
\$75,000-\$99,999	14	14.6%
\$100,000-\$149,999	23	24.0%
\$150,000-\$199,999	0	0.0%
\$200,000 or more	1	1.0%
Median Household Income	\$53,333	-
Mean Household Income	\$62,154	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural towns primarily serve as agricultural service centers and retail trade centers, but manufacturing activity is also found in many of these communities. Due to a primary reliance on agriculture (over 97% of the land is farmland) the economies that diversified have been impacted less by a downturn in the market Jamaica is typical of many smaller rural Iowa cities due to its dependence on regional employment opportunities. Many residents are required to commute to surrounding communities such as Guthrie Center or Jefferson. The employment by industry statistics are shown in Table L.4. The industries with the highest percentage employed include Educational services, and health care and social assistance (26.9%), Manufacturing (20.5%), and Construction (15.4%). These percentages are based on the total number of individuals 16 years and older that are from Jamaica and are employed.



**Table L.4: City of Jamaica Employment by Industry, 2023**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	78	100.0%
Agriculture, forestry, fishing and hunting, and mining	0	0.0%
Construction	12	15.4%
Manufacturing	16	20.5%
Wholesale trade	0	0.0%
Retail trade	10	12.8%
Transportation and warehousing, and utilities	4	5.1%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	4	5.1%
Professional, scientific, and management, and administrative and waste management services	4	5.1%
Educational services, and health care and social assistance	21	26.9%
Arts, entertainment, and recreation, and accommodation and food services	2	2.6%
Other services, except public administration	2	2.6%
Public administration	3	3.8%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table L.5 provides a compilation of the current planning and regulatory documents in place for the City of Jamaica.

**Table L.5: City of Jamaica Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	No	-
Building Code	No	-
Zoning Ordinance	No	-
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	Yes	2011
Floodplain Regulations	Yes	2017
City Code of Ordinances	Yes	2024

## NFIP Participation

In the past, there have been instances of significant flooding within the city limits of Jamaica. Jamaica started participating in the NFIP in 2011, and the flood map was updated in 2017 and the city's FIRMs can be found later in this appendix.

## Outlook and Future Development

Jamaica has seen limited growth since the last plan update. There has been some small commercial development within the city's downtown with the construction of a new strip mall. Other small development has been within the residential makeup of the city. Small residential development/improvement is planned for the future.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Jamaica's critical facilities can be found on Map L.2

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table L.6.

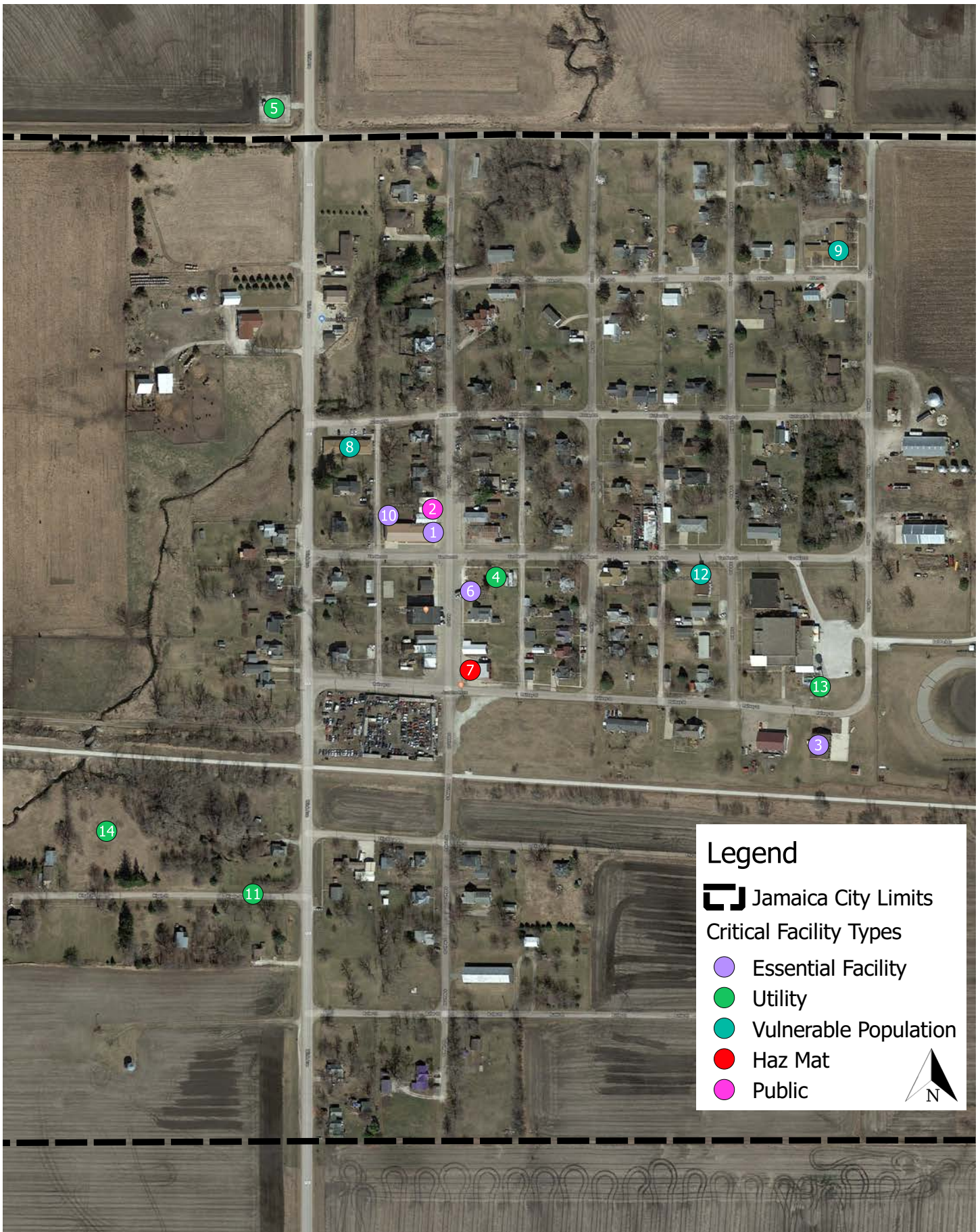
**Table L.6: City of Jamaica Essential Infrastructure**

<b>Major Arterials</b>	County Road P30	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Xenia Rural Water	<b>Sewer Service</b>	On-site septic systems
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Windstream, wireless	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Jamaica Fire Department	<b>Ambulance Service</b>	Panora EMS

**Table L.7: City of Jamaica Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	City Hall	316 Main Street	Essential Facility
2	Community Center/Library	316 Main Street	Public
3	Fire Department	509 Railway Street	Essential Facility
4	Iowa Telephone Company	Van Nest Street	Utility
5	Northern Natural Gas	Corner of 110th Street and Wink Avenue	Utility
6	Post Office	405 Main Street	Essential Facility
7	Schaal Oil Company	421 Main Street	HAZMAT
8	Senior Living	2 Richland Street	Vulnerable Population
9	Senior Living	110 4th Avenue	Vulnerable Population
10	Storm Siren	N of Van Nest Street and W of Main Street	Essential Facility
11	Treatment Plant	Wiggle Street	Utility
12	Jamaica Union Church	Van Nest Street	Vulnerable Population
13	Water Tower	Railway Street	Utility
14	Well	Wiggle Street	Utility

## Map L.2: City of Jamaica Critical Facilities





# Hazard Assessment

**Table L.8: City of Jamaica Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	A large portion of the City of Jamaica is agricultural land. Although this land represents a large portion of the community, there have been minimal reported losses from animal/plan/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Jamaica has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Jamaica, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Jamaica, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Jamaica. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2022, there has been one instance of flash flooding within the City of Jamaica, it caused no reported damage. While flash floods have little to no warning time, the committee anticipates that this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand in Jamaica. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control and posing a threat to life.
<b>HAZMAT Incident</b>	While there have been no reported instances of HAZMAT incidents in Jamaica in the recent past, this hazard can occur with no warning and impact the entire community. The committee feels that this hazard should not be discarded.
<b>Human Disease</b>	Iowa and more specifically the City of Jamaica are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Jamaica would be structural failure of either bridges or roadways.
<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Jamaica. It is unlikely that levee or dam failure will impact the city, although the city feels that planning for river flooding and planning for dam/levee failure are similar in nature.
<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Jamaica, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.



<b>River Flooding</b>	Portions of the City of Jamaica are located within a flood zone. Although there is some land in the flood zone, since 2018, there have been no reported river flooding instances within the community. This hazard has a medium probability of effecting the community, and if it were to happen, little property damage is anticipated.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Jamaica. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within the city of Jamaica. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Jamaica during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Jamaica, but is normally not severe in nature.
<b>Tornado</b>	Guthrie County and Jamaica have experienced a number of tornadoes in the recent past, but the large majority of these events have caused little to no damage. Although these historically have not caused large amounts of damage, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Jamaica are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. The Raccoon River Valley Trail runs through the community, therefore there is an increased risk of bike to vehicular incident which could cause injury and or death to the bicyclist. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Jamaica prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table L.9: City of Jamaica Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$4,500	195
<b>Commercial</b>	12	\$169,670	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	99	\$3,542,600	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table L.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table L.10: City of Jamaica Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	18
<b>Commercial</b>	1	\$15,270	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	9	\$318,834	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table L.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table L.11: City of Jamaica Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	49
<b>Commercial</b>	3	\$42,417	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	25	\$885,650	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table L.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

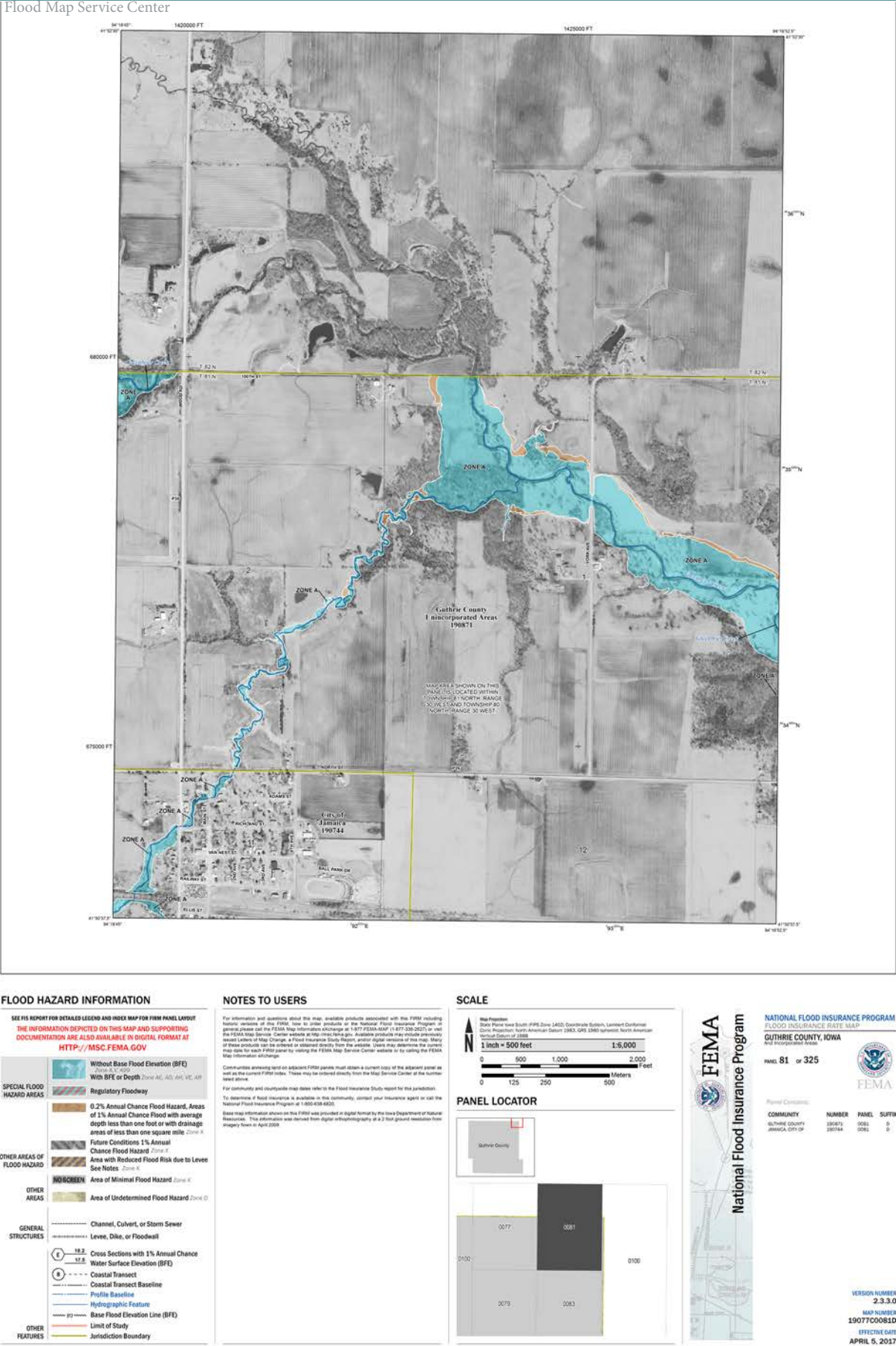
**Table L.12: City of Jamaica Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	98
<b>Commercial</b>	6	\$84,835	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	50	\$1,771,300	

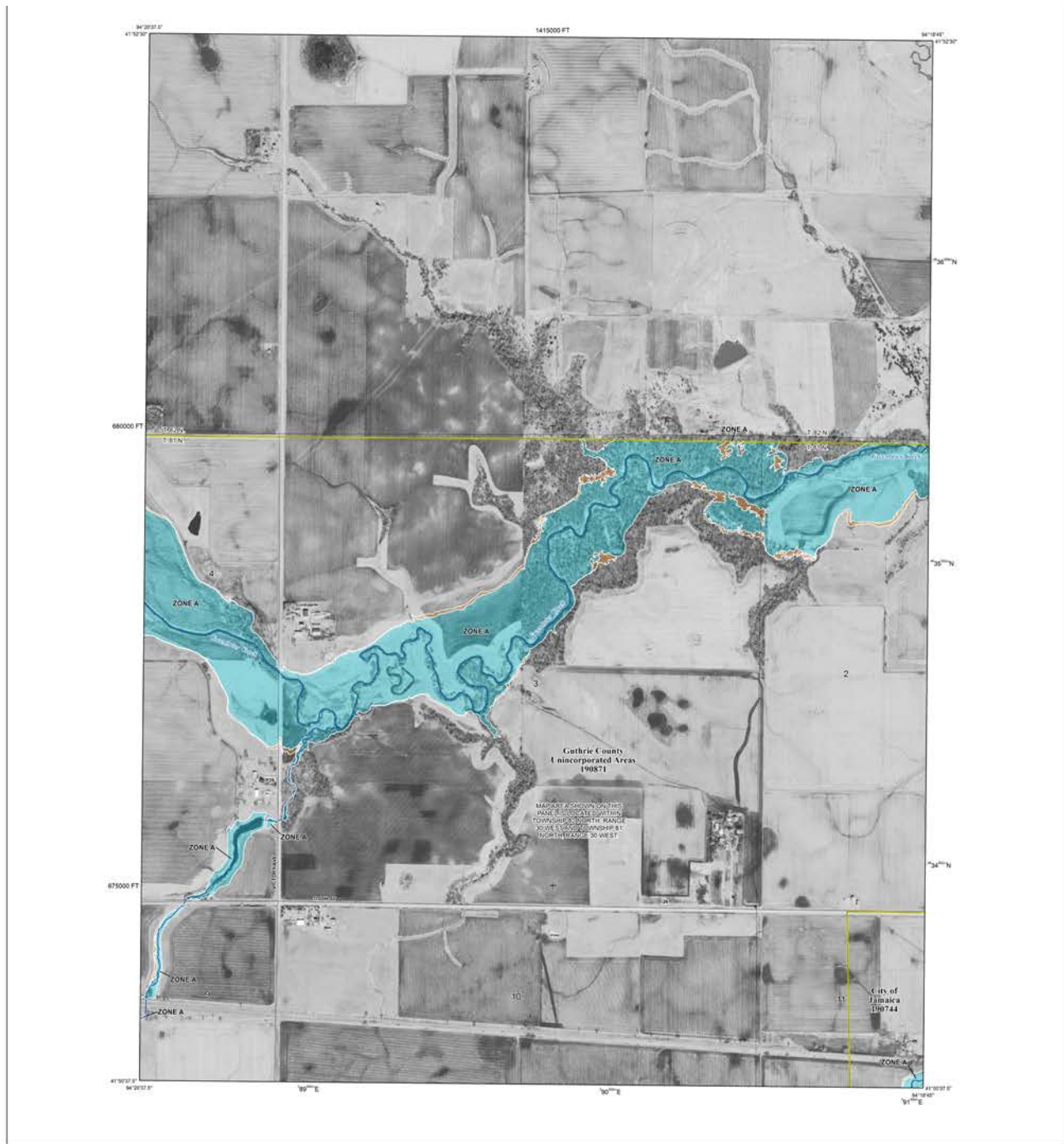
If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table L.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Maps

Source: FEMA Flood Map Service Center

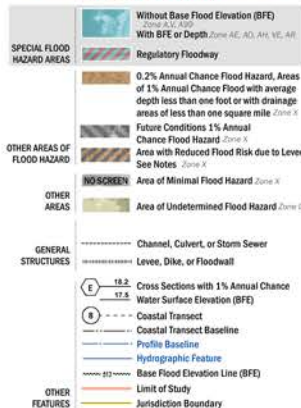






#### FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
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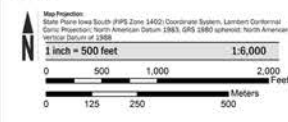
Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

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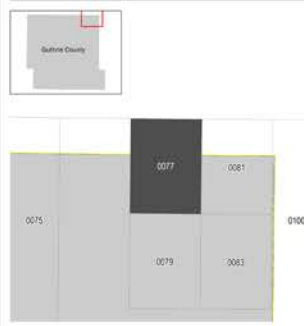
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectification at a 2 foot ground resolution from imagery from April 2008.

#### SCALE



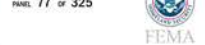
#### PANEL LOCATOR



#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
and incorporated areas

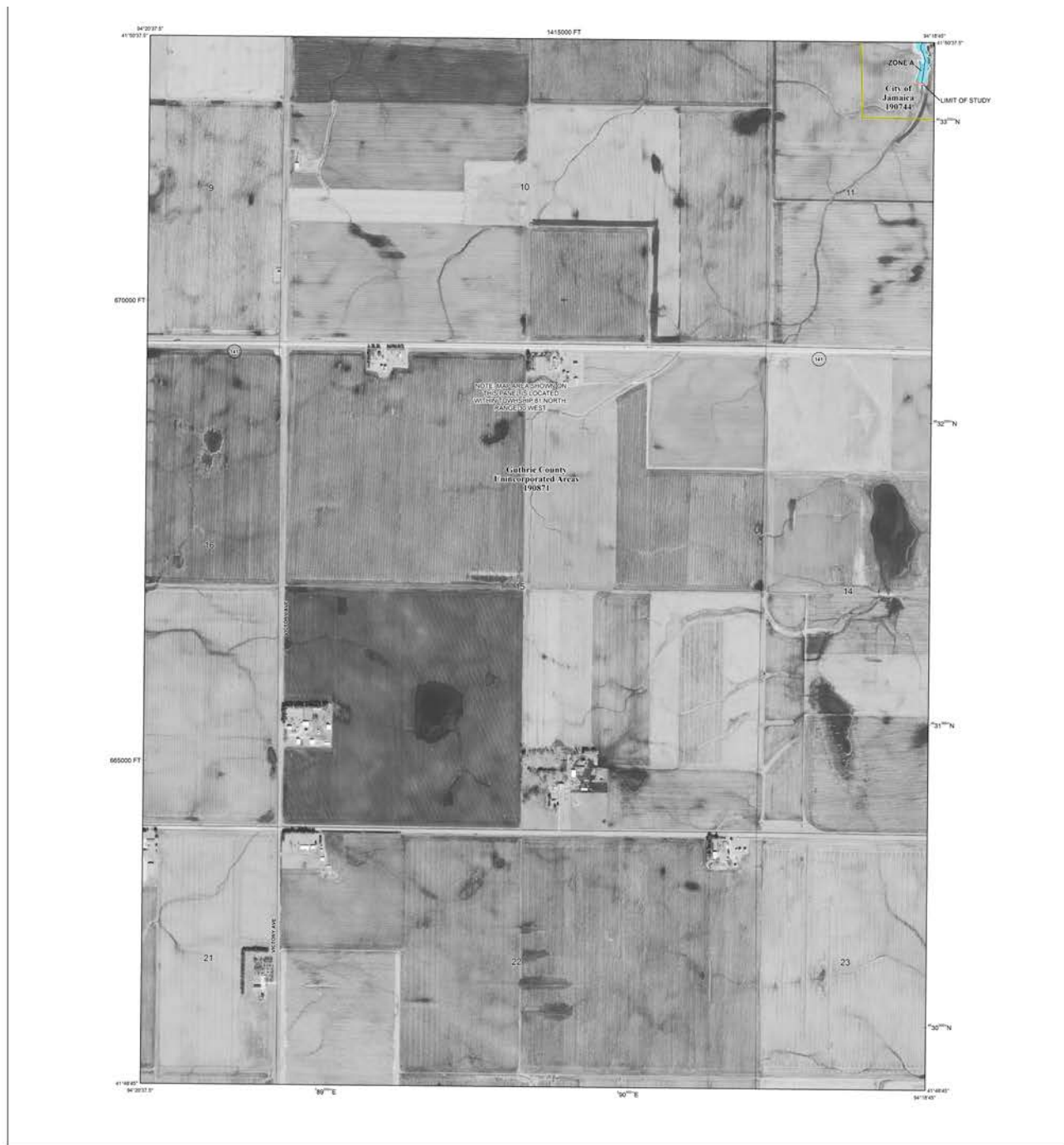
PANEL 77 of 325



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NUMBER: 190871  
PANEL: 0077  
SUFFIX: B

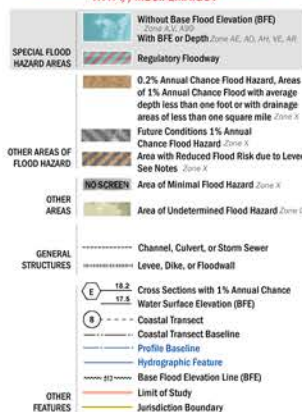
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MAP NUMBER  
19077C0077D  
EFFECTIVE DATE  
APRIL 5, 2017





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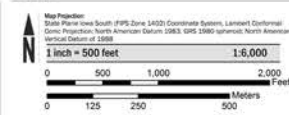
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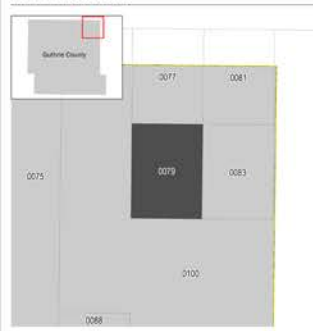
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## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

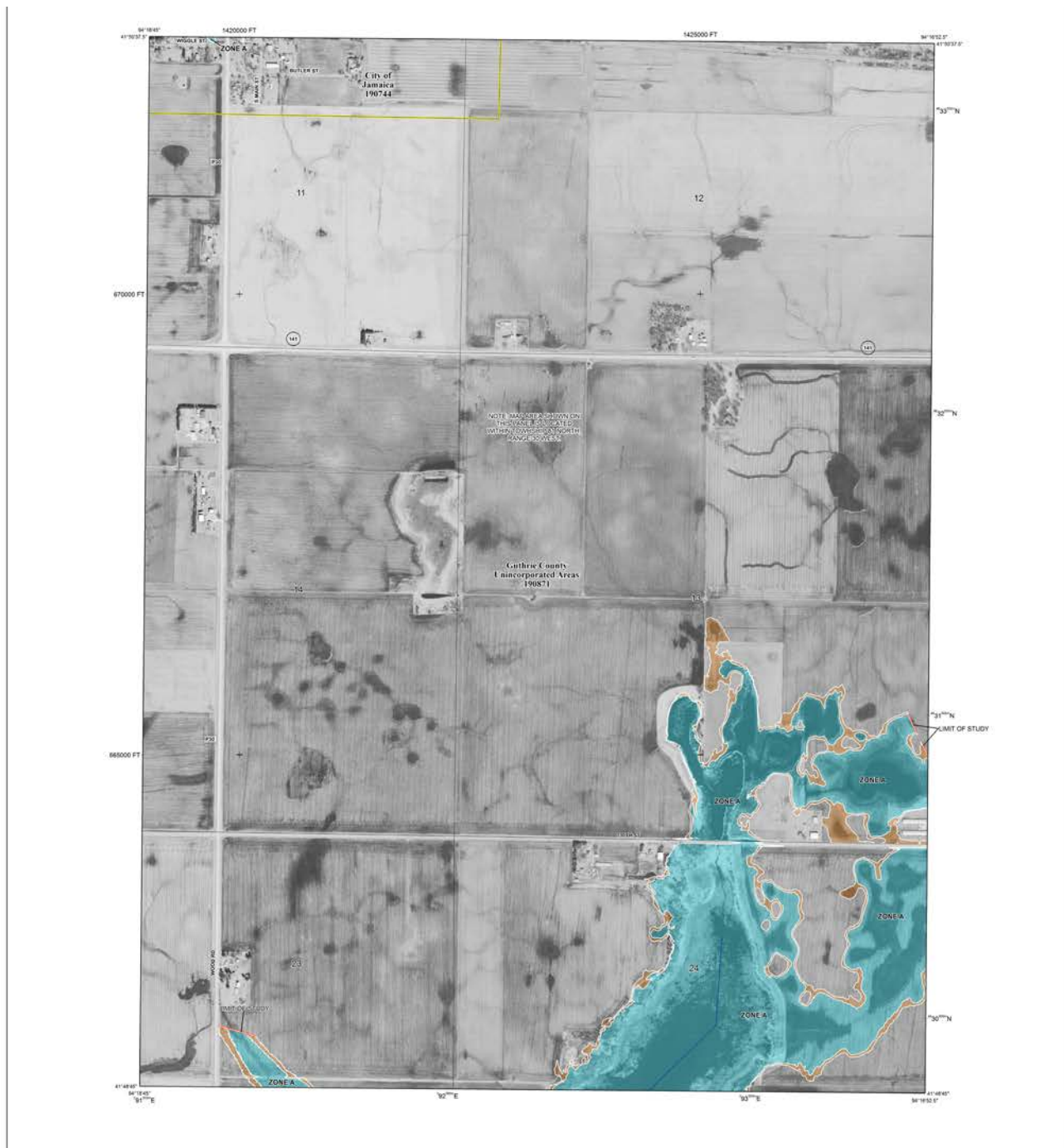
GUTHRIE COUNTY, IOWA  
and incorporated areas

Panel 79 of 325



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
GUTHRIE COUNTY 190871 0079 D  
JAMICA CITY OF 190744 0079 D

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C0079D  
EFFECTIVE DATE  
APRIL 5, 2017



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SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE)
	With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
OTHER AREAS	Area with Reduced Flood Risk due to Levee See Notes Zone X
	NO SCREEN Area of Minimal Flood Hazard Zone X
GENERAL STRUCTURES	Area of Undetermined Flood Hazard Zone B
	Channel, Culvert, or Storm Sewer
OTHER FEATURES	Levee, Dike, or Floodwall
	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
	Coastal Transverse
	Coastal Transverse Baseline
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

## NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including national versions of the FIRM, how to order products or the National Flood Insurance Program in general please call the FEMA Map Information Exchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

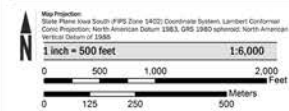
Communities desiring to use adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6623.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery taken in April 2008.

## SCALE



## PANEL LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
And Incorporated Areas  
Panel 83 of 325

COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE COUNTY	190871	0083	D
JAMAICA CITY OF	190744	0083	D

Panel Contents:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE COUNTY	190871	0083	D
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GUTHRIE COUNTY	190871	0083	D
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VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
1907700083D  
EFFECTIVE DATE  
APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table L.13: City of Jamaica Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Remove debris from drainage way	X				
Install a new warning siren	X				
Install dry hydrants					X
Purchase a generator to operate the water plant					X
Replace septic systems that do not meet State and County specifications	X				
Properly ventilate the old Fire Station					X
Drain area along South Main Street	X				

## Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table L.14: City of Jamaica Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Account for vulnerable populations
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Provide education and training to increase public awareness
Objective 2	Develop plans to become less vulnerable to hazards

**Table L.15: City of Jamaica Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Upgrade water system, water lines, and fire hydrants	Infrastructure Failure, Flash Flood	Mod	City Council	Mod	Local, State, Federal	Structural Project	Mid
Purchase a generator to operate the water plant	Infrastructure Failure	High	City Council	Low	Local, State, Federal	Emergency Services	Mid
Remove debris from drainage way	Flash Flood	High	City Council	Low	Local	Property Protection	Short
Develop a plan to get to homebound people during severe weather events	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Low	Local	Emergency Services	Short
Involve more groups in hazard mitigation planning	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Fire Department, City Council	Low	Local	Public Education and Awareness	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Annually train key local leaders on hazard mitigation issues	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Fire Department, City Council	Low	Local	Public Education and Awareness	Short
Install a new warning siren	Tornado	High	City Council	Low	Local, State, Federal	Emergency Services	Mid
Properly ventilate the old fire station	HAZMAT Incident	Mod	City Council	Low	Local	Prevention	Short
Upgrade warning systems	Tornado	Mod	Fire Department, City Council	Low	Local, State, Federal	Emergency Services	Short
Drain area along South Main Street	Flash Flood	Mod	City Council	High	Local, State, Federal	Property Protection	Long
Make all public facilities handicap accessible	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council	Mod-ate	Local, State, Federal	Structural Project	Mid
Continue NFIP Participation through the enforcement of Flood Plain Management Ordinances and Zoning Ordinances	Flash Flood, River Flood	High	City Council	Low	Local	Property Protection	Ongoing

# Incorporation into Other Planning Mechanisms

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Where possible, Jamaica will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- City Codes
- Hazard Mitigation Plan

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Jamaica Comprehensive Plan
- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans
- Building Code
- Zoning Ordinance
- Strategic Plan
- Housing Needs Assessment







# Appendix M: City of Menlo

## Community Profile

### *History*

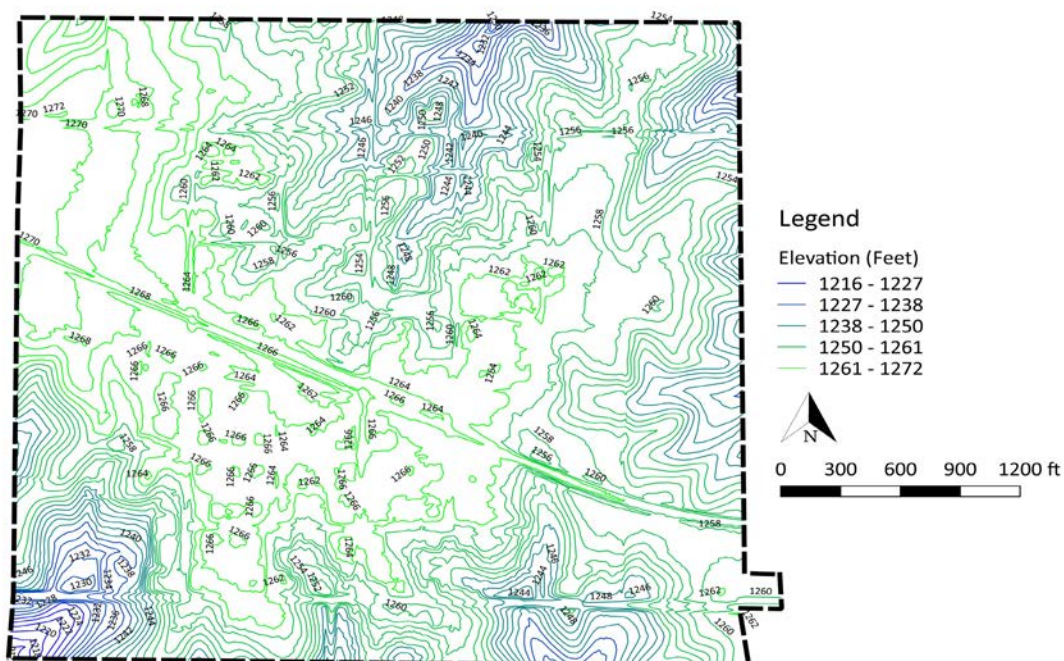
The naming of Menlo has quite a long history. When the land was bought for \$15 an acre in 1868 and platted in 1869 the town was called “The Switch”. Later, the town was known as the “Guthrie Switch” to signify the switching from Adair County land to Guthrie County land. In 1876, citizens dropped the “Switch” and the town was known as just Guthrie. Once the road leading to Guthrie Center was constructed, citizens feared transportation mistakes due to the similarity in city names. Finally, the town name was changed to Menlo in 1882. Menlo was originally started when the Chicago, Rock Island and Pacific Railroad depot was constructed. In 1880, a branch railroad made its way to Menlo and the train made two stops per day.

Menlo was originally known as a business center for travelers passing through the area. However, once the town began to grow, people realized the potential of the community as a place to live. The first grain elevator was constructed in 1874. Menlo’s total population hit a maximum of 500 people, and since then has steadily declined.

### *Geography and Environment*

Menlo is located in the southern part of Guthrie County. Menlo is located just north of Interstate 80, providing residents with easy commuting to many parts of the state. Menlo is 5.1 miles from Stuart, 15.9 miles from Guthrie Center, 18 miles from Greenfield and 44.7 miles from Des Moines.

**Map M.1: City of Menlo Elevation**



Source: Iowa DNR

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. Menlo's highest point in town is located on the western side of town with an elevation of 1,270 feet. The north side of town is the lowest portion of the community with an elevation of 1,240 feet. Map M.1 shows Menlo's elevation in relation to the rest of the county.

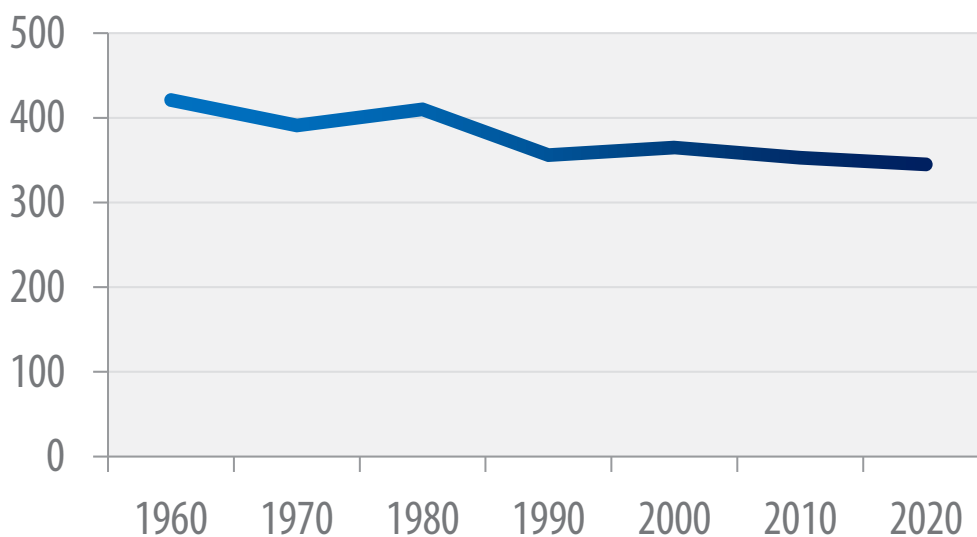
## Demographics

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Menlo's population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic and physical environments depends upon the composition, expectations and distribution of the population. A population's age distribution, income levels, ancestry and educational attainment are some of the characteristics that mold a community.

Menlo has experienced unstable growth over the past fifty-six years. In 1960, the total population was 421. Ten years later the population decreased by 30 individuals to 391. Growth occurred in the 1970s by a total of 19 individuals. Menlo then lost a significant amount of people in the 1980s as the population totaled 356. Since 2010, Menlo's population has decreased to 345 individuals. Figure M.1 shows the Menlo historic population change from 1960 to 2020.

**Figure M.1: City of Menlo Population, 1960-2020**

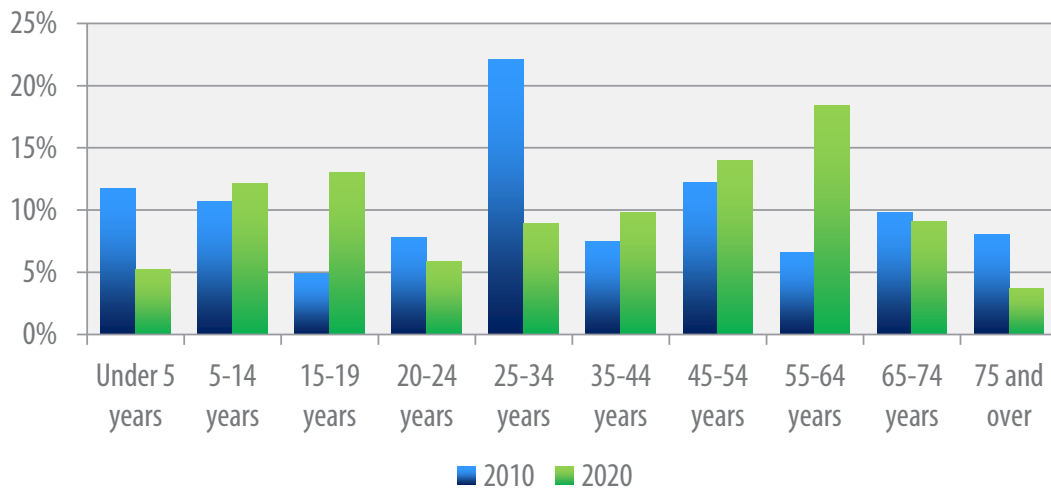


Source: US Census Bureau, American Community Survey

Figure M.2 is a comparison of the age distribution for Menlo from 2010 to 2020. The biggest population decrease occurred in the 25-34 age cohort which, in 2010, represented 22.1% of the total population, but only 8.9% in 2020. Another noticeable loss came in the under 5 age group. The largest population increase was seen in the 55-64 age cohort, which increased from representing 6.6% of the population in 2010 to 18.4% in 2020.

The age distribution in Figure M.2 is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as "brain drain."

**Figure M.2: City of Menlo Age Distribution**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most essential aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2022, Menlo lost only one housing unit. The number of vacant homes increased by 4 units. The number of renter-occupied units decreased by 13 units while owner-occupied units increased by 8 units. Table M.1 shows the housing trends for Menlo from 2010 to 2022.

**Table M.1: City of Menlo Housing Units, 2010 & 2022**

	2010		2022	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	165	94.8%	160	92.5%
<b>Owner Occupied</b>	138	83.6%	146	91.3%
<b>Renter Occupied</b>	27	16.4%	14	8.7%
<b>Vacant Housing Units</b>	9	5.2%	13	7.5%
<b>Total Housing Units</b>	174	100.0%	173	100.0%

Source: US Census Bureau, American Community Survey

According to the Guthrie County Assessor's, nearly 18% of the houses in Menlo are valued at less than \$50,000. Housing values can indicate the severity of hazard or disaster impacts. Homes with lesser values will be more susceptible to these hazards occurring. It also allows the city to identify damage costs if something drastic occurred. Table M.2 shows the distribution of owner-occupied housing unit values.

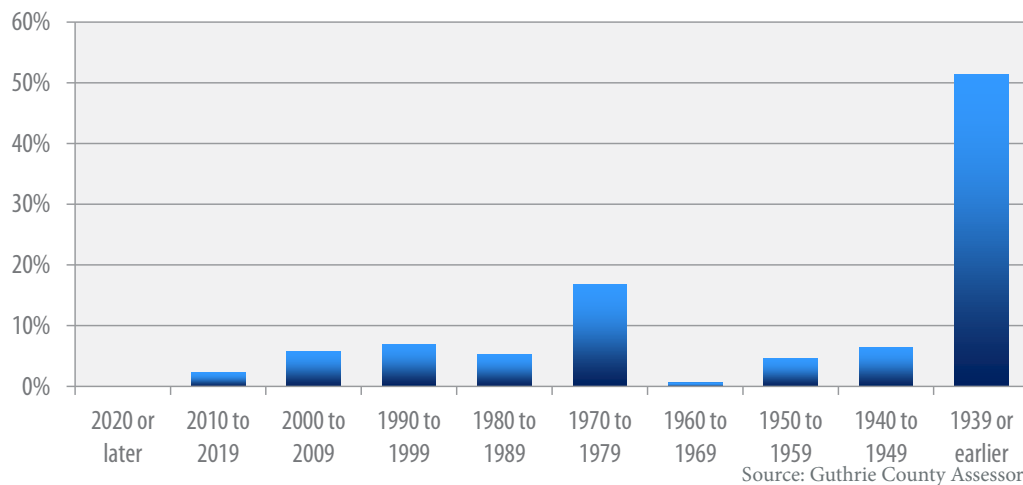
**Table M.2: City of Menlo Owner-Occupied Housing Units, 2022**

Value of Housing Unit	Percent of Homes
Less than \$50,000	17.8%
\$50,000 to \$99,999	27.4%
\$100,000 to \$149,999	35.6%
\$150,000 to \$199,999	14.4%
\$200,000 to \$299,999	3.4%
\$300,000 to \$499,999	1.4%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

According to the Guthrie County Assessor, 51.45% of homes were constructed prior to 1940. These aging structures will be more prone to damage if a disaster were to occur. Since 1940, construction decreased significantly. 16.76% of units were constructed in the 70's which was the second highest construction period in Menlo's history. An impressive 8.09% of homes were constructed between 2000 and 2019, which is considerably higher than many other communities in Guthrie County. Figure M.3 shows the distribution of housing units according to the year they were built.

**Figure M.3: City of Menlo Year Housing Unit Constructed, 2022**



## Economics

Table M.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$75,875 and the mean household income was \$83,740. According to the 2022 American Community Survey 5-year Estimates, 24.4% of households had incomes below \$49,000 and 27.6% had incomes above \$100,000.

**Table M.3: City of Menlo Household Income, 2022**

Income (In 2022 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	1	0.6%
\$10,000-\$14,999	3	1.9%
\$15,000-\$24,999	8	5.0%
\$25,000-\$34,999	13	8.1%
\$35,000-\$49,999	14	8.8%
\$50,000-\$74,999	34	21.3%
\$75,000-\$99,999	43	26.9%
\$100,000-\$149,999	24	15.0%
\$150,000-\$199,999	18	11.3%
\$200,000 or more	2	1.3%
Median Household Income	\$75,875	-
Mean Household Income	\$83,740	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural towns primarily serve as agricultural service centers and retail trade centers, but manufacturing activity is also found in many of these communities. Due to a primary reliance on agriculture (over 97% of the land is farmland) the economies that diversified have been impacted less by a downturn in the market. The employment by industry statistics for Menlo residents are shown in Table M.4.



The leading industries in employment include Finance and Insurance, and Real Estate and Rental and Leasing (17.9%), Agriculture, forestry, fishing and hunting, and mining (15.8%) and Manufacturing (12.9%). These percentages are based on the total number of individuals 16 years and over who are employed.

**Table M.4: City of Menlo Employment by Industry, 2022**

Industry	Estimate	Percent
Civilian employed population 16 years and over	240	100.0%
Agriculture, forestry, fishing and hunting, and mining	38	15.8%
Construction	13	5.4%
Manufacturing	31	12.9%
Wholesale trade	12	5.0%
Retail trade	23	9.6%
Transportation and warehousing, and utilities	5	2.1%
Information	4	1.7%
Finance and insurance, and real estate and rental and leasing	43	17.9%
Professional, scientific, and management, and administrative and waste management services	17	7.1%
Educational services, and health care and social assistance	26	10.8%
Arts, entertainment, and recreation, and accommodation and food services	5	2.1%
Other services, except public administration	18	7.5%
Public administration	5	2.1%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table M.5 provides a compilation of the current planning and regulatory documents in place for the City of Menlo.

**Table M.5: City of Menlo Existing Documents**

Document	Yes/No	Year
Previous HMP	Yes	2018
Comprehensive Plan	Yes	1994
Building Code	Yes*	-
Zoning Ordinance	Yes	2008
Strategic Plan	No	-
Housing Needs Assessment	No	-
NFIP Participant	Yes	2011
Floodplain Regulations	Yes	2017

\*State of Iowa Building Code

## NFIP Participation

In the past, there have been instances of significant flooding within the city limits of Menlo. The city began participating in NFIP in 2011, and the flood map was updated in 2017. The City's FIRMs can be found later in this appendix.

## *Outlook and Future Development*

Menlo's population has continued to decline in the recent past and the city has seen limited growth since the last plan update. The limited growth has been residential and extremely limited commercial. Similar growth is planned for the future.

## *Critical Facilities*

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Menlo's critical facilities can be found on Map M.2.

## *Essential Infrastructure and Services*

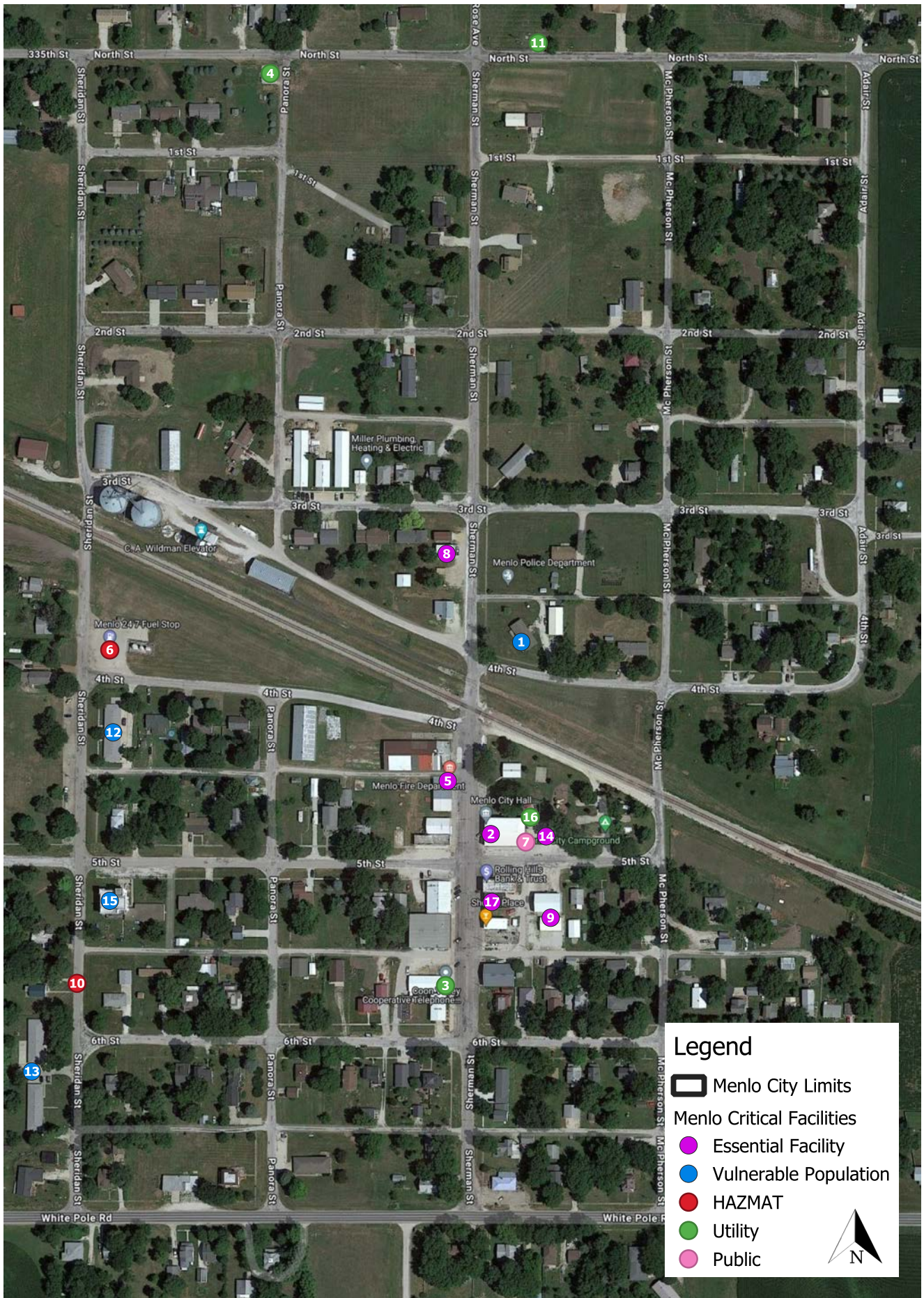
Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table M.6.

**Table M.6: City of Menlo Essential Infrastructure**

<b>Major Arterials</b>	IA Highway 925	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Xenia Rural Water	<b>Sewer Service</b>	Lawrence (Jake) Faust
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	Alliant Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Coon Valley Telephone	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Menlo Fire & Rescue	<b>Ambulance Service</b>	Panora EMS



# Map M.2: City of Menlo Critical Facilities



**Table M.7: City of Menlo Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Church of Christ	504 3rd Street	Vulnerable Population
2	City Hall	417 Sherman Street	Essential Facility
3	Coon Valley Telephone Coop	516 Sherman Street	Utility
4	Electric Substation	Corner of North Street and Panora Street	Utility
5	Fire Station	420 Sherman Street	Essential Facility
6	Menlo 24/7 Fuel Stop	Corner of 4th Street and Sheridan Street	HAZMAT
7	Library	504 5th Street	Public
8	County Maintenance Shed	Corner of 3rd Street and Sherman Street	Essential Facility
9	City Maintenance Shed	505 5th Street	Essential Facility
10	Natural Gas Line	S Sheridan Street	HAZMAT/Utility
11	Pump Station	North Street	Utility
12	Senior Living	408 Sheridan Street	Vulnerable Population
13	Senior Living	604 Sheridan Street	Vulnerable Population
14	Storm Siren	E 5th Street	Essential Facility
15	United Methodist Church	303 5th Street	Vulnerable Population
16	Water Tower	E 5th Street	Utility
17	Post Office	503 Sherman Street	Essential Facility



# Hazard Scores

**Table M.8: City of Menlo Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	A portion of the City of Menlo is agricultural land. Although this land represents some of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Menlo has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Menlo, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Menlo, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Menlo. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding within the City of Menlo. While flash floods have little to no warning time, with no instances within the past planning period, the committee anticipates that this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand in Menlo. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control and posing a threat to life.
<b>HAZMAT Incident</b>	There has been no instances of a HAZMAT Incident in Menlo over the last reporting period. Although there were no instances within the city limits, three HAZMAT incidents occurred just east of the community. One of those instances posed no threat, and two threatened the soil. This hazard occurs with no warning and with the right conditions, could impact the entire community. Mitigation actions for this hazard should be considered and this hazard should not be ignored.
<b>Human Disease</b>	Iowa and more specifically the City of Menlo are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Menlo would be structural failure of either bridges or roadways.
<b>Levee/Dam Failure</b>	There are no levees or dams located in the City of Menlo. It is unlikely that levee or dam failure will impact the city.

<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Menlo, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	No portions of the City of Menlo are located within a flood zone. The City's lagoons are not located within city limits or a flood zone, but are located immediately adjacent to a flood zone. This hazard has a low probability of effecting the community, and if it were to happen, it is anticipated that minimal damage would be noticed.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Menlo. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within the city of Menlo. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community. While impacts on the community may be minimal historically, the economic impact these storms have on the city continues to rise with the increase in cost of snow removal and the increase in cost in road repairs.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Menlo during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Menlo, but is normally not severe in nature.
<b>Tornado</b>	Guthrie County has experienced a number of tornadoes in the recent past, but the large majority of these events have caused little to no damage and no tornadoes have impacted the city of Menlo. Although these historically have not caused large amounts of damage, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Menlo are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Menlo prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table M.9: City of Menlo Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	2	\$33,300	348
<b>Commercial</b>	14	\$588,600	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	152	\$11,166,900	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table M.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table M.10: City of Menlo Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	31
<b>Commercial</b>	1	\$25,974	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	13	\$1,005,021	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table M.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table M.11: City of Menlo Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	87
<b>Commercial</b>	4	\$147,150	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	38	\$2,791,725	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table M.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

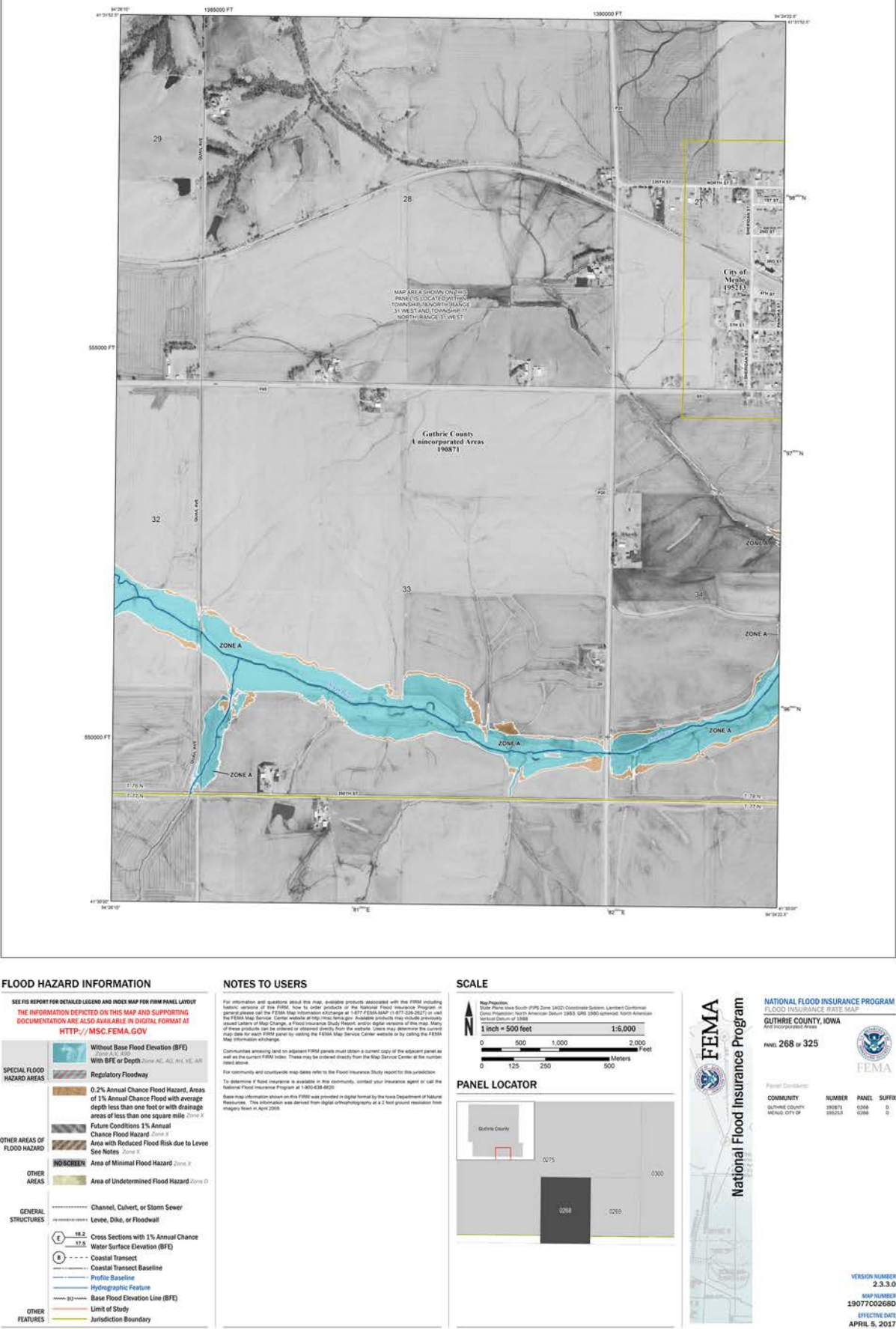
**Table M.12: City of Menlo Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$16,650	174
<b>Commercial</b>	7	\$294,300	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	76	\$5,583,450	

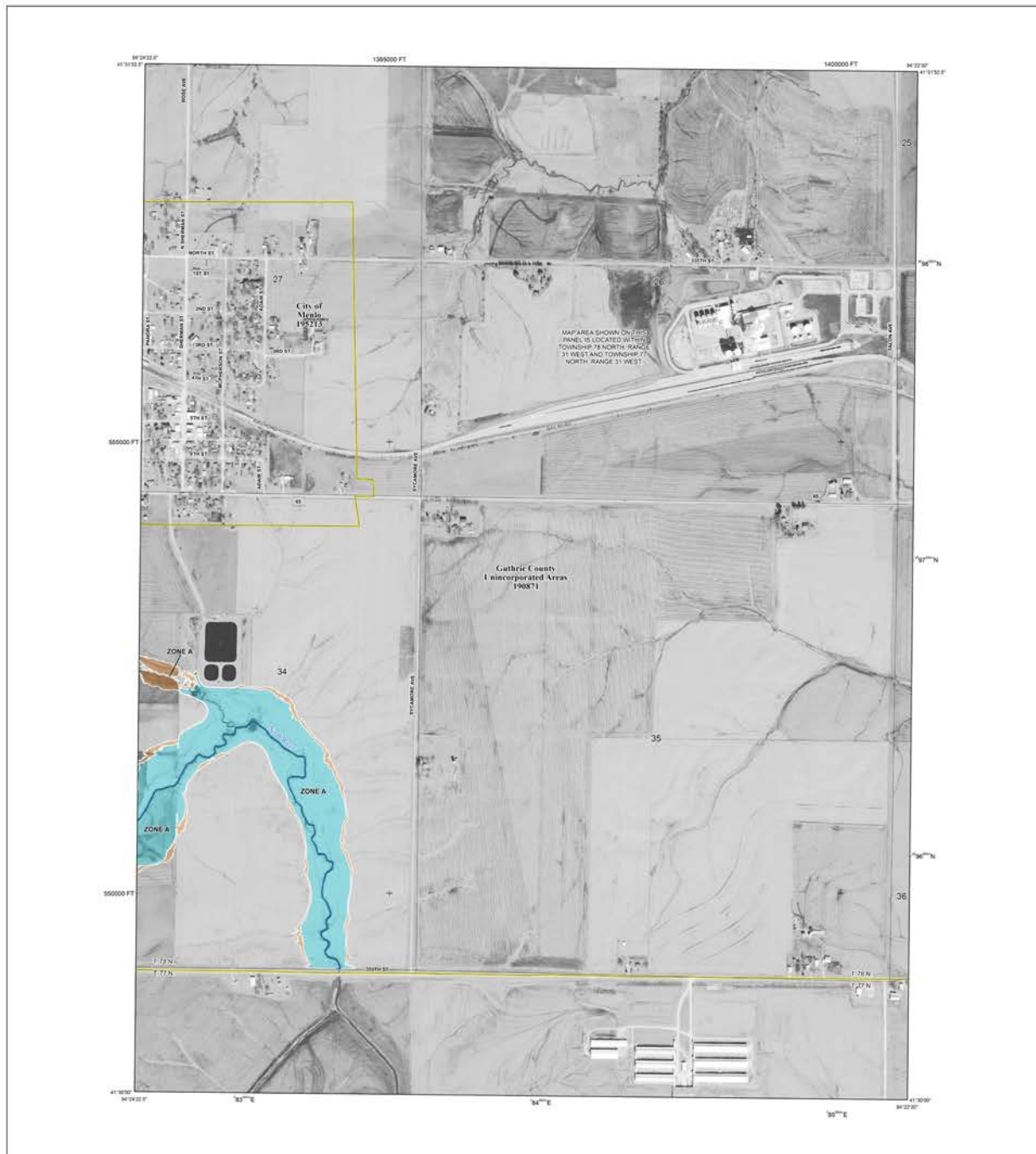
If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table M.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

# Flood Maps

Source: FEMA Flood Map Service Center







#### FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, X, ZONE A, ZONE A, ZONE A, ZONE A
		With BFE or Depth Zone A, ZONE A, ZONE A, ZONE A, ZONE A
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

#### NOTES TO USERS

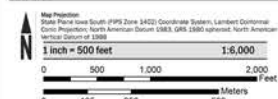
For information and questions about this map, available products associated with the FIRM including historic versions of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-MAP (1-877-368-2427) or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

Communities showing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

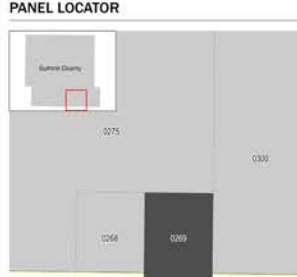
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-833-6842.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2009.

#### SCALE



#### PANEL LOCATOR



#### NATIONAL FLOOD INSURANCE PROGRAM

##### FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 269 of 325

Project Contents:

COMMUNITY	NUMBER	PANEL	SUFFIX
GUTHRIE COUNTY	19087	0269	0
MENLO CITY OF	19523	0269	0

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C02690  
EFFECTIVE DATE  
APRIL 5, 2017

# Status of Previous Mitigation Actions

**Table M.13: City of Menlo Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Acquire generator to power building during winter power outages			X		
Construct a tornado safe room					
Develop a storm water management plan or capital improvement plan to identify priority areas of Menlo in need of tile, curb/gutter, culverts, etc				X	
Secure funding				X	
Implement projects				X	
Become an NFIP participating community				X	
Determine if warning siren or weather radios are best alternative			X		
Seek and secure funding for desired project			X		
Implement project			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table M.14: City of Menlo Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Provide education and training to increase public awareness
Objective 3	Provide back-up systems for all critical systems and assets
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public warning capabilities
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 3	Provide back-up systems for all critical systems and assets
Objective 4	Account for vulnerable populations
Objective 5	Develop plans to become less vulnerable to hazards
<b>Goal 4</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Improve first responder resources and capabilities

**Table M.15: City of Menlo Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Install surge protectors on critical equipment	Infrastructure Failure	Mod	City Council	Minimal	Local	Property Protection	Short
Backup jurisdictional files and store in alternative location(s)	Infrastructure Failure	Mod	City Council	Minimal	Local	Property Protection	Short
Develop evacuation plan	Tornado, River Flood, HAZMAT Incident, Terrorism	Mod	Fire Department, City Council	Minimal	Local	Emergency Services	Short
Information on location of tornado shelters and cooling center	Tornado, Extreme Heat	High	City Council	Minimal	Local	Public Education and Awareness	Short
Continue participating in the NFIP	River Flood	Low	City Council	Minimal	Local	Prevention	Short
Install hazard signs in area campgrounds	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail	Mod	Parks and Recreation	Minimal	Local	Public Education and Awareness	Short
Special needs/oxygen user registration program (voluntary)	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department, City Council	Minimal	Local	Emergency Services	Short
	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail, Severe Winter Storm	High	Fire Department, City Council	Minimal	Local	Emergency Services	Short
Develop a plan to get to home-bound people during severe weather events	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail, Severe Winter Storm	High	Fire Department, City Council	Minimal	Local	Emergency Services	Short
Purchase portable generators	Infrastructure Failure	Mod	City Council	Minimal	Local, State, Federal	Emergency Services	Short



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Promote NOAA weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flood, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	Fire Department, City Council	Minimal	Local	Public Education and Awareness	Short
Establish alert systems for vulnerable population	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Fire Department, City Council	Minimal	Local	Emergency Services	Mid
Purchase essential vehicles and equipment	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	high	Fire Department, City Council	Mod-ate	Local, State, Federal	Emergency Services	Mid
Purchase vehicle extraction equipment	Transportation Incident	High	Fire Department, City Council	Low	Local, State, Federal	Emergency Services	Mid
Install warning sirens	Tornado, Windstorm	High	Fire Department, City Council	Low	Local, State, Federal	Emergency Services	Mid
Ensure shelters are stocked to support people for extended periods of time	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail, Severe Winter Storm	Mod	City Council	Minimal	Local	Emergency Services	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Develop a storm water management plan or capital improvements plan to identify areas of Menlo in need of tile, curb/gutter, culverts, etc	Flash Flood, Thunderstorm/Lightning/Hail	Low	City Council	High	Local, State, Federal	Property Protection	Long
Integrate safe room retrofits into critical assets (chair lift in existing location	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail, HAZMAT Incident, Severe Winter Storm	Mod	City Council	Minimal	Local, State, Federal	Emergency Services	Mid
Improvements on community safe room	Flash Flood, Tornado, Windstorm, River Flood, Thunderstorm/Lightning/Hail, Severe Winter Storm	Mod	City Council	Low	Local, State, Federal	Structural Project	Mid
Upgrade, replace, or expand sewer lines	Infrastructure Failure	Low	City Council	Moderate	Local, State, Federal	Natural Resource Protection	Long
Implement wastewater improvements	Infrastructure Failure	Low	City Council	Moderate	Local, State, Federal	Natural Resource Protection	Long

# Incorporation into Other Planning Mechanisms

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Where possible, Menlo will consider the findings from this document when updating or creating new planning and operating documents. Examples of planning documents that would benefit from information provided in this plan include, but are not limited to:

- City Codes
- Menlo Comprehensive Plan
- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans





# Appendix N: City of Panora

## City of Panora

### *History*

In 1851, Panora was established along the Middle Raccoon River and is the oldest community located in Guthrie County. Additionally, Panora was originally developed along the old Panora Speedway, which is now Highway 44, and the old Milwaukee Railway, now the Raccoon River Valley Recreational Trail. The name Panora is derived from an Iowa Guide created by the Federal Writer's Project in the 30's. It states that pioneers viewing the site of the present town from the hillside exclaimed, "What a beautiful Panorama!" The word "panorama" was therefore contracted to Panora when the town was platted.

Panora was the original county seat for Guthrie County and remained that way for many years. In 1876, Panora conceded the county seat to Guthrie Center. The empty courthouse was then used as the interim location for the Guthrie County High School until the new building was constructed. The High School was completed later that year on Panora's town square. The school was in operation until 1931 when it closed its doors. The building then became home to the Panora-Linden High students until it was replaced with a new building in 1974. In 1991, the abandoned high school building was demolished and replaced with a community center.

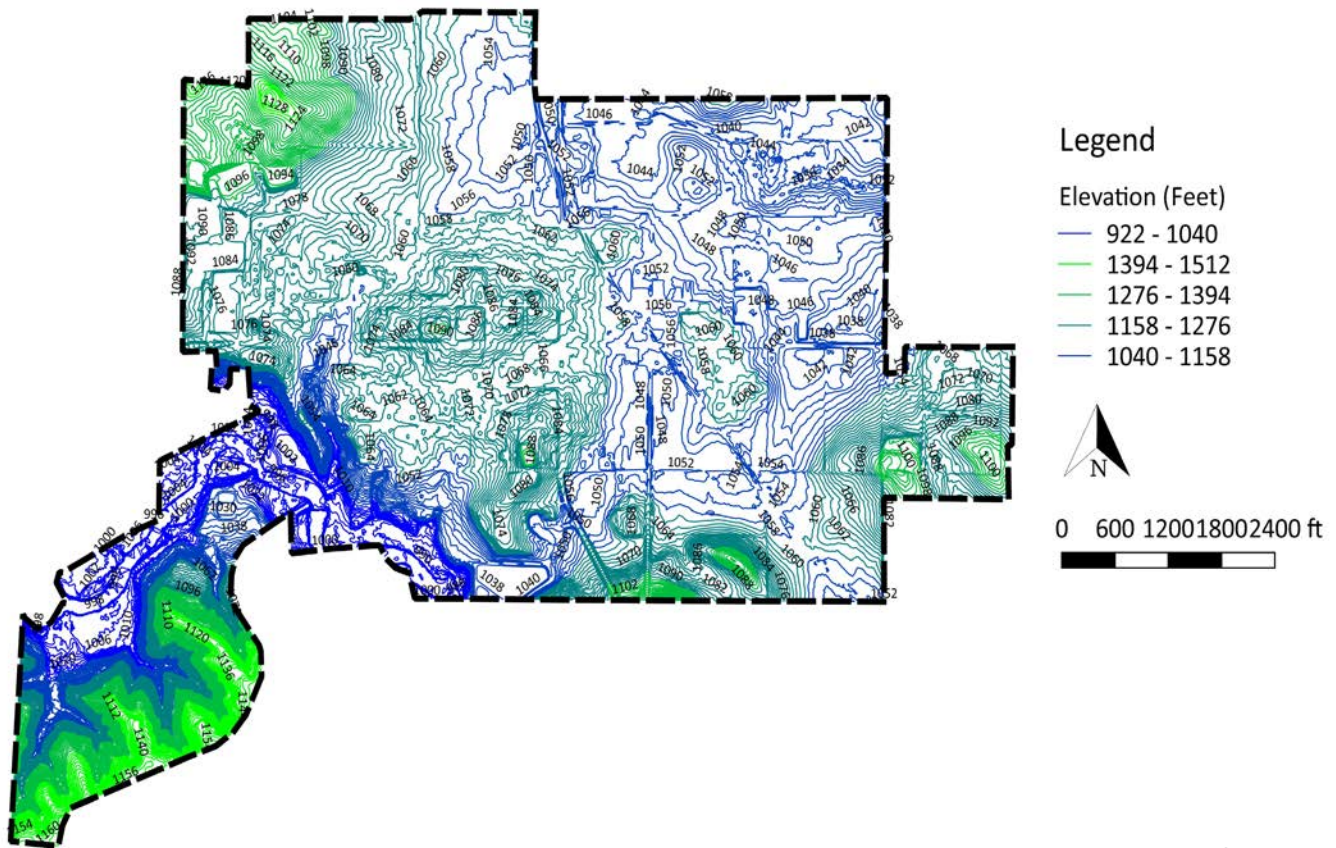
In 1852 the Reese Mill was constructed along the Middle Raccoon River. The Reese Mill was the first mill in the state located west of Des Moines. The mill was then destroyed and the Lake Panorama Dam was constructed in its place. A second mill in Panora was constructed in 1861. The Lenon Mill was converted to a flour and grist mill in 1877 and remained in operation through the early part of the 20th century. One of the original grinding stones remains at its current location at Lenon Mill Park.

### *Geography and Environment*

Panora is located in the east/central part of Guthrie County. IA 4 heads north out of town and connects to IA 144. IA 44 intersects the community going east/west. Interstate 80 is located roughly 16 miles to the south of Panora. Panora is located just 7.5 miles from Guthrie Center, 15.2 miles from Stuart, 24.1 miles from Perry, 27.8 miles from Coon Rapids, and 46.4 miles from Des Moines.

Panora is located in the east-central part of Guthrie County. The City's highest elevation lies at 1,158 above sea level and the lowest part lies at 922 feet. Map N.1 shows Panora's elevation.

## Map N.1: City of Panora Elevation



Source: Iowa DNR

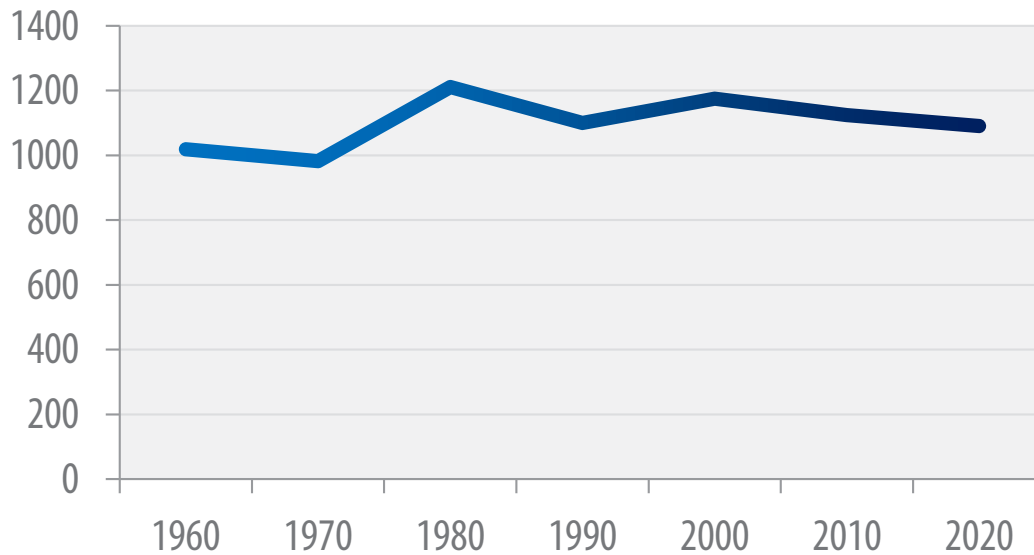
### *Demographics*

The population of an area represents one of its most important assets. A population includes the labor force, entrepreneurs, taxpayers, and buyers of goods and services. This section will address several characteristics of Panora's population through past, present and future trends of the region.

The size and composition of a community's population can exert influence on its development. For instance, population size, composition, and distribution influence the range of businesses a community can support, the pool of workers from which to draw, and the demand for and supply of services. Similarly, the effect people have on the social, economic, and physical environments depends upon the composition, expectations, and distribution of the population. A population's age distribution, income levels, ancestry, and educational attainment are some of the characteristics that mold a community. Population trends give community leaders and elected officials information on what kind of services need to be provided and offers prospective employers an overview of the local labor force.

In 1960, the total population was 1,019. Since then, the population has increased overall, but saw decades of population decline as well. The biggest decline came between 1980 and 1990 when Panora lost 111 residents and the largest population increase occurred from 1970 to 1980, when the city gained 229 residents. Since 2000, Panora's population has been on the decline, and sat at 1,091 as of 2020. Figure N.1 shows the population trend from 1960 to 2020.

**Figure N.1: City of Panora Population, 1960-2020**

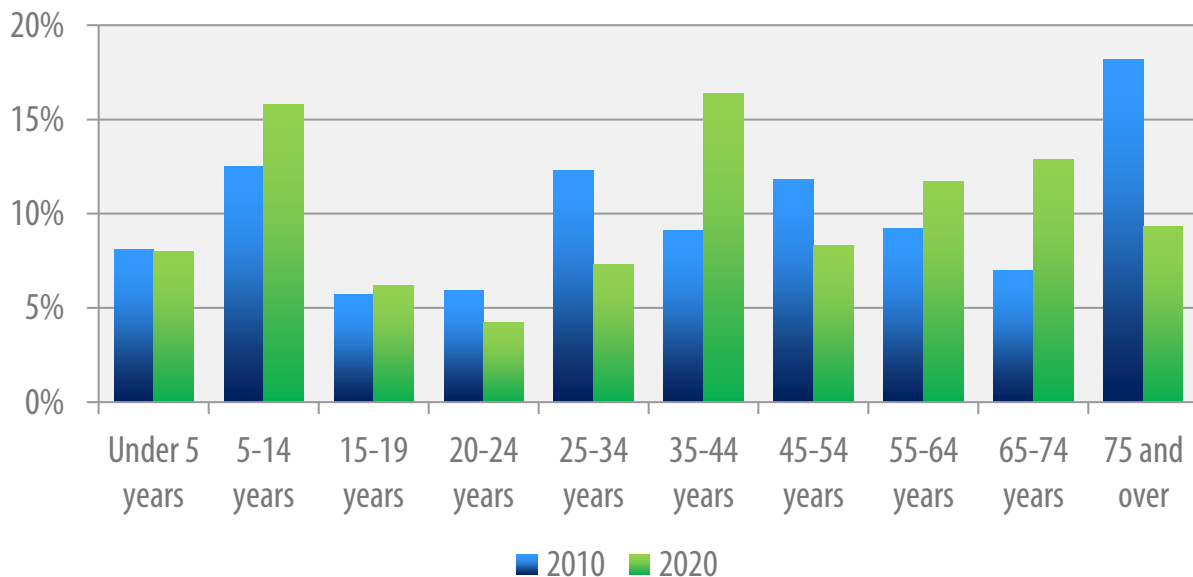


Source: US Census Bureau, American Community Survey

Figure N.2 is a comparison of the age distribution for Panora from 2010 to 2020. The biggest population decrease occurred in the 75 and over age cohort which, in 2010, represented 18.2% of the total population, but only 9.3% in 2020. The largest population increase was seen in the 35-44 age cohort, which increased from representing 9.1% of the population in 2010 to 16.4% in 2020.

The age distribution for Panora is consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as “brain drain.”

**Figure N.2: City of Panora Age Distribution**



Source: US Census Bureau, American Community Survey

## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2020, Panora gained a total of 110 housing units. With that, the number of vacant homes decreased by 21 units. The number of renter-occupied units decreased by 10 units while owner-occupied units increased by 91 units. Table N.1 shows the housing trends for Panora from 2010 to 2020.

**Table N.1: City of Panora Housing Units, 2010 & 2020**

	2010		2020	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	487	86.5%	591	91.5%
<b>Owner Occupied</b>	340	69.8%	431	72.9%
<b>Renter Occupied</b>	170	30.2%	160	27.1%
<b>Vacant Housing Units</b>	76	13.5%	55	8.5%
<b>Total Housing Units</b>	536	100.0%	646	100.0%

Source: US Census Bureau, American Community Survey

In Panora, 24.6% of homes are valued between at less than \$100,000 and 75.4% of homes are valued at more than \$100,000. This is an extremely high when compared to other communities in the region and is mainly due to the presence of Lake Panorama as the lake front properties are popular living locations and places of high value. Valuable homes are most likely in good condition and can withstand severe storms at a higher rate than un-maintained, low value homes. However, if a disaster were to occur, the impact on the community and economy will be more severe. Table N.2 shows the distribution of owner-occupied housing unit values.

**Table N.2: City of Panora Value of Owner-Occupied Housing Units, 2020**

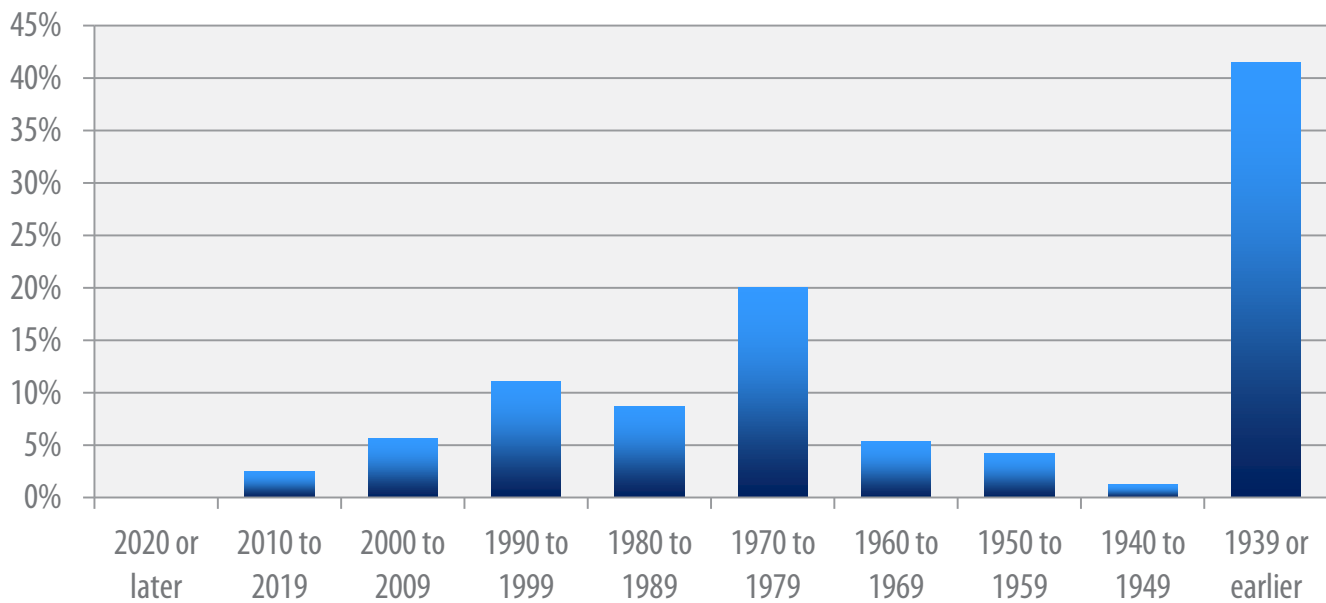
<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	4.2%
\$50,000 to \$99,999	20.4%
\$100,000 to \$149,999	22.0%
\$150,000 to \$199,999	32.5%
\$200,000 to \$299,999	19.0%
\$300,000 to \$499,999	1.9%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

41.5% of homes in Panora were constructed prior to 1940. Many of the more valuable homes were most likely constructed recently as an estimated 19.2% of homes have been constructed since 1990. Panora's housing stock is significantly healthy compared to the rest of the county and is a strong economic factor for the future development of Panora. Figure N.3 shows the housing unit construction distribution.



**Figure N.3: City of Panora Year Housing Unit Constructed, 2020**



Source: Guthrie County Assessor

## Economics

Table N.3 shows the household income in 2020 inflation-adjusted dollars. The median household income was \$61,438 and the mean household income was \$81,580. According to the 2022 American Community Survey 5-Year Estimates, 29.1% of Panora's households had incomes below \$49,000 and 25.3% had incomes above \$100,000. This is consistent with the city's housing values.

**Table N.3: City of Panora Household Income, 2022**

Income (In 2016 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	16	2.7%
\$10,000-\$14,999	31	5.2%
\$15,000-\$24,999	62	10.5%
\$25,000-\$34,999	63	10.7%
\$35,000-\$49,999	44	7.4%
\$50,000-\$74,999	145	24.5%
\$75,000-\$99,999	79	13.4%
\$100,000-\$149,999	73	12.4%
\$150,000-\$199,999	43	7.3%
\$200,000 or more	35	5.9%
Median Household Income	\$61,438	-
Mean Household Income	\$81,580	-

Source: US Census Bureau, American Community Survey

The employment by industry statistics are shown in Table N.4. The leading industries of employment in Panora include Educational Services and Health Care and Social Assistance (16.9%), Retail Trade (14.2%), and Other Services except public administration (11.4%). Taking advantage of regional strengths and industries will increase revenue generated in the community, resulting in increased income levels and housing values. These percentages are based on the total number of individuals 16 years and older that are from Panora and are employed.

**Table N.4: City of Panora Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	586	100.0%
Agriculture, forestry, fishing and hunting, and mining	26	4.4%
Construction	35	6.0%
Manufacturing	31	5.3%
Wholesale trade	3	0.5%
Retail trade	83	14.2%
Transportation and warehousing, and utilities	27	4.6%
Information	30	5.1%
Finance and insurance, and real estate and rental and leasing	79	13.5%
Professional, scientific, and management, and administrative and waste management services	46	7.8%
Educational services, and health care and social assistance	99	16.9%
Arts, entertainment, and recreation, and accommodation and food services	43	7.3%
Other services, except public administration	67	11.4%
Public administration	17	2.9%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table N.5 provides a compilation of the current planning and regulatory documents in place for the City of Panora.

**Table N.5: City of Panora Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2014
Building Code	Yes*	-
Zoning Ordinance	Yes	2007
Strategic Plan	Yes	2018
Housing Needs Assessment	Yes**	2018
NFIP Participant	Yes	2010
Floodplain Regulations	Yes	2017

\*State of Iowa Building Code

\*\* In progress

## *NFIP Participation*

In the past, there have been instances of significant flooding within the city limits of Panora. The city began participating in NFIP in 2010, and the flood map was updated in 2017. The city's FIRMs can be found later in this appendix.

## *Outlook and Future Development*

Panora has seen growth in both residential and commercial properties in the community since the last plan update. The city anticipates that these growth patterns will continue through the life of this plan.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Panora's critical facilities can be found on Map N.2.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table N.6.

**Table N.6: City of Panora Essential Infrastructure**

<b>Major Arterials</b>	IA Highways 4 & 44	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Municipal	<b>Sewer Service</b>	Municipal
<b>Electric Service</b>	Municipal	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Panora Fiber	<b>Law Enforcement</b>	Panora City Police
<b>Fire Service</b>	Panora Volunteer Fire Department	<b>Ambulance Service</b>	Panora EMS

## Panorama Community Schools

There are two schools that lie within Panora's city boundary: Panorama Elementary School and Panorama Middle/High School. Panorama Elementary School serves grades PreK-5 and is located at 401 Panther Drive in the northwest part of the city. Panorama Middle/High School serves grades 6-8 in Middle School and 9-12 in High School and is located at 701 W. Main Street in the west-central part of the city. Table N.7 displays Panorama's enrollment from 2018-2023. In the past five years, enrollment has been on the decline, losing an average of nine students each year.

Students and staff participate in drills and educational programs related to hazards and the mitigation of them. The District maintains its own equipment and supplies to maintain roads and walkways on campus.

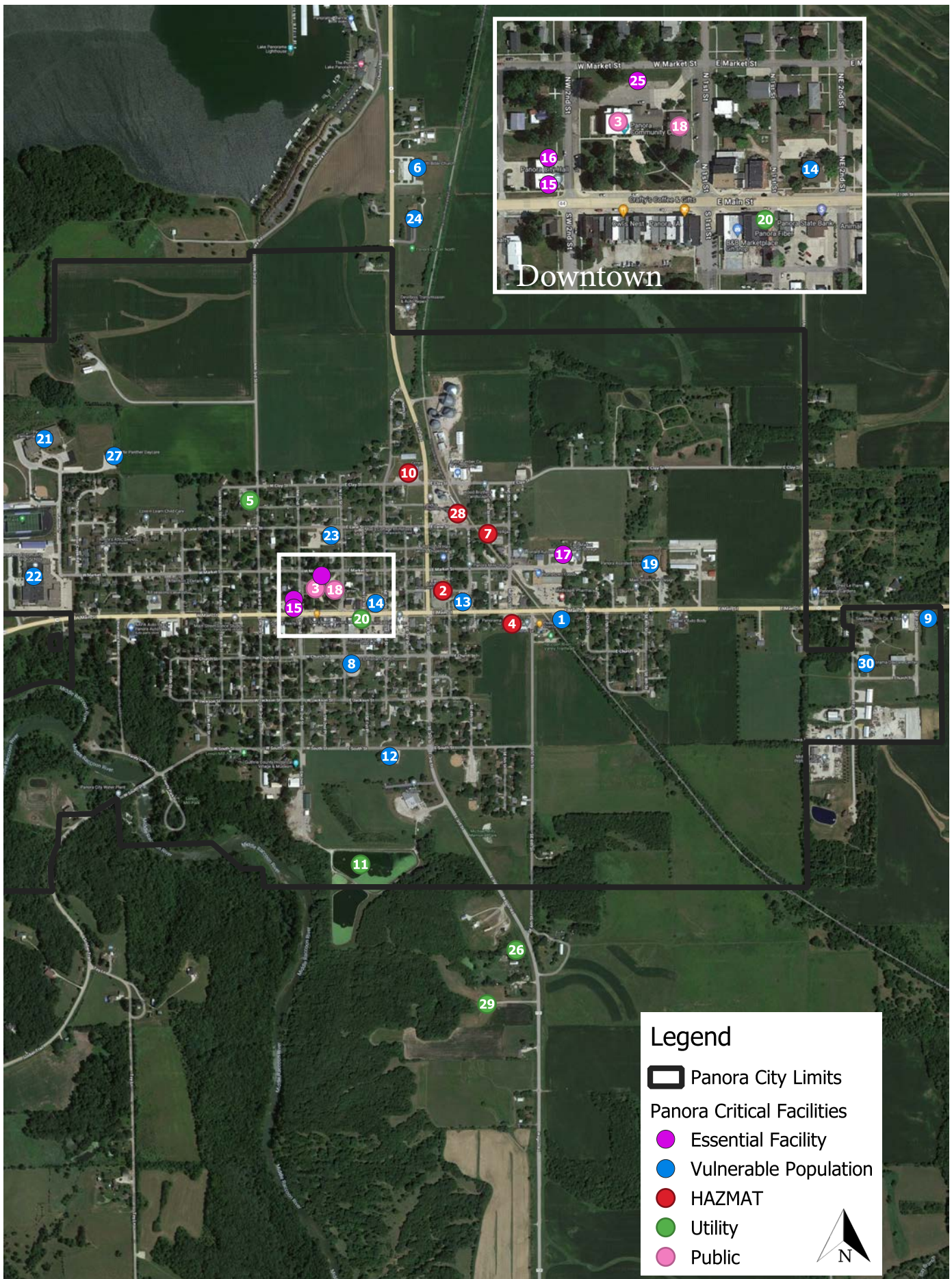
**Table N.7: Panorama Schools Enrollment**

<b>School Year</b>	<b>Elementary School Enrollment</b>	<b>Middle School Enrollment</b>	<b>High School Enrollment</b>	<b>Total Enrollment</b>
<b>2018-19</b>	319	154	258	731
<b>2019-20</b>	307	155	268	720
<b>2020-21</b>	302	163	258	723
<b>2021-22</b>	317	171	235	723
<b>2022-23</b>	317	161	213	691

Source: Iowa Department of Education, Bureau of Information and Analysis



## Map N.2: City of Panora Critical Facilities





**Table N.8: Panora Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Calvary Chapel	604 E Main Street	Vulnerable Population
2	Casey's	113 NE 3rd Street	HAZMAT
3	Community Center	115 W Main Street	Public
4	Post Office	117 E Church Street	Essential Facility
5	Electric Substation	314 W Clay Street	Utility
6	Faith Bible Church	2096 IA 4	Vulnerable Population
7	Ferrellgas	S of E Lane Street and W of NE 5th Street	HAZMAT
8	First Christian Church	102 E Church Street	Vulnerable Population
9	Guthrie County Hospital - Panora Clinic	103 SE 13th Street	Vulnerable Population
10	Heartland Gas Station	Corner of E Clay Street and NE 3rd Street	HAZMAT
11	Lagoon	South side of town	Utility
12	Lighthouse Assembly of God	202 SE 1st Place	Vulnerable Population
13	Mercy Clinics Family Medicine	319 E Main Street	Vulnerable Population
14	Panora United Methodist Church	119 W Main Street	Vulnerable Population
15	Panora City Hall	102 NW 2nd Street	Essential Facility
16	Panora EMS	102 NW 2nd Street	Essential Facility
17	Panora Fire Hall	607 E Market Street	Essential Facility
18	Panora Public Library	102 N 1st Street	Public
19	Panora Specialty Care	805 E Main Street	Vulnerable Population
20	Panora Fiber	114 E Main Street	Utility
21	Panorama Elementary School	401 Panther Drive	Vulnerable Population
22	Panorama High School	701 W Main Street	Vulnerable Population
23	St. Cecelia Catholic Church	220 N 1st Street	Vulnerable Population
24	St. Thomas Lutheran Church	2106 IA 4	Vulnerable Population
25	Storm Siren	Various	Essential Facility
26	Water Tower	Wagon Drive	Utility
27	Little Panther Day Care	601 Panther Drive	Vulnerable Population
28	Heartland Coop	310 E Clay Street	HAZMAT
29	Cell Tower	Wagon Drive	Utility
30	Panorama Daycare Center	1301 E Church Street	Vulnerable Population

# Hazard Assessment

**Table N.8: City of Panora Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	A portion of the City of Panora is agricultural land. Although this land represents some of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Panora has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Panora, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Panora, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Panora. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding within the City of Panora. With the community having large portions in river flooding areas, flooding precautions will be taken with an emphasis on river flooding, but flash flooding mitigation measures will also be considered. While flash floods have little to no warning time, the committee anticipates that this hazard is not a high priority hazard to address.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand in Panora. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control and posing a threat to life.
<b>HAZMAT Incident</b>	There has been one instance of a HAZMAT Incident in Panora over the last reporting period. This incident caused no threat to nature or life. This hazard occurs with no warning and with the right conditions, could impact the entire community. Mitigation actions for this hazard should be considered and this hazard should not be ignored.
<b>Human Disease</b>	Iowa and more specifically the City of Panora are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Panora would be structural failure of either bridges or roadways.
<b>Levee/Dam Failure</b>	While there is no levee or dam within Panora city limits, there are a few dams with significant and low hazard classifications just upstream. Failure at these dams could cause significant damage to the community. While there is no planning the city can do to prevent the failure of these dams, the city can mitigate the effects if a failure were to occur. This hazard can be linked to river flooding and mitigation actions may be similar.

<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Panora, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation that would not threaten the community as a whole.
<b>River Flooding</b>	Portions of the City of Panora are located within a flood zone. Although there is some land in the flood zone, since 2018, there have been no reported river flooding instances within the community. This hazard has a medium probability of effecting the community, and if it were to happen, little property damage is anticipated but larger amounts of crops may be affected.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Panora. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within the city of Panora. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community. While impacts on the community may be minimal historically, the economic impact these storms have on the city continues to rise with the increase in cost of snow removal and the increase in cost in road repairs.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Panora during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Panora, but is normally not severe in nature.
<b>Tornado</b>	Guthrie County and Panora have experienced a number of tornadoes in the recent past, but the large majority of these events have caused little to no damage. Although these historically have not caused large amounts of damage, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Panora are relatively low, so any transportation incident between vehicles is likely to cause little damage to property or humans. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Panora prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table N.10: City of Panora Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$35,000	1,091
<b>Commercial</b>	100	\$11,676,283	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	432	\$37,640,770	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table N.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table N.11: City of Panora Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	98
<b>Commercial</b>	9	\$1,050,865	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	39	\$3,387,669	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table N.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table N.12: City of Panora Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	273
<b>Commercial</b>	25	\$2,919,070	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	108	\$9,410,192	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table N.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table N.13: City of Panora Critical Hazard Impact**

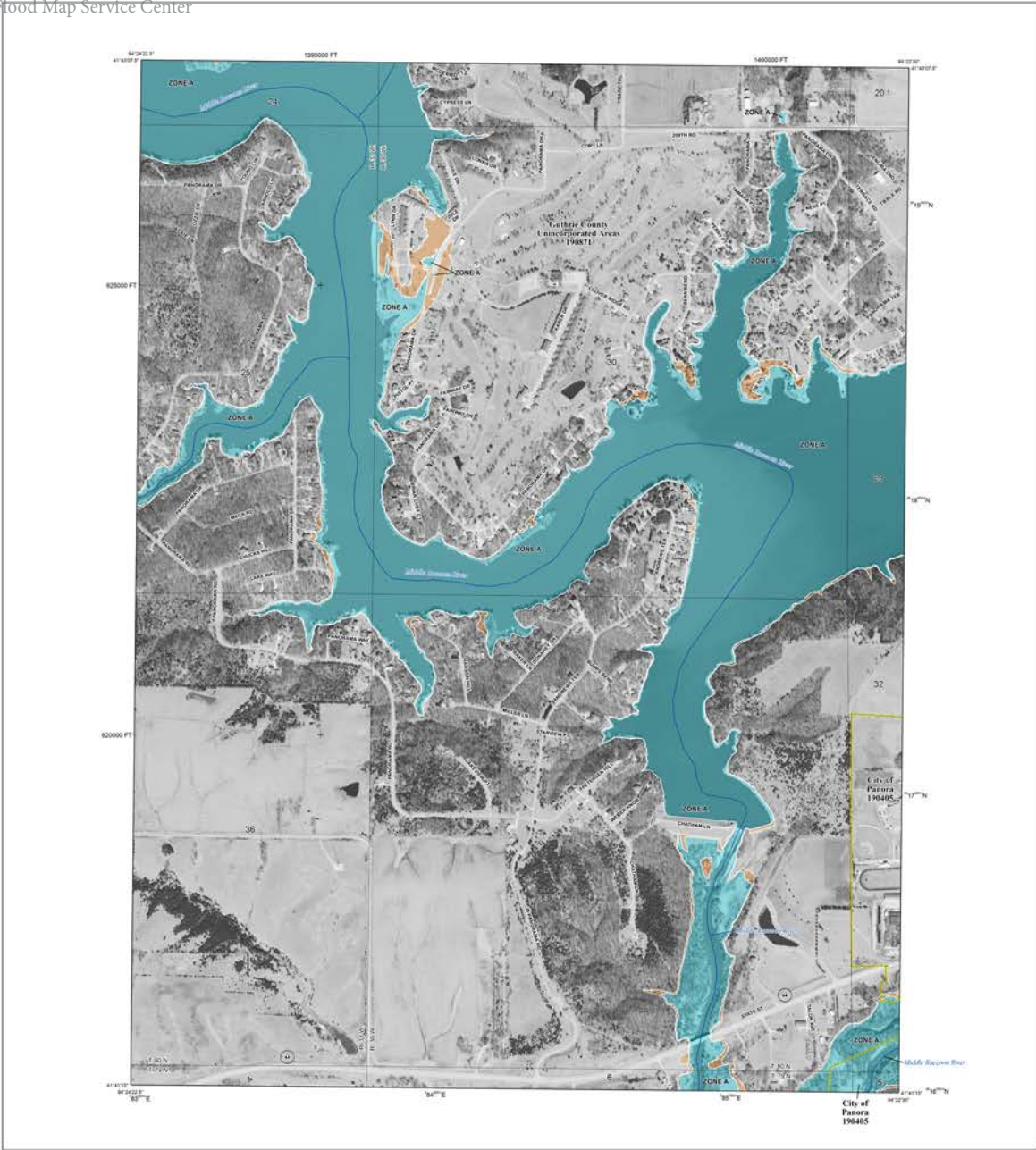
Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	546
<b>Commercial</b>	50	\$5,838,141	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	216	\$18,820,385	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table N.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.



# Flood Maps

Source: FEMA Flood Map Service Center



## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE)
		With BFE or Depth Zone A-E, A1, A2, A3, A4, A5, A6, A7
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile (Zone X)
OTHER AREAS		Future Conditions 1% Annual Chance Flood Hazard (Zone X)
		Area with Reduced Flood Risk due to Levee (Zone X)
GENERAL STRUCTURES		Area of Minimal Flood Hazard (Zone X)
		Area of Undetermined Flood Hazard (Zone B)
OTHER FEATURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Tract
OTHER FEATURES		Coastal Tract Baseline
		Profile Baseline
OTHER FEATURES		Hydrographic Feature
		Base Flood Elevation Line (BFE)
OTHER FEATURES		Limit of Study
		Jurisdiction Boundary

## NOTES TO USERS

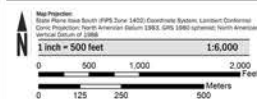
For information and questions about this map, available products associated with this FIRM including future editions of the FIRM, Map Service Center or the National Flood Insurance Program, in general, please call the FEMA Map Information Exchange at 1-877-FEMA-8087 or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued editions of this map, a Flood Insurance Study Report, and/or digital versions of the map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

Communities appearing on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-456-8023.

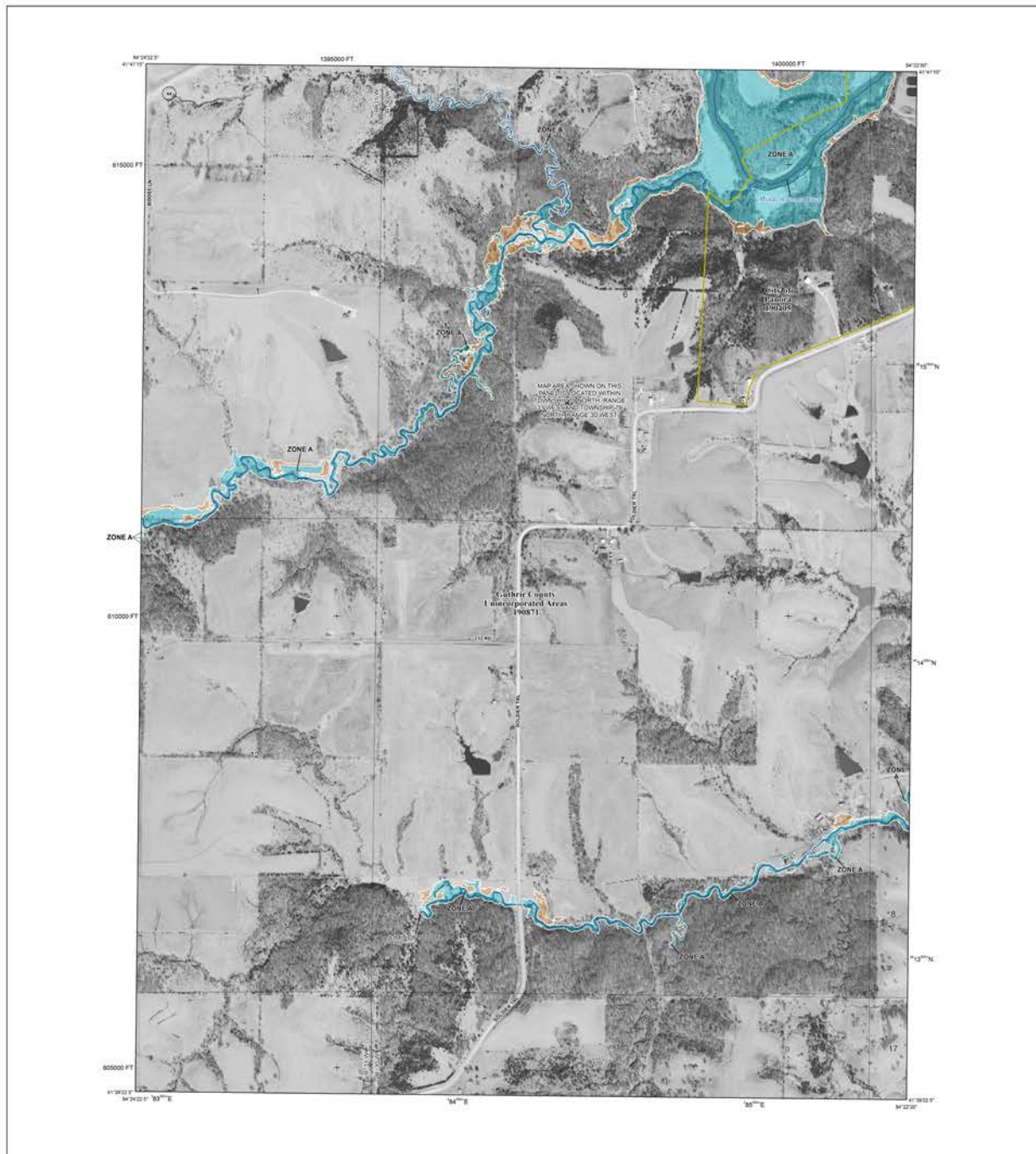
Base map information shown on this FIRM was provided to digital format by the Iowa Department of Natural Resources. This information was derived from digital orthorectified maps of a 1:25,000 scale resolution from imagery flown in April 2005.

## SCALE



## PANEL LOCATOR





#### FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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 DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, X
		With BFE or Depth Zone A, AC, AD, AE, AF, AH
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee See Notes Zone X
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary

#### NOTES TO USERS

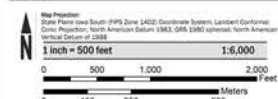
For information and questions about this map, available products associated with this FIRM including historic versions of the FIRM, how to order products or the National Flood Insurance Program is general, please call the FEMA Map Information Exchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at [msc.fema.gov](http://msc.fema.gov). Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

Communities desiring to add an adjacent FIRM panel must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map data refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-833-6842.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital or topographic data at a 2 foot ground resolution from imagery flown in April 2009.

#### SCALE



#### PANEL LOCATOR



**FEMA**  
 National Flood Insurance Program

#### NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA

Panel 167 of 325

Project Contacts:  
 COMMUNITY: GUTHRIE COUNTY  
 NUMBER: 1907701670  
 PANEL: 0167  
 SUPPLY: 0



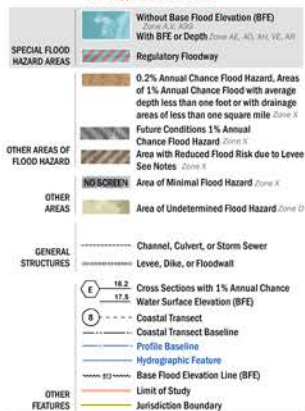
VERSION NUMBER: 2.3.3.0  
 MAP NUMBER: 1907701670  
 EFFECTIVE DATE: APRIL 5, 2017





## FLOOD HAZARD INFORMATION

SEE THIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

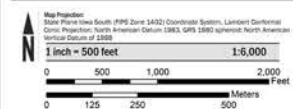
For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-366-2677) or visit the FEMA Map Service Center website at [www.fema.gov](http://www.fema.gov). Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities receiving land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

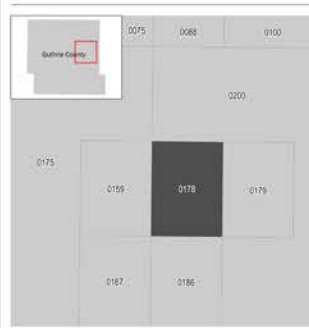
For community and countywide map dates refer to the Flood Insurance Study report for the jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-456-4600.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2-foot ground resolution from imagery flown in April 2000.

## SCALE



## PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

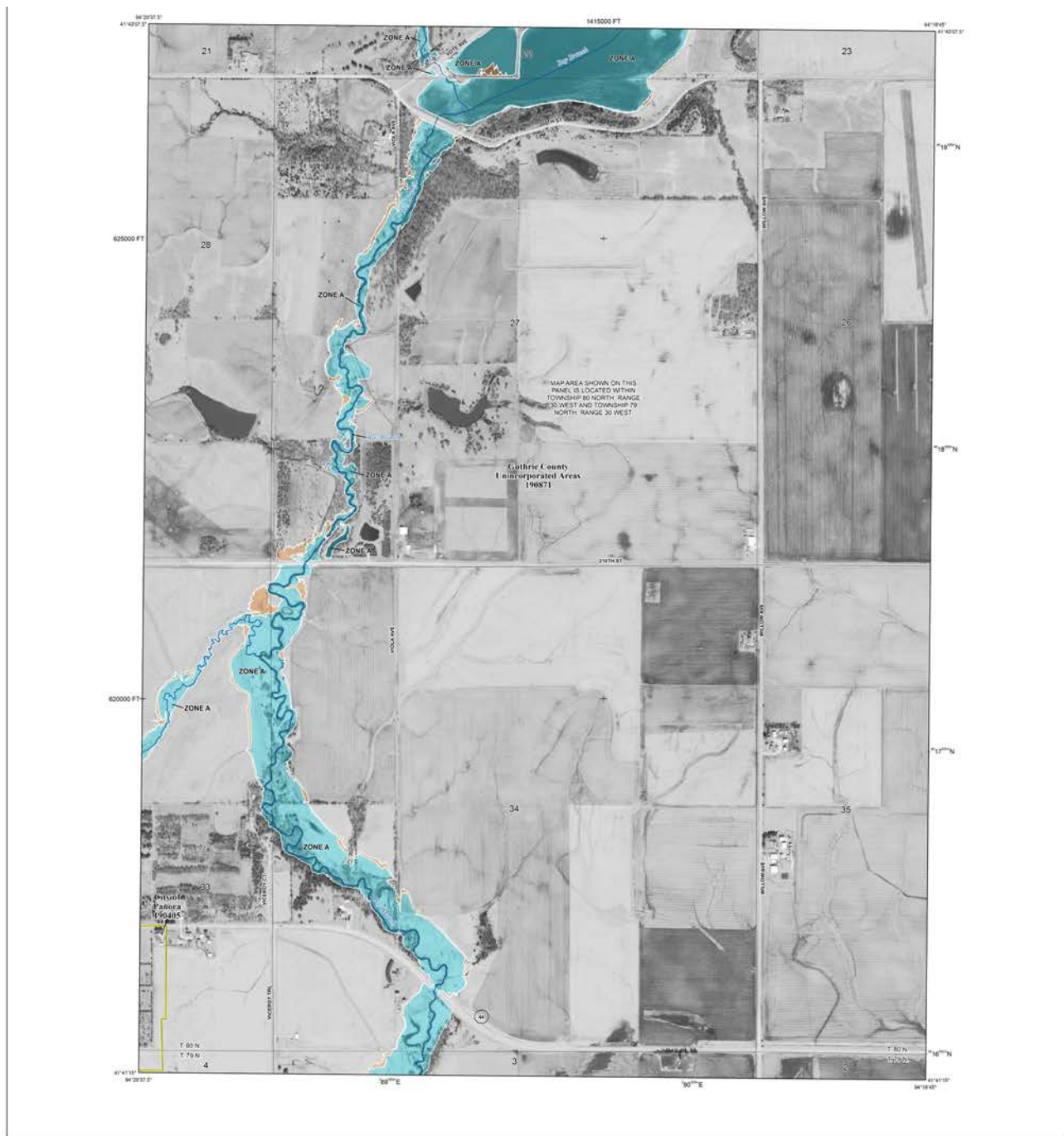
NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP  
GUTHRIE COUNTY, IOWA  
AND INCORPORATED AREAS

PANEL 178 OF 325

Panel Contains:

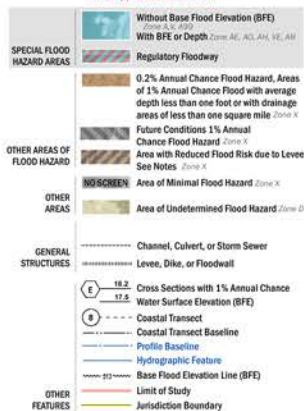
COMMUNITY	NUMBER	PANEL SUFFIX
GUTHRIE COUNTY	190871	0178
PANORA, CITY OF	190405	0178

VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19077C0178D  
EFFECTIVE DATE  
APRIL 5, 2017



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

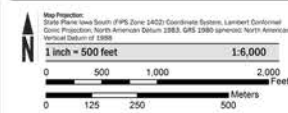
For information and questions about this map, available products associated with the FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FIRM-MAP or 1-877-336-2627 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

GUTHRIE COUNTY, IOWA  
And Incorporated Areas

PANEL 179 of 325



Panel Contains:

COMMUNITY: GUTHRIE COUNTY, IOWA  
INCORPORATED AREAS: PANORA, CITY OF

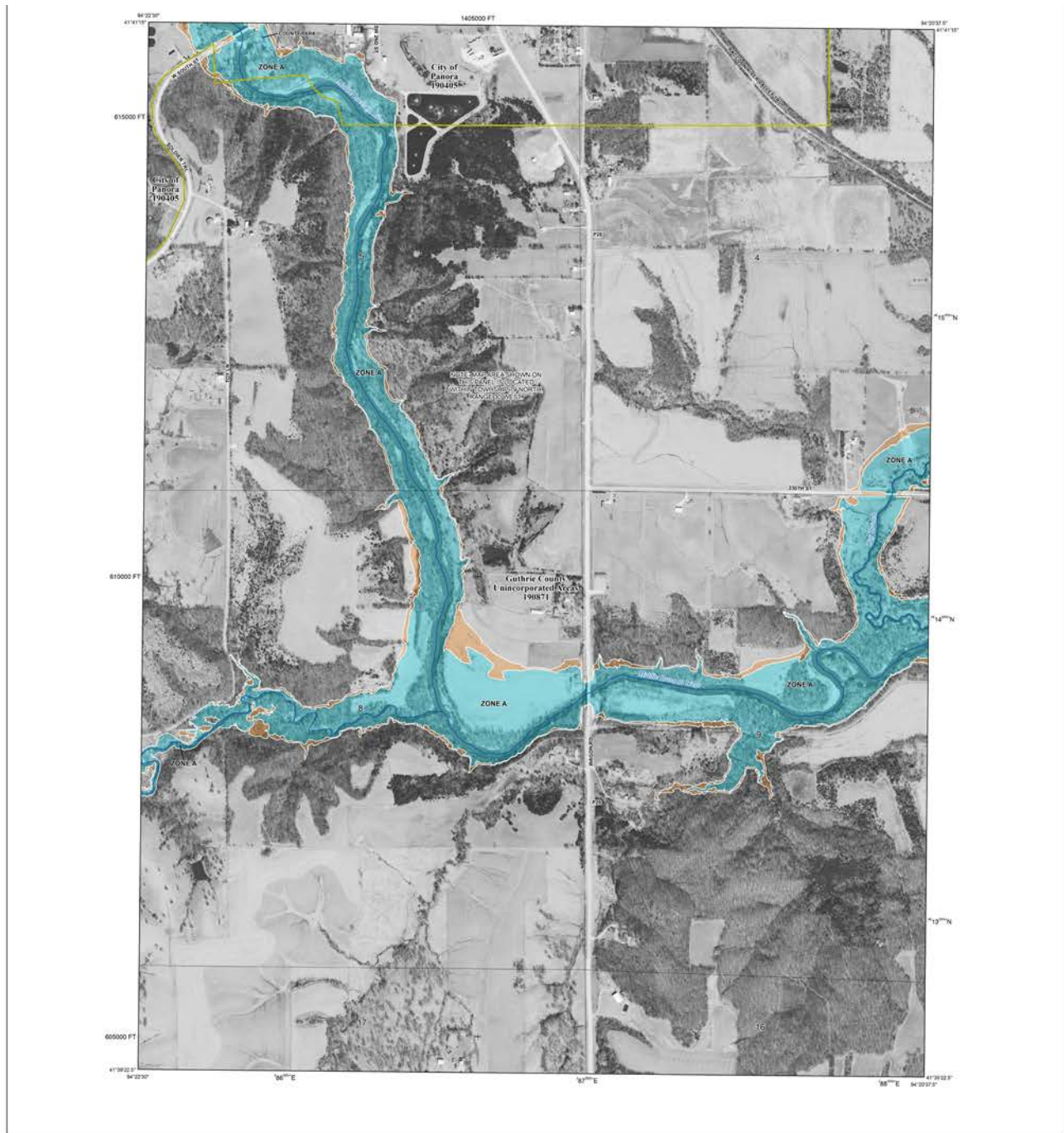
NUMBER: 190871, 190405

PANEL: 0179, 0179

SUFFIX: D, D

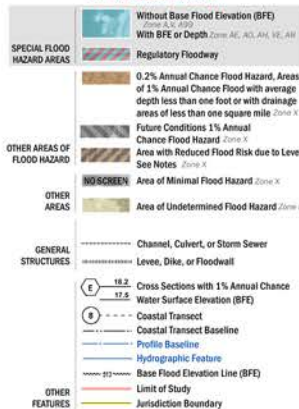
VERSION NUMBER: 2.3.0  
MAP NUMBER: 19077C01790  
EFFECTIVE DATE: APRIL 5, 2017





### FLOOD HAZARD INFORMATION

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
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[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



### NOTES TO USERS

For information and questions about this map, available products associated with the FIRM including historic versions of this FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FIRM-MAP or 1-877-338-2627 or visit the FEMA Map Service Center website at <http://www.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

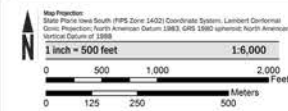
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

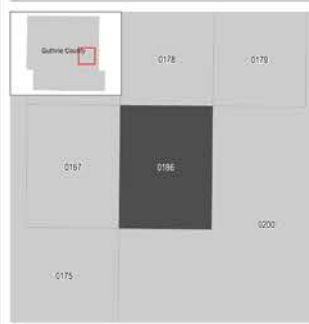
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

### SCALE



### PANEL LOCATOR



**NATIONAL FLOOD INSURANCE PROGRAM**  
 FLOOD INSURANCE RATE MAP  
**GUTHRIE COUNTY, IOWA**  
 And Incorporated Areas

PANEL 186 of 325



Panel Contains:  
 COMMUNITY: GUTHRIE COUNTY, PANORA, CITY OF  
 NUMBER: 19071, 19045  
 PANEL: 0186, 0189  
 SUFFIX: D, D

VERSION NUMBER  
**2.3.0**  
 MAP NUMBER  
**1907700186D**  
 EFFECTIVE DATE  
**APRIL 5, 2017**

# Status of Previous Mitigation Actions

**Table N.14: City of Panora Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Continue to upgrade electrical substation	X				
Ensure computer systems are backed up off site	X				
Adopt building codes to address various hazards			X		
Continue to maintain and improve backup systems on utilities			X		
Promote Global Connect					X
Continue to improve storm water projects			X		
Annually train key local leaders on hazard mitigation issues			X		
Business and residential preparedness programs				X	
Dispense information about key hazards			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table N.15: City of Panora Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Provide back-up systems for all critical systems and assets
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public warning capabilities
Objective 2	Improve public infrastructure
Objective 3	Provide education and training
Objective 4	Protect health and safety with structural projects
Objective 5	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 6	Adopt building codes to address various hazards
Objective 7	Develop plans to become less vulnerable to hazards
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Provide education and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Account for vulnerable populations
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Improve first responder resources and capabilities

**Table N.16: City of Panora Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Bury existing overhead utility lines	Tornado, Windstorm, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	Electric	High	Local, State	Structural Project	Short
Continue to trim trees from electrical lines	Tornado, Windstorm, Severe Winter Storms, Thunderstorm/Lightning/Hail	Mod	Electric	Minimal	Local	Prevention	Ongoing
Continue to maintain and improve backup systems on utilities	Infrastructure Failure	High	City	Moderate	Local	Structural Project	Ongoing
Ensure computer systems are backed up off site	Infrastructure Failure	Low	City Manager	Minimal	Local	Property Protection	Ongoing
Continue to improve storm water projects	Flash Flood, Infrastructure Failure	High	Public Works	High	Local, State, Federal	Prevention	Ongoing
Upgrade, replace, or expand water and sewer lines city-wide	Infrastructure Failure	High	Public Works	High	Local, State, Federal	Structural Project	Ongoing
Continue to upgrade electrical substation	Infrastructure Failure	High	Electric	High	Local	Structural Project	Mid
Business and residential preparedness programs	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	County EMA, City Council	Minimal	Local	Public Education and Awareness	Ongoing
	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Ongoing



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Promote hazard mitigation plan to the public	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Short
Annually train key local leaders on hazard mitigation issues	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Minimal	Local	Public Education and Awareness	Ongoing
Ensure shelters are stocked to support people for extended periods of time	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	Mod	City Council	Minimal	Local	Emergency Services	Ongoing
Develop a plan to get to homebound people during severe weather events	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	Mod	Fire Department	Minimal	Local	Emergency Services	Ongoing
Construct a community safe room	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms,	Mod	City Council or Panorama School Board	Moderate	Local, State, Federal	Structural Project	Long
Promote NOAA weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	Low	City Council, Fire Department	Minimal	Local, State	Public Education and Awareness	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Adopt building codes to address various hazards	All Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	Planning and Zoning	Minimal	Local	Prevention	Ongoing
Add another water tower for fire protection	Infrastructure Failure	Low	City Council	High	Local, State Federal	Structural Project	Long
Continue NFIP Participation through the enforcement of Flood Plain Management Ordinances and Zoning Ordinances	Flash Flood, River Flood	Mod	City Council	Low	Local	Property Protection	Ongoing
Surveillance Cameras at Critical Facilities	Terrorism	Low	City Council	Minimal	Local	Property Protection	Mid
Underground Power and Utility Lines- Downtown, Veterans Auditorium, Panora Community Center	Infrastructure Failure, Tornado	Mod	City Council	High	Local, State, Federal	Property Protection	Long
Obtain portable solar electricity back-up for the lagoons	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council	Moderate	Local, State, Federal	Property Protection	Short

# Incorporation into Other Planning Mechanisms - City of Panora

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Where possible, Panora will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- City Codes
- Hazard Mitigation Plan
- Comprehensive Plan
- Building Code
- Zoning Ordinance
- Strategic Plan
- Housing Needs Assessment
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans

# Incorporation into Other Planning Mechanisms- Panorama Schools

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The update of the mitigation strategy will be provided to the School Superintendent for consideration in the next update cycle of the capital improvement plan.









# Appendix O: City of Stuart

## Community Profile

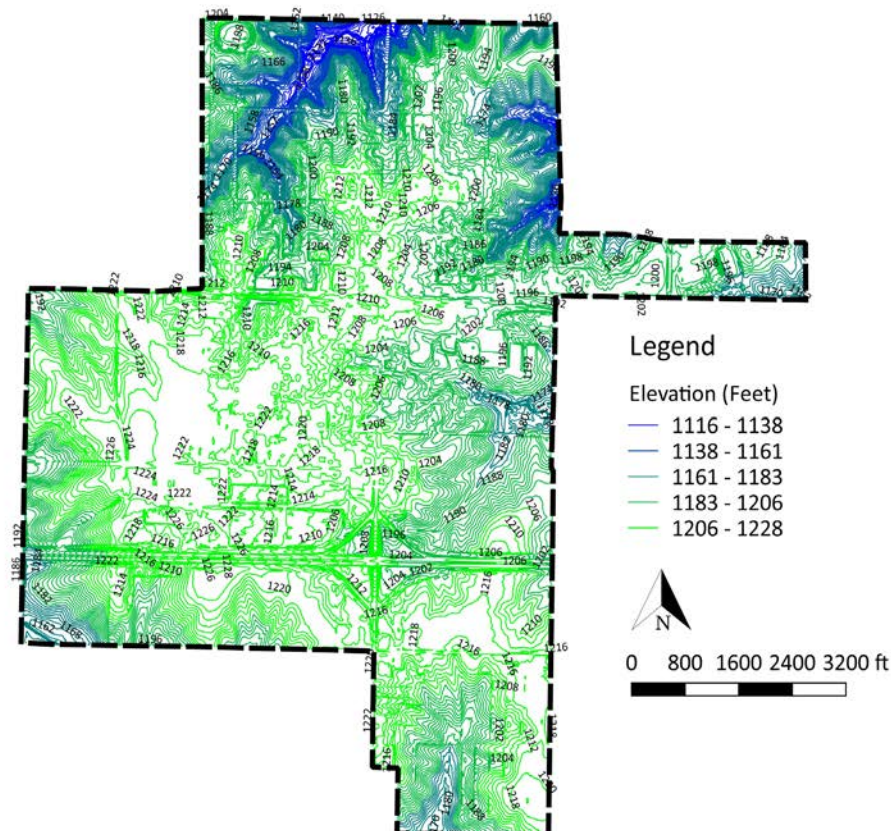
### *History*

Stuart was first laid out in December of 1868 by Captain Charles Stuart, who owned all of the property in town and for whom the town is named. The city was officially incorporated in 1877. The original name of Stuart was Summit Grove and it was a small Quaker community. At this time, Stuart was the largest shipping point for the Railroad in Guthrie County, mainly due to the brick depot constructed in 1868. The depot was considered the best building of its kind between Des Moines and Council Bluffs. The large investment of money and land to the railroad was to ensure that the Rock Island Railroad would establish their division headquarters in town. During the 1870s, Stuart experienced significant growth; however, many buildings were destroyed in the fire of 1873. During the rebuilding process, many brick buildings replaced the previous wood buildings. Several of these buildings are still present in the central business district today.

### *Geography and Environment*

Stuart is located in the southeast corner of Guthrie County. Though the county line splits the community in two, the majority of Stuart is located in Guthrie County. Stuart is fortunate to have Interstate 80 running through the southern part of town. This provides residents easy commuting to the Des Moines Metropolitan

**Map O.1: City of Stuart Elevation**



Source: Iowa DNR

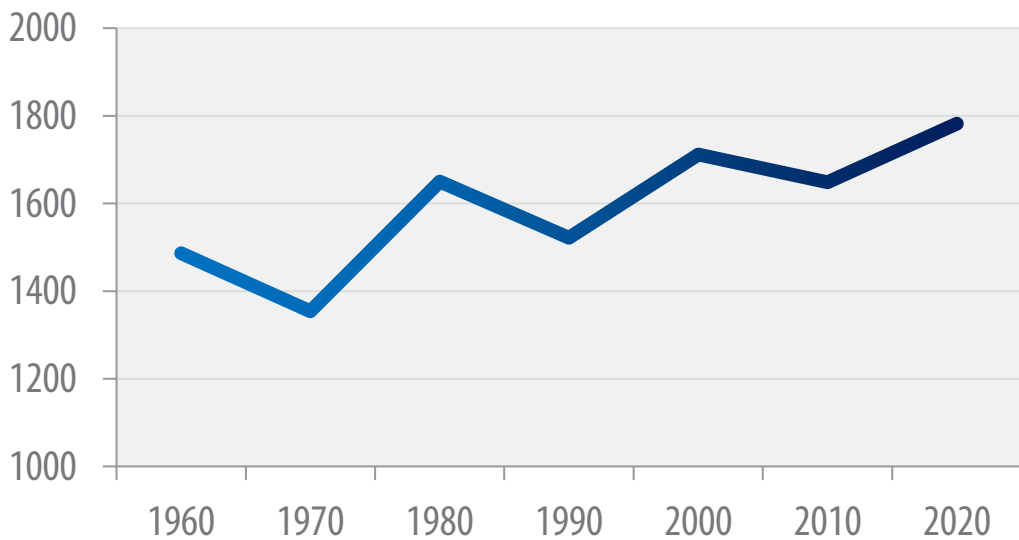
area, Omaha, or other destinations. State Highway 925 also splits the community going east/west and is a highly traveled road as well. Stuart is 15.2 miles from Panora, 20.4 miles from Guthrie Center, 21.3 miles from Greenfield, 32.4 miles from Winterset, and 39.9 miles from Des Moines.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation reaches 1,460 feet above sea-level. The highest point in Stuart can be found in the southwest corner with an elevation of 1,224 feet. The northern part of Stuart is essentially the lowest portion of town with elevations hovering around 1,144 feet. Map O.1 displays Stuart’s elevation.

Demographics

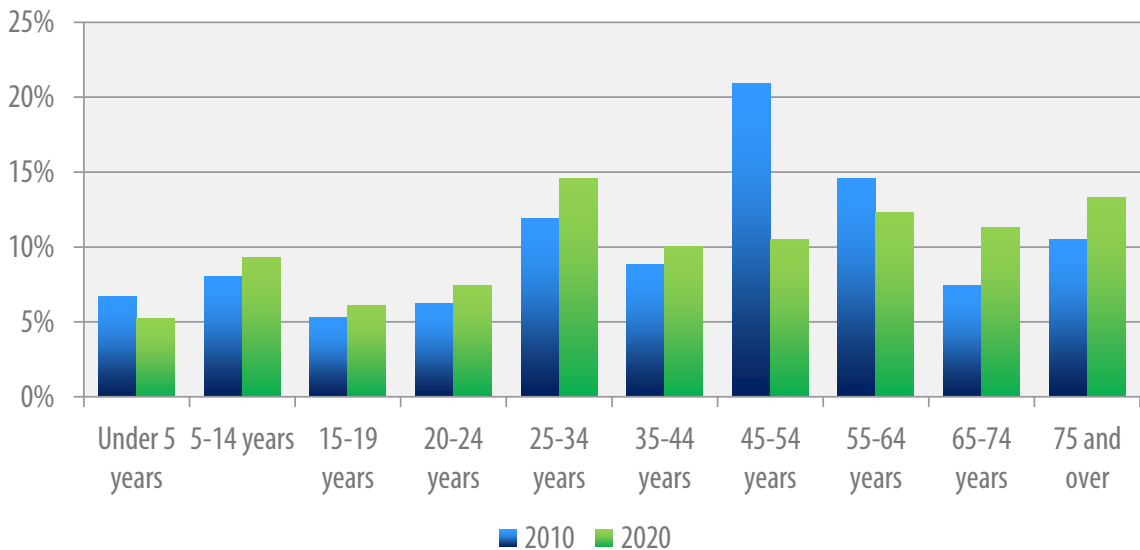
The population of Stuart has seen an inconsistent growth pattern since 1960. This trend is displayed below in Figure O.1. In 1960, the population totaled at 1,486 and declined to 1,354 people in 1970. A significant growth period occurred the following decade as nearly 300 residents moved to Stuart by 1980. This period however was followed by a decline of 128 individuals. Overall, Stuart has seen a population increase since reaching it’s smallest in 1970. As of 2020, the city’s population was 1,782 residents.

Figure O.1: City of Stuart Population, 1960-2020



Source: US Census Bureau, American Community Survey

Figure O.2: City of Stuart Age Distribution, 2010 & 2020



Source: US Census Bureau, American Community Survey



Figure O.2 is a comparison of the age distribution for Stuart from 2010 to 2020. The biggest population decrease occurred in the 45-54 age cohort which, in 2010, represented 20.9% of the total population, but only 10.5% in 2020. Other losses occurred in the Under 5 and 55-64 age cohorts. The largest population increase was seen in the 65-74 age cohort, which increased from representing 7.4% of the population in 2010 to 11.3% in 2011.3 The age distribution in Figure O.2 is consistent with other rural Iowa communities.

## Housing

A community’s ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community’s housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2022, Stuart lost a total of 78 housing units. With that, the number of vacant homes increased by 14 units. The number of renter-occupied units decreased by 59 units while owner-occupied units decreased by 34. Table O.1 shows the housing trends for Stuart from 2010 to 2022.

Table O.1: City of Stuart Housing Units, 2010 & 2022

	2010		2022	
	Number	Percent	Number	Percent
Occupied Housing Units	826	92.1%	733	89.6%
Owner Occupied	553	66.9%	519	70.8%
Renter Occupied	273	33.1%	214	29.2%
Vacant Housing Units	71	7.9%	85	10.4%
Total Housing Units	897	100.0%	818	100.0%

Source: US Census Bureau, American Community Survey

According to the 2022 American Community Survey 5-Year Estimates, 11.3% of the owner-occupied units in Stuart are valued less than \$50,000 and 61% of homes are valued at more than \$100,000. Housing unit values are displayed in Table O.2.

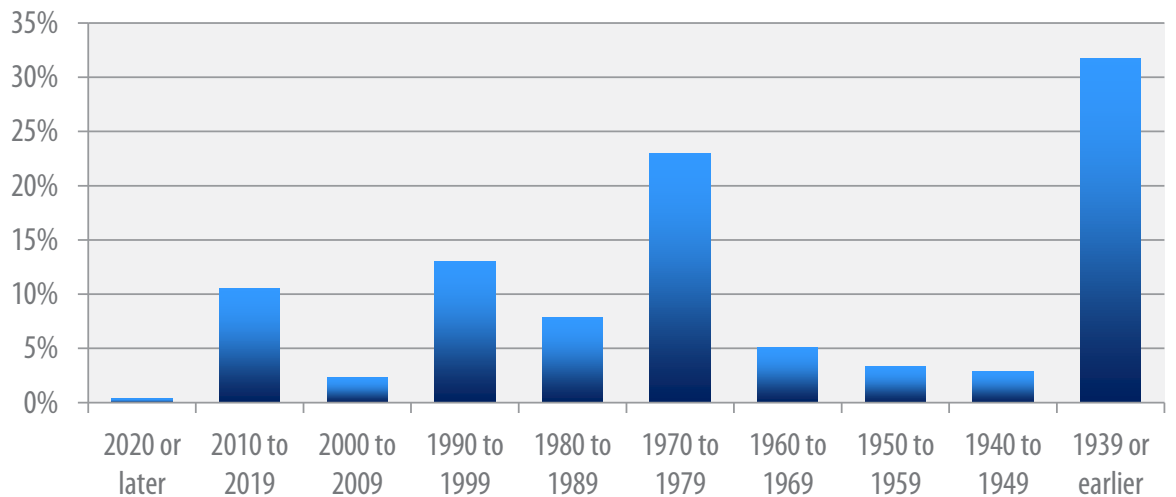
Table O.2: City of Stuart Value of Owner-Occupied Housing Units, 2022

Value of Housing Unit	Percent of Homes
Less than \$50,000	11.3%
\$50,000 to \$99,999	27.7%
\$100,000 to \$149,999	11.5%
\$150,000 to \$199,999	21.7%
\$200,000 to \$299,999	24.0%
\$300,000 to \$499,999	3.8%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Adair & Guthrie County Assessor

Roughly 32% of homes were constructed prior to 1940 and 23% were constructed in the 1970s. Higher housing values indicated stronger and more up to date units, ones that will be able to sustain severe storms and other disasters at a much higher rate than dilapidated, older homes. Figure O.3 shows the distribution of housing unit construction.

**Figure O.3: City of Stuart Year Housing Unit Constructed, 2022**



Source: Adair & Guthrie County Assessor

## Economics

Table O.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$57,031 and the mean household income was \$75,905. According to the 2022 American Community Survey 5-Year Estimates, 47.9% of Stuart's households had incomes below \$49,000 and 27.4% had incomes above \$100,000.

**Table O.3: City of Stuart Household Income, 2022**

Income (In 2022 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	16	2.1%
\$10,000-\$14,999	96	12.6%
\$15,000-\$24,999	67	8.8%
\$25,000-\$34,999	100	13.1%
\$35,000-\$49,999	86	11.3%
\$50,000-\$74,999	67	8.8%
\$75,000-\$99,999	122	16.0%
\$100,000-\$149,999	91	11.9%
\$150,000-\$199,999	105	13.8%
\$200,000 or more	13	1.7%
Median Household Income	\$57,031	-
Mean Household Income	\$75,905	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural towns primarily serve as agricultural service centers and retail trade centers, but manufacturing activity is also found in many of these communities. Due to a primary reliance on agriculture (over 97% of the land is farmland) the economies that diversified have been impacted less by a downturn in the market. The employment by industry statistics are shown in Table O.4. The leading industries in employment were Educational Services, and Health Care and Social Assistance (19.4%), Finance and insurance, and real estate and rental and leasing (19.0%), and Retail Trade (11.0%). Taking advantage of regional strengths and industries will increase revenue generated in the community, resulting in increased income levels and housing values. These percentages are based on the total number of individuals 16 years and older that are from Stuart and are employed.

**Table O.4: City of Stuart Employment by Industry, 2022**

Industry	Estimate	Percent
Civilian employed population 16 years and over	826	100.0%
Agriculture, forestry, fishing and hunting, and mining	58	7.0%
Construction	56	6.8%
Manufacturing	43	5.2%
Wholesale trade	19	2.3%
Retail trade	91	11.0%
Transportation and warehousing, and utilities	67	8.1%
Information	7	0.8%
Finance and insurance, and real estate and rental and leasing	157	19.0%
Professional, scientific, and management, and administrative and waste management services	34	4.1%
Educational services, and health care and social assistance	160	19.4%
Arts, entertainment, and recreation, and accommodation and food services	71	8.6%
Other services, except public administration	47	5.7%
Public administration	16	1.9%

Source: US Census Bureau, American Community Survey

## Existing Documents

Table O.5 provides a compilation of the current planning and regulatory documents in place for the City of Stuart.

**Table O.5: City of Stuart Existing Documents**

Document	Yes/No	Year
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2021
Building Code	Yes*	
Zoning Ordinance	Yes	2016
Strategic Plan	Yes	2021
Housing Needs Assessment	Yes	2017
NFIP Participant	Yes	2010
Floodplain Regulations	Yes	2017

\*State of Iowa Building Code

## NFIP Participation

In the past, there have been instances of significant flooding within the city limits of Stuart. The city began participating in NFIP in 2010, and the flood map was updated in 2017. The city's FIRMs can be found later in this appendix.

## Outlook and Future Development

Stuart has seen both commercial and residential growth since the last plan update. The city has recently seen housing development on the east side of town, and has plans and commitments to continue this expansion of housing on the same side of town. The city's commercial development has occurred primarily on the south side of town near Interstate 80. There are plans to expand this development as time progresses.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Stuart's critical facilities can be found on Map O.2.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table O.6.

**Table O.6: City of Stuart Essential Infrastructure**

<b>Major Arterials</b>	Interstate 80	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Stuart Municipal Utilities	<b>Sewer Service</b>	City of Stuart
<b>Electric Service</b>	Stuart Municipal Utilities	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	Local Haulers	<b>Landfill</b>	Carroll County Landfill
<b>Phone and Internet</b>	Coon Valley Telephone Company; Mediacom; Quest, Wireless	<b>Law Enforcement</b>	Stuart Police
<b>Fire Service</b>	Stuart City Fire & Rescue	<b>Ambulance Service</b>	Stuart Rescue Unit

## West Central Valley Community School District

The City of Stuart lies within the West Central Valley Community School District, which has locations in Stuart, Dexter, and Redfield. However, two schools lie within the city boundaries of Stuart, as seen on Map O.2. Stuart Elementary School serves students in grades PreK-5 and is located at 320 NE 3rd Street in the center of the city. West Central Valley High School serves students in grades 9-12 and is located at 3299 White Pole Road in the eastern part of the city. Table O.7 displays recent enrollment trends, which have been on a decline over the past four years, losing an average of 4 students each year.

The West Central Valley Community School district has a tornado safe room. This safe room was installed using HMGP money and has been an asset to the community that the School District to use sparingly. Students and staff participate in drills and educational programs related to hazards and the mitigation of them. The District maintains its own equipment and supplies to maintain roads and walkways on campus.

**Table O.7: West Central Valley Enrollment, 2018-2023**

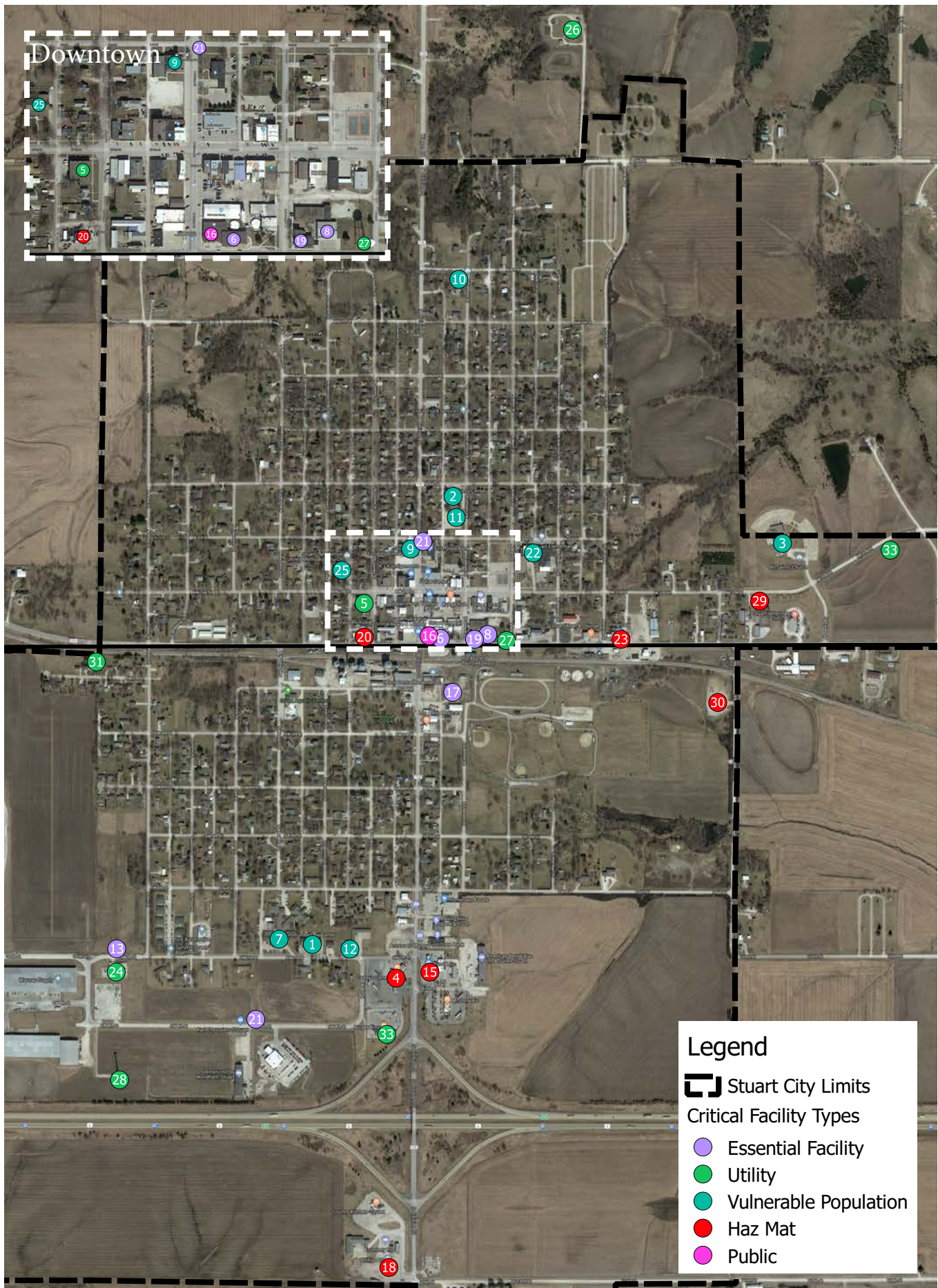
<b>School Year</b>	<b>Elementary Enrollment</b>	<b>High School Enrollment</b>	<b>Total Enrollment</b>
<b>2018-19</b>	237	240	507
<b>2019-20</b>	242	253	495
<b>2020-21</b>	232	254	486
<b>2021-22</b>	223	261	484
<b>2022-23</b>	219	268	487

Source: Iowa Department of Education, Bureau of Information and Analysis

\*Note: Middle School students (grades 6-8) and Dexter Elementary students are not accounted for in this table because they do not attend school in Stuart.



Map O.2: City of Stuart Critical Facilities



**Table O.8: Stuart Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Adair County Health System	303 SW 7th Street	Vulnerable Population
2	All Saints Center for Culture & the Arts	320 N Fremont Street	Vulnerable Population
3	All Saints Church	216 All Saint's Drive	Vulnerable Population
4	Casey's	708 S Division Street	HAZMAT
5	Centurylink/Qwest	124 N Gaines Street	Utility
6	City Hall	119 Front Street	Essential Facility
7	Community Care Center	325 SW 7th Street	Vulnerable Population
8	Fire Station	211 Front Street	Essential Facility
9	First Congregational Church	224 N Division Street	Vulnerable Population
10	Friends Church	723 N Fremont Street	Vulnerable Population
11	Guthrie County Hospital Medicine Clinics	312 N Fremont Street	Vulnerable Population
12	Heartland Baptist Church	207 SW 7th Street	Vulnerable Population
13	Helicopter Pad	S 7th Street	Essential Facility
14	High School (West Central Valley)	3299 White Pole Road	Vulnerable Population
15	Kum & Go	329 S Division Street	HAZMAT
16	Library	111 Front Street	Public
17	Maintenance Garage	121 S Division Street	Essential Facility
18	Phillips 66	1218 S Division Street	HAZMAT
19	Police Station	E Front Street	Essential Facility
20	R & D Services Unlimited	203 Front Street	HAZMAT
21	Storm Sirens	Various	Essential Facility
22	Stuart Elementary School	320 N 3rd Street	Vulnerable Population
23	Pelgrow/Pelsar	504 Front Street	HAZMAT
24	Substation	SW 7th Street	Utility
25	United Methodist Church	219 NE 2nd Street	Vulnerable Population
26	Wastewater Treatment	North of N 10th Street	Utility
27	Water Tower	E Front Street	Utility
28	Wind Turbine	SW 8th Street	Utility
29	Northern Natural Gas	NE 2nd Street	HAZMAT
30	Anhydrous Ammonia Tank	S Madison Street	HAZMAT
31	Xenia Rural Water Connection	West Side of Town near SW 2nd Street	Utility
32	Growmark FS	1003 SW 7th Street	HAZMAT
33	Lift Stations	Various	Utility



# Hazard Scores

**Table O.9: City of Stuart Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	A portion of the City of Stuart is agricultural land. Although this land represents some of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Stuart has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Stuart, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Stuart, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Stuart. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding within the City of Stuart. While flash floods have little to no warning time, the committee anticipates that this hazard is not a high priority hazard to address with no instances being reported within the past 20 years.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand in Stuart. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control and posing a threat to life.
<b>HAZMAT Incident</b>	There has been five HAZMAT Incidents in Stuart over the last reporting period. Three instances did not threaten life or resources, one threatened the soil, and one threatened soil and surface water. These hazards occur with no warning and with the right conditions, could impact the entire community. Mitigation actions for this hazard should be a high priority and this hazard should not be ignored.
<b>Human Disease</b>	Iowa and more specifically the City of Stuart are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Stuart would be structural failure of either bridges or roadways.
<b>Levee/Dam Failure</b>	It is unlikely a levee/dam failure would impact the city of Stuart. While there is no planning the city can do to prevent the failure of these dams, the city can mitigate the effects if a failure were to occur. This hazard can be linked to river flooding and mitigation actions may be similar.

<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Stuart, and the committee does not anticipate any happening in the next planning period. If an incident were to occur, the committee feels it would be a small, contained situation most likely along Interstate 80 that would not threaten the community as a whole.
<b>River Flooding</b>	Limited portions of the City of Stuart are located within a flood zone. Although there is some land in the flood zone, since 2018, there have been no reported river flooding instances within the community. This hazard has a medium probability of effecting the community, and if it were to happen, little property damage is anticipated but larger amounts of crops may be affected.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Stuart. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within the city of Stuart. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community. While impacts on the community may be minimal historically, the economic impact these storms have on the city continues to rise with the increase in cost of snow removal and the increase in cost in road repairs.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Stuart during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Stuart, but is normally not severe in nature.
<b>Tornado</b>	Guthrie County has experienced a number of tornadoes in the recent past, but the large majority of these events have caused little to no damage. While there have been reported tornadoes in the county, none have hit Stuart directly. Although these historically have not impacted the community, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Stuart are relatively low, except for where Interstate 80 cuts through the city limits. If transportation incidents were to occur on city streets, it is unlikely to cause little damage to property or humans. If an incident were to occur on the interstate, it is likely that significant damage could happen to property and could threaten life. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Stuart prompting the community to prepare more effectively for these hazards.



# Loss Estimates

**Table O.10: City of Stuart Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	9	\$68,729	1,528
<b>Commercial</b>	53	\$25,896,423	
<b>Industrial</b>	2	\$37,300	
<b>Residential</b>	639	\$58,434,594	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table O.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table O.11: City of Stuart Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$6,185	137
<b>Commercial</b>	5	\$2,330,678	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	58	\$5,259,113	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table O.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table O.12: City of Stuart Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	2	\$17,182	382
<b>Commercial</b>	13	\$6,474,105	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	160	\$14,608,648	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table O.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table O.13: City of Stuart Critical Hazard Impact**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	5	\$34,364	764
<b>Commercial</b>	16	\$12,948,211	
<b>Industrial</b>	1	\$18,650	
<b>Residential</b>	320	\$29,217,297	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table O.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.

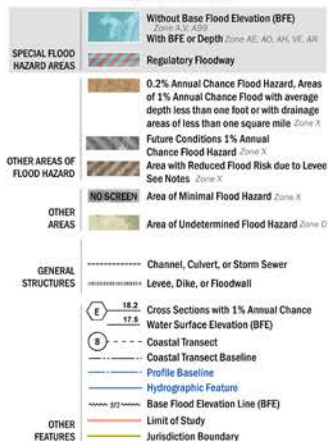
# Flood Maps

Source: FEMA Flood Map Service Center



## FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



## NOTES TO USERS

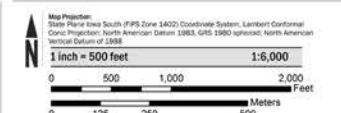
For information and questions about this map, available products associated with this FIRM including historic versions of the FIRM, how to order products or the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-MAP (1-877-336-2677) or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

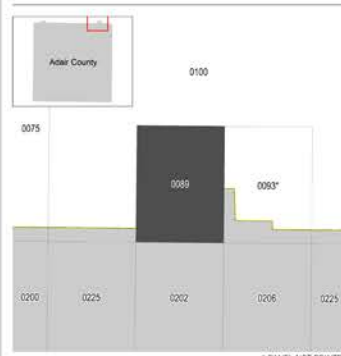
For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6629.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

## SCALE



## PANEL LOCATOR



## NATIONAL FLOOD INSURANCE PROGRAM

### FLOOD INSURANCE RATE MAP

#### ADAIR COUNTY, IOWA

##### Adair County, Iowa

##### PANEL 89 OF 500

##### Panel Contains:

##### COMMUNITY

##### ADAIR COUNTY

##### STUART, CITY OF

##### NUMBER

##### 190843

##### PANEL

##### 0089

##### SUFFIX

##### A

##### VERSION NUMBER

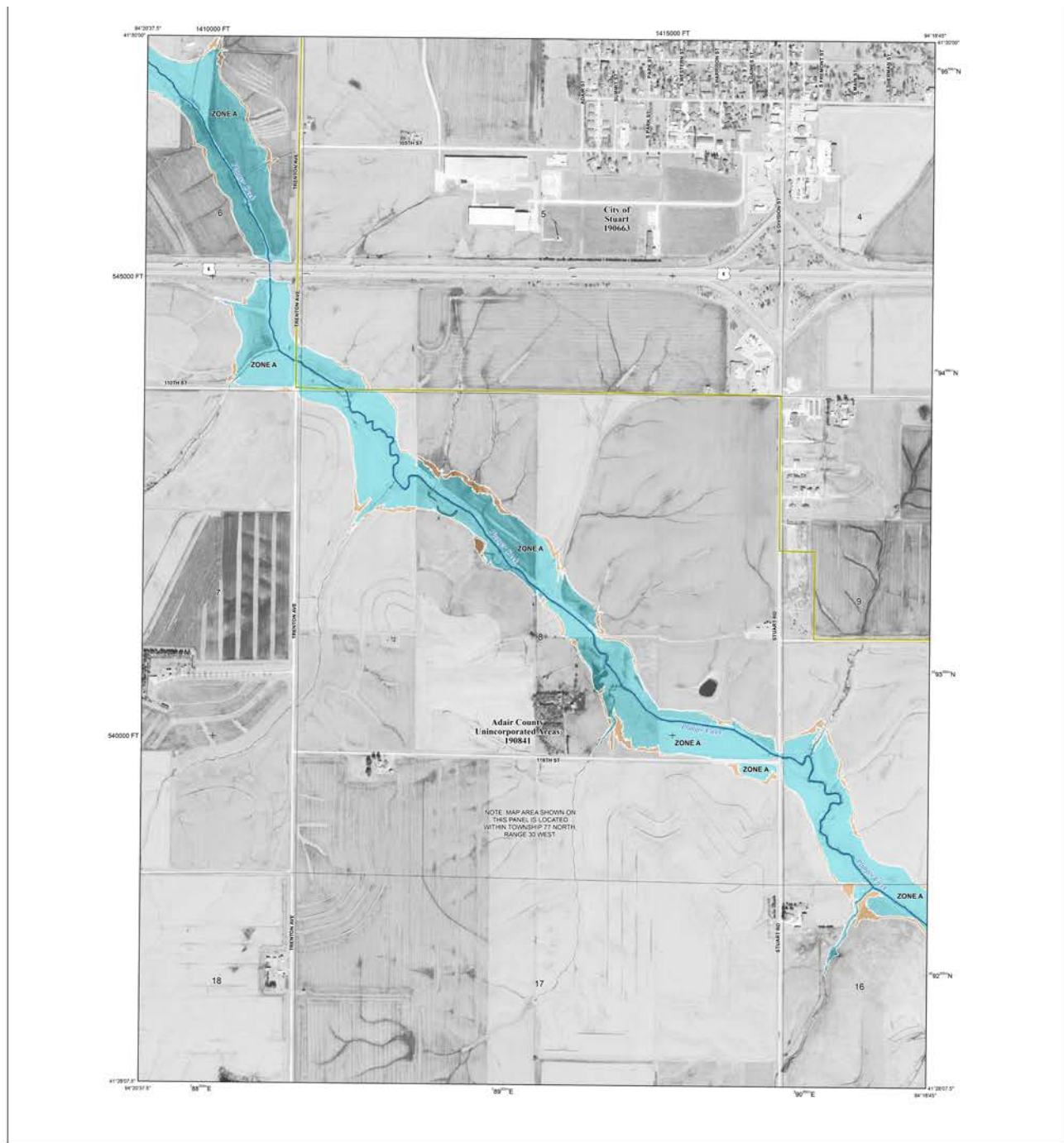
##### 2.3.3.0

##### MAP NUMBER

##### 19001C0089A

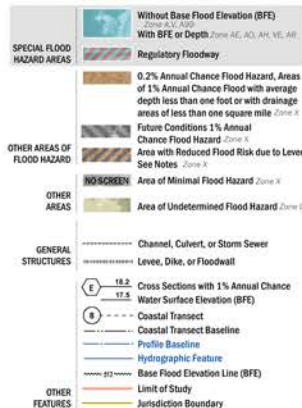
##### EFFECTIVE DATE

##### APRIL 5, 2017



# FLOOD HAZARD INFORMATION

SEE FIG REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT  
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING  
DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT  
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)



# NOTES TO USERS

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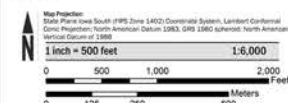
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

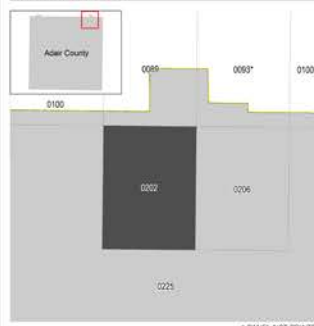
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was provided in digital format by the Iowa Department of Natural Resources. This information was derived from digital orthophotography at a 2 foot ground resolution from imagery flown in April 2008.

# SCALE



# PANEL LOCATOR



**FEMA**  
National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM  
FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA  
And Incorporated Areas

Panel 202 of 500



Panel Contents:  
COMMUNITY NUMBER PANEL SUFFIX  
ADAIR COUNTY 1908A1 0202 A  
STUART, CITY OF 1906A1 0202 A

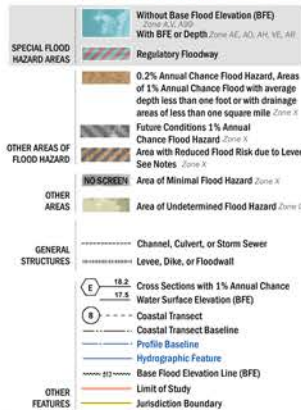
VERSION NUMBER  
2.3.3.0  
MAP NUMBER  
19001C0202A  
EFFECTIVE DATE  
APRIL 5, 2017





### FLOOD HAZARD INFORMATION

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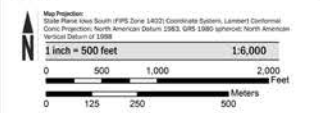
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For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

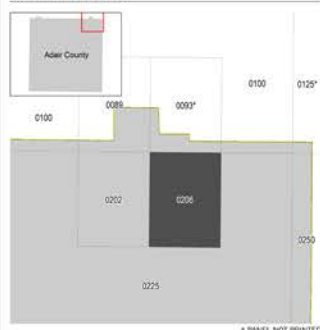
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-4620.

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### SCALE



### PANEL LOCATOR



**FEMA**  
 National Flood Insurance Program

### NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

ADAIR COUNTY, IOWA

Panel 206 of 500

Revised Contents:

COMMUNITY ADAIR COUNTY

STUART, CITY OF

NUMBER 190841

PANEL 0206

SUFFIX A

VERSION NUMBER 2.3.3.0

MAP NUMBER 19001C0206A

EFFECTIVE DATE APRIL 5, 2017



# Status of Previous Mitigation Actions

**Table O.14: City of Stuart Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Develop and maintain flu plan			X		
Discuss Storm Shelter for BeaCam Apartment project with owner				X	
Determine best location for the Storm Shelter (BeaCam Apts)				X	
Line up funding for the Storm Shelter(grants, loans, donations) (BeaCam Apts)				X	
Construct storm shelter (BeaCam Apts)				X	
Construct tornado safe rooms within critical facilities to include schools	X				
Encourage local businesses to acquire NOAA weather radios			X		
Watch for funding opportunities (NOAA Radios)			X		
Prioritize list of facilities needing radios			X		
Determine location for new City Hall	X				
Secure funding for new City Hall	X				
Construct new City Hall	X				
Determine feasibility of hiring additional staff (building inspector) and if position is full or part time		X			
Hire building inspector/official	X				
Acquire 15 hand held radios		X			
Acquire 20 pages	X				
Acquire 20 new sets of bunker gear	X				
Acquire 25 heat and motion PASS devices	X				
Establish a five year vehicle replacement program	X				
Continue to conduct fire and EMS training	X				
Implement and complete community storm sewer project			X		
Join the NFIP	X				

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Encourage and provide support to the County Supervisors and County EMC to enter into a countywide contract with the Council Bluffs response team for HAZMAT services	X				
Continue annual training with MidAmerican Energy for natural gas			X		
Bury power lines when feasible- especially in new development areas			X		
Add gravel or other material to line beds to reduce the potential for fugurte shifting/heaving soils			X		
Educate children about earthquake safety in school	X				
Regularly patrol City facilities	X				
Daily lock and secure City facilities, buildings not in use	X				
Enact water conservation notice if water supplies warrant conservation	X				
Provide additional locations for residents during extreme heat conditions	X				

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table O.15: City of Stuart Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Provide back-up systems for all critical systems and assets
Objective 3	Develop plans to become less vulnerable to hazards
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Develop plans to become less vulnerable to hazards
Objective 3	Improve public warning capabilities
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Provide educations and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Protect health and safety with structural projects
Objective 2	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas
Objective 3	Account for vulnerable populations
Objective 4	Improve first responder resources and capabilities
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Protect health and safety with structural projects
Objective 2	New equipment needed for EMS
Objective 3	New equipment needed for police
Objective 4	Training for police

**Table O.16: City of Stuart Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
700 Mhz Radio Conversion	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Police, Fire, EMS	Moderate	Local, State, Federal	Emergency Services	Mid
Develop a water protection plan	HAZMAT Incident, Terrorism, Human Disease, Drought	High	Public Works, City Council	Minimal	Local	Natural Resource Protection	Mid
Add gravel or other material to line beds to reduce the potential for future shifting/heaving soils	Flash Flood, Infrastructure Failure	Low	City Council	Minimal	Local	Property Protection	Ongoing
Bury existing overhead utility lines	Infrastructure Failure, Tornado, Windstorm, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	Public Works, Utility	High	Local, State, Federal	Property Protection	Ongoing
Upgrade, replace, or expand water and sewer lines	Infrastructure Failure, HAZMAT Incident, Flash Flood	Mod	Public Works, Wastewater	High	Local, State, Federal	Structural Project	Ongoing
Continue annual training with MidAmerican Energy for natural gas	Infrastructure Failure, Terrorism, Expansive Soils	Mod	Utility	Minimal	Local, State	Natural Resource Protection	Ongoing
Make all public facilities handicap accessible	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Moderate	Local, State, Federal	Structural Project	Long



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Install new fire hydrants (maintain dry hydrants)	Drought, Infrastructure Failure	High	Public Works, City Council	Low	Local, State	Property Protection	Ongoing
Backup jurisdictional files and records and store in an offsite location	Infrastructure Failure	High	City Manager	Low	Local	Property Protection	Mid
Update anti-virus software	Infrastructure Failure	High	City Manager	Minimal	Local	Property Protection	Mid
Global Connect for warnings	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	County Emergency Manager, City Council	Low	Local	Emergency Services	Short
Promote NOAA weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	Mod	County Emergency Manager, City Council, Fire Department	Minimal	Local	Public Education and Awareness	Ongoing
Develop an evacuation plan	Flash Flood, Tornado, Grass or Wildland Fire, River Flooding, Severe Winter Storm, Dam and Levee Failure, Landslide, HAZMAT Incident, Terrorism, Transportation Incident, Radiological	High	County Emergency Manager, City Council, Fire Department	Minimal	Local	Public Education and Awareness	Short
Set a schedule to update Emergency Operations Plans and Strategies	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Police Department, Fire Department, First Responders, City Council	Minimal	Local	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Promote Hazard Mitigation Plan to the Public	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	County Emergency Manager, City Council	Minimal	Local	Public Education and Awareness	Short
Continue community drills	Tornado, Severe Winter Storms	Mod	City Council, Fire Department, Police Department, First Responders	Low	Local	Emergency Services	Mid
Update city building code	Tornado, Windstorm, Severe Winter Storms, Earthquake	Mod	City Council	Minimal	Local	Property Protection	Short
Fire extinguisher code for apartments, rentals, duplex	Thunderstorm/Lightning/Hail, Infrastructure Failure	Mod	City Council, Fire Department	Minimal	Local	Property Protection	Short
Develop a plan to get homebound people during severe weather events	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flood, Severe Winter Storm, Thunderstorm/Lightning/Hail	High	Emergency Services, Police Department, Fire Department	Minimal	Local	Emergency Services	Short
Ensure shelters are stocked to support people for extended periods of time	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flood, Severe Winter Storm, Thunderstorm/Lightning/Hail	Low	Emergency Services, Police Department, Fire Department	Minimal	Local, State	Emergency Services	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Special needs/oxygen user registration program	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flood, Severe Winter Storm, Thunderstorm/Lightning/Hail	Mod	Public Health	Low	Local	Emergency Services	Mid
New pumper truck (every ten years)	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Fire Department	High	Local, State, Federal	Emergency Services	Ongoing
New ambulance (every 5 years)	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Emergency Services, City Council	High	Local, State, Federal	Emergency Services	Ongoing
Rotate EMS gear as needed or according to plan including defib/heart monitor	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Emergency Services	Moderate	Local, State	Emergency Services	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
New patrol car (every 3 years)	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Police Department, City Council	Low	Local, State, Federal	Emergency Services	Ongoing
Continue training law enforcement	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Police Department, City Council	Minimal	Local, State, Federal	Emergency Services	Ongoing
New quick attack 4x4 truck	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Moderate	Local, State, Federal	Emergency Services	Ongoing
Purchase essential vehicles and equipment for police department and EMS	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council, Police Department, Fire Department, EMS	Moderate	Local, State, Federal	Emergency Services	Ongoing



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Have a hazards and mitigation section in the library	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City Council	Minimal	Local	Public Education and Awareness	Mid
Purchase and update technology including computers in vehicles	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Police Department, City Council	Low	Local, State, Federal	Emergency Services	Ongoing
Install cameras at schools	Terrorism	Mod	School District	Low	Local, State	Emergency Services	Short
Install locking system for school doors	Terrorism	Mod	School District	Moderate	Local, State	Emergency Services	Short
Funding for full-time EMS	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	City Council	Moderate	Local, State	Emergency Services	Ongoing
Purchase backup generators for EMS	Infrastructure Failure	High	Public Works	Low	Local, State, Federal	Emergency Services	Ongoing

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
New ladder truck	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	High	Local, State, Federal	Emergency Services	Ongoing
New EMS building	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	High	Emergency Services, City Council	High	Local, State, Federal	Emergency Services	Short
Encourage local businesses to acquire NOAA weather radios	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	High	County EMA, City Council	Minimal	Local	Emergency Services	Ongoing
Prioritize list of facilities needing radios	Flash Flood, Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, Thunderstorm/Lightning/Hail	High	County EMA, City Council	Minimal	Local	Emergency Services	Ongoing
Rehabilitate structurally weak homes	Infrastructure Failure	Low	Planning and Zoning, City Council	Moderate	Local, State, Federal	Property Protection	Long
Install additional sirens	Tornado, Windstorm	High	City Council, Fire Department	Low	Local, State, Federal	Emergency Services	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Build a community safe room	Tornado, Windstorm, Extreme Heat, River Flooding, Severe Winter Storms, HAZMAT Incident, Terrorism, Radiological	Mod	City Council, Fire Department or West Central Valley School Board	Moderate	Local, State, Federal	Structural Project	Long
Continue NFIP participation through the enforcement of flood plain management ordinances and zoning ordinances	Flash Flood, River Flood	Mod	City Council	Low	Local	Property Protection	Ongoing

# Incorporation into Other Planning Mechanisms-

## City of Stuart

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Where possible, Stuart will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- Hazard Mitigation Plan
- Comprehensive Plan
- Building Code
- Zoning Ordinance
- Strategic Plan
- Housing Needs Assessment
- Floodplain Regulations

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans

# Incorporation into Other Planning Mechanisms-

## West Central Valley

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The update of the mitigation strategy will be provided to the School Superintendent for consideration in the next update cycle of the capital improvement plan.







# Appendix P: City of Yale

## Community Profile

### *History*

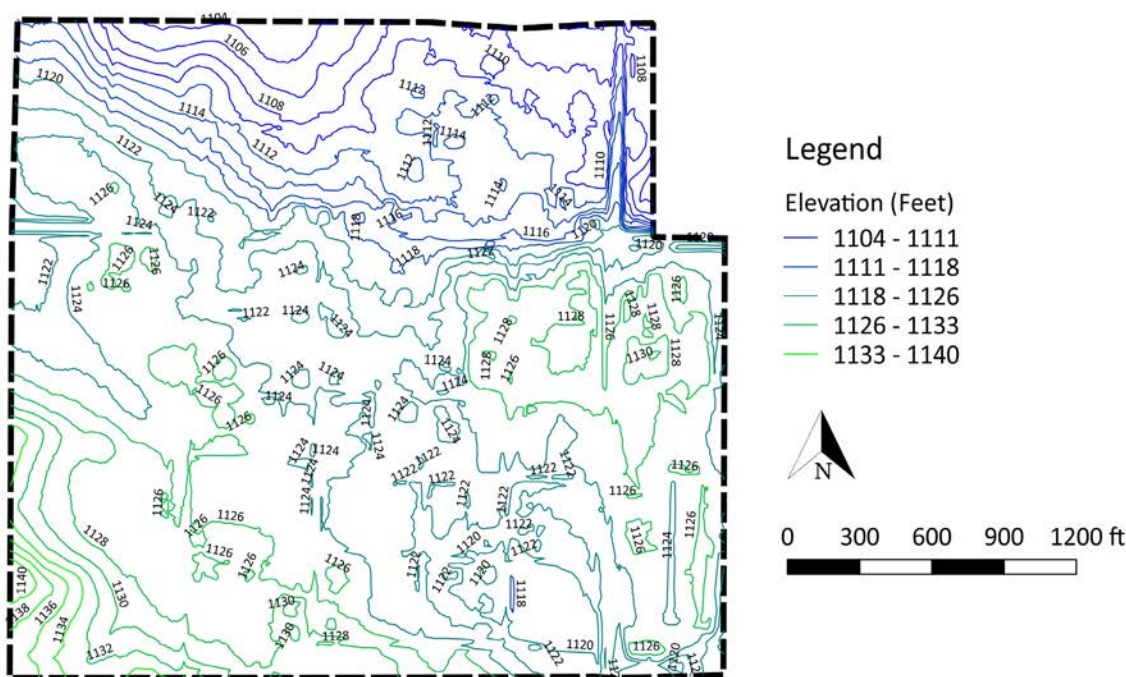
In October of 1882, the town of Yale was platted by the man whom the town is named, Milo Yale. Mr. Yale felt there was a need for a town to be located between Panora and Herndon along the railroad. The Yales contributed much of their land to churches and other community projects. The town was officially incorporated in November of 1901.

### *Geography and Environment*

Yale is located in the northeast section of Guthrie County. IA 4 runs along the west side of town connecting to IA 141 and IA 44 to the north and south. Yale is 6.6 miles from Panora, 14.1 miles from Guthrie Center, 19.0 miles from Perry, 22.2 miles from Coon Rapids, and 52.3 miles from Des Moines.

The highest elevation in Guthrie County can be found in the southwestern corner of the county. Here, the elevation can reach as much as 1,460 feet above sea-level. Since Yale is located in the northeast quadrant, elevation levels are slightly lower than this. The highest point in Yale can be found in the southwest corner (1,142 feet) while the lowest point in the opposite corner (1,108 feet). Map P.1 shows Yale's elevation in relation to the rest of Guthrie County.

**Map P.1: City of Yale Elevation**

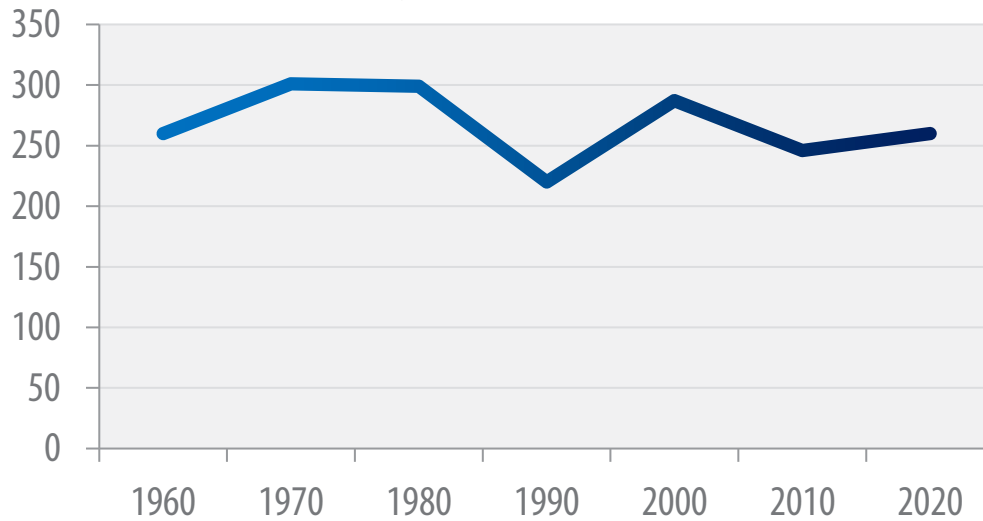


Source: Iowa DNR

## Demographics

Unstable population has been experienced throughout Yale's history. In 1960, Yale's population was 260 people. During the next 20 years, the population grew to 299 only to decline severely by 79 people in the 1980s. Yale then grew 67 people from 1990 to 2000. Since 2010, the city's population has once again been on the rise, and was 267 individuals in 2020. Figure P.1 below displays Yale's population from 1960-2020.

**Figure P.1: City of Yale Population, 1960-2020**

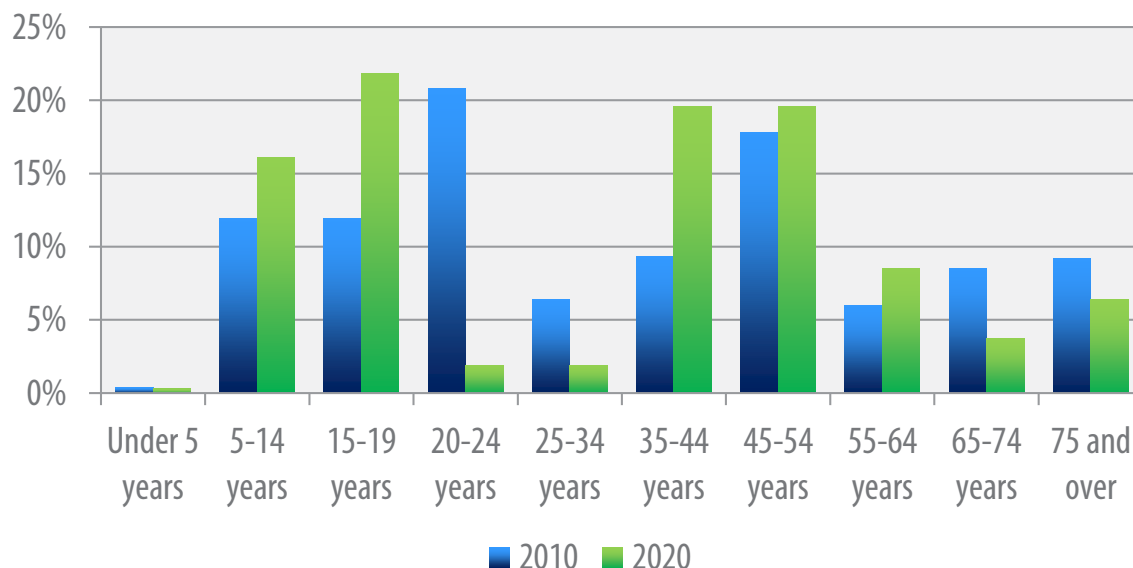


Source: US Census Bureau, American Community Survey

Figure P.2 is a comparison of the age distribution for Yale from 2010 to 2020. The biggest population decrease occurred in the 20-24 age cohort which, in 2010, represented 20.8% of the total population, but only 1.9% in 2020. The largest population increase was seen in the 15-19 age cohort, which increased from representing 11.9% of the population in 2010 to 21.8% in 2020.

The age distribution in Figure P.2 is not consistent with other rural Iowa communities. Normally there is a smaller population of 15-24 year olds due to the number of young adults leaving town for education or other employment opportunities. This phenomenon is known as "brain drain."

**Figure P.2: City of Yale Age Distribution, 2010 & 2020**



Source: US Census Bureau, American Community Survey



## Housing

A community's ability to attract new residents is important. One of the most important aspects to attracting residents is housing. A community's housing stock, type of households, and housing availability and affordability are determining factors.

Between 2010 and 2020, Yale's total number of housing units remained the same. With that, the number of vacant homes decreased by 6 units. The number of renter-occupied units increased by 14 units and owner-occupied units decreased by 4. Table P.1 shows the housing trends for Yale from 2010 to 2022.

**Table P.1: City of Yale Housing Units, 2010 & 2022**

	2010		2022	
	Number	Percent	Number	Percent
<b>Occupied Housing Units</b>	104	86.7%	114	95.0%
<b>Owner Occupied</b>	88	84.6%	84	74.0%
<b>Renter Occupied</b>	16	15.4%	30	26.0%
<b>Vacant Housing Units</b>	16	13.3%	6	5.0%
<b>Total Housing Units</b>	120	100.0%	120	100.0%

Source: US Census Bureau, American Community Survey

Of the 120 total housing units, 29.9% are valued below \$50,000 and 29.8% are valued above \$100,000. Like many other towns within the County, the City has no homes valued in the higher ranges. The highest value of a home within the City of Yale is \$164,800 according to the 2022 Guthrie County Assessor. Table P.2 shows the distribution of owner-occupied housing unit values.

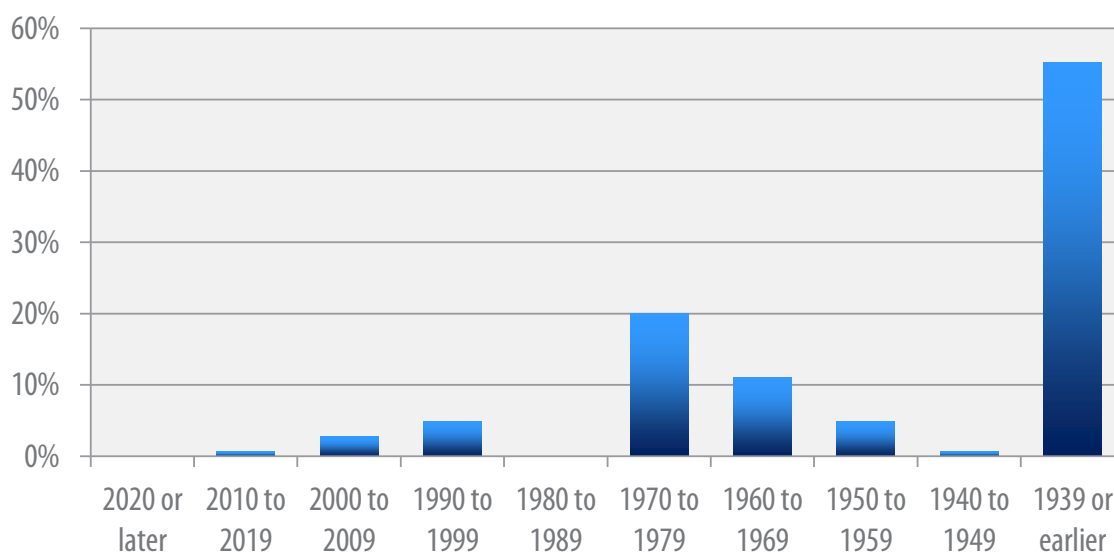
**Table P.2: City of Yale Value of Owner-Occupied Housing Units, 2022**

<b>Value of Housing Unit</b>	<b>Percent of Homes</b>
Less than \$50,000	29.9%
\$50,000 to \$99,999	40.2%
\$100,000 to \$149,999	23.8%
\$150,000 to \$199,999	6.1%
\$200,000 to \$299,999	0.0%
\$300,000 to \$499,999	0.0%
\$500,000 to \$999,999	0.0%
\$1,000,000 or more	0.0%

Source: Guthrie County Assessor

Figure P.3 shows the distribution of home construction in Yale's history. 55.17% of Yale's homes were constructed prior to 1940. The next highest construction period came in the 1970's when 20% of units were built. Since the housing stock in Yale is so old, many of these homes may be in need of repair. These homes are more susceptible to severe storms, fire and other disasters that may occur. Therefore, this information is crucial when planning hazard mitigation strategies and assessing damages in the aftermath.

**Figure P.3: City of Yale Year Housing Unit Constructed, 2022**



Source: Guthrie County Assessor

## Economics

Table P.3 shows the household income in 2022 inflation-adjusted dollars. The median household income was \$54,735 and the mean household income was \$79,466. According to the 2022 American Community Survey 5-Year Estimates, 42.8% of Yale's households had incomes below \$49,000 and 43.6% had incomes above \$100,000.

**Table P.3: City of Yale Household Income, 2022**

Income (In 2022 Inflation-Adjusted Dollars)	Number of Households	Percent of Households
Less than \$10,000	0	0.0%
\$10,000-\$14,999	5	3.8%
\$15,000-\$24,999	1	0.8%
\$25,000-\$34,999	20	15.3%
\$35,000-\$49,999	30	22.9%
\$50,000-\$74,999	15	11.5%
\$75,000-\$99,999	3	2.3%
\$100,000-\$149,999	53	40.5%
\$150,000-\$199,999	0	0.0%
\$200,000 or more	4	3.1%
Median Household Income	\$54,735	-
Mean Household Income	\$79,466	-

Source: US Census Bureau, American Community Survey

The region's small urban communities and rural towns primarily serve as agricultural service centers and retail trade centers, but manufacturing activity is also found in many of these communities. Due to a primary reliance on agriculture (over 97% of the land is farmland) the economies that diversified have been impacted less by a downturn in the market. The employment by industry statistics are shown in Table P.4. The leading industries in employment were Construction (41.3%), Educational services, and health care and social assistance (21.7%), and Manufacturing (7.0%). Taking advantage of regional strengths and industries will increase revenue generated in the community, resulting in increased income levels and housing values. These percentages are based on the total number of individuals 16 years and older that are from Yale and are employed.

**Table P.4: City of Yale Employment by Industry, 2022**

<b>Industry</b>	<b>Estimate</b>	<b>Percent</b>
Civilian employed population 16 years and over	143	100.0%
Agriculture, forestry, fishing and hunting, and mining	8	5.6%
Construction	59	41.3%
Manufacturing	10	7.0%
Wholesale trade	9	6.3%
Retail trade	0	0.0%
Transportation and warehousing, and utilities	3	2.1%
Information	0	0.0%
Finance and insurance, and real estate and rental and leasing	7	4.9%
Professional, scientific, and management, and administrative and waste management services	8	5.6%
Educational services, and health care and social assistance	31	21.7%
Arts, entertainment, and recreation, and accommodation and food services	3	2.1%
Other services, except public administration	3	2.1%
Public administration	2	1.4%

Source: US Census Bureau, American Community Survey

## *Existing Documents*

Table P.5 provides a compilation of the current planning and regulatory documents in place for the City of Yale.

**Table P.5: City of Yale Existing Documents**

<b>Document</b>	<b>Yes/No</b>	<b>Year</b>
Previous HMP	Yes	2018
Comprehensive Plan	Yes	2004
Building Code	Yes*	-
Zoning Ordinance	Yes	2006
Strategic Plan	Yes	2004
Housing Needs Assessment	Yes	1999
NFIP Participant	No	-
Floodplain Regulations	Yes	2017

\*State of Iowa Building Code

## *NFIP Participation*

In the past, there have been instances of significant flooding within the city limits of Yale. The city has recently joined the NFIP, and the city's flood maps were updated in 2017. The city's flood maps can be found later in this appendix.

## *Outlook and Future Development*

Yale has seen limited growth since the last plan update. This growth has primarily been in residential development and renovations. The City anticipates that this pattern of growth will continue throughout the life of this plan.

## Critical Facilities

Critical Facilities are facilities that are critical to the health and welfare of the population and are especially important following hazard events. Every jurisdiction is unique in such way that the list of critical facilities can vary widely from community to community. Yale's critical facilities can be found on Map P.2.

## Essential Infrastructure and Services

Knowing what services and infrastructure serve the city can be beneficial in a time of disaster so the appropriate companies can be contacted in need of utility shutoff or transportation routes. The city's essential infrastructure and services can be found in Table P.6.

**Table P.6: City of Yale Essential Infrastructure and Services**

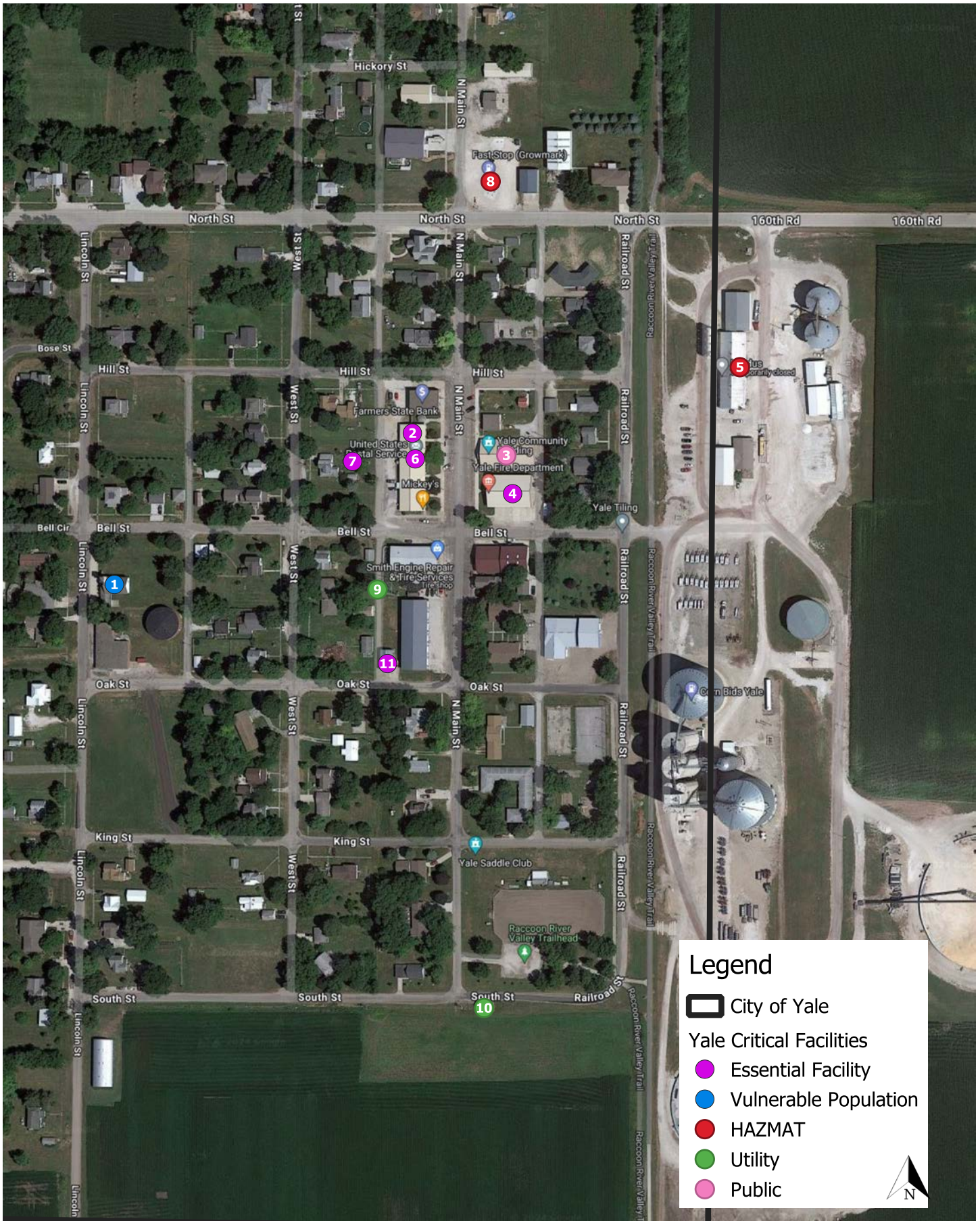
<b>Major Arterials</b>	160th Road	<b>Air Service</b>	Guthrie Co. Airport
<b>Water Service</b>	Municipal	<b>Sewer Service</b>	Private/Semi-Private
<b>Electric Service</b>	Alliant Energy	<b>Gas Service</b>	MidAmerican Energy
<b>Sanitation/Solid Waste</b>	R&S Waste	<b>Landfill</b>	Guthrie County Transfer Station
<b>Phone and Internet</b>	Panora Fiber	<b>Law Enforcement</b>	Guthrie County Sheriff
<b>Fire Service</b>	Yale Fire Department	<b>Ambulance Service</b>	Panora EMS

**Table P.7: City of Yale Critical Facilities**

<b>Number on Map</b>	<b>Name</b>	<b>Address</b>	<b>Type</b>
1	Church of Christ	307 Lincoln Street	Vulnerable Population
2	City Hall	207 Main Street	Essential Facility
3	Community Building	206 N Main Street	Public
4	Fire Department	210 N Main Street	Essential Facility
5	Landus Cooperative	1209 North Street	HAZMAT
6	Post Office	212 N Main Street	Essential Facility
7	Panora Communications Cooperative	206 N Main Street	Utility
8	Star Energy	525 N Main Street	HAZMAT
9	Water Tower	S of Bell Street and W of Main Street	Utility
10	Water Treatment Plant	South Street	Utility
11	County Maintenance Garage	745 Oak Street	Essential Facility



## Map P.2: City of Yale Critical Facilities



# Hazard Scores

**Table P.8: City of Yale Risk Assessment**

<b>Hazard</b>	<b>Comments</b>
<b>Animal/Plant/Crop Disease</b>	A portion of the City of Yale is agricultural land. Although this land represents some of the community, there have been minimal reported losses from animal/plant/crop disease within in the community. While this does impact the community, it is normally indirectly impacted.
<b>Drought</b>	Drought occurrences have increased across the state, and Yale has not been exempt from this hazard. Droughts continue to increase in severity and while there is little warning, this hazard can cause both direct and indirect issues for the City and it's residents.
<b>Earthquake</b>	There have been no instances of earthquake in the City of Yale, and the committee feels there will be no instances during the life of this plan.
<b>Expansive Soils</b>	There have been no instances of expansive soils in the City of Yale, and the committee feels there will be no instances during the life of this plan.
<b>Extreme Heat</b>	Extreme heat events continue to impact the City of Yale. Education may be one of the best action tools to combat the effects of extreme heat as individuals need to know the effects of extreme heat and how it can affect the body.
<b>Flash Flood</b>	Since 2018, there have been no instances of flash flooding within the City of Yale. While flash floods have little to no warning time, the committee anticipates that this hazard is not a high priority hazard to address with no instances being reported within the past 20 years.
<b>Grass/Wild Land Fire</b>	Grass and wild land fires are most commonly field fires or controlled burns that get out of hand in Yale. This hazard can pose a large threat to the community as elements out of anyone's control, such as wind direction and speed, can change this hazard from harmless and controlled to out of control and posing a threat to life.
<b>HAZMAT Incident</b>	There has been no HAZMAT Incidents in Yale over the last reporting period. These hazards can occur with no warning and with the right conditions, could impact the entire community. Mitigation actions for this hazard should be a high priority and this hazard should not be ignored.
<b>Human Disease</b>	Iowa and more specifically the City of Yale are still feeling the effects of the COVID-19 pandemic. The pandemic has reignited the need to plan for future outbreaks and examine the city's current practices. The pandemic also reminded the public the importance of staying informed and staying vigilant to protect themselves.
<b>Infrastructure Failure</b>	Infrastructure failures occur with little to no warning and can cause major disruptions within the community. Planning to respond to this hazard is important to the community to protect lives and property. The most likely infrastructure failure within Yale would be structural failure of either bridges or roadways.
<b>Levee/Dam Failure</b>	It is unlikely a levee/dam failure would impact the city of Yale. While there is no planning the city can do to prevent the failure of these dams, the city can mitigate the effects if a failure were to occur. This hazard can be linked to river flooding and mitigation actions may be similar.



<b>Radiological</b>	During the previous planning period, there were no instances of Radiological Incident in Yale, and the committee does not anticipate any happening in the next planning period.
<b>River Flooding</b>	No portion of the City of Yale is located in the flood zone. And the flood zones are located a measurable distance from the city. Therefore, this hazard has a low probability of effecting the community, and if it were to happen in the city's vicinity.
<b>Severe Winter Storm</b>	Severe Winter Storms continue to impact the City of Yale. These storms while historically, have caused little damage, continue to build in strength, threatening property and lives within the city of Yale. The warning period of this hazard continues to grow with meteorological advances, but can still pose great risks to the community. While impacts on the community may be minimal historically, the economic impact these storms have on the city continues to rise with the increase in cost of snow removal and the increase in cost in road repairs.
<b>Terrorism</b>	There have been no instances of terrorism in the City of Yale during the previous plan period and the committee feels there will be no instances during the life of this plan. If an instance were to occur, the committee feels it would be a targeted incident that would not threaten the entire community.
<b>Thunderstorm/ Lightning/Hail</b>	Thunderstorm/lightning/hail instances are frequent within the community. While they are frequent, most storms pose no threat to life, crops, or property. This hazard is prevalent in Yale, but is normally not severe in nature.
<b>Tornado</b>	Guthrie County has experienced a number of tornadoes in the recent past, but the large majority of these events have caused little to no damage. While there have been reported tornadoes in the county, none have hit Yale. Although these historically have not impacted the community, it is important that the city plans for the worst case event. Preparing the public and community is vital to ensuring there is no loss of life.
<b>Transportation Incident</b>	Speed limits within the City of Yale are relatively low. If transportation incidents were to occur on city streets, it is unlikely to cause little damage to property or humans. The committee anticipates that this hazard will effect the community in varying degrees throughout the planning period.
<b>Windstorm</b>	Recent windstorms have caused large amounts of reported damage to properties. These hazard events continue to build in magnitude, causing increasingly large amounts of damage to property and posing threats to lives. The recent derechos effected Stuart prompting the community to prepare more effectively for these hazards.

# Loss Estimates

**Table P.9: City of Yale Maximum Building and Population Exposure**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	2	\$11,200	267
<b>Commercial</b>	11	\$4,134,500	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	118	\$7,166,600	

It is unlikely that a jurisdiction can determine the impact any hazard will have. If a hazard were to impact the entire city, the numbers in table P.9 shows the number of people who would be affected and the maximum number of structures and their value. If this type of event were to occur, a shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability or even death.

**Table P.10: City of Yale Negligible Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	24
<b>Commercial</b>	1	\$372,105	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	11	\$644,994	

If a hazard were to report negligible impacts, it is anticipated that the numbers impacted would be similar to table P.10. If there were any shutdown of facilities or services, it is likely that these shutdowns would be for less than twenty-four hours. If any injuries were to occur, it is anticipated that these would be able to be treated with first aid. A negligible hazard would impact approximately 9% of the city.

**Table P.11: City of Yale Limited Hazard Impacts**

Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	0	\$0	67
<b>Commercial</b>	3	\$93,026	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	30	\$1,791,650	

If a hazard were to report limited impacts, it is anticipated that the numbers impacted would be similar to table P.11. A shutdown of some facilities and services could last more than a week and any injuries/illnesses would not result in permanent disability. It is estimated that 25% of the city would be impacted.

**Table P.12: City of Yale Critical Hazard Impact**

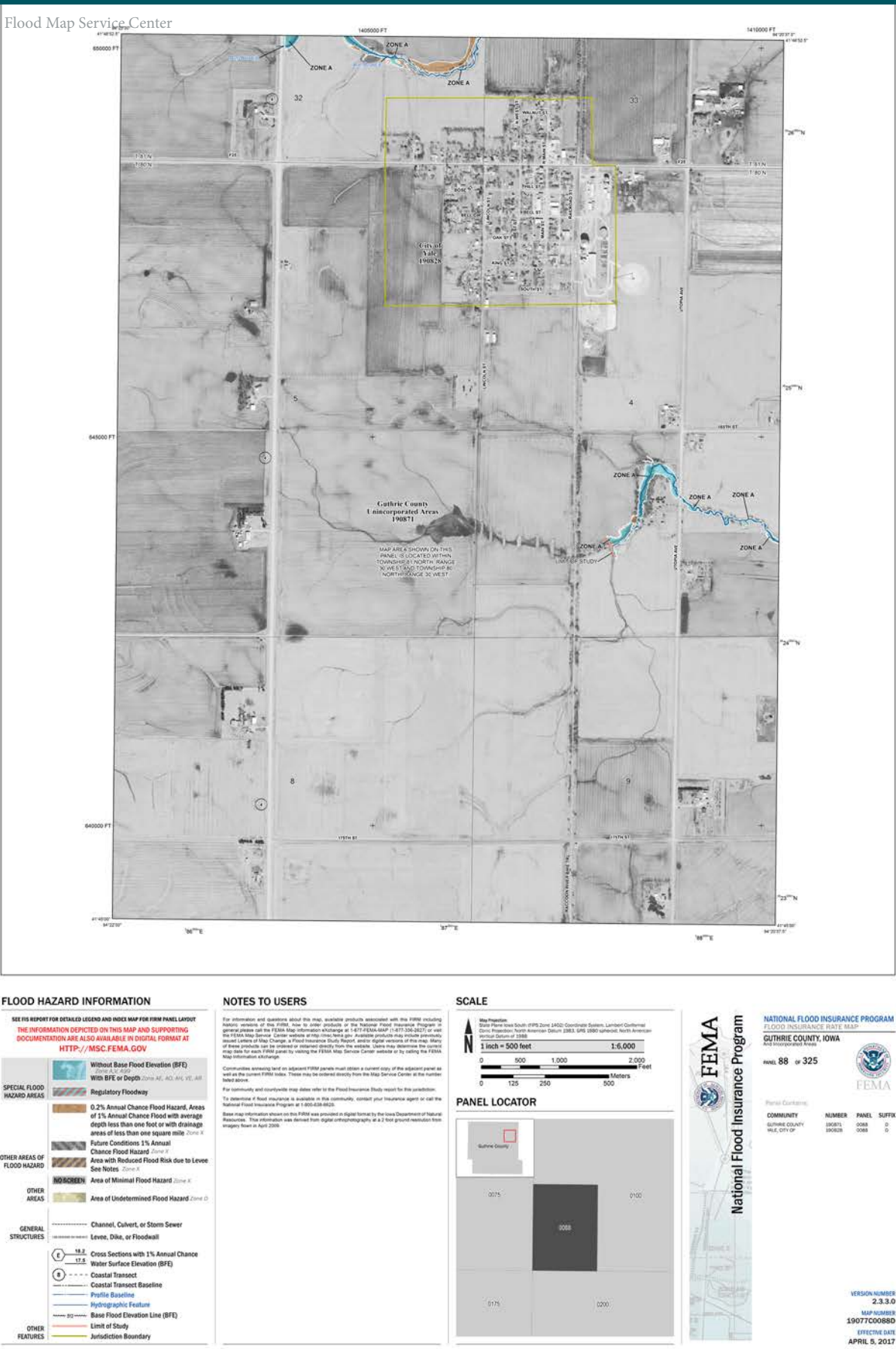
Type of Structure	Number of Structures	Value of Structures	Number of People
<b>Agricultural</b>	1	\$5,600	134
<b>Commercial</b>	6	\$186,052	
<b>Industrial</b>	0	\$0	
<b>Residential</b>	59	\$3,583,300	

If a hazard were to report critical impacts, it is anticipated that the numbers impacted would be similar to table P.12. A shutdown of some facilities and services could last for at least two weeks and some injuries/illnesses will result in permanent disability. It is estimated 50% of the city would be impacted.



# Flood Maps

Source: FEMA Flood Map Service Center



# Status of Previous Mitigation Actions

**Table P.13: City of Yale Status of Previous Mitigation Actions**

Previous Actions	Status				
	Complete	Underway	Ongoing	Future	Not Implemented
Educate citizens about summer storms via public information announcements through local media or by notices on utility bills			X		
Evaluate and upgrade Yale's warning siren coverage as necessary	X				
Educate citizens on NOAA weather radios	X				
Install additional storm sewer and drainage tiles as needed			X		
Replace and maintain snow removal equipment as necessary			X		
Upgrade or add backup generators as necessary				X	
Continual fire and emergency response training			X		
Upgrade fire equipment as necessary			X		
Initiate community fire prevention programs			X		
Provide firefighters, law enforcement, and EMS departments with adequate training and equipment			X		
Develop a city-wide evacuation plan		X			
Reduce water usage in extremely dry conditions					X
Construct new water tower			X		
Develop a contingency plan if water supply is diminished or contaminated				X	
Bury overhead power lines			X		
Trim trees and branches near overhead power lines			X		
Attend training for terrorism when offered			X		
Post signs and increase police surveillance around critical facilities			X		

# Action Plan

*Section 201.6 (c)(3)(ii): [The mitigation strategy] must also address the jurisdiction's participation in the NFIP, and continued compliance with NFIP requirements, as appropriate.*

*Section 201.6 (c)(3)(iii): The mitigation strategy shall include an action plan, describing how the action 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 associated costs.*

*Section 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.*

**Table P.14: City of Yale Action Plan**

<b>Goal 1</b>	<b>Maintain and protect public infrastructure</b>
Objective 1	Improve public warning capabilities
Objective 2	Improve public infrastructure
<b>Goal 2</b>	<b>Minimize deaths, injuries, property loss, and vulnerability due to natural hazards</b>
Objective 1	Improve public infrastructure
Objective 2	Education/Training
Objective 3	Protect health and safety
Objective 4	Improve first response
Objective 5	Provide education and training to increase awareness
<b>Goal 3</b>	<b>Improve coordination, public communication, education, and awareness of hazards</b>
Objective 1	Improve public warning
Objective 2	Provide educations and training to increase public awareness
<b>Goal 4</b>	<b>Enhance community protection</b>
Objective 1	Improve reactions to winter storms
Objective 2	Improve reactions to Drought
Objective 3	Improve reactions to Flash Floods
Objective 4	Improve reactions to Grass/Wild Land Fire
Objective 5	Improve reactions to Thunderstorm/Lightning/Hail, Tornadoes, and Windstorms
Objective 6	Improve reactions to Animal/Plant/Crop Diseases, HAZMAT Incidents, Human Disease, and Infrastructure Failure
<b>Goal 5</b>	<b>Maintain and support public safety facilities, including equipment and training</b>
Objective 1	Improve public infrastructure and critical assets in hazard impact areas
Objective 2	Provide education and training to increase public awareness
Objective 3	Protect health and safety with structural projects
Objective 4	Enact and enforce regulatory measures that ensure people are protected in existing and future development areas

**Table P.15: City of Yale Mitigation Actions**

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Implement water conservation programs and enforce the regulations (no watering yards, no farmers filling up tanks)	Drought	High	City Council	Low	Local, State	Prevention	Mid
Have an on-call extra personnel to help with snow removal	Severe Winter Storms	Mod	Public Works	Low	Local	Emergency Services	Short
Quick reaction by putting up warning signs for those areas that are at high risk of flooding and road block where necessary	Flash Flood	Low	Public Works	Minimal	Local, State	Emergency Services	Mid
Provide cooling shelters	Extreme Heat	Mod	Emergency Services	Low	Local	Emergency Services	Short
Designate a clean-up area for debris	Infrastructure Failure	Low	Public Works	Low	Local	Property Protection	Short
Maintain current fire department vehicles and maintenance vehicles	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	City Council	Low	Local, State, Federal	Prevention	Short
Dispense information about hazards	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Low	Local	Public Education and Awareness	Mid



Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Improve fire department's response time through training and practice drill	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Low	Local, State	Emergency Services	Mid
Establish alert systems	Infrastructure Failure	Mod	City Council	Low	Local, State	Emergency Services	Short
Local road flood prevention	Flash Flood	Low	Public Works	Low	Local, State, Federal	Prevention	Mid
Continue reverse E911 program	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Emergency Services	Low	Local, State	Emergency Services	Short
More training opportunities for fire department	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Low	Local, State	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Siren/Generator testing	Infrastructure Failure	Mod	Public Works	Minimal	Local	Emergency Services	Mid
Have someone check on the elderly and low income during severe winter storms	Severe Winter Storms	Mod	Fire Department	Low	Local	Emergency Services	Mid
Check on the elderly during extreme heat events	Extreme Heat	Mod	Emergency Services	Low	Local	Emergency Services	Short
Designate people to help the elderly to storm shelters	Tornado, Severe Winter Storms	Mod	Fire Department	Minimal	Local	Emergency Services	Short
Initiate community fire prevention program	Infrastructure Failure	Mod	Fire Department	Low	Local, State	Emergency Services	Mid
Provide firefighters, law enforcement, and EMS departments with adequate training and equipment	Infrastructure Failure	Mod	Fire Department	Low	Local, State, Federal	Emergency Services	Mid
Develop a contingency plan if water supply is diminished or contaminated	Drought	Mod	City Council	High	Local	Prevention	Long
Install more warning sirens	Tornado	Mod	City Council	Minimal	Local, State, Federal	Emergency Services	Mid
More fire department recruitment/volunteer appointed positions for crisis/disaster relief	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Minimal	Local	Emergency Services	Short

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
More educational programs about town resources	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City Council	Minimal	Local	Public Education and Awareness	Long
More mass casualty training events	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Mod	Fire Department	Low	Local, State	Emergency Services	Mid
Community drills for tornadoes and fire response time	Tornado, Severe Winter Storms, Infrastructure Failure	Low	County Emergency Manager, City Council, Fire Department	Minimal	Local	Public Education and Awareness	Mid
Post hazard information signs	Flash Flood	Low	Public Works	Minimal	Local	Prevention	Short
Replace and maintain snow removal equipment as necessary	Severe Winter Storms	Mod	Public Works	Low	Local, State, Federal	Emergency Services	Short
Add tree trimming ordinance	Tornado, Windstorm	Mod	City Council	Minimal	Local	Prevention	Short
Upgrade fire equipment as necessary	Infrastructure Failure	Mod	Fire Department	Low	Local, State, Federal	Emergency Services	Mid

Action	Hazard(s) Addressed	Priority	Responsible Department	Estimated Cost	Potential Funding Source(s)	Mitigation Measure Category	Target Completion Date
Construct community safe room	Animal/Plant/Crop Disease, Drought, Earthquake, Expansive Soils, Extreme Heat, Flash Flood, Grass/Wild Land Fire, HAZMAT Incident, Human Disease, Infrastructure Failure, Levee/Dam Failure, Radiological, River Flooding, Severe Winter Storm, Terrorism, Thunderstorm/Lightning/Hail, Tornado, Transportation Incident, Windstorm	Low	City Council	Low	Local, State, Federal	Structural Project	Long
Adopt building codes	Infrastructure Failure	Mod	City Council	Low	Local	Prevention	Mid
Create multi-family/rental fire extinguisher codes	Infrastructure Failure	Mod	City Council	Low	Local	Prevention	Mid
Purchase generator for water plant	Infrastructure Failure	High	City Council	Low	Local, State, Federal	Emergency Services	Short
Attend training for terrorism when offered	Terrorism	Low	Fire Department	Low	Local, State	Emergency Services	Long
Bury overhead utility lines	Tornado, Windstorm, Infrastructure Failure	Low	Public Works	Minimal	Local, State	Property Protection	Long
Install additional storm sewer and drainage tiles as needed	Flash Flood	Low	Public Works	Moderate	Local, State, Federal	Structural Project	Long
Construct a new water tower	Infrastructure Failure	Low	City Council	High	Local, State, Federal	Structural Project	Long



# Incorporation into Other Planning Mechanisms

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Where possible, Yale will consider the findings from this document when updating or creating new planning and operating documents. Information from this plan will be utilized to update the following documents:

- City Codes
- Hazard Mitigation Plan
- Yale Comprehensive Plan
- Zoning Ordinance
- Strategic Plan
- Housing Needs Assessment
- Floodplain Regulations
- Building Code

While the city currently does not have any of the plans listed below, if these plans were to be created during the life of this plan, this plan will be used to guide the development of:

- Water Conservation Plans
- Storm Water Management Plans
- Parks and Recreation Plans

