


EMERGENCY MANAGEMENT
DES MOINES COUNTY



2025 Multi-Jurisdictional Hazard Mitigation Plan Des Moines County Iowa

Adopted 10/30/25 SEIRPC

A Multi-jurisdictional Hazard Mitigation Plan

The purpose of Hazard Mitigation Planning is to improve the health, safety and welfare of the citizens of Des Moines County through development of effective strategies that can be implemented to mitigate the negative effects of known hazards.

This Plan was produced by the combined efforts of the Federal Emergency Management Agency (FEMA), the Iowa Department of Homeland Security and Emergency Management (HSEM), working together with

The Citizens of Des Moines County, and

- Des Moines County
- City of Burlington
- City of Danville
- City of Mediapolis
- City of Middletown
- City of West Burlington
- Iowa Army Ammunition Plant (IAAAP)
- Burlington Community School District
- Burlington Notre Dame Catholic Schools
- Danville Community School District
- Mediapolis Community School District
- Southeastern Community College
- West Burlington Independent School District
- North Bottoms Levee District
- Two Rivers Levee and Drainage District
- DESCOM
- SEIRPC

Planning staff is responsible for the production of this document and for any errors or omissions that may exist. For comments or corrections contact the planning office.

Thank you to all who participated.

US Census Facts:

For Planning purposes, we rely on two types of data produced by the US Census Bureau.

The standard for Total Population is the Decennial Census, taken at ten year intervals, such as years 2000, 2010 and 2020.

The second type of Census data we use is the American Community Survey (ACS), which is a more detailed count for a variety of subjects and is produced at 1 and 5 year intervals.

Most statistics relevant to planning topics were transferred to the ACS in 2005, when it replaced the decennial census long form (US CensusB, 2022) and estimates are published a year behind.

Therefore, we use the 2020 Decennial count for Population, with the 2023 ACS 5-year estimates on all other topics for the best accuracy within this document. 2024 estimates are not yet available.

General demographic conclusions based on either estimate remain valid.

For questions about this or other sources of information used in this plan, please refer to the bibliography or call Gail Thomas at the planning office:
(641) 233-8942.

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Hazard Mitigation Planning

What is Hazard Mitigation Planning?

A hazard is a situation that poses a threat to life, health, prosperity, or the environment of a community. Hazard Mitigation is any sustained action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards. This plan is intended to identify hazards that pose the greatest risk to Des Moines County and recommend action to mitigate future risk.

Disaster Mitigation Act of 2000

According to the Disaster Mitigation Act of 2000, local governments must prepare, adopt, and update a Hazard Mitigation Plan to be eligible for post-disaster FEMA assistance. This plan works to assess risk, decrease impact, and prevent future damage. The organization and contents of this plan are driven by the requirements of the FEMA and input of Des Moines County residents.

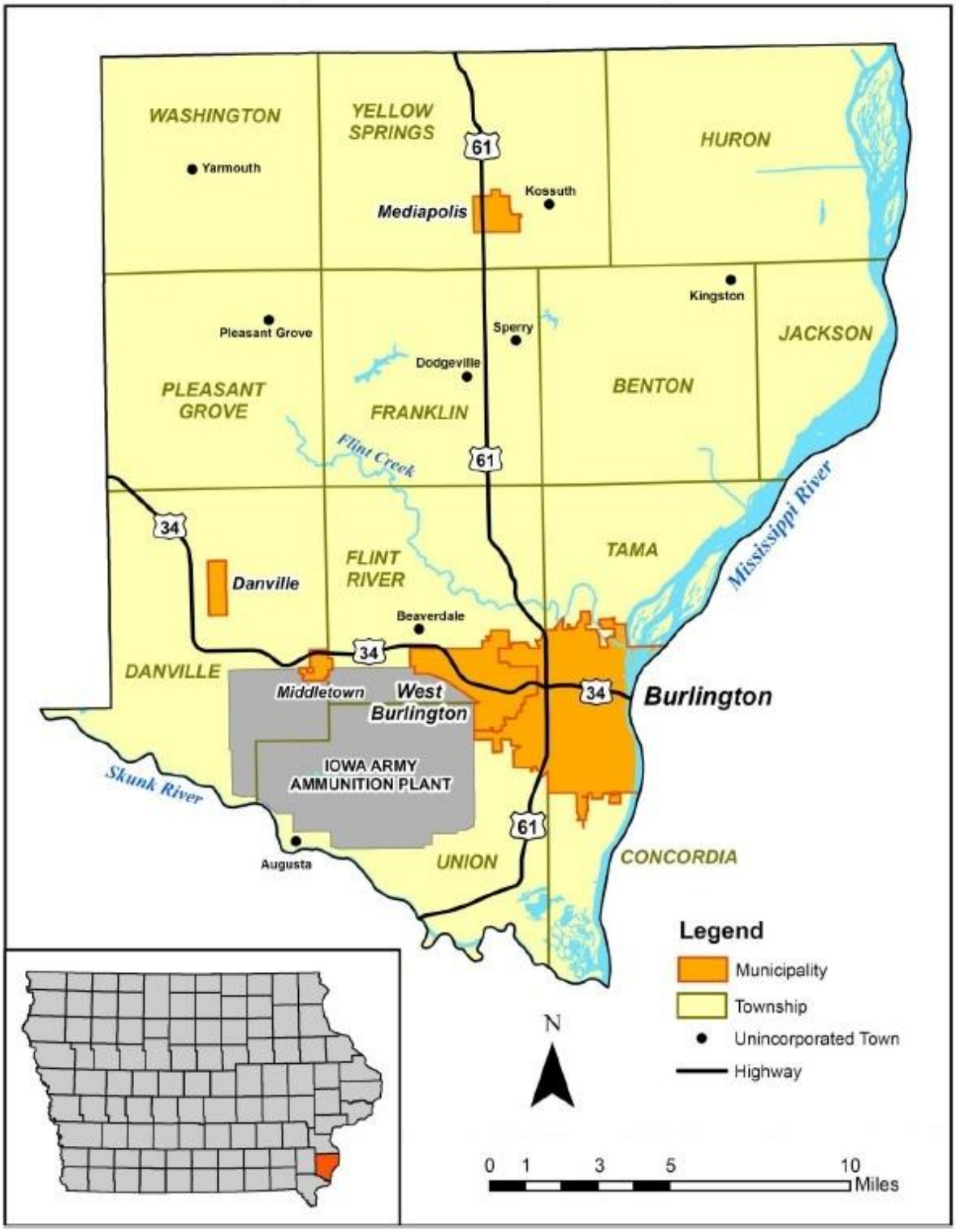
The development and update of the Des Moines County Hazard Mitigation Plan is a response to the passage of the Disaster Mitigation Act of 2000 (DMA), which was signed into law on October 30, 2000, with the goal of reducing losses and future public and private expenditures and improving response and recovery from disasters. This act, Public Law 106-390, amended the Robert T. Stafford Relief and Emergency Assistance Act. The following is a summary of the portions of the DMA that relate to local governments:

- ✓ Local governments and tribal organizations must prepare a multi-hazard mitigation plan to be eligible for funding from the FEMA Pre-Disaster Mitigation Assistance Program and Hazard Mitigation Program.
- ✓ Natural hazards need to be addressed in a risk assessment and vulnerability analysis sections of the multi-hazard mitigation plan. Assessment of human-caused hazards such as hazardous waste spills is encouraged but not required.
- ✓ Authorizes up to seven percent of Hazard Mitigation Grant Program funds available to a state following a federal disaster declaration to be used for development of state, local, and tribal organization multi-hazard mitigation plans.
- ✓ Without an up-to-date multi-hazard mitigation plan, local governments and tribal organizations cannot obtain funds from the Pre-Disaster Mitigation Grant Program

To comply with Section 322 of the Disaster Mitigation Act of 2000 and qualify for future hazard mitigation grant awards, Des Moines County must develop a county-wide hazard mitigation plan. The following grant programs require an approved and adopted hazard mitigation plan:

- Hazard Mitigation Grant Program (HMGP)
- Public Assistance Grant Program (PA)
- Building Resilient Infrastructure and Communities (BRIC)
- Pre-Disaster Mitigation Grant Program (PDM)
- Fire Management Assistance Grant Program (FMAG)
- Safeguarding Tomorrow Revolving Loan Fund Program
- Rehabilitation of High Hazard Potential Dam Grant Program (HHPD) (Stafford, 2023)

Des Moines County Map



Map by SEIRPC

Introduction

Plan Structure

This Multijurisdictional Hazard Mitigation Plan is designed to reflect first, conditions in the County as a whole, then address specific differences that may be present in each community. Issues specific to each community are noted in the Vulnerability and Impact section of each Hazard Profile in Section B. A brief summary for each community is included in Section G.

Brief County History

Des Moines County was established in 1834. It was named for the Des Moines River which runs through southeastern Iowa. Until 1833, Native Americans held the land that is now Des Moines County. For some years, a branch of the American Fur Company had a trading post on the present site of the city of Burlington.

When Des Moines County was established, Dubuque County was the only other county in Iowa. Together they contained all of present day Iowa in their borders. The present boundaries of Des Moines County were established in 1839.

Today, Des Moines County is made up of 12 townships with five incorporated communities: Burlington (the county seat), Danville, Mediapolis, Middletown, and West Burlington.

Historic Sites

There are 35 properties and districts listed on the National Register of Historic Places in the county, most of which are in Burlington.

Of particular note is the Burlington Public Library completed in 1898 at 501 North 4th Street. The Library traces its origin to a subscription library that was created in two rooms located in city hall in 1868. It was established by US Senator James Wilson Grimes who contributed $5,000 of his own money to the effort. Local philanthropist Philip M. Crapo suggested that a new library building be constructed. He offered $20,000 of his own money for the project if the city council matched his gift, which they did.

Mr. Crapo provided the funds for many of the furnishings in the building as well. Boston architect T.S. Hoyt designed the building in the Gothic Revival style. The builder, J. C. Sutherland, modified the plans and it was constructed in more of a Renaissance Revival style from 1896 to 1898. The total cost of the project was $55,000 (Schaile, 2015).

Geography

Southeast Iowa lies in the Great Plains. Part of the Southern Iowa Drift Plains, the land surface is characterized by steep rolling hills, level alluvial lowlands, and table-like upland divides. Des Moines County's landscape is continually evolving with a significant amount of erosion and weathering. The Mississippi River forms the eastern border of the county.

"Southern Iowa Drift Plain summits always seem to return to a uniform elevation, a clue to their geologic origins. These even-topped uplands disclose the approximate level of the original, once-continuous land surface constructed by the last ice sheet to pass this way. Every hillslope and valley floor mark the extent of erosion into the old glacial plain. The space between hills emphasizes the great amount of material that has been removed and the hundreds of thousands of years this process has taken" (Prior, 1991).

Climate

According to the Köppen Climate Classification system, Des Moines County has a hot-summer humid continental climate, abbreviated "Dfa" on climate maps. This climate zone has warm to hot humid summers with cold winters. There is no dry season, and precipitation is distributed throughout the year.

Summers are warm and humid, with daytime temperatures averaging 74F in July. Winters are cold, with January temperatures averaging about 22F. Although most of the annual precipitation falls in the warm months, snowstorms, ice storms and occasional blizzards occur during the winter. The average annual precipitation is 38 inches. Thunderstorms are common in summer. Droughts severe enough to cause widespread crop losses have a 5% chance of occurring in a given year (Iowa, 2023).

Tornado Alley. Supercell thunderstorms, which can cause violent tornados, are common in the Great Plains where warm air from the Gulf of Mexico tends to meet cooler air coming from Canada, creating peak tornado conditions. The region known as Tornado Alley generally encompasses parts of Kansas, Nebraska, Iowa, Oklahoma, and northern Texas.

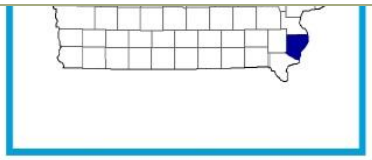
Land Use

Unincorporated Des Moines County has not adopted a zoning code and its Comprehensive Plan was last updated in 2004. The City of Burlington applies zoning to a two-mile area around the municipality. All the cities have zoning ordinances and future land use plans in place to guide land use development.

According to the US Census Bureau, the area of the county is 430 square miles (275,200 acres) of which 416 square miles is land. Water and wetlands cover 14 square miles (about 9,000 acres). The 2022 USDA Agricultural Census indicates that approximately 44% of the county's acreage is used for cropland, 1.5% is pasture, and 5% is forested.

The cities of Burlington and West Burlington lie adjacent on about 20 square miles of land (12,800 acres). Because other town centers are relatively small and trees and grass are typical elements in residential areas, those acres are grouped with forest and grassland rather than urbanized areas.

Des Moines County
Iowa



Total and Per Farm Overview, 2022 and change since 2017

	2022	% change since 2017
Number of farms	648	+9
Land in farms (acres)	148,881	-15
Average size of farm (acres)	230	-22
Total	($)	
Market value of products sold	145,787,000	+35
Government payments	3,221,000	-8
Farm-related income	7,080,000	-1
Total farm production expenses	104,398,000	+20
Net cash farm income	51,689,000	+62

2022 USDA Census of Agriculture County Profile

(Z) Percent of state agriculture sales

Share of Sales by Type (%)

Crops	81
Livestock, poultry, and products	19

Land in Farms by Use (acres)

Cropland	123,052
Pastureland	6,994
Woodland	13,444
Other	5,391

Acres irrigated: 3,082
2% of land in farms

Surface Water

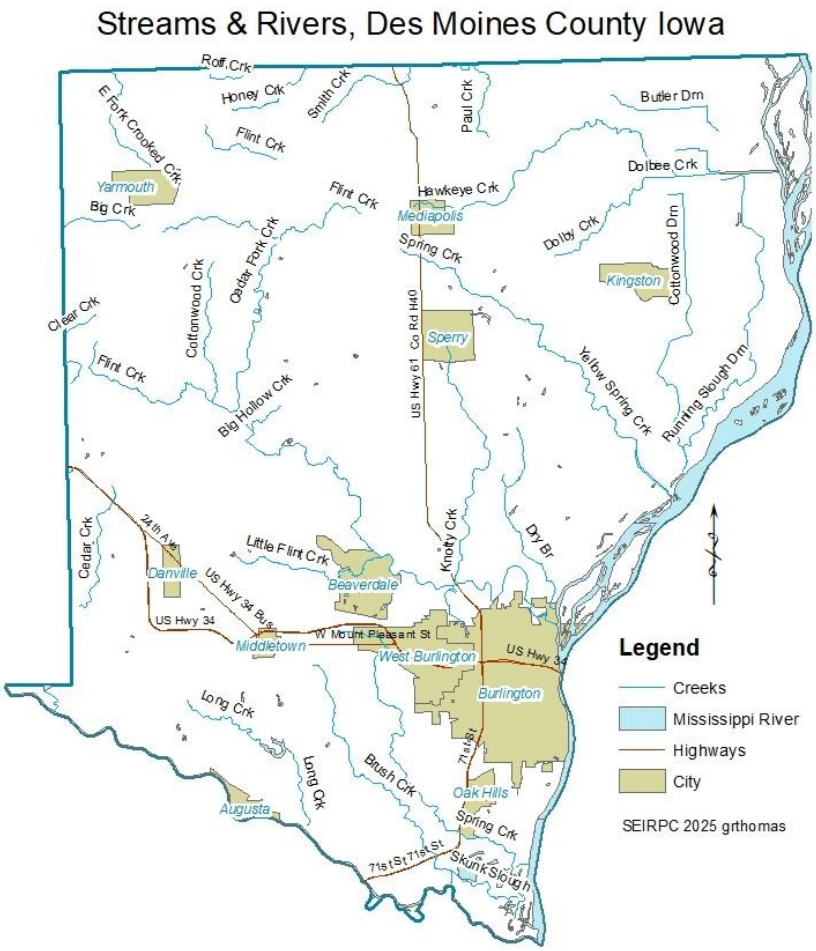
Des Moines County contains a variety of surface water features, mostly in the form of creeks, recreational lakes, and soil conservation structures. The Mississippi River forms the east border; Skunk River, the south border; and the county is drained by Flint Creek.

Lakes: Big Hollow

Rivers in Des Moines County: Iowa River, Skunk River, Mississippi River

Creeks in Des Moines County:

Des Moines County Creeks and Streams	
Big Creek	Honey Creek
Big Hollow Creek	Knotty Creek
Brush Creek	Little Flint Creek
Cedar Creek	Long Creek
Cedar Fork Creek	Mud Creek
Clear Creek	Paul Creek
Cottonwood Creek	Roff Creek
Dolby Creek	Skunk Slough
Dry Branch	Smith Creek
East Fork Crooked Creek	Spring Creek
Flint Creek	Sullivan Slough
Hawkeye Creek	Tyler Lake Drainage
Hawkeye-Dolbee Diversion Channel	Yellow Spring Creek



Outdoor Recreation

River access points:

- Casey Barrow River Access: 1867 180th St. in Burlington
- Edgewater Beach River Access: 13290 Tama Rd. in Burlington
- Flint River Trail: Port of Burlington river access
- Hawkeye Dolbee River Access: East on 225th Avenue, turn north on Lake Road to the boat ramp
- Sullivan Slough River Access: 3175 Sullivan Slough Rd. in Burlington
- Tama Beach River Access: 4 miles north of Burlington, just off Tama Road

Des Moines County Recreational areas:

- 4th Pumping Plant Recreation Area
- Big Hollow Recreation Area
- Chautauqua Park
- Harold and Mildred Linder Conservation Area
- Hickory Bend Recreation Area
- Hunt Woods Recreation Area
- Kevin J. Gahn Memorial Recreation Area
- Leopold Recreation Area
- Luckenbill Woods
- Starr's Cave Park and Preserve
- Welter Recreation Area
- Zion Schoolhouse

Des Moines County Statistics

Population

According to the U.S. Census Bureau, the 1850 population of Des Moines County was 12,988. The county grew steadily until 1970, when it had a peak population of 46,982. Since then, the county has seen a gradual decrease in population.

The 2010 decennial census estimated the countywide population at 40,325, which represented a 4.8% decrease from its 2000 population. As of the 2020 Decennial US Census, the estimated population of Des Moines County was 38,910, a decrease of about 3.5% from the previous decade.

Des Moines County Iowa		
Historic population		
Census	Pop.	% change
1850	12,988	—
1860	19,611	51.00%
1870	27,256	39.00%
1880	33,099	21.40%
1890	35,324	6.70%
1900	35,989	1.90%
1910	36,145	0.40%
1920	35,520	−1.7%
1930	38,162	7.40%
1940	36,804	−3.6%
1950	42,056	14.30%
1960	44,605	6.10%
1970	46,982	5.30%
1980	46,203	−1.7%
1990	42,614	−7.8%
2000	42,351	−0.6%
2010	40,325	−4.8%
2020	38,910	−3.5%
U.S. Decennial Census		

Demographics Des Moines County 2023 ACS Estimates	
Population	38,597
Hispanic or Latino	3.60%
White	86%
Black or African American	4%
American Indian, Alaska Native	0.3%
Asian	1%
Some Other Race	0.7%
Two or more races	7%

In 2023, median household income for Des Moines County was 82% of the state median, and 14% of residents have incomes below the poverty level. The percentage of people living with disability is higher than the rest of the state.

Median Household income	Household income	Poverty Level	Percent disabled
State of Iowa	$ 73,147	11%	12.4%
Des Moines County	$ 60,662	14.1%	16.5%

Housing

Owner-occupied homes account for 65% of the total occupied housing units in Des Moines County, and 35% are renter-occupied. US Census data (ACS 2023) indicates that Des Moines County has a somewhat larger proportion of vacant housing units (11%) compared to Iowa (9%). Mobile homes represent a greater share of housing in Des Moines County than in the state as a whole.

Total Housing Units	18,778	% DM County	% State of Iowa
Occupied	17,188	92%	91%
Vacant	1,590	9%	9%
Owner Occupied	12,495	73%	72%
Renter Occupied	4,693	27%	28%
Mobile homes	680	4%	3%

Resources: Zero-Vehicle Households

Thirteen hundred and forty eight households (about 3,100 people) do not have a personal vehicle available at home. Most of these live in Burlington and West Burlington. That represents 8% of the county population, compared to about 5% in the rest of the State.

Year built

The table at right shows the percentage of housing built in Des Moines County and in Iowa by era. Of the estimated 18,778 housing units in the county, more than half were built before 1960. Approximately 11% were built in the last twenty-five years.

Year Structure Built	Des Moines Co	Iowa
Since 2000	11%	21%
1980 - 1999	14%	17%
1960 to 1979	22%	24%
1940 to 1959	19%	15%
1939 or earlier	34%	25%

Median year structure Built

The median year-built shows that Des Moines County housing units in general are older than the state and national averages.

Geography	Median year built
Des Moines Co	1958
State of Iowa	1971
USA	1979

Home Values

Housing in Des Moines County is more affordable than in much of the nation. The average value of owner-occupied homes in 2023 was $141,500, about 28% lower than the statewide average of $195,900 and less than half the national average value of homes, at $303,400.

Owner-occupied home values	Median home value	% of homes below $100,000	% between $100,000 & $200,000	% over $200,000
Des Moines County	$141,500	33%	38%	29%
Iowa	$195,900	19%	32%	49%
USA	$303,400	12%	18%	70%

Economy

Since its founding, manufacturing has been a chief source of employment for residents of Des Moines County. Major occupations in the county today include educational services, health care and social assistance (24%), manufacturing (18%), and retail trade (13%). Arts, entertainment, recreation, accommodation, food services (10%), professional/scientific services (8%) and though it is a largely rural county, the agricultural sector employs just 3% of the population (US Census ACS 2023 5-yr tables).

Workforce

About 61% of the population over age 16 is actively engaged in the workforce. That compares to about 67% in the State of Iowa as a whole. The average commute to work is about 19 minutes.

Workforce		
Population 16 years and over	31,462	
In the Labor Force	19,274	61%
Civilian employed pop 16 years and over	18,652	59%
Mean travel time to work	19 mins	

Occupation	Number	Percent
Agriculture, forestry, fishing and hunting, and mining	479	3%
Construction	1028	6%
Manufacturing	3422	18%
Wholesale trade	487	3%
Retail trade	2467	13%
Transportation and warehousing, and utilities	1077	6%
Information	108	1%
Finance and insurance, real estate, rental, leasing	623	3%
Professional, scientific, management, admin & waste management	1273	7%
Educational services, health care and social assistance	4462	24%
Arts, entertainment, recreation, accommodation, food services	1918	10%
Public administration	373	3%
Other services	251	4%

Des Moines County Schools

Four public school districts; Burlington CSD, West Burlington ISD, Danville CSD, and Mediapolis CSD; one private school, Burlington Notre Dame Catholic schools, and one institute of higher education; Southeastern Community College (SCC), serve students in Des Moines County.

Critical facilities

Critical facilities are structures and institutions necessary for a community's response to and recovery from emergencies, Critical facilities must continue to operate during and following a disaster to reduce the severity of impacts and accelerate recovery.

Critical facilities include water and wastewater systems, power utilities, transportation infrastructure, communications systems, and energy pipelines and storage. Levees, dams and bridges must also be maintained for community safety during hazardous events.

FEMA defines critical facilities as structures and infrastructure essential for delivering vital services and protecting the public, especially during emergencies.

Critical Facilities	Critical infrastructure
Communication systems	Municipal water systems
Law Enforcement Center	Sewer systems
Police, Sheriff, State Patrol	Electric services
Local Fire Stations	Natural Gas
Emergency operations center	Internet/Broadband
City Halls	Cell phone & Radio towers
County Courthouse	
Schools	**Essential services**
Nursing Homes, Assisted Living	Grocery stores
Hospitals & Health facilities	Pharmacy
Community shelters	Convenience stores
Transportation	Fuel stations

Canadian Pacific Railroad	Trucking Companies
State & Federal Highways	Contractors
Primary & Secondary County roads	Pumping stations
City Streets	
Bridges	
Public Transit & School buses	
Pipelines	

Communications. The State of Iowa has 128 public safety answering points (PSAPs) that are the first line of response to a 911 call, with at least one PSAP in each county. All 99 Iowa counties have the capability of accepting wireless enhanced 911 Phase II service, which provides the person at the public safety answering point with latitude and longitude coordinates so they can more readily locate the person who has placed the 911 call.

DESCOM is short for Des Moines County Communications. DESCOM was created in 2014 by the various public safety entities in the county to serve the citizens, police and fire departments of Des Moines County. DESCOM is the sole PSAP (Public Safety Answering Point) and dispatch center in the county and handles all 911 and admin calls for service in the county.

The Communications Network (ICN) is a state agency that administers a statewide fiber optic network. The capacity of the Network enables authorized users such hospitals, state and federal government, public defense armories, libraries, schools and higher education institutions to communicate via high quality, full-motion video; high-speed internet connections; and telephones.

Local Media

Local Media Providers

Media Type	Agency Location Radio	
Radio	KBUR/KGRS	Burlington
	KCPS	Burlington
	KDMG	Burlington
	KBKB	Burlington
	KAYP	Burlington
	KKMI	Burlington
	KHDK	Burlington
	WQKQ	Burlington
Print or online news	The Hawk Eye	Burlington
	The Burlington Beacon	Burlington
	Des Moines County News	West Burlington
	Mediapolis News	Mediapolis
Cable TV	Mediacom	Burlington
	Mediapolis Telephone Company (MTC)	Mediapolis

Utility Systems

- Electric: Alliant Energy, MidAmerican Energy
- Natural Gas: Access Energy, Alliant Energy
- Sewer: Cities, Regional Utility Service Systems (RUSS)
- Telephone/Internet: Farmers Telephone Co., IMON, Lisco, Mediacom, NaTel, Windstream

Municipal water supply

- Burlington: The source of water is both groundwater and surface water. Approximately (80%) comes from the Mississippi River. The remaining (20%) comes from 3 wells in bedrock aquifers
- Danville: Purchases water from Burlington Municipal Waterworks
- Mediapolis: Water supply is provided by the City of Mediapolis, utilizing deep wells to access water from the Jordan Aquifer
- Middletown: Water supply is provided by American Ordnance LLC, operator of the Iowa Army Ammunition Plant. The water is drawn from groundwater sources, including wells tapping into the Jordan and Silurian aquifers.
- West Burlington: The city relies on a water supply from the City of Burlington. West Burlington also provides water through this system to unincorporated Beaverdale.

Vulnerable Sites

Some places may be more vulnerable to the negative impacts of disasters. Many of these sites can be considered critical facilities as well.

People and places that may be especially vulnerable when disaster strikes include:

- Preschool and daycare centers
- Retirement or nursing Homes
- Apartment complexes
- RV park
- Mobile home communities

Transportation

The transportation system in Des Moines County includes 4-lane highways, state highways, county and city road networks, a municipal airport, railroad, regional public transit, bicycle trails, sidewalks and pipelines.

Roads and Highways

Des Moines County is well connected to the US Highway System. US Highway 61 and US Highway 34 are major highways.

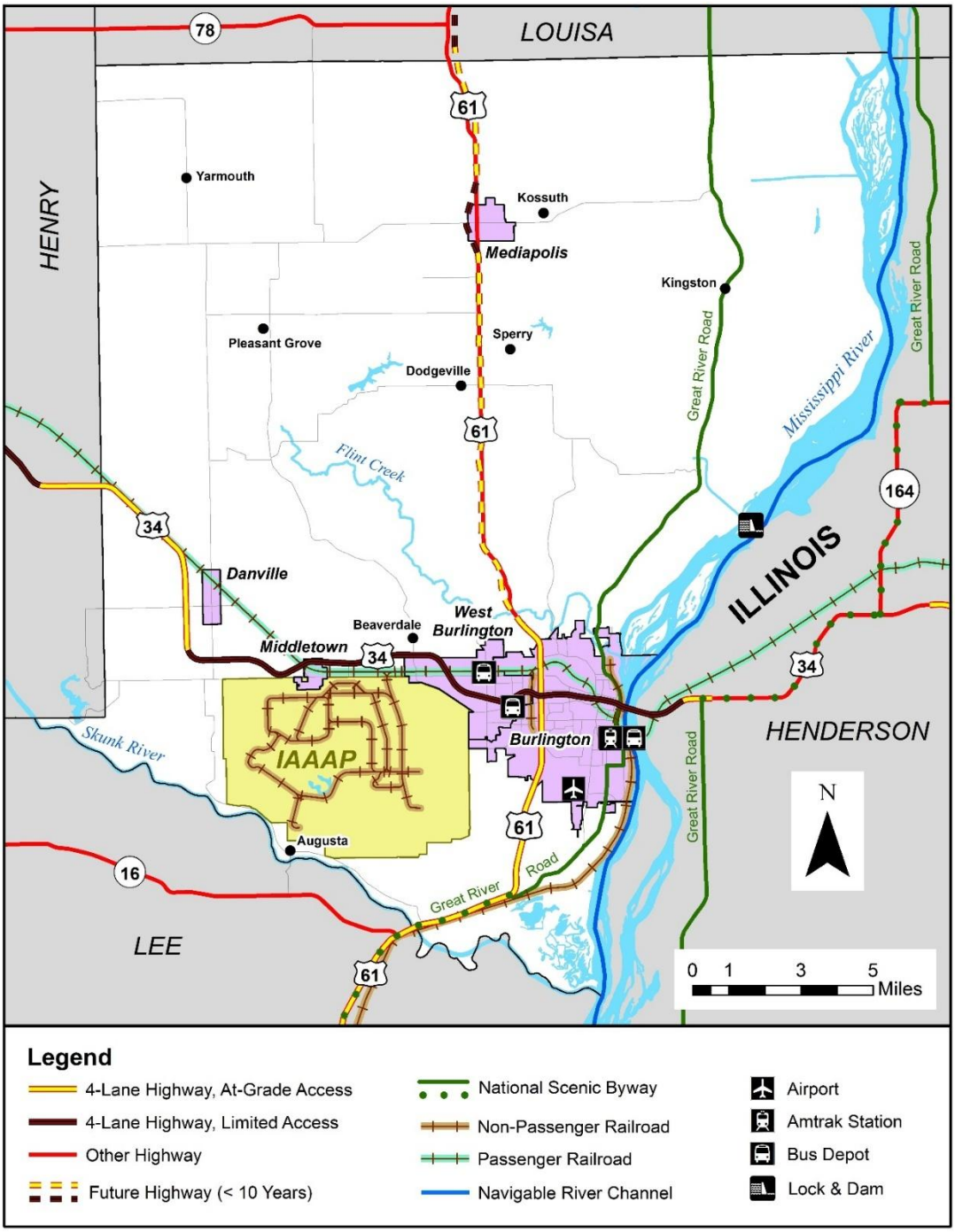
US 34 is a 4-lane divided highway, with the portion east of Danville being limited access, while the western section has at-grade intersections. US 61 is also a divided 4-lane highway with at-grade intersections. South of the Iowa border, US 61 joins the Avenue of the Saints. Together, these roads provide excellent access to major regional cities such as the Quad Cities, Des Moines, Minneapolis, Chicago, St Louis and Kansas City.

US 34 crosses the Mississippi River at Burlington and is the sole land connection between Des Moines County and western Illinois. The bridge is a vital economic link for the surrounding region. Many Illinois residents are employed in the Burlington area and the city serves as a regional hub for medical, service and shopping needs.

The Great River Road National Scenic Byway is a multi-state corridor that follows the Mississippi River on both sides. It was developed to promote tourism for local cultural resources along the length of the river. Despite the scenic designation, it remains an important regional corridor for truck freight traffic, particularly agricultural commodities. It also links Burlington's north side industrial cluster with US 34.

Streets. All cities maintain the streets within their municipal boundaries.

County Roads. Des Moines County Secondary Roads maintains about 638 miles of roads. There are 158 public roadway bridges in the county. Of these, 98 bridges (or 62% of the total) are located on a road that is classified as an Arterial, Collector or part of the Farm-to-Market system. Of those 98 bridges, more than half cross a river, stream, or other drainageway, while the remainder cross another road or a rail line.



Public Transportation

Demand-response transit service is provided through the regional Southeast Iowa Bus (SEIBUS) program. SEIBUS is operated by the Southeast Iowa Regional Planning Commission and serves Des Moines, Henry, Louisa and Lee Counties. SEIBUS also offers general public transportation in the southeast Iowa region, including a Medical Shuttle to the University of Iowa Hospital three days each week.

The City of Burlington operates the Burlington Urban Service (BUS), which provides a public transit option for city residents. BUS runs a combination of fixed and demand response routes. Nearly 90% of Burlington and West Burlington residents live within 3 blocks of a bus route.

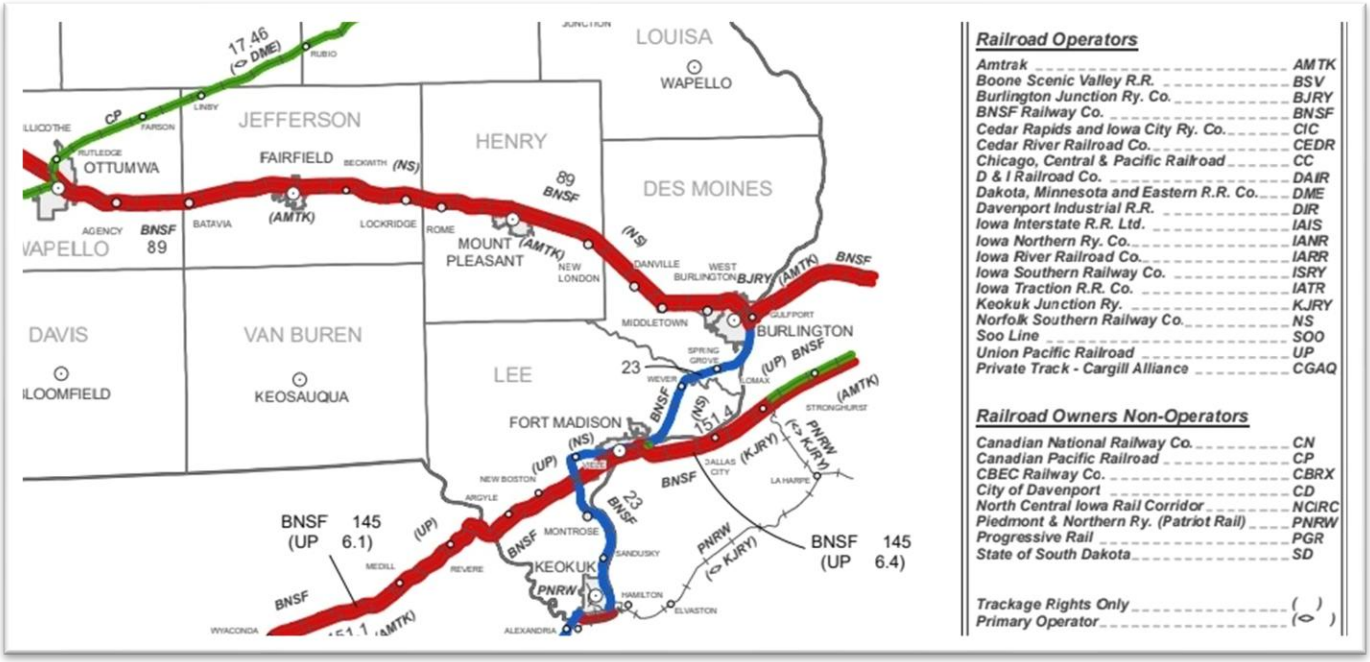
Airports

Commercial and General Aviation air services are available at the Southeast Iowa Regional Airport, located on the south side of Burlington. The airport is the only commercial service airport within a 75-mile radius and offers daily services to O'Hare in Chicago. General aviation includes every type of civil flying activity.

Other major airports within 2 hours drive are the Des Moines International Airport (DSM), Quad Cities International (MLI) and Peoria International (PIA), and the regional Eastern Iowa Airport in Cedar Rapids (CID), where non-stop flights are available to 18 US destinations.

Rail

Freight. According to the Iowa DOT, while rail accounts for only 3 percent of Iowa's 130,000 mile intermodal freight system, it carries 43 percent of Iowa's freight tonnage. BNSF Railway (formerly Burlington Northern Santa Fe) provides freight service for the Des Moines County community and surrounding region.

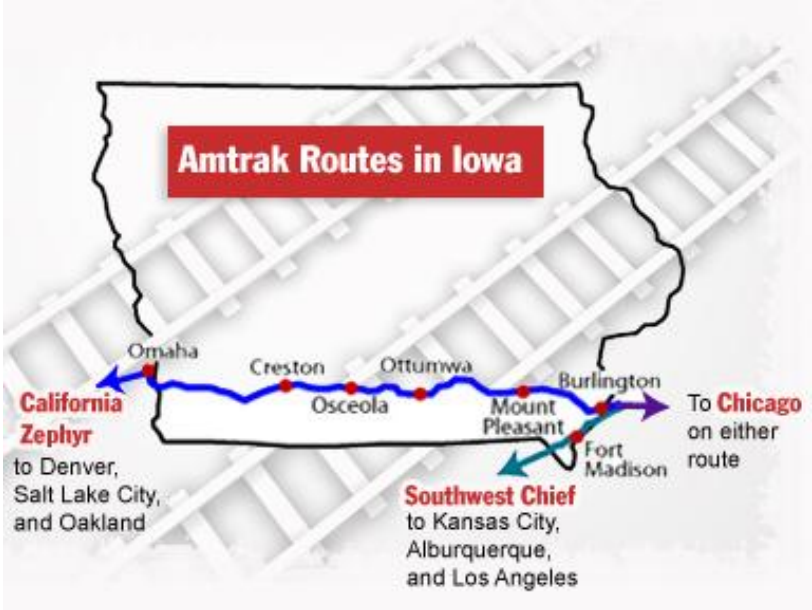


The Burlington Bridge is a vertical-lift railroad bridge across the Mississippi River between Burlington, Iowa, and Gulfport, Illinois. It is owned by BNSF Railway and carries two tracks which are part of BNSF's Chicago–Denver main line.

One travels east to west through Burlington, West Burlington, Middletown and Danville, while the other splits off at Burlington and follows the Mississippi River southward into Lee County.

Burlington Junction Railway (BJRY) operates two short-line railroads in the Burlington area. The first of these uses a remaining segment of the old Rock Island line that once traveled northward to Mediapolis. It extends 2 miles north from the BNSF mainline to serve Case/New Holland and several other industries. The other is located at the border between Burlington and West Burlington (just west of US 61) and serves several large industries.

Passenger Rail. The Amtrak California Zephyr stops in Burlington daily in both directions between Chicago, Illinois and the San Francisco Bay Area serving local and regional destinations along the way. This passenger train carried more than 350,000 passengers in 2024.



Passengers can board the Amtrak Southwest Chief in Fort Madison about 30 minutes southwest of Burlington. It takes a more southerly route from Chicago through Albuqurque NM to Los Angeles CA. During fiscal year 2024, the Southwest Chief carried 261,485 passengers.

Amtrak 2024	Ridership	Increase/Decrease
California Zephyr	351,155	+7%
Southwest Chief	261,485	+3%

(FY24, 2025)

Water Transportation

The Mississippi River forms the eastern boundary of the County. More than 16,000 barges moved freight through Lock & Dam 18 in 2022, carrying more that 17.5 million tons of goods. Other water transportation in Des Moines County is limited to recreational uses.

Pipelines

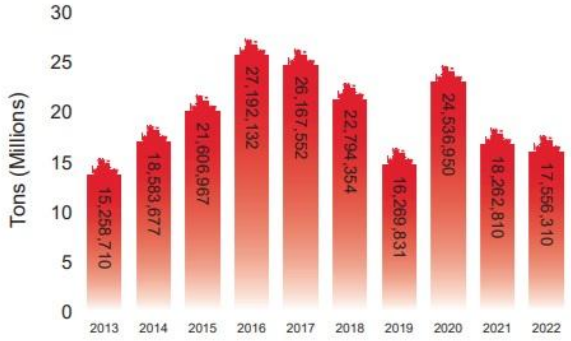
According to the National Pipeline Mapping Service (NPMS) about 152 miles of natural gas transmission pipelines are in Des Moines County. No hazardous liquid pipelines are located in the county. Data, including the status and conditions of these lines, is available through the National Pipeline Mapping Service (NPMS).

The map below highlights the approximate location of pipelines in Des Moines County. Most of these are located in rural areas dominated by agricultural and low-density residential uses, although a few pipelines pass through developed areas in West Burlington and the western periphery of Burlington.

Lock and Dam 18 Commodity Tonnage (2022)

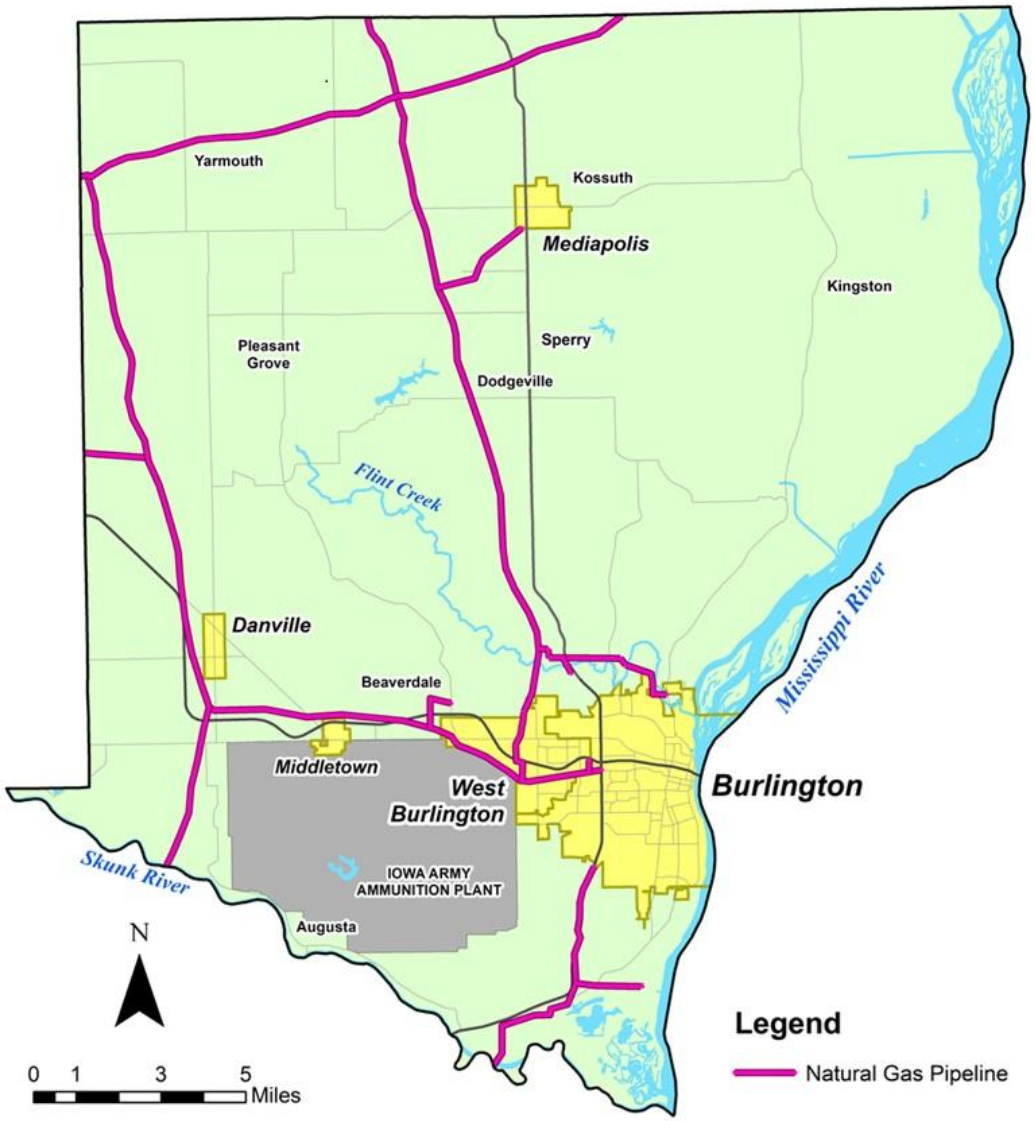
Food and Farm Products	9,907,370
Chemicals and Related Products	3,697,920
Crude Materials, Inedible, Except Fuels	1,262,710
Primary Manufactured Goods	1,248,320
Coal, Lignite, and Coal Coke	714,220
Petroleum and Petroleum Products	686,620
Manufactured Equipment & Machinery	23,350
Waste Material	--
Unknown or Not Elsewhere Classified	15,800
Total Tonnage	**17,556,310**

Annual Tonnage (10 Year- Historical)



U.S. ARMY CORPS OF ENGINEERS – ROCK ISLAND DISTRICT

https://www.mvr.usace.army.mil/Portals/48/LD18FactSheet.pdf



Trail Network

A significant number of recreational trails have been developed in Des Moines County over the last three decades. Water trails have yet to be formally developed although some potential sites have been identified.

All communities in the county would benefit from improved sidewalks and additional trails.

Trail systems are best designed for both recreational uses and enhanced transportation options, and the potential for connectivity among local destinations should always be evaluated when trails are planned.

If usual modes of travel are disrupted in an emergency, sidewalks and bike trails can be utilized more heavily as alternative transportation routes.

Recreational Trails in Des Moines County
Big Hollow Recreation Area
Blackhawk Trail
Flint River Trail
Hawkeye Dolbee Access
Hunt Woods
Lower Skunk River Access
Mississippi River Trail
Starr's Cave Park & Preserve
Upper Skunk River Access
Welter Recreation Park

FEATURED TRAIL – The Flint River Trail

From: The City of Burlington website. The Flint River Trail, in Burlington, Iowa, is a multi-use paved trail that follows the Flint River. It's currently 7 miles long and is planned to extend to 18 miles, connecting downtown Burlington, the Port of Burlington, Riverside Park, and Big Hollow Recreation Area. The trail is part of a larger system of trails in the area, including the Mississippi River Trail.

Key features of the Flint River Trail:

- Length: 7 miles (planned 18 miles).
- Surface: Concrete, crushed limestone, and on-road sections.
- Uses: Biking, hiking, and walking.

Route: Begins at the Port of Burlington, travels north through Riverside Park, and eventually connects to Big Hollow Recreation Area. The Flint River Trail begins along the riverfront, downtown - at the Port of Burlington. This trail travels north through Riverside Park to the North Bottoms area nearly 4 miles. The trail is paved and grade separated from traffic.

When complete, the Flint River Trail will be approximately 18 miles in length and will extend from downtown Burlington to Big Hollow Recreation Area in Des Moines County. It will connect the Mississippi River Trail, downtown Burlington, the Port of Burlington, Riverside Park, Star's Cave Park and Preserve, Hickory Bend Recreation Area, Historic Zion School, and Big Hollow Recreation Area through the Flint River Valley. Within the City, the trail will be primarily separated from the roadways for safety and the enjoyment of the users (Flint River Trail, 2025).

Development Trends

Housing. In recent decades, new housing construction has lagged behind state and national averages. According to Census estimates, approximately 2,052 new housing units have been built since 2000 which represents 11% of all housing, compared to 20.5% for the State as a whole. However, the total number of housing units remained stable, which implies that an approximately equal number of homes have been demolished during that period. In 2000, the Census reported 18,643 Housing units, while in 2024 the estimate was 18,778, an increase of only 135 dwellings.

Rural housing. County staff reported that the demand for homes in rural areas often results in shortcomings of infrastructure, as developers seek to build in remote areas where creating road access is difficult. There are many instances where narrow driveways provide access to numerous homes. The primary concern involved is emergency response, as Fire Departments now utilize larger vehicles, and many rural subdivisions lack ready access to high pressure water in sufficient volume for fighting fires.

Downtown Burlington. A significant amount of downtown redevelopment has been completed in Burlington in recent decades, including several new restaurants and a number of upper-story housing units. These economic revitalization efforts are expected to continue for some time.

Zoning. Unincorporated Des Moines County does not have zoning anywhere outside the two-mile area around Burlington, and its Comprehensive Plan has not been updated since 2004. All cities have planning mechanisms in place to guide land use development, such as zoning ordinances and future land use plans.

Business and industry. Business and industry are stable in the region. The county is a business-friendly community that features many small and local businesses but also offers a strategic location for larger international corporations. While growth is slow, Des Moines County has established a stable network of support for business:

The Greater Burlington Partnership is the identity for the organization which includes the Chamber of Commerce, Economic Development, Convention and Visitors Bureau and Downtown Partners, Inc. Each division has a separate mission, but the entities share one vision: to ensure Greater Burlington is a growing regional center of commerce, industry, education, health care, entertainment and culture which provide a great place to live and work. These organizations provide services for the entire Des Moines County area.

Section A The Planning Process

A1-a. How the plan was prepared

All the following activities are outlined in the tables below.

The Des Moines County HMP was developed through a cooperative effort. The Des Moines County Emergency Manager led the project and SEIRPC Planning staff conducted research on hazard data, documented the needs and goals of the community and organized the material into this report. The Hazard Mitigation Planning Committee (PC) was formed to provide guidance and oversight during the preparation of this Plan.

All public meetings were held in accordance with Iowa Open Meeting laws.

Members of the PC include all those that attended planning meetings in person or virtual meetings. Each participating community was represented by representatives at planning meetings. Individuals who participated in the development of this plan come from a wide range of backgrounds including local officials, community and business leaders, educators, nonprofits, the interested public, emergency management professionals and volunteers, firefighters and law enforcement.

Capability and Risk assessments for local governments were completed. Specific vulnerability and impacts were discussed for every jurisdiction. Local public participation provided valuable insight into the challenges and needs of individual jurisdictions.

Other Public engagement strategies applied during the planning process served to identify the goals and aspirations of the community and to guide the development of actions that should be taken to mitigate known hazards. Public opinion surveys and personal conversations were used to solicit comments throughout the planning process.

Staff conducted research on potential mitigation activities by reviewing the previous Des Moines County HMP, FEMA approved mitigation actions, the 2023 State of Iowa Hazard Mitigation Plan and other planning documents as detailed in a Table in Section A4 of this document.

This work resulted in additional meetings that offered the opportunity for each jurisdiction to discuss the mitigation strategies that had been included in the previous plan, which action items had been completed, and which should be carried forward to the 2025 plan. Options for other mitigation activities were presented by planning staff. Public suggestions were considered and incorporated. Local preferences for mitigation actions were compared to FEMA guidelines and participants prioritized the preferred action items for each community.

When the Draft Plan was complete, the draft was distributed to each jurisdiction for a final review during a 15-day public comment period. Additional digital copies were sent by email to adjacent jurisdictions and other interested individuals.

Comments were received and incorporated into the document. Recommended action steps were refined. The HMP was submitted to the Iowa Department of Homeland Security and Emergency Management (HSEM) for review, who then referred it to FEMA.

Schedule, time frame and activities

Timeline for Des Moines County Iowa	
March 2025	Draft document template for new FEMA guidelines
Prep work	Review previous local planning documents
	Review HM Plans adjacent Counties and State
	Fill in generic info and online information, statistics
	Data collection, begin draft of hazard profiles
April	Draft first two sections of the document
	Meet with local EM, discuss concerns and priorities
	Public Survey out, Press release
	Continue data collection, draft hazard profiles, NFIP
May	Individual community profiles
	Public Survey tabulation
June	Identify critical infrastructure
	Continue drafting Hazard Profiles
	Changes in Jurisdictional development and priorities
Meeting 1 Risk Assessment	Meeting 1 Risk assessment
	Review previous goals, objectives and actions to carry forward
	Hazard vulnerability & Impacts
	Document editing, check first half for compliance
July	Develop potential mitigation strategies for PC review
Interview each jurisdiction	Capability assessment, assess Vulnerability and Impact
Meeting 2 Mitigation Strategy	Meeting 2 Review action steps from 2020 plan
	Mitigation Strategy Development and Review
	Changes in development and priorities
	Draft Action Steps, cross check for compliance
August	Proofread entire draft, edit
Meeting 3 Action Steps	Review Final Draft Action Steps, receive comments
Jurisdiction review	Provide Final Draft Action Steps to Jurisdictions, seek comments
	Complete the Plan Maintenance & update sections
	Proofread entire draft, edit, check compliance w PRT
September	Provide final draft to PC, jurisdictions & stakeholders
	Initiate a 15-day Public Comment period
	Incorporate final comments into the Plan
	DM County adopts draft plan
	Submit Plan to Iowa HSEM
	Final details or corrections
October	Submit Plan to FEMA

A1-b Participating Jurisdictions

In addition to unincorporated Des Moines County, five communities, six educational institutions and four other authorities within the county are officially represented in this plan:

Jurisdictions	
Unincorporated Des Moines County	Schools
City of Burlington	Burlington Community School District
City of Danville	Danville Community School District
City of Mediapolis	Mediapolis Community School District
City of Middletown	West Burlington Independent School District
City of West Burlington	Burlington Notre Dame Catholic Schools
	Southeastern Community College
Two Rivers Levee and Drainage District	
North Bottoms Levee and Drainage District	
Des Moines County Communications (DESCOM)	
Iowa Army Ammunition Plant (IAAAP)	

Participating Jurisdictions. Each Jurisdiction participated in at least two interviews with the planner to provide information, local insight, and each community had an opportunity to review final drafts and make comments, edits and recommendations.

Contacts from participating jurisdictions performed each of the following tasks:
Capability assessment, risk assessment, local vulnerabilities and impacts
Review, recommend, and approve mitigation actions
Public comment period: Review final draft, comment and make recommendations

Primary Contact	Name	Role	How they participated
Des Moines County	Brian Carter	County Engineer	Capability, Risk Assessment, Final Review
City of Burlington	Chad Bird	City Manager	Capability, Risk Assessment, Final Review
City of Danville	Bryon Heater	Fire Chief, Asst PW Director	Capability, Risk Assessment, Final Review
City of Mediapolis	Ray Wilson	Emergency Management Coordinator	Capability, Risk Assessment, Final Review
City of Middletown	Paul Bishop	Public Works	Capability, Risk Assessment, Final Review
City of West Burlington	Gregg Mandsager	City Administrator	Capability, Risk Assessment, Final Review
Iowa Army Ammunition Plant	Bob Anderson	Admin Engineer	Capability, Risk Assessment, Final Review
Two Rivers Levee & Drainage District	Reed Wagenbach	Superintendent	Capability, Risk Assessment, Final Review
North Bottoms Levee and Drainage District	Kevin Feehan	Superintendent	Capability, Risk Assessment, Final Review

Des Moines County Communications (DESCOM)	Shanna Krogmeier	Director	Capability, Risk Assessment, Final Review
Burlington CSD	Brent Krieger	Director of Buildings & Grounds	Capability, Risk Assessment, Final Review
Danville CSD	Pat Wallace	Superintendent	Capability, Risk Assessment, Final Review
Mediapolis CSD	Adam Magliani	Superintendent	Capability, Risk Assessment, Final Review
Notre Dame School	Jon Billups	Development Director	Capability, Risk Assessment, Final Review
West Burlington ISD	Jason Wester	Superintendent	Capability, Risk Assessment, Final Review
Southeastern Community College	Cory Gall	Supervisor of Safety & Security	Capability, Risk Assessment, Final Review

Planning Committee (PC)

The primary point of contact for the 2025 Des Moines County Hazard Mitigation Plan (HMP) is the Des Moines County Emergency Manager, Shannon Prado.

PC Support staff, Gail R Thomas. Role: Support EM, conduct research, public engagement, provide meeting materials, draft documents, incorporate public comments, submit drafts and revisions, discuss vulnerabilities and impacts with individual jurisdictions, organize potential mitigation actions, update plan document.

Three meetings of the Planning Committee (PC) were held.		
Meeting 1	June 17, 2025	Capability assessment, risk assessment, local vulnerabilities and impacts
Meeting 2	July 7, 2025	Discuss and establish goals and objectives. Review and discuss mitigation alternatives, identify preferred actions to be recommended
Meeting 3	August 11, 2025	Review, edit and possibly approve final draft of Action Plan.
Comment period	Oct 30-Nov 15 2025	Prior to submission of the completed HMP to FEMA, each PC member was provided an electronic copy of the final draft document for review and comment during a 15 day public comment period

Planning Committee

PC MEMBERS	COMMUNITY TIES	PARTICIPATION
1. Shannon Prado	Des Moines County Emergency Manager, CERT Team Director	Led the project, provided guidance, recruited committee members, organized meetings, provided local knowledge and previous planning history, hazard data, and local insight

2. Chris Gram	GBP (Economic development) employee, Volunteer Downtown improvement	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
3. Angela Vaughan	Business owner. Rural landowner, Director Joint Safety Commission	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
4. Brian Carter	County engineer, farmer, Mediapolis CSD ties	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
5. Christa Poggemiller	Business owner, RN, Healthcare field	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
6. Crystal Jolin	GBP (Economic development) Finance Director, Citizen, Volunteer	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
7. Rodney Bliesener	Lifetime resident, Retired DM Co employee	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
8. Megan Brincks	Business owner, United Way Director, Volunteer Coordinator	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)
9. Danitha Johnson	County safety department, Mediapolis CSD ties	Meeting 1, Meeting 2, Meeting 3, Draft Review (See meeting content above)

A2-a. Other Stakeholders

The table below is a record of other stakeholders; organizations and agencies that made contributions to the HMP. Each of these participants provided hazard data, information, comments, suggested mitigation strategies or reviewed the plan.

Other Stakeholders assisted with vulnerability and impacts, mitigation solutions		
Contact person	**Represents**	**How contact was made**
Zach James	SEIRPC	Personal contact, phone, Email
Jared Lassiter	SEIRPC Mapping	Email

Neighboring Communities Contacted

Community	**Contact person**	**How contact was made**
Henry County	Walt Jackson, EM Coordinator	Email
Jefferson County	Brett Ferrel, EM Coordinator	Phone, Email
Louisa County	Kenny Marlette, EM Coordinator	Phone, Email

Local and Regional Agencies Contacted

Agency	**Contact person**	**How contact was made**
Iowa HSEM	Jack Stinogel	Email
Iowa Floodplain and Stormwater Mngmnt	Teresa Stadelmann	Email
Iowa DNR	Jason Wester	Email, Phone

A3-a Public Participation and Feedback

Public input is essential to Planning. With direct engagement, valuable and diverse local perspectives can be factored into mitigation of hazards. Everyone that lives or works in the county is a stakeholder in the outcomes of hazard mitigation planning in Des Moines County.

Public comments were requested by press release, posted notices, personal interviews and distribution of a survey through local governments. These methods of soliciting public comments ensured that the invitation to participate reached a representative sample of the community.

Underserved Communities and Socially Vulnerable Populations

In an effort to reach underserved and socially vulnerable populations, the following organizations were contacted directly and invited to distribute the Public Survey and submit comments. Comments received were incorporated into the Vulnerability, Impact and Mitigation Action Plan sections of this document.

Outreach to Underserved Communities and Socially Vulnerable Populations			
Organization	**Pop served**	**Contact Person**	**How contacted**
Community Action of SE Iowa	Low income	319-753-0193	Phone
Salvation Army	Low income, Homeless	319-753-2038	Phone
Neighborhood Center	Low income, Homeless	319-753-2893	Email
Hope Haven	Disabled adults	319-754-4689	Email
Optimae Life Services	Disabled	319-754-4618	Email
Veterans Affairs	Veterans	319-752-7171	Phone

Limited English Proficiency (LEP)

An estimated 3.7% of the population (1,345 people) in the county speak a language other than English at home. Of those, fewer than two percent (about 493 people) have limited English proficiency. The table below shows that among the languages spoken at home, less than 1% of the population needs assistance in any specific language, therefore no special LEP measures were taken.

Limited English Proficiency	**# of People**	**%**
Language at home other than English	1,345	3.7%
Total LEP (Speak English less than "very well")	493	1.4%
Spanish LEP	207	0.6%
Asian & Pacific Islander LEP	212	0.6%
Other LEP	74	0.3%

General Public Participation Opportunities

The public was invited to attend the County Supervisor and local City Council meetings. Notices of Public meetings were posted at the County Courthouse, City Hall buildings and other public places. Public participation was requested by press release, posted flyers, personal interviews and distribution of a survey through City Halls.

The table below describes ways in which the general public was informed and invited to participate in the planning process. Press releases were issued to 6 radio stations and two newspapers. No local media is dedicated to languages other than English.

Event	Entity	Date	How public was informed
Press release, Comments requested	9 Local press and radio	4/17/2025	Newspaper, radio & online
Board of Supervisors Meeting	Des Moines Co	4/22/2025	Public Agenda, Minutes
Public survey distributed	All jurisdictions	June July 2025	Distributed by City Halls
Citizen Interviews	Planner, EM Staff	Throughout process	Personal contacts
Board of Supervisors Meeting	Des Moines Co	8/12/2025	Public Agenda, Minutes
City Council Meeting	Burlington	8/14/2025	Public Agenda, Minutes
Board of Supervisors Meeting	Des Moines County	9/2/2025	Public Agenda, Minutes
Rotary Club Meeting	Burlington	9/22/2025	Public Agenda, Minutes
Board of Supervisors Meeting	Des Moines Co	9/23/2025	Public Agenda, Minutes
West Burlington School Safety Mtg	West Burlington	9/24/2025	Public Meeting, Minutes
Draft Plan released	All Jurisdictions	10/23/2025	Drafts provided to jurisdictions for public comment
Public comment period	All jurisdictions	10/30 to 11/15/2025	Posted notices
Board of Supervisors Meeting; Adopt Plan	Co Supervisors		Posted Agenda, Minutes

How public feedback was included in the plan:

The public was involved throughout the planning process. Survey results and public comments were organized and recorded. These were provided to the PC and discussed during planning meetings.

Public feedback was incorporated into the vulnerability and impact sections for each hazard in Section B Risk Assessment, and all comments were considered during the development of the mitigation action plan. The final draft was edited to reflect comments made during the final public comment period.

A4. Other plans and references

Plans, studies, reports and technical information were reviewed and incorporated into the plan.

Plans, Studies, Reports Reviewed or Incorporated	Section of this document
Iowa Comprehensive Emergency Plan (Ch. 5 – Hazard Mitigation) 2018 & 2023	Hazard Risk assessment, goals, objectives, mitigation strategies, climate trends
Iowa Comprehensive Emergency Plan (Ch. 3 – Hazard Mitigation) 2018 & 2023	Hazard Risk assessment, mitigation strategies, climate trends
Climate Change Trends: Iowa HMP 2023	Climate trends in Iowa, probability
Iowa DNR dams EAPs	Dam & Levee hazard profile
Keokuk County Hazard Mitigation Plan 2018 & 2024	Hazard risk assessment, goals, objectives mitigation strategies
Des Moines County Hazard Mitigation Plan 2016 & 2020	Hazard risk assessment, goals, objectives mitigation strategies
Henry County Hazard Mitigation Plan 2024	Hazard risk assessment, goals, objectives mitigation strategies

Iowa's Groundwater Basics 2003 (IDNR)	Risk assessment, vulnerability, impacts
Des Moines County NFIP Flood Maps	Risk Assessment
Marion County Iowa Hazard Mitigation Plan 2023	Risk assessment, Vulnerability, Impact, Funding guidebook
Dallas County Iowa HMP 2023	Hazard Risk assessment, doc organization
FEMA Mitigation Ideas 2013 & 2023	Hazard Mitigation strategies, actions
Building Community Resilience with Nature based Solutions (FEMA 2021)	Hazard Mitigation strategies, actions
Kansas State Hazard Mitigation Plan 2018	Climate trends, effects on agriculture
Oklahoma, OEM Approved Action Items	Hazard Mitigation strategies, actions
State Mitigation Planning Key Topics Bulletin: Risk Assessment FEMA October 2022	Risk assessment, vulnerability, impacts
FEMA Local Mitigation Planning Policy Guide 2022	Planning process, Document organization, Climate trends

Section B: Risk Assessment

B1. Identified Hazards

The 2023 Iowa State Hazard Mitigation Plan (Iowa HMP) is the guiding document for the hazards considered for the 2025 Des Moines County HMP. The full list of potential hazards as identified for Iowa are included in Appendix A.

The Planning Committee (PC) reviewed the Hazards from the previous HMP and the 2023 State of Iowa HMP, and determined that the following hazards were not of sufficient risk to require mitigation in Des Moines County. Omitted hazards include:

1. Earthquake: Earthquakes are not considered as urgent a concern as other hazards in SE Iowa. While more than 20 earthquakes have occurred in or around Iowa over the past 175 years, none have seriously impacted the state. Earthquakes with epicenters far away are occasionally felt in Iowa but have caused no damage. The strongest earthquake in Iowa, one that occurred near Davenport in 1934, resulted in slight local damage (Iowa, 2023).
2. Expansive soils: While the PC recognizes the presence of expansive soils in the county, the committee has decided not to include this hazard for mitigation at this time. The PC believes that damage that occurs would be caused by the disturbance of the soil rather than the soils in their natural state. No tracking mechanism exists. They also stated that they do not believe this to be a hazard on the scale that requires mitigation measures at this time, although they think it could be reconsidered for inclusion in a subsequent plan.
3. Landslide: From the Iowa HMP 2023: “While maps show that there are areas of the state that may be somewhat susceptible to landslides, this is not a hazard that has had much impact. Jurisdictions have not reported any significant damage due to landslides; future development and conditions are not likely to increase vulnerability or potential loss estimates.” According to USGS, the risk of landslide in Iowa is limited to areas of less than 100 square yards and the risk in the county is very low (Iowa, 2023).
4. Radiological incident: No fixed radiological facilities, transfer stations, or receiving stations for radiological material are located in or near Des Moines County. There are no significant sources of fixed radiological facilities.
5. Sinkholes: According to the 2023 Iowa HMP, Sinkholes in Iowa may be expected to occur in areas where old coal mines and karst limestone coexist. These features are generally northwest of Des Moines County. No old mines are recorded in the Iowa Coal Mine database and no sinkholes are known to have occurred in the area (Iowa Coal Mines, 2025).

Planning Committee members and other stakeholders discussed the frequency and severity of past disasters and completed the Hazard Vulnerability Assessment. Presidential disaster declarations, fire data, weather events, climate history, flood conditions, soil types and geological records were evaluated, and that data was incorporated into this plan.

Hazards Profiled for the 2025 Des Moines County HMP

In addition to the hazards addressed in the 2020 Des Moines County HMP, planning staff provided information to the PC about hazards included in the 2023 State of Iowa Hazard Mitigation Plan. See excerpts from Iowa HMP – Appendix A.

The planning committee applied a three-step assessment process to identify threats and hazards and what they need to do to address those risks by answering the following questions:

- ✓ What are the hazards that most affect our community?
- ✓ When they occur, what impacts do those threats and hazards have on our community?
- ✓ What can be done in the next five years to improve capability and mitigate hazard risk?

This assessment was used as a tool to understand threats and hazards, assess risks, evaluate and improve capabilities, reduce vulnerability, and identify ways to increase resilience. Risk assessment is Section B of this document, Capability assessment and Mitigation strategy are addressed in Section C.

Hazards that are profiled in this update are listed below in alphabetical order. The hazards profiled in this plan are similar to the previous plan, although the PC decided that the hazards of Earthquake or Landslide are not of sufficient risk to require mitigation at this time.

Hazards addressed in the 2025 Des Moines County HMP:

Natural Hazards	Other Hazards
Drought	Animal, Crop, Plant Disease
Extreme Heat	Dam or Levee Failure
Flooding – River, Flash, Stormwater	Hazardous Materials Incident
Severe storms; Hail, High Wind, Lighting	Human Disease Pandemic
Tornado	Infrastructure Failure
Wildfire	Terrorism
Winter Weather	Transportation Incident

The Planning Committee and public surveys both named Severe thunderstorms (Hail, High Wind and Lightning) as the hazard of most concern, followed by Tornados and Winter weather.

Disaster History

There were seven Federal declarations of disaster in Des Moines County during the years 2015 through 2024, for six events. Five were in response to severe storms and flooding; two declarations were related to the COVID-19 pandemic.

Federally Declared Disasters in Des Moines County 2015-2024			
Event	**Incident period**	**Number**	**Date Declared**
Severe storms, tornadoes, flooding	June 20-25, 2015	DR-4234-IA	7/31/2015
Severe storms and flooding	Sept. 21-Oct. 3, 2016	DR-4289-IA	10/31/2016
Flooding and storm damage	March 12-June 15, 2019	DR-4421-IA	3/23/2019
Iowa Covid-19 Pandemic	Jan 20, 2020 - May 11, 2023	EM-3480-IA	3/13/2020
Iowa Covid-19 Pandemic	Mar 17, 2020 - May 11, 2023	DR-4483-IA	3/23/2020
Major to moderate flooding	April 24 to May 13, 2023	DR-4732-IA	8/25/2023
Severe Storms and Tornadoes	Jun 16 - Jul 23, 2024	DR-4796-IA	6/24/2024

State Declared Disasters in Des Moines County 2015-2024			
Event	**Incident period**	**Proclamation**	**Date Declared**
Severe storms	June 20, 2015 and continuing	2015-09	6/30/2015
Severe Storms and Flooding	May 17, 2019 and continuing	2019-17	5/29/2019
Severe weather	May 26, 2022 and continuing	2022-20	5/31/2022
Severe weather	March 31, 2023 and continuing	2023-08	4/1/2023
Mississippi River flooding	April 24, 2023 and continuing	2023-11	4/24/2023
Severe weather	August 4, 2023 and continuing	2023-26	8/9/2023
Severe weather	April 16, 2024 and continuing	2024-08	4/17/2024
Severe Storms	July 15, 2024 and continuing	2024-35	7/16/2024
Severe Storms	August 27,2024 and continuing	2024-43	8/28/2024
Severe Storms and Flooding	May 17, 2019 and continuing	2019-17	5/29/2025

Hazard Probability Rating

The word "probability" is used here to mean the chance that a particular event (or set of events) will occur expressed on a linear scale from 0 (impossibility) to 1 (certainty), also expressed as a percentage between 0 and 100% (Wolfram, 2023). To determine the probability of future hazard events, the number of events of each type was documented and divided by the number of years being considered, giving the percent (%) chance of an event occurring in any given year. For this analysis, probability is categorized as follows:

Total number of events/Total number of years = Probability as a percentage.

Unlikely = < 10%
Moderate chance = 11 - 44%
Even chance = 45 - 54%
Likely = 55 - 84%
Very likely = 85- 100%

Natural Hazards	Events/time	Probability
Drought	Occurrences in 9 of 10 years = 90%	Very likely
Extreme Heat	14% of days each year = >100%	Very Likely
Flooding – River, Flash, Stormwater	24 events/10 years = >100%	Very Likely
Severe thunderstorms: Hail	Hail events: 18 in 10 years = >100%	Very likely
High winds	High winds: 17 events/10 years = >100%	Very likely
Lighting	Lightning: 40 events/10 years = >100%	Very likely
Tornado	8 events/10 years = 80%	Likely
Wildfire	48 events/10 years = >100%	Very likely
Winter weather	23 events/10 years = >100%	Very likely
Other Hazards		Very likely
Animal, Crop, Plant Disease	5 events/10 years = 50%	Even chance
Dam or Levee Failure	1 events/10 years = 10%	Unlikely
Hazardous Materials Incident	52 events/10 years = >100%	Very likely
Human Disease Pandemic	1 event/10 years = 10%	Unlikely
Infrastructure Failure	0 events/10 years = >10%	Unlikely
Terrorism	0 events/10 years = >10%	Unlikely
Transportation Incident	3 events /10 years = 30%	Moderate chance

Probability and Climate Change

Data indicates that Iowa's climate is growing warmer with more precipitation and more frequent severe weather events. Trends show small increases in average temperatures, but nighttime temperatures in Iowa have been increasing at a much higher rate over the last 100 years. Seasonal cycles and ranges of species have been observed to be shifting. For example, cold-water species of fish populations have been dropping due to rising groundwater temperatures and sedimentation.

Because it is impractical to limit a discussion of climate change to the scale of local government, we rely on the *2023 State of Iowa Hazard Mitigation Plan: Summary of Climate Change in Iowa and Effects upon Hazards* to assess the probable effects of climate trends on the SE Iowa region. From there, we can infer likely impacts on specific hazards in the county.

Significant trends and their effects on hazards in Iowa can be summarized as follows (Iowa B, 2023)

- An increase of 8 percent more precipitation from 1873-2008
- An increase in extreme heavy precipitation in summer in the last 40 years, with more precipitation coming in the first half of the year and less in the second
- A larger increase in precipitation in eastern Iowa than in western Iowa
- Long-term winter temperatures have increased six times more than summer temperatures.
- Nighttime temperatures have increased more than daytime temperatures since 1970.
- A substantial rise in humidity, especially in summer, providing more water to fuel convective Thunderstorms that provide more summer precipitation
- The increase in precipitation has contributed to a rise in streamflow levels and the potential for more frequent and greater flooding. The changes in precipitation patterns and higher winter and spring temperatures contribute to summertime becoming the new seasonal flood norm
- The rise in the number of large summertime rainfall events increases the probability of summertime floods, while higher winter and spring temperatures result in snow melting earlier and more slowly, reducing springtime flooding

Increased floods also pose health hazards in addition to death from rising water, including:

- Disbursement of hazardous chemicals into flood waters
- Dissemination of microbial pathogens from livestock facilities and sewage treatment plants
- Carbon monoxide poisonings from use of gasoline-operated tools after floods
- Molds contaminating flooded homes and businesses

Potential impacts on infrastructure and emergency services include:

- Stresses on infrastructure due to warmer temperatures, such as a roadway buckling
- Increased risk of extensive damage to water supply and waste treatment systems
- Greater demand for disaster-response services, including monitoring disaster potential, identifying vulnerabilities, and procuring governmental resources for recovery assistance
- A need for enhanced emergency management training and technical assistance to respond to a changing range of disaster consequences
- Increased Flood mitigation efforts reflecting warmer winters, greater annual stream flows, and more frequent severe precipitation events

Tornado patterns. Over the past decade, researchers have identified a decrease in tornados throughout Tornado Alley, which typically includes the central Great Plains states including Iowa, and an increase in Dixie Alley, which includes parts of eastern Texas, Arkansas, Louisiana, Mississippi, and Alabama (USA Facts, 2023).

B1-a-f Profiled Hazards

Hazards. Each hazard listed in the plan has been profiled and includes the following sections: Description, Location, Extent, Previous Occurrences, Probability of future events, Vulnerability and Impact. Hazards are essentially consistent across all jurisdictions because of the limited geographic extent of the study area. In general, the communities are similar enough that the elements of the hazard risk assessment need not be repeated for each participating jurisdiction in order to avoid redundancy. Projected climate conditions were addressed in the Probability section under each hazard profile below.

Vulnerability, Impacts. Because of the similar characteristics of participating jurisdictions, vulnerability and impacts of each hazard are also similar with some exceptions. Vulnerabilities specific to a particular jurisdiction or entity are described in more detail in the Vulnerability and Impacts elements of the hazard profiles.

Drought

A drought is a period of drier-than-normal conditions. If dry weather persists and water supply problems develop, the dry period can become a drought. Drought follows a slow, accumulating process, different from other natural hazards such as flood or wildfire where negative impacts are observed more quickly. Three types of drought are recognized: Meteorological, Agricultural and Hydrological. Together, these contribute to the social and economic effects of drought.

Meteorological drought is when lower precipitation occurs than is typical for a specific area and precedes the other types. The terms Agricultural drought and Hydrological drought are most pertinent to this assessment. Agricultural drought depends not only on precipitation, but soil conditions, groundwater or surface water as well. Crops are more susceptible to insufficient moisture at certain stages of development. Hydrological drought refers to the impact of precipitation deficiency on water levels in streams, lakes, reservoirs and groundwater. This is a long-term type of drought that can have an impact on wells, public water supplies and wildlife.

Drought Regions. Des Moines County is in drought region 5, which is characterized by shallow geology consisting of loess over glacial till, except the loess thickness thins to the eastern part of the state. The area is characterized by steeply rolling hills and a well-developed dendritic drainage system. Water resources are poor in the south-central portion of the region but improve to the east where shallow carbonate rock and deeply buried rocks are used for water supply (Prior, 1991).

Location

Unincorporated Des Moines County and its cities are impacted by drought. Agriculture and rural residential sites are most at risk. Because of the prevalence of surface water and the extensive network of water supply infrastructure in place, this hazard has been mitigated for most cities. Additional mitigation is seen as desirable to ensure the consistent availability of fresh water to the population in the future.

Extent

The Palmer Drought Severity Index (PDSI) is used to classify a deficiency of precipitation. Values in Des Moines County could be expected to fall at any point on the scale. All participating jurisdictions have experienced drought conditions ranging from 0 to <-5.0 on the scale and may expect such conditions to occur in the future.

The National Weather Service Drought scale (NOAA, 2023) provides the descriptive definitions below:

- D0 – Minor Drought: Going into drought; short term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought: lingering water deficits, pastures or crops not fully recovered.
- D1 – Moderate Drought: Some damage to crops or pastures; fire risk high, streams, reservoirs or wells low, water shortages developing, voluntary water use restrictions requested.
- D2 – Severe Drought: Crop or pasture losses; fire risk very high; water shortages common; water use restrictions imposed.
- D3 – Extreme Drought – Major crop and pasture losses, extreme fire danger; widespread water shortages and use restrictions.
- D4 – Exceptional Drought – Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams and wells, creating water emergencies.

Palmer Drought Severity Index			Drought Category
	< -5.00	Exceptional Drought	D4
	-4.99 to -4.00	Extreme Drought	D3
	-3.99 to -3.0	Severe Drought	D2
	-2.99 to -2.0	Moderate Drought	D1
	-1.99 to -1.0	Mild Drought	D0
	-0.99 to -0.5	Incipient Drought	D0
	-0.49 to 0.49	Near Normal	-

Previous Occurrences

According to the U.S. Drought Monitor, Des Moines County experienced 14 periods of drought from January 2015 through December 2024 (US Drought, 2025).

The Drought Monitor records 271 weeks of drought during the 10 year period. Drought data for each category includes all lesser categories. For example, during a week of D2 drought, D0 and D1 conditions are also assumed to be present.

The table below shows 271 weeks during which drought was present. Of the total weeks of drought during the study period, 142 weeks were in the D1 category and 37 were of D2 severity. No periods of D3 or D4 drought were recorded in the National Drought Monitor for Des Moines County during those years.

Probability

Evaluating the county over the ten-year study period 2015-2024, data from the U.S. Drought Monitor shows at least some portion of Des Moines County experienced moderate drought (D1) for periods of two weeks or longer in 9 of 10 years, indicating similar drought conditions are likely to occur in future years. Only in 2021 was the drought limited to D0 severity, mild drought.

Annual probability that drought of D1 level or greater will occur = 90%; “Very Likely.”

Climate Trends

Drought is a normal part of climate fluctuation. The highest occurrences of drought conditions with recorded events in Iowa are associated with agricultural and meteorological drought as a result of either low soil moisture or a decline in recorded precipitation.

Southeast Iowa counties may be affected by drought more often than they are now. Precipitation could be expected to vary more both temporally and spatially, with one area experiencing record heat and drought while nearby areas experience heavy precipitation. Drought may take on a seasonal aspect, with excessive moisture in spring and insufficient moisture in summer. Iowa already sees wetter spring and fall and drier summers than in its previous climate decade. Higher temperatures will increase evaporation rates, intensifying naturally occurring droughts (Iowa, 2023).

Des Moines County Drought – January 2015 through December 2024

	D0		WEEKS	D1		WEEKS	D2		WEEKS
1	3/31/2015	5/19/2015	8						
2	9/29/2015	11/17/2015	8	10/20/2015	11/10/2015	4			
3	6/14/2016	8/2/2016	8	6/21/2016	7/19/2016	5			
4	11/15/2016	4/25/2017	24						
5	6/13/2017			7/4/2017	7/25/2017	4			
				9/12/2017	9/19/2017	2			
				10/3/2017	10/10/2017	2			
				11/14/2017	3/20/2018	19			
		10/2/2018	69	5/22/2018	9/4/2018	16	8/21/2018	9/4/2018	3
6	7/23/2019	9/24/2019	10	8/13/2019	9/17/2019	6			
7	8/11/2020	9/22/2020	7	8/25/2020	9/8/2020	3			
8	11/24/2020	1/19/2021	9						
9	8/24/2021	8/31/2021	2						
10	11/30/2021	3/29/2022	18	2/15/2022	3/22/2022	6			
11	6/21/2022	2/21/2023	36	8/9/2022	2/14/2023	28	8/30/2022	9/13/2022	3
12	5/23/2023	4/16/2024	48	6/6/2023	4/2/2024	44	6/20/2023	1/9/2024	30
13	6/18/2024	7/2/2024	3						
14	9/10/2024	12/31/2024	17	10/22/2024	10/29/2024	2			
Other weeks of drought (non consecutive)			4			1			1
	Total		**271**			**142**			**37**

Vulnerability and Impacts

Affected jurisdictions: County & Cities, IAAAP, Drainage Districts. DESCOM and Schools do not report any direct impacts from drought. See Appendix C for an example of the effects of drought on agriculture.

Drought: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville		Danville Community School District
X	City of Middletown		Mediapolis Community School District
X	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

Water Supply in Des Moines County

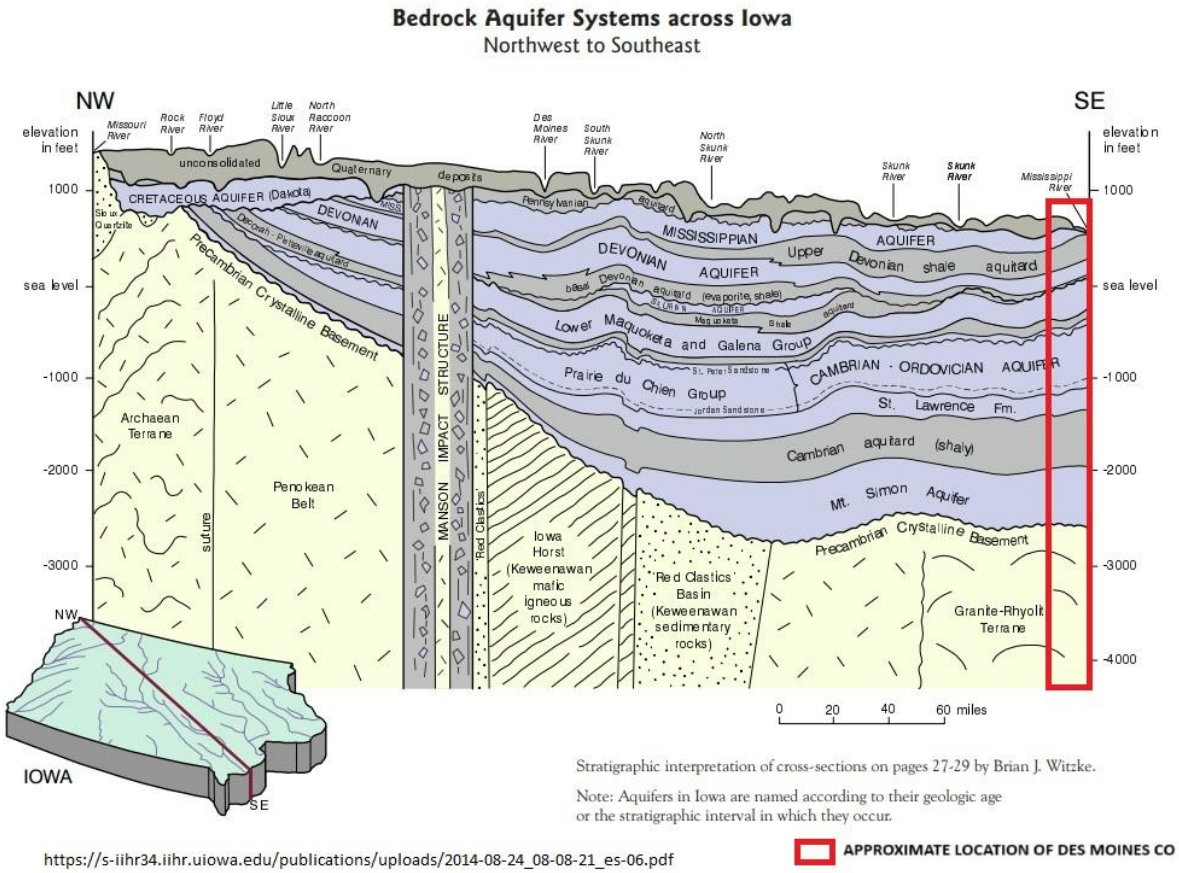
Municipal and rural water supply in Des Moines County is sourced from a combination of bedrock and alluvial aquifers and surface water, some from Lake Rathbun in Appanoose County, more than 100 miles away. Regardless of the source, all communities are vulnerable to the effects of drought on water supplies.

People in cities and towns benefit from water utilities that are intended to smooth out variations in natural water supply. Drought intensifies these variations in quality and available water may be reduced. Shortages in available water can lead to increased operating costs and difficulty meeting regulations for water supply and water treatment systems.

Rural subdivisions may lack ready access to high pressure water for fighting fires. This situation is most apparent in unincorporated Beaverdale which has an aging system and no public works department to provide regular maintenance.

The Mississippi River Alluvial Aquifer in Iowa is a significant groundwater resource found along the Mississippi River corridor in eastern Iowa and western Illinois. An alluvial aquifer is composed of unconsolidated materials like sand and gravel deposited by the river.

Two primary bedrock water sources in Des Moines County are the Mississippian Aquifer, closer to the surface, and the deep bedrock Cambrian-Ordovician Aquifer also known as the Jordan Aquifer, a primary source of water for all uses in southeast Iowa. The Mississippian aquifer underlies about 60 percent of Iowa, where it forms the upper bedrock surface and is generally overlain by the surficial (alluvial) aquifer system. The Cambrian/Ordovician Jordan aquifer is a deep bedrock water body that underlies virtually the entire state of Iowa.



https://s-iihr34.iihr.uiowa.edu/publications/uploads/2014-08-24_08-08-21_es-06.pdf

Bedrock Aquifers. Drought reduces the availability of fresh water for aquifer recharge. Bedrock aquifers are a regional groundwater supply and cannot be placed under local control. Industrial, agricultural and rural uses intensify depletion during periods of drought. The Jordan Aquifer is expected to undergo significant depletion by 2060. Long term depletion of the Jordan Aquifer is a hazard to the sustainability of business and public health throughout southeast Iowa and Des Moines County.

Alluvial Aquifers. Lack of precipitation prevents recharge of alluvial aquifers, at the same time water is drawn more heavily from those sources. The quantity and quality of fresh water for municipal use is reduced. Depletion of alluvial groundwater is intensified, reducing the supply of fresh water for residential, agricultural and industrial uses. Private well owners may need to restrict water use, dig deeper wells or monitor water quality more frequently during drought.

Surface water, ponds, streams, rivers, reservoirs. Livestock and wildlife depend on surface water, while quantity and quality are reduced during periods of drought. Health of livestock and wildlife are negatively impacted by deteriorating freshwater conditions.

Unincorporated Des Moines County. Drought can devastate crops, dry out forests, reduce food and water available for people, wildlife and livestock, restrict recreational activities, and stress businesses and economies. Drought reduces quantity and quality of water for residential, agricultural and business purposes. Rural households may have to reduce residential water uses; wells may go dry.

Agricultural production is important to the local economy. Agricultural crop production relies on sufficient water supplies and precipitation at key points in the growing cycle. Drought impacts livestock feed supply. Agricultural uses draw heavily from both underground sources and surface waters. Loss of agricultural

production and resulting economic stress can result in reduced business activity, jobs and lower tax revenue to local governments.

Natural vegetation, wildlife, stream flows, fish and aquatic vegetation all rely on good quality fresh water. Environmental impacts of drought include direct damage to plant and animal species, loss of wildlife habitat (wetlands, lakes, and vegetation) and biodiversity.

Risk of fire increases with drought and low humidity. There is an increased risk of fire at the same time as a reduced availability of water for fire suppression.

Climate Change Impacts: Increased length and intensity of drought will elevate risks.

Land use development: Intensified agriculture and urbanization will place aquifers at risk of accelerated depletion from both increased demand and reduced infiltration.

Population patterns: Increased population will place additional stress on diminishing water resources.

Extreme Heat

According to FEMA, in most of the U.S., extreme heat is a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. Hot, humid conditions can persist and air quality can deteriorate during the summer when a dome of high atmospheric pressure creates a temperature inversion that traps a stagnant air mass near the ground.

Location

Extreme heat events affect the entire planning area. Urbanized areas with more concrete and asphalt tend to have somewhat higher temperatures than open and vegetated areas, therefore it could be expected that the City of Fairfield could record a somewhat higher temperature than the more rural parts of the county.

Extent

The National Weather Service (NWS) uses the Heat Index Chart to categorize Extreme Heat, and values that fall anywhere on the Index may be expected to occur in the planning area.

Temperature and Humidity. Extreme heat conditions are a function of heat and humidity, illustrated below using a Heat Index Chart. For people and livestock living or working without air conditioning, caution should be taken when temperature exceeds 80 degrees and humidity is 40% or more. A status of Extreme Caution can occur at temperatures as low as 82 degrees Fahrenheit when humidity is at 90% and may be expected to reach Extreme Danger when temperatures reach 90 with high humidity. At temperatures of 98 degrees and above, humidity as low as 40% creates a dangerous situation. Southeast Iowa humidity typically ranges from 70% to 100% during summer days (wunderground, 2025).

The combined effects of rising temperatures and humidity present a situation where humans and animals may experience heat disorders which, at extreme levels can be fatal.

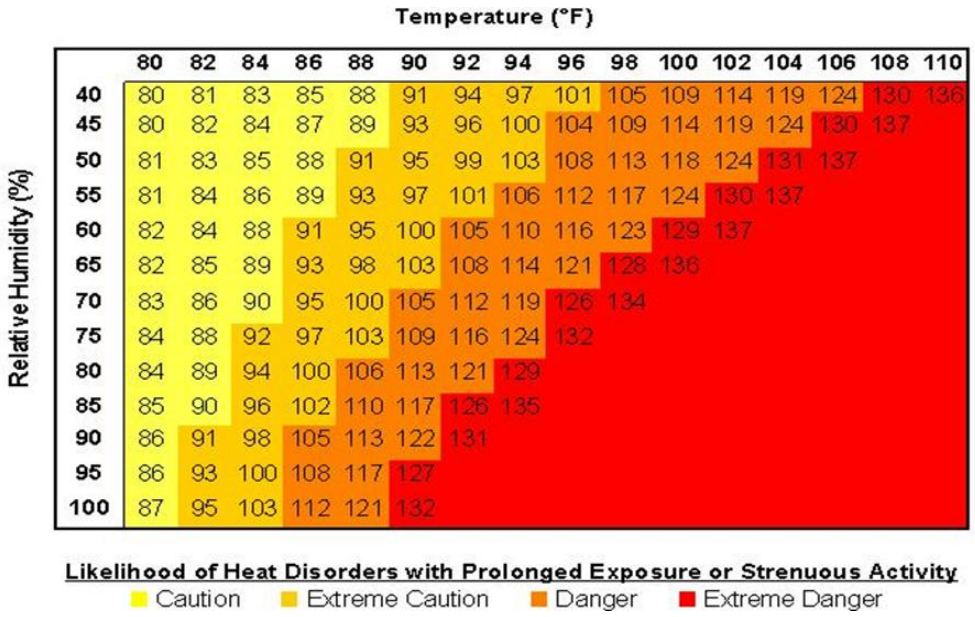
The NWS may issue a Heat Advisory or Excessive Heat Warning.

Heat Advisory. A heat index of 100°F or higher is expected for a period of 3 hours or more. A heat advisory shall be continued through the overnight hours, following a day with excessive heat, if the heat index is not expected to fall below "around 75°F". A heat advisory can be issued for a heat index less than 100°F

when the cumulative effect of successive days of near advisory heat leads to potentially life threatening conditions.

Excessive Heat Warning. A heat index of 105°F or higher is expected for a period of 3 hours or more. An excessive heat warning shall be continued through the overnight hours, following a day with excessive heat, if the heat index is not expected to fall below "around 75°F". An excessive heat warning can be issued for a heat index less than 105°F when the cumulative effect of successive days of near warning heat leads to life threatening conditions.

HEAT INDEX CHART



Previous Occurrences

Referring to the Heat Index and the climatological record, Des Moines County heat and humidity are such that caution should be taken during most summer days.

One way to identify periods of extreme heat is to record the number of days in the danger and extreme danger categories when temperatures reached 90 degrees or more and humidity was greater than 70%. When temperature or humidity exceed those levels, conditions always pose a danger of heat disorders to unsheltered people or other life.

The heat and humidity data below were provided by Weather Underground, based on regional measurement stations. Weather Station ID: KIABURLI64 is based in Burlington.

Summer days, heat. Of 920 summer days (June, July and August) from 2015 through 2024, 130 reached or exceeded 90 degrees (14% of summer days). On one day in 2023, the temperature reached 100 degrees.

Humidity. Virtually all summer days reached over 70% humidity (99% of days). 92% were over 90% humidity and 58% of all summer days reached 100% humidity. These humid conditions intensify the risk for heat disorders.

Heat Index. Heat and humidity overlap, and most days with temperatures over 90 degrees reach 70% humidity or more – dangerous heat conditions and often reach heat indices in the extreme danger category. Some of these days occur each year.

"Danger and Extreme Danger"

Des Moines Co Heat data	Days over 90F	Danger & Extreme Danger (90 degrees and 70% or more humidity)	Extreme danger (92 degrees and 90% or more humidity)
Summer days	130 of 920 days	130	35
10 year average	14%	14%	4%

(wunderground, 2025)

Probability

Fourteen percent (14%) of summer days in Des Moines County pose a danger to public health.
Days of heat danger occur each year. The probability of an Extreme Heat event in any given year is 10 of 10 years = 100% "Very likely."

Climate Trends

Extreme heat is increasing. Days with maximum temperatures above 90 are projected to occur 2 to 5 times more often by 2050 in the best case scenario. Days above 100, currently occurring once every few years in most of Iowa, are projected to happen several times each year by 2050. Days over 105 may not be rare either. 'Cooling degree days' will nearly double in about 50 years, straining energy systems and increasing chances of blackouts and brownouts (barring adaptation measures) (Iowa, 2023).

- ✓ Annual average temperatures at least 2.4°F higher compared to the first half of the 20th century, according to NOAA

Increased heat waves. By 2050, most of Iowa is projected to see about one extra month per year of daily high temperatures above 90°F than was observed from 1961 to 1990, according to the Climate Resilience Toolkit (Toolkit, 2025).

Vulnerability and Impacts

Extreme heat: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville		Danville Community School District
X	City of Middletown		Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

According to FEMA, Extreme heat results in the highest annual number of deaths among all weather-related disasters. All life forms can suffer injury or death from extreme heat. People, livestock, pets, crops, wildlife, vegetation and aquatic habitats are vulnerable to heat stress. Even healthy individuals working outdoors in the sun and heat are vulnerable.

Special populations. Small children, chronic invalids, the elderly, those on certain medications and other people with health problems are especially vulnerable to extreme temperatures. Special attention should be given to nursing homes, senior housing facilities, K-12 schools, preschool facilities, and hospitals in the county during extreme heat conditions because of the vulnerable residents being served in those institutions.

Over age 65. About 21% of the Des Moines County population are people over age 65. Older people are more susceptible to a health crisis in the event of extreme heat.

Poverty. 14% of people are living below the poverty line. People with very low incomes may struggle to afford adequate air conditioning systems at home. These individuals can suffer heat disorders if they are unable to maintain safe indoor temperatures at home.

Temperature controlled community shelters are absent or lack sufficient capacity. Indoor locations must be available and backup generators are needed at community facilities during power outages. Residents may not know that cooling centers are available or where they are located. Some people may not have adequate transportation to shelter locations.

Agriculture. Heat stress can negatively affect agricultural workers, livestock and crop production. Agricultural production losses affect the entire local economy and tax base

County Conservation. During summer, people are engaged in outdoor activities and summer recreation is underway. Extreme heat puts people at risk for heat exhaustion, reduces tourism and impacts revenue to support recreational areas.

County Conservation is also concerned with the protection of wildlife. Heat stress affects the health of the entire ecosystem and raises water temperatures to levels that can be injurious to aquatic life.

Critical services. In extreme heat situations local emergency responders accompany fire departments on calls, in the event they are needed to treat fire fighters for heat disorders. More people responding to extreme events places additional people at risk.

Infrastructure such as roads, bridges and electrical lines are subject to expansion and contraction during extreme temperatures. Long term damage to infrastructure eventually leads to disruptions in service and increased costs for maintenance and repair.

Cities of Burlington and West Burlington. Like most cities, Burlington and West Burlington have a persistent homeless population. There are health and safety risks to homeless people during extreme heat events when shelter, showers, laundry facilities and drinking water are not readily accessible. People may suffer from heat disorders or death.

Cities of Danville, Middletown. These towns have no public pool, splash pad or swimming area for families to cool down on hot summer days.

Notre Dame Catholic Schools. The school does not have air conditioning system, so some days of school may be missed due to extreme heat.

Impacts of Climate trends. Iowa already experiences heatwaves, but we should prepare for them to occur more often (Iowa, 2023).

> From the EPA: “Certain people are especially vulnerable, including children, the elderly, the sick, and the poor. The elderly may be particularly prone to heat stress and other heat-related health problems, including dehydration, cardiovascular strain, and lung problems. Those with low incomes may also be vulnerable if they lack air conditioning.

> Rising temperatures can also increase the formation of ground level ozone, a key component of smog. Ozone has a variety of health effects, aggravates lung diseases such as asthma, and increases the risk of premature death from heart or lung disease. As the climate changes, continued progress toward clean air will become more difficult" (EPA, 2016).

Land use development. Increasing number of days with extreme temperatures should be considered when planning new structures or retrofitting older structures to be more energy efficient. Land use development patterns are unlikely to increase the incidence of extreme heat in this rural county, although it may be advisable to plant additional trees in urbanized areas to mitigate effects of heat.

Population patterns. This hazard is unlikely to be affected by population patterns.

Flood

Two types of floods are tracked by the NOAA Storm Events Database: river floods and flash floods. River floods generally cause greater loss of property, and flash floods generally cause greater loss of life.

River flooding occurs when river levels rise and overflow their banks or the edges of the main channel and inundate areas that are usually dry. Most river floods can be linked to a storm of some kind, although floods can also be caused by dam failures, rapid snowmelt or ice jams.

Flash flooding occurs when too much rain falls too fast for the ground to absorb all the water. Flash flooding occurs in streams, gullies and other low elevations. If a storm stalls over one area, the intensity of rainfall can lead to dangerous flash flooding that threatens life and property. Sudden rising water can overwhelm retention capacity and wash out roads.

Stormwater may trigger flash floods and can also cause temporary flooding of streets, buildings and basements. While FEMA recognizes all of these flood types, stormwater problems in local communities are not tracked at the State or Federal levels.

Stormwater. Surface runoff occurs when the soil is saturated or there is inadequate drainage capacity for the volume of water. Without sufficient infiltration or drainage paths, the water will flow overland and find the lowest elevations, sometimes flooding a street or a basement. Surface runoff is intensified where impervious areas such as roofs and pavement do not allow water to soak into the ground. Stormwater runoff can be a significant cause of erosion and non-point water pollution.

NFIP. The National Flood Insurance Program (NFIP), established in 1968, provides flood insurance to property owners, renters and businesses. Private insurance companies do not cover flood damage. The NFIP defines Special Flood Hazard Areas (SFHAs), which are FEMA-designated floodplains. The NFIP works with communities to adopt and enforce floodplain management regulations that help mitigate the effects of flooding in those areas. Homes and businesses in SFHA areas with mortgages from government-backed lenders are required to have flood insurance (FEMA, 2022).

Federal flood insurance is not a disaster assistance program. It is an insurance program established to help property owners to recover more quickly at a lower cost than waiting for disaster aid. Because floods can happen outside of the special flood hazard area (SFHA), flood insurance is available to cover any property in participating NFIP communities.

Base flood. The terms "base flood," "100 year flood," and "one-percent annual chance flood" are often used interchangeably. The boundary of the Base flood is the Special Flood Hazard Area (SFHA) on FEMA's NFIP Maps.

Regulatory Floodway. A Floodway is defined by FEMA as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height."

Location

River/Stream flooding: Rural Des Moines County, Burlington, Danville, Mediapolis, West Burlington, IAAAP, Danville CSD.

Flash floods: Rural Des Moines County, Burlington, Danville, Mediapolis, West Burlington.

Stormwater: Rural Des Moines County, all Cities and both Levee and Drainage Districts have the potential to be affected by localized flooding from stormwater. West Burlington CSD and Danville CSD have some issues with stormwater on their properties.

NFIP Communities

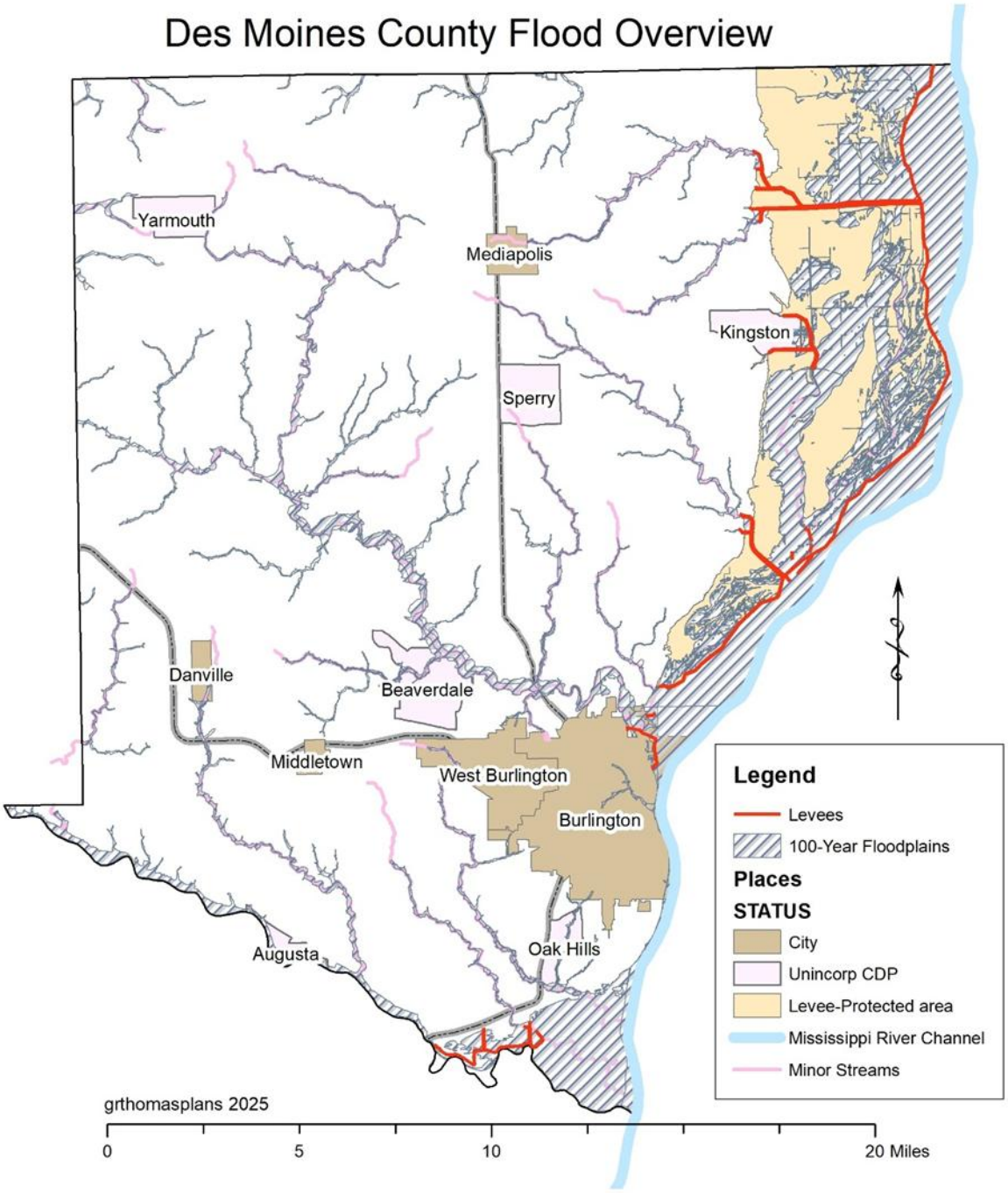
Four jurisdictions have areas that intersect with Special Flood Hazard Areas (SFHAs). Of these, all participate in the NFIP.

NFIP COMMUNITIES				
CID	Community Name	Init FIRM Identified	Current Effective Map Date	Reg-EmerDate
190113C	DES MOINES COUNTY	2/17/1982	10/21/2021	7/20/1993
190115C	CITY OF DANVILLE	8/2/2011	10/21/2021	2/2/2022
190615C	CITY OF MEDIAPOLIS	8/2/2011	10/21/2021	8/9/2011
190682C	CITY WEST BURLINGTON	8/2/2011	10/21/2021	2/29/2012

There is no Special Flood Hazard Area (SFHA) identified within the municipal boundary of Middletown and therefore the city does not participate in the NFIP. See maps below.

Extent

FEMA NFIP Flood Insurance Rate Maps (FIRMs) have been updated with an effective date of 10/21/2021. There are 14 FIRM panels for the City of Burlington alone. An overview of SFHA areas is reproduced below, but for greater detail, 94 individual FIRM panels are available at the FEMA Map Service Center website when you search the community name. (https://msc.fema.gov/portal/advanceSearch)


Des Moines County Flood Overview
Yarmouth
Mediapolis
Kingston
Sperry
Danville
Beaverdale
Middletown
West Burlington
Burlington
Augusta
Oak Hills
Legend
Levees
100-Year Floodplains
Places
STATUS
City
Unincorp CDP
Levee-Protected area
Mississippi River Channel
Minor Streams
grthomasplans 2025
0
5
10
20 Miles

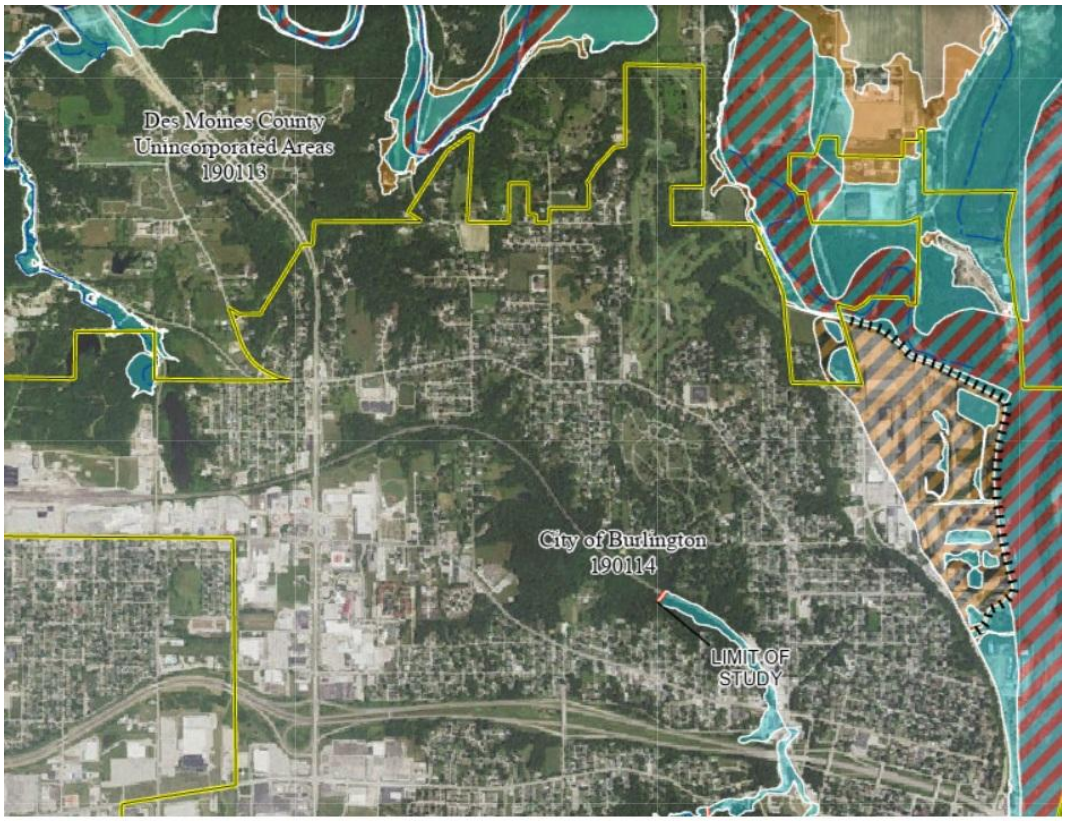
SFHA Zones

About 15% of the county land area is located in a Special Flood Hazard Area (SFHA), in Zones designated A, AE, and AH.

Zone A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones refers to areas that have a 1% annual chance of flooding, but base flood elevations have not been determined.
Zone AE	The base floodplain where base flood elevations are provided. The floodway is a subset of Zone AE – areas with a 1% annual chance of flooding (100-year flood), where base flood elevations have been determined. Base flood elevations are provided within these areas. In old format FIRMs, the base floodplain is shown in numbered A zones numbered from A1 to A30.
Zone AH	An area where shallow flooding or ponding (typically 1 to 3 feet deep) is likely during a 100-year flood event. About 13,000 acres of land in Des Moines County are in Zone AH (about 5%), all of this is located within the Tama Bottoms area between Burlington and the Louisa County border, along the Mississippi River. Much of the flooding expected in this area would result from backchannel flooding of tributary streams and drainage canals, rather than the Mississippi River itself.
Zone X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year (1% chance) and 500-year (.2% annual chance). Shaded Zone X refers to areas that would ordinarily have a 1% annual chance of flooding but have a substantially reduced risk due to being protected by a provisionally accredited levee. Nearly 18,000 acres of land in Des Moines County (or 7% of the land area) are in a shaded Zone X. These are all within the Two Rivers and North Bottoms Levee & Drainage Districts and are typically intermingled with areas of Zone AH floodplain.
Zone X (unshaded)	Area of minimal flood hazard. Zone X is the area determined to be outside the 500-year (.2% annual chance) flood. This zone includes about 79% of the county area. Those areas of unshaded Zone X with 0.2% annual chance of flooding (also called the 500-year floodplain) are less likely to flood than the SFHA but are still important to consider in evaluating overall risk to life and property. This category includes over 700 acres of land in Des Moines County (less than 0.5% of its area). These areas are often along the periphery of Zone AE floodplains, as the terrain gradually rises. The largest concentrations of this Zone are at the fringes of the Skunk River Bottoms and the area between the two levee & drainage districts north of Burlington. Another example is an area following some ravines on the west side of Burlington, near Division Street.

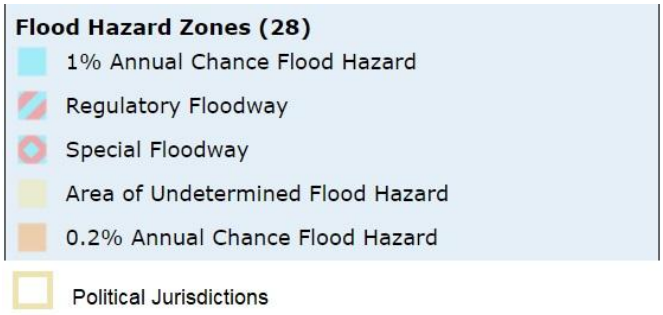
Flood Zone Designations by Community	
Community	Flood Zones
Des Moines County (Unincorporated Areas)	A, AE, AH, X
City of Burlington	A, AE, AH, X
City of Danville	A, AE, X
City of Mediapolis	A, AE, X
City of Middletown	X
City of West Burlington	A, X

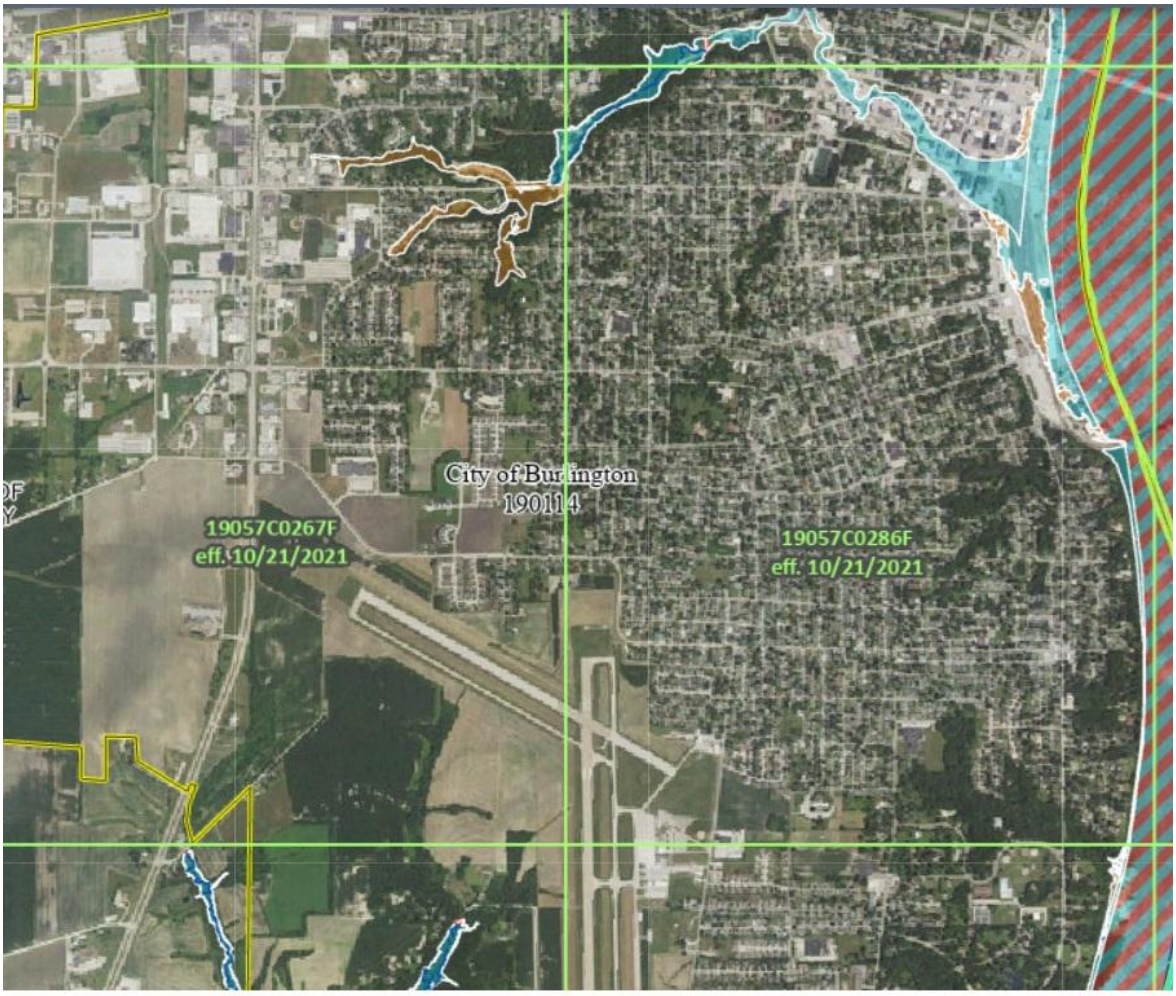
Jurisdictions with SFHAs



NORTH SIDE CITY OF BURLINGTON

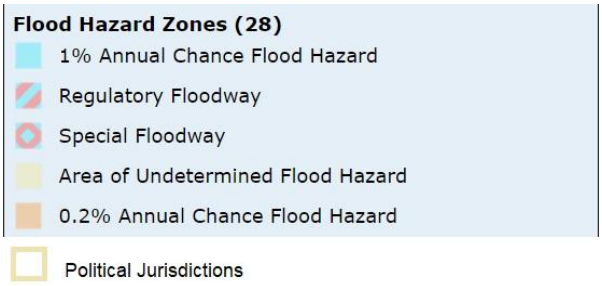
Burlington participates in the NFIP



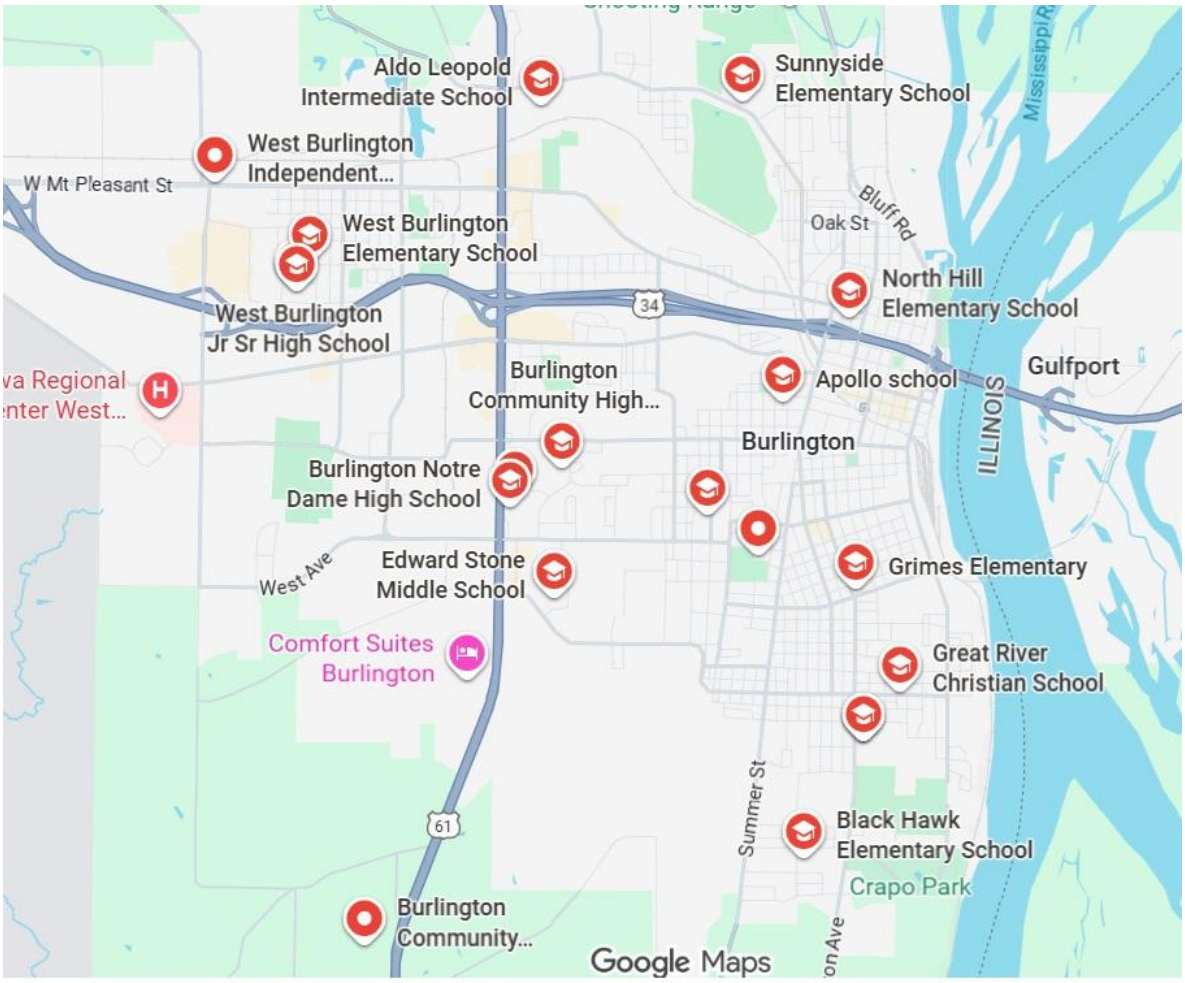


S SIDE CITY OF BURLINGTON

Burlington participates in the NFIP

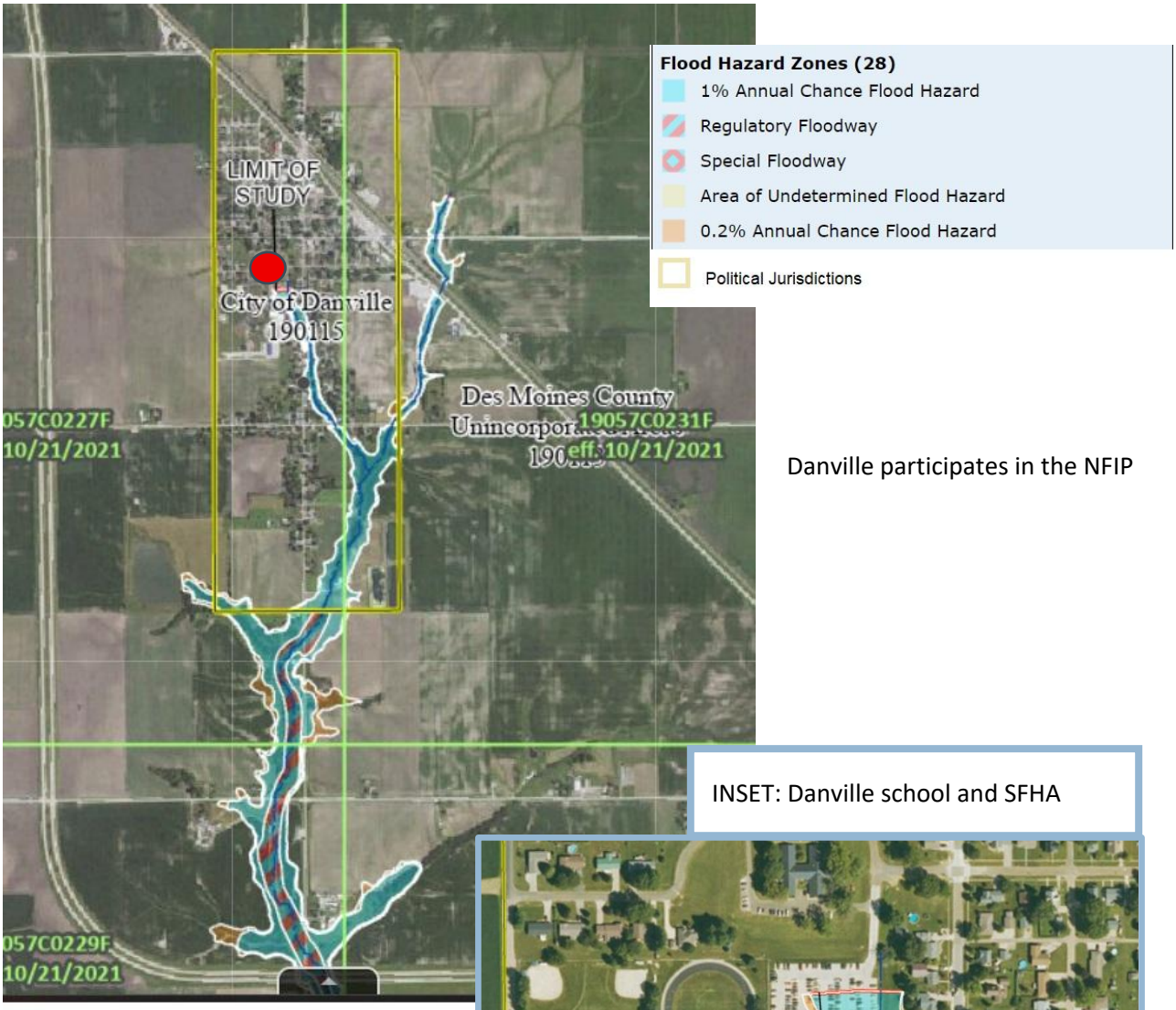


All schools in Burlington and West Burlington are in the interior of the cities and do not intersect with the SFHA.



School locations in Burlington and West Burlington

No schools are in the SFHA.

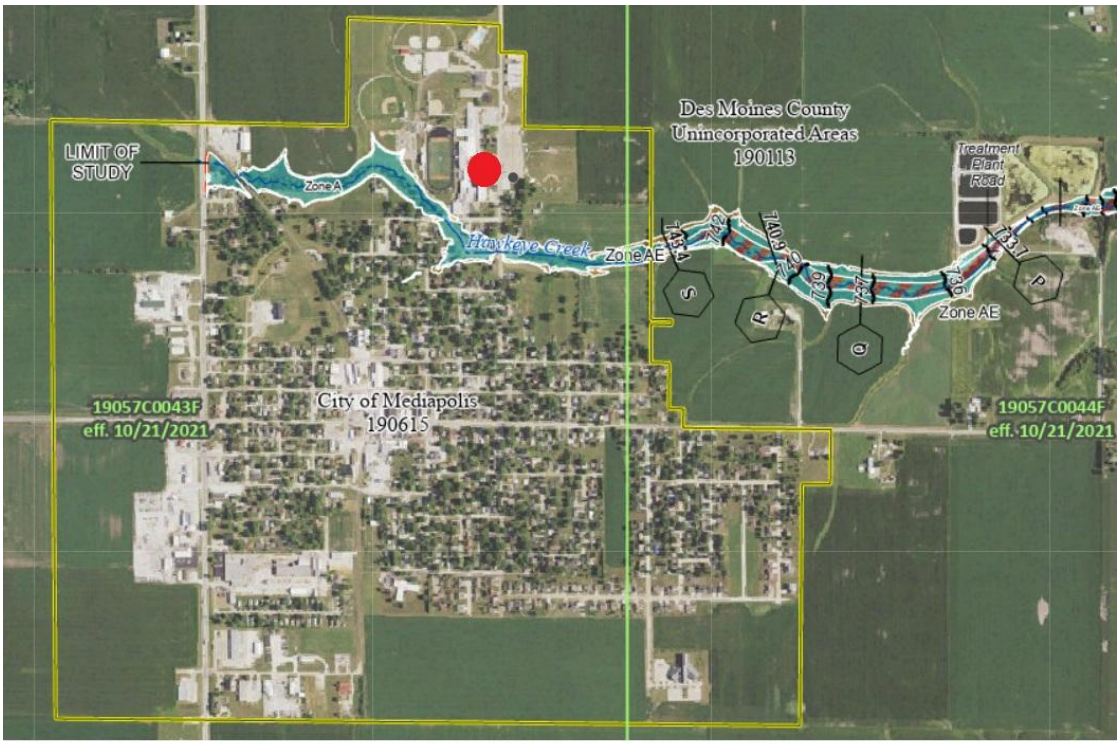


CITY OF DANVILLE

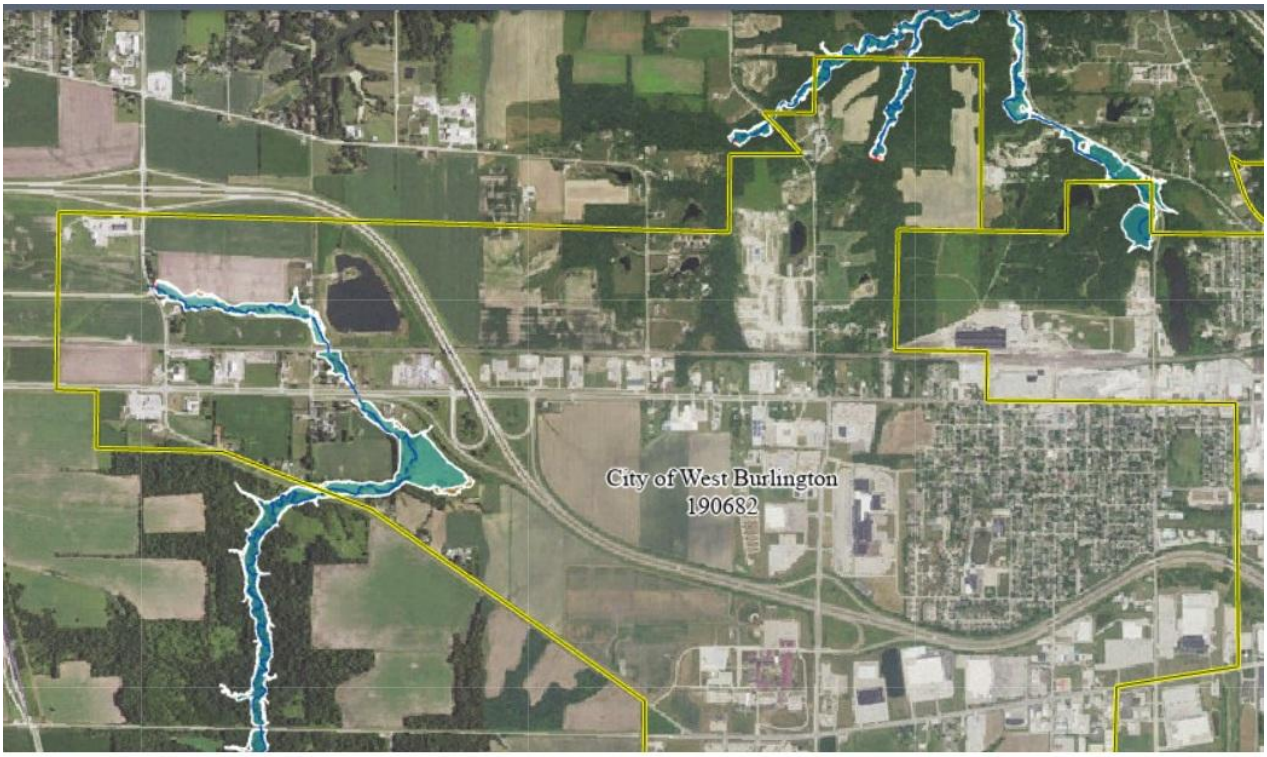
Danville participates in the NFIP

INSET: Danville school and SFHA

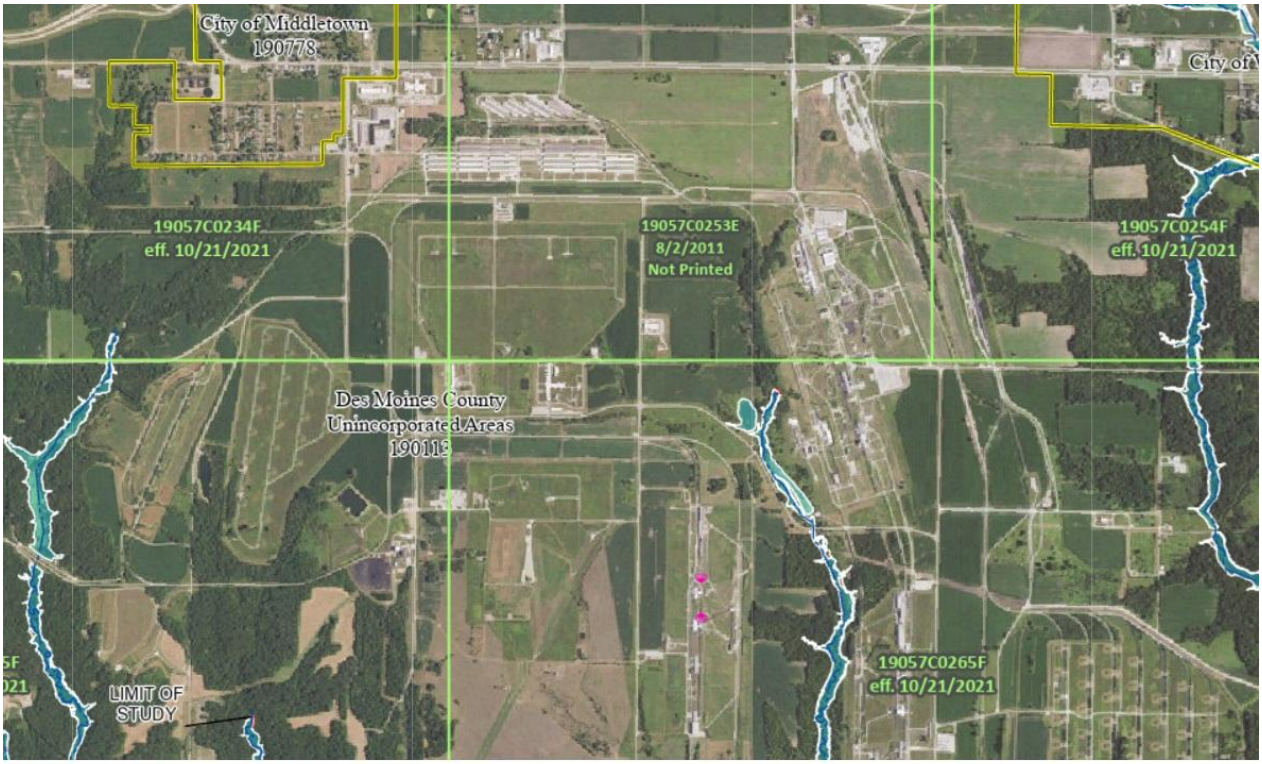
ZONE A FLOODPLAIN AREA AFFECTS THE DANVILLE CSD SITE



Mediapolis participates in the NFIP. Zone A SFHA intersects with school property, but not structures.



SFHA CITY OF WEST BURLINGTON



Iowa Army Ammunition Plant
No structures impacted by SFHA

North Bottoms Levee & Drainage District and Two Rivers Levee & Drainage District are both impacted by flood hazard. See Dam & Levee Hazard Profile and map Page 100, for levee locations.

Previous occurrences

Twenty-four flood events were recorded in the NOAA Storm database during the period 2015 through 2024. Six flood events occurred during the last five years (2020 through 2024); three of which were Flash floods and three were River flood events.

	BEGIN LOCATION	DATE	EVENT TYPE	FLOOD CAUSE	EVENT NARRATIVE
1	BURLINGTON AIRPORT	4/11/2020 4/16/2020	Flood	Heavy Rain / Snow Melt	The Mississippi River at Burlington (BRLI4) rose above its major flood stage of 18 feet at 9 PM CST on April 1 and fell below major flood stage at 1 AM on April 16th. The river crested at 18.21 feet at 6 AM on April 13.
2	WEST BURLINGTON	8/11/2021 8/11/2021	Flash Flood	Heavy Rain	The fire department reported water deep enough that vehicles could not pass through on Mt Pleasant Street and West Burlington Avenue.
3	DANVILLE	5/26/2022 5/27/2022	Flash Flood	Heavy Rain	Water flowing into homes, apartments, and the school. Water flowing over highway in Danville. 2 feet of standing water on Main Street and several gravel roads washed out west of Danville. There was an unofficial report of 9.0 inches of measured rainfall in Danville. Time estimated based on radar and fire/rescue information.
4	BURLINGTON AIRPORT	9/3/2022 9/3/2022	Flash Flood	Heavy Rain	Slow moving thunderstorms produced isolated heavy rainfall. Emergency management reported flash flooding with deep stationary water on roads near West Ave. and S. Garfield in Burlington.
5	BURLINGTON	4/26/2023 4/30/2023	Flood	Heavy Rain / Snow Melt	The Mississippi River at Burlington rose above its major flood stage of 18.0 feet during the evening hours of April 26th. The river continues to rise to 19.68 feet on the evening of April 30th. The Mississippi River at Gladstone rose above its major flood stage of 14 feet during the early morning hours of April 27th. It continued to rise to 15.6 feet during the evening hours of April 30th.
6	BURLINGTON AIRPORT	7/1/2024 7/22/2024	Flood	Heavy Rain	The Mississippi River at Burlington rose above its major flood stage of 18.0 feet around 11 PM on July 1st and crested at 20.48 feet on July 12th. The river fell back below its major flood stage around 10 PM on July 22nd.

Probability

Flash Flood, River Flood: Twenty-four events in ten years = > 100%; Six events in the most recent five years is also greater than 100%; probability is "Very Likely." See Climate trends, below.

Stormwater flooding can happen almost anywhere for a variety of reasons. Therefore, we cannot include hard data for this hazard, but we do address the problem in the Mitigation Action Plan. See Appendix C for more information about stormwater management.

Climate trends

Flood events. Precipitation is expected to increase in volume and intensity, with average annual precipitation increasing 1" to 4" in any county by 2050. Because warmer air temperatures can hold more water, storms may be larger but less frequent. Eastern Iowa is seeing a greater increase in precipitation than western Iowa, which indicates a likelihood of more flooding in eastern Iowa in coming decades.

Climate changes already observed – Iowa 2023:

- ✓ Increased humidity, especially in summer, fueling thunderstorms
- ✓ Every 1°F increase in temperature allows the atmosphere to hold 4% more water vapor
- ✓ Higher temperatures
- ✓ Warmer nighttime temperatures (DNR)
- ✓ Winters are warming six times faster than summers (DNR)
- ✓ Increased precipitation (8 percent from 1873 to 2008)

B2-c Repetitive Loss Properties

NFIP. The National Flood Insurance Program (NFIP) Repetitive Loss Properties (REP) report provides information on structures that have had multiple NFIP claims during the history of the program. As of 2/25/2024, the report indicated that 34 repetitive loss properties were identified in Des Moines County. Of these, 9 were mitigated after the most recent loss (2008 to 2015), leaving 25 properties still at risk. Four have flooded during the last five years (2020 through 2024).

Properties mitigated 2020 through 2024.

Community Name	Flood Zone	Occupancy Type	Insured Indicator	Total Losses	Most Recent Date of Loss
DES MOINES COUNTY	A08	SF Residence	1	2	6/13/2008
DES MOINES COUNTY	A08	SF Residence	0	2	6/14/2008
BURLINGTON, CITY OF	AE	SF Residence	0	2	6/14/2008
DES MOINES COUNTY	A	SF Residence	0	2	6/16/2008
DES MOINES COUNTY	A	SF Residence	0	4	6/16/2008
DES MOINES COUNTY	AE	SF Residence	1	3	6/16/2008
DES MOINES COUNTY	A08	SF Residence	0	5	4/22/2013
DES MOINES COUNTY	AE	SF Residence	1	2	7/1/2014
DES MOINES COUNTY	AE	SF Residence	0	5	7/3/2014

Properties that have flooded 2020 through 2024.

Community Name	Flood Zone	Occupancy Type	Insured Indicator	Total Losses	Most Recent Date of Loss
DES MOINES COUNTY	AE	SF Residence	1	4	3/27/2020
BURLINGTON, CITY OF	AE	Non-residential	1	18	4/24/2023
BURLINGTON, CITY OF	X	Non-residential	1	19	4/28/2023
BURLINGTON, CITY OF	AE	Non-residential	1	8	5/3/2023

Vulnerability and Impacts

Flood

SFHAs & Flash Flood: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown		Mediapolis Community School District
X	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
X	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		
	DESCOM		

Floodwater can be contaminated with pollutants such as agricultural pesticides, industrial chemicals, debris, and sewage. Excess chemicals and pollutants have negative impacts on water quality.

Structures built in flood hazard areas are subject to repetitive damage.

Floods cause sedimentation and erosion. Uptake and deposition of sediments alter the landscape by eroding riverbanks and causing them to collapse, affecting natural features and structures in the flooded area. Flooding can have negative effects on wildlife, including drowning, disease proliferation and habitat destruction. Aquatic life and fish can be displaced, and the nests destroyed.

Stormwater

Stormwater: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville	X	West Burlington Independent School District
X	City of Middletown	X	Danville Community School District
X	City of Mediapolis		Mediapolis Community School District
X	City of West Burlington		Notre Dame Catholic Schools
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

Stormwater may overwhelm drainage capacity during heavy rains. Flooded roads and streets place drivers and pedestrians at risk. Surface flow seeks the lowest elevation and interacts with structures. Water enters buildings, homes and basements, damages mechanical systems and other property, and causes mold growth. Water near buildings triggers the pressure of expansive soils on foundations and slabs.

Runoff is the primary source of nonpoint pollution, as it can carry contaminants from the ground surface into a channel. Chemicals and trash from urban streets are washed into streams. Agricultural pollution is exacerbated by surface runoff, leading to a number of downstream impacts, including nutrient pollution. Surface runoff is the primary agent of soil erosion by water.

Special impact: The stress of dealing with ruined structures and loss of personal items may be intensified by the discovery that flood damage is not covered by homeowners' insurance.

Impacts of Climate trends. From the US EPA Publication on Climate change in Iowa: During the next century, spring rainfall and average precipitation are likely to increase, and severe rainstorms are likely to intensify. Each of these factors will tend to further increase the risk of flooding. Summer droughts are likely to become more severe, floods may also intensify (EPA, 2016).

Land use development. New development should occur well outside the base flood areas whenever possible. Natural systems should be supported and best practices for stormwater management should be applied to new and rehabilitated development sites.

Population patterns. Population growth should be directed to higher ground, while population decrease may provide opportunities to acquire and demolish structures vulnerable to flood.

Severe Thunderstorms

Hail, high winds and lightning are the three primary components of severe weather systems known as thunderstorms. Severe Thunderstorms were identified as one of the top three concerns of the public and the Planning Committee. Each of these hazards is profiled individually below.

Hail

Hail is a form of precipitation associated with thunderstorms that consists of solid lumps of ice, which are individually called hailstones. Hail formation requires an atmospheric environment of strong, upward moving air, called an updraft, within the subfreezing region of a thunderstorm cloud.

As described by the Department of Atmospheric Sciences at the University of Illinois, hail is produced by intense thunderstorms where snow and rain can coexist in the central updraft. "As snowflakes fall, liquid rain freezes to them forming ice pellets that continue to grow as more and more drops are accumulated.

Upon reaching the bottom of the cloud, some of the ice pellets are carried by the updraft back to the top of the storm. As the ice pellets once again fall through the cloud, another layer of ice is added, and the hail stone grows larger. Once a hail stone becomes too heavy to be supported by the updraft, it falls to the earth."

Location

Hail affects all locations in the planning area.

Extent

The planning area uses the Hail Diameter Scale to categorize Hail events. Hailstones of any size described on the chart can be expected to occur.

The severity of damage caused by hail varies with the hailstone size, number of hailstones by area, and associated winds. Another factor that affects the amount of damage that results from hail is the speed at which it falls. Velocity is affected by the height of a falling object due to the constant acceleration of gravity.

According to NOAA, for small hailstones produced at lower atmospheric heights, the expected fall speed is between 9 and 25 mph. For hailstones of 1 inch to 1.75-inch in diameter that fall in a severe

thunderstorm, the expected fall speed is between 25 and 40 mph. In the strongest, upper level supercells which produce some of the largest hail, the expected fall speed can reach between 44 and 72 mph or more.

While there is a degree of uncertainty in these estimates due to variability in a hailstone's shape, degree of melting, fall orientation, and environmental conditions such as wind (NOAA, 2020), baseball size hailstones falling at 60 mph certainly have the potential to cause serious damage or injury.

Previous Occurrences

The NOAA Storm Database records hail events when hailstones are .75 inches (penny size) or greater. There were 18 such hail events recorded by NOAA during the 10 year period January 2015 through December 2024.

Probability of Hail

Hail over .75 inches in size often falls in the planning area more than once a year. During this study period, there were multiple such hail events, while in 2016, 2018, 2020 and 2022, no hail of that size or greater was recorded. Overall, the probability of a damaging hail event is 18 in 10 years = greater than 100%; "Very likely."

Climate Trends

Some of Iowa's natural hazards are expected to increase in frequency and intensity. The atmosphere acts like a sponge, and the warmer it is, the more moisture it can hold. The atmosphere's ability to hold more moisture also means that it takes more moisture to cause a precipitation event, which in turn means that the time between events is increased, and the potential for high-intensity precipitation is also increased (Iowa, 2023). Because of the way hail is formed, higher intensity storms can be expected to produce large hail.

DES MOINES COUNTY HAIL RECORD

Number of Hail events over .75 by year	
2015	4
2016	0
2017	2
2018	0
2019	2
2020	0
2021	2
2022	0
2023	4
2024	4
Total	**18**
Hail Size	**Number of events in 10 years**
(Inches)	
0.75	2
0.88	2
1	9
1.25	1
1.5	2
2.75	2
Total	18

Vulnerability and Impacts

Hail: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

Since hail occurs in random locations, and while most storms create relatively narrow paths of destruction, all geographic locations in the county are equally at risk. Other jurisdictions reported no specific concerns about vulnerability to Hail.

Injuries to people or animals, damage to crops and structures vary with the size and velocity of hailstones and the duration of the event. Large hail poses a threat to people caught outside in a storm, but it seldom causes the loss of human life. No personal injuries are recorded in the Storm Data record (Storm, 2025).

Property damage from hail is most severe in storms that produce high winds in addition to large hail, as winds blow hailstones into windows and siding that would not be impacted otherwise.

Des Moines County

Rural residential and agricultural structures of all vintage and a variety of construction materials are scattered throughout the county. Some of those are more vulnerable due to era of construction, siding materials or the type and age of the roof. Roofs, siding and windows on residential and business are damaged.

Personal vehicles, farm equipment and larger trucks are often stored outdoors. Damage to vehicles ranges from minor dents to total loss of value. The cost of damages to agriculture, buildings, vehicles and infrastructure must be borne by owners or insurance companies.

Hail events cause crop damage that ranges from minor to total loss. The economic impacts of crop loss affect family and business income and reduce tax revenues. Crops are at greater risk during early spring and late fall when the peak period for hailstorms coincides with critical agricultural seasons. Livestock frequently graze open land, away from roofed structures. Unsheltered livestock are stressed or injured by hail.

City jurisdictions

City-owned and private vehicles, equipment, trucks and RVs are often stored outdoors. Damage to vehicles and equipment ranges from minor damage to total loss of value.

Municipal utility services such as electric power and communication systems are vulnerable to hail. Large hail can impact trees and power lines. Damage to electric utility infrastructure causes power outages and secondary effects such as impaired emergency communication and failure of home medical equipment.

School Districts

Buildings, buses and other vehicles, and outdoor structures are exposed to the weather. Hail damages roofs, siding, windows, appurtenances and vehicles stored outside. Light fixtures and scoreboards on athletic fields are damaged by hail. Outdoor activities and sports events draw large crowds where people who are caught outdoors in a hail event may be injured.

Impacts of Climate trends. Frequency of hail events may be reduced. Storm severity is expected to intensify, which may increase the size and quantity of hailstones created by strong upper level winds.

Land use development. Changing land use or incidence of hail are not expected to influence each other.

Population patterns. This hazard is unlikely to be affected by population patterns.

High winds

High winds in Des Moines County can result from strong cold front passages, gradient winds between high and low pressure, thunderstorms or tornados. High winds are referred to as "straight-line" winds to differentiate the damage they cause from the rotating winds of tornados.

Downdraft winds are a small-scale column of air that rapidly sinks toward the ground, usually accompanied by precipitation as in a shower or thunderstorm. A downburst is the result of a strong downdraft associated with a thunderstorm that causes damaging winds near the ground.

Location

High winds affect the entire planning area. Iowa is in the path of powerful cold fronts traveling down from Canada or the Rocky Mountains which collide with warm, moist air from the Gulf of Mexico. Average wind speed in Des Moines County is estimated to be about 9 mph (IA Meso, 2024).

Extent

The Planning Area uses the Beaufort Wind Scale to categorize High Wind. The planning area can expect any range on the Beaufort scale from 0 – 12.

Beaufort Number	MPH		Terminology	Description
	Range	Average		
0	0	0	Calm	Calm. Smoke rises vertically.
1	1 -3	2	Light air	Wind motion visible in smoke.
2	4 - 7	6	Light breeze	Wind felt on exposed skin. Leaves rustle
3	8 - 12	11	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13 - 18	15	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19 - 24	22	Fresh breeze	Smaller trees sway.

6	25 - 31	27	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use is difficult.
7	32 - 38	35	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39 - 46	42	Gale	Twigs broken from trees. Can veer on road.
9	47 - 54	50	Severe gale	Light structure damage.
10	55 - 63	60	Storm	Trees uprooted. Considerable structural damage.
11	64 - 73	70	Violent storm	Widespread structural damage.
12	74 - 95	90	Hurricane	Considerable and widespread damage to structures.

Previous Occurrences; High winds

The NOAA Storm Events Database is a primary source of weather records for the nation. From January 2015 through December 2024, forty thunderstorms occurred that had wind speeds of 50 mph or more.

Seventeen of those were "Severe," having speeds of 58 mph or more (Level 10).

In 2021, one high wind event with wind speeds of 53 mph occurred that was not associated with a thunderstorm.

Severe Thunderstorm winds		
Location	**Date**	**mph**
ZONE (LENOX PK)	6/10/2015	65
COUNTY-WIDE	6/20/2015	70
DANVILLE	8/18/2015	61
MEDIAPOLIS	7/10/2017	61
ZONE (LENOX PK)	6/28/2018	61
BURLINGTON	5/24/2019	61
(BRL) BURL MUNI	5/28/2019	59
(BRL)BURL MUNI	6/28/2019	61
ZONE (DODGEV)	7/17/2019	61
MEDIAPOLIS	8/20/2019	61
BURL ARPT	11/26/2019	61
COUNTY-WIDE	7/19/2020	70
MEDIAPOLIS	11/10/2020	65
WEST BURL	6/11/2021	61
WEST BURL	12/15/2021	61
ZONE (PR GRV)	7/15/2024	61
WEST BURL	8/27/2024	70
ZONE (LENOX PK)	6/10/2015	65
COUNTY-WIDE	6/20/2015	70

Probability; High winds

Seventeen severe wind events were recorded during the study period, 17/10 years = the probability for damaging high winds is >100%, "Very likely."

Climate trends

Temperature differentials drive winds. Wind patterns across the North American Continent may shift in ways not yet fully understood. Changes in temperature from one region to the next can be expected to have a dramatic influence on the direction and intensity of winds.

- ✓ Earth's average global temperature is rising, but the amount of warming is not equal in all areas of the world
- ✓ At high latitudes, especially in and near the Arctic, temperatures are warming faster than places closer to the equator. The Arctic is heating up about twice as quickly as the global average
- ✓ As the climate warms, the ocean is expected to warm more slowly than land because it takes much more heat to warm water than air and land. The air above ocean water is expected to warm more slowly than land too
- ✓ In general, the middles of continents are expected to warm more than coastal areas. Regional topography will influence this too (NSF NCAR, 2023)

JET STREAM WINDS WILL ACCELERATE WITH WARMING CLIMATE

> New research by the University of Chicago and the U.S. National Science Foundation National Center for Atmospheric Research (NSF NCAR) finds that fast jet stream winds will get significantly faster by mid-century because of climate change.
>
> The study, in Nature Climate Change, suggests that the fastest upper-level jet stream winds will accelerate by about 2% for every degree Celsius (1.8° Fahrenheit) that the world warms. Furthermore, the fastest winds will speed up 2.5 times faster than the average wind.
>
> Jet stream winds are powerful and narrow bands in the upper atmosphere that generally move from west to east, influencing weather patterns . . . Faster winds would likely increase the potential for severe weather.
>
> Jet streams form because of the contrast between the cold, dense air at the poles and the warm, light air in the tropics, in combination with the rotation of the Earth. The new study, by University of Chicago Professor Tiffany Shaw and NSF NCAR scientist Osamu Miyawaki, uses climate models to show that climate change intensifies this density contrast because moisture levels for air above the tropics will increase more than above the poles.
>
> "This may have implications for air travel," Miyawaki said. "The faster the jet stream winds, the more severe the impacts on turbulence. The faster winds may also lead to conditions that are favorable for stronger and more prolonged storms" (NSF NCAR, 2023).

From the 2023 Iowa State Hazard Mitigation Plan:

"The 2017 U.S. Climate Science Report notes that in a higher greenhouse gas (GHG) concentration scenario, within 80 years we would likely see average global temperatures at least 5°F warmer than the averages of the first half of the 20th century. Furthermore, even if the currently increasing rate of GHG concentrations begins decreasing significantly by 2050, we can expect average temperatures at least 2.4°F and as much as 5.9°F warmer. It is not, however, the average that affects us most, but the extremes. Weather extremes have already begun to worsen and are expected to continue" (Iowa, 2023).

Vulnerability and Impacts

High winds: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		
	DESCOM		

Severe storms cause a significant amount of tree damage. The number of trees damaged, and total cost of damages is difficult to quantify because there is no central reporting mechanism for local tree loss among landowners, professional tree service companies, municipal clean-up crews and utility companies. The State does have the ability to interpolate loss estimates, which are reported through the Iowa DNR.

For example, according to the Iowa DNR, the state lost an estimated 7.2 million trees in cities and farms when a hurricane-force derecho struck the state on August 10, 2020. The state estimates the costs to Iowa at $20 million annually, with lost trees no longer able to capture and store carbon that contributes to climate change, reduce air pollution, or provide windbreaks and shade that cut energy use (Eller, Iowa DNR survey, 2021). Additional costs include tree removal, disposal, and replacement. See Appendix C for an example of the impacts of High winds on Agriculture.

Countywide vulnerabilities and impacts

Buildings, especially roofs are vulnerable to the effects of high wind. Depending on wind speed and direction, debris of various weight and material is torn apart and carried aloft. People, livestock, vehicles and structures are impacted by airborne debris. Windows are broken; eye injuries can occur from debris in the air.

Utility infrastructure: above ground power lines and poles are vulnerable to high wind. Trees are uprooted or broken; limbs take down utility lines. Power outages cause secondary impacts such as endangering the health of people who may be dependent on power for home medical devices or refrigeration of insulin. When electrical lines fall, it may be necessary to close roads or streets until power companies can ensure public safety.

Semi-trucks and other high profile vehicles travel local highways. Sustained winds of 30 mph or gusts of 45 mph or more make it difficult to drive high profile vehicles such as semi-trucks and RVs (NWS, 2020). Parked vehicles can be overturned at higher wind speeds depending on the weight of the load.

There are 680 mobile homes throughout the county. Mobile homes are less resilient to the effects of high winds than traditional homes, especially those built prior to modern building standards. People living in mobile homes are at risk of personal injury from damaging high wind events when alternative shelter is not readily available. See Community profiles in Section G for an estimate of mobile homes in each community.

RVs and campers are commonly in use and are vulnerable to damage or being blown over with sustained winds of 30 mph or gusts of 45 mph. People living or travelling in RVs and campers may be injured when alternative shelter is not readily available. RVs are stored outdoors on residential lots throughout the county. These lightweight, high profile vehicles may be blown over or impacted by debris.

Wind delivers additional oxygen to fires. It also lays over the flames toward the fire front, increases fire intensity by pre-heating and drying the fuel ahead of the fire, and carries sparks and embers ahead of the main fire, causing spot fires. In high winds, sparks become wildfires very quickly.

City Jurisdictions

Residential, commercial and governmental buildings and utility infrastructure are exposed to damaging wind events. Roofs, siding and appurtenances attached to walls or roofs can become detached, causing damage and airborne debris.

Trees are uprooted or broken, pull down power lines, damage adjacent structures and block streets. Where vacant lots are unkempt, some of the trees that grow are less resilient species such as cottonwood, mulberry or poplar, are less likely to be maintained and are more vulnerable to breakage.

IAAAP & Two Rivers L&DD

Both of these sites are vulnerable to tree damage. IAAAP is a large rural property. Trees are an important stabilizing factor on the Two Rivers Levee system.

All Schools: power outages

The schools are dependent on the local power system. These systems use above-ground power lines, which are susceptible to high wind damage. Power outages interrupt school operations and may result in a loss of refrigerated food.

Impacts of Climate trends. Changing wind patterns and increased temperature differences among regions are likely to increase the occurrence of high wind events in coming decades.

Land use development. High winds are unlikely to have any effect on land use in the foreseeable future.

Population patterns. Population patterns and high winds are unlikely to have any effect on each other in the foreseeable future.

Lightning

The National Weather Service defines a thunderstorm as "a rain-bearing cloud that produces lightning." Lightning is a discharge of intense atmospheric electricity, accompanied by a vivid flash of light, from one cloud to another or from a cloud to the ground. As lightning passes through the atmosphere, the air immediately surrounding it is heated, causing the air to expand rapidly, producing a sound wave we hear as thunder.

All thunderstorms are dangerous. In the United States, an average of 300 people are injured and 80 people are killed each year by lightning (NWS, 2021).

Positive, negative lightning. Lightning is formed by the separation of positive and negative charges that occur when ice crystals collide high up in a thunderstorm cloud. According to the National Weather Service (NWS), cloud-to-ground (CG) lightning is the most damaging and dangerous form of lightning. Most flashes originate near the lower-negative charge center and deliver negative charge to Earth. However, an appreciable minority of flashes carry positive charge to Earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life.

> Positive lightning makes up less than 5% of all strikes. However, despite a significantly lower rate of occurrence, positive lightning is particularly dangerous for several reasons.
>
> Since it originates in the upper levels of a storm, the amount of air it must burn through to reach the ground is usually much greater. Therefore, electric fields associated with positive cloud-to-ground (CG) strikes are typically much stronger than those associated with negative strikes. The flash duration is also longer with peak charge and potential up to ten times greater as compared to negative CG strikes; as much as 300,000 amperes and one billion volts . . . Also, positive flashes are believed to be responsible for a large percentage of forest fires and power line damage. Thus, positive lightning is much more lethal and causes greater damage than negative lightning (NWS, 2021).

Location

All geographic locations and schools in the planning area are subject to Lightning hazard.

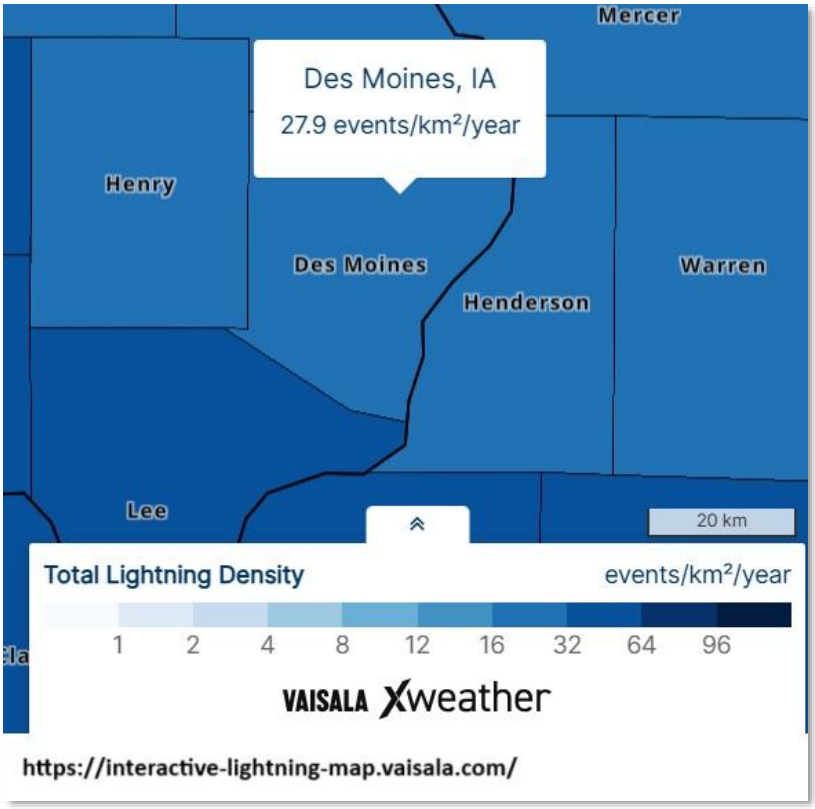
Extent

The planning area uses the Lightning Activity Level Scale (LAL Scale) to categorize lightning extent. Any level on the LAL Scale can be expected to occur.

Lightning Activity Level (LAL)	
A scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud-to-ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud-to-ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud-to-ground to ground strikes in a 5 minute period.

LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud-to-ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Dry lightning. Lightning often strikes outside of the rain in the thunderstorm and may occur as far as 10 miles away from any rainfall. As noted in the scale above, Lightning Activity Level 6, lightning often occurs in apparently dry conditions. A dry thunderstorm is a thunderstorm that produces thunder and lightning, but where most of the precipitation evaporates before reaching the ground. Dry lightning refers to lightning strikes occurring in this situation. The terms are sometimes used interchangeably.



Lightning density.

Vaisala is a company that has become a leading resource for lightning data, tracking lightning density across the globe. Density is the number of lightning strikes or flashes per chosen spatial area (e.g. km²) and time interval. Vaisala has produced an interactive map that shows yearly lightning density data, averaged from 2016 to 2023.

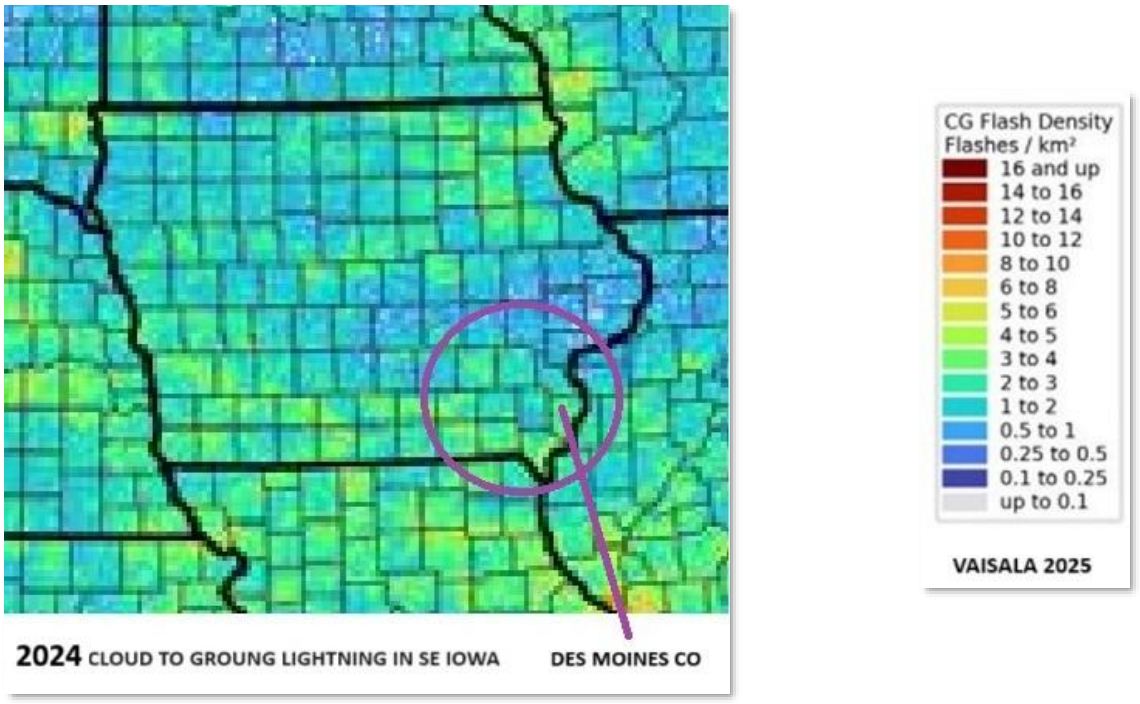
According to this data, Des Moines County averages about 28 lightning flashes per square kilometer each year (Vaisala, 2025). That data includes all flashes, including cloud to cloud lightning and cloud-to-ground strikes.

The US Census Bureau estimates the county has a total area of 1,100 square kilometers (430 square miles).

Previous Occurrences

For the period January 2015 through December 2024, there were 40 thunderstorms recorded in the NOAA storm data record. Several thousand cloud-to-ground strikes are known to occur each year.

Many more thunderstorms occur that do not meet the criteria to be included in the database. Individuals report that during the study period lightning events have damaged equipment, structures and caused loss of power. There is no practical way to document all known or suspected damages caused by lightning, which impacts all types of structures, public and private. Therefore, we rely on the frequency data to evaluate the probability for this hazard.



Cloud to Ground Lightning Strikes. Vaisala estimates cloud-to-ground strikes in southeast Iowa to be about 1 to 5 strikes per square kilometer per year.

Probability

All thunderstorms produce lightning (NWS, 2021). During the study period, there were 40 documented thunderstorms = greater than 100%; probability of lightning is "Very likely."

Climate trends

Expected increase in thunderstorm intensity will likely increase the incidence of cloud-to-ground lightning per storm. Reduced frequency of storms can be expected to reduce lightning density.

Vulnerability and Impacts

Lightning: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville		Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

From the National Weather Service: Facts About Lightning

- Lightning's unpredictability increases the risk to individuals and property.
- "Heat lightning" is actually lightning from a thunderstorm too far away for thunder to be heard. However, the storm may be moving in your direction
- Most lightning deaths and injuries occur when people are caught outdoors in the summer months during the afternoon and evening.
- The chance of being struck by lightning is estimated to be 1 in 600,000 but could be reduced by following safety precautions (NWS, 2023).

Des Moines County

Des Moines County is a rural community where people commonly work outdoors and animals graze on open land. Both are at risk for bodily injury or loss of life due to lightning strikes. People and livestock caught outside during a thunderstorm—particularly those on hills, under trees, in open areas, or on the water—are at higher risk from lightning.

People or animals struck by lightning need immediate lifesaving medical attention. The lower density of the rural population means that emergency responders may have to travel some distance in response to life-threatening events.

Lightning suppression devices are not installed on most county, city or school buildings. Many privately owned buildings are not equipped with lightning suppression devices. Unprotected combustible structures may ignite when struck by lightning.

Cities

Periods of drought are very likely to occur. Lightning strikes start fires more readily during drought conditions when any spark can ignite ready tinder.

Most residential, commercial and municipal structures lack lightning suppression devices. Electronics inside buildings are destroyed by the power surge of a lightning strike passing through the electrical grid, which can disable critical systems.

Critical facilities and utility infrastructure are exposed to weather and components are vulnerable to lightning damage, particularly electrical transformers or substations. Power loss puts the health of individuals at risk when electricity fails and home medical equipment or extreme temperatures threaten health.

Municipal water wells

Cities are dependent on municipal water supplies. Lightning strikes or power failure can disable well pumps and disrupt service.

Mediapolis CSD, West Burlington ISD

These Schools lack Lightning suppression devices.

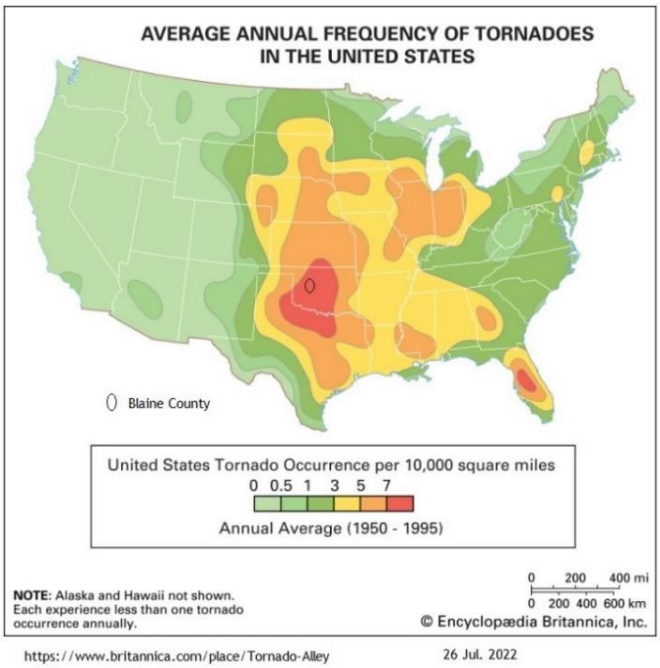
Impacts of Climate trends. Frequency of thunderstorms may be reduced while storm severity is expected to increase, which will likely increase the intensity and severity of lightning incidents.

Land use development. Property owners and developers should be aware of the risk and install proper lightning protection devices when performing major rehabilitation or new construction.

Population patterns. Additional population does put more people at risk. This hazard is unlikely to be affected by population patterns in Des Moines County in the near future.

Tornado

Tornados are violently rotating columns of air that reach from the bottom of a cumulonimbus cloud to the ground. Tornados are found in severe thunderstorms, but not all severe thunderstorms produce tornados. While all tornados touch both the ground and the bottom of a cloud, it is possible for only part of the tornado to be visible.



A tornado may be on the ground for only a few seconds, or last for over an hour. They can appear in a variety of shapes and sizes, ranging from thin, rope-like circulations to large, wedge shapes greater than one mile in width. However, a tornado's size is not necessarily related to its wind speed. The strongest tornados can have wind speeds in excess of 200 mph.

Des Moines County lies in the weather region often referred to as Tornado Alley, where cool, dry air from Canada collides with warm, moist air from the Gulf of Mexico (IA Meso, 2024). Meteorologically, the region is ideally situated for the formation of supercell thunderstorms, often the producers of violent (EF-2 or greater) Tornados (NOAA, 2022).

More than half of Iowa's tornados occur during the months of May and June but may occur anytime the necessary atmospheric conditions are present. June is the most active month of the year with 28.8 percent of all tornado reports, closely followed by May with 24.3 percent (MWC, 2023). Most tornados occur between 2pm and 9pm. The state of Iowa averages 48 tornados each year. The record number of tornados in one year was 2021 when 146 tornados were documented in the state (NWS, 2023).

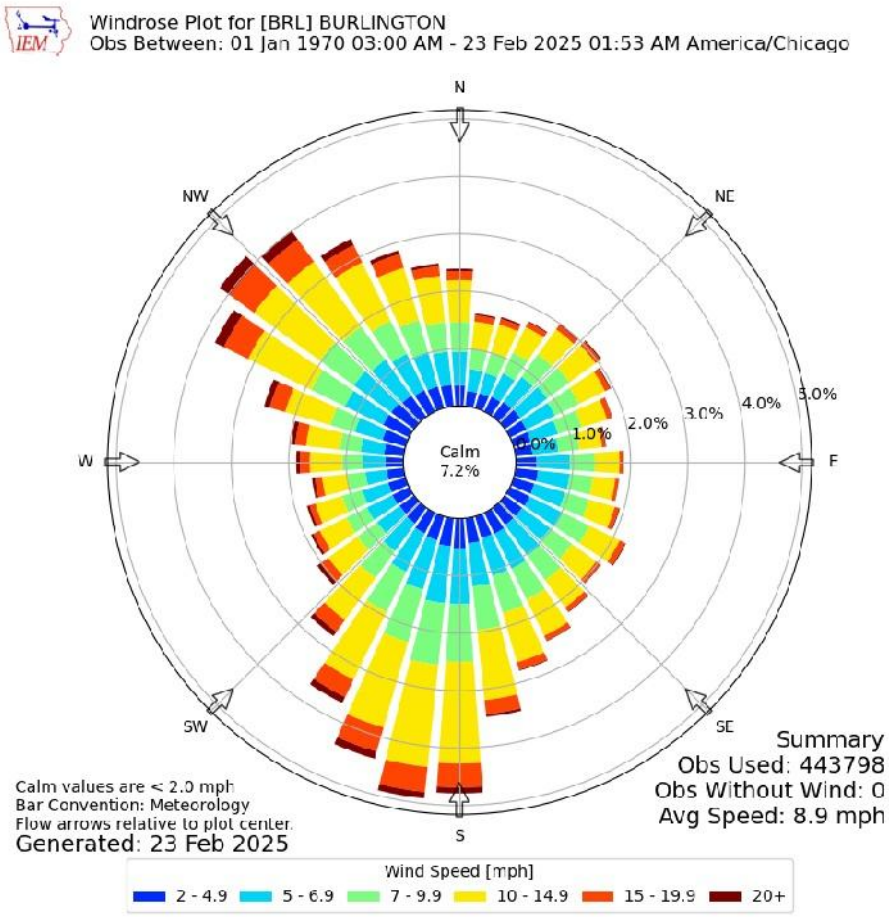
Wind roses are used to illustrate wind speed and direction for a particular locality over time. Below, a wind rose for the airport at Burlington (BRL) shows the long term patterns for wind direction and speed in the region, with dominant winds evident from both the south and northwest over a 52 year period. See Illustration below.

Location

Tornados affect the entire planning area.

Extent

The scale of intensity for Tornados in Des Moines County is measured by the Enhanced Fujita (EF) Scale. The EF Scale is used to assign a tornado a rating based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of Damage Indicators and Degrees of Damage which help estimate better the range of wind speeds the tornado likely produced. From that, a rating (from EF0 to EF5) is assigned. The Planning area can expect Tornados of any magnitude on the scale to occur.



Enhanced Fujita Scale

Rating	Wind speed	Expected Damage
EF0	**65-85 mph**	Minor damage. Shingles or parts of roof peeled off; damage to gutters and siding; branches broken off; shallow rooted trees toppled.
EF1	**86-110 mph**	Moderate damage. More significant roof damage; windows broken; exterior doors damaged or lost; mobile homes badly damaged or overturned.
EF2	**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 may be tossed.
EF3	**136-165 mph**	Severe damage. Entire stories of well-constructed homes destroyed; significant damage to large buildings; homes with weak foundations may be blown away; trees begin to lose bark.
EF4	**166-200 mph**	Extreme damage. Well-constructed homes leveled; cars thrown significant distances; top story exterior walls of masonry buildings likely collapse.
EF5	**> 200 mph**	Incredible damage. Well-constructed homes swept away; steel reinforced concrete structures critically damaged; high rise buildings sustain severe structural damage; trees usually completely debarked, stripped of branches and snapped.

https://www.weather.gov/hun/efscale_explanation

Previous occurrences

Eight tornados were recorded in the county during the years 2015 through 2024.

On 6/15/2019 during widespread thunderstorm activity, three tornadoes were observed in Des Moines County, west of Mediapolis and south of Oakville, between 7:50 pm and 8:30 pm. Two tornadoes west of Mediapolis were rated EF2 and downed numerous trees, severely damaged a house displacing it from its foundation, destroyed outbuildings, and downed power poles. A tornado south of Oakville remained in an open field with no observable structural damage to assign a rating.

BEGIN LOCATION	DATE	EF SCALE	EVENT NARRATIVE
MIDDLETOWN	6/20/2015	EF1	An EF1 tornado touched down briefly on the northwest side of the Iowa Army Ammunition Plant and tracked southeast for about 3 miles. Trees, roofs, outbuildings, power poles, and vehicles were damaged along the path. The maximum wind was estimated at 95 mph.
(UNINCORP) SPRING GROVE	5/27/2019	EF0	Video and picture evidence of a tornado occurring at this location. However, there have been no reports of damage near the touchdown.
SOUTH OF OAKVILLE NEAR (UNINCORP) PLEASANTGROVE	6/15/2019	EFU	A tornado with 70 mph peak winds touched down in an open field west of Mediapolis, IA. It lasted for about 2 minutes. There was no observable damage from which the NWS could assign a rating.
MEDIAPOLIS	6/15/2019	EF2	An EF2 tornado with 120 mph peak winds touched down doing damage to trees and the roof of a house. As it moved east it strengthened causing more tree damage and siding damage to a house. The tornado then reached peak strength, destroying a farm outbuilding, throwing two pieces of farming equipment 40 yards, and then moving a pickup truck through the air approx 20 yards. A house at this location suffered major damage, as it was moved off its foundation. All the windows were blown out, a bolted down garage was destroyed and lofted. Three power poles were snapped at this location. The tornado then turned northeast, destroying numerous trees. Once it came down the bluff, it hit power lines causing them to lean over.
MEDIAPOLIS	6/15/2019	EF2	A second EF2 tornado with winds to 120 mph, touched down just east of the first one initially damaging trees and the roof of a mobile home. As it moved east, it strengthened as it went down the bluff. Here it destroyed a pig farm building along with taking down a wooden high power transmission line. One other house along with numerous trees sustained damage from the tornado.
MEDIAPOLIS	3/31/2023	EF2	A brief tornado tracked east across the southern portions of the town of Mediapolis, destroying siding and shingles on a few homes and businesses. Numerous large tree limbs fell on mobile homes and frame houses, damaging roofs and siding. In the middle of town, at its peak strength, the tornado widened to 150 yards and produced EF2 damage at a home, where it removed the entire roof, and snapped a few large trees off. The peak winds are estimated to be 120 mph with this tornado.
WEST BURLINGTON	5/7/2023	UNK	Severe thunderstorm activity. Funnel clouds going up and down in the clouds occasionally but never reached the ground.

(UNINCORP) PLEASANTGROVE	4/16/2024	EF2	One of several large and damaging tornados in SE Iowa passed through northwest Des Moines County and caused damage at several farmsteads southeast of Yarmouth. The tornado had a maximum path width around 600 yards. The tornado path length was around 42 miles. Maximum winds were estimated around 130 mph.

Probability

Eight Tornados occurred during the study period. 8/10 years = 80% probability; "Likely" that a tornado will occur in any given year.

Climate trends

Changing jet stream wind patterns can be expected to impact the location and intensity of tornados in coming decades, however, the patterns are not yet clear.

"Tornados, a source of many disasters in Iowa, do not appear to be increasing with climate change. That said, the spatial distribution of tornado occurrences appears to have moved eastward in the past 40 years, with most of Iowa seeing more days favorable to tornado formation, and there has been some variation in when tornados happen. Since these changes have not been directly tied to climate change, it is unclear whether or how long the trends will continue. Nevertheless, warming winters will likely extend tornado season (Iowa, 2023)."

Vulnerability and Impacts

Tornado: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		
	DESCOM		

All geographic locations are vulnerable to this hazard and aside from the soundness of building construction, all structures have a relatively equal risk of being in the path of a tornado. While it may be unlikely that a tornado will impact a specific location in any given year, the threat is always present.

Levee and drainage districts do not have infrastructure that is likely to be impacted by tornados and DESCOM is sited in a well-protected basement.

Tornado Watch and Tornado Warning.

"Tornado Watch: Be Prepared! Tornadoes are possible in and near the watch area. Review and discuss your emergency plans, take inventory of your supplies and check your safe room. Be ready to act quickly if a warning is issued or you suspect a tornado is approaching. Acting early helps to save lives! Watches are issued by the Storm Prediction Center for counties where tornadoes may occur. The watch area is typically large, covering numerous counties or even states.

Tornado Warning. Take Action! A tornado has been sighted or indicated by weather radar. There is imminent danger to life and property. Move to an interior room on the lowest floor of a sturdy building. Avoid windows. If in a mobile home, a vehicle, or outdoors, move to the closest substantial shelter and protect yourself from flying debris. Warnings are issued by your local forecast office. Warnings typically encompass a much smaller area (around the size of a city or small county) that may be impacted by a tornado identified by a forecaster on radar or by a trained spotter/law enforcement who is watching the storm" (NWS2, 2025).

General Impacts

Tornados strike with incredible velocity. Wind speeds may approach 300 miles per hour, and the storm can travel across the ground at more than 70 mph. While advancements in weather forecasting have allowed watches to be delivered to those in the path of these storms up to hours in advance, tornados have been known to change paths very rapidly, thus limiting the time available to take shelter.

Rotating tornadic winds uproot trees and structures and turn airborne debris into deadly missiles. The level of damage can vary from high wind damage to roofs and siding, to a total collapse of the structure. Airborne debris puts lives at risk and causes damage to adjacent structures.

Cost as a vulnerability. It is very expensive to prepare for an event of tornadic magnitude when that event is statistically very unlikely to strike any specific location. Public or community sized safe rooms must withstand tremendous forces, be accessible to all people, meet all manner of safety and regulatory requirements, while they may rarely be occupied for the intended purpose. Private shelters are an expensive improvement for homeowners to make. Therefore, programs that financially support both of these efforts are important to public safety.

Another consideration. It is difficult to locate, organize and transport vulnerable people to a safe place.

- Elderly Pop: 8,144 people over age 65 live in the county (about 21% of the population)
- Children under age 18: 8,444 people, 22% of the population
- Disabled Pop: 2,219 people in the county are disabled, 766 of whom are age 65 or over
- Mobile homes are more susceptible to damage from a tornado; there are 680 mobile homes in the county, housing an estimated 1,564 people
- LEP Pop: An estimated 1,345 people (4% of the population) live in homes where a language other than English is spoken; 493 (1.5%) report having Limited English Proficiency
- The uninformed: those who do not understand the difference between a Tornado Watch and a Tornado Warning or are not aware of a safe place to go.

For these reasons, the planning committee decided to place new emphasis on privately owned shelters and education in addition to investing in larger public shelters.

Des Moines County

In 2022, Ag Statistics reports that there were about 25,000 hogs and 3,000 cattle produced in Des Moines County. Most of these are raised in confinement barns. When a tornado hits a confinement barn, thousands of animals can be injured or killed. If live animals are exposed to severe weather events or power outages, farmers have a significant challenge to contain and protect the health of livestock and humans in contact with injured animals. Severe weather events such as tornados can also result in manure spills at confinement facilities.

Des Moines County parks have campgrounds for tents and RVs, but no tornado shelters. Park visitors may not know where to seek shelter in an emergency.

County and Cities

All structures including critical facilities are susceptible to tornado damage. Some privately owned facilities are critical as well, such as gas stations, pharmacies and the dialysis center.

IAAAP & Two Rivers L&DD

Both of these sites are vulnerable to Tree damage. IAAAP is a large rural property. Trees are an important stabilizing factor on the Two Rivers Levee system.

Schools

Schools need safe storm shelters and backup power generation. SCC completed a new Tornado shelter in 2024.

Impacts of Climate trends. Warming winters will likely extend tornado season. Changing wind patterns and intensification of wind differentials are likely to impact tornado occurrence in ways that are not yet fully understood.

Land use development. This hazard is unlikely to be affected by land development patterns.

Population patterns. Additional population does put more people at risk. This hazard is unlikely to be affected by population patterns in the near future.

Tornado in Iowa (Ready Iowa)

https://ready.iowa.gov/disasters-emergencies/tornadoes

Example of tornado damage in Greenfield IA, 2024

https://ipmnewsroom.org/tornado-devastates-iowa-town-killing-multiple-people-as-powerful-storms-rip-through-midwest/

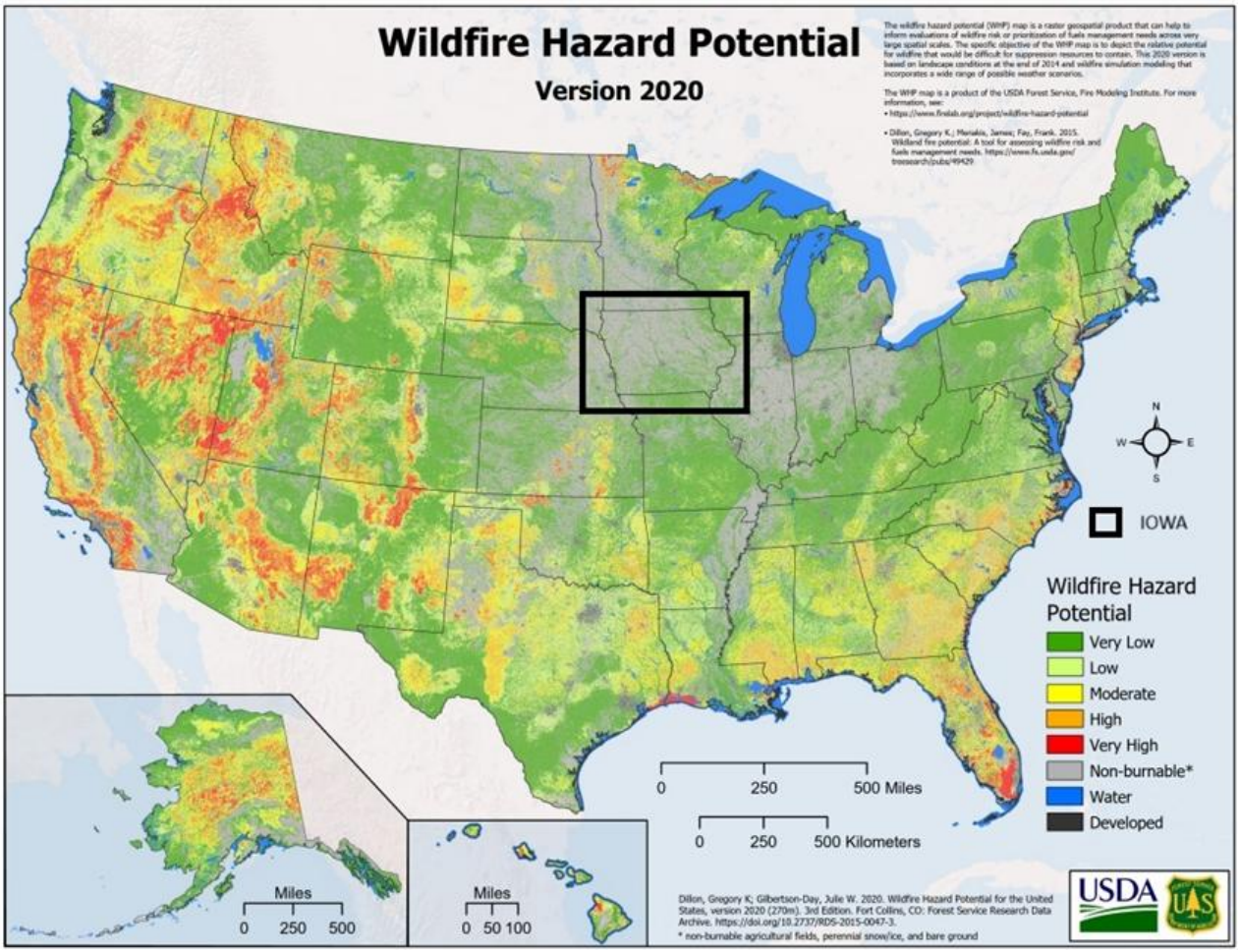
Wildfire

Wildfire conditions tend to be regional, therefore much of the narrative in this section is drawn from the State of Iowa Hazard Mitigation Plan published in 2023.

A grass fire or wildland fire is an uncontrolled fire that threatens life and property in a rural or wooded area. A grass fire or wildland fire is not a cropland fire. Damage to crops from fire are often covered by insurance on land that is not "wild." Wildland or grass fires occur in natural, wild areas. Wildland fires are more likely to occur when conditions are favorable, such as during periods of drought when natural vegetation is more combustible.

Due to the high quality and quantity of agricultural soils, Iowa and Illinois have the smallest percentage of wild land in the United States. Consequently, there are fewer opportunities for wildfires in Iowa than in other states. Almost the entire state is mapped with a "Very Low" wildfire hazard potential. No event reported in the state has been a historically significant wildfire (Iowa B, 2023).

The map below shows the WHP assessed risk in the State of Iowa in context with other states. On its own, the WHP map is not an explicit map of wildfire threat or risk, it illustrates the locations where wildfire is most likely, or probable, to occur (Iowa, 2018).



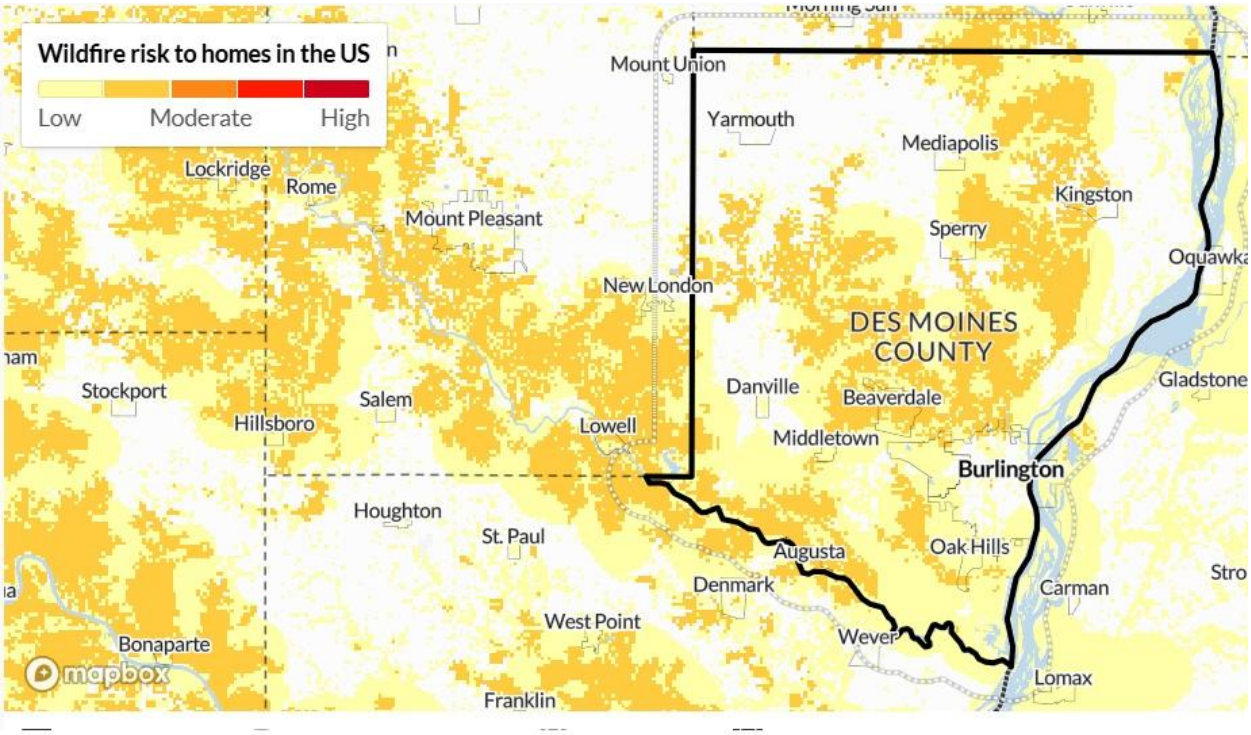
Location

Des Moines County has relatively low vulnerability to wildland fires because of the large percentage of tilled agricultural land or otherwise developed property. Locations which are at the most risk are housing developments outside of corporate limits in natural areas. These houses tend to be located in areas which have longer fire response time.

Schools are unlikely to be impacted by wildfires in Des Moines County because they are located within city boundaries and are not adjacent to wild areas.

Extent

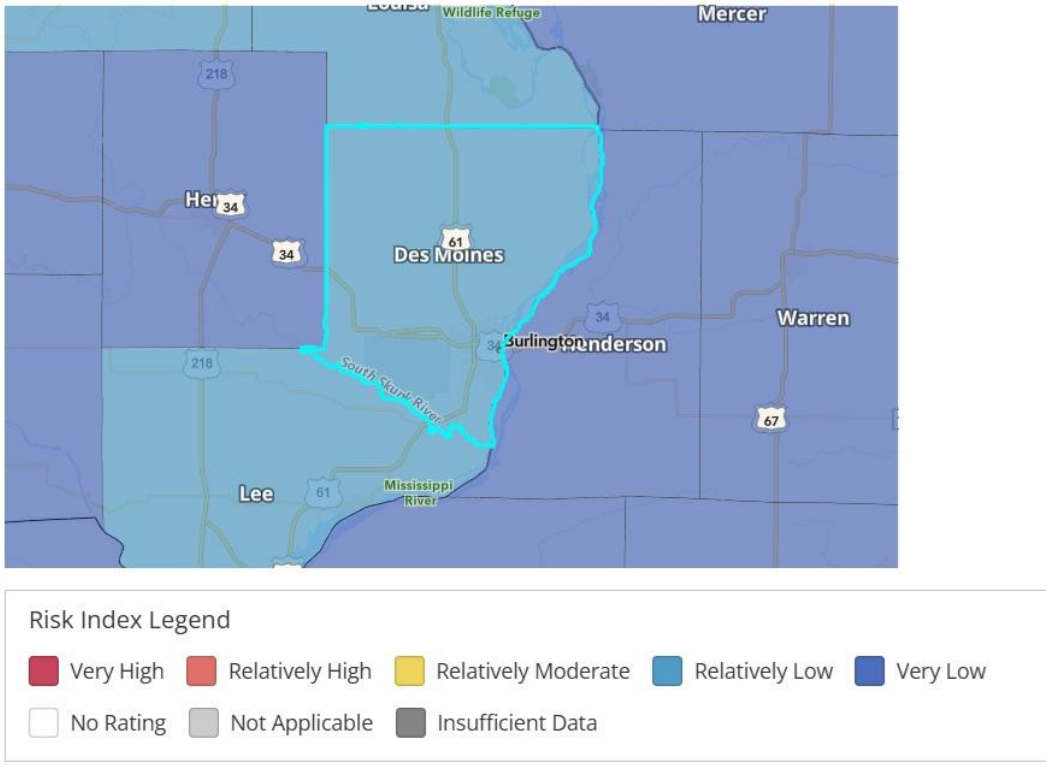
Homes in Des Moines County have, on average, greater risk than 40% of counties in the US and lower risk than 60% of counties in the US (WF Risk, 2025).



https://wildfirerisk.org/explore/risk-to-homes/19/19057/

Wildfire risk in Des Moines County is rated as Relatively Low. This rating is slightly higher than some adjacent counties because of the amount of land in timber or more natural state near the rivers. For example, in Henry or Jefferson Counties wildfire risk is Very Low, because of the quantity of tilled land and minimal number of wild or natural acres. Still, much of Des Moines County is designated as "Non-burnable," mostly cropland (Firelab, 2020).

The Risk Index rating is **Relatively Low** for **Des Moines County, IA** when compared to the rest of the U.S.



https://hazards.fema.gov/nri/report/viewer?dataLOD=Counties&dataIDs=C19057

WUI. Another consideration for wildfire risk is the proximity of housing to wild land areas, called the Wildland Urban Interface (WUI).

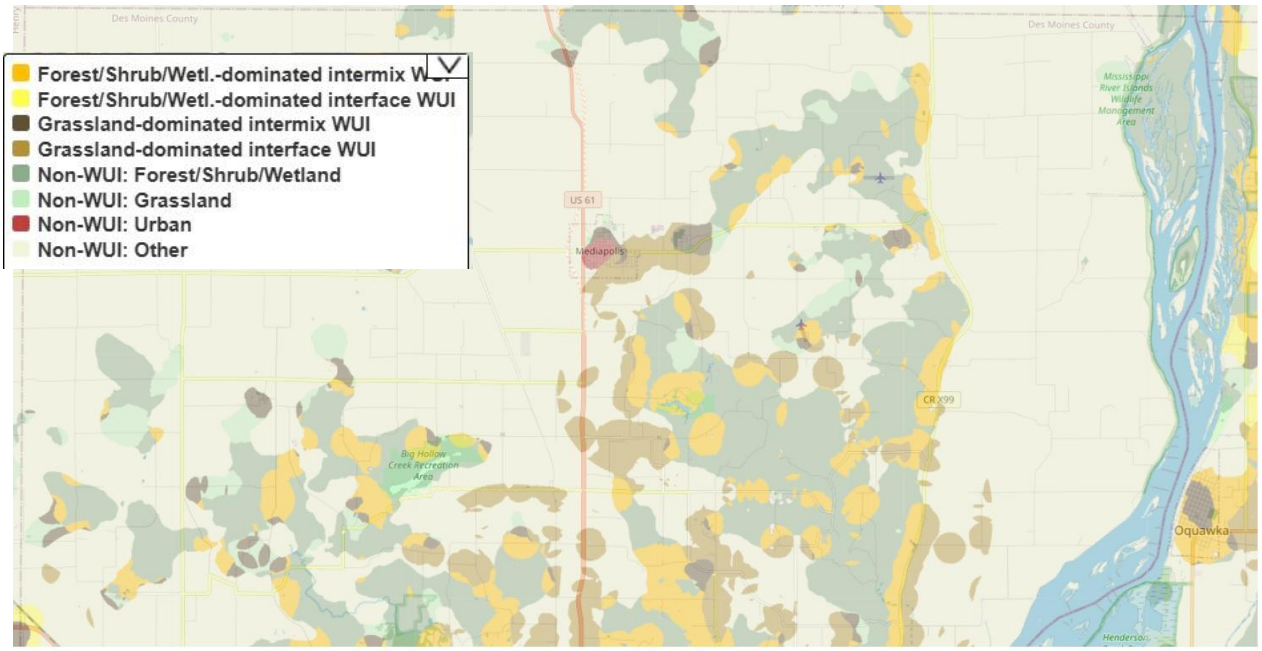
The WUI can be further categorized into:

- ✓ Interface: High-density development directly adjacent to wildland areas.
- ✓ Intermix: Development scattered within the wildland, creating a mix of structures and vegetation.

On the community maps below, yellow or orange indicates Interface or Intermix of wildland with housing or other development.

Red indicates the medium or higher density housing of cities. Tan areas are non-vegetated or tilled agricultural land. Browns are grassland interface or intermix.

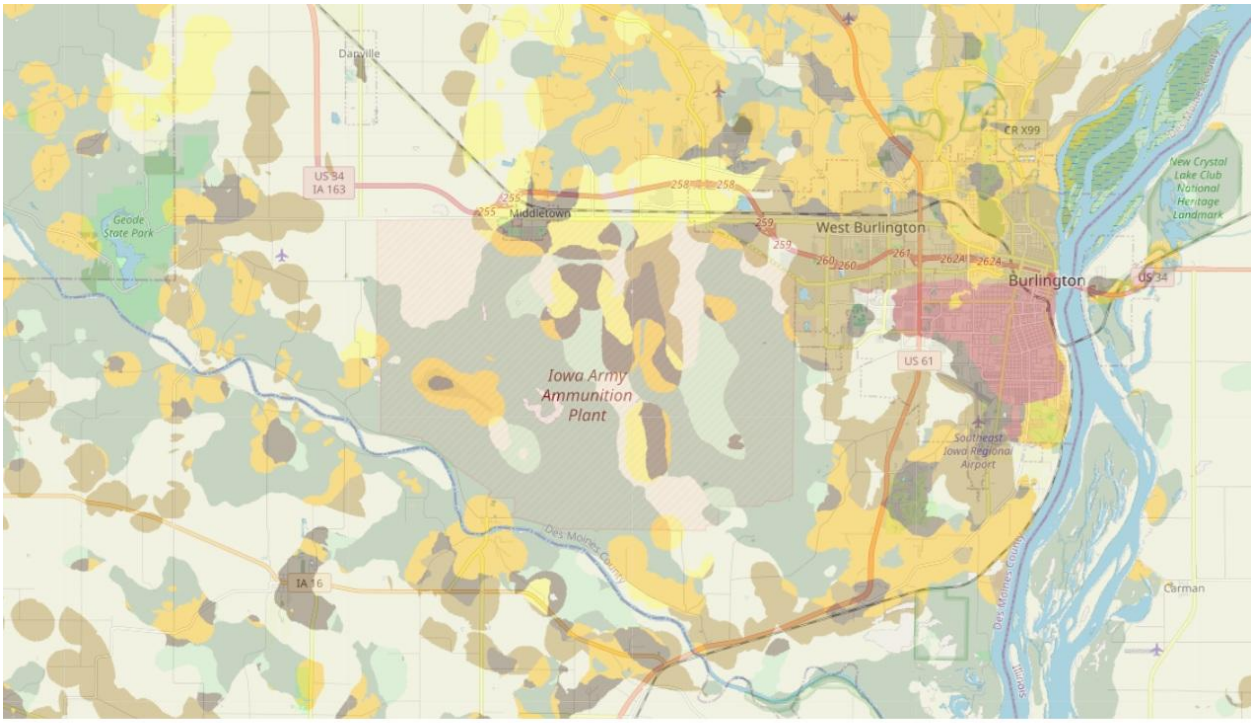
Des Moines County schools and SCC are in medium density housing (red) zones within cities and not adjacent to intermix or burnable wildfire areas. See below.



WUI NORTH HALF DES MOINES COUNTY

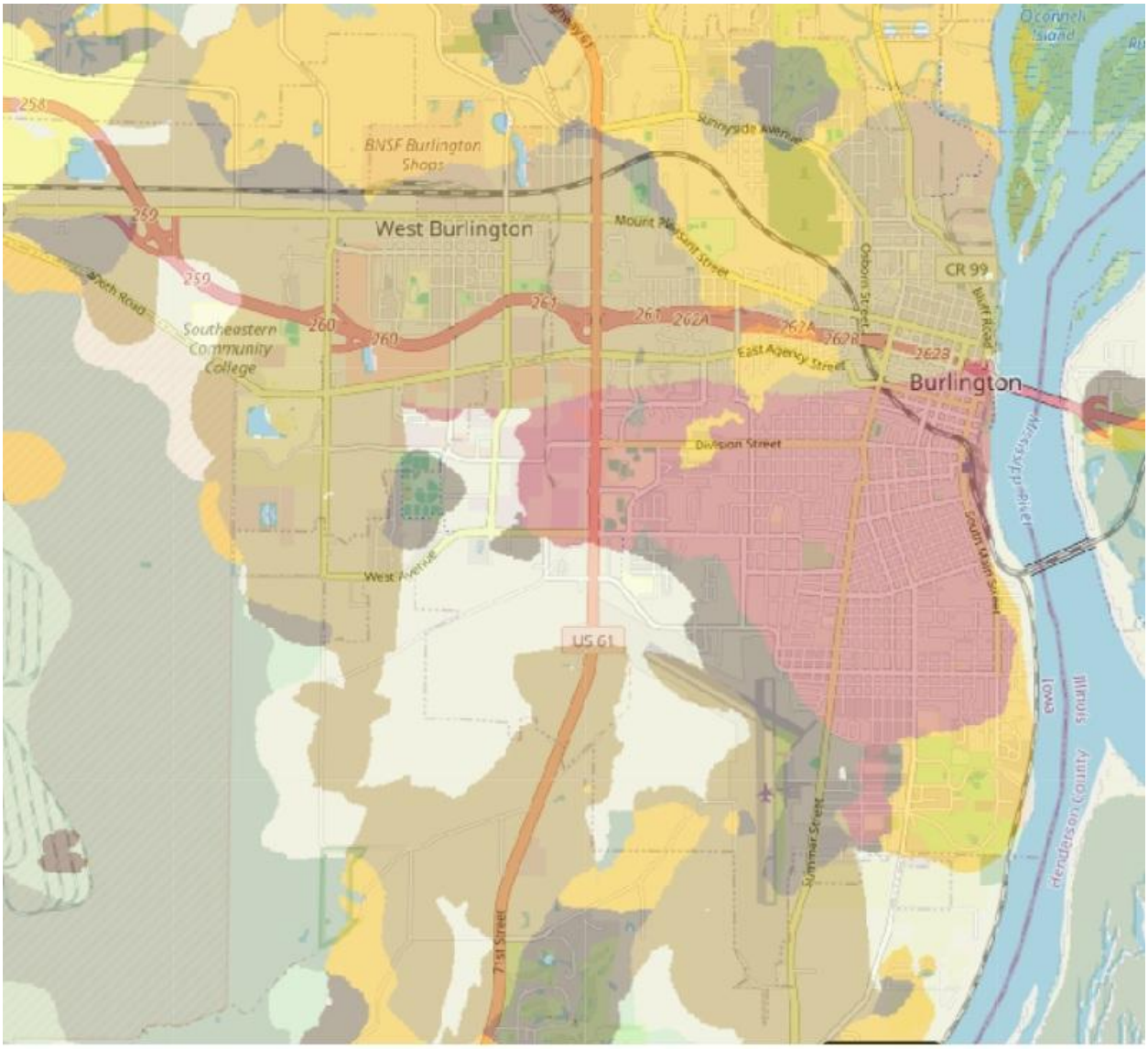
https://geoserver.silvis.forest.wisc.edu/geodata/fast/globalwui/

Much of Des Moines County is classified in Non-WUI categories. Pockets of potentially burnable land are small and scattered, limiting the potential for a wildfire of any significant size. The North side of the urbanized area in Burlington does have somewhat more potential interface.



WILDLAND URBAN INTERFACE SOUTH HALF DES MOINES COUNTY

https://geoserver.silvis.forest.wisc.edu/geodata/fast/globalwui/



WUI INTERFACE BURLINGTON, WEST BURLINGTON

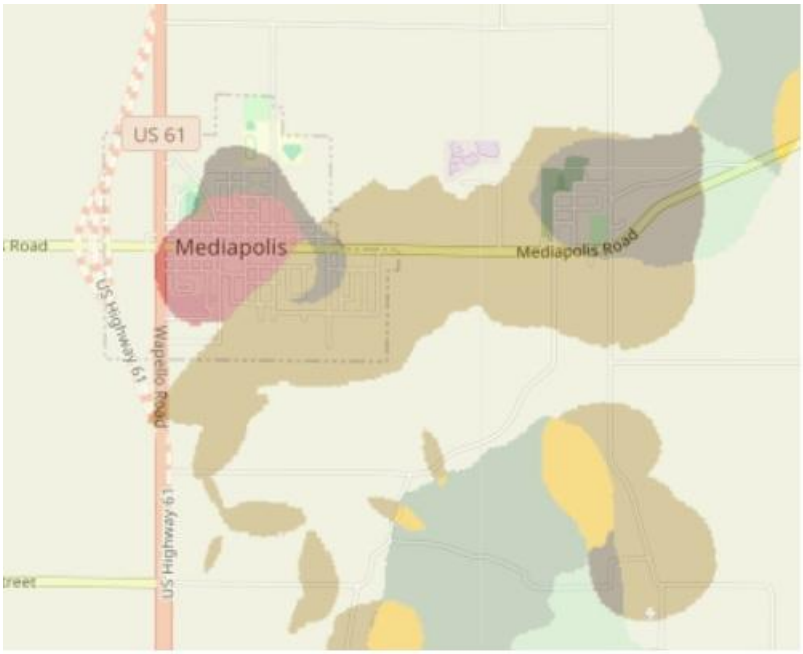
Burlington and West Burlington have a limited amount of natural areas interspersed with non-WUI areas within the city limits and on the periphery.

This means there is a limited amount of potential for a wildfire to occur.

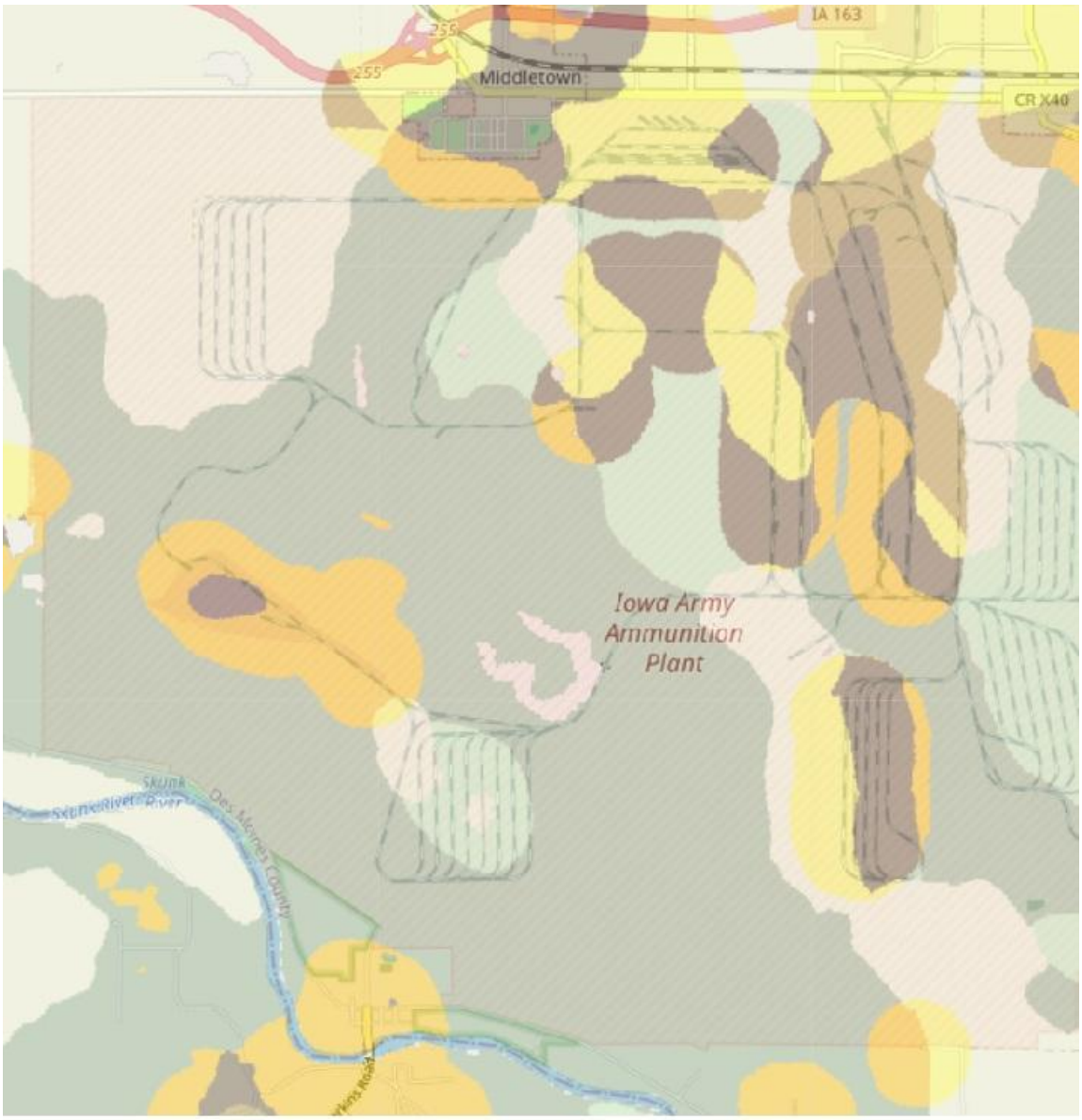
Danville is entirely surrounded by non-WUI land

Mediapolis is mostly Non WUI – Urban and has some grassland area on the north and east sides of town

WUI DANVILLE



WUI MEDIAPOLIS



WUI MIDDLETOWN, IAAAP

Middletown and the Iowa Army Ammunition Plant have some natural areas that are mostly forest and wetland dominated. Much of the area is Non-WUI Forest/shrub/wetland or Forest/shrub/wetland interface. This means there is a very limited potential for a wildfire of any size to occur.

Previous Occurrences

Wildfire data in southeast Iowa has been poorly tracked in recent years. Data from the Iowa Department of Natural Resources is unavailable at this time (Walker, 2025). This is a data deficiency.

The 2020 Des Moines County HMP indicates that approximately 130 acres were affected by 19 grass or wildfire events occurring between January 2015 and May 2020. Those fires averaged about 8 acres in size with the exception of two larger fires of 70 and 180 acres, for a total of 21 wildfires in five years.

Burlington Fire Department responded to 45 grass fires during the same period, 40 of which were 1 acre or less. The largest was 250 acres (about .4 square miles), three were about 20 acres and one was 7.5 acres.

Probability

If we assume the incidence of wildfire is consistent with historic DNR data for previous years and comparing those incidents to known data from nearby counties up to 2023, 21 wildfires in five years gives us a probability greater than 100% = "Very likely." It should be noted that, while a wildfire is very likely to occur during any year, the number of acres burned per fire is relatively small. All the wildfires recorded were in rural areas of the county.

Climate trends

Changes in precipitation are expected to increase periods of drought which can be expected to elevate wildfire risk. However, due to the extensive amount of agricultural land, Des Moines County has a very limited potential for wildfire and that is unlikely to change in the near future.

Vulnerability and Impacts

Wildfire: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
	City of Danville		Danville Community School District
X	City of Middletown		Mediapolis Community School District
	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

According to the Wildfire Hazard Potential data, and the WUI map, most rural areas are at low or very low risk for wildfires. Much of the County is classified as non-burnable. Aerial maps verify where natural areas are, in relation to towns.

Des Moines County

Where rivers and streams are present, there are more potential burnable acres than in most of the county. Housing is very low density in these areas. Wildfires can occur in remote areas, where fire response may be delayed.

Cities of Burlington and West Burlington

While much of Des Moines County is classified as non-burnable with limited interface or intermix, the urbanized area has a somewhat higher potential for wildfire to intersect with development on the north side of these towns. Residential or commercial areas adjacent to potentially burnable acres are impacted when natural debris is allowed to collect near homes or buildings. Some risk of wildfire is present where timber and natural areas are within or adjacent to city limits or unincorporated places.

Middletown and the Iowa Army Ammunition Plant (IAAAP)

This area has areas of Forest/Wetland/Grass intermix and interface, therefore the potential for wildfire is somewhat greater than the other small communities in the county.

Impacts of Climate trends. Drought is a hazard with the greatest effect on wildfire. Increased length and intensity of drought would elevate risks.

Land use development. Development in wooded areas would increase risk from wildfire, however most wooded areas are conservation land and not available for development.

Population patterns. This hazard is unlikely to be affected by population patterns because Des Moines County is almost entirely a non-vegetated or non-burnable agricultural zone.

Winter Weather

Winter weather can refer to a combination of winter precipitation, including snow, sleet and freezing rain. A severe Winter weather event can range from freezing rain or sleet to moderate snow over a few hours, or to blizzard conditions and extremely cold temperatures that last several days.

Blowing snow is wind-driven snow that reduces visibility and causes significant drifting. Loose snow begins to drift when wind reaches a speed of 9 to 10 mph under freezing conditions.

Blizzards occur when falling and blowing snow combine with winds of 35 mph or greater, reduced visibility of 1/4 mile or less, and white out conditions.

Freezing rain is precipitation that falls onto a layer of freezing air near the surface. When the precipitation contacts the surface, it forms into a coating or glaze of ice and even a small accumulation can cause a significant hazard.

Sleet is frozen precipitation that has melted by falling through a warm layer of the atmosphere and then refreezes into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and can accumulate like snow and become a hazard to motorists.

Ice storms are extended freezing rain events, lasting from several hours to days, when the freezing rain accumulates on surfaces and damages trees, utility lines, and roads. Ice loads on overhead power lines, combined with windy conditions, may cause the lines to "gallop." This forceful motion often causes the lines to break away from the connectors and poles, resulting in widespread power failure.

Wind Chill is used to describe the relative discomfort and danger to people from the combination of cold temperatures and wind. The wind chill chart from the National Weather Service shows the apparent temperature derived from both wind speed and temperature.

Location

The geographic planning area is at risk from Winter weather events several times each year. Ice and freezing rain, snowfall, cold temperatures and wind are hazardous to all residents and structures.

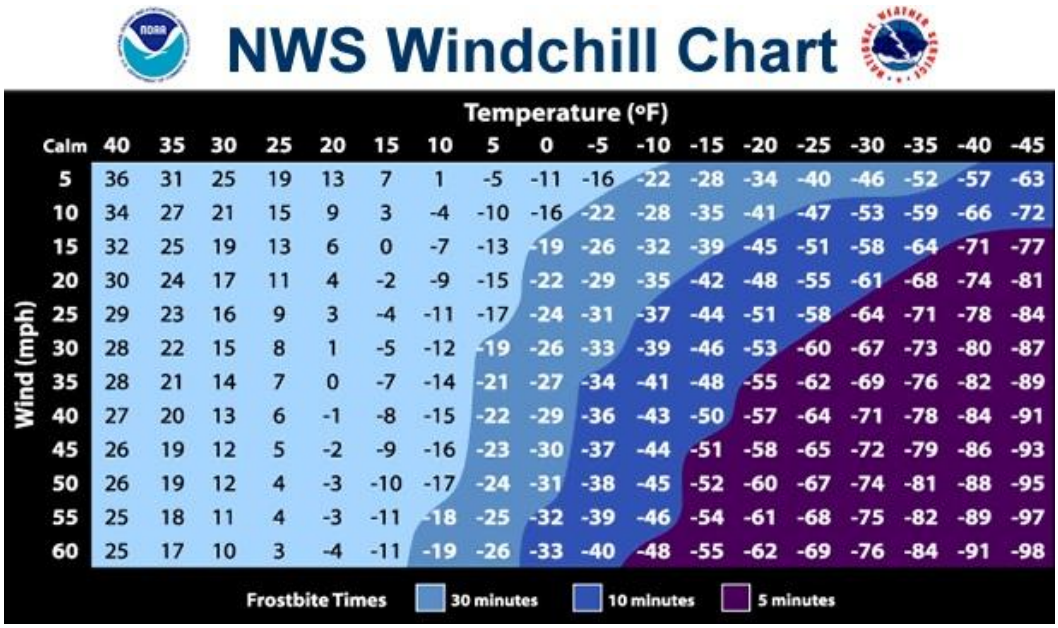
Extent

The Sperry-Piltz Ice Accumulation Index is used to categorize ice damage, as shown in the table below. Ice accumulation can be expected to occur at any level on the Sperry-Pilz Index.

The planning area also uses the National Weather Service (NWS) Windchill Chart to evaluate the potential for injury or loss of life due to low temperatures. Due to the unpredictable nature of Winter weather, the planning area can experience a wide variety of temperatures referenced on the Windchill Chart (below). It is expected that temperatures of -20 or warmer can occur, with potential wind speeds at any level on the NWS chart below.

Sperry Piltz Ice Accumulation Index

Ice Damage Index	Damage and Impact Descriptions
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick or hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice conditions.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is extensive. Outages lasting 1-5 days.
4	Prolonged and widespread utility interruptions with extensive damage to main distribution feeder lines and some high voltage transmission lines and structures. Outages lasting 5 to 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.



Previous Occurrences

During the years 2015 through 2024, twenty-three winter weather events are recorded for Des Moines County in the NOAA Storm database. In some years, few severe winter events occur, while at other times, several events can be recorded in a single winter season.

BEGIN_DATE	END_DATE	EVENT_TYPE	EVENT
1/5/2015	1/6/2015	Winter Storm	Spotters reported 6 inches of snow.
2/1/2015	2/1/2015	Winter Storm	A report of 9 inches was observed near Burlington. Other reports ranged from 4 to 6 inches within the county.
2/25/2015	2/26/2015	Winter Storm	Storm observer reported 6.0 snow in Burlington. Other reports within the county were between 3 to 6 inches of snow.
12/28/2015	12/28/2015	Winter Storm	Trained spotters reported between 0.20 and 0.25 inches of ice accumulation on the morning of December 28th. Ice was accumulating on trees. Several branches and small trees were down in the county. The largest branches were 4 to 5 inches in diameter. In addition to the freezing rain, a trained spotter reported an inch of sleet in Burlington.
12/24/2017	12/24/2017	Winter Weather	Snowfall reports ranged from 2.5 inches 1 mile north of Burlington to 3.8 inches in Burlington.
12/29/2017	12/29/2017	Winter Weather	COOP observer snowfall reports ranged from 0.5 inches 2 mile south of Burlington to 3.0 inches near Gladstone.
4/8/2018	4/9/2018	Winter Weather	A trained spotter reported 4.0 inches of snow 2 miles north of Burlington.

11/25/2018	11/26/2018	Winter Blizzard	Multiple sources of snow amounts of 9 inches up to over 11 inches, combined with strong north winds of over 30 mph with frequent gusts over 40 mph produced blizzard conditions in the county. These conditions started in the afternoon and lasted into the overnight hours.
1/11/2019	1/13/2019	Winter Storm	Snowfall reports ranged from 9.0 inches from a trained spotter in Burlington to 11 inches from a COOP Observer 2 miles south of Burlington.
1/18/2019	1/19/2019	Winter Storm	Snowfall reports ranged from 5.0 inches 1 mile west of Burlington to 7.0 inches 1 mile east northeast of the Burlington Regional Airport. Wind gusts of 20 to 30 MPH caused blowing and drifting snow.
1/29/2019	1/31/2019	Winter Extreme Cold	Record low temperatures were set on the mornings of the 30th and 31st when the ASOS at Burlington recorded record low temperatures of -20 and -21 degrees Fahrenheit. The coldest wind chill measured at the Burlington Regional Airport ASOS was -46 at 253 AM on the 30th.
10/30/2019	10/31/2019	Winter Weather	A trained spotter reported 4.0 inches of snow 2 miles north of Burlington.
4/16/2020	4/17/2020	Winter Storm	Trained spotter reports ranged from 7.0 inches from the COOP Observer 1 mile east southeast of the Burlington Airport to 8.3 inches from a trained spotter 5 miles south southeast of Sperry.
12/29/2020	12/30/2020	Winter Storm	Trained spotters and COOP observers reported 4 inches of snow and ice accumulations near 0.25 inches.
1/1/2021	1/1/2021	Winter Storm	Snowfall reports ranged from 2.0 inches from the The COOP observer 2 miles south of Burlington to 3.0 inches from a trained spotter 2 miles north of Burlington.
1/25/2021	1/26/2021	Winter Weather	The COOP observer 2 miles south of Burlington reported 2.3 inches of snow.
1/30/2021	1/31/2021	Winter Weather	The COOP observer 2 miles north of Burlington reported 2.5 inches.
2/4/2021	2/4/2021	Winter Storm	Rain and wintry mix started the day, leading to snow (heavy at times), where between 1 and 3 inches of snow fell throughout Des Moines County. Strong winds were also noted in the afternoon, with a peak gust at 48 mph reported at the Burlington Airport ASOS.

1/1/2022	1/1/2022	Winter Storm	Spotter, COOP, and public reports of 4-8 inches of snow fell across portions of Des Moines County. Blowing and drifting snow continued to cause problems on roads after plowing, lasting into January 2nd. Verification was also considered using snow amounts and other combined hazards/impacts, with the highest snowfall report in Burlington at 7.5 inches.
1/14/2022	1/15/2022	Winter Storm	Spotter, COCORAHS, and public reports of 5-8 inches of snow fell across portions of Des Moines County. Blowing and drifting snow continued to cause problems on roads after plowing, lasting into January 15th. The highest snowfall report from the event was 7 inches in Burlington.
12/22/2022	12/24/2022	Winter Storm	A CoCoRAHS observer 2 miles southwest of Yarmouth reported 2.0 inches of snow. Winds quickly increased with gusts of 40 to 50 MPH which led to blowing and drifting snow across the area. the peak measured gust at the Burlington Airport was 49 MPH. Additionally, this also produced wind chills of -20 to -30. The coldest wind chills occurred on the 23rd.
1/8/2024	1/9/2024	Winter Storm	Snowfall reports ranged from 8.0 inches from the COOP Observer in Augusta, to 11.5 inches from the COOP Observer 2 miles south of Burlington. A trained spotter reported 13.5 inches, 1 mile east northeast of the Burlington Airport.
1/11/2024	1/12/2024	Winter Storm	Numerous reports of 5 to 9 inches of snow were received, with widespread significant drifting snow continuing into the evening hours.

Probability

Twenty-three events over a ten year period gives a probability greater than 100% that a severe winter event will occur, “Very likely.”

Impacts of Climate trends. Severe Winter weather events are decreasing. As winters warm faster than summers, winter weather is expected to cause less damage in coming decades. Overnight lows are increasing quickly relative to daytime temperatures, meaning there may be less than historical rates of re-freezing of snow and ice at some points in winter, and more at other points. Winters are becoming shorter as well (Iowa, 2023).

- ✓ Frost-free seasons increasing by up to 10 days by 2045 and 20 days by 2065, compared to the period of 1976-2005
- ✓ A shorter, less severe winter may permit the survival of more pests and pathogens.

Climate trends already observed by 2023.

- ✓ Winters warming six times faster than summers
- ✓ Increased precipitation (8 percent from 1873 to 2008)

Vulnerability and Impacts

Winter weather: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

Winter weather impacts the planning area and presents life-threatening conditions. All forms of travel are impacted by ice, snow, and winter temperatures.

Heavy snows of more than six inches in a 12 hour period or freezing rain greater than 1/4 inch accumulation can cause hazardous conditions in the community by slowing or stopping the flow of vital supplies as well as disrupting emergency and medical services. Ice accumulation of one-fourth inch in thickness is heavy enough to damage trees and above ground electric lines leading to power outages, increasing the vulnerability of people in homes and businesses.

Ice storms often cause tree damage, downed power lines and utility poles. These storms have caused power outages over large areas at times.

Des Moines County

Thousands of people travel local highways each day. Six hundred thirty-eight miles of paved and gravel county roads carry thousands more. Each vehicle carries at least one person and often several, of all ages and abilities, who are at risk of life threatening exposure to the elements.

Roadways covered with ice and snow create problems; vehicles become stranded, and first responders are delayed providing emergency services to a large number of people in need of assistance in a short timeframe. Emergency personnel mobilized to render assistance are additional lives placed at risk during the most hazardous conditions.

Cold temperature affects agriculture and farm workers. Frost and freeze impacts are especially destructive to crops early or late in the growing season. Unprotected livestock suffer from cold, and it may be difficult for farmers to deliver sufficient hay and feed in bad weather.

County and Cities

Ice accumulation or winds take down power lines resulting in loss of heat sources, loss of refrigeration. Water pipes freeze, and people may experience hypothermia.

Community shelters are absent or lack sufficient capacity. Problems include a lack of temperature controlled public space; beds, hygiene facilities, food supplies and personnel to shelter residents and stranded strangers. Elderly or disabled people may not be able to travel independently to a safe, temperature controlled place.

Power outages impact people who rely on home medical equipment to sustain health or refrigeration for insulin. Improper use of alternative heat sources can create other hazards such as carbon monoxide poisoning or structural fires.

Heavy snow and winter cold: Costs of snow removal, repairing damage, and loss of business. Economic impacts due to property damage and agricultural production loss can be significant. Lost wages and interruptions to business affect tax revenue. Additional costs for employees needed to clear the snow can strain city budgets. Sidewalks and paths become obstructed and slippery. Ice covered paths and steps lead to falls, especially dangerous for the elderly.

Winter weather makes fires more difficult and dangerous to fight due to extreme temperatures and heavy snow. Fires during winter weather present increased danger because water supplies may freeze, and firefighting equipment may not function effectively. Personnel and equipment may be unable to reach the fire. Firefighters are exposed to water and severe low temperatures, life threatening conditions.

Schools

Buses must travel all types of roads to transport hundreds of children to school in poor road conditions. Bus routes may be diverted to safer roads, impacting the families who must either transport the students to the nearest bus route or miss days of school.

For students that commute, winter snow, ice and frigid temperatures present unsafe travel conditions.

Schools have to close for staff and student safety. Students miss valuable days of education. The closing of schools has an impact on families if parents must arrange last-minute childcare or miss work.

Impacts of Climate trends. Extreme cold and Winter weather may come less frequently as winters warm.

Land use development. Developers should consider the travel challenges that will be faced by residents and businesses in severe winter weather. Gravel roads, steep driveways and proximity to highways are just a few of the potential factors that would increase or decrease risk from additional new development.

Population patterns. An increase in residential housing would increase the need for roads to be cleared promptly in those areas.

Other hazards

Animal, Crop, Plant Disease

This hazard includes diseases that affect trees, crops, plants, livestock and wildlife such as deer, birds, rodents, fish, insects and other living things. Infectious diseases are caused by diverse living agents that replicate in their hosts. The agents that cause disease fall into five groups: viruses, bacteria, fungi, and parasites (protozoa and worms) (Janeway CA Jr, 2001).

Large-scale infestations of insects or rodents negatively impact other life and are often fueled by environmental drivers or by the weakened health of another species.

Overpopulation and the geographic movement of wildlife can contribute to the spread of disease. For example, according to the Center for Disease Control, while deer are not infected with Lyme disease, they are an important source of blood for ticks and are important to tick survival and movement of Lyme infected ticks to new areas (CDC Lyme, 2023).

International travel and the movement of goods in the global economy create conditions where contamination of native species is unavoidable. "Incidents of animal or plant disease are not solely natural occurrences. Human actions are extensively implicated in the spread and outbreak of disease. In turn, disease affects human interests widely, and much effort is spent in the control of disease (Wilkinson, 2011)."

The United States Department of Agriculture monitors reports submitted by veterinarians and labs to identify patterns. The Iowa Department of Agriculture and Land Stewardship (IDALS) conducts numerous animal disease investigations each year. The department is proactive in providing information to the agricultural community on medical concerns.

Location

The potential for Animal, Crop and Plant Disease is present throughout Des Moines County and its cities. Livestock and crop farms are present throughout the rural areas and as part of the world food supply are a substantial portion of the local economy. Due to this agricultural production, a high impact occurrence of disease would affect the entire county and beyond.

The rich landscape of SE Iowa provides habitat for a great diversity of wildlife and plant species. If a new disease, pest or pathogen is introduced, it can negatively affect the entire ecosystem.

Affected jurisdictions: County and Cities

Extent

Different measures of severity apply to the various fields of study of disease, and a discussion of all of these is beyond the scope of this study. The US Department of Agriculture and the Department of Natural Resources both track and report plant and animal disease under different methods.

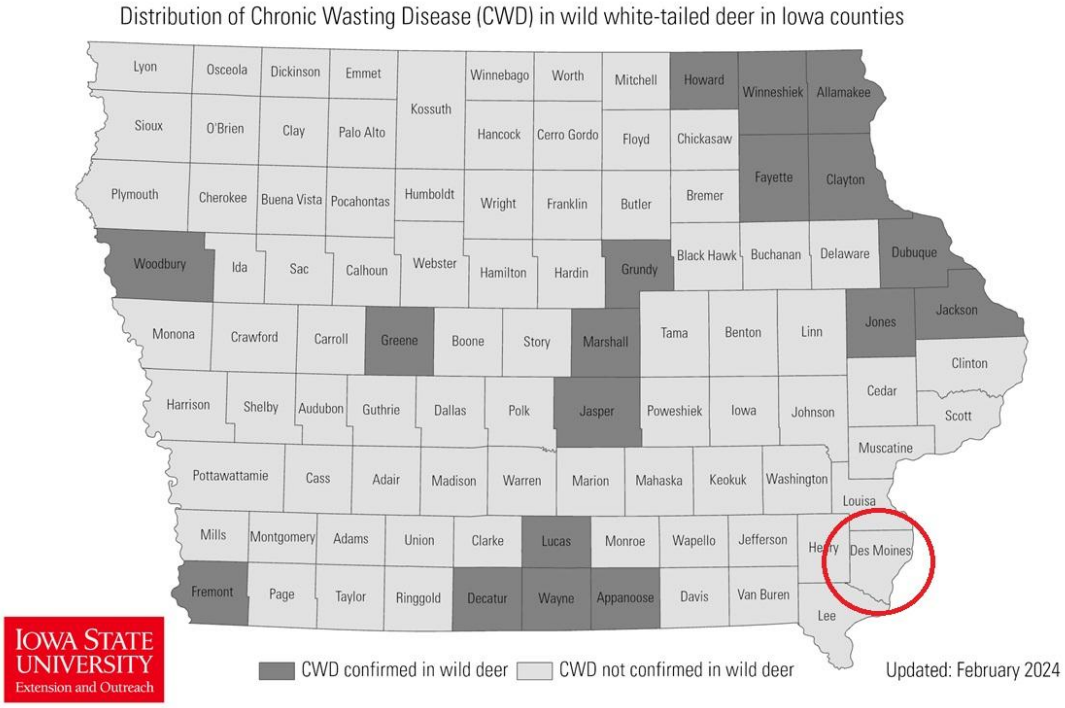
For this report, we define an animal, crop or plant disease as a hazard event if it would have widespread social, economic or public health impacts.

Previous occurrences

The emerald ash borer is an invasive insect known to be highly destructive to ash trees. Damage to ash trees in the area from the emerald ash borer was acknowledged by all communities. By 2023, Emerald Ash Borer had been confirmed in all but two Iowa counties, including Des Moines County, according to the Iowa DNR, although most ash trees in the county have now been removed. Experts suggest that emerald ash borer infestation will significantly impact any remaining trees and forested areas (IDNR, 2023).

Disease in local deer population. At least two diseases are of concern to the Des Moines County community, Chronic Wasting Disease (CWD) and Epizootic Hemorrhagic Disease (EHD), also known as "blue tongue". While CWD has been detected in Iowa, it is not known to be present in Des Moines County.

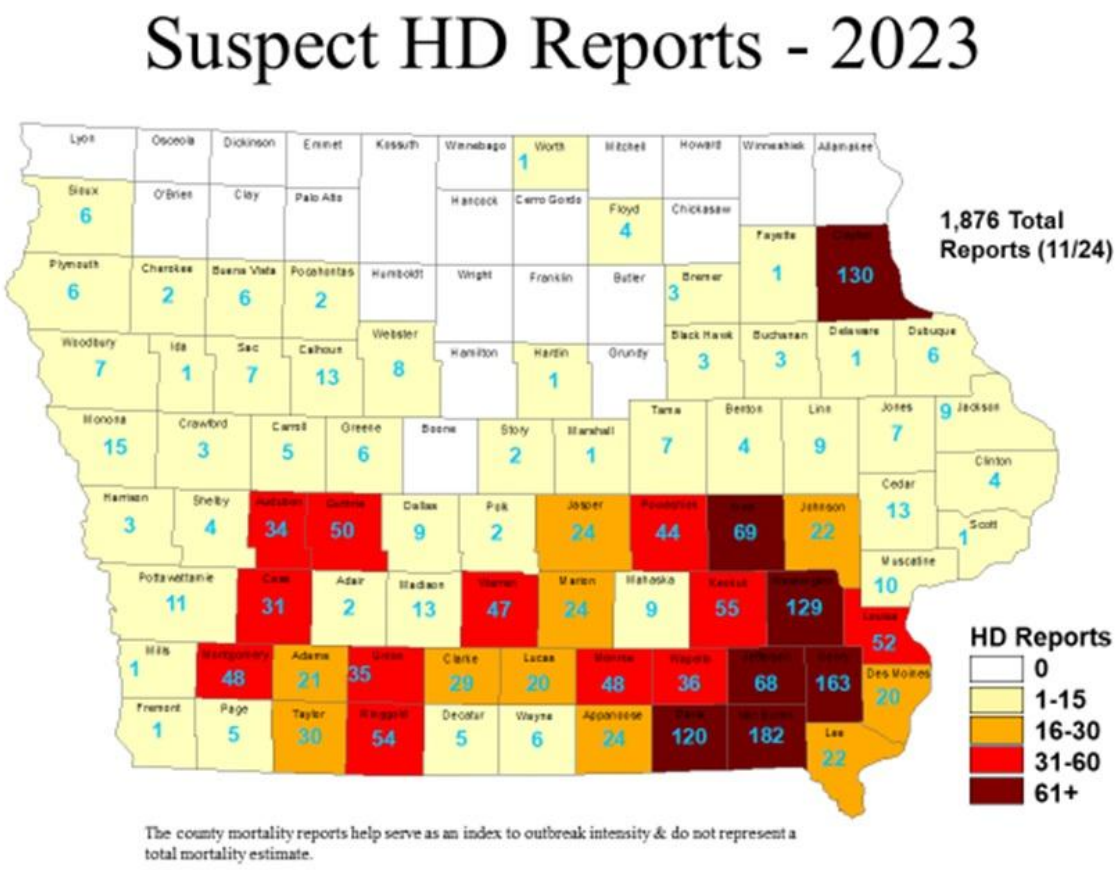
Chronic Wasting Disease (CWD) is caused by a protein that deteriorates the brains of deer. It is always fatal. The disease is known to have been in Iowa for about 10 years and is spreading. Jace Elliott, a Department of Natural Resources deer biologist says he expects to see more chronic wasting disease in deer each year. "I would consider Chronic Wasting Disease to be the greatest threat that the Iowa deer



herd faces" Elliott said (Markel, 2023).

While CWD has not yet been detected in Des Moines County the community considers it a potential hazard.

Epizootic Hemorrhagic Disease (EHD)



EHD Outbreak in Iowa Deer Herd from the publication Western Iowa Today 2023:

> An outbreak of Epizootic hemorrhagic disease is occurring amongst Iowa's deer population, particularly in the eastern half of Iowa.
>
> Keith Ringler, Private Land Biologist for the Iowa Department of Natural Resources, says EHD is a native disease that causes significant morbidity and mortality among whitetail deer in North America. He says the virus is transmitted primarily by biting midges. Ringler says the incubation period for developing disease in deer is five to ten days. Ringler says the condition is also called blue tongue.
>
> Ringler encourages farmers harvesting crops or hunters finding dead deer near a water source to contact the DNR. Ringler says the first hard freeze will eliminate the midges, making this less prevalent through the fall and winter (Robinson, 2023).

From Iowa Capital Dispatch, by Jared Strong November 30, 2023:

> So far this year, those midge bites have resulted in 1,876 suspected EHD deaths in Iowa's whitetail deer, predominantly in the far southeastern part of the state, said Jace Elliott, the state deer biologist. The disease is not believed to transmit from deer to deer.
>
> The virus has infected deer across most of Iowa this year (2024) and is the most widespread outbreak documented by the DNR so far. There have been reports of deaths in 76 of the state's 99 counties.

As of Nov. 24, 2023 the southeast counties with the highest totals for the year include Van Buren at 182, Henry at 163, Washington at 129 and Davis at 120. Jefferson County reported 68 suspected EHD deaths.

The reported death toll from the outbreak is likely to increase during the hunting seasons and surpass the outbreak of 2019, which had slightly more deaths than what have been tallied so far this year, Elliott said. Nearly 3,000 suspected EHD deaths of deer were recorded in 2012, when the disease was first detected in the state. The true number of deaths is likely higher because not all of them are detected. The most obvious signs of EHD infections are dead deer near water, where they are driven by fevers that are associated with the disease.

Elliott said outbreaks are generally expected to happen every three to five years.

Agriculture and Avian Flu. A severe occurrence of infectious animal disease causes significant damage to markets. In 2022, Avian influenza outbreaks reduced egg production, driving prices to record highs. U.S. egg inventories were 29 percent lower in the final week of December 2022 than at the beginning of the year. By the end of December, more than 43 million egg-laying hens were lost to the disease itself or to depopulation since the outbreak began in February 2022 (USDA, 2023). Another outbreak was detected in 2024.

In 2015 Iowa experienced impacts to avian populations when 18 counties and 77 sites across the state were affected by highly pathogenic avian influenza (HPAI). The 2018 Iowa State Hazard Mitigation Plan noted that more than 33 million birds had to be euthanized and disposed of with the cost of replacement estimated at $83.6 million. The replacement cost does not include economic impacts from unemployment and costs to euthanize birds and dispose of carcasses.

Probability

Five events in the ten year period 2015-2024 are noted above – Ash borer, 2 Deer diseases, 3 cases of Avian flu. The probability for Animal, Crop and Plant Disease is determined to be 50% = “Even chance.”

Climate trends

Changes in temperature, precipitation, water levels and a host of other environmental factors will affect the range and survival of many species of plants and animals. Winters are warming faster than summers; therefore, pest and pathogen survival may increase.

Changes in the amount of moisture in the local environment will affect the health of plants and pathogens. Wet soil conditions are cited as the cause for an epidemic of soybean sudden death syndrome that occurred in Iowa in 2010.

Wildlife. As one example of the effects of climate trends on wildlife, according to the National Audubon Society, “Scientists agree that we should take immediate action to hold warming at 1.5 degrees Celsius or else face increasingly dire consequences. If we do nothing, 1.5 degrees is imminent, 2 degrees could happen as soon as 2050, and 3 degrees could occur by 2080.”

At an increase of 3 degrees Celsius, Highly and Moderately vulnerable birds may lose more than half of their current range as they are forced to search for suitable habitat and climate conditions elsewhere (Degrees, 2023). Fifty species of bird are classified as having Moderate (36) or High (14) Vulnerability to climate change in Iowa.

Changes already observed in Iowa by 2023.

A shorter, less severe winter may permit the survival of more pests and pathogens.

- ✓ Winters are warming six times faster than summers
- ✓ Increased precipitation (8 percent from 1873 to 2008)
- ✓ Abnormal seasons
- ✓ Longer average growing season by two weeks (frost-free seasons increased by an average of nine days since 1901)
- ✓ Longer pollen season, exacerbating allergies, asthma, and sinusitis
- ✓ Plants leafing out and flowering sooner
- ✓ Migrating pollinators miss plants that bloom too early, endangering both
- ✓ Birds migrating earlier, sometimes missing seasonal waters and food sources
- ✓ Habitable ranges changing (some native plants and animals having a harder time in Iowa, some from warmer regions moving north)
- ✓ Favorable conditions for survival and spread of many unwanted pests and pathogens

Lower air quality

- ✓ Higher temperatures, sun, and stagnant air are generally more favorable to ozone formation. Rain, wind, humidity, clouds, and cool air limit ozone formation
- ✓ High ozone concentrations, which can be high in both rural and urban contexts may reduce soybean and corn yields by 5 and 10 percent, respectively
- ✓ Ozone also negatively impacts human and animal health

(Iowa, 2023)

Vulnerability and Impacts

Animal, plant & crop disease: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville		Danville Community School District
X	City of Middletown		Mediapolis Community School District
X	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

Unincorporated Des Moines County is affected by diseases in agriculture and wildlife. Cities are most often affected by diseases in domesticated animals, plants and trees, although there is a significant population of wild deer living within city limits throughout the county.

Pest and pathogen infestations can cause widespread tree and plant loss. Once infestation occurs, a pest may become endemic, causing repeated losses in subsequent growing years, and may ultimately lead to species extinction. Two historic examples of this are the devastating effects of the imported fungus which destroyed the American Chestnut, and Dutch Elm Disease. The Emerald Ash Borer was a recent threat to Ash trees in Des Moines County.

Wildlife suffers from pest and pathogen infestations as well. Intensified drought and flood cycles have a negative impact on wildlife. A reduced quantity and quality of fresh surface water during drought impacts the health of wild plants and animals, while too much water and additional flooding damages habitat.

Notes on Agriculture

Even rumors of an infectious animal disease can cause disruptions to the economy, often due to a lack of information or misunderstanding about food and health safety. One example of the potential scope of the problem comes from an Article in the Des Moines Register in September of 2019:

Iowa's $8 billion pork industry tests its readiness for African swine fever:

> Dermot Hayes, an Iowa State University agricultural economist, said that in the wake of an African swine fever outbreak, the U.S. likely would lose most of its export markets, which account for about 27% of the country's production.
>
> The lost exports would cut pork receipts by about 45%, and U.S. pork producers would lose $8 billion in just the first year, Hayes estimated.
>
> It likely would mean about 25% of Iowa's producers would close, he said. "When you lose your export markets, you have to downsize your industry," Hayes said.
>
> Getting rid of the disease in the U.S. would be difficult, he said. Pigs are moved around the country daily, and with an incubation period of about 10 days, infected animals could be transported hundreds of miles before showing symptoms.
>
> "We have about a million pigs moving on the road on any given day" in the U.S., Hayes said (Eller, Pork Industry Tests its Readiness, 2019).

Des Moines Co Agriculture

In unincorporated Des Moines County, a large percentage of the county is agricultural. It takes time to mobilize assistance from state or federal sources. Animal disease outbreaks can rapidly overwhelm the local animal care system. With hundreds of thousands of head of livestock produced and transported in the state each year, Iowa could be a rich environment for a disease epidemic. An incident of high consequence disease will significantly limit the ability to move, slaughter, and export animals and animal products.

Agriculture is vulnerable to the introduction of foreign plant and animal diseases. Contamination can occur through material carried by international travel and trade, by the importation of infected products, or carried by migratory wildlife.

Iowa is the nation's number one producer of corn, soybeans, eggs, and hogs. A local outbreak of disease in agricultural products has widespread economic and social implications. Economic impacts of animal, crop or plant disease include not only loss of jobs and exports, but a reduction in the local and even global

food supply. Rising prices due to shortages impact families while reduced tax revenue impacts local government.

Des Moines County; Deer

Des Moines County is a rural county with a significant amount of wildlife. Climate trends affect habitat and range for traditional species. There is a rising incidence of blue tongue disease (EHD) among a prolific deer population and chronic wasting disease (CWD) in the state. Concerns about the health of deer reduces hunting, increasing the deer population. Overpopulation leads to increased disease transmission.

Reduced harvesting of game deer has secondary effects: deer feeding on crops and residential plantings, and significant costs to insurance companies from an excessive number of deer/vehicle collisions on Iowa roads.

Local hunting of Whitetail deer is not only an important cultural and recreational activity; deer meat is a low cost source of nutrition on which many families rely. Doubts about the health of local deer means that a greater percentage of game may not be harvested, families will have to purchase more meat.

Des Moines County & All Cities

Wild and domestic trees, plants and animals lack resistance to introduced pests and pathogens, mutations of native pathogens and changing trends in moisture and temperature. Changes in moisture, temperature and habitat weaken species and force relocation.

International shipping of plants, animals, grains and containers make the introduction of non-native lifeforms virtually unavoidable.

In recent years, Ash trees throughout the US have been infested with the Emerald Ash Borer, an exotic species fatal to Ash trees. While local communities have successfully removed affected trees, secondary effects remain. Loss of shade and reduced benefits of evapotranspiration, cost of removal and disposal of diseased trees, cost to replace lost trees with a resilient species, and the extended time for new trees to reach maturity are some of the impacts of this hazard.

New concerns: Cities: Stray and Feral Cats

Stray and feral cats are becoming a permanent part of the wildlife ecosystem. Cats can reduce the availability of prey for native wildlife, changing the dynamics of the ecosystem with unknown consequences. Without spay/neuter programs for feral cats each female can produce up to 200 kittens during an 8-10 year lifetime, resulting in exponential population growth.

Feral cats in neighborhoods bring pathogens into contact with domestic cats and humans. Free-roaming cats present a particularly compelling case because of their large population sizes and their central role in the life cycle of the parasite Toxoplasma gondii (T. gondii) that infects both wildlife and humans. Rabies is another disease whose risk is increased by free-roaming cats. In the United States, cats are the most common rabies positive domestic species (PhysOrg, 2022).

According to the USDA “Free-ranging cats are more likely to be exposed to a variety of diseases including Feline Leukemia Virus (FLV), Feline Immunodeficiency Virus (FIV), and are 2.8 times more likely to be infected with parasites (and parasite-spread diseases) than indoor cats (Levy et al. 2006; Chalkowski et al.2019) . . . Cats are considered domestic animals and as such are governed by laws and regulations governing the treatment of pets and livestock, even though they often persist on the landscape as an uncontained and uncontrolled feral population. Free-ranging cats present special legal challenges. Should they be considered invasive wildlife or domestic animals? The lack of clear-cut responsibility and

jurisdiction complicates the management of free-ranging cats for landowners, conservationists, and management agencies (USDA, 2021)."

Impacts of Climate trends. Timing of precipitation or drought is likely to impact agricultural practices, with increased possibility of delayed plantings, and disease outbreaks (Kansas, 2018).

"The National Wildlife Federation . . . released a report stating that the effects of climate change will likely cause increases in populations of disease-bearing deer ticks and mosquitoes and the spread of more, and stronger, poison ivy (Rogers, 2018)."

Projected changes by 2050:

- ✓ Loss of plant and animal habitat, and ecosystems in flux
- ✓ Invasion by non-native species and tropical pests and diseases
- ✓ Decreased corn yields due to heat stress, despite longer growing season and higher CO2
- ✓ Increased soybean yield due to higher CO2, though potentially less so in southern Iowa

Recent trends indicate that surface wind speeds (measurement height of 32 feet) over Iowa have been declining, which means less crop ventilation and more heat stress for plants and animals. Reduced wind also creates favorable conditions for survival and spread of unwanted weeds, fungi, pests and pathogens. Waterlogged soil conditions during early plant growth often result in shallower root systems that are more prone to disease, nutrient deficiencies, and drought stress later in the season. Heavy spring rains, likely followed by summer droughts will tighten an already shortened planting window, exacerbating soil erosion and nutrient runoff (Iowa, 2023).

Land use development. Land use development is unlikely to increase or decrease risk from this hazard in the near future.

Population patterns. Population patterns are unlikely to increase or decrease risk from this hazard in the near future.

Dam or Levee Failure

Dams

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

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

Causes. Dam failure is usually attributed to one of five causes:

- Overtopping caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of dam failure. National statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for approximately 34% of all U.S. dam failures.
- Foundation defects, including settlement and slope instability, cause about 30% of all dam failures
- Cracking caused by movements like the natural settling of a dam or earthquake
- Inadequate maintenance and upkeep
- Piping is internal erosion caused by seepage. When seepage through a dam is not properly filtered and soil particles continue to progress, sink holes form in the dam. An estimated 20% of U.S. dam failures have been caused by piping. Seepage often occurs around hydraulic structures, such as pipes and spillways; through animal burrows; around roots of woody vegetation; and through cracks in dams, dam appurtenances, and dam foundations.

Contributing factors. The Association of State Dam Safety Officials (ASDSO) Incident Database lists nine types of Incident Drivers, a dominant cause or contributing factor for an incident:

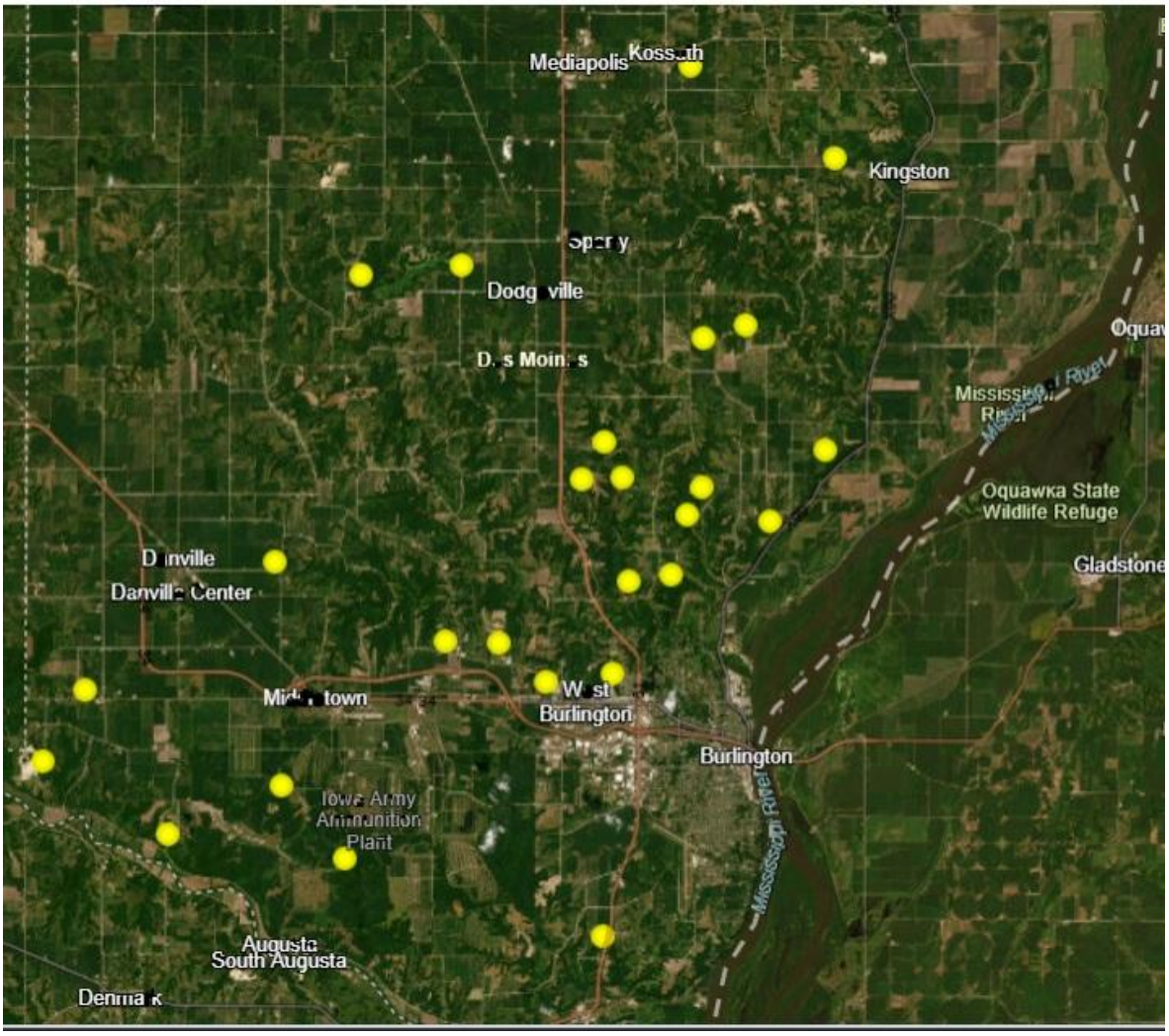
Dam Incident Drivers	
Deterioration or Poor Condition	Seepage/Internal Erosion
Hydrologic/Flooding	Seismic
Malfunction of Equipment/Gate	Structural Stability
Manmade action	Other or Unknown

Location, Dams

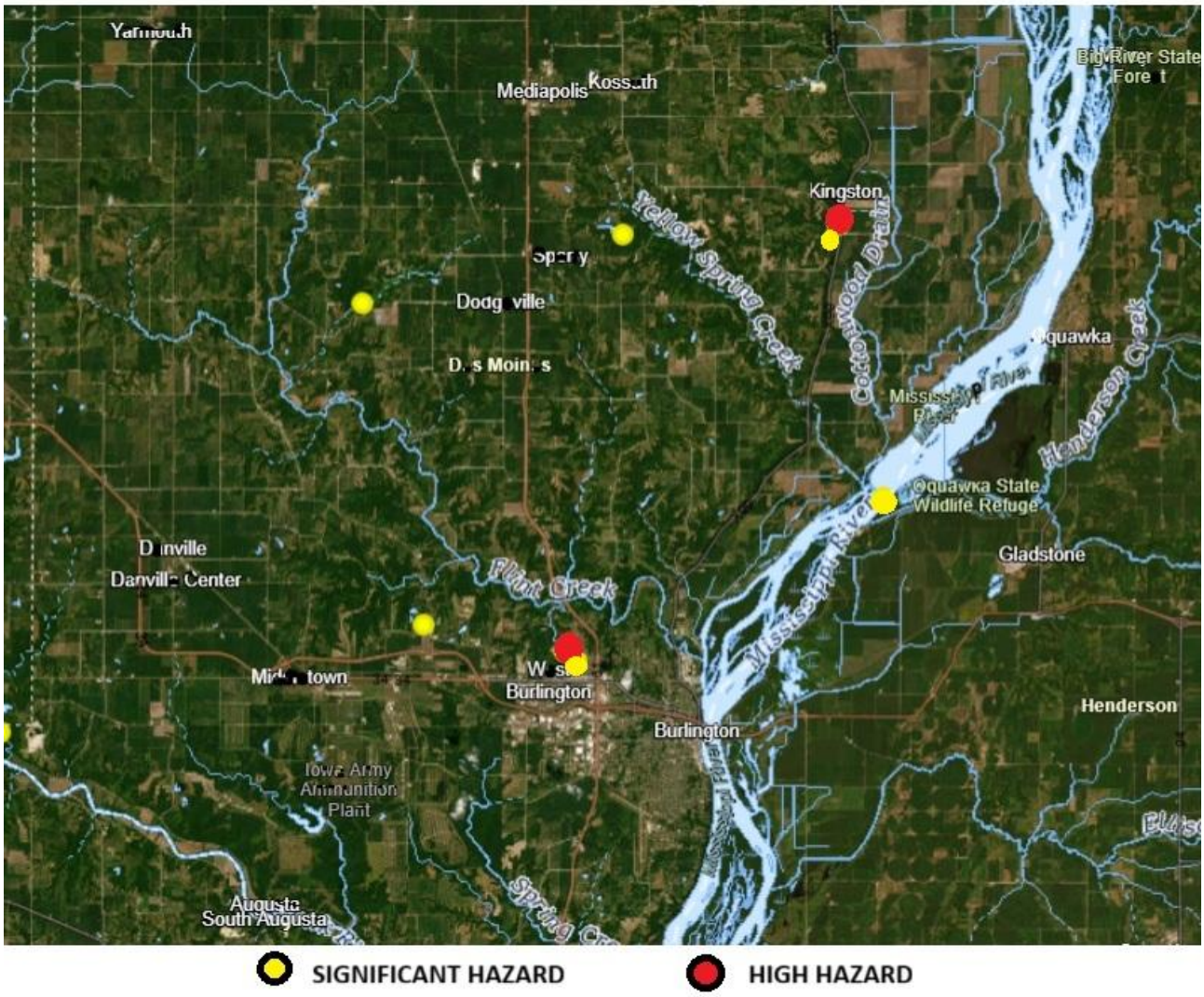
The Iowa DNR is responsible for tracking all dams that are greater than twenty-five feet high or have storage capacities of at least fifty acre-feet of water.

According to the National Inventory of Dams there are 34 dams in Des Moines County that meet the DNR criteria for official tracking. Twenty-six of these dams are Low hazard dams, relatively small and used as water quality and control features on or near farmland. Sixteen of these are for *fire Protection, stock, or small fish ponds*, seven are for *recreation*, two are *road grade* dams and one is for *grade stabilization.* There are two High hazard dams both privately owned for *recreation,* and six Significant hazard dams in the county, four for *recreation*, one for *navigation* on the Mississippi River and one owned by Burlington Northern Railroad. Local dams have an average age of 54 years, with the eight oldest having been constructed before 1950, 23 built between 1965 and 1992 and three built since 2008. (USACE, 2025).

LOW HAZARD DAMS IN DES MOINES COUNTY IOWA



SIGNIFICANT AND HIGH HAZARD DAMS IN DES MOINES COUNTY IOWA



Extent; Dams

There are three dam classifications: High Hazard, Significant Hazard and Low Hazard. Dams are classified according to the damages that would occur downstream if that dam were to fail. The classification may change over time because of new development. Older dams may not have been built to the standards of its new classification.

Below are the hazard classifications defined by Iowa Department of Natural Resources (DNR):

- High Hazard – Dams are classified as High hazard when it is located in an area where dam failure may create a serious threat of loss of human life.
- Significant Hazard – 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 where 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 – 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.

Dam Classification Chart

Hazard-Potential Classification	Risk Involved with Dam Failure	Inspection Frequency
High	probable loss of human life	annually, by a registered professional engineer
Significant	no probable loss of human life but can cause economic loss or disruption of lifeline facilities	every three years by a registered professional engineer
Low	no probable loss of human life and low economic loss	every five years

The designation of "High hazard" reflects a dam's potential for causing damage downstream if it were to fail and does not mean that a dam is in need of repair. According to the US Army Corps of Engineers, only high hazard dams have inundation zone determinations.

Federal Dam Safety Guidelines and the National Dam Safety Program Act, passed by Congress in 1996, and reauthorized in 2006, both consider a well-planned and coordinated Emergency Action Plan (EAP) to be an essential responsibility of the owner. Both High hazard dams do have current EAPs on record.

It has long been established that having an EAP reduces the potential for loss of life downstream of dams. The dam owner can be held responsible and liable for loss of life caused by failure of the dam. Compliance with government or professional standards does not necessarily absolve an owner from liability, but it does establish a standard of care to be used by owners.

Poor condition. Two Des Moines County dams are classified as being in Poor condition. One is a private recreational impoundment (Schoenewe Dam), the other is at the Iowa Army Ammunition Plant (Mathes Lake).

Name	Classification	Condition	EAP available	Stream name
Schoenewe Dam	High	Poor	Yes	Tributary of Little Flint River
Mathes Lake	Low	Poor	Yes	Long Creek

High hazard dams

Schoenewe Dam	Hazard Potential	Owner Types	Primary Purpose	Nearest City	Nearest City (Miles)	River or Stream Name	State Regulatory Agency	Dam Types	Foundation	Height (Ft)	Length (Ft)
	High	Private	Recreation	BURLINGTON	5	TR-LITTLE FLINT RIVER	Iowa DNR	Earth	Soil	41	200
	Year Completed	**Max Storage (Acr**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Last Inspection Date**	**Inspection Frequency**	**Condition**	**EAP, revised**	**Inundation Maps?**
	1978	78	28	2.8	0.09	1	6/26/2024	2	Poor (2024)	Yes, 2024	No
Zaiser Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	High	Private	Recreation	Kingston (unincorp)	1	Trib Haight Creek	Iowa DNR	Earth	Soil	61	525
	Year Completed	**Max Storage**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Last Inspection Date**	**Inspection Frequency**	**Condition**	**EAP**	**Inundation Maps?**
	2010	205	135	9.5	0.15	30	7/2/2024	2	Satisfactory (2024)	No	No

Significant Hazard Dams:

Significant hazard dams are inspected every 5 years. None have inundation maps of record.

Big Hollow Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	Local Government	Recreation	Burlington (14)	Big Hollow Creek	Iowa DNR	Earth	Soil	60	795
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP, revised**	
		2008	5942	3046	178	7.5	3	Satisfactory	Yes, 2014	
Geode Lake Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	State	Recreation	AUGUSTA (9)	TR-SKUNK RIVER	Iowa DNR	Earth	Rock;Soil	59	1060
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP**	
		1949	6200	4700	195	15.35	60	Satisfactory	Not Required	
Murguia Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	Private	Recreation	MISSISSIPPI RIVER (9)	TR-YELLOW SPRING CREEK	Iowa DNR	Earth	Soil	43	520
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP, revised**	
		1978	675	397	30	1.11	3	Satisfactory	Not Required	

Izaak Walton Lake Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	Local Government	Recreation	MISSISSIPPI RIVER (8)	TR-HONEY CREEK	Iowa DNR	Earth	Soil	22	450
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP, revised**	
		1921	140	75	12.4	0.64		Satisfactory	Not Required	
Burlington Northern Dam	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**State Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	Private	Other	MISSISSIPPI RIVER (8)	TR-HONEY CREEK	Iowa DNR	Earth	Soil	25	300
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP, revised**	
		1930	124	76	4	0.08		Not Rated	Not Required	
Mississippi River Lock and Dam 18	**Hazard Potential**	**Owner Types**	**Primary Purpose**	**Nearest City (Miles)**	**River or Stream Name**	**Regulatory Agency**	**Dam Types**	**Foundation**	**Height (Ft)**	**Length (Ft)**
	Significant	Federal	Navigation	BURLINGTON (adjacent)	MISSISSIPPI RIVER	USACOE	Concrete; Earth; Gravity	Soil	41	7330
		Year Completed	**Max Storage (Acre-Ft)**	**Normal Storage (Acre-Ft)**	**Surface Area (Acres)**	**Drainage Area (Sq Miles)**	**Spillway Width (Ft)**	**Condition**	**EAP, revised**	
		1937	90000	0	13600	113600	1350	Not Available	Yes, 2025	

Levees

The National Flood Insurance Program (NFIP) defines a levee in Title 44, Chapter 1, 59.1 of the Code of Federal Regulations (44 CFR 59.1) as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water in order to reduce risk from temporary flooding."

Certification: "Levee certification is the process that deals specifically with the design and physical condition of the levee and is the responsibility of the levee owner or community in charge of the levee's operations and maintenance. Certification must be completed for the levee to be eligible for accreditation by the Federal Emergency Management Agency (FEMA).

Accreditation: FEMA accredits a levee as providing adequate risk reduction on the FIRM if the certification and adopted operation and maintenance plan provided by the levee owner are confirmed to be adequate. An operations and maintenance plan specifies key operating parameters and limits, maintenance procedures and schedules, and documentation methods. FEMA's accreditation is not a health and safety standard – it only affects insurance and building requirements . . . Areas behind nonaccredited levees will be shown on FIRMs as a high-risk floodplain (Levee12, 2012)."

On the National Levee Database, there are three levee systems located in Des Moines County, two of which are managed by levee & drainage districts, while the third is privately owned and maintained. These include approximately 53 centerline miles of levees, 44 miles of which are accredited, while the remaining 9 are non-accredited. In total, levees protect approximately 51 square miles (or 32,700 acres) of land. Most of these directly protect property from the floodwaters of the Mississippi River and its immediate tributaries, while the remainder are along the Skunk River several miles upstream from the Mississippi.

North Bottoms Levee and Drainage District

North Bottoms Levee and Drainage District office is based in Burlington. It covers a small but economically significant area of land on the north side of the city. This District's levee, 1.7 centerline miles in length, protects an area of approximately 0.4 square miles of land. The area includes several large manufacturing facilities, a barge terminal, the raw water pumping station for the City of Burlington, and some adjoining residential areas. The levee is positioned at the confluence of the Mississippi River and Flint Creek, the largest tributary of the Mississippi between the Skunk and Iowa Rivers. The National Levee Database indicates that approximately 140 people, 73 structures, and more than $85 million worth of property would be at risk if the levee were to fail. Large industrial buildings in this area account for the relatively high property values at risk.

Levee Name	**North Bottoms Levee & Drainage District**
Location	Burlington, Des Moines County, Iowa
People at Risk	140
Structures at Risk	73
Property Value (2020)	$85 M
Assessment Level	Low risk
USACE District	Rock Island
Entity Maintaining Levee	Locally maintained
Recent Update	Levee failed 2019
USACE Rehabilitation Program Status	Active

Two Rivers Levee and Drainage District

Based in unincorporated Kingston, Two Rivers Levee and Drainage District manages an extensive network of levees, drainage diversion channels and ditches within an area of around 70 square miles in both Des Moines and Louisa Counties. By physical size, it is the second largest drainage district on the Upper Mississippi River. Approximately 49 square miles of its area is in Des Moines County, and this includes approximately 45 centerline miles of levee. According to the National Levee Database from the US Army Corps of Engineers, approximately 700 people, 400 structures, and $113 million worth of property are protected by the levees in this system and would be at risk if a levee failure were to occur. These figures include the portion within Louisa County.

In Des Moines County, there are 3 levees that make up the Two Rivers system. These are split by two major tributaries of the Mississippi River, which drain from the high bluffs in the northern half of the county. The Hawkeye-Dolbee Diversion Channel, created to consolidate the flows of two nearby creeks, splits the Middle and Upper Units, with the Upper Unit extending northward to the Iowa River in Louisa County. Several smaller inland levees protect areas of farmland from backchannel flooding from the tributaries and drainage channels.

Much of the land protected by the Two Rivers levees is agricultural. Most of the residences are associated with farming operations, although there are a few exceptions. A portion of the unincorporated community of Kingston is within the Middle Unit of the levee system and there are a number of homes along Tama Road within the Lower Unit. There are also several clusters of homes and river cabins built on the river side of these levees, most of which are elevated well above the land surface on piers or similar foundations to protect them from flood risk. Finally, there is a public campground behind the levee near Pumping Station #4, just south of the Louisa County border.

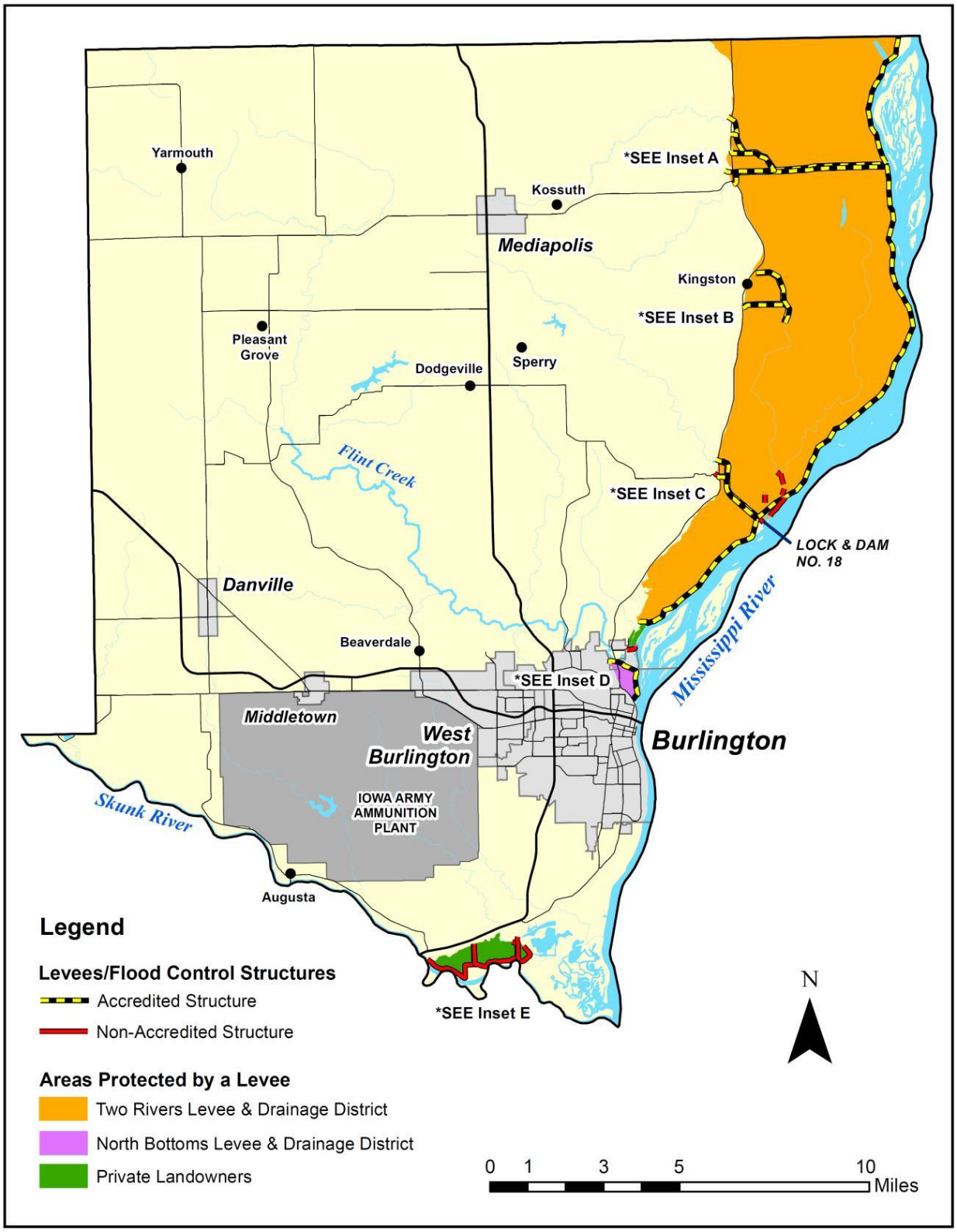
Levee Name	**Two Rivers L&DD - Middle Unit Location**
Location	Des Moines County, Iowa
People at Risk	297
Structures at Risk	157
Property Value	$40 M
Assessment Level	Low risk
USACE District	Rock Island
Entity Maintaining Levee	Locally maintained
Recent Update	Floods in June 2019
USACE Rehabilitation Program Status	Active

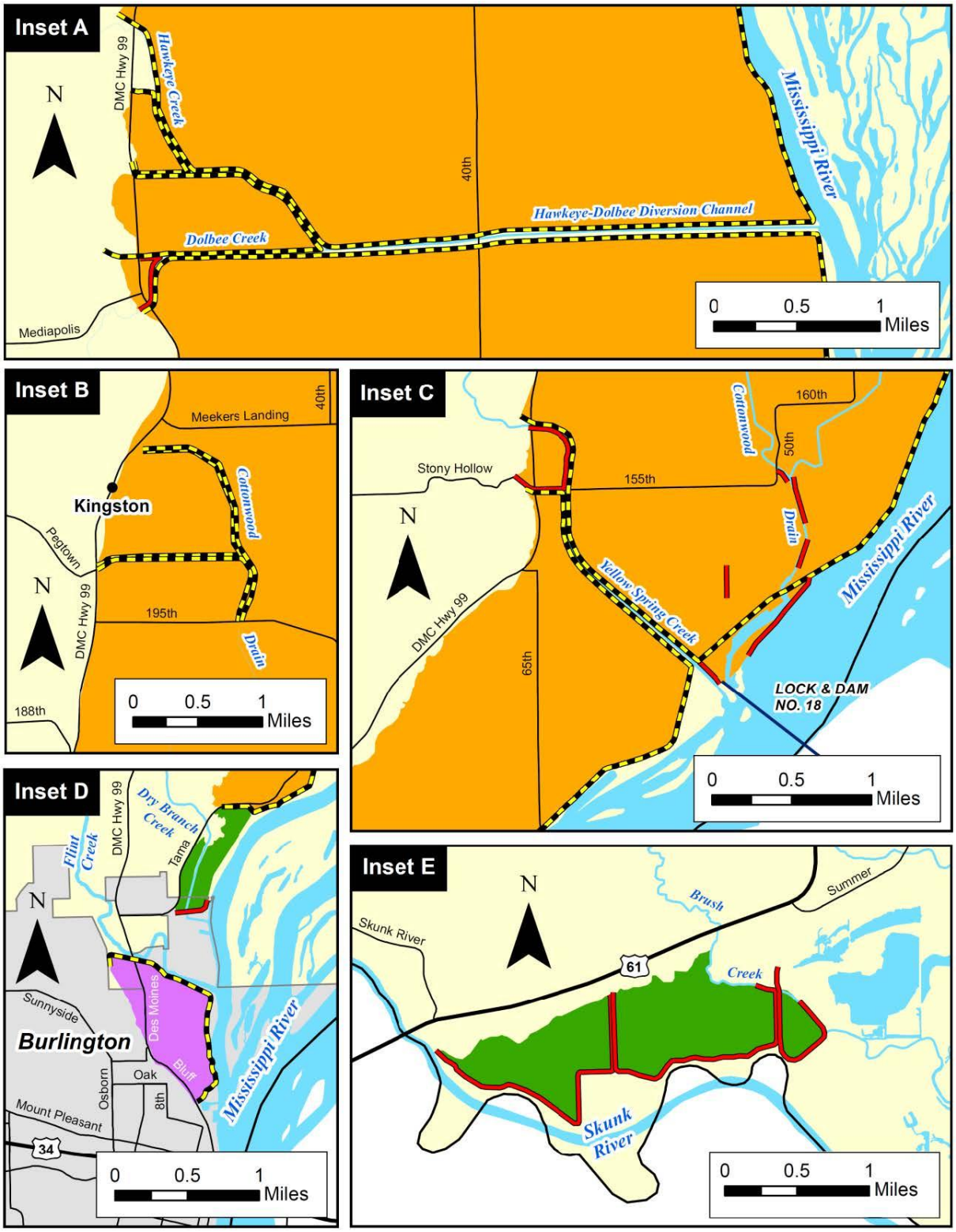
Non-accredited Levees

Along the Skunk River between Highway 61 and the Mississippi River, there is a system of privately owned and maintained levees that protect a low-lying agricultural area. This includes approximately 2 miles of non-accredited levees, which protect approximately 1.2 square miles of land. According to the National Levee Database, this area does not contain any population or buildings.

Another privately owned, non-accredited levee sits between the North Bottoms and Two Rivers Levee & Drainage Districts. Only a small section is recognized by the National Levee Database, protecting an area of approximately 0.15 square miles, all of which is privately owned land that is set aside for conservation purposes, near Dry Branch Creek just above its confluence with the Mississippi River. This is a remnant of the original Mississippi River levee system in northern Des Moines County and was left out when the section to the north (the present-day Lower Unit of the Two Rivers Levee & Drainage District) was improved in 1954.

Location; Levees




Inset A
N
DMC Hwy 99
Hawkeye Creek
40th
Mississippi River
Hawkeye-Dolbee Diversion Channel
Dolbee Creek
Mediapolis
0 0.5 1 Miles
Inset B
Meekers Landing
40th
Kingston
Cottonwood
Pegtown
N
DMC Hwy 99
195th
Drain
188th
0 0.5 1 Miles
Inset C
Cottonwood
160th
50th
Stony Hollow
155th
N
Drain
Mississippi River
Yellow Spring Creek
DMC Hwy 99
65th
LOCK & DAM NO. 18
0 0.5 1 Miles
Inset D
Dry Branch Creek
DMC Hwy 99
Flint Creek
Tama
N
Sunnyside
Des Moines
Burlington
Bluff
Mississippi River
Osborn
Oak
8th
Mount Pleasant
34
0 0.5 1 Miles
Inset E
N
Brush
Summer
Skunk River
61
Creek
Skunk River
0 0.5 1 Miles

Extent; Levees

The North Bottoms Levee and Drainage District in Burlington protects an industrial area along the Mississippi River from flooding. The levee was authorized in 1977 and constructed in 1984. The Merschman Fertilizer Mississippi River Terminal is located within the area and has recently been involved in repairs and improvements that required permission from the U.S. Army Corps of Engineers. The levee is built to withstand a river crest of 28 feet.

The North Bottoms Levee was breached in March 2019, when record spring flooding caused several Iowa levee breaches. Factors contributing to the extensive flooding include snowmelt, frozen ground, ice jams, saturated soils, and heavy rainfall in March and April.

NOAA Stream gauge data at Burlington Iowa						
Normal Pool: 6.8 ft						
Record: 25.7 ft						
Preliminary values subject to review (P)						
Recent Crests				**Historic Crests**		
1	20.48 ft	on 07-12-2024	(P)	1	25.73 ft	on 06-17-2008
2	16.57 ft	on 06-01-2024	(P)	2	25.10 ft	on 07-10-1993
3	20.00 ft	on 05-04-2023	(P)	3	24.47 ft	on 06-02-2019
4	18.21 ft	on 04-13-2020		4	23.65 ft	on 07-06-2014
5	18.36 ft	on 10-15-2019		5	23.54 ft	on 05-03-2019
https://water.noaa.gov/gauges/brli4						

The Two Rivers Levee and Drainage District system protects 1/6th of the county area. The levees are certified as 100 yr levees. The highest recorded crest occurred in 2008, when the stream gauge measured the river level at 25.73 feet.

Previous Occurrences; Dams and Levees

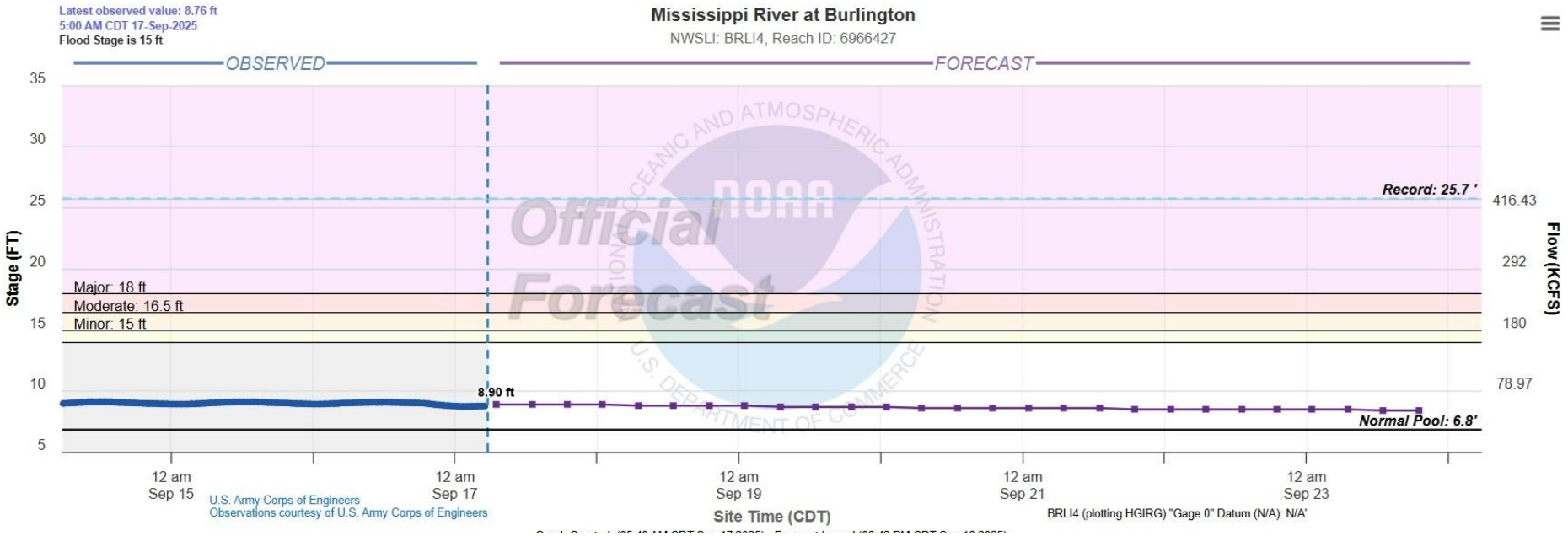
During the last 10 years (01/01/2015-12/31/2024) there have been no dam failures in Des Moines County.

The North Bottoms Levee did fail in 2019. According to the Environmental Law and Policy Center (ELPC) report on levees along the Mississippi River, both Des Moines County Levee & Drainage Districts are in the USACE category of Low-risk Levees. In 2019, several levees in the Midwest were breached, raising concerns about the overall stability of such structures. One of these was the North Bottoms Levee.

"(November 2019) . . . the flooding of Spring 2019 likely further weakened levee infrastructure across the region. Several levees breached this year (2019) and many have not yet received follow-up repairs. Moreover, several low-risk levees breached during these floods, thereby raising concerns about the risk of all levees." (ELPC, 2019)

Probability

The probability of future events based on the ten year data is 1 event in 10 years = 10% "Unlikely."



CATEGORY	STAGE
Major Flooding	**18 ft**
Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.	
Moderate Flooding	**16.5 ft**
Some inundation of structures and roads near stream.	
Minor Flooding	**15 ft**
Minimal or no property damage, but possibly some public threat.	
Action	**14 ft**
The level which, when reached by a rising stream, represents the level where the NWS or a customer/partner needs to take some type of mitigation action in preparation for possible significant hydrologic activity.	

https://water.noaa.gov/gauges/brli4

Climate trends

> Scientists anticipate heavier rain events to affect the Midwest as global temperatures rise, which could exacerbate flooding and levee stress. Prudent decisionmakers should take climate resilience into account for long-term planning, prioritize which dams and levees are repaired given limited federal and state funds, and shift towards green infrastructure. One of the projected impacts of climate change is an increased frequency of severe storms. Changes in the intensity of precipitation events and flooding may have an effect on dams and levees in Des Moines County (ELPC, 2019).

Already observed in Iowa: An 8 percent increase in precipitation from 1873 to 2008.

Flood: Increasing. Precipitation is expected to increase in intensity, though not necessarily frequency. With average annual precipitation increasing 1" to 4" in any county by 2050, heavy precipitation events are likely to become more common. Eastern Iowa has measured a greater increase in precipitation than western Iowa which indicates greater likelihood of flooding in eastern Iowa (Iowa, 2023).

Dams and Levees that were designed decades ago are unsuited to a warmer world and stronger storms. The American Society of Civil Engineers, in its report card on infrastructure in 2017, gave the nation's dams a "D" grade. Aging structures along with rising temperatures and storm intensity suggests that there may be an increase in dam failures.

Water from the Mississippi River floods into downtown Burlington after a temporary barrier was breached, Saturday, June 1, 2019, in Burlington, Iowa.

Joseph Cress/Iowa City Press-Citizen

Vulnerability and Impacts

Dam or Levee failure: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
	City of Danville		Danville Community School District
	City of Middletown		Mediapolis Community School District
	City of Mediapolis		Notre Dame Catholic Schools
	City of West Burlington		West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
X	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		
	DESCOM		

Private dams

New development is unrestricted downstream from most rural private dams. The consequences of a dam failure increase when new development occurs downstream, even when dam conditions are unchanged. Individual decisions of area landowners can impact others in the watershed and increase hazard risk.

High hazard dams

The Schoenewe Dam in West Burlington is classified as a High hazard dam in poor condition. Surrounding development includes a number of mobile homes.

Zaiser Dam is a high hazard dam in satisfactory condition. Both dams are monitored by the Iowa DNR.

Vulnerability and Impacts: Levees

Levees constructed of compacted clay with a high plasticity tend to crack during long dry spells. During heavy rainfalls that follow dry periods, water fills the cracks and fissures. This increases hydrostatic forces, and the water also is slowly absorbed by the clay causing an increase in the unit weight of the clay as well as a decrease in its shear strength. This results in a simultaneous increase of the slide (driving) forces and a decrease of the resisting (shear strength) forces.

Furthermore, in levee failure, the cyclic shrink/swell behavior of the cracked clay zone results in a progressive reduction of the shear strength of the clay, perhaps approaching its residual strength. It also results in the deepening of the cracked clay zone; cracks may reach a depth of 9 feet or more, especially for clays with a plasticity index greater than 40 (SEIRPC, 2020). Fifty-one square miles of property could be inundated if all local levees were to fail or be overtopped.

Vulnerability: Gauge readings in feet	Flood Impacts
28	Water reaches the top of the North Bottoms Levee that protects industry at the north end of Burlington.
26.5	Water affects Main Street in Burlington.
26	Water reaches the top of the Gulfport town levee.
23.9	Water is in the Burlington Post Office lot. Water is also where the ramp starts at a bank. Water also reaches the top of the number 1 and 2 Henderson levees.
23.5	Water also affects Main at Division.

23	Water affects the Port of Burlington and Front Street businesses in Burlington.
22.6	Water affects the Burlington water treatment plant.
22.5	Water reaches Port of Burlington. Water also affects sewer lines on Front Street and other areas downtown.
22	Water reaches the first floor of the interior of Port of Burlington. Water also gets on Front Street.
21.5	Water reaches the tracks for the Burlington Jct railroad. Water also affects Illinois Highway 96 between Niota and Dallas City.
21	Water affects the floor of the lift station at Market Street. Water also reaches the top of the railroad tracks for the BNSF railroad.
21	Water affects several homes on First Street in Dallas City. Carman Road Blacktop is affected by floodwaters. Water also reaches the top of the Niota town levee.
20	Water reaches the front steps of the Burlington Municipal Auditorium and affects the parking lot. Water affects industries at the south end of town. Water affects most of Riverview Park in Fort Madison.
19.5	Water affects the Port of Burlington. Water affects residences on First Street in Dallas City. Water also affects several homes in Pontoosuc.
19	Water causes access problems to a restaurant along the river. Water also goes over the new seawall on the riverfront. Water affects streets bordering the river in Pontoosuc.
18.5	Water is over the bank south of the Burlington auditorium and reaches the base of Old Fort Madison.
18	Water affects the Burlington Auditorium parking lot. Water also affects Bluff Harbor Marina. Water affects North Shore Marina in Fort Madison. In Dallas City, water affects First Street at the ballpark.
17.5	Water affects Riverview Drive in Riverview Park in Fort Madison.
17	Water affects the Port of Burlington parking lot.
16	Water affects low lying buildings and homes in Montrose and Niota.
15	Agricultural flooding occurs.
14	Water covers Cabin Road in Gulfport.
13.5	Water affects Sullivan Slough Road south of Burlington.

Impacts of Climate trends. Increased volume of precipitation per storm would increase risk to aging dams and levees.

Land use development. Development permitted below a dam would increase the hazard and potentially result in dam removal. Impacts include loss of the intended function and associated economic benefits of the dam.

Levees may lose accreditation or fail, resulting in increased flood risk and higher insurance cost. Structures may have to be raised or relocated.

Population patterns. An increase in residential housing in potential inundation zones would elevate the hazard risk.

Hazardous Materials Incident

The accidental release of flammable, combustible, explosive, toxic, noxious, corrosive, oxidizable, irritant, or radioactive substances or mixtures can pose a risk to life, health or property that may require evacuation of the vicinity. As many as 500,000 products can be defined as hazardous chemicals that pose physical or health hazards.

For this plan, hazardous materials stored at fixed sites and transportation of hazardous materials including radiological waste were evaluated.

A fixed hazardous materials incident is the accidental release of chemical substances or mixtures which present a danger to the public health or safety during production or handling at a fixed facility. Fixed hazardous material incidents usually affect a localized area, and the use of planning and zoning can minimize the area of impact.

The Secretary of the Department of Transportation has the authority to regulate transportation of hazardous materials, including transport over highways, roads, rail and pipelines.

The Pipeline and Hazardous Materials Safety Administration (PHMSA) was delegated the responsibility to develop the hazardous materials regulations, found in Title 49 of Federal Regulations Parts 100-185. Shippers and carriers in Iowa are required to comply with those hazardous materials regulations (PHMSA, 2023).

Location

Hazardous materials may be spilled anywhere they are being stored or transported. In Des Moines County, spills typically occur at storage sites or on roads and highways. Pipeline and railroad incidents are infrequent. See maps of Pipelines, Roads and Rail, below.

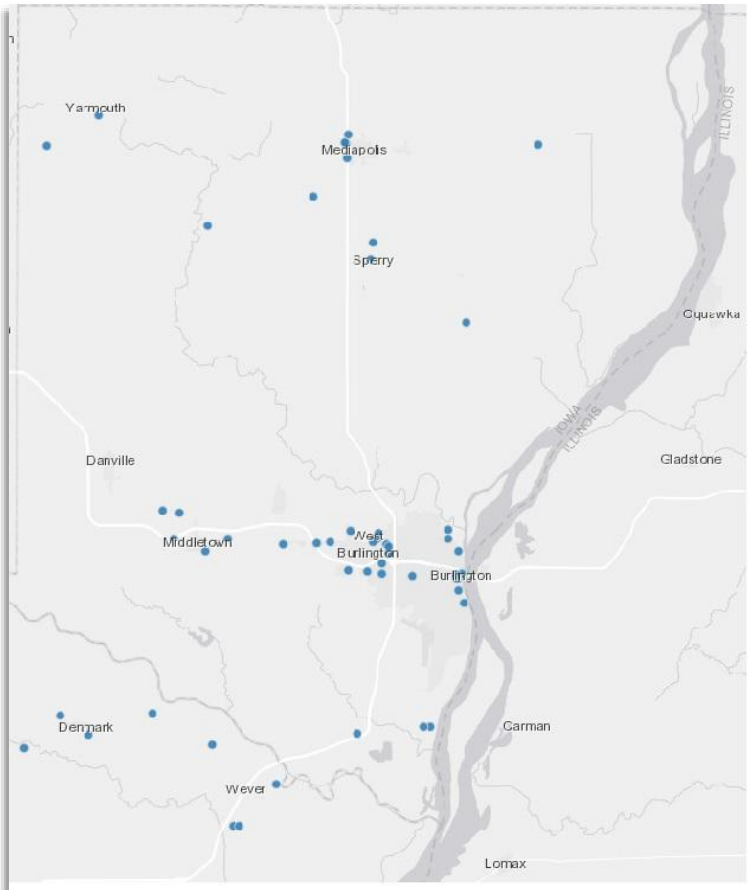
Transport of Radiological hazardous waste

From the Iowa State Plan 2023:

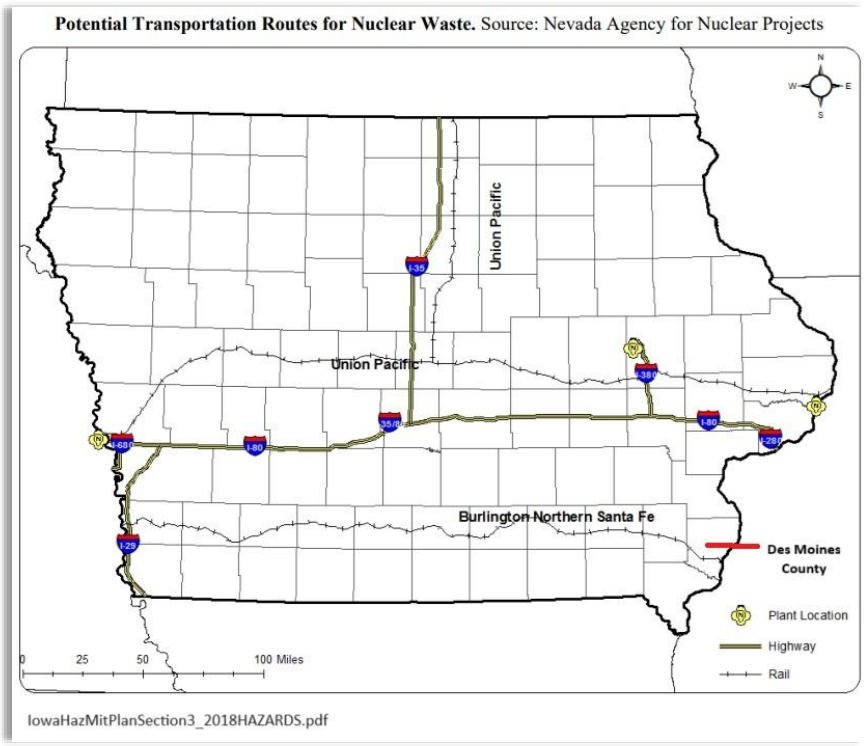
> Radiological incidents related to transportation are described as an incident resulting in a release of radioactive material during transit. The transportation of radioactive material by any means of transport is licensed and regulated by the federal government. When these materials are moved across Iowa highways, State officials are notified, and appropriate escorts are provided. As a rule, there are two categories of radioactive materials that are shipped over the interstate highways.
>
> Low-level waste consists primarily of materials that have been contaminated by low-level radioactive substances but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than that which exists from other hazardous materials.
>
> High-level waste, usually in the form of spent fuel from nuclear plants, is transported in specially constructed casks that are built to withstand a direct hit from a locomotive. Potential rail and highway routes for the shipment of radioactive waste have been identified and mapped below (Iowa, 2023).

Fixed Sites Chemical Storage Facilities
Des Moines County
Iowa

Iowa Geospatial Data Clearinghouse



FIXED SITE CHEMICAL STORAGE FACILITIES IN DES MOINES COUNTY
https://geodata.iowa.gov/



Extent

As a standard, Hazardous materials have been grouped into nine classes. Each class includes several subclasses. Warning stickers are required on hazardous materials containers of transport vehicles to provide critical information about the potential dangers involved.

The National Fire Protection Association (NFPA) has developed a color-coded number system called NFPA 704. The system uses a color-coded diamond with four quadrants in which numbers are used in the upper three quadrants to signal the degree of health hazard (blue), flammability hazard (red), and reactivity hazard (yellow). The bottom quadrant is used to indicate special hazards.

The NFPA system is useful for alerting personnel to the degree of hazard of the chemical and draws attention to storage needs and the necessary emergency equipment needed. This system does not indicate chronic health hazards.

In addition to labels on hazardous materials containers, these markings may be posted on fences or doors to identify general hazards in storage areas.

- ✓ Red quadrant indicates flammability
- ✓ Blue indicates health hazard
- ✓ Yellow indicates instability
- ✓ White indicates a special hazard

Within the red, blue, and yellow quadrants is a hazard rating number. This number can range from 0 to 4, with 0 being no hazard to 4 being extremely hazardous.

Because the white quadrant indicates special hazards, the marking in this area will be either blank for no hazard or an abbreviation or symbol indicating a specific hazard.

Emergency Response Levels. Classifications of HAZMAT-related situations refer to the level of response needed.

Explanation of nfpa chemical hazard label

Class	Material
1	Explosives
2	Flammable Gas
3	Flammable Liquids
4	Flammable Solids
5	Oxidizing Agents, Organic Peroxides
6	Toxic & Infectious Substances
7	Radioactive Substances
8	Corrosive Substances
9	Miscellaneous.

Hazardous Material Incident Classifications		
Level 1	Involves hazardous materials that can be contained, extinguished, and/or abated using immediately available public sector responders having jurisdiction (local Response)	Level 1 incidents present little risk to the environment and to public health with containment and cleanup.
Level 2	Involves hazardous materials beyond the capabilities of the first responders on the scene and could be beyond the capabilities of the public sector responders having jurisdiction (State response)	These incidents can pose immediate and long-term risk to the environment and public health and may need state- or federal-level level emergency assistance
Level 3	Involves hazardous material incidents beyond the capabilities of a single state or regional response team and requires additional assistance (Federal response)	These incidents generally pose extreme, immediate, or long-term risk to the environment and public health

Pipeline events, Significant and Serious. A Serious Pipeline Event is defined by the Pipeline & Hazardous Materials Safety Administration (PHMSA) as those incidents that involve a fatality or injury requiring in-patient hospitalization. A Significant Pipeline Event is defined by the PHMSA as those incidents reported by pipeline operators when any of the following specifically defined consequences occur:

1. Fatality or injury requiring in-patient hospitalization
2. $50,000 or more in total costs, measured in 1984 dollars
3. Highly volatile liquid releases of 5 barrels or more or other liquid releases of 50 barrels or more
4. Liquid releases resulting in an unintentional fire or explosion (PHMSA, 2023).

Previous Occurrences

The Iowa DNR Hazardous Substance Incident Tracking Database provides hazardous material spill data. During the period 2015 through 2024, 52 hazardous material spills have been recorded in Des Moines County, from a single quart of oil to more than 2000 gallons of Hydrochloric acid (see article Appendix D; Borghi USA 4/12/2022).

Transformer oil was the most commonly spilled material, with 15 events over 10 years, 10 spills of diesel fuel or gasoline, 12 involving various other forms of oil, and numerous other individual products. See record in Appendix D.

Pipeline spills

Des Moines County. No Pipeline incidents or accidents occurred in Des Moines County during the study period. One was recorded in the last twenty years.

Iowa. During the last 20 years, records indicate that seven people were injured and none were killed in pipeline events in Iowa. Of all events recorded, 77 were classified as Significant and four Serious events occurred with seven people injured.

The events that occurred during the 10 year period from 2015 through 2024 and shown in the table at right, represent only 36% of all incidents in the last two decades, an indication that safety has improved (PHMSA2, 2024).

Radiological incidents

"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 B, 2023).

Probability

Probability of a hazardous materials incident in Des Moines County is 52 events/10 years = > 100%, Very likely. None involved radioactive materials.

There is only one pipeline incident recorded in recent decades – in 2013 an ANR pipeline leak occurred due to excavation. No incidents or accidents have occurred in the last 10 years. Probability for a release of material from a pipeline is "Unlikely."

PHMSA Pipeline Incidents: (2005-2024)
Incident Type: All Reported **System Type:** (All Column Values) **State:** IOWA

Calendar Year	Number	Fatalities	Injuries	Total Cost As Reported
2005	11	0	1	$1,152,601
2006	8	0	0	$581,093
2007	5	0	0	$341,393
2008	14	0	0	$1,475,040
2009	10	0	0	$684,536
2010	12	0	3	$2,693,903
2011	12	0	0	$8,097,866
2012	14	0	2	$2,017,354
2013	14	0	0	$2,571,119
2014	8	0	0	$924,368
2015	4	0	1	$229,186
2016	6	0	0	$201,368
2017	5	0	0	$2,928,408
2018	4	0	0	$3,914,023
2019	8	0	0	$772,847
2020	9	0	0	$3,170,119
2021	11	0	0	$2,531,371
2022	8	0	0	$384,521
2023	3	0	0	$240,366
2024	3	0	0	$238,029
Grand Total	**169**	**0**	**7**	**$35,149,511**

PHMSA Pipeline Incidents: Multi-Year Averages (2005-2024)
Incident Type: All Reported **System Type:** (All Column Values) **State:** IOWA

https://portalpublic.phmsa.dot.gov/analytics/saw.dll?PortalPages&PortalPath=/shared/PDM%20Public%20Website/_portal/SC%20Incident%20Trend&Page=All%20Reported

Climate trends

HazMat and weather: As temperatures rise, the length of tornado season may increase. Such an increase would statistically increase the risk that a tornado could impact a fixed chemical storage site or a transport vehicle.

Some evidence suggests that 'Tornado Alley' – an area most favorable to tornado formation – is moving east, but the greatest effect of this is in the South. The likelihood of a tornado in any given part of Iowa has not significantly shifted.

Vulnerability and Impact

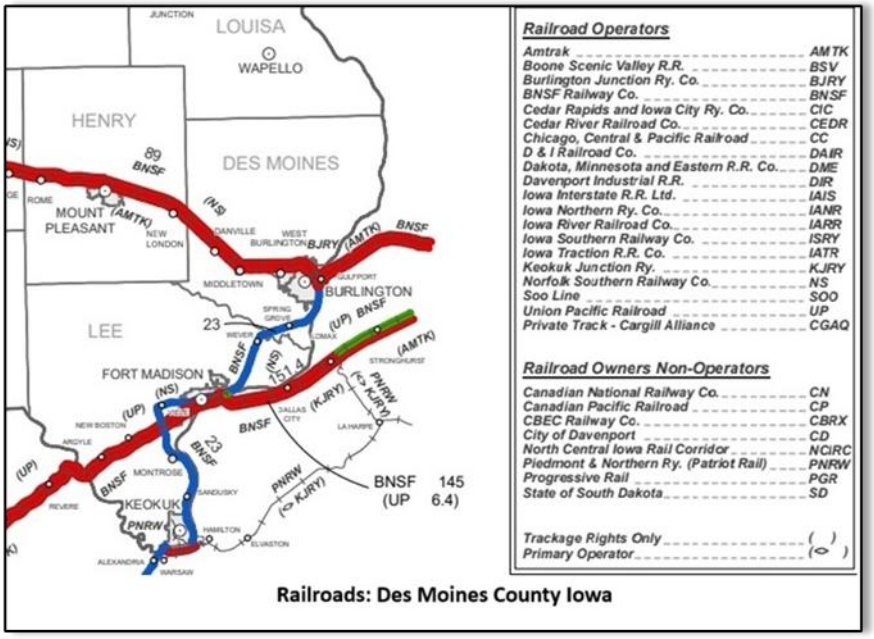
HazMat Incident: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of Danville	X	Danville Community School District
X	City of Middletown	X	Mediapolis Community School District
X	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

According to FEMA, there are six types of injury that humans experience as a result of a hazardous materials incident: Thermal Harm, Radiological Harm, Asphyxiation, Chemical Harm, Etiological (Biological) Harm, and Mechanical Harm. (Hazardous Materials, 2019). All of these threaten health and life, depending on the degree of exposure.

Because of the wide variety of potentially hazardous materials in our environment, almost any location could be impacted by a HazMat Incident. Locations affected during the study period 2015-2024 are: Rural Des Moines County, Burlington, Danville, West Burlington, IAAAP (Middletown) and the unincorporated community of Sperry.

Des Moines County

Highway or Railroad Hazardous Materials Incidents are a primary concern for Des Moines County Emergency Management. Local emergency personnel are first on the scene of these incidents, while their authority is restricted under regulatory agencies such as DNR, DOT, and Railroads. Training for first responders is essential.



Railroads: Des Moines County Iowa

Agricultural hazards. Farm chemicals are frequently transported on local roads and highways, often at slow speeds on narrow roads. Conflicts between vehicles on the road or driver error can result in spills of hazardous materials. Transportation accidents can result in chemical and manure spills from tanks and containers during transport contaminating the soil, air and water. Manure contains pathogens such as bacteria, viruses, and parasites that can infect humans or livestock, and enter groundwater.

City of Burlington and Burlington CSD

As the largest city in the county, Burlington has the most exposure to potential hazardous material spills. Emergency responders are exposed to a variety of hazardous substances and scenarios. A major 4-lane highway bisects the city and BNSF Railroad passes through downtown. A HazMat incident could occur due to an accident or a derailment. Fixed chemical handling sites are present throughout the area. People in the vicinity of an accident are at risk of exposure to hazardous chemicals.

Danville, Middletown and West Burlington, Danville CSD, West Burlington ISD

The cities of Danville, Middletown and West Burlington are adjacent to the BNSF Railroad. A derailment could lead to a HazMat Incident that would affect the population and property in those cities.

Mediapolis CSD

The Mediapolis Consolidated School District is within 2 miles of a large industrial fertilizer plant. In the event of a disaster at the plant, the school area could be contaminated.

West Burlington ISD

Potential hazardous sites that could affect West Burlington School District is adjacent to the Iowa Army Ammunition Plant, a large fertilizer plant is within 15 miles, and an ethanol plant is 5 miles away. The railroad is about a mile from the school.

Southeastern Community College

IAAAP borders the campus, a fertilizer plant is nearby in Lee County, Borghi is 1 mile away, Natural gas line runs under the campus.

IAAAP

Three spills occurred at the ammunition plant during the study period. The nature of the facility does put it at risk for hazardous materials incidents.

Impacts of Climate trends. Increased or decreased tornado activity would impact the security of hazardous materials stored at fixed sites or the transportation of hazardous materials. An increase or decrease in Winter weather would also have positive or negative impacts on these. Additional precipitation intensity will likely result in higher levels of agricultural chemicals present in local streams and rivers.

Land use development. From FEMA regarding Land Use Policies:

"Proximity of these facilities to residential areas and businesses creates the potential for devastating impacts should a release or explosion occur. Jurisdictions should consider zoning and regulations to ensure that hazardous facilities are not located near residents, schools, and businesses and that future development is restricted within a certain distance of facilities that store hazardous materials" (HazMat, 2019) .

Population Patterns. An increase in population near HazMat storage or transportation routes would place more people at risk.

Human Epidemic or Pandemic

Epidemics are geographically localized, high occurrences of disease, while a Pandemic is an incidence of disease that is widely spread across a wide area including several countries.

Epidemic

The Centers for Disease Control and Prevention defines an epidemic as an unexpected increase in the number of disease cases in a specific geographical area. An epidemic disease doesn't necessarily have to be contagious. The term epidemic refers to a disease or health problem when cases are clearly above the expected occurrence in a community or region.

Pandemic

Pandemics are most often caused by viruses, such as influenza or Coronavirus Disease 2019 (COVID-19), which can easily spread from person to person. The World Health Organization declares a pandemic when disease growth is exponential.

From the CDC:

> Although pandemics occur infrequently, planning and preparing for a pandemic is important to ensure an effective response. Planning for and responding to a pandemic is complex and pandemics can affect everyone in a community. Therefore, public health officials, health care professionals, researchers and scientists in the United States and across the world are working together to plan and prepare for possible pandemics. Many resources are available to help international, national, state and local governments, public health and health care professionals, corporations, and communities develop pandemic preparedness plans and strengthen their capabilities to respond to different pandemic scenarios (CDC, 2023).

Location

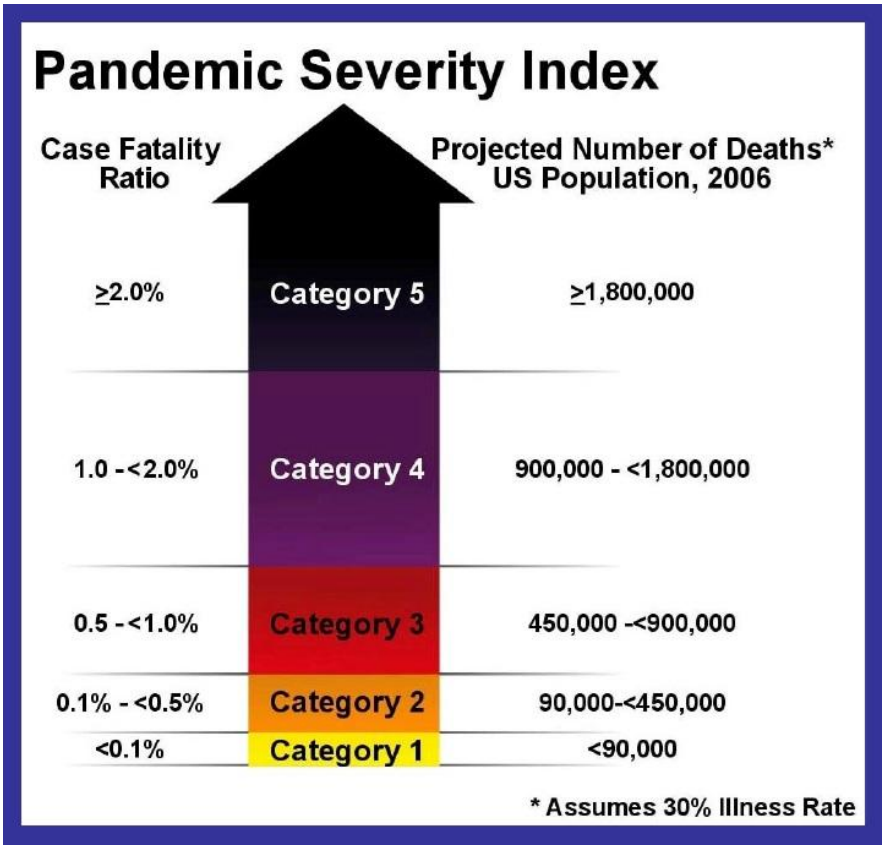
This is a county-wide Hazard.

Affected Jurisdictions. All Jurisdictions are at risk from a Human epidemic or pandemic.

Extent

Public health programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious diseases, and provide early detection and treatment for infected persons. The Iowa Department of Public Health monitors diseases to identify patterns and provide information to the community on emerging medical concerns.

A Pandemic Severity Index chart from the Center for Disease Control shows fatality rates and projected deaths for each category. An example of the corresponding steps to take is given for each category (Reed, 2023).



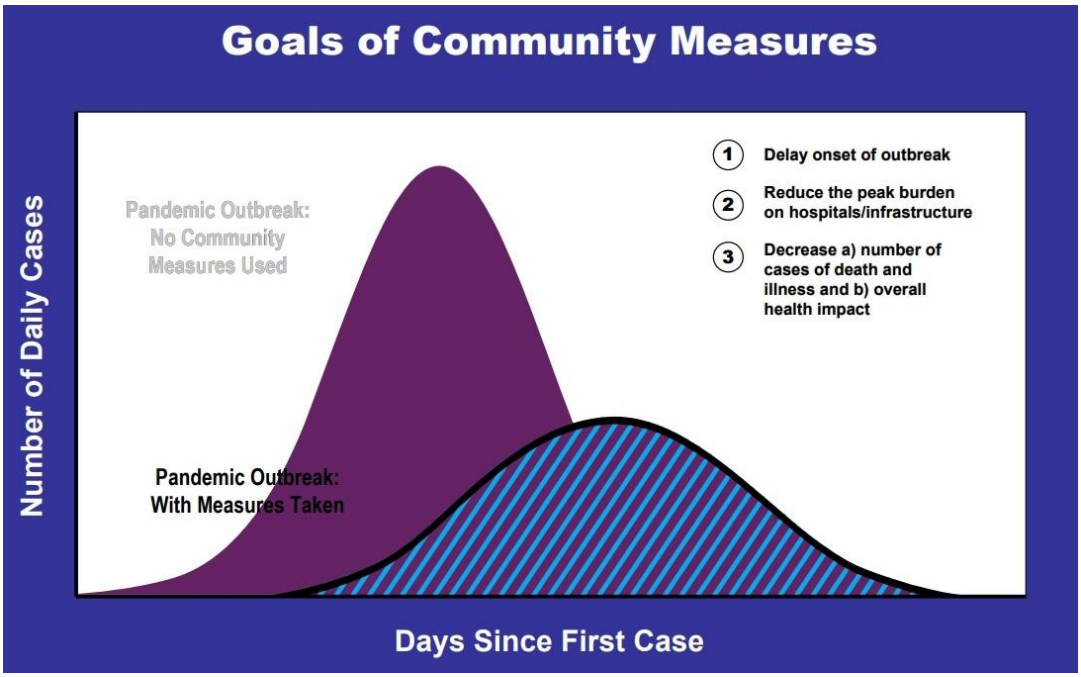
Community Strategies by Pandemic Flu Severity (1)

	Pandemic Severity Index		
Interventions by Setting	**1**	**2 and 3**	**4 and 5**
Home			
Voluntary isolation of ill at home (adults and children); combine with use of antiviral treatment as available and indicated	Recommend	Recommend	Recommend
Voluntary quarantine of household members in homes with ill persons (adults and children); consider combining with antiviral prophylaxis if effective, feasible, and quantities sufficient	Generally not recommended	Consider	Recommend
School			
Child social distancing –dismissal of students from schools and school-based activities, and closure of child care programs	Generally not recommended	Consider: ≤ 4 weeks	Recommend: ≤ 12 weeks
–reduce out-of-school contacts and community mixing	Generally not recommended	Consider: ≤ 4 weeks	Recommend: ≤ 12 weeks

Community Strategies by Pandemic Flu Severity (2)

	Pandemic Severity Index		
Interventions by Setting	**1**	**2 and 3**	**4 and 5**
Workplace/Community **Adult social distancing**			
–decrease number of social contacts (e.g., encourage teleconferences, alternatives to face-to-face meetings)	Generally not recommended	Consider	Recommend
–increase distance between persons (e.g., reduce density in public transit, workplace)	Generally not recommended	Consider	Recommend
–modify, postpone, or cancel selected public gatherings to promote social distance (e.g., stadium events, theater performances)	Generally not recommended	Consider	Recommend
–modify workplace schedules and practices (e.g., telework, staggered shifts)	Generally not recommended	Consider	Recommend

Community Measures. The purpose of community mitigation strategies in human disease transmission is to slow the spread of illness and reduce mortality. Unchecked outbreaks of disease result in additional injury or deaths when the healthcare system is overwhelmed with cases (CDC, 2023).



Previous Occurrences

Many diseases throughout human history have been pandemic. In the 1918 Influenza pandemic which lasted about 2 years, about 28% of the US population of 105 million became infected, and 500,000 to 850,000 died (0.48 to 0.81 percent of the population). A Category 3 pandemic. As a result, in one calendar year average life expectancy dropped by 12 years. Influenza pandemics in 1957 and 1968 killed 70,000 and 34,000 people respectively worldwide.

COVID-19. There has been one significant pandemic in the study period. In the United States, more than six million people have been hospitalized, and 1.2 million people are known to have died from Covid-19 as of August 2025.

That level of mortality places the COVID-19 pandemic in Category 4 on the Severity Index. In 2023, the CDC estimates that 77% of the US population over age 18 had been infected by Covid-19 since 2020. This does not mean that those people need not be vaccinated, because new variants continue to emerge, to which people are not immune.

Probability

There has been one event in ten years. 1/10 = 10%. The probability of a human epidemic or pandemic in Des Moines County is “Unlikely” in any given year.

Climate trends

Increased spread of some diseases. More favorable conditions for survival and spread of many pests and pathogens (Iowa, 2023).

Vulnerability and Impacts

Human epidemic or pandemic: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
X	City of West Burlington	X	Danville Community School District
X	City of Danville	X	Mediapolis Community School District
X	City of Middletown	X	Notre Dame Catholic Schools
X	City of Mediapolis	X	West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
X	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		

All jurisdictions

Des Moines County is a rural community with one hospital. Health care systems have a limited capacity to shelter and treat large numbers of very ill patients.

In rural communities, the scope and magnitude of contagious disease can escalate quickly to overwhelm limited medical staff and supplies. Disruption of business, social life and loss of jobs and tax revenue occur due to an epidemic or pandemic.

It takes some time for medical professionals to develop and distribute vaccinations against new diseases or new variants of known viruses. In the event of a virulent human epidemic or pandemic, it is likely that many people would be exposed before the danger was fully understood or any significant assistance could be provided by the State.

Misinformation, misunderstanding and mistrust can be spread rapidly through modern social media, leaving the general population confused by conflicting information. When the general public has an inconsistent response to an epidemic or pandemic, there is a reduced effectiveness of efforts to contain or manage the situation, or to measure the results of various treatment methods.

Schools

Schools are a place where many vulnerable people are concentrated in a small space, facilitating disease transmission. Disruption of the school year and a switch to no-contact learning have serious and long term effects on education of young people, who may have long term difficulty overcoming these fundamental challenges.

Impacts of Climate trends. The effects of climate change will likely cause increases in the survival of pests and pathogens.

Land use development. Land use development is unlikely to increase or decrease risk from this hazard in the near future.

Population patterns. Increased population density is not expected in the next few years, therefore population patterns are unlikely to increase or decrease risk from this hazard in the near future.

Infrastructure Failure

Infrastructure failure is an extended interruption, widespread breakdown, or collapse of any public or private infrastructure including communication failure, energy failure, structural failure, and major structural fires.

Because of the relatively modest size of public infrastructure under the control of local government in Des Moines County, most catastrophic infrastructure failures as defined by FEMA are not applicable. Large scale infrastructure failures would be regional and would require the intervention of State and Federal agencies.

Three potential failures from the 2020 HMP were not carried forward because they have been largely mitigated or are no longer viewed as a hazard that requires mitigation. They are:

Communication failures. This risk has been largely mitigated since the publication of the 2020 HMP. Des Moines County now has a 911 dispatch center (DESCOM). Backup service is provided by Lee County, as well as from the State of Iowa within 2 hours of a cease of operations. Due to the support of other jurisdictions, redundancy, and secondary communication devices, communication failures are very unlikely to affect the population of the county for any significant period of time. Ongoing improvements will continue as new technology becomes available.

Energy failures. Serious widespread energy failures are outside the response capability of local government, such as a breakdown in the nationwide petroleum or regional natural gas delivery systems. Regional power companies manage electric utilities.

Major structural fires. Certain circumstances such as density of downtown buildings, industrial fires or the involvement of highly combustible materials can lead to major structural fires, however with modern training, equipment, fire detection devices, and building regulations and inspections, most structural fires can be quickly contained and limited to the immediate structure involved.

Risk of Infrastructure failure in Des Moines County was identified in the following circumstances:

- ✓ Structurally deficient bridges
- ✓ Critical facilities. Local public utility failure

Structurally Deficient bridges.

A structurally deficient bridge (SD) is a bridge having deterioration, cracks, or other flaws that reduce its load carrying capacity. This classification does not mean a bridge is unsafe. Most SD bridges can continue to serve traffic safely if they are properly inspected and maintained, but they may be posted for weight limits that are less than the maximum legal weights allowed by law.

There are 22 SD bridges in Des Moines County, half of which are programmed for rehab or replacement. The remainder will be programmed for rehab or replacement in coming years.

Critical facilities. Local public utility failure.

Power outages affect all cities, but some are more frequently impacted than others. Most power outages are caused by tree damage during high winds, ice accumulation, or tornados, that take down overhead electrical lines. Power outages are largely outside of the control of local government except that cities can encourage utility companies to place additional power lines underground and regular tree maintenance can be employed.

Water service. Another concern expressed by the community is a need for back up mechanisms to ensure water supply networks have sufficient reserve capacity and alternative supply paths. Local government

can be proactive in addressing this concern by identifying secondary water resources that may be used during emergency conditions.

The unincorporated community of Beaverdale, served by the West Burlington Water system, is a community chronically affected by interruptions in water service due to an aging water system and lack of public works personnel. This puts pressure on the West Burlington water delivery system.

Location

Structurally Deficient bridges.

Affected jurisdictions: Rural Des Moines County

Critical facilities. Local Public utility failure.

Affected Jurisdictions: Cities, West Burlington (Beaverdale)

Extent

Extent: Structurally deficient bridges

County Structurally Deficient Bridges Summary Report FY 2023 Iowa DOT

County	Beginning status			Structures taken off SD status	Structures that remained in SD status at end of year					
	SD at beginning of reporting period	Became SD during FY 2023	Total SD during this FY	Total restored	Partially Rehabbed	Programmed for replace or rehab	Not yet programmed	Closed: Plan to rehab or replace	Closed: Not likely to reopen	Total SD remaining
Des Moines	21	1	22	0	0	11	11	0	0	22

https://iowadot.gov/media/3588/download?inline=

Structurally Deficient (SD) Bridges are those that have deteriorations, cracks, or other flaws that reduce their load carrying capacity which may cause weight restrictions on the bridge. The Iowa DOT emphasizes that "Structurally deficient" does not mean a bridge is unsafe. Most structurally deficient bridges can continue to serve traffic safely if they are properly inspected and maintained.

Functionally Obsolete (FO). Bridges that do not have lane widths, shoulder widths, or adequate vertical clearances, or the bridge may be subject to occasional roadway flooding. While it is not unsafe for all vehicles, the older design features cannot adequately accommodate current traffic volumes or vehicle sizes and weights.

As reported in an article on the website Radio Iowa, in 2023:

> *Director Scott Marler said there are 4,558 structurally deficient bridges or poor bridges in the state — but that doesn't mean they are unsafe. He says there are only two types of bridges in Iowa, a safe bridge or a closed bridge. Marler says Iowa ranks at the top in part because of the number of bridges here. "In terms of total bridges, we're seventh in the nation. For population our size, that means we have got a lot of bridges. Why? Well, we've got an extensive grid network across Iowa and our farm market system, we're really moving a lot of product to a global market," Marler says.*
>
> *He says a majority of the poor bridges are on the rural road system. "Those bridges carry in many cases, very little traffic," he says. "In fact, 50 percent of those bridges carry fewer than 35 vehicles per*

day. And 74 percent carry fewer than 100 vehicles." Marler says counties are faced with significant and difficult decisions about which bridges to replace.

He says only 26 bridges on the primary road system that the DOT oversees are in poor condition. Marler says they've reduced the number of poor bridges from 256 in 2006. And 21 of the 26 poor bridges on the primary system are slated for repair in the next five year road improvement program (RadioIowa, 2023).

According to the Iowa DOT County Structurally Deficient Bridges Report for FY 2024, there are 22 structurally deficient (SD) bridges in Des Moines County. Twenty-one of the SD bridges in the county were designated as such during 2022, evidence that more bridges continue to become deficient or obsolete over time. Eleven of the 22 are currently programmed for rehabilitation or replacement, and 11 others will need repair or replacement soon. No bridges are listed as currently closed to traffic.

2024 **County**	Total at beginning of reporting period	Became SD during FY 2023	Total SD during this FY	Programmed to replace	Not yet programmed
Des Moines	21	1	22	11	11

Extent: Critical facilities. Local public utility failure.

There is no formal tracking mechanism in place where power outages or water system disruptions are recorded. Therefore, this hazard is difficult to quantify, and occurrences are largely anecdotal.

Previous Occurrences

Structurally deficient bridges. No bridge failures have occurred that placed life or health at risk in Des Moines County.

Critical facilities. Local Public utility failure

Power Outages. The most frequent failure of local infrastructure is electrical power outages. Des Moines County jurisdictions experience short term interruptions of power during severe weather. This occurs on average of about three times per year. Local power companies do provide prompt repairs, and the electric service is usually restored within a few hours, but all communities can expect that longer periods without electricity could occur. There was a storm in August 2024 when the power was out for much of Burlington and West Burlington for approx. 28-36 hours.

Water service. Ongoing maintenance of water lines is an issue for all communities. Minor failures are common, but no events of more than 24 hours duration have occurred in the last five years.

Probability

While Infrastructure failure is a real and present danger, significant or catastrophic failures happen rarely.

Structurally deficient Bridges. Zero (0) events in ten years = less than 10%, the probability of a bridge failure in any given year is "Unlikely."

Critical facilities. Local Public utility failure

Power outages. The most frequent failure of local infrastructure is local electrical power outages. In any given year, most buildings lose power at least once due to storms or line damage. Power loss events typically last fewer than 24 hours. One storm in August 2024 did result in a loss of power in areas of Burlington and West Burlington for up to 36 hours.

One (1) event in ten years = 10%; the probability of a power outage of more than 24 hours duration in any given year is “Unlikely.”

Water service. Zero (0) events of more than 24 hours duration in 10 years = less than 10%, the probability of a water service outage of greater than 24 hours is Unlikely.

Vulnerability & Impacts

Infrastructure failure: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of West Burlington		Danville Community School District
X	City of Danville		Mediapolis Community School District
X	City of Middletown		Notre Dame Catholic Schools
X	City of Mediapolis		West Burlington Independent School District
	DESCOM		Southeastern Community College
	Iowa Army Ammunition Plant (IAAAP)		
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		

Infrastructure failure in general

Causes of infrastructure failure can be from increased carrying loads, corrosion of materials due to environmental exposure, erosion, and stress beyond what the system was designed to do. Infrastructure failures can result from human error, accidents, or the effects of natural hazards that exceed the tolerances of structural materials, placing life and property at risk.

An increase in population would place greater demands on infrastructure systems that were built decades ago with lower-capacity designs.

Updating or replacing these systems requires huge capital investments and will happen slowly. In the meantime, older infrastructure has the potential to fail.

Structurally deficient bridges.

Twenty-two (22) structurally deficient bridges will need to be rehabilitated or replaced in coming years. Deteriorating county bridges, some serving fewer than 35 vehicles a day may have to be closed.

Aging structures combined with increased loads and larger vehicles all increase the vulnerability of transportation infrastructure. Bridge replacement costs may be impractical or impossible for a small community to fund independently. Safety may dictate the closing of a road or bridge if it becomes unsafe, increasing travel times or disrupting business access causing extended travel time for regular users.

Critical facilities. Local Public utility failure.

Power outages. Des Moines County experiences minor interruptions of power during severe weather. This occurs on average of about three times per year. Electrical lines and equipment are exposed to the elements and are vulnerable to the effects of high winds, lightning strikes, the weight of ice accumulation, tornados or wildfires.

Loss of electrical power has direct effects on larger entities like schools, hospitals, government and business, as well as impacts on individuals and households. Secondary effects of power failure include problems such as inability to operate home medical equipment, inoperable gas pumps, grocery or convenience store registers, and loss of refrigeration create problems throughout the community. As a result, health emergencies, interruptions to business and travel, and food spoilage occur.

In Des Moines County, because of the large percentage of elderly residents, prolonged interruption of electric or gas utilities would create a risk to life due to exposure to extreme temperatures. Communities in the county do not have enough shelters with generator backup to house elderly residents during prolonged energy disruption. If an interruption in service for an extended period were to occur, the only recourse would be to evacuate vulnerable residents to a safe location.

Water service. Aging water and sewer facilities must be maintained and replaced over time. This is an ongoing process in every community. Line breaks occur unexpectedly as a result of natural processes, or as the result of excavation too close to the line. Many underground water and sewer lines in use throughout the Midwest were put into service decades ago and were constructed of materials not designed to last so long.

Modern streets complicate the excavation, repair or replacement of lines, many of which must eventually be moved into the right-of-way.

The unincorporated community of Beaverdale is served by West Burlington Water system. Beaverdale has no official Public Works department. Aging water lines in place are at increased risk of failure. Leaks and water line breakage are common in Beaverdale. This problem will only get worse without some type of intervention.

Funding as a vulnerability**.** Replacing aging and inadequate infrastructure is costly and politically difficult. Without a clear crisis, it is a challenge to persuade taxpayers to replace expensive structures. State and federal programs have been established to subsize costs and assist communities with infrastructure improvement needs, but even these strategies may not be implemented due to a lack of funding for the local share of costs.

Impacts of Climate trends. Climate change is likely to cause greater intensity of severe weather which could affect above ground power lines.

Land use development. Land use development should include strategies to ensure adequate water supply over the long term. New developments would affect the traffic load and risk level for deficient bridges.

Population patterns. Increased population density is not expected in the next few years; therefore, population patterns are unlikely to increase or decrease risk from this hazard in the near future.

Terrorism

This hazard includes a wide variety of human caused threats including domestic or foreign enemy attack, biological terrorism, agro-terrorism, chemical terrorism, conventional terrorism, cyber terrorism, radiological terrorism, school violence and public disorder. Of these, public comments and national data indicate that terroristic threats in Des Moines County are most likely to occur under the categories of enemy attack, agro terrorism, conventional terrorism, cyber terrorism, and violent attacks at schools.

These include the use of 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 have the potential to cause massive destruction and/or extensive casualties.

Excerpts from the State of Iowa 2023 HMP:

Enemy attack is an incident that causes massive destruction and extensive casualties. An all-out war would affect the entire population. Some areas would experience direct weapons' effects of blast, heat, and nuclear radiation. Other areas could experience indirect weapons' effects, primarily radioactive fallout.

Agroterrorism. Causing intentional harm to an agricultural product or vandalism of an agricultural/animal related facility is classified as agroterrorism. Activities could include: intentional introduction of disease, animal rights activists who release animals; disgruntled employees who intentionally contaminate bulk milk tanks or poison animals; ecoterrorists who destroy crops/facilities; theft of agricultural products, machinery, or chemicals; or criminals who vandalize agricultural facilities. Depending upon the type of action taken, the implications will vary greatly.

Conventional terrorism. Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion, or ransom is conventional terrorism. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the time 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 or sniping from remote locations.

Iowa has not been immune to acts of terrorism or sabotage. The state has experienced many bomb threats . . . Recent national events have increased awareness pertaining to school safety, workplace safety, and vulnerability at public gatherings.

Cyber terrorism. Electronic attack using one computer system against another in order to intimidate people or disrupt other systems is a cyber attack.

. . . We are interested in the context of emergency management only the type of terrorist attacks that cause disruption to other sectors, such as electrical or other utilities, or which attacks result in the deployment of rolling response equipment, such as police and fire vehicles. With that definition in mind, cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection.

Other comments regarding Terroristic threat:

Enemy attack. Some sites in Des Moines County could be potential targets of enemy attack from malicious foreign or domestic actors. The Iowa Army Ammunition Plant is one. Critical facilities and critical infrastructure could be expected to be at some risk.

Agro terrorism. According to the Iowa Soybean Association:

> Considering recent agroterrorism events, U.S. Rep. Zach Nunn drafted the Preventing Lethal Agricultural and National Threats (PLANT) Act.
>
> The PLANT Act seeks to close a critical gap in the federal law that currently requires the U.S. government to prove intent to cause harm with biological agents to seek criminal prosecution. Presently, there is no statute that addresses the possession or importation of potentially dangerous agricultural pathogens without the required United States Department of Agriculture (USDA) permit.
>
> "The baseline of the PLANT Act is to make sure that if someone comes into the United States and knowingly attempts to bring something illegal and doesn't disclose it, we can hold them accountable at a federal level," Nunn says.
>
> The implementation of the PLANT Act would give agencies such as the USDA and the Department of Justice (DOJ) the ability to prosecute individuals and groups associated with the illegal possession or importation of pathogens. It provides another layer of protection for farmers, the U.S. food supply and national security against potential agroterrorism threats, Nunn says (Jordan, 2025).

Conventional terrorism; Mass shooting. There is no fixed definition of a mass shooting in the United States. Among the various definitions most use a minimum of 4 victims as a threshold, and exclude gang killings, domestic violence, or terrorist acts sponsored by an organization.

For the purposes of this hazard profile, we use the following definition: an act of public firearm violence in which a shooter kills at least four victims.

July 4, 2025. According to the Gun Violence Archive (GVA), there have been at least 198 mass shootings in the United States so far this year, leaving at least 150 people dead and 900 injured.

> A dangerous pace of mass shootings escalated in 2020 during the Covid-19 pandemic and has persisted since then. Last year, the United States recorded 502 mass shootings, the lowest total in a year since 2019, before the pandemic began. 2021 remains the worst year for mass shootings in the US since GVA began tracking them in 2013, with 689 across 44 states and Washington, DC (Boschma, 2025).

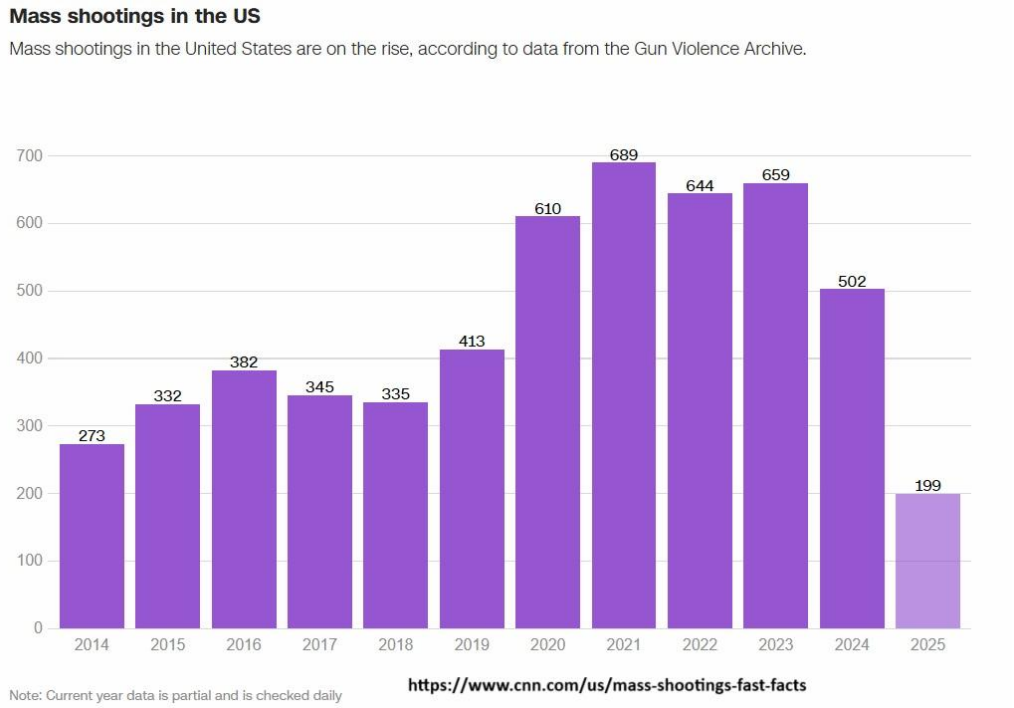
Schools. Mass public shootings increasingly occur at schools, shopping malls, or other public places where people gather. An active shooter can inflict a substantial number of injuries and deaths in a short period of time. Following the tragedy at Columbine High School in 1999, incidents of gun violence perpetrated at schools have become increasingly common. All schools are now considered to be at risk for this category of terrorism.

Cyber terrorism. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks. Cybersecurity and critical infrastructure protection are among the most important national security issues facing our country today, and they will only become more challenging in the years to come (Iowa, 2023).

Location

Critical Facilities, Schools.

Extent



Previous occurrences

While the threat is real and ever present, there have been no incidents of Terrorism to date in Des Moines County.

Probability

Zero events in 10 years gives us a probability of less than 10%; “Unlikely.”

Climate trends

Climate trends are not expected to have an impact on this hazard.

Vulnerability and Impacts

Terrorism: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington	X	Burlington Community School District
	City of Danville	X	Danville Community School District
	City of Middletown	X	Mediapolis Community School District
	City of Mediapolis	X	Notre Dame Catholic Schools
X	City of West Burlington	X	West Burlington Independent School District
X	Iowa Army Ammunition Plant (IAAAP)	X	Southeastern Community College
	North Bottoms Levee District		
	Two Rivers Levee and Drainage District		
	DESCOM		

The Iowa Army Ammunition Plant is an example of a potential military target within Des Moines County. The plant supplies munitions to the U.S. armed forces while the land area is home to Iowa National Guard engineering units and training areas.

Because of the unpredictable nature of a terrorist attack, it is reasonable to assume that Des Moines County is susceptible, but it is difficult to predict the severity and magnitude of an attack. The county has significant critical infrastructure whose failure could cause significant damage and the potential loss of life, from the Lock & Dam to schools to agricultural facilities.

Other critical facilities such as government offices, shopping centers, churches, and community events could also be targets for this type of terrorism. Terrorists threaten people and facilities through "bomb threats" and other scare tactics. Precautions must then be taken to ensure the safety of the people and property involved.

The county has limited equipment and training beyond the hazardous materials response team to handle any events, and the county's geographic location at a rural corner of Iowa could result in delays from State teams arriving from the Des Moines or Cedar Rapids areas. Given the limited history of terrorist acts in Iowa, government employees of critical facilities, and students are particularly vulnerable to this hazard.

Rural sites, such as Danville CSD and Mediapolis CSD would likely be at greater risk due to longer law enforcement response times. The Des Moines County Sheriff's Department is the law enforcement agency for both of those communities, in addition to the rest of the county, which would likely result in response times to an event at either one of those schools to be longer than if the event were to occur in Burlington or West Burlington.

Transportation Incident

Description

Potential Transportation incidents and disasters

Large scale Transportation incidents. Major transportation system incidents, including air, rail and waterway disasters are largely outside the authority or capability of local government emergency management, while local first responders are the first to arrive on scene. Many such responders are trained volunteers.

Highway transportation incidents. A highway transportation incident can involve a single vehicle or multiple vehicles. Traffic accidents occur daily and result in property damage and injuries, but major accidents involving multiple vehicles and serious injury are not uncommon. If the design capacity of the roadway is exceeded, the potential for a major highway incident will increase.

Local Transportation incidents. Thousands of trips a day are made on the streets, roads, highways, and interstates in the county and region. Local residents, travelers, business, industry and governments rely on the smooth flow of this network.

Rail. Des Moines County has a significant amount of railway traffic, with several railroad lines routed through populated areas in Burlington and West Burlington. Burlington has an active railroad track through its central business district, which represents a significant risk for property damage and potential

loss of life if a serious accident or derailment were to occur. Amtrak carried more than 350,000 passengers through downtown Burlington in 2024 (Amtrak FY24, 2025).

Waterways. Des Moines County has significant barge traffic on the Mississippi River, which has the potential to damage important infrastructure such as bridges, dams or levees. If a barge were to collide with a local levee, a breach could occur.

Damages to the railroad bridge in Burlington from a waterway incident would be disruptive to the economy of the region and the mobility of national freight rail and Amtrak passenger rail networks.

Another potential site of a waterway accident is the Highway 34/Great River Bridge. Closing of the four-lane bridge due to a waterway incident would have a significant impact on the economy and mobility of the region, affecting both eastern Iowa and western Illinois.

Focus of this HMP

Due to the limited size of the local population and corresponding capabilities, the most severe transportation incidents would require a State or Federal level response. Therefore, the focus of this hazard profile for Des Moines County is limited to two primary topics:

- ✓ Surface transportation incidents that require response beyond normal day-to-day traffic management
- ✓ First-response capability

NOTE: Many transportation incidents of local concern for this HMP are covered under the hazard profiles for hazardous materials spills and winter weather events.

Location

According to the Federal Railroad Administration, there are 178 rail crossings in Des Moines County. At least 32 of these crossings are private.

Previous occurrences

Three railroad accidents are recorded by the FRA during the study period. All were freight train derailments. One occurred in 2017, two in 2019. No fatalities or injuries were reported.

	RR	Mo	Day	Track	Locos Derailed	Cars Derailed	Causes	Equip Damage	Track Damage	Mph
2017	BNSF	12	11	Industry	0	1	H307	12,871	4,500	2
2019	BNSF	10	23	Yard	0	2	H607, H702	1,000	20,000	4
2019	BNSF	12	23	Yard	1	11	T110	70,062	5,000	5

CODE KEY:

FRA Cause codes: Train Accidents	
H307	Shoving movement, man on or at leading end of movement, failure to control
H607	Failure to comply with restricted speed, not in connection with a block or interlocking signal
H702	Switch improperly lined
T110	Wide gage (due to defective or missing crossties)

Probability

Three incidents in 10 years indicates a probability of 30%; “Moderate chance.”

Climate trends

Increased flood levels could disrupt surface and water transportation in the future.

Vulnerability and Impacts

Transportation incident: Affected Jurisdictions			
X	Des Moines County (unincorporated)		**Schools & Academic**
X	City of Burlington		Burlington Community School District
X	City of Danville		Danville Community School District
X	City of Middletown		Mediapolis Community School District
X	City of Mediapolis		Notre Dame Catholic Schools
X	City of West Burlington		West Burlington Independent School District
	Iowa Army Ammunition Plant (IAAAP)		Southeastern Community College
X	North Bottoms Levee District		
X	Two Rivers Levee and Drainage District		
	DESCOM		

Air Transportation. The Southeast Iowa Regional Airport is located next to residential neighborhoods and commercial areas, and its flight paths are above every part of Burlington and West Burlington People on the ground can be injured or killed. The lives and health of the pilot, crew, passengers, and the population on the ground would be at risk from air transportation incident.

Damage to the aircraft itself and cargo is costly and the potential loss of life could be devastating. Buildings, fences, utility lines, and trees are damaged or destroyed in plane crashes. Any direct hit to a structure would be devastating, to people and property. If an aircraft were to strike a critical facility, the local response capability could be pushed beyond its limit.

Rail. Derailments can involve both cargo and passengers. Either scenario can endanger life and property.

Highways. Incidents involving buses or other high-occupancy passenger vehicles on major highways could demand a response that exceeds the normal day-to-day capabilities of local emergency personnel.

Incidents involving livestock complicate response efforts.

Hazardous materials spills can occur due to traffic accidents, including fuels, chemicals and manure spills.

Waterways. The leading causes of waterway incidents are inclement weather and operator error. Levee & Drainage Districts could potentially be damaged by a barge in that a barge could run aground or be beached against a levee or collide with the dam.

Impacts of Climate trends. Climate trends are unlikely to increase transportation incidents in the near future, although conditions should be reevaluated at the time the HMP is updated.

Land use development. New development should be planned with awareness of potential hazards in mind.

Population patterns. Population growth should be directed to less vulnerable sites, while population decrease may provide opportunities to acquire and demolish structures vulnerable to transportation impacts.

Section C: Mitigation Strategy

C1. Capabilities Assessment

The ability of a community to respond and recover from disasters is a function of the capabilities and resources available. Each incorporated municipality has the authority to impose regulations on land development, manage floodplains, and may be a provider of critical utilities or functions such as water, sewer, and electric services and waste collection. In addition to reliance on the skills and abilities of staff, services may be acquired by contract for special skills such as grant writing or engineering.

For much of the year, schools are responsible for nearly every child in a community and employ many people. Schools, therefore, have a special interest in ensuring public safety from hazardous events. Other educational opportunities offered to a community can make pre-disaster planning and post-disaster management more effective.

Des Moines County

The Des Moines County Board of Supervisors consists of three elected district representatives. As the legislative body of the county, the board is empowered to approve budgets of county officials, establish and vacate public highways, allow claims against the county and order same paid, levy taxes to raise revenue for county expenses, fill vacancies in office of elected officials except their own board, constitute a drainage board for the drainage district of the county, approve ordinances and amendments to ordinances, enter into leases and insurance agreements, and more.

The Des Moines County Public Health Department provides a variety of services designed to accomplish a mission of promoting physical and mental health and preventing disease, injury and disability. They offer an immunization clinic and environmental health services, such as: disaster preparedness, needle collection program, free well water testing, grant funding for closing abandoned wells and cisterns, well construction and rehabilitation, radon test kits and information, lead testing of homes and children, food safety information, licensing and inspections, on-site waste water treatment systems, and health inspections of pools, spas, tanning facilities, tattoo parlors, and hotels and motels.

The goal of the Des Moines County Conservation Board is the establishment of a quality park, recreation, conservation, and environmental education system that serves the residents of Des Moines County and the State of Iowa, and to ensure that in coming years, all visitors may have ample opportunity to enjoy the scenic beauty and recreational potential of the area. To reach these objectives, they energetically promote programs and interest in conservation of natural resources.

The Des Moines County Secondary Roads Department, headed by the County Engineer, administers the construction and maintenance of the secondary road system in unincorporated Des Moines County. The road system also includes bridges and culverts.

Des Moines County Emergency Management supports citizens and first responders to ensure cooperation to build, sustain and improve the county's capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. The EMA is a county-wide agency representing all unincorporated areas of the County and all incorporated cities. The emergency management coordinator is responsible for coordinating all the components of the emergency management system in the jurisdiction. These components consist of fire and police, emergency medical service, public works, volunteers, and other groups contributing to the management of emergencies. This also includes the local volunteer community emergency response team. Des Moines County Emergency Management Agency assists public officials, schools, hospitals, business, and industries and the public to promote preparedness, disaster response,

and recovery operations and will encourage mitigation efforts in all jurisdictions and to ensure the safety of all the residents of Des Moines County.

The Des Moines County Sheriff is an elected official serving a four year term and is responsible for enforcing state and county laws. The Sheriff's office patrols the 430 square miles of the county and is the chief law enforcement for the cities of Middletown, Mediapolis, Danville, and all other unincorporated areas of Des Moines County.

DESCOM provides 24-hour dispatching of law enforcement, fire and EMS Services for all public safety emergency entities within Des Moines County. Staffing includes one executive director, ten full time communication operators, and four part time communication operators.

Household hazardous materials in Des Moines County are handled by Des Moines County Regional Waste Commission and HazChem Center of Southeast Iowa.

Burlington Fire Department assists with confined space rescue, high angle rope rescue, and technician level hazardous materials response.

The Cedar Rapids Area Chapter of the Greater Iowa American Red Cross is the branch serving Des Moines County. The Red Cross is a humanitarian organization led by volunteers that provides relief to victims of disasters and helps people prevent, prepare for, and respond to emergencies. It does this through services that are consistent with its congressional charter and principles of the International Red Cross movement.

Building codes

Building codes in Iowa are mandatory statewide. However, local Iowa jurisdictions with a population of more than fifteen thousand, have the authority to adopt the prevailing state codes or adopt codes that are stricter, depending on the needs and preferences of the local community. If a small community does not adopt a building code or issue permits, State Codes still apply.

The State of Iowa imposes a combination of state-required codes and locally adopted codes. The state-adopted version of the 2015 IFC is required to be enforced for all occupancies statewide by state and local government enforcement agencies. Local jurisdictions have the option of adopting the remaining state-adopted codes or a stricter code as determined by the jurisdiction (ICC, 2024).

Capability Summary

The tables below summarize planning documents, staff, regulations, technical abilities, and other mitigation support mechanisms by jurisdiction. Based on the guidance from FEMA's Local Mitigation Planning Handbook, the tables provide examples of people or mechanisms by which mitigation activities can be implemented and also indicate whether or not communities possess certain capabilities. Most information was provided by employees of each jurisdiction.

Powers and duties of incorporated cities in Des Moines County are described in the Iowa Code. A city may exercise any power and perform any function it deems appropriate to protect and preserve the rights, privileges, and property of the city or of its residents, and to preserve and improve the peace, safety, health, welfare, comfort, and convenience of its residents. This stands valid if the city is not expressly limited by the Constitution of the State of Iowa and is not inconsistent with the laws of the general assembly. Examples of municipal powers relevant to hazard mitigation include eminent domain powers, taxing authority, police powers, and issuances of bonds.

C1-a Existing Institutions, Plans, and Ordinances

Jurisdiction	Des Moines County	Burlington	Danville	Mediapolis	Middletown	West Burlington
Existing Institutions, Plans, and Ordinances						
Has your community adopted a Building Code?	State Code	Yes	Yes	Yes	Yes	Yes
Building permits	No	Yes	Yes	Yes	Yes	Yes
Zoning Ordinance	No	Yes	Yes	Yes	Yes	Yes
Subdivision Ordinance	Yes	Yes	Yes	Yes	Yes	Yes
Site Plan Review Requirements	Yes	Yes	Yes	Yes	No	Yes
Floodplain Ordinance	Yes	Yes	Yes	Yes	No	Yes
Storm Water Ordinances	No	Yes	Yes	Yes	No	Updated 2025
Tree and Shrub Ordinance	No	Yes	Yes	Yes	No	Yes
Growth Management Ordinance	No	No	No	No	No	No
Historic Preservation Ordinance	No	Yes	Yes	No	No	No
Critical Facilities Inventory	Yes	Yes	Yes	Yes	Yes	Yes
Comprehensive Plan	Yes	Yes	Updated 2025	Yes	No	Yes
Capital Improvement Plan	No	Yes	No	Yes	No	Yes
Economic Development Plan	Yes	No	Yes	Yes	No	Yes
Emergency Operations Plan	Yes	Yes	Yes	Yes	No	Yes
Post-Disaster Recovery Plan	yes	No	Yes	Yes	No	No
Financial Capabilities						
Capital Improvements Project Funding	Yes	Yes	Yes	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	Yes	Yes	Yes
Water, Sewer, Gas, or Electric service Fees	No	Water	Yes, S,W,E	Yes, S&W	No	Yes
Incur fees for new development	No	No	Yes	Yes	No	Yes
Incur debt through bonds or private activities	Yes	Yes	Yes	Yes	Yes	Yes
CDBG Grants	Yes	Yes	Yes	Yes	Yes	Yes
Other federal funding programs	Yes	Yes	Yes	Yes	Yes	Yes
Other state funding programs	Yes	Yes	Yes	Yes	Yes	Yes

Jurisdiction	Des Moines County	Burlington	Danville	Mediapolis	Middletown	West Burlington
Administrative and Technical Capability						
Public Works Official	Yes	Yes	Yes	Yes	Yes	Yes
Sanitation department	No	Yes	Contract	Yes	Contract	Contract
Grant writers	SEIRPC	No	Local, SEIRPC	SEIRPC	SEIRPC	Yes
Staff Planner	SEIRPC	Yes	YES	Yes	SEIRPC	SEIRPC
Engineer	Yes	Yes	Contract	Contract	Contract	Contract
Personnel skilled in GIS and/or HAZUS	Yes	Yes	DM Co & Local	DM Co		Yes
Emergency Management Coordinator	Yes	No	DM Co	Yes	County	County
NFIP/Floodplain Administrator	SEIRPC	Yes	SEIRPC	SEIRPC	NA	Yes
NFIP						
Is your jurisdiction mapped with FEMA Floodplains?	Yes	Yes	Yes	Yes	No	Yes
Date of Adoption of FP Ordinance	Dec 2021	Dec 2021	March 2020	Dec 2021	NA	Dec 2021
Participate in the Community Rating System (CRS)?	No	No	No	No	NA	No

Capability, Schools

Jurisdiction: Does the school have this?	Burlington CSD	Danville CSD	Mediapolis CSD	Notre Dame School	West Burlington ISD	Southeastern Community College
Administrative Capability, sufficient staff	Yes	Yes	Yes	Yes	Yes	Yes
Emergency Management Plan (EOP)	Yes	Yes	Yes, Annual update	Yes, Annual update	Yes update 2025	Yes
Post disaster recovery plan	Yes	Yes	Yes	Yes	Yes	Yes but could be improved
PTO/PTA/Booster Club	Yes	Yes	Yes	Yes	Both	
Financial Capabilities						
Authority to levy taxes	Yes	Yes	Yes	No	Yes	Yes
Incur debt or Bonds	Yes	Yes	Yes	Yes	Yes	Yes
Has your District had positive response to Bond issues in the past?	Yes	Yes	Pending	Yes	No	Yes
Is your District growing or declining in population?	Stable	Stable	Growing	Stable	Stable	Growing
Public/Private partnerships, Corp donations	Yes	Yes	Yes	Yes	Yes, GB Partnership and City plus many other businesses	Yes

Budget to raise match funds for mitigation grants	Yes	Yes	Yes	Yes	Yes	Yes
Does the jurisdiction have generators?	Yes	Yes	No	No	No	Yes
Do they need additional generators?	Yes	Yes	Yes	Yes	Yes, protect food storage, improve shelter capability	Yes, 2 fixed: one for FEMA safe room and one extra. Need more capacity

Other School Capabilities

- School superintendents typically have the primary responsibility for grant writing but also use outside services
- Districts are partially funded through the statewide penny sales tax, which can be applied to hazard mitigation activities
- Districts are eligible to acquire funding through FEMA's Hazard Mitigation Assistance (HMA) grant program

C1-b Jurisdictions can build upon capabilities

Communities under 1000 population (Danville, Middletown) have limited opportunities to expand capabilities or revenue, while the mid-sized communities of Mediapolis (pop 1930) and West Burlington (pop 3184) have some ability to expand capabilities. The City of Burlington has a greater ability to increase capability. For more information on Des Moines County towns, see the detailed community profiles in Section G.

Jurisdictions can benefit from additional staff training in hazard vulnerability. Other educational and outreach capability could be improved with increased citizen involvement and ongoing public information programs.

Strategies that can be applied to improve capability include the development, update and adoption of local plans, such as Comprehensive Plans, Economic Development plans and Capital Improvement Plans that include the mitigation strategies recommended in the 2025 Des Moines County Hazard Mitigation Plan for each locality. Participation in programs such as the NFIP Community Rating System (CRS) and increased public private partnerships are other ways to build capability.

Review of recommended mitigation strategies during the annual budget process will improve implementation. An Action Plan Summary Table for each community is included in Section G to provide an easy reference for that purpose.

Ways Improve capability	
Jurisdiction	**Actions recommended**
County, Cities	Adoption of a Shelter and Evacuation plan would improve disaster response
County, Cities	Additional education for staff, fire departments and the public
Planning:	
County, Cities	Draft and adopt a Comprehensive Plan
County, Cities	Capital Improvement Plan
Financial Capabilities	
All jurisdictions	Plan for Local grant-matching funds
County, Cities	Apply annually for CDBG Grants
All jurisdictions	Federal and State funding programs on an annual round
Physical capabilities	
All jurisdictions	Generators
Cities	Sirens, warning systems
All Cities	Shelters and safe room improvements
All jurisdictions	Improve resilience

For School Districts, capability can be improved through ongoing improvements in funding for storm shelters and safe rooms at school, increased emphasis on hazard awareness and education, continued public support for bond issues, the development and adoption of Capital Improvement Plans that include mitigation, public-private partnerships, implementation of Hazard Mitigation strategies, and procedures for post-disaster hazard analysis.

Ways to improve school capabilities
More law enforcement funding for LEO and First Responders
Internet backup and cyber security

Safe routes to school, sidewalks, bike paths, trails
Improved stormwater drainage
Improved storm shelter capability
Greater access to funding resources
Improved access to home high speed internet and computers for students

C2-a Participation in NFIP

Unincorporated Des Moines County, Burlington, Danville, Mediapolis and West Burlington have Special Flood Hazard Areas (SFHAs). Flood Insurance Rate Maps (FIRMs) show properties affected by floods that have at least a 1% chance of occurring in any given year. Generally, these areas are adjacent to larger streams and rivers. Most of these floodplains are on agricultural or conservation land, but a few residential and commercial structures are in flood hazard areas. See digital maps in Section B1, above.

The City of Middletown does not intersect with a Special Flood Hazard Area (SFHA). While they are not required to adopt floodplain ordinances or issue permits, participation in the NFIP would be a benefit to local property owners who may wish to purchase flood insurance for their property.

. *Participating communities*

NFIP COMMUNITIES				
CID	Community Name	Initial FIRM	Effective Map Date	Reg-Emer Date
190113C	DES MOINES COUNTY	2/17/1982	10/21/2021	7/20/1993
190114C	CITY OF BURLINGTON	7/2/1981	10/22/2021	7/2/1981
190115C	CITY OF DANVILLE	8/2/2011	10/21/2021	2/2/2022
190615C	CITY OF MEDIAPOLIS	8/2/2011	10/21/2021	8/9/2011
190682C	CITY OF WEST BURLINGTON	8/2/2011	10/21/2021	2/29/2012

Implement substantial improvement or substantial damage provisions of the NFIP:

When structures in the Special Flood Hazard Area (SFHA) are damaged, National Flood Insurance Program (NFIP) participating communities have a responsibility to assess impacts before repairs can be made, no matter the cause of damage. If the cost to repair is 50% or more of the market value, the structure is considered Substantially Damaged and must be brought into compliance with current local floodplain management standards (NFIP, 2023).

The jurisdictions follow the method below to administer the Substantial Improvement/Substantial Damage regulations of the NFIP:

1. Determine Market value. The property tax assessment is used to determine the value of the structure before the damage or planned improvements. Adjustment to value may be made if there is evidence that the market value of the property would be significantly more or less than the assessed value.
2. Determine cost to repair or cost of improvements. Cost of work includes materials, labor, demolition, disposal, utility expenses, site prep, interior or exterior finishes and cost of elevation if applicable.
3. Substantial improvement. If the cost of repair or improvements equals or exceeds 51% of the pre-damage value, it is “substantial” and must comply with current regulations.

What happens if a community does not participate in the NFIP?

Sanctions for Non-participation. A community that does not join the National Flood Insurance Program (NFIP), has withdrawn from the program, or is suspended from it faces the following sanctions:

- ✓ Flood insurance will not be available. No resident will be able to purchase a flood insurance policy.
- ✓ If the community withdraws or is suspended, existing flood insurance policies will not be renewed.
- ✓ No Federal grants or loans for the acquisition or construction of buildings may be made in identified flood hazard areas under programs administered by Federal agencies such as HUD, EPA, and SBA.
- ✓ No Federal disaster assistance may be provided to repair insurable buildings located in identified flood hazard areas for damage caused by a flood.
- ✓ No Federal mortgage insurance or loan guarantees may be provided in identified flood hazard areas. This includes policies written by FHA, VA, and others.
- ✓ Federally insured or regulated lending institutions, such as banks and credit unions, must notify applicants seeking loans for insurable buildings in flood hazard areas that:
    - There is a flood hazard, and
    - The property is not eligible for Federal disaster relief

These sanctions can be severe on any community with a substantial number of buildings in the floodplain. Most communities with a flood problem have joined the NFIP and are in full compliance with their regulatory obligations (FEMA, 2022).

C3-a. Mitigation Goals

The purpose of mitigation is to protect life and reduce property damage. Mitigation is defined as any sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event.

Hazard Mitigation Goals 2025	
Goal 1	Protect the health, safety and quality of life of citizens
Goal 2	Reduce or eliminate property loss, economic cost, and damage to the natural environment caused by a disaster
Goal 3	Ensure government operations, response, and recovery are not significantly disrupted by disaster events
Goal 4	Expand public awareness and support intergovernmental cooperation, coordination and communication to build a more resilient community

Objectives to support these Goals include:

Objective 1: Update Plans and Regulations. Establish processes or regulatory measures that reduce local vulnerability to hazards and alleviate impacts such as death, injury, environmental damage, and property loss.

Objective 2: Structure and Infrastructure Projects. Encourage property protection measures and construction projects to prevent damage to life property and the environment.

Objective 3: Continuity of government. Provide for continued access to government and emergency services for all hazards and disaster events to preserve life and property.

Objective 4: Education and Awareness. Enhance public education to expand awareness and encourage intergovernmental cooperation, coordination, and communication to mitigate against all hazards.

Objective 5: Implementation. Assist local governments in attaining funding and advancing hazard mitigation projects. Build capacity to prevent or reduce risks from all hazards for protection of citizens, property, and natural resources. Examples include installation and maintenance of sirens, backup generators and other safeguards.

Development of Action Steps

Mitigation can protect critical community facilities, reduce exposure to liability, and minimize disruption of community services. Examples of mitigation actions include land use planning, adoption of building codes, acquisition and demolition of structures in hazard-prone areas or ensuring that appropriate shelters are available. Mitigation actions should be cost-effective and environmentally sound.

C4-a Analysis of a comprehensive range of actions/projects

There are five mitigation action types:

- Structure/Infrastructure Projects: Modify or remove infrastructure to mitigate hazard
- Local Plans & Regulations: Using authorities, policies, codes to influence development
- Natural System Protection: Minimize damage by preserving natural system functions
- Education and Awareness Programs: Inform citizens on how to mitigate hazards
- 5% Projects: Actions not quantifiable by a Benefit Cost Analysis (sirens, generators, etc.)

Each jurisdiction considered options to reduce the impacts of hazards identified in the risk assessment including: take no action at this time or take an action in one of the five mitigation action categories.

Mitigation Alternatives Considered

The Planning Committee evaluated mitigation alternatives. Actions recommended in this update include those that jurisdictions agreed to keep or modify from the previous plan, new actions based on community needs and public comments, and suggestions selected or adapted from the 2013 publication FEMA Mitigation Ideas. The State of Iowa Hazard mitigation plan also provided useful guidance. Mitigation alternatives from other local plans were also included for consideration. Some previously identified actions were deleted as detailed in a table in Section E2-b.

Committee members discussed the mitigation needs of their respective communities and strategies that could be implemented in a five year time frame. Scoring based on community responses was used to prioritize potential actions that were then recommended to the Board of Supervisors, City Councils and School Boards, who have the final authority over which actions to adopt.

C4-b. Compliance

For each of the hazards identified within the plan's risk assessment, at least one mitigation action is recommended for each affected jurisdiction. A scoring table in Appendix H tracks compliance with this requirement.

C5 Action plan

Section C5-a, below, outlines the method applied to prioritize each adopted action item, while section C5-b displays a comprehensive action table that indicates how each activity meets FEMA requirements for hazard mitigation planning.

C5-a Prioritizing Mitigation Actions

The planning team agreed to use the scoring methodology described below to assist in prioritizing mitigation strategies. Costs and benefits were subjectively evaluated. The STAPLEE Method as shown in the table below was applied to each proposed action to help quantify benefits.

Local preference was given to the actions that mitigate hazards to new and existing buildings and infrastructure. Special consideration was also given to mitigation strategies that reduce hazards of greatest concern to the public.

Surveys indicated that the top 3 concerns of the public are severe thunderstorms, tornados and Winter weather. Dam Failure was uniformly the hazard of least concern.

Finally, each action was ranked in priority compared to the other mitigation actions by score.

Cost and Benefit	
1 point	Benefit expected to be equal to OR greater than cost
2 points	Benefit expected to be equal to or greater than cost AND ensure continuity of government
3 points	Benefit expected to be greater than cost AND mitigate multiple hazards
4 points	Benefit is expected to be greater than cost AND the action benefits underserved communities or socially vulnerable populations
5 points	Benefit expected to be significantly greater than cost OR the action is expected to prevent deaths or injuries
STAPLEE = 1 point for each category, up to 7	
Social	Community acceptance, effect on segments of the population, educational
Technical	Technical feasibility, long term solution, secondary impacts
Administrative	Staffing, funding available, maintenance & operations
Political	Political support, local leadership support, public support
Legal	Jurisdictional authority, potential legal challenge
Economic	Benefits outweigh costs, contributes to economic goals, outside funding required
Environmental	Effect on land, water, species, consistent with sound environmental goals
Local emphasis = 1 point each, up to 2	
1 point	Mitigates impacts to people from Severe storms (Hail, High wind, Lightning), Tornados or Winter weather
1 point	Mitigates hazards to buildings and infrastructure
Total score = Priority	
10 or more	Priority A: High priority
6-9 points	Priority B: Medium priority
5 points or fewer	Priority C: Desirable if funding is available

C5-b Implementation and Funding

Each proposed activity is given a targeted implementation timeline in the table, based on a five-year plan. Jurisdictions will review potential mitigation opportunities during the annual budget process.

Any activity may be pursued at any time depending on the needs of the community or as funds become available. The variety of actions recommended provides each jurisdiction with opportunities to improve safety at all levels of financial ability.

Funding for Mitigation

The list below includes some of the potential funding sources for mitigation activities.

For a comprehensive list of funding opportunities in the State of Iowa:

The reader is referred to the excellent list of funding resources found in the 2023 Marion County Iowa Hazard Mitigation Plan at https://www.jeo.com/marioncounty-hmp published by JEO Consulting, under Marion County Hazard Mitigation Plan - Upfront and County Profile pages 231-256 Funding Guidebook.

FEMA Assistance Program	FED/LOCAL COST SHARE
Hazard Mitigation Grant Program (HMGP) project grant	75/25
Hazard Mitigation Grant Program Post Fire	75/25
Safeguarding Tomorrow Revolving Loan Fund Program (Pending)	Loan program
Flood Mitigation Assistance (FMA), FMA RL, FMA SRL	90/10
FMA – Socially Vulnerable Communities with a CDC SV Index (SVI) of 0.5 or greater	90/10

https://www.fema.gov/fact-sheet/summary-fema-hazard-mitigation-assistance-hma-programs

Funding for Community Safe Rooms

Federal programs that provide funds for safe room construction include U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) funds, Federal Housing Administration (FHA) mortgage insured financing, the FEMA Hazard Mitigation Grant Program (HMGP), the Pre-Disaster Mitigation (PDM) grant program and Safe Schools 101.

Additionally, many states have developed initiatives for the construction of residential, public, and private safe rooms, including safe rooms in hospitals, emergency operations centers, first-responder facilities, schools, day care centers, manufactured home parks, private residences, community centers, senior centers, and campgrounds. For more information about safe room funding and initiatives, visit http://www.fema.gov/safe-rooms/public-and-community-safe-rooms .

ACTION PLAN TABLES

Structure/Infrastructure

Action 1	**Equip critical facilities and community shelters to accept generators, by hard-wiring or install fixed generators**
Action description	Ensure function of critical facilities during power outages. Provide safe shelter for residents when they are displaced from home by hazards
Hazards addressed	Extreme Heat, Severe storms (Hail, High wind, Lightning),Tornado, Winter weather, Terrorism
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All All Schools
Responsible party	County EM, City & Town Administrators, Superintendent of All Schools
Goals	1,3,4
Score & Priority	10 A
Implementation timeline	12-24 months
Cost	$4,000 to $8,000 per facility
Potential funding sources	HMGP, Community Budget

Action 2	**Facilitate the funding, installation and improvement of public and private storm shelters and safe rooms**
Action description	Improve community storm shelters, apply for FEMA & HSEM storm shelter assistance and Safe All Schools 101. Provide staff to assist with grant applications to assist homeowners who wish to construct a safe room. Facilitate development of shelters and saferooms facilities for mobile home parks and campgrounds.
Hazards addressed	Extreme Heat, Severe storms (Hail, High wind, Lightning),Tornado, Winter weather, Terrorism
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools
Responsible party	County EM, County Conservation, City Administrators, Superintendent of Schools
Goals	1
Score & Priority	12 A
Implementation timeline	12-60 months
Cost	$75,000 to $110,000, Staff time; grant matching funds up to 25% of total project cost
Potential funding sources	HUD, CDBG, FHA, HMGP, Community Budget, Bonds, Safe All Schools 101

Mitigation Action 3	Improve physical security measures at emergency response facilities, critical facilities and All Schools
Action description	Evaluate and implement upgrades to the security systems in place to improve security as new strategies are developed
Hazards addressed	Terrorism
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, Iowa Army Ammunition Plant, Two Rivers L&DD, DESCOM, All Schools
Responsible party	County Supervisors, City Administrators, Public works depts, School Administrators, IAAAP, law enforcement
Goals	1,2,3
Score & Priority	6 B
Implementation timeline	1-60 months, ongoing
Cost	Variable
Potential funding sources	HSEM local match funds

Plans & Regulations

Mitigation Action 4	Develop a long-term shelter and evacuation plan
Action description	1. Develop and adopt a long term shelter and evacuation plan for the general public. 2. Develop and adopt a long term strategy for housing the homeless population to reduce risk to life from weather hazards 3. Coordinate this action item with Emergency Support Function 6 (ESF-6) Mass Care, Emergency Assistance, Housing and Human Services of the Comprehensive Countywide Emergency Operations Plan.
Hazards addressed	Extreme Heat, Hail, High wind, Lightning, Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools
Responsible party	County EM, City and School administrators
Goals	1.4
Score & Priority	10 A
Implementation timeline	12-60 months
Cost	20000
Potential funding sources	Annual budget, planning grant

Mitigation Action 5	Coordinate with State agencies to improve access to grant funding
Action description	All jurisdictions work together to develop and implement a strategy to track funding opportunities and apply for hazard mitigation grants on an annual basis. Raise awareness of annual grant opportunities and how to access those funds more efficiently. Include Safe Routes to Schools and Transportation Alternative Program to improve resilience.

Hazards addressed	All hazards
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools
Responsible party	County Supervisors, City Councils, Boards, School Administrators
Goal	1,3
Score & Priority	11 A
Implementation timeline	12-24 months
Cost	SEIRPC support, Staff time, improved communication with HSEM
Potential funding sources	General fund

Mitigation Action 6	**Develop and implement a Continuity of Government plan**
Action description	Develop and adopt a plan to facilitate continuity of government during hazard events
Hazards addressed	Severe storms (Hail, High wind, Lightning), Tornado, Winter weather, Human epidemic
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	County Supervisors, City Administration
Goals	1,3,4
Score & Priority	7 B
Implementation timeline	12-60 months
Cost	$20,000 TO $60,000
Potential funding sources	Annual budget

Mitigation Action 7	**Develop a volunteer call list and procedure to contact vulnerable individuals that might need assistance during or after a major hazard event**
Action description	Appoint a volunteer group to organize and implement a call list of vulnerable people and willing helpers
Hazards addressed	Extreme heat, Severe storms (Hail, High wind, Lightning), Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	Volunteers
Goals	1,4
Score & Priority	8 B
Implementation timeline	12-24 months
Cost	County or City Staff support
Potential funding sources	Volunteers

Mitigation Action 8	Establish charging stations for electronics at various locations for use by the public after a disaster
Action description	Cooperate with local establishments to assist people with charging communication devices after an event
Hazards addressed	Extreme heat, Severe storms (Hail, High wind, Lightning), Tornado, Winter weather, Infrastructure failure
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	County Supervisors, City Administration
Goals	1
Score & Priority	7 B
Implementation timeline	12 months
Cost	$1500 to $3000
Potential funding sources	Donations

Mitigation Action 9	Develop Memoranda of Understanding (MOUs) with private sector gasoline service providers to prioritize fuel supplies for emergency vehicles
Action description	Prioritize Emergency/Critical Vehicles (government, police, fire, ambulance, etc.) during times of emergency or power outages
Hazards addressed	Severe storms (Hail, High wind, Lightning), Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	Fire Departments, City/Town Councils, County EM
Goals	3
Score & Priority	6 B
Implementation timeline	12 months
Cost	500
Potential funding sources	Community or County Budgets, FEMA or Forestry Grants

Mitigation Action 10	Encourage utility companies to increase the percentage of cables that are underground
Action description	Adopt a policy that requires underground lines when possible
Hazards addressed	Severe storms (Hail, High wind, Lightning), Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	Building permit officials
Goals	1,2,3,4
Score & Priority	6 B
Implementation timeline	12 months, ongoing

Cost	Staff time
Potential funding sources	Part of construction costs for new or substantially improved structures

Mitigation Action 11	**Evaluate water redundancy and ensure water supply networks have sufficient reserve capacity and alternative supply paths.**
Action description	Develop agreements for secondary water sources that may be used during drought conditions
Hazards addressed	Drought
Jurisdiction affected	Cities of Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	Public works officials, City Councils
Goals	1.3
Score & Priority	8 B
Implementation timeline	60 months
Cost	Staff time
Potential funding sources	Current budget

Mitigation Action 12	**Require any new manufactured housing, mobile home/RV Park to include storm shelters as part of development**
Action description	Update building permits to require a shelter strategy. Assist with private applications for FEMA grants for shelters
Hazards addressed	Severe storms, Tornado
Jurisdiction affected	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	Building officials
Goals	1,2,4
Score & Priority	10 A
Implementation timeline	12 months
Cost	Costs: 100 sqft ~ $15,000-$24,000, 250 sqft ~$37500-$60000, 500 sqft ~ $75000-$120000
Potential funding sources	Part of new construction costs, FEMA funding for private shelters

Mitigation Action 13	**Prepare and adopt a stormwater drainage plan and ordinance to implement best practices for stormwater management in affected areas**
Action description	This item encourages best practices through design of a drainage plan. Implementation will involve improvements to current infrastructure in addition to new construction
Hazards addressed	Flood: Stormwater
Jurisdiction affected	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington

Responsible party	County Board of Supervisors, County Emergency Coordinator, Mayors
Goals	1,2,4
Score & Priority	7 B
Implementation timeline	1-60 months
Cost	Planning: Staff time
Potential funding sources	Current budget

Mitigation Action 14	**Improve safety where railroads intersect with roads and trails**
Action description	This action involves collaboration between state and local officials, as well as representatives from the private sector
Hazards addressed	Hazardous Materials, Transportation incident
Jurisdiction affected	Des Moines County, Burlington, Danville, Middletown, West Burlington
Responsible party	Des Moines County Emergency Management Coordinator, Fire Chiefs
Goals	1,4
Score & Priority	9 B
Implementation timeline	60 months
Cost	Lights/Gates: $150,000-$300,000
Potential funding sources	Railroad

Mitigation Action 15	**Ensure cooperation with the railway industry to ensure quick response and adequate information regarding number of passengers and type of products being transported.**
Action description	Improve communication. Tabletop exercises
Hazards addressed	Hazardous Materials, Transportation incident
Jurisdiction affected	DM County and Local Emergency response personnel
Responsible party	County EM, Fire departments, EM response team
Goals	1,2,4
Score & Priority	9 B
Implementation timeline	24 months
Cost	Staff time
Potential funding sources	Current budget

Natural Systems

Mitigation Action 16	**Conduct annual tree maintenance**
Action description	Cooperate with utility companies and residents to ensure tree-trimming around power lines and structures. Inspect trees in the right of way and and remove limbs, diseased or dying trees as necessary. Assist property owners with tree debris removal
Hazards addressed	High wind, Tornado, Wildfire, Winter weather, ACP Disease

Jurisdiction affected	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP
Responsible party	Public Works Officials
Goals	2
Score & Priority	6 B
Implementation timeline	12-24 months
Cost	$2500 per tree (City of Burlington budgets ~$45,000 per year and does approx. 160 trees a year)
Potential funding sources	County & City maintenance budgets

Mitigation Action 17	**Acquire and remove any structures that remain in the SFHA floodplain**
Action description	Identify any structures that remain in SFHA areas, acquire when the opportunity arises. Elevation and/or stabilization of structures, elevation and/or stabilization of roadways, addition of culverts, addition of lift stations and/or pumping stations, erosion control methods along waterway, etc.
Hazards addressed	Flood, Dam Failure
Jurisdiction affected	SFHA Flood: Des Moines County, Cities of Burlington, Danville, Mediapolis, West Burlington
Responsible party	County Supervisors, City Councils
Goals	2,4
Score & Priority	7 B
Implementation timeline	Ongoing
Cost	Variable, depending on each structure $8000 to $100,000
Potential funding sources	FEMA, local funding

Education & Awareness

Mitigation Action 18	**Conduct hazard awareness programs for citizens and students to teach emergency preparedness**
Action description	Educate the public on a variety of Hazard topics. See list below
Hazards addressed	Extreme Heat, Flood, Hail, High wind, Lightning, Tornado, Winter weather, HazMat Incident, Human disease epidemic
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools
Responsible party	County EM, City Administrators, School Administrators
Goals	1,4
Score & Priority	7 B
Implementation timeline	12-60 months
Cost	$1000 to $3000
Potential funding sources	Printing, Staff. Current operating budgets

Educational recommendations:	
Hail, High wind, Lightning, Tornado, Winter weather, HazMat Incident	Distribute public information on how to develop a family emergency plan and a disaster preparedness kit
Extreme heat	Educate the Public regarding a) what precautions to take during hot weather, b) shelter locations, c) hot weather precautions d) free fan distribution de providing sufficient shade and water for animals
Flash Flood	Educate the public regarding a) location of Flash flood hazard areas; b) precautions of hazards due to flood waters
Flood SFHA	Educate the public regarding a) location of special flood hazard areas; b) precautions of hazards due to flood waters; c) best practices for water retention and infiltration on private property
Flood Stormwater	Educate the public about best practices for stormwater management
Hail, High wind, Lightning, Tornado, Winter weather	Educate the public regarding a) proper response to the sirens; b) tornado safe room locations; c) accessing watch and warning information; d) weather advisories and warnings by the National Weather Service
Winter weather	Educate the Public regarding a) information on precautions to take in the event of severe Winter weathers; b) dangerous routes and road closings
Winter weather	Educate the public on shelter locations and the potential dangers of alternative heat sources
HazMat Incident	Provide education about the safe storage and handling of hazardous materials and how to respond in the event of a hazardous materials spill.
Human Epidemic	Educate public regarding existing diseases and best practices for prevention and care; a) management of communicable diseases and outbreaks; b) immunization clinics and locations

Mitigation Action 19	Continue fire safety education for adults and children
Action description	Provide Fire prevention educational materials and continue fire prevention programs, especially with local Schools
Hazards addressed	Wildfire
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	County EM, Fire departments, Schools
Goals	1,2,4
Score & Priority	5 C
Implementation timeline	Ongoing
Cost	$500 to $1500 annually
Potential funding sources	Fire Departments, DNR, HSEM

Mitigation Action 20	Practice drills and train firefighters, responders, and community leaders on effective disaster response
Action description	Perform Tabletop exercises, attend training on disaster response. Ensure the training for the HazMat team is maintained.
Hazards addressed	Hail, High wind, Lightning, Tornado, Wildfire, Winter weather, Human epidemic, HazMat
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools,
Responsible party	County EM, Cities, Fire departments
Goals	1,3,4
Score & Priority	8 B
Implementation timeline	Annually
Cost	$500
Potential funding sources	Staff time

Mitigation Action 21	Ensure critical services and information is protected from cyber-attacks; educate local officials about cyber security.
Action description	14.2
Hazards addressed	Terrorism
Jurisdiction affected	All jurisdictions
Responsible party	IT Managers, Administrators
Goals	3
Score & Priority	7 B
Implementation timeline	Ongoing
Cost	$75,000
Potential funding sources	Annual budget

5% Projects

Mitigation Action 22	Equip and train local authorities to improve response capability
Action description	Ongoing acquisition of equipment and increased availability of training to improve response to terror threats. Response planning and training with Law Enforcement and all County Fire Department agencies.
Hazards addressed	Terrorism
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools
Responsible party	County EM
Goals	1,2,3,4
Score & Priority	9 B
Implementation timeline	Ongoing
Cost	Within current training budget & Staff time
Potential funding sources	EM Budget, HSEM, HMGP 5% Project

Mitigation Action 23	Purchase and install backup generators for critical facilities, including Schools and shelters
Action description	Purchase generators to ensure continued operation of critical facilities in a hazard event
Hazards addressed	Extreme Heat, Flood, Hail, High wind, Lightning, Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, Two Rivers Levee & Drainage District, All Schools
Responsible party	Des Moines County Emergency Coordinator, Mayors, Superintendents
Goals	1,2,3
Score & Priority	11 A
Implementation timeline	1-60 months, ongoing until complete
Cost	$75,000 to $110,000 per facility
Potential funding sources	EM Budget, HSEM, HMGP 5% Project

Mitigation Action 24	Purchase and install additional sirens and upgrade existing storm sirens
Action description	Evaluate existing sirens and implement upgrade to the warning system with alternate power backups and remote activation
Hazards addressed	Severe storms, Tornado
Jurisdiction affected	Cities of Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	City Administrators, Public works dept
Goals	1,3,4
Score & Priority	11 A
Implementation timeline	1-24 months
Cost	$25,000 new or $2000 upgrade or maintenance
Potential funding sources	HMGP 5% Project

Mitigation Action 25	Promote use of NOAA weather radios
Action description	Implement a program to purchase and distribute weather radios throughout the community
Hazards addressed	Drought, Extreme heat, Flood, Hail, High wind, Lightning, Tornado, Winter weather, Dam Failure
Jurisdiction affected	Des Moines County
Responsible party	County EM
Goals	1,4
Score & Priority	7 B
Implementation timeline	Ongoing
Cost	$50 per radio
Potential funding sources	EM Budget, HSEM, HMGP 5% Project

Mitigation Action 26	**Install, upgrade and maintain lightning protection systems for critical facilities**
Action description	Install lightning protection system to protect critical facilities
Hazards addressed	Lightning
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, Two Rivers Levee & Drainage District, DESCOM, All Schools
Responsible party	Building maintenance officials
Goals	2,3
Score & Priority	9 B
Implementation timeline	Initiate within 12 months, then ongoing
Cost	$15,000 to $50,000 per structure
Potential funding sources	Building fund, HMGP 5% Project

Action Item 27	**Obtain an All-Terrain-Vehicle for first responders/ emergency purposes**
Action description	All-terrain vehicles will enhance the local governments' ability to respond to disasters.
Hazards addressed	Flood, Severe storms, Tornado, Winter weather, ACP disease, HazMat incident, Transportation incident
Jurisdiction affected	DM County, Emergency responders for Burlington, Danville, Mediapolis, Middletown, West Burlington
Responsible party	County EM, City Administration, Public works departments
Goals	1,3
Score & Priority	7 B
Implementation timeline	36 months
Cost	$5,000 to $20,000
Potential funding sources	Grant funds, donations, public works budgets, 5% project

Action Item 28	**Update current law enforcement and first responder equipment**
Action description	Continue to acquire modernized equipment according to best practices
Hazards addressed	Flood, Dam Failure, HazMat incident, Terrorism, Transportation
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, DESCOM
Responsible party	County EM, Fire Chiefs, Law enforcement, DESCOM
Goals	1,2,3.4
Score & Priority	10 A
Implementation timeline	1-60 months, ongoing
Cost	$6,000,000 County wide
Potential funding sources	HMPG 5% projects

Action Item 29	**Acquire woodchipper to quickly handle storm debris.**
Action description	Purchase equipment to manage tree limbs and brush, to reduce flammable material in the community
Hazards addressed	Severe storms, Tornado, Winter weather
Jurisdiction affected	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, Two Rivers L&DD
Responsible party	County EM, City Administration, Grounds maintenance personnel
Goals	1,2
Score & Priority	5 C
Implementation timeline	12-36 months
Cost	$150,000-$200,000
Potential funding sources	HMGP 5% Project, property maintenance funds

Action item 30	**Place Alert signs in county parks, along walking/biking trails**
Action description	Signage locations and design will require coordination among county management and conservation staff.
Hazards addressed	Extreme heat, Flood, Severe storms, Wildfire, Winter weather
Jurisdiction affected	County
Responsible party	County EM, County Conservation
Goals	1
Score & Priority	9 B
Implementation timeline	12-36 months
Cost	$5,000
Potential funding sources	HMGP 5% Project

Section D: Plan Maintenance

Making the Plan Work

The Hazard Mitigation Plan is a guide for policy and decision-making regarding mitigation actions within Des Moines County. The Plan considers community background information, local trends and projections, current and future mitigation measures. The goals and objectives have been developed to reflect the consensus of the Hazard Mitigation Planning Committee (PC), the City Councils, the Board of Supervisors, and the citizens of Des Moines County.

Hazard Mitigation Planning Committee:

The Hazard Mitigation Planning Committee members will be responsible for promoting and encouraging the implementation of the Hazard Mitigation Plan. The Committee will also serve as a resource to city councils and public agencies involved in Hazard Mitigation measures.

Committee members will monitor the plan, review the mitigation goals and action plan, and speak with city leaders to discuss any change in risks posed by hazards and mitigation strategies that have been initiated or completed.

D1-a Continuing Public participation

The success of this Plan will require the support of the residents and staff from each of the participating communities. All jurisdictions will keep the public informed by announcing and approving projects and activities at City Council meetings as implementation of a specific action is initiated. For structure and infrastructure projects, a press release may be issued to inform the public and request comments. As the process for the next update begins, a new round of public participation will be implemented.

D2-a Track the progress

Progress made on mitigation activities will be documented by the participating jurisdictions. Each community will evaluate current resources being allocated to implement the plan, discuss the outcomes that have occurred from plan implementation, address any implementation problems that have occurred, and provide project reports to Des Moines County Emergency Management when projects are completed or on an annual basis. The Emergency Manager will provide a list of completed projects on Worksheet 1 for the Hazard Mitigation Planning Committee annually.

The worksheets provided for that purpose are reproduced in Appendix F, *Worksheet 1 Progress Report,* and *Worksheet 2, Project Report.* The person responsible for project management will submit the worksheets to the Des Moines County Emergency Manager upon completion of each project.

D2-b Evaluate the plan for effectiveness

The Hazard Mitigation Planning Committee (PC) will monitor plan implementation, facilitate public input, and report to the governing bodies of each participating jurisdiction and the Des Moines County Emergency Management Commission on an annual basis. Worksheets 1 & 2 in Appendix F will be used to evaluate completed projects.

Once the review forms are completed, they will be presented to the Des Moines County Emergency Management Commission, the Des Moines County Board of Supervisors, the City Councils and Mayors and to the public for comment and attached to the Hazard Mitigation Plan as an addendum.

D2-c Process to update the plan

This update represents a five year plan. Progress reports will be attached to the plan on an annual basis and shall be considered an addendum to the current plan in place. Updates will occur prior to plan expiration, to reflect changes to mitigation needs or progress made in the county.

As the five year cycle progresses, the PC will follow the guidelines below. The Des Moines County Emergency manager and PC members will report progress at local public meetings at intervals throughout the update process to keep citizens informed.

Proposed schedule for future updates	**Time**
Planning Committee meets to review Projects and Risks: Worksheets 2 and 3	Annually
Apply for Planning funds from the state. Notice of Intent	2 years prior to plan expiration
Evaluate Planning team: Worksheet 2	14 months prior to Plan expiration
Receive funding award or authorize cost. Planner in place	1 year prior to Plan expiration
Begin Plan update, review and update Introduction and planning process chapters	1 year prior to Plan expiration
Complete the Capability assessment for each jurisdiction	11 months prior to plan expiration
Data collection and Hazard profiles	10 months prior to plan expiration
Vulnerability and Impacts for each jurisdiction	9 months prior to plan expiration
Evaluate previous mitigation action plan with each jurisdiction	8 months prior to plan expiration
Initiate public survey for risk assessment	8 months prior to plan expiration
Record and organize all public and jurisdiction comments	7 months prior to plan expiration
Draft new mitigation strategies and action tables	6 months prior to plan expiration
PC reviews all data, comments and drafts	5 months prior to plan expiration
PC reviews new action plan	4 months prior to plan expiration
Staff drafts, PC reviews maintenance section for update	3 months prior to plan expiration
PC approves final draft, County adopts to send to state	60 days prior to plan expiration
Final draft complete, submit to Iowa HSEM	60 days prior to plan expiration
Receive FEMA approval	30 days prior to plan expiration
All jurisdictions adopt	Prior to previous plan expiration

D3-a,b,c Integrating the Plan:

Planning needs and capabilities of participating jurisdictions vary and hazard mitigation will be integrated by appropriate means.

Several guiding documents in Des Moines County can support hazard mitigation efforts.

The following steps describe ways in which this plan will be integrated into other planning mechanisms.

1. The Des Moines County Code of Ordinances serves as a guide for future housing, transportation, and economic development. It also specifies emergency declaration authorities and permits.
2. As part of the annual review and evaluation process, the Hazard Mitigation Planning Committee will meet and discuss opportunities to integrate this Plan into other planning mechanisms. Participating jurisdictions will be represented on this committee, including schools.

3. The annual assessment helps keep this Plan relevant as projects are completed, new needs become apparent and will be documented on the review and evaluation form Worksheet 1 in Appendix F.
4. Southeast Iowa Regional Planning Commission (SEIRPC) provides planning services to Des Moines County communities that lack staffing and resources to produce local plans. Des Moines County communities will proactively seek out opportunities for integrating hazard mitigation, as plans are updated. One such plan is the Comprehensive Economic Development Strategies (CEDS) plan.
5. All participating jurisdictions will review adopted mitigation measures during annual budgeting and dedicate funding as appropriate. The review and budgeting will be done as part of the City Council or School Board Budgeting process.
6. Participating jurisdictions will review and consider ways to integrate this Mitigation Plan into Comprehensive Plans when those plans are being created or updated. Similarly, adopted hazard mitigation projects will be integrated into Capital Improvement Plans and other local plans as appropriate.
7. Integration of this Plan into other planning mechanisms will adhere to the public input process required for those planning mechanisms.

Section E: Plan Update

E1-a Changes that increase or decrease vulnerability

Increased vulnerability. No new developments or reductions in service have occurred in the last 5 years that increased vulnerability. Climate trends do have the potential to increase vulnerability to some hazards as detailed in Section B, Hazard Profiles.

Decreased vulnerability and Progress in Mitigation efforts.

Des Moines County communities have implemented many of the mitigation strategies that were recommended in the 2020 HMP. The status of previous recommended actions is noted in Section E2-b, below. Additional examples of Mitigation actions implemented are included under each section below.

E2-a. Changes in jurisdictional priorities and progress in local mitigation efforts

How the plan was revised due to changes in community priorities

Many action items from the previous plan were implemented. Local officials expressed increased concerns about the potential for hazardous materials incidents and human epidemic or pandemics, therefore more emphasis was placed on those hazards in this update than in the previous plan.

The top concerns of the public remain the same: Severe storms, Tornados, Winter weather. Respondents say they need updated alert systems and generators for community facilities to keep people safer during weather emergencies. Respondents and other stakeholders also indicate an increase in need for cyber security and anti-terrorism security protocols. Neighbors want to support the vulnerable people in the community.

People who lack housing are at risk from weather events; more emphasis was placed on the needs of homeless individuals in the community, particularly veterans. Some people pointed out that patients being released from the hospital to the street need a shelter or housing solution.

Animal and Plant Disease. Concerns about the Emerald Ash Borer have largely been addressed. However, tree disease and pests are expected to be a recurring problem. As an example of the amount of potential damage from tree pest or disease, Emma Hanigan, Iowa DNR urban forestry coordinator, reports that the U.S. Forest Service 2012 inventory indicated that there were 52 million woodland ash trees and 3.1 million urban ash trees in Iowa (Rodriguez, 2023). Most of those were impacted by the Emerald Ash Borer. During the 1960's through the 1980's, it is estimated that 80% of elm trees in Iowa were killed by Dutch Elm Disease.

Impacts of climate trends on the ecosystem raise new concerns about agricultural vulnerability, wildlife species range and an increase in pests and pathogens. Rain events are trending toward greater intensity.

Conservation best practices have evolved faster than funding opportunities. Recreational areas would benefit from additional funding to implement fresh land management strategies.

E2-b Status update for mitigation actions identified in the previous mitigation plan

Of 87 proposed mitigation actions in the previous plan, 7 were combined into new recommendations and 4 items were deleted. Reasons for deletion include that the action has been implemented, it is not under local control, does not qualify as mitigation or is no longer viewed as a priority. The remaining recommendations were either completed or prioritized and integrated into the new proposed Action Items (Sec C5-b) and sorted into the five mitigation action categories.

Mitigation Actions from Previous Plan

1.1	Prohibiting new facilities for persons with special needs/mobility concerns in hazard areas.	Completed
1.2	Retrofitting fire and police stations to become hazard resistant	Completed
1.3	Identifying and strengthening facilities to function as public shelters.	Completed
1.4	Storing digital or hard copies of public records in low-risk, offsite locations.	Completed
1.5	Maintain a reverse 911 system to quickly disseminate emergency messages to residents.	Doing this
1.6	Establish charging stations for electronics at various locations for use by the public after a disaster.	Keep
1.7	Develop a long-term shelter plan.	Combine with 7.2
1.8	Develop, implement, and maintain natural and technological hazard education and outreach programs to increase awareness through but not limited to, the following means: Masters of Disasters, Blood Drives, Senior Health Fair, Crime Prevention Week, Safe Boating, Fire Safety Awareness Week, Meth Lab Awareness, and National Incident Management Systems.	Combine with Public Ed
1.9	Obtain an All-Terrain-Vehicle for first responders/ emergency purposes	Keep
1.10	1.10 Development of Saferooms	Keep
1.11	Assessment of special needs population.	Keep
1.12	Digital mapping of community and infrastructure.	Completed
1.13	Obtain necessary information for future vulnerability assessments.	Doing this
2.1	Educate the public regarding existing diseases, existing and new invasive species, and best prevention and care.	Combined with Public Ed
2.2	Conduct a tree inventory and remove diseased or dying trees as necessary.	Completed
3.1	Developing criteria or triggers for drought-related actions.	Completed
3.2	Developing a drought emergency plan which will identify and develop criteria or triggers for drought related actions.	Completed
3.3	Developing agreements for secondary water sources that may be used during drought conditions.	Combine with 9.1, 9.2
3.4	Develop an ordinance to restrict non-essential use of public water sources.	Delay
4.1	Organizing outreach to vulnerable populations, including establishing accessible cooling centers in the community.	Completed
4.2	Educate the public regarding: a) shelter locations b) hot weather precautions c) free fan distribution d) providing sufficient shade and water for animals.	Keep
5.1	Creating an ordinance to regulate dumping in streams and ditches.	Completed
5.2	Maintain flood awareness signs at low water crossings and flash flooding areas.	Completed
5.3	Preparing and adopting a stormwater drainage plan and ordinance.	Keep
6.1	Encourage safe disposal of yard and household waste rather than open burning.	Doing this

6.2	Encourage all fire districts in the planning area to implement a fire awareness campaign and pass burn ordinances to discourage leaf burning and yard waste burning in order to protect existing buildings and infrastructure.	Doing this
6.3	Create defensible zones around power lines, oil lines, gas lines, and other infrastructure systems.	Delete. Not under local govt control
7.1	Identify locations and conditions of above ground chemical storage tanks.	Completed
7.2	Plan for alternate transportation such as school district buses in case evacuations are required.	Combine with 1.7
7.3	Maintain communication with IDOT and Iowa State Patrol regarding hazardous material transportation.	Doing this
7.4	Educate the public regarding: a) proper use and disposal of household, commercial, and industrial hazardous waste; b) reporting requirements of use, storage, and spills of hazardous materials; c) proper handling of hazardous materials; d) information on who to contact in the event of a spill or hazmat incident; e) public shelters.	Doing this
8.1	Provide Personal Protective Equipment (PPE) for emergency responders.	Completed
8.2	Identify and acquire more equipment for supporting immunization areas.	Delay
8.3	Disease surveillance and awareness program in collaboration with the Iowa Department of Public Health to alert local doctors, day care centers, and schools of potential warnings and disease characteristics.	Doing this
8.4	Conduct mass immunization drills to ensure proper procedures and supplies are in place and to ensure collaboration between state, county, and local health care departments, local emergency responders, Red Cross and other non-profit agencies, and the public.	Completed
8.5	Repurposing, renovating, expanding, or reusing existing facilities, the placement of prefabricated facilities on a site, or the construction of new temporary facilities to respond to a pandemic.	Completed
8.6	Educate the public and health care providers regarding communicable diseases and outbreaks and immunization clinics and locations.	Keep
9.1	When necessary, expand water facility storage to ensure fire suppression ability in new developments.	Combine with 9.2
9.2	Evaluate water redundancy and ensure water supply networks have sufficient reserve capacity and alternative supply paths.	Combine with 9.1
9.3	Identify alternate fueling sites/sources for emergency vehicles.	Keep
9.4	Ensure that school buses have two-way radios on board for communication.	Delete
9.5	Develop a comprehensive shelter list.	Completed
9.6	Ensure a generator back up is available for critical facilities, including schools and shelters.	Keep
9.7	Educate the public on installation/update of smoke detectors, fire awareness and prevention campaigns in the schools, use of the 911 system, and who to contact in case of a gas leak or fire.	Completed

9.8	Regionalize public safety communications ability through enhanced technology and infrastructure and dispatch capability including conducting a benefit/cost analysis of a regional public safety community function.	Completed
9.9	Update current law enforcement and first responder radio equipment.	Keep
9.10	Update and enforce building codes through required inspection to protect new and existing buildings and infrastructure.	Completed
10.1	Adopt sediment and erosion control regulations to manage development in erosion and landslide hazard areas.	Completed
10.2	Complete inventory of locations where critical facilities, vulnerable sites, and critical infrastructure are vulnerable to landslides.	Completed
11.1	Assess the current state of all existing dams and levees within Des Moines County and create a levee/dam failure map, including dams and levees located upstream of Des Moines County, to better identify potential loss.	Completed
12.1	Forming a regional watershed council to help bring together resources for comprehensive analysis, planning, decision-making, and cooperation.	Delay
12.2	Adopting ASCE-24-05 Flood Resistant Design and Construction, a referenced standard in the International Building Code that specifies minimum requirements and expected performance for the design and construction of buildings and structures in flood hazard areas.	Completed
12.3	Participate in NFIP.	Completed
12.4	Acquire Jon boats and other flood emergency rescue equipment.	Completed
12.5	Educate the public regarding: a) requirements of floodplain ordinances; b) flood water hazard precautions; c) maintaining status with the NFIP; d) levee certifications.	Keep
12.6	Elevation and/or stabilization of structures, acquisition of structures, elevation and/or stabilization of roadways, addition of culverts, addition of lift stations and/or pumping stations, erosion control methods along waterway, etc.	Keep
12.7	Requiring standard tie-downs for propane tanks.	Completed
13.1	Organize outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community.	Completed
13.2	Encourage all citizens to install carbon monoxide monitor and alarms.	Completed
13.3	Encourage utility companies to increase the percentage of cables that are underground.	Keep
14.1	Educate the Public regarding a) creating a Family Disaster Plan; b) the National Terrorism Advisory System; c) how to respond to a terrorist event; d) where to get vital information.	Completed
14.2	Ensure critical services and information is protected from cyber-attacks; educate local officials about cyber security.	Keep, Ongoing progress
14.3	Develop and implement Continuity of Government plan.	Keep
14.4	Improve security measures at emergency response facilities and other sensitive facilities.	Ongoing progress

14.5	Equip and train local authorities to be able to appropriately respond to large scale enemy attack. Equipment and training include but not limited to sniper rifles, continued operation, Bearcat, and training for the Tactical Response Unit (TRU).	Keep, Ongoing progress
15.1	Educate the public regarding: a) precautions to take outdoors during severe weather; b) driving precautions and advisories; c) use of NOAA weather radios; d) safe room locations.	Completed
15.2	Locate safe rooms to minimize damage.	Completed
15.3	Cooperate with utility companies and residents to ensure tree-trimming around power lines and structures.	Keep
15.4	Acquire wood chipper to quickly handle storm debris.	Keep
15.5	Update storm sewer capacity and sewer lining, develop storm water retention basins, and implement other storm water management techniques.	Keep
16.1	Develop a local grant program to assist homeowners who wish to construct a safe room.	Keep
16.1	Test, replace, and expand the siren warning system in the county.	Keep
16.2	Promote use of NOAA weather radios and create a program to purchase and distribute weather radios to citizens.	Keep
16.3	Require any new manufactured housing development to include shelters as part of development.	Keep
16.4	Develop and maintain countywide storm spotters education and training program.	Completed
16.5	Develop shelters and saferooms facilities for campgrounds.	Keep
16.6	Create ordinance requiring all manufactured homes to be secured to the ground	Completed
16.6	Create ordinance requiring all manufactured homes to be secured to the ground.	Completed
16.7	Conduct public outreach to promote registration for the DMC Alerts (Iowa Alerts) system.	Completed
16.8	Place Alert Iowa/DMC Alert signs in county parks, along walking/biking trails, etc.	Keep
16.9	Educate the public regarding: a) proper response to sirens; b) tornado safe room locations; c) assessing watch and warning information; d) developing and maintaining countywide storm spotter education and training.	Completed
17.1	Install mobile and/or fixed real-time electronic signage along critical roadway and highway points to communicate messages to drivers.	Completed
17.2	Improve safety where railroads intersect with roads and trails.	Keep
17.3	Educate the Public regarding a) driving precautions during severe weather conditions; b) dangerous routes and roads during severe weather; c) precautions for water and boating safety.	Completed
17.4	Ensure cooperation with the railway industry to ensure quick response and adequate information regarding number of passengers and type of products being transported.	Keep
17.5	Ensure the training, equipment, and knowledge of the existing HazMat team is maintained.	Keep, Ongoing progress
18.1	Educate the public on need to purchase earthquake insurance.	Delete
18.2	Adopt and enforce building codes such as International Building Code (IBC) and International Residential Code (IRC) to reduce earthquake damage risk.	Delete

E2-c. How jurisdictions have integrated the mitigation plan

In addition to the mitigation actions completed after the 2020 HMPU, communities made the following comments:

Jurisdiction	Des Moines County	Burlington	Danville	Mediapolis	Middletown	West Burlington
In the last few years, has the town made any changes to reduce impacts of hazards and improve safety?	Adopted Alert Iowa system	Flood wall	Rebuilt storm center 1&3, HMGP grant to replace storm sirens and UG remainder of overhead lines, GRID grant, loop 3 phases at ww plant, all new residential smart meters for instant disconnect or instant reading	Updated emergency plans, emergency generator opens doors, but service is limited.	New water system. 2013	Stormwater master plan underway, grant applications underway, Ongoing updates to system working with state on Critical Infrastructure Security Agency (CISA) system, to implement enhanced security and resilience and training on this. Upgrades to radios software with DESCOM
Have they updated building codes or building permits?	Annual review	2024 and annual reviews and updates ahead on building codes	2024 Building Code	No changes	Annual review	Building code to be adopted for 2021 version, Updated Zoning, subdivision
Have they adopted a new floodplain ordinance or regulations?	No	New FIRMs	2020	Not new	No	2021 FP Ord

Have they updated any other local planning documents in the last 5 years?	Yes, CEDS, SEIRPC updates plans and regs for the county on a regular schedule	Comp plan underway.	Underway	Yes, 2024, reviewed and updated all planning documents. Stormwater drainage has been worked on the last 5 years town wide	Emergency operations plan updated annually	Emergency op plan updated in April 2025
Did the jurisdiction use information from the previous mitigation plan in other planning mechanisms like Ordinances, Permits, Comprehensive Plans or Emergency Plans?	Yes, when updating all plans and regs	Yes, when updating all plans and regs	Yes, refer to it when updating plans and regs	No	Yes	No, but it would be a useful tool.

Other stakeholders, mitigation measures taken

Jurisdiction	Iowa Army Ammunition Plant	North Bottoms Levee & DD	Two Rivers Levee & DD	DESCOM
In the last 5 years, have they made any changes to reduce impacts of hazards and improve safety?	Ongoing work to mitigate brownfields, ongoing modernization of security systems	Work on altering flood gates to upgrade gate system for greater efficiency	Ongoing monitoring with Corps, update to maintenance strategies	Developed and implemented extensive county-wide communication network. Primary public safety 911 calls, "Next generation" modernized, State shared services for better locates. Radio improvements for Geography, terrain. New radio system 2025 for LE and working on Fire Ds.
Have they updated any planning documents in the last 5 years?	Yes	Flood response plan and O&M Manual Updated annually	Yes, Emergency plan, with post disaster actions	No
Did the jurisdiction use information from the previous mitigation plan in Emergency Plans?	Yes	Yes	Yes	Yes

Schools – Mitigation measures taken

Mitigation actions taken	Burlington CSD	Danville CSD	Mediapolis CSD	Notre Dame School	West Burlington ISD	Southeastern Community College
Updated any plans in the last 5 years?	Annually	Annually	Annually	Annually	Emergency plans	Annually
Did the jurisdiction use information from the previous mitigation plan in Emergency Plans?	Yes	Yes annually	Not directly	Yes	Yes	Not directly
In the last 5 years, has the school made any changes to reduce impacts of hazards and improve safety?	Locked down school, no public access. Active shooting annual training, drills, LE drills review emergency plans annually, increased security protocols	Unplanned drills. School safety upgrades: hardened entryways, added 41 cameras, full time deputy available, updated fire alarms, new PA system, cell phone apps, school guard. COPS grant, AI firearm detection system, smart sensors, entry shields, metal detectors	Applied for COPS grant, replaced AC unit, new storm safe building & tornado, purchased disinfecting equipment, PPE. Active shooting annual training, drills LE drills review emergency plans annually, increased security protocols, State safety and security grant for cameras radios and servers. New bond will redo entryway to restrict access	Locked down school, no public access. After annual review we update safety. Improved storm safe areas in 2025.	ALICE training, cyber security contract, Drills, education, quarterly tornado fire active shooter bus evacuation training, annual update the EM Plans Updated Cameras access control and 2 way radio systems	Completion of FEMA storm shelter in 2024, Private security ongoing training,

Section F: Plan adoption

All participating jurisdictions will adopt a FEMA approved plan. Resolutions for formal adoption will be placed in Appendix G.

Section G: Community profiles

Community Profiles contain information specific to jurisdictions participating in the Des Moines County planning effort. Community Profiles were developed with the intention of highlighting each jurisdiction's unique characteristics that affect its risk to hazards.

Population

There is a discrepancy between two US Census products, in some cases greater than the margin of error. The 2020 Decennial population is the official number, while the 2023 American Community Survey (ACS) is a 5-year estimate. We are using the official count here because it seems most consistent with local observations and previous census data. All other Census statistics below are from ACS 2023. 2024 data are not yet available.

Community Population	2020 Decennial Census
Total County Pop	38,597
Burlington	23,800
Danville	966
Mediapolis	1,930
Middletown	319
West Burlington	3,184

Racial profiles

Des Moines County is composed of a relatively homogenous population where 86% of people selected a racial category of "White." Four percent (4%) of people in the county consider themselves to be "Black or African American," while 7% say they belong to two or more racial groups. All other racial categories were selected by less than 2% of the people. Three point five percent (3.5%) say they are Hispanic. The most racial diversity is in the cities of Burlington and West Burlington.

Racial selections	Burlington	Danville	Mediapolis	Middletown	West Burlington
White	84%	96%	92%	94%	86%
Black or African American	6%	0%	1%	0%	6%
Two or More Races	8%	2%	6%	6%	8%

Among the small towns, fewer than 4% of the population identified themselves as "Hispanic."

Hispanic population	Burlington	Danville	Mediapolis	Middletown	West Burlington
Hispanic (of any race)	4%	3%	3%	0%	4%

Risk Assessment – County

Jurisdiction	Des Moines County
Drought	No direct effect on county operations, does affect Ag, and Fire Departments. Ag industry economic impact affects tax base.
Extreme Heat	Homeless, Elderly are vulnerable
Flooding – River, Flash, Stormwater	Mississippi River, Iowa River can flood. Important issue, FEMA disasters. Stormwater drainage issues
Severe thunderstorms: Hail, High winds, Lightning	Hail is major economic factor, tree damage, DOT lost a shed to high winds. More wind events over time
Tornado	Felled trees across roads, 2 yrs ago tornado damage to private property,
Wildfire	Small grass fires, especially springtime, no big fires
Winter weather	Ice, snow high winds, biggest financial impact is overtime for county labor
Animal, Crop, Plant Disease	Yes, but mostly private property. Conservation, livestock. More frequent disease in row crops, increasing, (2025, Corn)
Dam or Levee Failure	Mississippi river-potential risk to levee damage, age of dams, entire ag system depends on M River for commodities transport
Hazardous Materials Incident	BNSF Rail, Highways
Human Disease Pandemic	Public health, vulnerable population
Infrastructure Failure	Lack of Funding for deficient bridges
Terrorism	IAAAP, Cyber attack potential, Critical facilities
Transportation Incident	HazMat, River transportation vulnerabilities but dams outside local control, Levee system
Recent Hazard events, biggest problems	Flood is the biggest, snow, ice then wind
Interruptions in water or sewer service have been caused by:	NA
Do Power outages happen often? Caused by	No
Are there storm shelters for campers?	No campground shelters
Changes in development in the last 5 years: Water sewer extensions or land annexations	No
New housing, new industrial	Some scattered residential

Mitigation actions taken – County

Mitigation taken – County	
In the last few years, has the county made any changes to reduce impacts of hazards and improve safety?	Updated Plans and Regulations
Have they updated building codes or building permits?	Updated Subdivision policy procedures
Have they adopted a new floodplain ordinance or regulations?	No, updated as needed by SEIRPC
Have they updated any other local planning documents in the last 5 years?	Yes, SEIRPC takes care of this
Did the jurisdiction use information from the previous mitigation plan in other planning mechanisms like Ordinances, Permits, Comprehensive Plans or Emergency Plans?	Yes, SEIRPC takes care of this

Jurisdiction comments	Mitigation activities since 2020
County	Improved communication network and cyber security
	Improved stormwater drainage, prevent erosion
	Conducted practice drills and provided EM response training
	New FIRM maps were provided by FEMA
	Inspect and maintain roads and bridges in flood hazard areas
	Rehabilitated 11 Structurally Deficient (SD) bridges
	All Fire Departments and emergency personnel have engaged in ongoing training exercises and educational opportunities
	Improvements to stormwater management to reduce environmental impact
	Improved public information about Hazards present in the community
	Adopted Alert Iowa as a county-wide alert system

County priorities for mitigation

Concerns	Mitigation action priorities
Community priorities: If funding were available, what would be the best things to do to improve safety in your community?	Better funding for transportation: emergency response in bad weather conditions, bridge funding, rail safety, Water transportation safety. Ongoing improvements to communication for Emergency response even during power outages. Generators would help. Stormwater management improvements Manage tree damage

Mitigation recommendations for priorities	Action item
Funding for transportation	5
Ongoing communication upgrades	25,28,30
Sirens	24
Generators for power backup	1,23
Stormwater management	13
Tree debris management	16,29

Mitigation needed:

Most of the recommended actions apply to the County.

See full Action Plan Tables pages 147-157 and Summary table in the final pages of this document.

County	Action steps
Drought	25
Extreme Heat	1.2.4.7.18,23,25
Flooding – River, Flash, Stormwa	13,17,18,23,24,27
Severe thunderstorms	1,2,4,6,9,10,12,27,29,30
Tornado	1,2,4,6,7,8,10,12,16,18,20,23,25,27,29,30
Wildfire	16,19,20
Winter weather	1,2,4,6,7,9,10,16,18,20,23,25,27,29,30
Animal, Crop, Plant Disease	16
Dam or Levee Failure	17,25,27
Hazardous Materials Incident	14,15,18,20,28
Human Disease Pandemic	6,18,20
Infrastructure Failure	6,9,10
Terrorism	3,21,22,28
Transportation Incident	14,15

Burlington

Burlington is the county seat of Des Moines County, Iowa. The population was 23,982 in the 2020 census, a decline from the 26,839 population in 2000. The population of Burlington peaked in 1960 at about 32,430 people. Burlington is the center of a micropolitan area, which includes West Burlington and Middletown in Iowa and Gulfport, Illinois.

According to the United States Census Bureau, the city has a total area of 15.24 square miles, of which 14.48 square miles is land and 0.76 square miles is water. There are an estimated 12,016 housing units in the city.

Situated on the west bank of the Mississippi River, the American Fur Company of John Jacob Astor established a post in the area in 1829. Settlement began in 1833, shortly after the Black Hawk Purchase.

Burlington	
Demographics: Population	23,982
Median Age	42.8
65 Years and Over	22%
Population age 16 and over	82%
in Labor Force	60%
Commute to Work	17 minutes
Households	
Median Household Income	$55,274
Percent Poverty	16%
Zero-vehicle households	1,081
Housing	
Total Housing Units	12,506
Occupied Housing Units	90%
Vacant Housing Units	10%
Mobile Homes	75 = 1%
Median home value	$115,800
Year built	
Since 2000	10%
Before 1980	79%
Before 1940	41%

Special considerations:
Burlington may have special vulnerability in the following categories:

- ✓ 16% of households are in poverty
- ✓ About 5200 people are over age 65, 1700 of whom are also disabled
- ✓ 79% of housing was built before 1980
- ✓ 41% of housing was built before 1940

Community representative:
Chad Bird, City Administrator
Hazards that affect the community:

Burlington	
	Drought
X	Extreme Heat
X	Flooding – River, Flash, Stormwater
X	Severe storms: Hail, High wind, Lighting
X	Tornado
	Wildfire
X	Winter storm
X	Animal, Crop, Plant Disease
	Dam or Levee Failure
X	Hazardous Materials Incident
X	Human Disease Pandemic
	Infrastructure Failure
	Terrorism
X	Transportation Incident

Community priorities for Mitigation:

- ✓ Finish flood wall
- ✓ Update sirens
- ✓ Expand the storm shelter system geographically across city
- ✓ Supportive housing concept 27 units - plan being developed
- ✓ Burlington Water Works needs generators for towers or pump stations

See Action Tables Pages 147-157 for recommendations to mitigate each hazard that affects the community.

Danville

Located about 13 miles west of downtown Burlington on Highway 34, there are 381 housing units on .76 square miles of land. A growing city, population peaked in 2020 at 927 people. Danville is approximately four miles northeast of Geode State Park.

Danville

Demographics: Population	927
Median Age	38.5
65 Years and Over	16%
Population age 16 and over	77%
in Labor Force	73%
Commute to Work	20 minutes
Households	
Median Household Income	$82,917
Percent Poverty	11%
Zero-vehicle households	4
Housing	
Total Housing Units	386
Occupied Housing Units	92%
Vacant Housing Units	9%
Mobile Homes	30 = 8%
Median home value	$148,600
Year built	
Since 2000	2%
Before 1980	79%
Before 1940	31%

Special considerations:
Danville may have special vulnerability in the following categories:

- ✓ 79% of housing was built before 1980
- ✓ There are 30 mobile homes housing about 70 people in the community for which no storm shelter is readily available

Community representative:
Bryon Heater: PW Director, Fire Chief

Hazards that affect the community:

Danville	
	Drought
	Extreme Heat
	Flooding – River, Flash, Stormwater
	Severe storms: Hail, High wind, Lighting
X	Tornado
	Wildfire
	Winter weather
X	Animal, Crop, Plant Disease
	Dam or Levee Failure
X	Hazardous Materials Incident
X	Human Disease Pandemic
X	Infrastructure Failure
	Terrorism
X	Transportation Incident

Community priorities for Mitigation:

- ✓ Water utility improvements Loop water feeder to water tower
- ✓ Street and ditch drainage
- ✓ Funding for infrastructure and match funds
- ✓ Need generators for community FD and City Hall

See Action Tables Pages 147-157 for recommendations to mitigate each hazard that affects the community.

Mediapolis

Located about 16 miles north of Burlington on Highway 61, there are about 770 housing units on 1.2 square miles of land. A growing city, population peaked in 2020 at 1,688.

From 1875 to the mid-20th century, Mediapolis was a railroad junction where the Burlington and Northwestern Railway to Washington (later a branch of the Chicago, Burlington and Quincy) met the original north–south line. The Rock Island Railroad ceased operation in 1980, leading to the abandonment of the north–south line through Mediapolis. One heavy industry remains two miles southwest of town, the US Gypsum Sperry mine.

Community representative: Ray Wilson, Emergency Manager	
Mediapolis	
Demographics: Population	1,688
Median Age	34.7
65 Years and Over	19%
Population age 16 and over	73%
in Labor Force	68%
Commute to Work	24 minutes
Households	
Median Household Income	$71,250
Percent Poverty	10%
Zero-vehicle households	32
Housing	
Total Housing Units	770
Occupied Housing Units	94%
Vacant Housing Units	6%
Mobile Homes	39 = 5%
Median home value	$167,300
Year built	
Since 2000	13%
Before 1980	74%
Before 1940	27%

Special considerations:
Mediapolis may have special vulnerability in the following categories:

- ✓ 75% of housing was built before 1980
- ✓ There are 39 mobile homes (housing about 90 people) in the community for which no storm shelter is readily available

Hazards that affect the community:

Mediapolis	
	Drought
X	Extreme Heat
X	Flooding – River, Flash, Stormwater
X	Severe storms: Hail, High wind, Lighting
X	Tornado
	Wildfire
X	Winter weather
X	Animal, Crop, Plant Disease
	Dam or Levee Failure
X	Hazardous Materials Incident
X	Human Disease Pandemic
	Infrastructure Failure
	Terrorism
X	Transportation Incident

Community priorities for Mitigation:

- ✓ Additional/improved Generators
- ✓ Additional/improved sirens. Update siren controller and add another siren for the city. An additional siren is needed for the unincorporated area (Kossuth) outside of town
- ✓ HazMat safety
- ✓ Public awareness and education

See Action Tables Pages 147-157 for recommendations to mitigate each hazard that affects the community.

Middletown

Located about 10 miles west of Burlington on Highway 34, there are about 153 housing units on .61 square miles of land. In 2020, a relatively stable population was estimated to be 363 people.

Middletown was settled in 1846 and incorporated in 1914. In 1940, the Iowa Army Ammunition Plant was established just to the south of Middletown.

Community representative:
Paul Bishop, Public Works

Middletown

Demographics: Population	363
Median Age	40.9
65 Years and Over	19%
Population age 16 and over	77%
in Labor Force	63%
Commute to Work	19 minutes
Households	
Median Household Income	$64,167
Percent Poverty	11%
Zero-vehicle households	3
Housing	
Total Housing Units	158
Occupied Housing Units	90%
Vacant Housing Units	10%
Mobile Homes	16 = 10%
Median home value	$144,300
Year built	
Since 2000	22%
Before 1980	68%
Before 1940	41%

Special considerations:
Middletown may have special vulnerability in the following categories:

- ✓ 68% of housing was built before 1980

Hazards that affect the community:

Middletown	
	Drought
X	Extreme Heat
X	Flooding – River, Flash, Stormwater
	Severe storms: Hail, High wind, Lighting
X	Tornado
	Wildfire
	Winter weather
X	Animal, Crop, Plant Disease
	Dam or Levee Failure
X	Hazardous Materials Incident
X	Human Disease Pandemic
	Infrastructure Failure
X	Terrorism
X	Transportation Incident

Community priorities for Mitigation:

- ✓ Generators. The city needs an additional fixed generator at the Fire Station which is the communication center, emergency op center
- ✓ Sirens. Upgrade Sirens with radio control, Generators. Equip City Hall building with new generator for government and community shelter
- ✓ Public information & awareness for public health

See Action Tables Pages 147-157 for recommendations to mitigate each hazard that affects the community.

West Burlington

West Burlington is west of and adjacent to the City of Burlington. The population was 3,197 at the 2020 census. It is part of the Burlington, IA–IL Micropolitan Statistical Area. A relatively stable population peaked in 1980 at 3,371 people. There are an estimated 1,532 housing units on 4.95 square miles.

The city was originally founded and incorporated in 1883, to provide housing and commercial services for workers at the newly established repair shops for the Chicago, Burlington and Quincy Railroad. Today, West Burlington is home to Westland Mall as well as several other big box retailers and several car dealerships. The community is also home to the Great River Medical Center, a 378-bed regional medical facility, and the main campus of Southeastern Community College.

Community representative:
Gregg Mandsager, City Administrator

West Burlington

Demographics: Population	3,184
Median Age	35.9
65 Years and Over	20%
Population age 16 and over	80%
in Labor Force	58%
Commute to Work	17 minutes
Households	
Median Household Income	$48,289
Percent Poverty	23%
Zero-vehicle households	135
Housing	
Total Housing Units	1357
Occupied Housing Units	97%
Vacant Housing Units	3%
Mobile Homes	111 = 8%
Median home value	$126,700
Year built	
Since 2000	9%
Before 1980	80%
Before 1940	18%

Special considerations:

West Burlington may have special vulnerability in the following categories:

- ✓ 23% of people live in poverty
- ✓ Of people over age 65, 40% are also disabled
- ✓ 80% of housing was built before 1980

Hazards that affect the community:

West Burlington	
	Drought
	Extreme Heat
X	Flooding – River, Flash, Stormwater
	Severe storms: Hail, High wind, Lighting
X	Tornado
	Wildfire
	Winter weather
X	Animal, Crop, Plant Disease
	Dam or Levee Failure
X	Hazardous Materials Incident
X	Human Disease Pandemic
X	Infrastructure Failure
X	Terrorism
X	Transportation Incident

Community priorities for Mitigation:

- ✓ Correct Stormwater issues and a 24 inch force main needed
- ✓ Improved access to funding
- ✓ Implement enhanced security and resilience and training on this
- ✓ Upgrades to radios software with DESCOM

See Action Tables Pages 147-157 for recommendations to mitigate each hazard that affects the community.

Risk Assessment – Cities

Risk Assessment Cities					
Jurisdiction	**Burlington**	**Danville**	**Mediapolis**	**Middletown**	**West Burlington**
Does the jurisdiction have generators?	Yes, portable	2, portable	1 generator,	1 fixed on the sewer lift station	1 at City Hall, 1 at Lift station, 1 New,
Does the jurisdiction have sirens? Type and number	Yes 7 but need updates.	Yes, remote operation, but need updated sirens	1 siren, remote and manual capability	1 siren on the same generator	Need 2 portable generators
Do they need additional sirens or generators, or modernized?	Upgrades to sirens county wide.	Upgrades to sirens county wide.	Upgrades to sirens county wide.	Radio control upgrade needed on siren	Upgrades needed
Drought	No	No	No issues	No	No issues
Extreme Heat	Homeless population needs shelter, plans in place	No problems, do have shelter space at community building	Community shelter w generator, city hall shop, fire station, problems with pet sheltering Red Cross has a Pet program Red Rover	No shelter, no generator	WB does have cooling stations available
Flooding – River, Flash, Stormwater	City is on Mississippi River. Currently in process of flood mitigation - planned completion Dec 2027. Protects whole city, critical facilities and private investment	Residential, Critical Facilities not affected, except WW Tx plant which is being moved	Occasional flooding sumps in place, no flash flooding, stormwater drainage has been worked on the last 5 years town-wide.	Some drainage issues	Pumps have gone out at times. Some basements flood. At Lewis Park, N side Mt Pleasant Street, culvert needs dredged, detention pond by mall flows into it needs clean out ongoing maintenance, also older residential district can flood with stormwater, could benefit from funding

Severe thunderstorms: Hail, High winds, Lighting	Typical, Solar panels are vulnerable. Wind typical. No Lightning suppression for city facilities	Tree damage, 85% of electric is underground 2028 goal of 100% UG, 3 Sirens remote operated, Danville does it themselves, not DESCOM. 1 generator at waste water tx plant and 1 for city Hall, FD and Community Center	#1 concern. Power outages, straight line winds; townwide hail, roof damage, windows, power outage; rural water has tower in Sperry, which comes to pump, that can be impacted by lightning	No damage no lightning hazard spare pump at lift station	Tree damage plan for Alliant to UG lines, Last year trees, blocked streets, in ROW do have dump sites, residents need help with tree damage cleanup, some building damage
Tornado	City not as susceptible due to topography	Most residences have basements, schools have safe rooms	"Emergency" shelter, Post incident. Has shelter capacity for the community only, not excess space.	No basement, no shelter, some private shelters	Most have basements, older basements, no community shelter, City Hall basement, Public education needed
Wildfire	No	No	No	No	Possible during Drought, has been no direct impact on city
Winter weather	Homeless population, plans in place. Ice on overhead lines, tree damage,	Ice on overhead electric lines	Ice and power outages. Temperature control for homes. Coordinate with Co EM	No shelter, no generator	Snow emergency regs updated 2024. Residential sidewalks hard to clear especially with snow plows proximity. Walking to school is more difficult
Animal, Crop, Plant Disease	Deer in city, feral cats. treated and removed trees due to Ash borer	Ash trees were removed as preemptive mitigation, feral cats present	Not affected	Deer in town. Cats (buildings that house them need to be condemned).	Older canopy so tree maintenance is very important, tree replacement available from WW TX Plant all new programs focus on native species. Cat problem.

Dam or Levee Failure	Flood wall, no on Dams	No	Not affected	No	Not affected
Hazardous Materials Incident	2 state highways, rail traffic, fixed sites, bioethanol plant w of town	RR runs through town, E side. Transport LP bulk, Explosion possible no incidents in last 5 years	Large amt of anhydrous within 1 mile of the school and town. Also flammable liquid storage. 50,000 gallon tanks and other that occasionally leak. Local are first on scene and in charge, Burlington regional HMat team supports the local. Manure tanks and anhydrous on Highway 61.	Ammunition plant, bordered by ammo plant on E,W,S. Brownfields adjacent. Farm anhydrous.	Industry has not reported spills as required. Buildings must kept up to proper standards. See article below Re: Borghi 2022
Human Disease Pandemic	No special problems	County PH response	Concerns about complacency.	No special problems	Need sufficient PPE for employees and public safety in a timely manner
Infrastructure Failure	DESCOM has mitigated potential communication issues	Utilities handle locally water utility concerns	Possible but not much infrastructure in place. Sewer, water maintenance is ongoing and water main replacement.	No concerns	New upgrades needed for radio software. city wide.
Terrorism	No specific concerns	No	Nothing specific, they stay in touch w state	Ammo plant nearby	Awareness of vulnerability of water system to potential chemical tampering, sewer plant could be susceptible to cyber hack.

Transportation Incident	Airport, typical city transportation	RR or Highway 34 on w side Anhydrous Nitrogen and manure. No incidents	Current Major Highway construction underway w increased commodity and truck traffic. First on scene and in charge, Burlington regional HMat team supports the local	No High traffic. Rail accident potential	RR does go through N side. DoT making upgrades to overpasses
Recent Hazard events, biggest problems	None	Flood 2022 85% of town was affected No facilities except ww tx, building a new one	Severe summer winter, Tornados, Thunderstorm, HazMat and Transportation. city hm & transp.	None	Trees stormwater, HazMat
Interruptions in water or sewer service have been caused by:	Age of system	Ongoing maintenance on sewer - aging clay tile	On top of repair or replacement not aware of expansive soils	No problems	Age of the system, clay tile, dry weather, expansive soils, cold weather. 24 in force main needs federal funding for N of 34 to tx plant. Unincorporated Beaverdale buys water from WB which buys water from Burlington. Beaverdale water infrastructure is aging and has frequent breaks and leaks. They do not have a PW Dept.
Do Power outages happen often? Caused by	Overhead lines	Few problems	Few problems	High winds, tree damage	Do have frequent PO, lines down even in the absence of trees. 1 to 4 hours.

What problems happen when the power goes out?	Home temp control, medical devices	Home temp control, medical devices	Temp control. Home medical devices	Home temp control, medical devices	Loss of heat and cooling, refrigeration, complicates stormwater sump pumps.
Are there apartment buildings in your town?	Yes	2	Yes, no storm shelter	No	Yes
Is there an RV or mobile home park in your town?	Yes	1	Yes, Mobile home park got hit by a recent tornado	No	Planned west side
Are there storm shelters for Apartment residents or RV campers?	No on site , but community shelters available	No	No		Not now
Is there a public pool or splash pad in town?	Yes	No	Yes, Public pool	No	Yes, Public pool
Changes in development in the last 5 years: Water sewer extensions or land annexations	No	No except ww tx upgrade	No	None	No
New housing, new industrial	No	Plan for new residential on farm land in town perimeter	No	New housing scattered site	Two multi res, a small subdivision, 1 potential subdivision
Other	No	No	No	No	New senior facility

Mitigation needed, Cities

For each hazard that affects cities, at least one Mitigation action is recommended. See full Action Plan Tables pages 147-157 and Summary table in the final pages of this document.

Cities	**Action steps**
Drought	10,11
Extreme Heat	1,2,4,7,18,23
Flooding – River, Flash, Stormwa	13,17,18,23,25
Severe thunderstorms	1,2,4,6,7,8,24,29
Tornado	1,2,4,6,7,8,9,10,12,16,18,20,23,24,27,29
Wildfire	19,20
Winter weather	1,2,4,6,7,8,9,10,16,18,23,25,27,29,30
Animal, Crop, Plant Disease	5,16
Dam or Levee Failure	17,27
Hazardous Materials Incident	14,18,20,28
Human Disease Pandemic	5,6,18,20
Infrastructure Failure	6,8,9,10
Terrorism	3,21,22,28
Transportation Incident	5,14

Other Jurisdictions

While the following entities are not municipalities, they choose to participate in hazard planning and mitigation activities. Each has the authority to independently apply for mitigation funding.

Iowa Army Ammunition Plant

The Iowa Army Ammunition Plant (IAAAP), located in Des Moines County in southeastern Iowa, near the city of Burlington, produces and delivers component assembly, and medium- and large-caliber ammunition items for the United States Department of Defense. The facility is part of the US Army Joint Munitions Command.

The 19,011 acre plant is located south of Middletown, 8 miles west of Burlington. IAAAP is housed on 19,011 acres with 767 buildings, 271 igloos and has storage capacity of 1,100,775 square feet. It also has 143 miles of roads and 102 miles of railroads.

The IAAAP was established in November 1940, as the Iowa Ordnance Plant and started production in 1941. Production was stopped in 1945, when World War II ended. The plant resumed its ammunition manufacturing mission in 1949. In 1950, in response to the Korean conflict, production increased dramatically. In 1975, the Army assumed responsibility for IAAAP.

In August 1989, IAAAP was placed on the National Priorities List (NPL), because explosives had caused surface water contamination beyond the installation boundary. A Restoration Advisory Board keeps the public informed and involved in its clean-up activities.

Two Rivers Levee and Drainage District

The Two Rivers Levee and Drainage District protects much of the northeastern part of the County, which is mostly farmland – about 1/6th of the county area.

North Bottoms Levee and Drainage District

The North Bottom Levee District protects the northeast part of the City of Burlington, an area with several major employers and industrial locations.

DESCOM

From the DESCOM website:

> Started July 1, 2014, DESCOM is short for Des Moines County Communications.
>
> DESCOM is its own emergency service organization that works with and provides dispatch services to all law enforcement, medical and fire agencies in Des Moines County.
>
> DESCOM was created by the various public safety entities in the county to serve the citizens and Police and Fire departments of Des Moines County. DESCOM is the sole PSAP (Public Safety Answering Point) and dispatch center in the county and handles all 911 and admin calls for service in the county.
>
> DESCOM utilizes various national standards such as Emergency Medical Dispatching and MABAS fire dispatching to provide the citizens of the county prompt and professional service in its times of need.

Ongoing improvements over the last several years include centralized and modernized communication systems including “next generation” 911 locates for emergencies called in on cell phones, radio improvements to overcome challenges of geography and terrain, and currently working on new county-wide radio support for law enforcement and fire departments.

Risk Assessment – Other

Hazards	IAAAP	North Bottoms Levee & DD	Two Rivers Levee & DD	DESCOM
Drought				
Extreme Heat				
Flooding – River, Flash, Stormwater	SFHA	Flood control	Flood control	
Severe thunderstorms: Hail, High winds, Lighting	Tree damage		Tree damage on levee	Emergency communications
Tornado	Tree damage		Tree damage on levee	Emergency communications
Wildfire				
Winter weather	Tree damage		Ice jams form in DD or in River, localized flooding, water in pumping station pipes freezes	
Animal, Crop, Plant Disease				
Dam or Levee Failure		Potential	Potential	
Hazardous Materials Incident	Hazardous Materials on site			
Human Disease Pandemic				
Infrastructure Failure				
Terrorism	Foreign or domestic terrorism	Some potential for sabotage of levee	Some potential for sabotage of levee	Cyber security
Transportation Incident			Potential for a barge accident impacting structures	

Mitigation needs:

Jurisdiction	Iowa Army Ammunition Plant	North Bottoms Levee & DD	Two Rivers Levee & DD	DESCOM
Do they need grants or funding for equipment or anything else?	Funding for ongoing improvements & HazMat	Flood gates, ongoing need for levee improvements	Ongoing need for funding for levee improvements. Seek grant funding for a new pumping station, modernizing PS motors, replace relief wells, lightning protection system	Siren upgrades
If funding were available, what would be the best things to do to improve safety in your community?	Security	Levee Improvements	Levee Improvements. Community is vulnerable to levee failure. This levee protects 1/6th of the county	Public awareness about severe weather, flooding, tornado. Siren upgrades. Siren activation for county on old radio system needs modernized

Other Jurisdictions	Hazard	Action steps
IAAAP	Severe Storms, Lightning, Winter weather, (Tree damage), Terrorism	3,5,26,28,29
North Bottoms L&DD	Flood (Funding)	5
Two Rivers L&DD	Flood, Severe storms, Winter weather, (Funding, Tree damage),Terrorism, Transportation incident	3,5,16,22
DESCOM	Severe storms, Flood, Tornado, Winter weather (Sirens, Emergency Communications)	18,24

Schools

2024-25 Certified Enrollment by District - January 16, 2025

District #	Public School Name	Certified Enrollment
0882	Burlington Comm School District	3673
1602	Danville Comm School District	419
4203	Mediapolis Comm School District	870
6937	West Burlington Ind School District	386

2024-2025 Non-Public Schools Certified Enrollment

District	Non-Public School Name	Certified Enrollment
0882	Notre Dame High School	220
0882	Notre Dame Elementary School	141

2024-2025 Community College

Location	School Name	Enrollment
West Burlington	Southeastern Community College	2562

Southeastern Community College had a total enrollment of 2,562 students in 2023. The full-time enrollment at Southeastern Community College is 1,207 students and the part-time enrollment is 1,355. This means that 47.1% of students enrolled at Southeastern Community College are enrolled full-time.

Primary concerns for Schools

Shelter and safety for people, and power loss are the top concerns.

Special Considerations:

Southeastern Community College completed a new tornado shelter on campus in 2024. All other schools would benefit from additional storm-safe room capability.

Hazard Mitigation and Security

K-12 Schools have engaged in mitigation activities including traditional exercises such as fire drills and moving to a storm safe area. At the same time, national trends in terrorist active shooter events have increased the need for heightened security, response drills and intensified school building safety measures such as video surveillance, restricted access, locked doors and bullet proofing of windows. SCC employs a private security firm on campus but would likely benefit from heightened security measures or law enforcement presence on campus.

One newer program several communities have been able to benefit from is called a Community Oriented Policing Services (COPS) Grant. A COPS grant is a federal funding award from the U.S. Department of Justice's COPS Office to support law enforcement activities, such as hiring officers, purchasing equipment, or enhancing community policing initiatives. Iowa law enforcement agencies can apply for these grants to increase their capacity and effectiveness in their local communities.

Risk Assessment – Schools

Hazards of concern for schools	Burlington CSD	Danville CSD	Mediapolis CSD	Notre Dame School	West Burlington ISD	Southeastern Community College
Drought	No	No	No	No	No	No
Extreme Heat	No	No	No	Miss school	Fully AC	Buildings have AC, but EH affects systems function, need upgrades to chiller and boiler, affects health of people
Flooding – River, Flash, Stormwater	No direct risk	Flash, Stormwater	2019 community dislocated and sheltered at the school	No	Stormwater drainage, floods near building	No direct risk
Severe thunderstorms: Hail, High winds, Lighting	Safe areas	Have shelter	Lightning	Safe areas	Solar panels, no lightning suppression, do have surge protecters, could use had damage to equipment controls for HVAC	Power outages cancel classes, hail damage to roof and equipment
Tornado	Safe areas	Have shelter	Yes	Safe areas	Not had one, have a contingency plan No safe room but shelter capacity, sound construction	Tornado shelter new 2024
Wildfire	No	No	No	No	No	No

Winter weather	Shut down	Bussing on gravel	90% Bus routes on gravel	Miss school Bussing	Shut down . Late start, not as much bussing	Shut down school , snow removal, equipment updates ongoing
Animal, Crop, Plant Disease	No	No	No	No	No	Deer damage to trees, ash borer still working on it, lease land to farmers
Dam or Levee Failure	No	No	No	No	No	No
Hazardous Materials Incident	Rail	IAAAP, Rail	Fertilizer plant Nutrien 2 miles away	Freeway	Ordinance plant 12 miles away. Ethanol plant 5 mile fertilizer plant 15 miles RR is 1 mile away.	IAAAP on border, Fertilizer plant Lee County, Borghi is 1 mile away, Natural gas line runs under campus
Human Disease Pandemic	Shut down school	Shut down school	Shut down school	Shut down school	Shut down school	Shut down school
Infrastructure Failure	No	No	No	No	No	No
Terrorism	Yes, concerned. Building and student security Direct attack, physical security concerns, cyber attacks	Yes, concerned. Building and student security	Yes, concerned. Building and student security	Yes, concerned. Locked down school no public access	Physical security for buildings and students, Cyber attacks	Direct attack, physical security concerns, cyber attacks are frequent
Transportation Incident	Potential for hazmat with transportation accident	Railroad nearby	Interstate construction underway increases risk	Potential for hazmat with transportation accident	RR, Major hwy 61 and 34 1 mile away	Potential for hazmat with transportation accident

Have any hazard events impacted your school in the last 5-10 years?	Winter weather, Power outages, Human Disease Epidemic, Cyber attacks	Flood Stormwater, Winter weather, Power outages, Human Disease Epidemic	Power outages due to Wind, Lightning, Winter weather; Human Disease Epidemic When the community had a flood event, people sheltered at the school	Extreme heat, Winter weather, Power outages, Human Disease Epidemic	Hail lightning, Power outages, stormwater, winter weather, Human Disease Epidemic	Extreme Heat, Winter weather, Human Disease Epidemic, Cyber attacks
Do Power outages happen often?	No	No	Not often	Rarely	Short duration	About once a year
What problems happen when the power goes out?	Lose internet, refrigeration, showers	Lose internet, refrigeration	Lose internet, refrigeration, showers	Heat or cold	Food storage	Can't hold classes, affects 250 dorm residents, shuts down meals, potential food loss, generator needed
Updated any plans in the last 5 years?	Annually	Annually	Annually	Annually	Emergency plans	Annually
Did the jurisdiction use information from the previous mitigation plan in Emergency Plans?	Yes annually	Yes annually	Not directly	Yes	Yes	Not directly

In the last 5 years, has the school made any changes to reduce impacts of hazards and improve safety?	Unplanned drills. School safety upgrades, hardened entryways, review emergency plans annually, increased security protocols. After annual review we update safety.	Unplanned drills. School safety upgrades: hardened entryways, added 41 cameras, full time deputy available, updated fire alarms, new PA system, cell phone apps, school guard. COPS grant, AI firearm detection system, smart sensors, entry shields, metal detectors	Applied for COPS grant, replaced AC unit, new storm safe building & tornado, purchased disinfecting equipment, PPE. Active shooting annual training, drills law enf drills, review emergency plans annually, increased security protocols, State safety and security grant for cameras radios and servers. New bond will redo entryway to restrict access	Locked down school no access. After annual review we update safety. Improved storm safe areas in 2025.	ALICE training, cyber security contract, Drills, education, quarterly tornado fire active shooter bus evacuation training, annual update the EM Plans Updated Cameras access control and 2 way radio systems	Completion of FEMA storm shelter in 2024, Private security ongoing training,

Hazard events that have impacted your school in the last five years	
Burlington CSD	Winter weather, Power outages, Human Disease Epidemic
Danville CSD	Flood Stormwater, Winter weather, Power outages, Human Disease Epidemic
Mediapolis CSD	Power outages due to Wind, Lightning,, Winter weather; Human Disease Epidemic When the community had a flood event, people sheltered at the school
Notre Dame Schools	Extreme heat, Winter weather, Power outages, Human Disease Epidemic
West Burlington ISD	Winter weather, Power outages, Human Disease Epidemic

Mitigation needs, Schools

Schools mostly need funding for safety, security and backup power generators.

Schools	Action steps
Extreme Heat	23 (NDC Schools, SCC)
Flooding – River, Flash, Stormwa	13 (WB ISD)
Severe thunderstorms	1,2,4,18
Tornado	1,2,4,18,23
Winter weather	1,2,4,18
Hazardous Materials Incident	18
Human Disease Pandemic	18
Terrorism	3,21,22

Public Opinion:

The question to respondents was “If funding were available, what would be the best things to do to improve safety in your schools and community?”

School and Community Needs	Hazard	Action item
Stormwater improvements	Flood	13
Security, Support for LEO and responders, SRO officer at school, Mutual aid agreements, More law enforcement funding for First responders	Terrorism	3,20,22,28
Lightning protection, power supply backup, evacuation plan	Extreme heat, Severe Storm (Hail, High wind, Lightning) Tornado, Winter weather	26
Safe rooms and storm shelters. Shelter for homeless people, especially patients discharged from hospital	Extreme heat, Severe Storm (Hail, High wind, Lightning) Tornado, Winter weather	1,2,4,5
Safe routes to schools, bike paths, trails for student safety and community resilience	Transportation	5

Special Populations, Vulnerable individuals

Concerns of the community
Growing client base of those needing assistance
Hazard events cause people and families to be displaced
Homeless individuals are especially vulnerable
Extreme heat: medication makes some people more sensitive; medication causes some people to sunburn easily
People with seizure disorders are very vulnerable to temp extremes
If trees are down, some people need help to clear the debris from their yard
During or after hazard events, people with few resources may have to be relocated

Hazards of concern:
Extreme heat
Flood
Severe storms
Tornados
Winter weather
HazMat Incident

Mitigation needed	Action item
Cooling center and heated space – more capability needed	1,2
Homeless need short term shelters and long term housing	1,2,23
People need support to meet basic needs during hazard events: showers, shelter, blankets, water, food, clothing	4,5
Drills for emergencies and evacuation include plans for special populations	20,22
Ongoing Information and education to improve coping skills during hazard events	18
Tree maintenance and storm debris removal	16

Conclusion

The Goals and Action Items detailed in this 2025 Hazard Mitigation Plan Update are intended to be a guide to officials and residents of Des Moines County as they continue to make progress towards becoming a safer community. As new information and new technology become available, this plan will be updated accordingly.

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Appendices

Appendix A - Recreational Trails

Trails, bike paths and sidewalks improve community resilience by providing alternative transportation during hazard conditions or post disaster recovery.

Starr's Cave Park and Preserve

With miles of trails (some even handicap accessible), interpretive signage, beautiful landscapes, an impressive bridge spanning Flint Creek and nature center staff close by, Starr's Cave is certainly the top choice for trail hikers of all ages.

Hunt Woods Recreation Area

Another park close to Burlington with miles of trails and picturesque forests, Hunt Woods is a popular destination for families wanting a close-to-home place to connect with nature.

Luckenbill Woods

Closer to Mediapolis, Luckenbill Woods also offers fantastic forests, prairies and even a couple ponds (with decent fishing, by the way) along with its network of trails.

The Flint River Trail

The Flint River Trail, in Burlington, Iowa, is a multi-use paved trail that follows the Flint River. It's currently 7 miles long and is planned to extend to 18 miles, connecting downtown Burlington, the Port of Burlington, Riverside Park, and Big Hollow Recreation Area. The trail is part of a larger system of trails in the area, including the Mississippi River Trail.

Key features of the Flint River Trail:

- Length: 7 miles (planned 18 miles).
- Surface: Concrete, crushed limestone, and on-road sections.
- Uses: Biking, hiking, and walking.

Route: Begins at the Port of Burlington, travels north through Riverside Park, and eventually connects to Big Hollow Recreation Area.

The Flint River Trail begins along the riverfront, downtown - at the Port of Burlington. This trail travels north through Riverside Park to the North Bottoms area nearly 4 miles. The trail is paved and grade separated from traffic.

“When fully complete, the Flint River Trail will be approximately 18 miles in length and will extend from downtown Burlington to Big Hollow Recreation Area in Des Moines County. It will connect the Mississippi River Trail, downtown Burlington, the Port of Burlington, Riverside Park, Star's Cave Park and Preserve, Hickory Bend Recreation Area, Historic Zion School, and Big Hollow Recreation Area through the Flint River Valley. Within the City, the trail will be primarily separated from the roadways for safety and the enjoyment of the users.” https://www.burlingtoniowa.org/2309/Flint-River-Trail

Progress

- Riverfront, Main Street: Completed from Port of Burlington to Angular Street, along Main Street in 2023

- Bluff Road, N 8th Street to Cash Street: Expected to be complete by summer 2024 (funding on-hand)
- Riverside Park RR Track Crossing/Connection to Bluff Road: Expected to commence spring 2024 (pending funding)
- Accessibility: The Riverside Park Path, a segment of the Flint River Trail, is likely accessible for visitors using wheelchairs, mobility equipment, or strollers.

Other trails in the area: Includes segments of the Flint River Trail within Starr's Cave Park and Preserve, according to Des Moines County Conservation.

Mississippi River Trail

The Mississippi River Trail (MRT) is a 10-state bicycling route in the process of development. Many of the trail's 3,000 miles follow roadways used by motor vehicles, although some of the route is on multi-use trails. When complete, the route will consist of trails and bike-friendly roads between the headwaters at Lake Itasca, Minnesota and the Gulf of Mexico, with "MRT" signs identifying the way.

The trail is divided into three sections: Northern, Central, and Southern. In some locations trails are along both sides of the river.

Appendix B – Hazards profiled for Iowa

Hazards selected for this plan came from the 2023 State of Iowa HMP Section 3, pages 3-1 and 3-2.

To comply with 44 CFR 201.4 (c) (2), this plan must contain an "overview of the type and location of all natural hazards that can affect the state." Section 3.3 profiles each of the following natural hazards determined to affect the state of Iowa:

1. Drought
2. Tornadoes and other High Wind Events (including derechos)
3. Flooding-River
4. Flooding-Flash
5. Severe Winter weather
6. Hail and Lightning storms
7. Excessive Heat
8. Dam and Levee failure (relates to natural hazard of flooding)
9. Landslides
10. Earthquake
11. Wildfire, including Grass Fire
12. Sinkholes
13. Expansive Soils

The natural hazard profiles include information on the nature of each natural hazard, the locations or areas where they are found, and information on previous occurrences of hazard events. Using best available information, the probability of future hazard events is also provided for each natural hazard profiled in section 3.3.

Section 3.4 includes a brief overview of several "non-natural" hazards that affect Iowa, namely:

1. Animal/Crop/Plant Disease
2. Pandemic Human Disease
3. Hazardous Materials
4. Infrastructure Failure
5. Radiological Incident
6. Terrorism
7. Transportation Incident

These seven hazards plus the thirteen natural hazards are the same 20 hazards used in the Threat and Hazard Identification and Risk Assessment (THIRA) for Iowa.

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1

DES MOINES COUNTY, IOWA

AND INCORPORATED AREAS

COMMUNITY NAME	CID
CITY OF BURLINGTON	190114
CITY OF DANVILLE	190115
DES MOINES COUNTY (UNINCORPORATED AREAS)	190113
CITY OF MEDIAPOLIS	190615
CITY OF MIDDLETOWN*	190778
CITY OF WEST BURLINGTON	190682

*No Special Flood Hazard Areas Identified

FEMA

REVISED: October 21, 2021

FLOOD INSURANCE STUDY NUMBER
19057CV000C

Version Number 2.4.3.0

HMA Funding

FEMA has identified four climate resilient mitigation activities that are eligible for funding under its Hazard Mitigation Assistance program. Funding for these activities is intended to support communities in reducing the risks associated with climate change. The guides focus on:

- ✓ aquifer storage and recovery,
- ✓ floodplain and stream restoration,
- ✓ flood diversion and storage and
- ✓ green infrastructure.

These climate resilient mitigation activities are available for Hazard Mitigation Grant Program funding resulting from a major disaster declared on or after September 30, 2015, and for HMA funding for which the application period opens on or after September 30, 2015. The activities can mitigate any natural hazard; however, the activities are focused on mitigating the impacts of flood and drought conditions. FEMA encourages communities to use this information in developing eligible HMA project applications that leverage risk reduction actions and increase climate resilience.

From https://www.amwa.net/article/fema-provides-information-hazard-mitigation-assistance-climate-resilient-mitigation

Stormwater management

Flood diversion and storage projects are climate resilient mitigation actions.

While there may be many different types of localized flood risk reduction projects, stormwater management projects are some of the most common to the HMA programs. Stormwater management is defined as efforts to reduce the impact of increased runoff that results from new development in a watershed. Stormwater management also encompasses many aspects of water quality and includes efforts to reduce erosion and the entry of sediment and pollutants into receiving streams.

The objective of this activity is to prevent future development from increasing flood hazards to existing development, to protect existing hydrologic functions within the watershed, and to maintain and improve water quality. Unmanaged stormwater runoff from new development and redevelopment throughout a watershed increases flood hazards by causing more frequent flooding, greater flood depths and longer-lasting floods.

As forests, fields and farms are covered by impermeable surfaces such as streets, rooftops and parking lots, more of the rain runs off, and at a faster rate. When an area is urbanized, the rate and volume of runoff can increase fivefold or more. Communities are affected by development that takes place upstream in their watershed, and the community's own development can have an impact on downstream communities. Communities are encouraged to cooperate with adjacent communities to manage stormwater.

Stormwater management regulations regulate development on a case-by-case basis to ensure the peak flow and volume of stormwater runoff from each site will be no greater than the runoff from the site before it was developed or redeveloped.

Stormwater management practices can be grouped loosely into the following categories:

Infiltration: These approaches manage stormwater by infiltrating it into the ground. These methods are considered pollutant-reducing. Some examples include porous pavement, subsurface infiltration and bioinfiltration.

Slow release: These approaches detain and slowly release stormwater over time. An example is a detention/retention pond.

Pollutant-reducing: These approaches incorporate pollutant-reducing practices. They may include infiltration practices and some slow-release practices.

Vegetated: These approaches use vegetation as a significant component within the storage area. Examples include bioretention basins, ponds and wet basins, green roofs, and vegetated media filters.

Non-vegetated: These approaches do not have a significant vegetation component. They include but are not limited to porous pavements, blue roofs, media filters, cisterns, and subsurface storage and conveyance methods (Flood Risk Reduction, 2024).

Many flood diversion and storage projects are currently eligible for HMA as flood risk reduction activities. The HMA Guide focuses on flood diversion and storage projects implemented using green infrastructure methods as much as possible to address drought mitigation and climate change resilience in addition to reducing flood risk.

Des Moines County Critical facilities in SFHA

• Danville Public Works Maintenance Building: This building is adjacent to Long Creek in a 100-year floodplain at the south end of the City. It is primarily used for the storage of equipment for the Public Works Department.

• Burlington Waterworks Intake Pipe: This is where the Burlington Waterworks draws water from the Mississippi River for public use. A pumping station is situated behind the North Bottoms Levee just to the west, which transports the river water northward to the Water Treatment facility.

• Burlington Waterworks – Water Treatment Plant: This facility treats drinking water for use in Burlington, West Burlington, and through a series of agreements, a large portion of the remainder of the county. The building itself is located at a higher elevation in the 500-year floodplain, while much of the outdoor infrastructure is located in the 100-year floodplain to the south.

• Burlington Wastewater Treatment Plant: This facility treats wastewater from the City of Burlington. Flooding of this facility could result in untreated sewage mixing with floodwaters, which would create a significant public health hazard. Most of the outdoor infrastructure is in the 100-year floodplain, the buildings are split between the 100 and 500-year floodplains, with the office building outside the floodplain entirely.

• Market Street Lift Station: Located along the riverfront in Downtown Burlington, this lift station is an integral part of the City of Burlington sewer system. Flooding of this facility can result in sewer backups, a significant health hazard. Its vulnerable location has resulted in it being impacted by major floods in 1993, 2008, and 2019. The impact of the latter was particularly serious, since the Hesco barriers breached in the immediate vicinity of the station, causing the release of raw sewage into the waters surrounding it.

• Silver Street Lift Station: This Burlington sewer facility is located between the CNH Industrial factory and the Mississippi River. It is situated at the edge of a Zone AH floodplain – an area protected by a levee where shallow backchannel flooding or ponding is expected during a 100-year flood event.

• Danville Wastewater Treatment/Lift Station: The lift station and the vast majority of the wastewater treatment facility are located within the 100-year floodplain around Long Creek.

• Two Rivers L&D Pumping Station #4 (Pumping Station Road): This is the northernmost of the three pumping stations for the Two Rivers Levee & Drainage District in Des Moines County. Most of the facility

is located in a Zone AH floodplain (shallow flooding area). Damage to this facility would inhibit the ability of the Two Rivers Levee and Drainage District to pump out any water from flooding behind their levee system.

• Two Rivers L&D Pumping Station #7 (150th Ave): This facility is similar to Pumping Station #4. However, the Zone AH floodplain only minimally encroaches on the building, on the side facing the outlet of a drainage channel (Cottonwood Drain).

• Alliant Energy Burlington Generating Station: This large coal-fired power plant generates power for Alliant's customers throughout Des Moines and neighboring counties. It is situated along the Mississippi River south of Burlington, just west of the BNSF rail line that hugs the shoreline. Most of the facility is in the 500-year floodplain, while small portions are in the 100-year floodplain.

• Alliant Energy Power Station – South 4th: This large substation is located at the south end of Downtown Burlington, just south of the BNSF railroad tracks. The northernmost portion of the substation is within the 100-year floodplain, although this section has been artificially raised several feet, so that the entire surface of the substation is flat and level, while the natural ground surface slopes gradually downward from south to north.

• Burlington Rail Bridge (BNSF): While technically located with the 100-year floodplain, the travel surface of this mainline railroad bridge is positioned just above the 100-year flood elevation, and it includes a swing span portion that raises to allow boat and barge traffic to pass through.

• Great River Bridge (US 34): While technically located with the 100-year floodplain, the travel surface of this 25-year old 4-lane highway bridge is elevated well above the 100-year flood elevation.

• Bluff Harbor Marina: This private recreational facility is located just north of Downtown Burlington along the Mississippi River. The marina itself, the clubhouse and storage buildings are all within the 100-year floodplain.

• Memorial Auditorium: Located on Burlington riverfront, this building serves as a large gathering place for concerts, speakers, and other demonstrations. This building would also serve as a shelter in a time of disaster and is designated as an overflow triage center in the possibility that the Great River Medical Center is overwhelmed by a disaster or hazard. It is immediately protected by a permanent floodwall along the river (installed in 2018), but a 2019 breach of temporary Hesco barriers to the north and south caused the area to be inundated with several feet of water.

• 4th Pumping Station Park Campground: Operated by Des Moines County Conservation, this campground is located just east of the namesake pumping station operated by the Two Rivers Levee & Drainage District. It is operated by Des Moines County Conservation. The southernmost portion of the campground is in a Zone AH floodplain (shallow flooding area).

• Welter Recreation Area Campground: Also operated by Des Moines County Conservation, this campground is adjacent to the Skunk River, just east of the unincorporated community of Augusta. The entirety of the campground is in the 100-year floodplain.

• Starr's Cave Nature Center: This facility is operated by Des Moines County Conservation, on land owned by the Iowa Department of Natural Resources. The building itself is located in the floodplain, along with a series of trails and nature exhibits that are closer to Flint Creek. A flash flood damaged a section of trail near the river in late May 2019.

• Conger's Mobile Home Park: This mobile home park is situated in a steep ravine that drains westward to Hawkeye Creek, a tributary of the Mississippi River. There are approximately 30 mobile home units in the park, the vast majority of which are in the 500-year floodplain.

Appendix D – Additional Risk information

Hazard Impacts on Agriculture

Drought and High winds

The Des Moines Register
Published 8:04 a.m. CT July 27, 2021 Updated 12:16 p.m. CT July 27, 2021
By Donnelle Eller

Iowa farmers absorbed $243 million in losses from last year's devastating drought, derecho, new tally says

The derecho and drought that hammered Iowa last year destroyed $802 million in corn, soybeans and pastures, a new report shows, with farmers absorbing nearly one-third of the losses.

The American Farm Bureau Federation, which is lobbying congressional leaders to provide additional disaster aid for U.S. growers, says crop insurance covered nearly $560 million of the losses that Iowa farmers faced following the devastating drought and the derecho. The state's farmers were responsible for covering $243 million out of pocket.

Nationwide, natural disasters caused $6.5 billion in damage to crops, pasture and rangeland, according to the Farm Bureau. Federal crop insurance is covering $2.9 billion in losses, leaving U.S. growers to cover $3.6 billion of the total hit.

Damage from natural disasters, including hurricanes, wildfires and Tornados, drought and derechos, extended beyond just agricultural land: Nearly $99 billion in damages was reported to homes, businesses, farms and other property last year.

It was the fourth-most expensive year of natural disasters since 1980, according to the National Oceanic and Atmospheric Administration. The natural disasters killed 262 people last year, NOAA reported, including three Iowans who died in the derecho.

The derecho's straight-line winds reached 140 mph on Aug. 10 as it traveled 770 miles across eight states from South Dakota to Ohio. Total damages to homes, businesses and farms — much of it centered in Iowa and Illinois — reached $11.5 billion, NOAA reported, up from a $7.5 billion estimate made last fall.

It was the most costly thunderstorm in U.S. history, according to NOAA.

The storm ripped through cities and towns across Iowa, including Des Moines, Marshalltown and Cedar Rapids, leaving about 400,000 people without power. Many of Cedar Rapids' 132,000 residents were without power for days, stretching past two weeks for some.

The derecho's damage to Iowa corn, soybeans and other crops reached $490.8 million, with federal crop insurance covering $343.3 million of those losses and farmers picking up the remaining $147.5 million in costs, said Daniel Munch, the Farm Bureau associate economist who wrote the report, released earlier this month.

The drought caused $308.2 million in damage to Iowa crops, with $214.5 million covered by insurance, the report shows. An estimated $93.7 million in losses were uncovered.

Munch said last year's drought, which has continued this year, contributed to the derecho damage, potentially weakening plants. Experts also say the storm's timing — hitting shortly before crops were harvested — contributed to damage by snapping tall corn.

The storm damaged crops on an estimated 6 million farm acres as it swept across the central third of Iowa. Farm Bureau's crop damage estimate doesn't include other ag losses, such as twisted grain bins on farms

and at elevators, loss of livestock or the additional equipment, time and other costs that farmers experienced when harvesting thousands of acres of fallen corn and soybeans, Munch said.

The report also indicated the drought and derecho damaged about $3.1 million of Iowa pasture and rangeland, with nearly $2 million of losses uncovered.

Last year, Iowa farmers insured about 95% of the state's total corn and soybean acres, U.S. Department of Agriculture data shows. The insured crops represented $12 billion of value. Taxpayers subsidized about half of the state's crop insurance costs; farmers paid the remainder.

Congress and the former Trump administration made about $4 billion available to farmers to help cover natural disaster costs in 2018 and 2019. It was part of a larger $19.1 billion disaster package for Americans.

U.S. Reps. Randy Feenstra, R-Iowa, and Cindy Axne, D-Iowa, voted to provide coverage for the derecho and other high wind-events in an $8.5 billion disaster bill that the House agriculture committee approved Tuesday. The bill would provide assistance to farmers and ranchers seeking natural disaster assistance for last year and 2021.

Donnelle Eller covers agriculture, the environment and energy for the Register. Reach her at deller@registermedia.com or 515-284-8457

Hazardous Materials Incidents

The Hawk Eye Feb 22, 2023

Fire department shuts down West Burlington plant after chemical spill, reports of sick employees

By: Brad Vidmar

WEST BURLINGTON — Employees at the Borghi USA Inc. manufacturing plant in West Burlington were sent home Thursday after emergency crews responded to a report of a hydrochloric acid spill that was making some workers ill.

Just before 9 a.m., the West Burlington Fire Department was sent to the building after receiving an anonymous tip, according to Fire Chief Shaun Ryan.

A pipe at the factory broke late Tuesday, resulting in a large spill of hydrochloric acid, according to Ryan.

Ryan said the plant's manager told crews 2000-4000 gallons of the acid is estimated to have leaked.

Shortly after West Burlington fire crews arrived on the scene, and due to the potential for hydrochloric acid to be explosive, Ryan said he ordered the plant to shut down and send employees home at about 9:15 a.m.

"I basically told the whole plant they had to evacuate," Ryan said. "(Hydrochloric acid) does have the potential to be explosive if the right conditions exist."

Ryan said the pipe that was the source of the spill no longer was leaking but that the chemical was still present on the floor when crews arrived.

Cleanup crews with Clean Harbors Environmental Services were at the facility on Thursday. Ryan said those cleanup crews had already been called to the site by Borghi officials prior to the fire department's arrival at the facility.

The West Burlington Police Department and West Burlington Public Works Department also responded to the call at the facility on Thursday.

The facility will be closed until Monday while cleanup crews work to remove the chemical residues, Ryan said. The company manufactures automotive, agricultural and industrial sector pipes.

One year later:

Borghi plant served with federal search warrant: Brad Vidmar bvidmar@thehawkeye.com

- Feb 3, 2023 Updated Mar 10, 2024

WEST BURLINGTON — Federal agents served the Borghi USA Inc. plant with a search warrant on Wednesday morning.

Assistant United States Attorney and Public Information Officer MacKenzie Benson Tubbs, of the Southern District of Iowa, confirmed to The Hawk Eye the federal search warrant was executed at the plant but declined to provide any additional information on the search or the reason behind it.

On Wednesday, several Borghi employees submitted anonymous tips to The Hawk Eye that federal agents raided the plant that morning.

One Borghi employee, who spoke on condition of anonymity, said they witnessed several federal (whom they recognized to be members of the Federal Bureau of Investigation and Environmental Protection Agency) and local law enforcement agents enter the plant, inform employees they were not allowed to leave the facility, interview several office employees, seize paper and computer records. Office employees were then sent home for the day, but production continued as normal.

The employee also told The Hawk Eye the search was part of a follow-up investigation into the massive chemical spill that occurred at the plant in April 2022, but this has not been confirmed by law enforcement.

The Hawk Eye reached out to West Burlington Police Chief Jesse Logan, but he declined to comment on the investigation and referred all questions to Tubbs.

It is unknown at this time why the search warrant was executed, what investigators were looking for, and what investigators discovered during their search of the plant on Wednesday.

But the search comes nearly a year after an estimated 2,200 gallons of hydrochloric acid spilled throughout the plant over the course of three days. On April 12, a pipe leak caused a massive spread of hydrochloric acid to spread throughout the floor of the plant.

Despite regulations requiring the plant to shut down and call in hazmat crews and the fire department, the plant remained in production. Employees tell The Hawk Eye that the plant attempted to use shop vacuums and other in-house methods to clean up the spill.

Employees also told The Hawk Eye that several crew members either walked off the job while others left to seek medical attention for becoming ill or injured after being exposed to the chemicals.

On April 14, two days after the leak began, the plant shut down, and employees were sent home after the West Burlington Fire Department received an anonymous phone call reporting the spill.

“They should have called us right away,” Ryan told The Hawk Eye shortly after the incident, adding that hydrochloric acid can potentially be explosive under the right conditions.

Professional cleanup crews were called to the plant, but the factory remained closed for nine days before production employees were allowed back into the plant.

Ryan said he was told by an Occupational Safety and Health Administration (OSHA) official that the spill was “one of the largest chemical catastrophes in the state of Iowa in recent history.”

It is unclear how many Borghi employees sought medical treatment after being exposed to the chemicals or the severity of their illnesses or injuries, but The Hawk Eye did speak with several employees who did seek medical attention and spoke of others doing the same.

The Hawk Eye also spoke with James P. Hoffman, a Keokuk attorney who specializes in workman's compensation cases, who confirmed in April 2022 that he was giving legal counsel to several Borghi employees following the spill but declined to state how many employees or the extent of their injuries.

At the time of the spill, Ryan said the Iowa Department of Natural Resources, Environmental Protection Agency, and OSHA were all investigating the incident, but it was unclear when those investigations would be complete.

According to OSHA records, the plant was fined a total of $184,320 for violations (including those related to hazardous waste and emergency response) related to a complaint filed on April 19, 2022, but records do not specify if the violations are related to the spill or a different incident.

The OSHA records also indicate that the complaint is still being investigated, and the case has not been closed at this time.

The Hawk Eye reached out to Borghi on Friday but was told that plant management officials were not available for comment.

Record of HazMat incidents 2015-2024

Location City	Discovered Date	Medium	Material
West Burlington	5/29/2015	Land	Diesel Fuel: 50 Gallons
Sperry	6/11/2015	Land	Transformer Oil (Unknown PCB): 10 Gallons
Burlington	6/23/2015	Land	Transformer Oil (Non PCB): 75 Gallons
Burlington	9/2/2015	Land	Transformer Oil (Unknown PCB): 5 Gallons
Danville	9/10/2015	Land	Transformer Oil (Unknown PCB): 1 Gallons
Burlington	9/26/2015	Land	Diesel Fuel: 100 Gallons
Sperry	10/29/2015	Land	Transformer oil (PCB): 4 Gallons
Burlington	2/25/2016	Land	Sodium hypochlorite: 30 Gallons
IAAAP Middletown	4/25/2016	Land	Ethyl Alcohol (200 proof alcohol): 10 Gallons
Burlington	5/26/2016	Air	Ammonia (NH3): 789 Pounds
Burlington	7/8/2016	Surface Water	Gasoline non-ethanol: 10 Gallons
West Burlington	8/4/2016	Land	Transformer Oil (Non PCB): 4 oz
Danville	5/10/2017	Land	Antifreeze: 5 Gallons
Burlington	6/22/2017	Land	Mineral oil: 1 Gallons
West Burlington	7/5/2017	Land	Transformer Oil (Non PCB): 1 pt
IAAAP Middletown	7/14/2017	Land	Hydraulic Fluid: 5 Gallons
Burlington	7/17/2017	Land	Asphalt mix: 500 Gallons
Burlington	7/17/2017	Land	Transformer Oil (Unknown PCB): 1 Gallons
Burlington	11/9/2017	Land	Hydraulic Fluid: 10 Gallons
Sperry	6/24/2018	Land	non-PCB Oil: 1 Gallons
Burlington	7/3/2018	Land	Transformer Oil (Unknown PCB): 5 Gallons
Burlington	8/1/2018	Surface Water	Motor oil: 1 qt
Mediapolis	2/5/2019	Land	Diesel Fuel: 200 Gallons

Burlington	4/7/2019	Land	Diesel Fuel: 1 Gallons
Middletown	5/14/2019	Land	Mercury: 1 Pounds, Fuel Oil: 1 Pounds
Burlington	5/26/2019	Land	Transformer Oil (Non PCB): 25 Gallons
Burlington	9/5/2019	Land	Mineral oil: 3 Gallons
Burlington	11/27/2019	Land	Transformer Oil (Unknown PCB): 5 Gallons
Sperry	2/18/2020	Land	Transformer Oil (Unknown PCB): 7 Gallons
West Burlington	5/25/2020	Land	Gasoline non-ethanol: 2 Gallons
Burlington	6/22/2020	Land	Oil: 800 Gallons
West Burlington	12/21/2020	Land	Transformer Oil (Unknown PCB): 5 Gallons
Burlington	12/25/2020	Land	Diesel Fuel: 30 Gallons
Burlington	3/17/2021	Surface Water	Denatured Alcohol: 1000 Gallons
Burlington	6/11/2021	Land	Transformer Oil (Non PCB): 5 Gallons
Burlington	8/5/2021	Land	non-PCB Oil: 12 Gallons
Burlington	8/11/2021	Land	non-PCB Oil: 1 qt
Burlington	8/31/2021	Land	Hydraulic Fluid: 40 Gallons
Burlington	11/25/2021	Land	Transformer Oil (Non PCB): 4 Gallons
West Burlington	4/12/2022	Land	Hydrochloric Acid (HCL): 2000 Gallons
IAAAP Middletown	6/6/2022	Land	Mercury: 3 Pounds
Burlington	6/20/2022	Land	Oil - Food Grade: 12 Gallons
Burlington	8/11/2022	Land	non-PCB Oil: 10 Gallons
Burlington	1/31/2023	Land	Treated Wastewater Sludge: 54 cf
Burlington	9/2/2023	Land	Mineral oil: 1300 Gallons
West Burlington	9/19/2023	Land	Diesel Fuel: 20 Gallons
Sperry	9/26/2023	Land	Hydraulic Fluid: 3 Gallons
Burlington	12/10/2023	Land	non-PCB Oil: 20 Gallons
Burlington	4/22/2024	Land	Ammonium phosphate: 700 Gallons
Burlington	9/25/2024	Land	Gasoline non-ethanol: 5 Gallons
Burlington	12/17/2024	Land	Petroleum Products - unknown type: 45 Gal
Burlington	12/18/2024	Land	Gasoline non-ethanol: 10 Gallons

Appendix E – Summary of Public Survey

The Public Survey instrument is reproduced here:

Public Opinion Survey, Page 1

Natural Hazards of concern for this Planning project:

Natural Hazards
Drought
Earthquake
Expansive Soils
Extreme Heat
Flood – River, Flash flood, Stormwater
Dam/Levee Failure (Flood)
Grass or Wildland Fire
Landslide
Sinkholes
Thunderstorms – Hail & Lightning
Tornado, High winds
Winter Storms

Which Natural hazards are you most concerned about?

#1
#2
#3
#4
#5

What do you think should be done to improve safety for these hazards?

#1
#2
#3
#4
#5

Public Opinion Survey, Page 2

Other Hazards of concern for this Plan:

Other Hazards
Animal/Plant/Crop Disease
Hazardous Materials Incident
Human Disease Pandemic
Infrastructure Failure
Radiological Incident
Terrorism
Transportation Incident
Other (Name the hazard)

Which of the above hazards are you most concerned about?

#1
#2
#3
#4

What do you think should be done to improve safety for these hazards?

#1
#2
#3
#4

Comments:

The Tally for the municipal jurisdictions is as follows: The top 3 hazard concerns are Severe Storms (Hail, High wind, and Lightning), Tornados and Winter weather. Ranking fourth and fifth were Flood and Terrorism. Severe Storms were considered the most frequent hazard, Tornados the most dangerous.

Top 3	
1	Severe storms
2	Tornado
3	Winter weather

The primary concerns for all towns can be grouped under three topics

1. Public safety
2. Critical facilities, public utilities and
3. Community resilience (continuity of government, community support)

Public concerns and mitigation solutions

On the whole, residents of Des Moines County seem to feel that they are relatively safe from most natural hazards and that local leaders are meeting community needs effectively within budget constraints.

Mitigation solutions most often proposed by the public are additional sirens, generators, community shelters and tornado safe rooms.

The problem citizens mentioned most is “power outage” caused by severe storms and winter weather. While loss of power is not usually long lasting, people worry that a long term outage could cause serious health and safety consequences, especially in winter. Several people would like to see more local solar or wind power to improve resilience.

Tornados are viewed as a constant threat. The unpredictability, threat to life and the potential amount of property damage all raise concerns every year. Many people do not really have adequate tornado shelter available and the cost of constructing and maintaining shelters is prohibitive for small communities or individual households.

Appendix F – Plan Review Worksheets

The following worksheets are used to report and evaluate projects and guide plan revisions.

Worksheet 1 – Annual Progress Report

To be filled out by Emergency manager and provided to Planning Committee

Date _____

Progress report period from Date: _____ to _____

Which Hazard Mitigation projects were initiated or completed in participating jurisdictions this year? Attach Project Report (Worksheet 2) for each project in the jurisdiction.

Project 1	Community
	Project
	Contact person
	Email or phone
Project 2	Community
	Project
	Contact person
	Email or phone
Project 3	Community
	Project
	Contact person
	Email or phone
Project 4	Community
	Project
	Contact person
	Email or phone

Comments:

Worksheet 2 – Project Report

To be filled out by local official and submitted to EMA when projects are complete

Community name: _____

Contact person: _____ Phone _____ Email _____

Project name: _____

Total project cost: _____

Funding sources: _____

Hazard(s) Mitigated: _____

Project Location and description:

Actual or expected date of completion _____-_

Which of the following Goals does the project support:

Protect life Protect property Protect the environment

Increased public preparedness for disasters

Was there public or political support for the project? _____

Was the project successfully completed? _____

Within the proposed budget? _____

Within the proposed timeframe? _____

Please attach any supporting photos or other pertinent information.

Comments:

Worksheet 3 – Risk Assessment

Community name: _____

Contact person: _____ Phone _____ Email _____

Have there been any changes in development in the community?

Has the community adopted or updated any plans, codes or regulations?

Which recommended Mitigation Actions have been Implemented?

Has the community been impacted by hazards since the last HM Plan?

Are there new concerns?

Comments:

Worksheet 4 – Process to update the plan

As the five year cycle progresses, the Hazard Mitigation Planning Committee (HMPC) will follow the guidelines below.

Prep for 5 year Update:

Evaluate the Planning Team

Local staffing changes that require a new team member?

Unrepresented stakeholders that should be invited to the team?

Are there ways to gain more diverse and widespread participation?

Are there new or unused methods of funding that we should pursue?

Who will research funding by contacting State Emergency Management, FEMA, DNR, USDA, and other communities that have achieved successful projects?

Check with all Jurisdictions for changes to Building codes, permits, comp plans, projects planned, completed or underway, school hazard mitigation activities, or other Hazard Mitigation measures taken since the adoption date of last HMP (use and attach worksheets 1 & 2).

Proposed schedule for future updates	Time
Apply for planning funds from the state. Notice of Intent	2 years prior to plan expiration
Evaluate Planning team: see above	14 months prior to Plan expiration
Receive funding award or authorize cost. Planner in place	1 year prior to Plan expiration
Begin Plan update, refresh community information	1 year prior to Plan expiration
Complete the capability assessment for each jurisdiction	11 months prior to plan expiration
Begin data collection and hazard profiles	10 months prior to plan expiration
Initiate public survey for risk assessment	9 months prior to plan expiration
Vulnerability and Impacts for each jurisdiction	8 months prior to plan expiration
Review previous mitigation action plan with each jurisdiction	8 months prior to plan expiration
Record and organize all public and jurisdiction comments	7 months prior to plan expiration
HMPC reviews all data, comments and drafts	6 months prior to plan expiration
Draft new mitigation strategies and action tables	5 months prior to plan expiration
HMPC reviews new action plan	4 months prior to plan expiration
Staff drafts, HMPC reviews maintenance section for update	3 months prior to plan expiration
HMPC approves final draft, county adopts to send to state	60 days prior to plan expiration
Final draft complete, submit to Iowa HSEMD	60 days prior to plan expiration
Receive FEMA approval	30 days prior to plan expiration
All jurisdictions adopt	Prior to previous plan expiration

Appendix G – Adoption Resolutions

Jurisdiction	Date of Adoption
Des Moines County	
Burlington	
Danville	
Mediapolis	
Middletown	
West Burlington	
IAAAP	
North Bottoms L&DD	
Two Rivers L&DD	
Burlington CSD	
Danville CSD	
Notre Dame Catholic Schools	
Mediapolis CSD	
West Burlington ISD	
Southeastern Community College	

Appendix H – Compliance, Scoring Mitigation Actions

There is at least one Mitigation action per hazard for each affected jurisdiction, See summary table below and full action tables pages 128-138.

One Mitigation Action for each Hazard per affected jurisdiction

County	Action steps
Drought	25
Extreme Heat	1.2.4.7.18,23,25
Flooding – River, Flash, Stormwa	13,17,18,23,24,27
Severe thunderstorms	1,2,4,6,9,10,12,27,29,30
Tornado	1,2,4,6,7,8,10,12,16,18,20,23,25,27,29,30
Wildfire	16,19,20
Winter weather	1,2,4,6,7,9,10,16,18,20,23,25,27,29,30
Animal, Crop, Plant Disease	16
Dam or Levee Failure	17,25,27
Hazardous Materials Incident	14,15,18,20,28
Human Disease Pandemic	6,18,20
Infrastructure Failure	6,9,10
Terrorism	3,21,22,28
Transportation Incident	14,15

Cities	Action steps
Drought	10,11
Extreme Heat	1,2,4,7,18,23
Flooding – River, Flash, Stormwa	13,17,18,23,25
Severe thunderstorms	1,2,4,6,7,8,24,29
Tornado	1,2,4,6,7,8,9,10,12,16,18,20,23,24,27,29
Wildfire	19,20
Winter weather	1,2,4,6,7,8,9,10,16,18,23,25,27,29,30
Animal, Crop, Plant Disease	5,16
Dam or Levee Failure	17,27
Hazardous Materials Incident	14,18,20,28
Human Disease Pandemic	5,6,18,20
Infrastructure Failure	6,8,9,10
Terrorism	3,21,22,28
Transportation Incident	5,14

Schools	Action steps
Extreme Heat	23 (NDC Schools, SCC)
Flooding – River, Flash, Stormwa	13 (WB ISD)
Severe thunderstorms	1,2,4,18
Tornado	1,2,4,18,23
Winter weather	1,2,4,18
Hazardous Materials Incident	18
Human Disease Pandemic	18
Terrorism	3,21,22

Other Jurisdictions	Hazard	Action steps
IAAAP	Severe Storms, Lightning, Winter weather, (Tree damage), Terrorism	3,5,26,28,29
North Bottoms L&DD	Flood (Funding)	5
Two Rivers L&DD	Flood, Severe storms, Winter weather, (Funding, Tree damage),Terrorism, Transportation incident	3,5,16,22
DESCOM	Severe storms, Flood, Tornado, Winter weather (Sirens, Emergency Communications)	18,24

Scoring Table

item	Activity	Cost benefit	STAPLEE score	Local Emphasis	TOTAL	Priority group	Supports Goals
Action 1	Equip critical facilities and community s	4	S,T,A,P 4	2	10	A	1,3
Action 2	Facilitate the funding, installation and i	5	S,T,A,P,Ec 5	2	12	A	1
Action 3	Improve physical security measures at e	2	T,A 2	2	6	B	2
Action 4	Develop a long-term shelter and evacu	4	S,T,A,P,L 5	1	10	A	1
Action 5	Coordinate with State agencies to impr	5	T,A,L,Ec 4	2	11	A	1,2,3,4
Action 6	Develop and implement a Continuity o	3	T,A,P 3	1	7	B	1,3
Action 7	Develop a volunteer call list and proced	4	S,T,A 3	1	8	B	1
Action 8	Establish charging stations for electroni	4	S,T 2	1	7	B	1
Action 9	Develop Memoranda of Understanding (M	2	A,P,L 3	1	6	B	3
Action 10	Encourage utility companies to increase	1	T,A,P 3	2	6	B	1,2,3
Action 11	Evaluate water redundancy and ensure	2	T,Ec,Env 3	1	8	B	1
Action 12	Require any new manufactured housing	4	S,A,L,P 4	2	10	A	1,2
Action 13	Prepare and adopt a stormwater draina	1	T,A,P,L,Env 5	1	7	B	2
Action 14	Improve safety where railroads interse	5	A,P,L 3	1	9	B	1
Action 15	Ensure cooperation with the railway inc	5	S,A,L, 3	1	9	B	1,2
Action 16	Conduct annual tree maintenance	3	A,Env 2	1	6	B	2
Action 17	Acquire and remove any structures that	1	A,T,L,P,Env 5	1	7	B	2
Action 18	Conduct hazard awareness programs fo	3	S,T,A 3	1	7	B	1,4
Action 19	Continue fire safety education for adul	1	S,T,A 3	1	5	C	1,2,4
Action 20	Practice drills and train firefighters, res	3	S,T,A, 3	2	8	B	1,2,4
Action 21	Ensure critical services and information	2	T,A,P,L 4	1	7	B	3
Action 22	Equip and train local authorities to impr	5	T,A,P 3	1	9	B	1,2,3,4
Action 23	Purchase and install backup generators	5	S,T,A,Ec 4	2	11	A	1,2,3
Action 24	Purchase and Install additional sirens a	5	S,T,A,Ec 4	2	11	A	1,3,4
Action 25	Promote use of NOAA weather radios	3	S,T,A 3	1	7	B	1
Action 26	Install, upgrade and maintain lightning	2	S,T,A,P 4	1	7	B	2,3,
Action 27	Obtain an All-Terrain-Vehicle for first respo	4	T,A 2	1	7	B	1,3
Action 28	Update current law enforcement and first r	5	T,A,P,L 4	1	10	A	1,2,3
Action 29	Acquire wood chipper to quickly handle sto	1	A,Ec,Env 3	1	5	C	1,2,
Action 30	Place Alert Iowa/DMC Alert signs in county	5	S,A,P 3	1	9	B	1

Appendix I – Summary Action Plan

See full tables in Section C5-b.

2025	Des Moines County Action Summary			
Item #	**Activity**	**Hazards mitigated**	**Affected Jurisdictions**	**Score**
Structure & Infrastructure				
Action 1	Equip critical facilities and community shelters to accept generators, by hard-wiring or install fixed generators	Extreme Heat, Severe storms,Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools	10 A
Action 2	Facilitate the funding, installation and improvement of public and private shelters and safe rooms	Extreme Heat, Severe storms,Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools	12 A
Action 3	Improve physical security measures at emergency response facilities, critical facilities and schools	Terrorism	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, Iowa Army Ammunition Plant, DESCOM, All Schools	6 B
Plans & Regulations				
Action 4	Develop a long-term shelter and evacuation plan	Extreme Heat, Severe storms,Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools	10 A
Action 5	Coordinate with State agencies to improve access to grant funding	All Hazards	All jurisdictions	11 A
Action 6	Develop and implement a Continuity of Government plan	Severe storms, Tornado, Winter weather, Human epidemic, Infrastructure failure	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington	7 B
Action 7	Develop a volunteer call list and procedure to contact vulnerable individuals that might need assistance during or after a major hazard event	Extreme heat, Severe storms,Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington	8 B
Action 8	Establish charging stations for electronics at various locations for use by the public after a disaster	Severe storms, Tornado, Winter weather, Infrastructure failure	Cities of Burlington, Danville, Mediapolis, Middletown, West Burlington	7 B
Action 9	Develop Memoranda of Understanding (MOUs) with private sector gasoline service providers to prioritize fuel supplies for emergency vehicles	Severe storms, Tornado, Winter weather, Infrastructure failure	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington	6 B

Action 10	Encourage utility companies to increase the percentage of cables that are underground	Severe storms, Tornado, Winter weathe, Infrastructure failure	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington	6 B
Action 11	Evaluate water redundancy and ensure water supply networks have sufficient reserve capacity and alternative supply paths.	Drought	Cities of Burlington, Danville, Mediapolis, Middletown, West Burlington	8 B
Action 12	Require any new manufactured housing, mobile home/RV Park to include shelters as part of development	Severe storms, Tornado	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington	10 A
Action 13	Prepare and adopt a stormwater drainage plan and ordinance to implement best practices for stormwater management in affected areas	Flood: Stormwater	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington WB ISD	7 B
Action 14	Improve safety where railroads intersect with roads and trails	Hazardous Materials, Transportation incident	Des Moines County, Burlington, Danville, Middletown, West Burlington	9 B
Action 15	Ensure cooperation with the railway industry to ensure quick response and adequate information regarding number of passengers and type of products being transported.	Hazardous Materials, Transportation incident	DM County and Local Emergency response personnel	9 B
Natural systems				
Action 16	Conduct annual tree maintenance	High wind, Tornado, Wildfire, Winter weather, ACP Disease	Des Moines County, Burlington, Danville, Mediapolis, Middletown, West Burlington	5 C
Action 17	Acquire and remove any structures that remain in the SFHA floodplain	Flood, Dam Failure	SFHA Flood: Des Moines County, Cities of Burlington, Danville, Mediapolis, West Burlington	7 B
Education & Awareness				
Action 18	Conduct hazard awareness programs for citizens and students to teach emergency preparedness	Extreme Heat, Flood, Severe storms (Hail, High wind, Lightning), Tornado, Winter weather, HazMat Incident, Human disease epidemic	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools	7 B
Action 19	Continue fire safety education for adults and children	Wildfire	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools,	5 C

Action 20	Practice drills and train firefighters, responders, and community leaders on effective disaster response	Hail, High wind, Lightning, Tornado, Wildfire, Winter weather, Human epidemic, HazMat	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, All Schools,	8 B
Action 21	Ensure critical services and information is protected from cyber-attacks; educate local officials about cyber security.	Terrorism	All jurisdictions	7 B
5% Projects (a funding category for FEMA)				
Action 22	Equip and train local authorities to improve attack response capability	Terrorism	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, AllSchools	9 B
Action 23	Purchase and install backup generators for critical facilities, including schools and shelters	Extreme Heat, Flood, Hail, High wind, Lightning,Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, Two Rivers L & DD, All Schools	11 A
Action 24	Purchase and Install additional sirens and upgrade existing storm sirens	Severe storms, Tornado	Cities of Burlington, Danville, Mediapolis, Middletown, West Burlington	11 A
Action 25	Promote use of NOAA weather radios	Drought, Extreme heat, Flood, Hail, High wind, Lightning, Tornado, Winter weather, Dam Failure	County EM	7 B
Action 26	Install, upgrade and maintain lightning protection systems for critical facilities	Lightning	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, Two Rivers Levee & Drainage District, DESCOM, All Schools	7 B
Action 27	Obtain an All-Terrain-Vehicle for first responders/ emergency purposes	Flood, Dam Failure, Severe Thunderstorm,Tornado, Winter weather	DM County, Emergency responders for Burlington, Danville, Mediapolis, Middletown, West Burlington	7 B
Action 28	Update current law enforcement and first responder equipment	Terrorism, HazMat incident	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, DESCOM	10 A
Action 29	Acquire wood chipper to quickly handle storm debris.	Severe storms, Tornado, Winter weather	DM County, Burlington, Danville, Mediapolis, Middletown, West Burlington, IAAAP, Two Rivers L&DD	5 C
Action 30	Place Alert Iowa/DMC Alert signs in county parks, along walking/biking trails, etc.	Severe storms, Tornado, Winter weather	Des Moines County	9 B