

Jurisdiction: Wright County Multi-Jurisdictional	Title of Plan: Wright County Multi-Jurisdictional Hazard Mitigation Plan	Date of Plan: January 2013
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Funding Source: HMGP		
State Reviewer:	Title:	Date:
FEMA Reviewer: Steve Greene	Title: HM Community Planner	Date: 08/08/2013
Date Received in FEMA Region VII	08/07/2013	
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved	08/08/2013	

Jurisdiction:	NFIP Status*	
	Y	NP
Unincorporated area of Wright County	Y	
City of Belmond	Y	
City of Clarion	Y	
City of Dows	Y	
City of Eagle Grove	Y	
City of Galt (included with Unincorporated area)		NP
City of Goldfield	Y	
City of Rowan		NP
City of Woolstock		NP

* Notes: Y = Participating NP = Not Participating in NFIP S- Sanctioned R-Rescinded

SECTION 1: REGULATION CHECKLIST

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Chapter 2, pp. 14-22	✓		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Chapter 2, p. 17 (1B) and p. 18 (5c) and pp 19-20 "Meeting Schedules"	✓		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Chapter 2, pp 17-18 (5c), pp19-20 "Meeting Schedules", and pp. 20-21	✓		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Chapter 2, p 19 and Chapter 3, p. 23	✓		
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Chapter 2, p 19 (7C); Chapter 7, p. 57	✓		
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Chapter 2, p. 19 (7) and Chapter 7, pp. 56-57	✓		
ELEMENT A: REQUIRED REVISIONS				

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)

Location in Plan
(section and/or
page number)

Met

Not
Met

ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT

B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))

Chapter 3, pp. 23-47
Appendix A pp. 58-70
Appendix B pp. 100-110
Appendix C pp. 146-169
Appendix D pp. 200-213
Appendix F pp. 247-260
Appendix G pp. 294-308
Appendix H pp. 345-358
Appendix I pp. 382-394

✓

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))

Chapter 3, pp. 23-47
Appendix A pp. 58-70
Appendix B pp. 100-110
Appendix C pp. 146-169
Appendix D pp. 200-213
Appendix F pp. 247-260
Appendix G pp. 294-308
Appendix H pp. 345-358
Appendix I pp. 382-394

✓

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))

Chapter 3, pp. 22-40
Appendix A pp. 58-78
Appendix B pp. 100-121
Appendix C pp. 146-171
Appendix D pp. 200-222
Appendix F pp. 247-270
Appendix G pp. 294-321
Appendix H pp. 345-369
Appendix I pp. 382-404

✓

B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

Appendix M p. 455

✓

ELEMENT B: REQUIRED REVISIONS

ELEMENT C. MITIGATION STRATEGY

C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))

Chapter 1, pp. 10-11 &
Chapter 7 pp. 57

✓

C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

Chapter 1, pp. 11-12

✓

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)

Location in Plan
 (section and/or
 page number)

Met

**Not
 Met**

<p>C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))</p>	<p>Chapter 2 p. 22 Chapter 5 p. 52 Appendix A pp. 81-85 Appendix B pp. 124-128 Appendix C pp. 174-181 Appendix D pp. 224-229 Appendix F pp. 271-274 Appendix G pp. 322-324 Appendix H pp. 370-371 Appendix I pp. 407-412</p>	<p>✓</p>	
<p>C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))</p>	<p>Chapter 5 pp.50-52 Chapter 6, pp. 53-55 Appendix A pp. 79-84 Appendix B pp. 121-128 Appendix C pp. 171-181 Appendix D pp. 221-229 Appendix F pp. 269-274 Appendix G pp. 320-324 Appendix H pp. 368-371 Appendix I pp. 403-412</p>	<p>✓</p>	
<p>C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))</p>	<p>Chapter 4 p. 49 Chapter 5 pp.50-52 Chapter 6, pp. 53-55 Appendix A pp. 79-84 Appendix B pp. 121-128 Appendix C pp. 171-181 Appendix D pp. 221-229 Appendix F pp. 269-274 Appendix G pp. 320-324 Appendix H pp. 368-371 Appendix I pp. 403-412</p>	<p>✓</p>	
<p>C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))</p>	<p>Chapter 7, pp.56-57</p>	<p>✓</p>	

ELEMENT C: REQUIRED REVISIONS

1. REGULATION CHECKLIST

Regulation (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Appendix N, pp. 456-457	✓	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Appendix N, pp. 456-457	✓	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Appendix N, pp. 456-457	✓	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix I p. 434	✓	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Appendix A p.99 Appendix B p. 145 Appendix C p. 198 Appendix D p. 244 Appendix E p. 245 Appendix F p. 292 Appendix G p. 343 Appendix H p. 380 Appendix I p. 434 Appendix P p. 459	✓	
ELEMENT E: REQUIRED REVISIONS			
Written proof that all jurisdictions' governing bodies have formally adopted the plan (usually a resolution) must be submitted to FEMA. See <i>Local Multi-Hazard mitigation Planning Guidance (July 2008) pages 17-18.</i>			
Note: If the plan is not adopted by a participating jurisdiction, that jurisdiction would not be eligible for project grants under the following hazard mitigation assistance programs: HMGP, PDM, FMA, and SRL.			

SECTION 2: PLAN ASSESSMENT

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Plan Strengths

- The plan shows good use of tables for conveying information. See, e.g., pages 10-12. Of particular note is Table 10 which summarizes the regulatory framework of the participating communities.
- The plan author does a very good job of explaining the plan development process, especially summarizing what was discussed at each of the meetings. The level of details provided shows the quality of the discussions the planning committee had in developing their plan.
- The maps highlighted in the plan provide an excellent reference in conveying the potential impacts of the identified hazards.

Opportunities for Improvement

- In future plan updates, the countywide hazards profiled in the plan do not need to be repeated in each of the jurisdiction's appendices. The countywide hazards should be profiled once in the plan. This will help prevent any confusion or conflicting information about the hazards profiled. If there is any community specific information (i.e. a specific type of damage that occurred or unique impact in the community from that hazard) that the planning committees would like to highlight, it is highly encouraged to do so.
- The plan shows an excellent cross-section of representation on the planning committees of the various participating communities. It should be noted, however, that the schools that had representation on the committees will not be eligible for mitigation grant funding unless they are treated as separate participants. This means that the schools must have their own risk assessments, vulnerability analyses, strategy and adoption of the plan. School assets located in SFHAs must be identified.
- For the next plan update, the plan should elaborate on how neighboring jurisdictions were invited to and involved in the planning process. Consider including:
 - The names of the jurisdictions invited to participate
 - The correspondence formally inviting neighboring jurisdictions (letter, email, etc.)
 - Identify which neighboring jurisdictions did participate in the process

B. Resources for Implementing Your Approved Plan

A variety of mitigation resources are available to communities. The Iowa Homeland Security & Emergency Management website: http://www.iowahomelandsecurity.org/disasters/hazard_mitigation.html provides planning and project related information as well as details on how major FEMA mitigation programs are implemented in the State.

HSEMD's training website provides information on upcoming training opportunities within the State: <http://homelandsecurity.iowa.gov/training/>.

Review of the FEMA HMA guidance (FY11 is the most current) is also encouraged as guidance provides information about application and eligibility requirements. This guidance is available from <http://www.iowahomelandsecurity.org/grants/HMA.html> or through FEMA's grant applicant resources page at http://www.fema.gov/government/grant/hma/grant_resources.shtm.

The FEMA Hazard mitigation planning site <http://www.fema.gov/plan/mitplanning/index.shtm> contains the official guidance to meet the requirements of the Stafford Act, as well as other resources and procedures for the development of hazard mitigation plans.

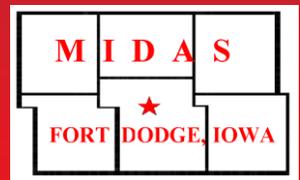
Various funding programs are available from several state and federal agencies to assist local jurisdictions in accomplishing their mitigation activities and goals. A detailed listing of programs, information on each program, and contact information is also available from the 2010 State Hazard Mitigation Plan.

2013

WRIGHT COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN



FEMA



MIDAS COUNCIL OF GOVERNMENTS

1/7/2013

Wright County Multi-Jurisdiction Hazard Mitigation Plan

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Executive Summary

Purpose

The Wright County Multi-Jurisdictional Hazard Mitigation Plan has been created to prepare for and reduce the effects of hazards that may impact the cities of Belmont, Clarion, Dows, Eagle Grove, Galt, Goldfield, Rowan, and Woolstock; as well as the unincorporated area of Wright County. The overall goal of the plan is to protect the people and property of the county from the effects of hazard events including tornadoes, flash flooding, river flooding, severe winter storms, windstorms, hailstorms, thunderstorm and lightning, extreme heat, drought, grass or wildfire, transportation of HAZMAT materials, fixed facilities that manufacture or store HAZMAT, watershed pollution, pipeline incident, energy disruption, terrorism, violent demonstration, disease, structural fire, structural failure, communications failure, transportation event, and air transportation event.

The Wright County Multi-Jurisdictional Hazard Mitigation Plan demonstrates the County's commitment to reducing risks due to hazards, and serves as a tool to help decision-makers facilitate mitigation activities and resources. This plan was also developed to make the county and cities within, eligible for certain federal disaster assistance, specifically the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Program and the Flood Mitigation Assistance Program.

The Wright County Multi-Jurisdictional Hazard Mitigation Plan looks at all aspects of hazard mitigation. The plan is split into seven chapters. These chapters serve as an overview for the plan. The first two chapters give a general background on Wright County and explain the planning process used in the development of the plan. Chapters three through six put the planning process in motion by explaining the specific steps taken to generate each city's risk assessment (3), vulnerability assessment and loss estimates (4), mitigation strategies (5) and action plan (6). The final chapter of the Wright County plan (chapter 7) explains how the plan was adopted and will continue to be maintained.

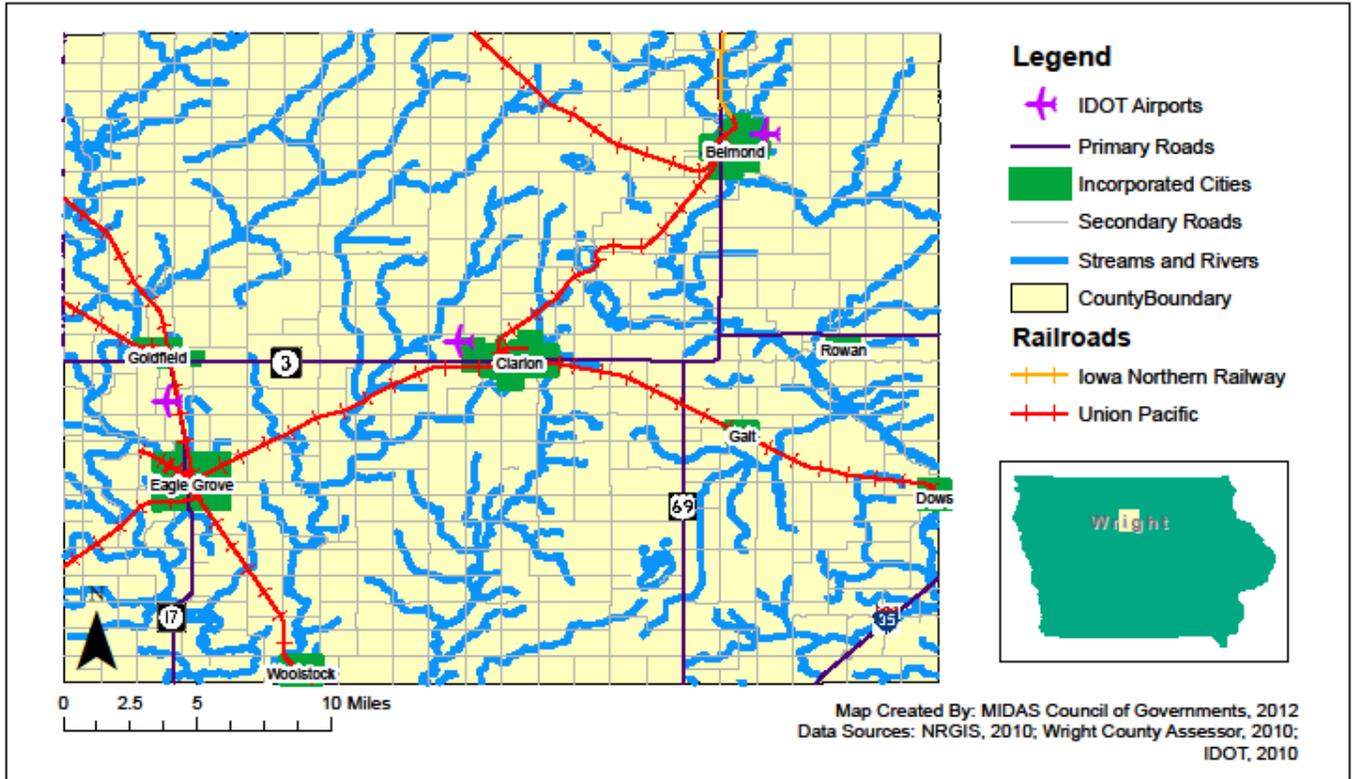
Following the plan's main discourse, appendices A through L articulate the details of each city's hazard mitigation plan outcomes. Sections one through five of each city's appendix explain the city's risk assessment, vulnerability and loss estimates, mitigation strategies, action plan and critical facilities. The remaining sections, (six and seven) display the city's agendas, minutes and sign-ins; and resolutions.

Wright County as well as the cities of Belmont, Clarion, Dows, Eagle Grove, Galt, Goldfield, Rowan, and Woolstock has reviewed the hazard mitigation plan prior to submittal to HSEMD FEMA. Each of these entities has also adopted the hazard mitigation plan and will readopt it if it is deemed necessary after the plan is granted approval by HSEMD FEMA.

Chapter 1: Introduction

Geography

Wright County is located in north central Iowa; Major roads include I35, US Highway 3, Highway 17 and Highway 69.



Wright County is located in the Des Moines Lobe of Iowa. Recent glaciers formed the terrain of north central Iowa. The Wisconsin glacier advanced southward to present day Des Moines, then retreated from Iowa only 12,000 to 14,000 years ago. Where the advance and retreat were rapid, a flat to gently rolling landscape resulted. The poorly drained flats and rich black soils of this youngest region have been extensively tilled and converted to intensive agricultural uses. Below is a map displaying the area of the Des Moines Lobe.



History

Wright County was officially organized in 1855 and was named after Silas Wright and Joseph Albert Wright, who were influential Governors from the States of New York and Indiana; of which States many of the County's earlier settlers migrated from. Prior to its organization, Wright County was part of Delaware, Polk, Boone and Webster County and only consisted of hunters and trappers who traveled in the area. The first settlements began in 1854; of the first settlers were William H. Montgomery, William Stryker and Minter Brassfield, each of which came with their families within a few weeks of one another.

The first election took place in 1855 during the month of August. At this time the original County Seat was established in Eagleville, which was a town that was platted west of present-day Eagle Grove, but never fully built. The Courthouse was located in a log cabin owned by S.B. Hewett, Sr. In 1858 the County Seat was moved to "Liberty", which today is known as Goldfield. The County Seat made its final move in 1865 to Grant, which was chosen for its central location. In June of 1870 the City of Grant was renamed Clarion, which is after Clarion, Pennsylvania.

After the organization of the County Seat in Grant (Clarion), a decision on whether to move the old courthouse from Liberty (Goldfield) to Grant or build a new one could not be reached. The problem was finally resolved in November 1865, when the courthouse committee contracted Perry & Nees to build a two-story, frame building for \$5,600.

Approximately twenty years later, in the 1890 election, the voters approved the building of a new courthouse and jail. Much celebration took place upon approval of this building. The present day courthouse was fully constructed in 1892. The red brick building has since undergone extensive remodeling to the interior and exterior, which was completed in 1974.

Figure 2.2 Wright County Courthouse, Clarion, IA

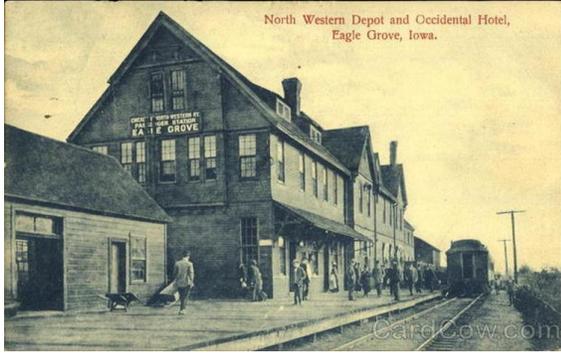


<http://www.iowacourts.gov/wfdata/frame1759-1464/pressrel98.asp>

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The first railroad completed in Wright County was the old Burlington, Cedar Rapids and Northern, which reached Clarion in 1881. A few months later the Chicago & Northwestern road reached Goldfield, having been at Eagle Grove a few months before. A branch of the Iowa Central road was also soon pushed through to Belmont and reached Clarion by August of 1895. By 1915 approximately 120 miles of rail lines ran through Wright County including lines run by Chicago and Northwestern; Chicago and Iowa; Chicago, Rock Island and Pacific and Chicago Great Western.

Figure 2.3: Northwestern Depot, Eagle Grove, IA



1915).

While the construction of the railroad lines greatly aided in the settlement of Wright County, so did the cost of land with good soil. In 1880 Wright County had 785 farms. A majority of which were occupied by the owners who worked them. In 1905 the number of farms went up to 1,688. Since this time the County has developed into an important corn and soybean production area, which is discussed in Chapter 5 of this plan.

The History of Wright County was developed from the History of County Governments in Iowa (Iowa State Association of Counties, 1992) and History of Wright County, Iowa (Birdsall, History of Wright County, IA,

Population and Demographics

According to the 2010 US census, the population of Wright County is currently 13,229.

Table 2: Population of Wright since 1900

Decade	Population	% Change
1900	18,227	--
1910	17,951	- 1.51%
1920	20,348	13.35%
1930	20,216	- 0.65%
1940	20,038	- 0.88%
1950	19,652	- 1.93%
1960	19,447	- 1.04%
1970	17,294	- 11.07%
1980	16,319	- 5.64%
1990	14,269	- 12.56%
2000	14,334	0.46%
2010	13,229	- 5.66%

The table below shows the current population demographic of Wright County.

Table 3: Population Demographics

Age	Number	Percent
Under 18 years	3,086	23.3%
20 to 24 years	592	4.5%
25 to 34 years	1,339	10.1%
35 to 49 years	2,318	17.5%
50 to 64 years	2,820	21.3%
65 years and over	2,769	20.9%

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Economy

Below is a table that shows the economic makeup of Wright County according to the 2007 Economic Census. The table below show the industries present in Wright County, the number of establishments, and the number of employees that each of those industries employ.

Table 4: Employment

Industry	Number of Establishments	Number of Employees
Manufacturing	26	1,096
Health care and social assistance	40	915
Retail trade	65	554
Accommodation and food services	37	242
Professional, scientific, and technical services	24	158
Information	10	147
Administrative, support, waste management, and remediation services	19	125
Other services (except public administration)	30	73
Real estate, rental, and leasing	15	33
Arts, entertainment, and recreation	5	23

www.census.gov (10/25/11)

The top three industrial sectors in Wright County that employ the most people are Manufacturing, Health care and social assistance, and retail trade. The top industrial sectors that have the most number of establishments are Retail trade, Health care and social assistance, and Accommodation and food services.

Table 5, shows the level of income of households throughout Wright County in 1999.

Table 5: Income Levels

Household Income in 1999	Number	Percent
TOTAL Households	5,972	100
Less than \$10,000	500	8.4
\$10,000 to \$14,999	502	8.4
\$15,000 to \$24,999	915	15.3
\$25,000 to \$34,999	944	15.8
\$35,000 to \$49,999	1,231	20.6
\$50,000 to \$74,999	1,271	21.3
\$75,000 to \$99,999	348	5.8
\$100,000 to \$149,999	156	2.6
\$150,000 to \$199,999	44	0.7
\$200,000 or more	61	1.0
Median household income	36,197	

www.census.gov (08/19/09)

Housing

Below are the existing housing conditions in Wright County according to the 2010 Census.

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Table 6: Housing Status

Census Category	2010 Census	Percent
# housing units	6,529	100%
# occupied housing units	5,625	86%
# renter occupied	1,491	23%
# owner occupied	4,134	63%
# vacant housing units	904	14%
# for rent	176	3%
# for sale	119	2%
# occasional use housing	203	3%

Housing Demographics

The table below depicts the housing demographic of owner-occupied housing units in Wright County.

Table 7: Housing Demographics

	Number	Percent
15 to 24 years	64	1.5%
25 to 34 years	369	8.9%
35 to 44 years	556	13.4%
45 to 54 years	843	20.4%
55 to 59 years	509	12.3%
60 to 64 years	395	9.6%
65 to 74 years	635	15.4%
75 to 84 years	545	13.2%
85 years and over	218	5.3%
Total	4,134	100%

Public Utilities & Services

Table 8: Public Utilities

Public Utilities							
	Public Water (yes/no)	Sanitary Sewer (yes/no)	Storm Sewer (yes/no)	Percentage of Community with Storm Sewer	Electric Provider	Gas Provider	Telecommunication Service Provider(s)
Belmond	Y	Y	Y	85%	Alliant Energy	Alliant Energy	Frontier Communications Mediacom
Clarion	Y	Y	Y	100%	Mid American	Mid American	Goldfield Com Mediacom
Dows	Y	Y	Y	100%	Alliant Energy	LP	Various
Eagle Grove	Y	Y	Y	100%	Mid American	Mid American	Goldfield Access, Quest, Woolstock Mutual, Mediacom, DTSnet.
Galt	Y	N	N	0%	Alliant Energy	LP	Various
Goldfield	Y	Y	N	0%	Mid American	Mid American	Various
Rowan	Y	N	N	0%	Alliant Energy	LP	Frontier Communications Keyon Communications
Woolstock	Y	Y	Y	95%	City of Webster City	LP	Woolstock Mutual Telephone Co Goldfield Access
Unincorporated Area	N	N	Tiled	0 %	Various	LP	Various

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Table 9: Public Services

Public Services				
	Fire Protection Provider	Law Enforcement Provider	Hospital (yes/no)	Community Tornado Shelter (yes/no)
Belmond	Belmond Fire Dept.	Belmond Police Dept.	Yes	No
Clarion	Clarion Fire Dept.	Clarion Police Dept.	Yes	No
Dows	Dows Rural Fire Association	Franklin County Sherriff's Dept	In Clarion	No
Eagle Grove	Eagle Grove Fire Dept.	Eagle Grove Police Dept	In Clarion	No
Galt	Clarion Fire Dept.	Wright County Sherriff's Dept.	In Clarion	No
Goldfield	Goldfield Fire Dept	Eagle Grove Police Dept	In Clarion	No
Rowan	Rowan Fire Dept	Wright County Sherriff's Dept	In Clarion and Belmond	No
Woolstock	Woolstock Fire Dept	Wright County Sherriff's Dept	In Clarion	No
Unincorporated Area	City/Township Dept.	Wright County Sherriff's Dept.	In Clarion	No

Regulatory Framework

Table 10: Past Planning

Regulatory Framework							
	Comprehensive Plan (yes/no)	Year Created	Zoning Ordinance (yes/no)	Restricted Residential District (yes/no)	Building Ordinance (yes/no)	Floodplain Ordinance (yes/No)	
Belmond	Yes	2002	Yes	No	Yes	Yes	
Clarion	Yes	2002	Yes	No	Yes	Yes	
Dows	No	N/A	No	No	No	Yes	
Eagle Grove	Yes	2004	Yes	No	Yes	Yes	
Galt	No	N/A	No	No	No	No	
Goldfield	Yes	2006	Yes	No	No	Yes	
Rowan	Yes	2010	No	Yes	Yes	No	
Woolstock	No	N/A	No	No	No	No	
Unincorporated Area	Yes	1997	Yes	No	No	No	

Community Structure

The Wright County Board of Supervisors is the governing body of Wright County. The Board consists of five supervisors who meet weekly at the Wright County Courthouse in Clarion.

Each city's governing body is a Mayor/Council form of government with five person City Councils except Galt which has a 3 person City Council and one Mayor. Each city has a City Clerk and Belmond, Clarion, and Eagle Grove also have City Administrators.

Past Hazard Mitigation Planning

Table 11: Past Hazard Mitigation

Previous State Approved Hazard Mitigation Plans		
	Previous Plan (yes/no)	Year Created
Belmond	Yes	2009
Clarion	Yes	2004
Dows	Yes	2004
Eagle Grove	Yes	2009
Goldfield	Yes	2004
Rowan	Yes	2004
Woolstock	Yes	2004
Unincorporated Area	Yes	2004

Existing Hazard Mitigation Programs

The following list gives a quick overview of mitigation actions or programs that currently are implemented in the County and various Cities”

- Fire Department Services
- Law Enforcement Services
- Region V HAZMAT Team
- Snow Removal
- Emergency Management Services (through the County)
- City Flood Plain Ordinances
- Public Health Clinics

Critical Facilities

Critical facilities are those facilities that are critical to the health and welfare of the population and that are especially important during and following hazard events. Each committee identified the critical facilities in their individual community. The community facilities are shown on the maps in Section 5 of Cities’ Appendices (Appendices A-I).

- Appendix A – Belmond Hazard Mitigation
- Appendix B – Clarion Hazard Mitigation
- Appendix C – Dows Hazard Mitigation
- Appendix D – Eagle Grove Hazard Mitigation
- Appendix E – Goldfield Hazard Mitigation
- Appendix F – Rowan Hazard Mitigation
- Appendix G – Woolstock Hazard Mitigation
- Appendix H – Unincorporated Area of Wright County Hazard Mitigation

NFIP Participation and Continued Compliance

Community participation in the National Flood Insurance Program (NFIP) is voluntary. According to FEMA, nearly 20,000 communities across the United States and its territories participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. The following table shows each community’s NFIP status in Wright County:

Table 12: NFIP Status

National Flood Insurance Program Status		
Wright County - 2011		
City	NFIP Participant? (Yes/No)	NFIP #
Belmond	Yes	190303
Clarion	In Process	N/A
Dows	Yes	190305
Eagle Grove	Yes	190928
Goldfield	Yes	190584
Rowan	No	N/A
Woolstock	No	N/A
Unincorporated Area	In Process	N/A

*There are no repetitive loss properties in Wright County

Climate

The temperatures in Wright County vary greatly from season to season, from very cold winters, to warm, humid, summers. The average high and low temperatures, as well as the average precipitation, of each season are shown below:

Table 1: Average Temperatures

	Spring	Summer	Fall	Winter
Average Temperature	46.3°F	70.8°F	48.3°F	18.2°F
Average Precipitation	3.17 in	4.50 in	2.51 in	0.82 in

Vegetation

The majority of the county was once covered in tall grass prairie interspersed with wetlands, many of which were linked drainage depressions. The root system of the prairie vegetation and the accumulation of rich organic matter from these young hydric soils created deep, dark colored soil, rich in nutrients.

Vegetation today consists of row crop, cattails, bulrushes, bur-reeds, reeds, and sedges. The river beds are lined with trees and there are groves of trees which are made up of oak, hickory, hazel, elm, walnut, butternut and cottonwood.

Rivers and Watershed

Wright County crosses three different watersheds, Upper Iowa, Middle Des Moines, and Boone Watersheds. The specifics of each watershed are laid out below:

Upper Iowa Watershed

The whole watershed covers parts of ten counties, with most of the area located in Hardin, Wright, and Hancock counties. This region of Iowa receives a moderate amount of precipitation and has a humid continental climate. Prior to the installation of subsurface drainage, this region had abundant wetlands, many of which were interconnected prairie potholes, specifically in the Des Moines Lobe. Now a large portion of the region is artificially drained in order to support row crop agriculture. Approximately 98% of this watershed is privately owned with almost 79% in corn and soybean production. There are also over 300 animal feeding operations in the watershed.

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The Upper Iowa Watershed has a drainage area of approximately 932,500 acres or 1,457 square miles. The watershed has over 1,280 miles of streams that supports a diversity of fish and wildlife species. Approximately 118 miles of stream in the Upper Iowa Watershed in central Iowa is designated as a Protected Water Area by the DNR.

Middle Des Moines Watershed

The Middle Des Moines River Watershed contains 1,203,644 acres. Fifteen percent of the watershed is in Pocahontas County, 3.65 percent in Humboldt County, 31.71 percent in Webster County, 3.13 percent in Greene County, 25.24 percent in Boone County, 7.86 percent in Dallas County, 9.03 percent in Polk County, and the remaining 4.37 percent is split between Buena Vista, Clay, Palo Alto, Wright, Calhoun, Hamilton, and Story counties.

Four percent of the watershed is publicly owned, and 96 percent is privately owned. Seventy-five percent of the watershed is in row crop, 6.7 percent is pasture or hay land, 8.8 percent in woodland, natural area, or wetland, 1.2 percent is water, and 8.6 percent is developed or urban areas.

Boone Watershed

The Boone River Watershed is located in the prairie pothole region of the Des Moines Lobe and covers parts of six counties, with most of the area located in Hamilton, Wright, and Hancock counties. Prior to the installation of subsurface drainage, this region had abundant wetlands, many of which were interconnected prairie potholes. Now a large portion of the region is artificially drained in order to support row crop agriculture. Approximately 99% of this watershed is privately owned with almost 90% in corn and soybean production. There are also over 100 animal feeding operations in the watershed.

The Boone River Watershed has a drainage area of approximately 581,186 acres or 908 square miles. The watershed has over 760 miles of streams that supports a diversity of fish and wildlife species, including the federally endangered species Topeka Shiner. Approximately 115 miles of stream length in the Boone River Watershed is designated as a Protected Water Area by the Iowa DNR, most of which is in the lower portion of the watershed. In general, the lower stretch of the river is relatively large and fast moving as it cuts through a steep forested valley. It is often utilized for recreation, such as canoeing, rafting, and fishing. The upper portion of the Boone River and its tributaries are smaller shallower streams with few wooded areas. One of the major threats to this watershed is water quality degradation caused by high levels nitrogen, phosphorus, bacteria and sediment loadings primarily attributed to agricultural practices.

Chapter 2: The Planning Process

Introduction

To develop the Wright County Multi-Jurisdictional Hazard Mitigation Plan Wright County hired MIDAS (Mid Iowa Development Association) Council of Governments to assist in the plan's development. MIDAS followed the scope of work developed by the Iowa Homeland Security Emergency Management Division when developing the plan; this process is listed later in this chapter. Multiple planning staff from MIDAS took part in the planning process and used the following developmental steps in creating this plan.

Organization

As specified by FEMA, the first step in developing a hazard mitigation plan is to organize resources. In following this initial step, MIDAS attended the city council meeting of each incorporated city in Wright County to determine if they wished to be a part of the multi-jurisdictional plan and if so how the city wished to form their hazard mitigation committee. All incorporated cities in the county choose to participate in the plan and be part of the planning process by establishing their own hazard mitigation committee except the Galt who chose to be part of the unincorporated planning committee due to the size of the City. The cities participating included Belmond, Clarion, Dows, Eagle Grove, Galt, Goldfield, Rowan, Woolstock and the unincorporated area of Wright County. The various hazard mitigation committees included members of the community, city officials and employees, emergency personnel, County emergency management, members of the local school district(s), care facilities, local businesses and nearby cities.

Each city's committee members, as well as the unincorporated committee members are listed below (to include people who, at any one time, were present in the plan development practice).

Belmond Hazard Mitigation Committee:

Committee Members	Representing
Frank Beminio	Belmond Police Department, Police Chief
Jeff Zogg	National Weather Service, Senior Hydrologist
Jim Chelesvig	Jaspersen Inst RE, Chelsvig Appraisals – Realator/Appraiser
Jim Lester	Wright County Emergency Manager
Lee Ann Waltzing	City of Belmond City Manager
Mark Bruns	Rowan Fire Chief
Mark Dirks	City of Belmond Public Works Director
Marty Schuman	Sygenta, Plant Manager
Rex Peterson	City of Belmond Mayor
Ron Schachtner	Max Yield Cooperative, Plant Manager
Sid Swenson	City of Belmond City Council Member
Steve Been	Printing Services Inc., President and Owner
Steve Soma	First Gabrielson Agency, Insurance Sales and Agency Manager
Wayne Bruggeman	Belmond Fire Department, Fire Chief

Clarion Hazard Mitigation Committee:

Committee Members	Representing
Bill Kem	Presbyterian Church, Clergy
Brian Marker	Clarion Waste Water Treatment Certified Pool Operator
Bud Young	Sumners Insurance Agency, Agent
Cory Abels	Clarion City Council Member

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David Hill	City of Clarion Fire Chief
Jim Lester	Wright County Emergency Manager
Jim Redemske	Public Works Director
Jon Devries	City of Clarion – Public Works Asst
Mike Nail	City of Clarion, Mayor
Shelley Pohlman	Clarion City Administrator Assistant
Steve Henniger	City of Clarion Police Chief
Tim Fletcher	City of Clarion Water Superintendent
Vicky Boyington	Clarion City Administrator

Dows Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Brian Butt	Citizen of City
Don Lane	Dows City Council Member
Jeanette Wenzel	Dows City Clerk
Linn Larson	Franklin County Sherriff's Office, Chief Deput
Mike Schroeder	Citizen of City
Ray Kracht	Dows City Council Member
Rosanne Beyer	City of Dows, Mayor
Shannon Muhlenbruch	Citizen of City

Eagle Grove Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Bob Johannsen	Rotary Ann
Brian Kelley	Gold Eagle Co-op
Bryan Baker	Eagle Grove Water Superintendent
Carl Steil	Citizen of Eagle Grove
Clay Hansen	Town & Country Insurance
Curtis Nesvold	Eagle Grove Wastewater Superintendent
Gary Schultz	Mount Calvary Ev. Lutheran Church, Pastor
Jeff Clabaugh	AGP
Jeff Dencklau	AGP
Jim Christ	Christ Furniture, Owner
Jim Lester	Wright County Emergency Manager
Jordan Fuller	City of Eagle Grove City Administrator
Kerry Amonson	Airport Commission, Lyle's Ford
Matt Hill	Eagle Grove EMS
Mike Kruger	Eagle Grove City School District, Principal
Mitch Kirkland	Advanced Drainage Systems
Nathan Brockman	Citizen of Eagle Grove
Paul Kuening	Rotary Ann
Ray Kellogg	Mayor of Eagle Grove
Robert Lunda	Eagle Grove Public Works Director
Tom Anderson	Eagle Grove Police Chief

Goldfield Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Andy Miller	Corn LP, Manager
Barb Jergenson	City of Goldfield City Clerk
Craig Carlson	Goldfield City Council Member
Doug Helgevold	Citizen of Goldfield
Jeff Slaikeu	Goldfield Fire Chief

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Jim Lester	Wright County Emergency Manager
Kelly Sorensen	Goldfield Telecom, Job Supervisor
Randy Purcell	Goldfield Public Works Superintendent
Rick Rasmussen	City of Goldfield, Mayor
Steve Whyte	City of Goldfield Council Member
Tom Stevenson	Goldfield Fire Department, Fireman

Rowan Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Berne Ketchum	City Rowan, Mayor
Dale Hollman	Citizen of Rowan
David Eriksen	Rowan Water Superintendent
Eugene Drury	Citizen of Rowan
Harlan Dorenkamp	Farmers Cooperative, Manager
Kay Jacobson	Citizen of Rowan
Larry Heaberlin	Citizen of Rowan
Mark Bruns	City of Rowan Council/Fire Department Member
Nancy Hofmeister	United Church of Rowan, Pastor
Ron Bailey	Citizen of Rowan
Sean Fogarty	Rowan Fire Department, Asst. Chief
Tami Hollman	Citizen of Rowan
Vicki Box	Rowan City Clerk

Woolstock Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Brian Anderson	Woolstock Fire Chief
Bryan Claude	Citizen of Woolstock
Chance Pruismann	Woolstock City Council Member
Conrad Grunwald	City of Woolstock, Mayor
Logan Harrison	Woolstock City Council Member
Mary Weisberg	Woolstock City, Past City Clerk
Pam Gearhart	Woolstock City Clerk
Robin Hamer	City of Woolstock Citizen

Wright County (unincorporated area including Galt) Hazard Mitigation Committee:

<u>Committee Members</u>	<u>Representing</u>
Adam Clemons	Wright County Asst Engineer
Betty Ellis	Wright County Auditor
Bradley Berg	Wright County Health Dept., Environmental Health & Bio Energy
Bruce Linder	Wright County Conservation Director
Bud Young	Sumners Insurance, Insurance Agent
Danny Waid	Wright County Engineer
Debra Johnson	City of Galt
Dennis Bowman	Wright County Economic Development
Jerry Johnson	City of Galt Council Member
Linda Klehm	Wright County Health Dept., Administrator
Lorie Patrick	Wright County Deputy Auditor
Paul Kirstein	Wright County Secondary Roads, Foreman
Paul Shultz	Wright County Sheriff
Sandi Reitz	Galt City Clerk
Stan Watne	Supervisor, Wright County Board of Supervisors
Troy Watne	Wright County Farm Bureau, Farmer

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Each hazard mitigation committee determined the meeting dates and length of the meetings. Some committees established a set day of the month to meet and others scheduled the date of their next meeting at a current meeting. MIDAS moderated all of the committee meetings and was also responsible for recording the meeting's minutes.

The amount of time each meeting lasted depended on the committee. Meetings generally ranged from one to two hours and were typically held in each city's governing building as they are normally handicapped accessible. The total number of meetings held for each committee varied between six to twelve meetings.

MIDAS Council of Governments worked with each city's hazard mitigation committee to develop and write the Wright County Multi-jurisdictional Hazard Mitigation Plan. The city's that participated followed the scope of work by Iowa Homeland Security and Emergency Management listed below. Please note that the City of Belmont and Eagle Grove began the hazard mitigation planning process prior to all of the other cities in Wright County as to develop their own, single jurisdiction plan. Belmont was approved by FEMA on October 9, 2009. Eagle Grove was approved by FEMA on October 31, 2009. These approved plans were then incorporated into the Wright County Multi-Jurisdictional plan, which both the City of Belmont and Eagle Grove have adopted by resolution.

Scope of Work

1. Plan Process:
 - A. Organized a committee to develop the hazard mitigation plan
 - B. Organizations invited to participate in the plan development included:
 - a. Local representatives
 - b. Community leaders
 - c. Business leaders
 - d. Educators
 - e. General public
 - f. Neighboring community leaders
 - g. Hospital/healthcare professionals
2. Community Profile (A-D done county-wide using U.S. Census data, E-F identified at the city level by committee and City Staff)
 - A. Population identification
 - B. Population trend
 - C. Housing and residential development trends
 - D. Commercial/industrial development trends
 - E. Critical facility identification
 - a. Name and function
 - b. Location
 - F. Special flood hazard area
 - a. Identification of residential, commercial, and industrial structures located in the special flood hazard area
 - b. National flood insurance program participation
 - c. Identification of repetitive loss structures
 - d. Identification of national flood insurance program policies in effect
3. Hazard Analysis/Risk Assessment – each committee selected those hazards applicable to their community or area based on the list of hazards identified below. (Note that because this planning process was started prior to the release of the 2010 State of Iowa Hazard Mitigation Plan, that hazard names and definitions were formed from the 2007 State of Iowa Hazard Mitigation Plan.)
 - A. Hazard identification
 - a. Air Transportation Event
 - b. Communications Failure
 - c. Dam Failure

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- d. Drought
 - e. Earthquakes
 - f. Energy Disruption
 - g. Expansive Soils
 - h. Extreme Heat
 - i. Flash Flooding
 - j. Grass or Wild land Fire
 - k. Hailstorms
 - l. Human Disease Incident
 - m. HAZMAT - Fixed Facility
 - n. HAZMAT - Transportation
 - o. Landslide
 - p. Levee Failure
 - q. Pipeline Incident
 - r. Public Disorder
 - s. River Flood
 - t. Severe Winter Storms
 - u. Sink Holes
 - v. Structural Failure
 - w. Structural Fire
 - x. Terrorism
 - y. Thunderstorm and Lightning
 - z. Tornadoes
 - aa. Transportation Event
 - bb. Watershed Pollution
 - cc. Windstorms
- B. Hazard profile – risk assessment – MIDAS conducted research and prepared assessment tables for each committee’s selected hazards. The committee then provided supplemental community-specific information
- a. Hazard definition (profile)
 - b. Hazard description (profile)
 - c. Historical occurrence (risk assessment)
 - d. Probability (risk assessment)
 - e. Vulnerability (risk assessment)
 - f. Maximum threat (risk assessment)
 - g. Severity of impact (risk assessment)
 - h. Speed of onset (risk assessment)
- C. Identification of vulnerable buildings located in hazard areas
- a. Identification of critical facilities
 - b. Critical facilities map(s)
 - c. Identification of special flood hazard area
 - d. Identification of repetitive loss structures
4. Mitigation Strategies – MIDAS provided information regarding a wide-range of possible mitigation strategies. Each committee/community identified current mitigation activities, evaluated mitigation strategies and selected those strategies to be recommended to the appropriate governing body)
- A. Development and identification of local hazard mitigation goals and objectives that focus on reducing the risks from identified hazards
 - B. Development and identification of specific hazard mitigation measures. This includes the development and identification of a comprehensive range of specific mitigation actions and projects that would reduce the effects of each hazard. Also include feasibility, prioritization and potential/probable funding sources
 - C. Development of a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.
 - D. Implementation of hazard mitigation measures. Identification of completed or current hazard mitigation measures.

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5. Public Participation/Comment Period and Public Education
 - A. Prior to the beginning of the planning process, the public was invited to participate in the planning process
 - B. The general public was notified of planning committee meetings and invited to attend or provide input throughout the planning process.
 - C. Upon completion of the Draft Plan, one public participation opportunity took place so the public could offer their input and consider adoption of the plan. In addition, the draft plan was made available for a 30 day-review period.
 - a. The plan was available at the County Courthouse during this period.
 - b. The location of the plan was announced in a publication, which is circulated countywide.
6. Plan Adoption
 - A. Prior to submittal to HSEMD FEMA, Wright County and each of its participating communities held a public hearing to discuss the hazard mitigation plan. Each city's or areas' local representatives, community leaders, business leaders, educators and general public were invited to attend.
 - B. After the public hearing, Wright County and each of its participating communities made a formal adoption of the hazard mitigation plan
7. Plain Maintenance and Review Continuation
 - A. Plan monitoring, evaluation and updates
 - a. The Plan should be reviewed annually to determine program effectiveness; or
 - b. At a minimum, the Plan shall be reviewed and update within 5 years of the date of FEMA approval
 - B. Plan Implementation through Existing Programs
 - a. As deemed appropriate by Wright County and City Governments, this Plan shall be incorporated into existing or proposed development of Comprehensive Plans, Land-Use Plans and the appropriate programs that accompany such
 - C. Continuation of Public Involvement. Process will be established to ensure opportunities for continued public participation
 - a. As part of annual review
 - b. When the Plan is reviewed prior to its 5 year anniversary

Referenced Plans

Plans that were referred to in the process of the planning process:

- Iowa State Hazard Mitigation Plan
- Carroll County Hazard Mitigation Plan
- City of Tripoli Hazard Mitigation Plan
- City of Cylinder Hazard Mitigation Plan
- Black Hawk County Hazard Mitigation Plan
- Jasper County Multi-Jurisdictional Hazard Mitigation Plan
- Gundy-County Multi-Jurisdictional Hazard Mitigation Plan 2012
- 2004 County/City Mitigation Plans
- Belmond and Eagle Grove 2009 Plan

Meeting Schedules

The various cities and the County choose how they would establish their hazard mitigation committee. Some of the entities held a public meeting at the start of the process asking for volunteers to participate in the program. All those organizations listed in the scope of work were invited to the meeting including, local representatives, community leaders, business leaders, educators, general public, neighboring community leaders and hospital/healthcare professionals. Other entities identified individuals/groups which they believed would could contribute to the process and were from the community. Each entity

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tried to get participation from the organizations listed in the scope of work if such entity existed in the community. Also if there was a neighboring cities/counties close by they were invited.

Each incorporated city and Wright County held face to face meetings. Meeting schedules followed that schedule below developed by IHSEMD. Committees were notified of meetings through email and or regular mail. Agendas, minutes and sign in sheets may be found in Section 7 of Cities' Appendices (Appendices A-I). (As official minutes only have to reflect action items taken most of the minutes are brief.)

1st Meeting – With the participating jurisdictions to explain the purpose of mitigation plan, the planning process, composition of the planning committee and getting the public involved. Participating jurisdictions will announce beginning of planning process, formation of the planning committee and invite representatives from business, education, health services, other organizations and the general public to participate in the process. Neighboring communities will also be notified and invited to provide input.

2nd Meeting – Review purpose of mitigation plan, the planning process and public involvement. Establish schedule and agenda for future meetings. Explain hazard analysis/risk assessment process and information needs for next meeting.

3rd Meeting – Review Communities' Profile information. Identify hazards that may impact communities.

4th Meeting – Hazard analysis/risk assessment. Review information regarding the hazards (planners will provide data and preliminary worksheet based on planner research and information gathered with the assistance of the community and County EMC.) Select hazards to include in the plan. Conduct hazard analysis/risk assessment following Iowa Hazard Analysis Risk Assessment (HARA) guidelines: <http://www.iowahomelandsecurity.org/Partners/CountyCoordinators/Planning/tabid/108/Default.aspx>

5th Meeting – Complete HARA and Identify Mitigation Strategies. Planners will provide a draft HARA prior to meeting to each committee member and to the City for public review. Review HARA draft, modify (as necessary) and "rate" hazards using a scale consistent with the one contained in the Iowa HARA guidance. Rank hazards. Identify goals and objectives. Identify possible mitigation measures.

6th Meeting – Discuss current mitigation activities. Select mitigation measures for further review and evaluation. Evaluate mitigation measures using STAPLEE process. Review includes identifying primary responsible party, estimated cost, and implementation timeline. Select mitigation measures to recommend to the City. Identify measures requiring further review.

7th Meeting – Select mitigation measures to recommend to the City. Prior to the meeting, planner will provide committee members a Draft Goals-Objectives-Mitigation Strategy Section for their review and comment. Modifications provided by the City and committee members prior to the 6th Meeting will be incorporated into a revised draft. Review draft, modify (as necessary), and select.

8th Meeting – Public meeting. Community adopts Plan. Upon completion of draft revisions, the planner will provide a revised draft to committee members. The Community will announce a revised draft is available for review and comment by the public. The committee will review and modify the Plan if necessary. The Community will forward requested changes. At least one month prior to the scheduled public meeting, the planner will provide a complete draft of the Local Hazard Mitigation Plan. The Community will announce the plan is available for review prior to the scheduled public meeting.

Public Involvement

The public was welcome to participate in the planning process and attend the hazard mitigation meetings at any time during the development of the hazard mitigation plan. Committee meetings were open session meetings, as required by the Code of Iowa, and anyone that wanted to participate was welcome. ("Open session" means a meeting to which all members of the public have access.) Many cities posted

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notice of meetings prior to each meeting. All meetings were in compliance with Chapter 21 of the Code of Iowa.

The hazard mitigation plan was discussed during various city council and county supervisor meetings, which are conducted in compliance with the Iowa Open Meeting Law – Iowa Code, Chapter. The minutes from city council and county supervisor meetings are also published and made open for the public.

Various hazard mitigation committees sent out surveys and held a public during the strategic planning process to gather further public input.

Before submitting the plan to FEMA for review, the county supervisors held a public meeting prior to adopting the plan. The public meeting was published in the three county newspapers and a draft copy of the plan was available to the public at the County Courthouse and on the MIDAS Council of Government website www.midascog.net for review and comment.

Hazard Identification

The planning process for this plan began prior to the release of the 2010 State of Iowa Hazard Mitigation Plan; therefore, the hazards identified were consequent to the 2007 State of Iowa Hazard Mitigation Plan, as well as other hazard mitigation plans previously approved by FEMA. The list of potential hazards was taken before each committee along with data of past recorded natural hazard incidents. The committees removed those hazards which the committee identified as not pertaining to their community. The remaining hazards were assessed and were used to develop pertinent actions based on each community's needs, as explained in further detail in the following pages.

Risk Assessment

Upon hazard identification that could impact their area, each community ran a risk assessment of those hazards. The risk assessment is an analysis where committee members give each hazard a rating based on its historical occurrence, the probability that it might occur, the vulnerability of the community to the hazard, the maximum area at threat, the severity of impact and the speed of onset. The higher rating a hazard is given, the higher risk the community is at being impacted by the hazard. More details on the risk assessment are discussed in Chapter 3 of this plan.

Goal Setting

Establishing hazard mitigation goals and objectives for each community is important to gain an understanding of the types of actions that each community should focus on. Committees were given the option to establish their goals using one of two approaches. The first approach consisted of a bottom-up approach where goals and objectives were created using the mitigation actions that the committee developed. The other approach was to use a top-down tactic, where the committee determined their overall hazard mitigation goals, then worked down to establish more specific objectives and even more specific mitigation actions. Each community's hazard mitigation goals are displayed in Section 3 of their referenced appendix (Appendices A-I).

Possible Mitigation Actions

MIDAS provided information regarding a wide-range of possible mitigation strategies that each city could potential implement to mitigate the effects of specific hazards to include the "Mitigation Ideas" tool from FEMA-R5, 9/02. In developing these strategies, or actions, the committee's identified mitigation activities their community was currently participating in, evaluated potential mitigation strategies and selected those strategies that they believed should be recommended to the County.

Action Plan

Once potential mitigation strategies were established, they were analyzed for feasibility using the STAPLEE, discussed in Chapter 5 of this plan. Based on this feasibility, a priority was given and an Action Plan was developed for each strategy. The Action Plan outlines details for the implementation of each strategy including start dates, estimated costs, potential funding sources, completion dates, etc. Each community's Action Plan is displayed in Section 4 of their referenced appendix (Appendices A-I).

Chapter 3: Risk Assessment

The Hazard Risk Assessment was completed to gain an understanding of how each hazard currently impacts or could potentially impact the unincorporated area of the County. The risk assessment was completed by each hazard mitigation committee and was based on the historic data provided.

All committees reviewed the hazards identified in the 2007 Iowa Hazard Mitigation Plan displayed below:

- Agro-terrorism
- Air Transportation Event
- Animal/plant/crop Disease
- Biological Terrorism
- Chemical Terrorism
- Communications Failure
- Conventional Terrorism
- Cyber Terrorism
- Dam Failure
- Drought
- Earthquake
- Enemy Attack
- Energy Failure
- Expansive Soils
- Extreme Heat
- Flash Flooding
- Grass or Wild-land Fire
- Hailstorm
- Hazardous Materials Incident - Fixed
- Hazardous Materials Incident – Transportation
- Highway Transportation Incident
- Human Disease Incident
- Human Disease Pandemic
- Landslide
- Levee Failure
- Pipeline Transportation Incident
- Public Disorder
- Radiological Incident – Fixed
- Radiological Incident - Transportation
- Radiological Terrorism
- Railway Transportation Event
- River Flood
- Severe Winter Storm
- Sink Holes
- Structural Failure
- Structural Fire
- Thunderstorm and Lightning
- Tornado
- Waterway Incident
- Windstorm

Some committees combined some of the hazards and some added additional hazards.

Five communities added Watershed Pollution as a hazard they wished to address.

Those hazards that the various planning committees determined were not a threat were removed from that community's list of hazards.

All Committees identified the hazards below as not a threat to their committee and removed them from the plan these hazards will not be discussed in the individual appendixes.

- **Animal/Plant/Crop Disease:** IHSEMD defines Animal/Plant/Crop Disease as an outbreak of disease that can be transmitted from animal to animal or plant to plant. Since the DNR regulates such situation it was removed from consideration. (The City of Goldfield completed a risk assessment on this hazard but it had such a low score they removed it from consideration.)
- **Dam Failure:** According to the Iowa DNR, there is only one dam in Wright County. The Dam is a low-head dam, approximately 5 feet in height and located on the Boone River. The City of Goldfield owns the structure, and according to the City's hazard mitigation committee and the DNR, the dam no longer functions therefore, failure of such dam would result in little-to-no impacts to the City or downstream. Based on the functioning status of the Goldfield Dam, which is the only dam in Wright County, it was determined that Dam Failure would not be a threat to the County.

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- **Enemy Attack:** The hazard mitigation committees did not see enemy attack as an issue due to the size and/or location of the cities and the County.
- **Landslide:** Commonly occur in areas where steep slopes exist and are the result of soil erosion that causes the unstable soils to suddenly propel downward along a slope, typically wiping out anything in its path. Because very few slopes are present within the County, the hazard mitigation committees determined that landslides are not a great threat. (The City of Goldfield completed a risk assessment on this hazard but it had such a low score they removed it from consideration.)
- **Levee Failure:** According the representatives of Wright County and the USACE National Levee Database there are no levees in the county (see list of levees in Appendix O). Due to the lack of levees the county, the hazard mitigation committees decided to remove levee failure from further consideration in the plan.
- **Radiological Incident Fixed:** There are no sites in the County which house radiological materials.
- **Radiological Incident - Transportation:** There have been no known occurrences of radiological transportation incidents in the County.
- **Sink Holes:** Generally sink holes occur in areas where mining or erodible soils are present which are not a concern in the County therefore, sink holes were considered irrelevant.
- **Waterway Incident:** A waterway incident is an accident involving any water vessel that threatens life and/or adversely affects a community's capability to provide emergency services. The only waterways navigable for commercial purposes in Iowa are the Mississippi and Missouri Rivers neither run through Wright County.

Committees also reviewed the various hazard data was provided to committee members as part of the review process including:

- Data from the 2007 Iowa Hazard Mitigation Plan
- National Climatic Data Center
- Committee member information
- 2004 County Mitigation Plan
- Army Corp of Engineers National Levee Database
- DNR Hazardous Spill Summary Report

A majority of the historical event data stems from the National Climatic Data Center (NCDC) historic data provided in Appendix M. The NCDC data has various limitations in that it is only a partial record of significant events. Some information may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc.; which is not always verified by the NWS. Therefore accuracy or validity is not guaranteed, further only lightning data included are those events that result in fatality, injury and/or property and crop damage. (NOAA, 2012)

Each committee used the above resources to rate hazards in a risk assessment, which establishes a rating system for hazards based on historical occurrence, the probability that it might occur in the future, the vulnerability of the community to the hazard, the maximum area at threat, the severity of impact and the speed of onset. While the committees used the NCDC and IDNR data as a baseline for historic recollection, the committee ultimately scored each element as they saw most appropriate/accurate to their community.

Upon determining which hazards each committee would address in the plan, the committee's ran a risk assessment of the hazards identified based on the information available for each hazard. The risk assessment was done by giving each potential hazard a rating based on its historical occurrence, the probability that it might occur, the vulnerability of the community to the hazard, the maximum area at threat, the severity of impact and the speed of onset. Each hazards risk was determined using the

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scoring for each element as described in the following tables. (Where there was an overlap in description occurrences than range for the overlap would be “from the # + occurrences to up to the # of occurrences” i.e. 2+ - up to 4 then 4+ up to 6 etc.).

Historical Occurrence: Number of times that a hazard has occurred in the community within the last 20 years	
Score	Description
1 point =	less than 2 occurrences
2 points =	2-4 occurrences
3 points =	5-6 occurrences
4 points =	7-9 occurrences
5 points =	10 or more occurrences

Probability: Likelihood of the hazard occurring		
Score	Description	
1 point =	Rare	Less than 10% probability in the next year
2 points =	Unlikely	10% to 25% probability in the next year
3 points =	Possible	26% to 75% probability in the next year
4 points =	Likely	Between 76% and 99% probability in the next year
5 points =	Highly Likely	100% chance in the next year

Vulnerability: Measure of the percentage of people and property that would be affected by the hazard	
Score	Description
1 point =	Negligible: Less than 10% of people and property affected
2 points =	Minimal: 10-25% of people and property affected
3 points =	Limited: 26-50% of the people and property affected
4 points =	Critical: 51-75% of the people and property affected
5 points =	Catastrophic: More than 75% of people and property affected

Maximum Threat: Spatial extent of the community that might be impacted	
Score	Description
1 point =	Less than 10% of spatial community impacted
2 points =	10-25% of spatial community impacted
3 points =	26-50% of the spatial community impacted
4 points =	51-75% of the spatial community impacted
5 points =	More than 75% of spatial community impacted

Severity of Impact: Assessment of the severity in terms of fatalities, injuries, property losses, and economic losses	
Score	Description
1 point =	Few if any injuries or illness, minor quality of life lost with little or no property damage. Brief interruption of essential facilities or services for less than four hours
2 points =	Minor injuries or illness, limited impact on quality of life and some property damage which does not threaten structural stability, slight interruption in essential services.
3 points =	More serious injuries or illness, minor or short term property damage which does not threaten structural stability, shutdown of essential services for 24 hours or more
4 points =	Serious injury or illness, major or long term property damage which threatens structural stability, shutdown or essential services and facilities for 24-72 hours.
5 points =	Multiple deaths, property destroyed or damaged beyond repair, complete shutdown of essential facilities and services for 3 days or more.

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Speed of Onset: Potential amount of warning time available before the hazard occurs	
Score	Description
1 point =	More than 24 hours warning time
2 points =	13-24 hours warning time
3 points =	6-12 hours warning time
4 points =	5 or less hours warning time
5 points =	Minimal or no warning time

Using the committee’s recollection of each hazard’s six elements, the ratings were recorded using the table displayed below:

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Severe Thunderstorm and Lightning	1	1	1	1	1	1	
	2	2	2	2	2	2	
	3	3	3	3	3	3	
	4	4	4	4	4	4	
	5	5	5	5	5	5	

After all of the hazards were given a rating based on the six elements, the risk assessment score was totaled. High scores indicated a high risk of the hazard, while low scores indicated a less significant risk. The risk assessment results were reviewed by the committee; changes were identified and discussed based on the committee’s judgment. The results of the risk assessment give the planning committees an idea of those risks that could potentially have a great impact on their community, which could assist the committee in addressing such hazards with pertinent mitigation strategies or actions.

A summary of each communities’ hazard ratings as an average for the entire County are listed by hazard in the following table. A detailed risk assessment results and deliberations are presented in Section 2 of each City’s referenced appendix (Appendices A-I).

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Average County Risk Assessment Results								
Scope*	Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total
C	Severe Winter Storms	5	5	5	5	3	3	25
L	Energy Failure	4	5	4	5	2	5	25
C	Thunderstorm and Lightning	5	5	3	4	3	4	24
L	Flash Flooding	5	4	4	3	3	4	23
C	Tornados	2	3	4	4	4	5	23
C	Windstorm/High Wind	5	5	3	4	2	4	22
C	Hailstorms	4	4	4	4	2	5	21
L	Communications Failure	2	3	4	4	2	5	19
L	Structural Fire	4	4	1	1	3	5	19
L	HAZAMAT – Fix Facility	3	3	3	3	3	5	19
L	HAZMAT – Transportation	2	3	2	3	3	5	18
L	River Flooding	4	4	3	3	2	3	18
C	Earthquake	1	1	3	5	3	5	18
L	<i>Bioterrorism/Chemical</i>	1	2	1	5	4	5	18
L	<i>Highway Transportation Event</i>	4	5	1	1	2	5	18
C	Watershed Pollution	3	4	2	2	2	5	18
L	Terrorism	1	2	2	3	4	5	17
L	Transportation Incident	3	3	2	2	2	5	16
L	<i>Rail Transportation Event</i>	1	3	2	2	3	5	16
C	Extreme Heat	4	4	2	3	2	1	16
L	Pipeline Incident	1	2	2	2	2	5	15
C	<i>Human Disease Pandemic</i>	1	2	4	4	3	1	15
L	Structural Failure	2	3	1	1	2	5	15
C	Human Disease	2	2	3	3	3	1	14
L	<i>AgroTerrorism</i>	1	2	1	2	2	5	13
L	Grass or Wild land Fire	2	2	1	1	1	5	12
C	Drought	2	2	3	3	2	1	12
L	<i>Air Transportation Event</i>	1	2	1	1	2	5	12
L	Natural Gas	1	1	1	1	3	5	12
L	Expansive Soils	2	2	2	1	1	3	11
L	Public Disorder	1	1	1	1	1	5	10
L	<i>Conventional Terrorism</i>	1	1	1	1	1	5	10

*Area generally impacted by hazard: C-Countywide Impacts, L-Local Impacts

According to the average results of the countywide assessment, the major County-wide risks include Severe Winter Storms, Thunderstorms and Lightning, Tornados, Windstorms and Hailstorms. All of which are very common events in the State of Iowa. Each of the County-wide hazards and the County's

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average overall rating are reviewed in the following tables. Those hazards with local impacts are discussed in each City's portion of this plan, located in Appendices A-I.

Hazard	Severe Winter Storms
Location	Severe winter storms can occur anywhere within the planning area.
Historical Occurrence	Historical data provided by the National Climatic Data Center (NCDC) is presented in Appendix L; this data shows there have been multiple winter storm events reported in Wright County each year. Based on this it was estimated there being more that 10 severe winter storms having had impacts on the unincorporated area in the last 13 years.
Probability	<p>Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. The snow season normally extends from late October through mid-April but significant snows have fallen as early as September 16 (1881) to as late as May 28 (1947). The average number of days per season with snow cover one inch or deeper varies from about 30 days along the Missouri border to around 85 days along the Minnesota border. In about half of all winters, the State of Iowa experiences at some location a daily snowfall of five to six inches or more is recorded in snowiest months, averaging about seven inches each. However, late winter and early spring storms in March and April have produced as much as 27 inches of snow in a single storm and 24-hour amounts have reached 24 inches. The snowiest winter of record (since 1887-1888) was 1961-1962 with a statewide average of 59.0 inches while the lowest State average, only 11.9 inches, occurred in the winter of 1965-1966.</p> <p>Based on the above information and common knowledge; there is nearly a 100% chance that there will be severe winter storms that will occur throughout Wright County.</p>
Vulnerability	Everyone is vulnerable to winter storms as it affects everyone throughout the area. Everyone has hazardous driving conditions in the event of a storm, everyone must suffer through the bitter cold in the event of extreme cold, and it's possible for a roof to collapse due to heavy buildup of snow. However; again, like all of the other hazards, the elderly are the most susceptible to having problems. If elderly people need medical attention during blizzard emergency vehicles may not be able to get to them in time.
Maximum Threat	Because winter storms are a regional event, the entire county would be impacted.
Severity of Impact	Severe winter storms can hinder travel and slow emergency response as well as cause concern in the event of a power outage. Blowing snow can also decrease visibility on the roads as well as cause snow drifts which can vary in height, from a few feet, to being able to block entire roadways. Injuries are mostly due to either exposure or vehicle incidents on the hazardous roadways.
Speed of Onset	With weather spotters and radar equipment is likely that the county would get 6-12 hours warning time in the case of a severe winter storm.

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Hazard	Thunderstorm and Lightning
Location	Thunderstorms generally affect an entire area or region; therefore, if a thunderstorm event were to occur, a majority of the County would be exposed to the event.
Historical Occurrence	The NCDC historical data (Appendix L) shows multiple thunderstorm wind events in Wright County each year. Based on this data and the fact that thunderstorms and lightning are a common occurrence in the Midwest, it was determined that more than 10 thunderstorms and/or lightning strikes have been experienced in Wright County in the last 13 years.
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The central area of the United States is home to some of the most severe thunderstorms in the world. About 85 percent of Iowa thunderstorms occur between April and September, with most storms occurring during the month of June. Based on the events having been reported relating to thunderstorm winds, it was determined that there is nearly a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	While thunderstorms and their accompanying lighting are a regional event, the committee determined that 26-50% of the population of the County is susceptible to retaining damages due to thunderstorms and/or lightning. The vulnerability is dependent on the extent of the storm; under an average scenario a thunderstorm and lighting event would impact less than half of residents & structures.
Maximum Threat	While it was estimated that on average, impacts would be felt by 26-50% of residents and structures, 51-75% of the spatial extent of the County would directly impacted, as some areas of the County may experience a greater intensity of thunderstorm than others.
Severity of Impact	While the hazard mitigation committee determined that a majority of thunderstorm and lightning events may cause minor injuries; they determined that some property damage, which generally does not impact structural stability could occur and power outages for specific of the County could last for more than 24 hours.
Speed of Onset	Overall, it was determined that the County's residents have 5 hours or less warning time that a major thunderstorm event will occur.

Hazard	Tornados
Location	The location of a tornado may occur anywhere within Wright County.
Historical Occurrence	The majority of communities have not seen a tornado occur within their City in the last 13 years, there may have been sitings of funnel clouds or such event nearby; however, on average only about 2-4 tornados have substantially impacted the County, none of which caused impacts to the entire extent.
Probability	Based on the average responses, it is possible that a tornado will affect the county in the next year; they determined there is between a 26-75% chance in the next year.
Vulnerability	The vulnerable population of the County depends on the tornados path; however, if an incorporated area of the County were impacted, there is a chance that 51-75% of the population could be impacted.
Maximum Threat	Similar to the vulnerability; approximately 51-75% of the County's population could be impacted by a tornado.
Severity of Impact	If a tornado were to hit anywhere within the County, it would cause serious injury, and damage the structural stability of any buildings that it comes into contact with.
Speed of Onset	There is minimal or no warning time for tornados in Iowa.

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Hazard	Windstorms
Location	The location of Windstorms may occur anywhere within Wright County.
Historical Occurrence	According to the NCDC, multiple high wind events and multiple thunderstorm wind events have been recorded in each year. Based on this data it was estimated that windstorms have occurred more than 10 times within Wright County in the last 13 years.
Probability	The majority of hazard mitigation committees determined that it is highly likely that a windstorm will occur in the next year, as they accompany multiple events, such as winter storms, thunderstorms, hailstorms, tornadoes, etc.
Vulnerability	It was determined that on average approximately 26-50% of the people and property in Wright County are affected by windstorms. Most concerns are for falling limbs and power outages, which generally impact specific areas.
Maximum Threat	Due to the total amount of people being affected by windstorms, it was estimated that the spatial area of people affected would be from anywhere between 51%-75%.
Severity of Impact	The hazard mitigation committee decided that there would be minor injuries and slight property damage due to windstorm. There could also be an interruption in electrical service, which does not usually last long.
Speed of Onset	Recent technology gives weather reporters the capability to give some warning time; however, depending on the event a windstorm accompanies, it was determined that people have 5 hours or less warning.

Hazard	Hailstorms
Location	Hailstorms have the potential to affect any area within Wright County.
Historical Occurrence	According to data collected from the NCDC (Appendix L), there have been multiple hailstorm events recorded in Humboldt County, with some even occurring in the same year. While the specific event has occurred multiple times, there have only been about 7-9 major occurrences in the last 13 years that have had major impacts on areas of the County.
Probability	Hailstorms that take place in Iowa occur most frequently in May; however, most crop damage due to hail occurs in July when crops are more susceptible to damage. Hail losses are greatest in the northwestern part of the state, due to the severity and frequency of such events. Based on this statement and the historical occurrence of significant hail events in Wright County, it was determined that it is likely that a hailstorm could occur within the County in any given year.
Vulnerability	All facilities and buildings are exposed to hailstorms. It was determined that on average approximately 51-75% of people and property are impacted throughout the County.
Maximum Threat	Spatially, communities felt that 51-75% of their spatial extent would experience a hailstorm.
Severity of Impact	If directly exposed to a hailstorm, a person may be at risk of serious injuries, which would make the rating a 3; however, because a hailstorm wouldn't generally cause a shutdown of essential facilities for a long period of time, it would be rated at 1. Because all buildings are exposed to hailstorms, it was determined that short-term property damage would occur; therefore, a rating of 2 was given for severity of impact.
Speed of Onset	Hailstorms are very difficult to forecast, therefore there would be minimal or no warning time.

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Hazard	Earthquake
Location	An earthquake would most likely impact the entire County.
Historical Occurrence	No data was available for earthquakes having impacted Wright County are known.
Probability	Because there have been no instances where an earthquake has occurred, it was determined that it is highly unlikely one will impact the County.
Vulnerability	Because the closest fault line is in southern Missouri, impacts would be minor, and only about 26-50% of the population would feel the event.
Maximum Threat	While impacts would be limited, a wide area of the County would feel an earthquake, most likely the entire spatial extent.
Severity of Impact	While the nearest fault line to Wright County is in Missouri, due to this distance it is anticipated that the only impacts felt would be a minor shake. However, a major, unexpected event could cause more substantial impacts.
Speed of Onset	Earthquakes occur with little warning.

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in the County.
Historical Occurrence	Much of the watershed pollution that might occur within the County would most likely be due to nonpoint source pollution. A probable cause for this type of pollution would be the runoff of pollution that would flow into nearby water sources. While it is difficult to measure the number of times this kind of pollution occurs, it was estimated that there have been 5-6 events of the hazardous spills that affected the County's waterways.
Probability	It is likely that watershed pollution will occur, as there are two main tributaries that flow through the County: the Boone River and the Iowa River.
Vulnerability	While watershed pollution may occur, its impacts would only be to those who use the water sources that are impacted, based on this it was estimated that only about 10-25% of the County would be impacted.
Maximum Threat	Similar to the vulnerability, only 10-25% of the County's spatial extent would experience impacts.
Severity of Impact	Since DNR monitors the water quality, it is estimated that only minor illness would occur. No property damage would be experienced.
Speed of Onset	There is minimal to no warning time of when a watershed reaches that critical pollutant level, there is a point where the water may not be dangerous, and then it breaches that point to make it dangerous.

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Hazard	Extreme Heat
Location	Extreme heat occurs throughout the entire area of Wright County.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; a few extreme heat events have been recorded for having occurred in Wright County; however, their measure of extreme heat may be different from that defined within IHSEMD's definition of Extreme Heat. Therefore, on average there have been approximately 7-9 major events since 2000.
Probability	On average, it was determined that there is between a 76-99% chance that extreme heat will happen in any given year.
Vulnerability	During extreme heat approximately 10-25% of the population is affected. Only individuals without air conditioning or fans, or those who work outside feel specific impacts.
Maximum Threat	Spatial extent of extreme heat usually covers a very large area; however, certain areas see greater impacts than others; therefore it was determined that, on average, 26-50% of the spatial extent is impacted.
Severity of Impact	Although a heat event would affect a lot of people, the impacts felt would be minor, unless directly exposed. There may be a slight shutdown of services and some minor injuries or illness due to heat.
Speed of Onset	The forecasters can usually predict when there is going to be long stretches of high heat, therefore the warning time would be greater than 24 hours notice.

Hazard	Human Disease <i>Human Disease Pandemic</i>
Location	When disease takes hold in a region it is hard to locate a certain geographic location, although many times the incidents will be more concentrated in and around communities.
Historical Occurrence	Historical instances of human disease such as contaminations, epidemics and plagues have rarely occurred within the Wright County. In recent years it was estimated that only 2-4 instances have occurred.
Probability	The hazard mitigation committee determined that it was unlikely that human disease would be experienced within the County in the next year.
Vulnerability	While structures would not be impacted, it was estimated that on average 26-50% of the population could be impacted in most communities.
Maximum Threat	Spatially it was determined that outbreaks would stay within populated areas; with that, on average about 26-50% of the spatial extent would be impacted.
Severity of Impact	Impacts would be minimal to property; however, multiple residents could be impacted whether it is family friends or other acquaintances. Based on this, it was determined that while multiple illnesses would occur; no structures would be damaged.
Speed of Onset	As soon as a contamination, epidemic or plague is suspected, residents are warned to take cover; therefore, there is generally more than 24 hours of warning.

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Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire county would be in a Drought.
Historical Occurrence	There are three recorded occurrences of droughts in the NCDC Database since 2000. Based on this it was determined that 2-4 occurrences have taken place.
Probability	Based on past data and most recent impacts due to a drought, it was determined that it is unlikely that another drought could occur in the next year.
Vulnerability	The most vulnerable to a drought situation are crops, livestock and agriculture. It was estimated that 26-50% of the property could be affected in some way.
Maximum Threat	As drought mostly affects agriculture spaces; which would generally account for 26-50% of the spatial area of the County that could not withstand such hazard.
Severity of Impact	Although a drought would have a major impact on the economy, no illnesses or major injuries would result, no structural damages would result. The majority of impacts would be to services, such as wells; and the local economy.
Speed of Onset	The onset of a drought would be very slow; therefore, there would most likely be more than 24 hours warning time.

Hazards Defined

Air Transportation Event

Definition:

Any incident involving a military, commercial, or private aircraft.

Description:

Air transportation is playing a more prominent role in transportation as a whole. Airplanes, helicopters, and other modes of air transportation are used to transport passengers for business and recreation as well as thousands of tons of cargo. A variety of circumstances can result in an air transportation incident. Mechanical failure, pilot error, enemy attack, terrorism, weather conditions, and on-board fire can all lead to an incident at or near the airport. Air transportation incidents can occur in remote unpopulated areas, residential areas, or downtown business districts. Incidents involving military, commercial, or private aircraft can also occur while the aircraft is on the ground.

Communications Failure

Definition:

The widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities or long-term interruption of electronic broadcast services.

Description:

Emergency 911, law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services that rely on communication systems to effectively protect citizens. Business and industry rely heavily on various communication media as well. Mechanical failure, traffic accidents, power failure, line severance and weather can affect communication systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term. If switching stations are affected, outage could be more widespread. (*Iowa Hazard Mitigation Plan, 2007*)

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Drought

Definition:

A period of prolonged lack of precipitation, generally for weeks at a time producing severe, dry conditions.

Description:

There are three types of drought conditions that are relevant to Iowa: Meteorological drought, which refers to precipitation deficiency; hydrological drought, which refers to declining surface water and groundwater supplies; and agricultural drought, which refers to soil moisture deficiencies. Droughts can be spotty or widespread and last from weeks to a period of years. A prolonged drought can have serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months.

Earthquake

Definition:

Any shaking or vibration of the earth caused by the sudden release of energy that may impose a direct threat on life and property.

Description:

An earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the Earth's surface. This shaking can cause buildings and bridges to collapse; disrupt gas, electric, and phone service; and sometimes trigger landslides, flash floods, and fires. The three general classes of earthquakes now recognized are: tectonic, volcanic, and artificially produced.

Energy Failure

Definition:

An extended interruption of electric, petroleum or natural gas service, which could create a potential health problem for the population.

Description:

International events could potentially affect supplies of energy-producing products, while local conditions could affect distribution of electricity, petroleum or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems. If the disruptions are long-term, public shelters may need to be activated to provide shelter from either extreme cold or extreme heat. Stockpiles of energy products eliminate short disruptions, but can also increase the level of risk to the safety of people and property in proximity to the storage site.

Expansive Soils

Definition:

Soils and soft rock that tend to swell or shrink excessively due to changes in moisture content.

Description:

The effects of expansive soils are most prevalent in regions of moderate to high precipitation, where prolonged periods of drought are followed by long periods of rainfall. The hazard occurs in many parts of the Southern, Central, and Western United States. Recent estimates put the annual damage from expansive soils as high as \$7 billion. However, because the hazard develops gradually and seldom presents a threat to life, expansive soils have received limited attention, despite their costly effects. (*Iowa Hazard Mitigation Plan, 2007*)

Extreme Heat

Definition:

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There are different ways to identify the occurrence of extreme heat. Some locations evaluate current and forecast weather to identify extreme heat conditions with site-specific, weather-based mortality algorithms. Other locations identify and forecast extreme heat events based on statistical comparisons to historical meteorological baselines. For example, the criterion for extreme heat conditions could be an actual or forecast daily high temperature that is equal to or exceeds the 95th percentile value from a historical distribution for a defined time period (e.g., the summer or a month-long window centered on the date)

Description:

Extreme Heat is defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year; this is because how hot it feels depends on the interaction of multiple meteorological variables (e.g., temperature, humidity, cloud cover). EHE criteria typically shift by location and time of year. In other words, Boston, Philadelphia, Miami, Dallas, Chicago, San Diego, and Seattle are likely to have different EHE criteria at any point in the summer to reflect different local standards for unusually hot summertime weather. In addition, these criteria are likely to change for each city over the summer. As a result, reliable fixed absolute criteria, e.g., a summer day with a maximum temperature of at least 90 F, are unlikely to be specified.

A prolonged period of excessive heat and humidity. The heat index is a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature. Exposure to full sunshine can increase the heat index by at least 15 degrees. Extreme heat can impose stress on humans and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks. (*Iowa Hazard Mitigation Plan*)

NOAA's National Weather Service Heat Index

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

Likelihood of heat Disorders with Prolonged Exposure or Strenuous Activity

Caution Extreme Caution Danger Extreme Danger

Heat Index (1/28/09)

<http://www.weather.gov/om/heat/index.shtml>

Flash Flooding

Definition:

A flood event that occurs with little to no warning where water levels rise at an extremely fast rate.

Description:

Flash flooding results from intense rainfall over a brief period of time, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding which can reach full peak in only a few

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minutes and allows little or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can roll boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower developing river and stream flooding. (*Iowa Hazard Mitigation Plan, 2007*)

Grass & Wild land Fire

Definition:

A grass or wildfire is an uncontrolled fire that threatens life and property in either a rural or wooded area.

Description:

Grass and wild-land fires can occur when conditions are favorable such as during periods of drought when natural vegetation would be drier and subject to combustibility. In this plan, grass and wildfires also include corn and bean fires.

Fire spreads quickly; there is no time to gather valuables or make a phone call. In just two minutes, a fire can become life-threatening. In five minutes, a residence can be engulfed in flames.

Heat and smoke from fire can be more dangerous than the flames. Inhaling the super-hot air can sear a person's lungs. Fire also produces poisonous gases that cause disorientation and drowsiness. Instead of being awakened by a fire, a person may fall into a deeper sleep. Asphyxiation is the leading cause of fire deaths, exceeding burns by a three-to-one ratio. (*Iowa Hazard Mitigation Plan, 2007*)

Hailstorm

Definition:

A hailstorm is an outgrowth of a severe thunderstorm in which balls or irregularly shaped lumps of ice greater than 0.75 inches in diameter fall with rain.

Description:

Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm carry water droplets to a height where freezing occurs. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants and crops. (*Iowa Hazard Mitigation Plan, 2007*)

HAZMAT – Fixed Facility

Definition:

A hazardous material event taking place at a fixed facility is the accidental release of chemical substances or mixtures during production, storage or handling at a fixed site, which present a danger to the public health or safety.

Description:

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Hazardous substances are categorized as toxic, corrosive, flammable, explosive or an irritant. Hazardous material incidents generally affect a localized area, and the use of planning and zoning can minimize the area of impact. (*Iowa Hazard Mitigation Plan, 2007*)

HAZMAT – Transportation

Definition:

A hazardous materials event related to transportation is the accidental release of chemical substances or mixtures that present a danger to public health or safety as a result of the transport of such materials.

Description:

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Each year, over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or an irritant. Hazardous material incidents related to transportation generally affect a localized area, where the spill or leak occurred. The release of such materials may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment.

According to the Department of Natural Resources (IDNR) since 1995 20 hazardous spill events relating to transportation were recorded to have occurred in the County. A table showing the hazardous material events follows:



Iowa Department Of Natural Resources Hazardous Spill Summary Report

Reported Date	County	Responsible Party	Mode	Type	Land	Air	Ground water	Surface Water	Material Name	Amount	Unit
1/2/2007 08:05	Wright	Gold Eagle Coop			-	-	-	-			
1/10/2002 16:35	Wright	Draves,Robert	Handling And Storage	Petroleum	-	-	x	-	Diesel Fuel	90	gal
1/19/2009 14:02	Wright	Leerar,Danny	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/19/2009 16:30	Wright	Olson,Larry	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/19/2009 13:24	Wright	Jorden Ag Enterprises, Inc.	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/19/2009 13:25	Wright	Jorden Ag Enterprises, Inc.	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/19/2009 14:25	Wright	Bluestem Farms LLC	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/19/2009 16:00	Wright	Swine Graphics Ent	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 08:15	Wright	Nelson,Conley	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 12:18	Wright	White,Michael (2)	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 13:33	Wright	Odland,Brent	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 13:41	Wright	Hazel,Dave	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 14:31	Wright	Hazen,Dave	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 16:15	Wright	CORN LP	Handling And Storage	Petroleum	-	-	x	-	Hydraulic Oil	10	gal
1/20/2009 16:04	Wright	Hill,Dennis	Manure	Ammonia/Ag-related	-	x	-	-	Ammonia	1	unk
1/20/2009 07:37	Wright	Brown, Winick, Graves, atty	Manure	Manure	-	x	-	-	Manure	180	lbs
1/21/2009 16:53	Wright	Iowa Select Farms	Manure	Manure	-	x	-	-	Manure	1	unk
1/22/2009 11:16	Wright	Mennega,Daren	Manure	Manure	-	x	-	-	Manure	1	unk
1/23/2004 08:20	Wright	W-H Coop Oil Co.	Handling And Storage	Petroleum	x	-	-	-	#2 clear diesel	30	gal

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1/24/2002 11:40	Wright	Union Pacific Railroad	RR Incident	Petroleum	-	-	x	-	Motor oil	250	gal
2/6/2004 17:25	Wright	Prairie Energy Cooperative	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil	5	gal
2/18/1998 13:05	Wright	SELECT FARMS,IOWA	Motor Carrier	Petroleum	x	-	-	-	Diesel Fuel		unk
2/25/2008 21:27	Wright	Smith Transportation Company	Transportation	Petroleum	x	-	-	-	Diesel Fuel	90	gal
2/26/2001 11:49	Wright	Unknown	Transformer	Transformer oil/PCB	x	-	-	-	Transformer mineral oil	13	oz
3/2/2005 12:36	Wright	Unknown	Transportation	Petroleum	x	-	-	-	Diesel Fuel	1	unk
3/5/1998 06:30	Wright	INC.,AGP	Railroad	Animal/Veget able Product	x	-	x	-	Soybean Oil		unk
3/7/2007 12:42	Wright	C J Transportation	Transportation	Petroleum	x	-	-	-	diesel	150	gal
3/8/2002 08:30	Wright	Prairie Energy Cooperative	Handling And Storage	Petroleum	x	-	-	-	Hydraulic Oil	1	gal
3/13/2003 12:50	Wright	Farmers Cooperative – Dows	Handling And Storage	Petroleum	x	-	-	-	Diesel Fuel	3	gal
3/18/2002 14:53	Wright	Unknown	Transformer	Transformer oil/PCB	x	-	-	-	Transformer mineral oil	8	oz
3/18/2004 09:30	Wright	ICCC	Handling And Storage	Petroleum	x	-	-	-	Fuel Oil	1	unk
3/21/2001 12:45	Wright	Unknown	Handling And Storage	Inorganic Chemical	x	-	-	-	Mercury	4	oz
4/4/2009 10:11	Wright	Union Pacific Railroad	Handling And Storage	Petroleum	x	-	-	-	Diesel Fuel	4	gal
4/7/2010 16:43	Wright	Prairie Energy Coop.	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil (Non PCB)	5	gal
4/10/1998 21:49	Wright	NATURAL GAS,NORTH ERN	Pipe line	Propane/LP G/Natural Gas	-	-	-	-	Natural gas		unk
4/15/2007 18:25	Wright	Ahrans,Clint	Handling And Storage	Petroleum	x	-	x	-	Diesel Fuel	1	gal
4/17/1995 20:10	Wright	CALKWARF,E ARL	Motor Carrier	Acids/Bases	x	-	-	-	318-18 STARTER LIQUID FERTILIZER		unk
4/19/2002 13:20	Wright	Ag Max Partners Lt	Handling And Storage	Fertilizer Pesticide	x	-	-	-	Surpass	58	lbs
4/20/2009 10:20	Wright	Agvantage FS	Transportation	Fertilizer Pesticide	x	-	-	-	28% liquid fertilizer	1700	gal
4/20/2010 18:32	Wright	MaxYield Coop	Transportation	Fertilizer Pesticide	x	-	-	-	28% nitrogen fertilizer	40	gal
4/24/1996 11:05	Wright	GRAIN,FARM ERS	Motor Carrier	Acids/Bases	x	-	-	-	28 % FERTILIZER /DUAL/SUR PASS		unk
4/26/2000 08:00	Wright	Belmond	Transportation	Other Chemical	x	-	-	-	sludge from wastewater plant	500	gal
4/26/1995 07:44	Wright	COUNTY R.E.C.,WRIG HT	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil		unk
4/30/2003 12:40	Wright	Hagie Manufacturing	Handling And Storage	Petroleum	x	-	-	-	Hydraulic Oil	20	gal

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5/4/2007 08:05	Wright	Johnson,Phil	Transportation	Fertilizer Pesticide	x	-	-	-	32% liquid fertilizer	30	gal
5/5/2005 12:15	Wright	Iowa Select Farms	Manure	Manure	x	-	x	-	Manure	1	unk
5/6/2008 12:57	Wright	Bachman Transport	Transportation	Fertilizer Pesticide	x	-	-	-	28% nitrogen fertilizer	100	gal
5/9/2005 16:00	Wright	Andolino,Mary ellen	Handling And Storage	Petroleum	x	-	-	-	fuel – oil	3	gal
5/9/2008 01:35	Wright	Prairie Energy Coop.	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil – Non PCB Oil	2	gal
5/10/2006 13:00	Wright	Prestage- Stoecker Farms, Inc.	Manure	Manure	x	-	-	-	Manure	10	gal
5/10/1997 11:10	Wright	NW 4 TH AVE, CLARION, IA 50525,405	Motor Carrier	Acids/Bases	x	-	-	-	28% N PLUS FRONTIER HERBISIDE		unk
5/17/2001 15:05	Wright	Custom Made Products	Transportation	Petroleum	x	-	-	-	Diesel Fuel	30	gal
5/21/2005 19:26	Wright	Union Pacific Railroad	Transportation	Animal/Veget able Product	x	-	-	-	Grain	1	unk
5/21/1998 14:58	Wright	CARGILL,	Motor Carrier	Acids/Bases	x	-	-	-	2.5 GALLONS		unk
5/22/2009 15:30	Wright	North Central Coop	Transportation	Fertilizer/Pes ticide	-	-	x	-	Roundup Herbicide	200	gal
5/23/2003 13:16	Wright	Jacobsen,Dav id	Transportation	Fertilizer Pesticide	x	-	-	-	Valor	3	lbs
6/1/2006 13:49	Wright	Prairie Energy Cooperative	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil	25	gal
6/4/1996 13:01	Wright	FARMS,DEC OSTER	Handling Storage Process	Petroleum	x	-	-	-	Diesel Fuel		unk
6/4/1996 08:45	Wright	EAGLE COOP,GOLD	Handling Storage Process	Acids/Bases	-	-	x	-	28 % LIQUID NITROGEN		unk
6/5/2006 09:40	Wright	Prairie Energy Coop.	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil	4	gal
6/9/2004 08:05	Wright	Hillandale Farms	Transportation	Petroleum	x	-	-	-	Diesel Fuel	200	gal
6/11/2002 09:36	Wright	Unknown	Transformer	Transformer oil/PCB	x	-	-	-	Transformer mineral oil	8	oz
6/15/2004 19:27	Wright	Iowa Select Farms	Manure	Manure	x	-	-	-	Manure	3000	gal
6/16/2000 17:59	Wright	Craig Martin	Transportation	Fertilizer/Pes ticide	x	-	x	-	Roundup Herbicide	30	gal
6/21/2007 20:59	Wright	Gold Eagle Coop	Handling And Storage	Petroleum	x	-	-	-	Diesel Fuel	50	gal
6/23/2010 12:34	Wright	Panama Transfer	Transportation	Petroleum	x	-	-	-	Diesel Fuel	5	gal
6/26/2008 23:44	Wright	Gold Eagle Coop	Theft	Ammonia (anhydrous)	x	x	-	-	Anhydrous ammonia	400	gal
6/27/2005 09:20	Wright	Unknown	Handling And Storage	Petroleum	-	-	x	-	Diesel Fuel	1	unk
									Waste Oil	1	unk
6/27/2010 14:30	Wright	Prestage Farms of Iowa	Manure	Manure	x	-	-	-	Manure	1	unk

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7/8/2009 20:45	Wright	City of Clarion	Handling And Storage	Petroleum	x	-	x	-	Diesel Fuel	1	unk
7/11/1996 14:35	Wright	STATE ENGINEERING, TWIN	Handling Storage Process	Acids/Bases	x	-	-	-	FURIDAN 4F (MFG BY FMC)		Unkn own
7/12/2005 16:00	Wright	Prestage-Stoecker Farms, Inc.	Manure	Manure	x	-	x	-	Manure	1	unk
7/27/2009 14:11	Wright	Kum-N-Go	Handling And Storage	Petroleum	x	-	-	-	Gasoline	8	gal
7/30/2007 17:34	Wright	Unknown	Transportation	Fertilizer/Pesticide	x	-	-	-	Round-up Original Max Herbicide	35	gal
7/31/2008 09:50	Wright	North Central Coop	Handling And Storage	Fertilizer Pesticide	x	-	x	-	UAN	0	unk
8/26/2001 10:16	Wright	K & H Coop	Handling And Storage	Fertilizer/Pesticide	-	x	-	-	Ammonia (anhydrous) – Agricultural	100	lbs
8/26/2008 03:50	Wright	Gold Eagle Coop	Handling And Storage	Animal/Vegetable Product	x	-	x	-	Grease	4000	gal
8/27/2004 15:30	Wright	Prairie Energy Cooperative	Handling And Storage	Petroleum	x	-	-	-	Mineral oil	2	gal
8/27/2009 08:02	Wright	Spade, Justin	Other	Inorganic Chemical	-	x	-	-	Mercury	3	ml
9/2/2003 17:52	Wright	National By-Products, Inc.	Transportation	Petroleum	x	-	-	-	diesel	10	gal
9/2/2010 02:13	Wright	Bell, Christopher	Dumping	Inorganic Chemical	-	-	-	x	Meth Lab Remains	1	unk
9/22/1995 18:50	Wright	SELECT FARMS, IOWA	Motor Carrier	Acids/Bases	x	-	-	-	RODENTICIDE (DIPHACINONE)		unk
9/26/2005 09:15	Wright	Alliant Energy	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil	10	gal
9/26/2005 09:16	Wright	Alliant Energy	Transformer	Transformer oil/PCB	x	-	-	-	transformer non PCB	10	gal
10/18/1995 08:15	Wright	CO. REC, WRIGHT	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil		unk
10/21/2006 09:40	Wright	Anderson Trucking			-	-	-	-			
11/2/1997 19:26	Wright	UNKNOWN,	Motor Carrier	Petroleum	-	-	x	-	Diesel Fuel		unk
11/5/2007 15:42	Wright	Unknown	Transportation	Ammonia (anhydrous)	x	x	-	-	Anhydrous ammonia	300	gal
11/7/2003 08:13	Wright	Eagle Pork	Manure	Manure	x	-	-	-	Manure	500	gal
11/9/2004 14:25	Wright	Lyon, Jerry	Transportation	Petroleum	x	-	-	-	Diesel Fuel	100	gal
11/10/2009 10:10	Wright	Dragster	Manure	Manure	-	-	-	x	swine manure	1000	gal
11/20/1996 21:03	Wright	VAN LINES, GRABEL	Motor Carrier	Petroleum	x	-	-	-	Diesel Fuel		unk
12/7/2010 13:59	Wright	Kum-N-Go #544	Handling And Storage	Petroleum	x	-	-	-	Gasoline – Premium Unleaded	2	gal
12/9/2002 12:10	Wright	Unknown	Manure	Manure	x	-	-	-	Manure	20	ton
12/13/2001 11:50	Wright	Unknown	Handling And Storage	Fertilizer Pesticide	x	-	x	-	28% nitrogen fertilizer	46000	gal

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12/13/2004 14:02	Wright	Unknown	Handling And Storage	Petroleum	x	-	-	-	#2 Fuel Oil	47	gal
12/13/1996 07:55	Wright	SELECT FARMS,IOWA	Handling Storage Process	Acids/Bases	x	-	x	-	HOG WASTE		unk
12/13/1996 00:50	Wright	TRUCKING,W EBER	Motor Carrier	Petroleum	x	-	-	-	Diesel Fuel		unk
12/19/2000 21:00	Wright	Unknown	Handling And Storage	Propane/LP G/Natural Gas	-	x	-	-	Propane	150	gal
12/19/1997 22:28	Wright	EAGLE COOP,GOLD	Handling Storage Process	Ammonia (anhydrous)	-	x	-	-	Anhydrous ammonia		unk
12/23/1996 10:15	Wright	CORP.,EATON	Motor Carrier	Petroleum	x	-	-	-	Engine oil		unk
12/24/1998 08:55	Wright	Gold Eagle Coop	Handling And Storage	Inorganic Chemical	x	-	-	-	Ammonia (conc 20% or greater)	80000	gal
12/27/2000 5 18:10	Wright	Prairie Energy	Transformer	Transformer oil/PCB	x	-	-	-	Transformer Oil	5	gal
12/29/2000 9 16:18	Wright	Prairie Energy Coop.	Transportation	Petroleum	x	-	-	-	Hydraulic Oil	5	gal

Human Disease Incident

Definition:

A medical, health, or sanitation threat to the general public (such as contamination, epidemics, plagues, and insect infestation).

Description:

Public health action to control infectious diseases in the 21st century is based on the 19th century discovery of microorganisms the cause of many serious diseases (e.g., cholera and TB). Disease control has resulted from improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs. Scientific and technologic advances have played a major role in each of these areas and are the foundation for today's disease surveillance and control systems. Scientific findings also have contributed to a new understanding of the evolving relation between humans and microbes. As of January 1, 2000, a total of 60 infectious diseases were designated as *notifiable* at the national level. A *notifiable disease* is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of the disease. (*Iowa Hazard Mitigation Plan, 2007*)

Pipeline Incident

Definition:

A break in a pipeline creating a potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation.

Description:

Iowa is served by many high pressure pipelines to residents and industries. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small, slow leak that is not ignited to a large rupture in which the gas is ignited. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those in proximity to the pipelines.

Public Disorder

Definition:

Mass demonstrations or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes.

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Description:

People assembled together in a manner to substantially interfere with public peace constitute a threat, by use of unlawful force or violence against another person, causing property damage; or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target group or institution. Most events are within the capacity of local law enforcement. (*Iowa Hazard Mitigation Plan, 2007*)

River Flooding

Definition:

River flooding is the rise or overflow of a river onto adjacent land not usually covered by water when the volume of water exceeds the body's capacity. River flooding may occur seasonally, where flooding appears almost every year during seasons when rainfall is heavy or winter snows start to melt.

Description:

Floods are the most common and widespread of all natural disasters next to fire. Most communities in the United States can experience some kind of flooding after spring rains, heavy thunderstorms, winter snow thaws, waterway obstructions, or levee or dam failures. Often it is a combination of these elements that causes damaging floods. Floodwaters can be extremely dangerous. The force of six inches of swiftly moving water can knock people off their feet and two feet of water can float a car. Floods can be slow or fast-rising but generally develop over a period of days. Flooding is a natural and expected phenomenon that occurs annually, usually restricted to specific streams, rivers, or watershed areas.

Severe Winter Storm

Definition:

Severe winter storms are harsh winter weather conditions that affect day-to-day activities. These can include blizzard conditions, heavy snow, blowing snow, heavy sleet, and extreme cold.

Description:

Severe winter storms are common during the winter months of October through April. The various types of extreme winter weather can cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapsed buildings, loss of livestock and wildfires. Blizzard conditions are winter storms that last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of ¼ mile or less, and whiteout conditions. Heavy snows of more than 6 inches in a 12-hour period or freezing rain greater than ¼ inch accumulation causing hazardous conditions in the community can slow or stop the flow of vital supplies as well as disrupt emergency and medical services. Loose snow begins to drift when the wind speed reaches 9 to 10 mph under freezing conditions. The potential for some drifting is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind. Frigid temperatures and wind chills are dangerous to people, particularly the elderly and the very young. Dangers include frostbite or hypothermia. Water pipes, livestock, fish, wildlife and pets are also at risk from extreme cold and severe winter weather. (*Iowa Hazard Mitigation Plan, 2007*)

Measurements (Wind Chill Index)

The wind chill temperature index measures how cold people feel when outside. Wind chill is based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature. The wind therefore makes it feel much colder. If the temperature is at 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill temperature, exposed skin can freeze in 30 minutes.

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Below is a revised wind chill table that was introduced by the National Weather Service on November 1, 2001. The new index was tested on human subjects and is based on heat loss from exposed skin. The old index, formulated in 1945 by Antarctic explorers, measured the cooling rate of water.

		Temperature (°F)																		
		Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Wind (mph)	5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63	
	10	34	27	21	15	9	3	-4	-	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
	15	32	25	19	13	6	0	-7	-	-10	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
	20	30	24	17	11	4	-2	-9	-	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
	25	29	23	16	9	3	-4	-11	-	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
	30	28	22	15	8	1	-5	-12	-	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
	35	28	21	14	7	0	-7	-14	-	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
	40	27	20	13	6	-1	-8	-15	-	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
	45	26	19	12	5	-2	-9	-16	-	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
	50	26	19	12	4	-3	-10	-17	-	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
	55	25	18	11	4	-3	-11	-18	-	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
	60	25	17	10	3	-4	-11	-19	-	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Time = 30 minutes 10 minutes 5 minutes

NWS Windchill Chart (1/28/09)

<http://www.weather.gov/os/windchill/index.shtml>

<http://www.infoplease.com/ipa/A0001374.html>

Structural Failure

Definition:

The collapse of any portion of a public or private structure including roads, bridges, towers and buildings.

Description:

A road, bridge or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may cause a roof of a building to collapse under the weight of the snow. Heavy rains and flooding can undercut and washout a road or bridge. The age of the structure is sometimes independent of the cause of the failure. Enforcement of building codes can better guarantee that structures are designed to hold up under normal conditions. Routine inspection of older structures may alert inspectors to “weak” points.

When a structure does fail, the level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge and the type and amount of products stored in the structure. (*Iowa Hazard Mitigation Plan, 2007*)

Structural Fire

Definition:

An uncontrolled fire in a populated area that threatens life and property and is beyond the normal day-to-day response capabilities.

Description:

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Structural fires present a far greater threat to life and property and the potential for much larger economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved firefighting equipment, training and techniques, lessen the chance and impact of a major urban fire. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of the material involved.

Terrorism

Definition:

Terrorism comes in multiple forms including agro, biological, chemical, and conventional.

Agro-Terrorism: An action causing intentional harm to an agricultural product or vandalism of an agricultural/animal-related facility. Events might include the following examples; animal rights activists who release mink or lab animals; disgruntled employees who intentionally contaminate bulk milk tanks or poison animals; eco-terrorists who destroy crops/facilities; theft of agricultural products, machinery or chemicals; or criminals who vandalize agricultural facilities.

Biological Terrorism: The use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom.

Chemical Terrorism: The use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom.

Conventional Terrorism: The 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.

Cyber Terrorism: Electronic attacks using one computer system against another in order to intimidate people or disrupt other systems.

Enemy Attack: An incident which would cause massive destruction and extensive casualties. An all-out war would affect the entire population. Some areas would experience direct weapons' effects: blast, heat, and nuclear radiation; others would experience indirect weapons' effect, primarily radioactive fallout.

Description:

Agro-Terrorism: This category covers a wide variety of incidents from the intentional introduction of disease, vandalism of facilities, theft of agricultural products, machinery or chemicals; the release of animals and/or the contamination of agricultural products. Depending upon the type of action taken, the implications will vary greatly.

Biological Terrorism: Liquid or solid contaminants can be dispersed using sprayers or aerosol generators, or by point or line sources such as munitions, covert deposits or moving sprayers. Biological agents may pose viable threats from hours to years depending upon the agent and the conditions in which it exists. Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infections can be spread via human or animal vectors. Agro-terrorism is the direct, generally covert, contamination of food supplies or introduction of pests or disease agents to crops and livestock.

Chemical Terrorism: Liquid, aerosol or dry contamination can be dispersed using sprayers or other aerosol generators, liquids vaporizing from puddles or containers, or munitions. Other dispersal methods may include intentional releases from petro-chemical facilities or intentional releases during rail or truck transportation. Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists. Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not mitigated.

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Conventional Terrorism: Detonation of an explosive device on or near a target that is generally delivered by a person, vehicle, or projectile. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of the 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.

Cyber Terrorism: Cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection. Generally, there are no direct effects on the built environment, but secondary effects may be felt depending upon the system being terrorized. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.

Enemy Attack: The federal government monitors the international political and military activities of other nations and would notify the state of Iowa of escalating military threats. There are many smaller military installations in Iowa. Most are Iowa National Guard assets spread throughout the state comprised of various military units and functions.

Thunderstorm and Lightning

Definition:

Thunderstorms are the atmospheric imbalance and turbulence that may result in thunder, heavy rains (which may cause flash flooding), and strong winds reaching or exceeding 58 mph resulting in tornadoes, surface hail of at least 0.75 inches in diameter, and lightning. The National Weather Service considers a thunderstorm severe if it produces hail at least ¾ inches in diameter, wind 58 mph or high, or tornadoes.

Description:

Atmospheric imbalance and turbulence caused by: (1) the rapid rising of unstable warm air into the atmosphere, (2) a sufficient amount of moisture to form clouds and produce rain, and (3) the collision of separate weather fronts (warm and cold) creating an upward lift of air currents. These conditions may result in thunder, heavy rains, which may cause flash flooding, and strong winds reaching or exceeding 58 mph resulting in tornadoes, or surface hail of at least 0.75 inches in diameter. When the water rises to between 15,000 and 25,000 feet above sea level, it begins a chemical process to turn the water into ice. This process creates a build-up of positive and negative charges that produce an upsurge of electricity that releases towards the earth in 50-yard sections called ladders that are searching for a source of conduction. When a suitable source is located, the connection is made creating a circuit. When the circuit is complete, the charge is then transferred from the cloud where it was formed, to the site in the ground where the circuit was made. A lightning bolt can approach a temperature of 50,000 degrees Fahrenheit at the site of impact in a split second. This rapid heating, expansion, and cooling of air near the lightning bolts create thunder. Thunderstorms are common in Iowa and can occur singly, in clusters, or in lines. Most thunderstorms produce only thunder, lightning, and rain. Severe storms however, can produce tornadoes, high straight-line winds above 58 mph, microbursts, lightning, hailstorms, and flooding. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes. Lightning occurs with all thunderstorms even if the buildup of electricity isn't strong enough to send a bolt to the ground. (*Iowa Hazard Mitigation Plan, 2007*)

Tornado

Definition:

A violent, destructive, rotating column of air taking the shape of a funnel that progresses in a narrow, erratic path. Rotating wind speeds can exceed 300 mph and travel across the ground at average speeds of 25 to 30 mph.

Description:

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A tornado is a violent whirling wind characteristically accompanied by a funnel shaped cloud extending down from a cumulonimbus cloud. A tornado can be a few yards to about a mile wide where it touches the ground. An average tornado, however, is a few hundred yards wide. It can move over land for distances ranging from short hops to many miles, causing great damage wherever it descends. The funnel is made visible by the dust sucked up and by condensation of water droplets in the center of the funnel. The rating scale used to rate tornado intensity is called the Enhanced Fujita Scale, which started being used February 1, 2007. (*Iowa Hazard Mitigation Plan, 2007*) The table below further describes the scale and the amount of damage that can result from that type of tornado:

Scale	Wind Speed	Potential Damage
EF0	65-85 mph	Light Damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0.
EF1	86-110 mph	Moderate Damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135 mph	Considerable Damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165 mph	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200 mph	Devastating damage. Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	201+ mph	Total destruction. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100m; steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation; incredible phenomena will occur. So far there have been two EF5 tornadoes recorded since the Enhanced Fujita Scale was introduced on February 1, 2007. The most recent one occurring in Parkersburg, Iowa on May 25, 2008 which leveled ½ the city.

<http://www.spc.noaa.gov> (1/28/09)

Transportation Event

Definition:

Highway Transportation Incident: A single or multi-vehicle incident which results in property damage and/or death(s)/injury(s). A derailment or a train accident which directly threatens life or property, or which adversely impacts a community's capabilities to provide emergency services.

Railway Transportation Incident: A derailment or a train accident which directly threatens life or property, or which adversely impacts a community's capabilities to provide emergency services.

Description:

Highway Transportation Incident: An extensive transportation network exists in Iowa. Local residents, travelers, businesses, and industries rely on this network on a daily basis. Thousands of trips a day are made on the streets, roads, highways, and interstates in the state. If the designed capacity of the roadway is exceeded, the potential for a major highway incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the state as does the time of day (rush hour) and day of week. Incidents involving buses and other high-occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.

Railway Transportation Incident: Railway incidents may include derailments, collisions, and highway/rail crossing incidents. Train incidents can result from a variety of causes including; human error, mechanical failure, faulty signals, and problems with the track. Results of an incident can be range from minor "track hops" to catastrophic hazardous materials incidents and even passenger casualties.

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With the many miles of track in Iowa, there are numerous at-grade crossings at which vehicles must cross the trains' path.

Watershed Pollution

Definition:

When pollutants enter rivers, lakes, and ground water systems through point and non-point pollution sources.

Description:

Point source pollution is when pollutants get dumped directly into a pipe that feeds into a stream, or when pollutants are dumped directly into the water source itself. These can be traced back to a specific location, or "point", such as an industrial facility, wastewater treatment plant, etc. However, most water quality problems in Iowa's lakes and streams are caused by non-point source pollution.

Non-point source pollution happens when rainfall, snowmelt, or irrigation water runs over land or through the ground and picks up pollutants and deposits them into streams, lakes, or groundwater. These pollutants include excess soil, bacteria and nutrients (from farm fertilizers and manure).

Keeping these pollutants out of our water is important for many reasons. Humans depend on clean water for drinking water and recreation like swimming, boating and fishing. Aquatic life, such as fish, also depends on clean water to survive. (*Iowa Hazard Mitigation Plan, 2007*)

Windstorm

Definition:

Windstorms consist of extreme winds associated with severe winter storms, severe thunderstorms, downbursts, and very strong pressure gradients.

Description:

Windstorms generally produce wind speeds in excess of 50 mph, and/or produce (extensive) property damage, injuries, and/or death. These events can range from a few hundred feet in extent up to tens of miles wide and several hundred miles long.

Measurements

One of the first scales to estimate wind speeds and the effects was created by Britain's Admiral Sir Francis Beaufort (1774-1857). He developed the scale in 1805 to help sailors estimate the winds via visual observations. The scale starts with 0 and goes to a force of 12. The Beaufort scale is still used today to estimate wind strengths. (*Iowa Hazard Mitigation Plan, 2007*)

Force	Wind Speed (mph)	WMO Classification	Appearance of Wind Effects on Land
0	0-1	Calm	Calm, smoke rises vertically
1	1-3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4-7	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	13-18	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	19-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-31	Strong Breeze	Larger tree branches moving, whistling in wires
7	32-38	Near Gale	Whole trees moving, resistance felt walking against wind

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8	39-46	Gale	Whole trees in motion, resistance felt walking against wind
9	47-54	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	55-63	Storm	Seldom experience on land, trees broken or uprooted, "considerable structural damage"
11	64-72	Violent Storm	Very rarely experienced, accompanied by wide-spread damage
12	73-83	Hurricane	--

The Beaufort Wind Scale (1/28/09)

http://www.zetnet.co.uk/sigs/weather/Met_Codes/beaufort.htm

<http://www.spc.noaa.gov/faq/tornado/beaufort.html>

Chapter 4: Vulnerability Assessment & Loss Estimates

According to FEMA a “Vulnerability Assessment provides the extent of injury and damages that may result from a hazard event of a given intensity in a given area”. Also, “vulnerability is susceptibility to physical injury, harm, damage or economic loss” (FEMA, 2006). To determine the extent of the area that is susceptible to damages from each hazard, the committee’s began by estimating the exposure of each element, which according to FEMA “is the people, property, systems, or functions that could be lost to a hazard”. FEMA goes on to say that “exposure includes what lies in the area the hazard could affect” (FEMA, 2006). Wright County is vulnerable to a wide range of hazards including; air transportation event, communications failure, drought, earthquake, energy disruption, expansive soils, extreme heat, flash flooding, grass or wild land fire, hailstorm, human disease incident, HAZMAT – fixed facility, HAZMAT – transportation, levee failure, pipeline incident, public disorder, river flooding, severe winter storm, sink holes, structural failure, structural fire, terrorism, thunderstorm and lightning, tornados, transportation event, watershed pollution and windstorms.

Based on the potential impacts of each hazard that is listed above, the vulnerability and loss estimates for the community’s of Wright County were calculated. An example of the tables used in calculating the loss estimates of each hazard is displayed below. All structural data in the tables and figures are based on 2010 parcel data provided by the Wright County Assessor and population data came from the U.S. Census, 2010.

Type of Structure	Number of Vulnerable Structures			Potential Damages (Loss Estimates)			Number of People Vulnerable		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ loss from Hazard	% loss from Hazard	# in City	#in Hazard area	% in Hazard area
Residential			%	\$	\$	%			
Commercial			%	\$	\$	%			
Agricultural			%	\$	\$	%			
Industrial			%	\$	\$	%			
Total			%	\$	\$	%			

The calculations for ‘Number of Vulnerable Structures’ are based on those structures that are exposed to each hazard; therefore, vulnerable structures include those structures that have the potential of being impacted by a hazard. For example; a tornado can strike any random area at one time; therefore 100% of the community may be vulnerable to a tornado. However, if a tornado was to strike a community there’s a chance that it may not impact the entire community; therefore, while 100% of the community may be vulnerable to a tornado, 100% of the community would not necessarily experience damages. Based on each city’s vulnerability, more specific estimates of potential damages or losses were deduced, as explained below

“Potential Damages”, also known as the Loss Estimates, vary based on the city and the hazard. For example; a pipeline incident may impact each city differently depending on its location and substance. Using GIS, an area where potential damages due to a pipeline incident can be specifically laid-out; using this specified area, detailed loss estimates can be calculated. However, for thunderstorms and lightning a specific area of damages is difficult to lay out; therefore, using different data including state historical data and/or committee spatial or vulnerability ratings loss estimates can be calculated. The process used for each hazard is explained in each community’s Vulnerability Assessment & Loss Estimate Section, which is displayed in Section 2 of their referenced appendix (Appendices A-I).

The “Number of People Vulnerable” for each hazard was based on the Residential “Number of Vulnerable Structures”. By multiplying the average household size of each city by the number of vulnerable, residential structures in that city, the number of residents at risk could be calculated. This is explained in further detail in each community’s Vulnerability Assessment & Loss Estimate Section, which is displayed in Section 2 of their referenced appendix (Appendices A-I).

Chapter 5: Mitigation Strategies and Priorities

The Research, Review, and Prioritization Process

After the hazard risk analysis was completed for each community, the individual hazard mitigation committee brainstormed mitigation actions that might reduce or eliminate the loss of property and life due to hazards.

Each committee was supplied with a supplement to provide help in picking mitigation activities for specific hazards. The supplement was titled *Mitigation Ideas: Possible Mitigation Measures by Hazard Type, a mitigation planning tool for communities*. The booklet contained a list of possible hazard mitigation measures for communities compiled from experience and discussions within the states of FEMA Region 5 (Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin). The list gives mitigation ideas for of natural hazard types, such as flood or tornados. These are then followed by types of man-made hazards. As extensive as the list is, it does not prohibit other local ideas for activities to save lives and prevent or reduce damages in the futures. Many of the ideas and actions are developed in other FEMA publications, including www.fema.gov, as well as in publications of other federal and state agencies.

After listing all of the possible hazard mitigation actions, the committees then discussed the list again, and selected from it all of the actions that were the most realistic, and actions that they thought would be feasible for the community.

The selected actions were then moved to the next step of feasibility, which is the prioritization of hazard mitigation actions. This step was split into two stages. The first stage was to perform a STAPLEE analysis for each mitigation action. The second stage was to look at the results of the STAPLEE analysis and determine which actions would have the highest priority based on the hazard the strategy impact, the need of the community, and the likelihood of the action's completion.

STAPLEE Analysis

STAPLEE is an acronym that refers to the various dimensions of feasibility that must be considered before an action is implemented. The STAPLEE is a Cost Benefit study for each action.

The committee was asked to consider the following questions for each category when doing the analysis:

Social – Is the mitigation action socially acceptable? Will the action adversely affect any one segment of the population? What are the social costs of the action? What are the social benefits of the action?

Technical – Is the proposed action technically feasible and does it provide the appropriate level of protection? Will the action create more problems than it solves/ what are the technical costs and benefits of the action?

Administrative – Does the community have the capability (staff, expertise, funding) to implement the action? Can the community provide the necessary maintenance? Can the action be accomplished in a timely manner? What are the administrative costs and benefits of the action?

Political – Is the mitigation action politically acceptable? What are the political costs and benefits of the action?

Legal – Does the community have the authority to implement the proposed action? Is the action likely to be challenged by stakeholders who may be negatively affected? What are the legal costs and benefits of the action?

Economic – Do the costs of the action seem reasonable for the size of the problem and the likely benefits? What burden will be placed on the local economy to implement and maintain the action? What are the economic costs and benefits of the action?

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Environmental – How will the action affect the natural environment? Will the action comply with local, State, and Federal environmental regulations? What are the environmental costs of the action? What are the environmental benefits of the action?

The STAPLEE analysis was scored using a simple scoring system. In each category, for each action, if the action would be considered favorable it would be given a Yes (Y), if negative or less favorable a No (N) was given, and a Maybe (M) for a neutral rating. If the question was not applicable, then it was given a N/A. The scores were then tallied after answering all of the questions for each of the mitigation actions. The chart for the STAPLEE analysis is shown below:

STAPLEE Criteria	S		T			A			P			L		E			E			TOTAL SCORE				
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water		Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws
Tiling surface water away from city	Y	Y	M	Y	Y	N	N	Y	Y	Y	Y	N/A	Y	N	Y	Y	Y	Y	Y	N/A	N	Y	N/A	9
Tree trimming and structural proximity to power lines	Y	Y	Y	N	Y	Y	N	Y	Y	Y	Y	N/A	Y	N	Y	Y	Y	Y	Y	N/A	N/A	Y	N/A	11
Snow plow attachments	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A	Y	N	Y	Y	Y	Y	Y	N/A	N/A	Y	N/A	15

Tallying the scoring of the STAPLEE is done by adding one point to every ‘Yes’ answer and subtracting one point for every ‘No’ answer. If communities give a ‘Maybe’ or ‘N/A’ answer, there will be no point added or subtracted to that score. The answers that are shaded in red are questions that were given a ‘Yes’ answer, but a ‘Yes’ answer for these questions signifies a negative effect on the City, likewise for ‘No’ answers having a positive effect on the City. In this instance a ‘No’ answer would add a point and ‘Yes’ answer would subtract a point.

Each community’s hazard mitigation STAPLEE results are displayed in Section 3 of their referenced appendix (Appendices A-I).

Prioritization Process

Each Hazard Mitigation Committee was presented with the results of the STAPLEE analysis then the committees reviewed their prioritization of hazards. The committee also determined which projects were priorities for the community based on the need of the community, benefits of the action, the feasibility of the action being completed and the time it would take to complete the action.

After reviewing all of these factors the committee ranked each action as Priority I, Priority II or Priority III. Priority I projects were projects that the committee determined would be started within 1 year of the plan being adopted by the County/City. Priority II projects were actions that would be started within 2-4 years of the plan being adopted by the County/City. Priority III projects were actions that would be started within 5 or more years of the plan being adopted by the County/City. An example of the hazard mitigation prioritization determinations is shown in the following table:

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Mitigation Action	Priority	Department Responsible	Completion Date
Tree trimming and structural proximity to power lines	High	Mid-American Energy	2011
Snow plow attachments	High	Public Works Department	2011
Update signage on streets (truck/no truck traffic signs, lights by railroad, road closed signage)	High	Public Works Department	2011
Subsidizing citizens utilities in extreme heat	High	Mid-American Energy	2011

Each community's hazard mitigation prioritizations are displayed in Section 3 of their referenced appendix (Appendices A-I).

Goals and Objectives

Communities were given the option to establish their goals using one of two approaches. The first approach consisted of a bottom-up approach where goals and objectives were created using the mitigation actions that the committee developed. The other approach was to use a top-down tactic, where the committee determined their overall hazard mitigation goals, then worked down to establish more specific objectives and even more specific mitigation actions. Each community's hazard mitigation goals are displayed in Section 3 of their referenced appendix (Appendices A-I).

Chapter 6: Action Plan

Action Plan

The Action Plan is a combination of the description of the mitigation action, the hazards addressed by each action, the prioritization of action, the responsible department/party for the action, the estimated cost of the action, the potential funding source for the action, the mitigation measure category, and the target completion date of the action. All of these categories are combined in an easy to reference chart for future projects. An example of the chart is shown below:

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

- Minimal: Cost estimate is \$9,999 or less;
- Low: Cost estimate ranges from \$10,000 - \$99,999;
- Moderate: Cost estimate ranges from \$100,000 - \$299,999;
- High: Cost estimate is \$300,000 or higher.

Examples of action tables:

Tree trimming and structural proximity to power lines	
Description	This action is to begin a tree trimming management program for the City of Clare. The purpose of this enforcement is to reduce the frequency of power outages due to downed tree limbs and reduce the amount of vegetative debris after severe storms.
Hazards Addressed	Severe Thunderstorm and Lightning, Hailstorm, Winter Storm, and Windstorms
Priority	I
Responsible Dept./Party	City of Clare, Mid American Energy
Estimated Cost	Minimal
Potential Funding Source	General fund property taxes
Mitigation Measure Category	Prevention
Target Completion Date	2015

Each community's hazard mitigation Action Plans are displayed in Section 4 of their referenced appendix (Appendices A-I).

Mitigation Categories

Prevention Actions

Prevention actions are intended to address future development. These actions ensure that future development does not increase hazard losses and guide future development away from hazards, while maintaining other community goals, such as economic development and quality of life.

Communities can achieve significant progress toward hazard resistance through prevention actions. Prevention actions are particularly effective in areas that have not been developed or where capital investment has not been substantial.

Examples:

- Zoning codes, such as an overlay zone that limits development in a floodplain
- Open space preservation and development of parks and recreational areas in hazard prone areas
- Land development regulations, such as requiring large lot sizes to ensure a minimum amount of impervious surface area

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- Storm water management regulations that call for retention/detention basins and clearing of ditches
- Dune and beach maintenance and regulations that prohibit any development activity beyond the dunes
- Capital Improvement Planning that prevents extension of public infrastructure into hazard areas
- Building or fire codes that require certain types of roofing or sprinkler systems

Property Protection Actions

Property protection actions modify existing buildings or their surroundings to reduce risk. These actions directly protect people and property at risk.

Protecting a building does not necessarily affect the building's appearance and is therefore a popular mitigation action for historic and cultural sites.

Examples:

- Acquisition – public procurement and management of lands that are vulnerable to damage from hazards
- Relocation – permanent evacuation of hazard-prone areas through movement of existing hazard-prone structures to safer areas
- Retrofitting – modifying structures to reduce damage by future hazard events
- Flood-proofing – modifying a flood-prone structure to reduce future flood damage by preventing water from entering the structure or by designing the structure so that water can flow through it harmlessly

Public Education and Awareness Mitigation Actions

Public education and awareness actions inform and remind the public about hazards and the actions they can take to avoid potential damage and injury. These actions are directed toward property owners, potential property owners, business owners, and visitors to the community.

Examples:

- Providing hazard maps and other hazard information to homeowners
- Developing a Web site that makes hazard information publicly available
- Developing and implementing outreach programs that provide hazard and mitigation information to the public
- Asking business owners to provide mitigation information to employees
- Mailing or delivering notices about hazards to residents and property owners in specific, hazard-prone areas
- Preparing displays about hazards and mitigation in widely used facilities, such as libraries, public buildings, and malls
- Printing information about hazard mitigation in newspapers or airing announcements and interviews on radio and television stations
- Providing information to property owners using a videotape or a printed booklet
- Making presentations at neighborhood meetings
- Adopting a real estate disclosure requirement so that potential property owners are informed of the risk before purchase
- Designing and delivering educational programs for school age children or adults

Natural Resources Protection Actions

Natural resources protection actions reduce the intensity of hazard effects and improve the quality of the environment and wildlife habitats. They are usually implemented by parks, recreation, or conservation agencies or organizations

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Examples:

- Erosion and sediment control programs
- Wetlands protection programs
- Expanding public open space
- Environmental restoration or freshwater and sediment diversion programs

Emergency Services Protection Actions

Emergency services protect people before, during, and after a hazard event. Most counties/parishes and many cities have emergency management offices to coordinate warnings about, response to, and recovery from a disaster. Actions taken to ensure the continuity of emergency services are considered mitigation actions.

Examples:

- Protection of warning system capability
- Protection or hardening of critical facilities, such as fire stations and hospitals
- Protection of infrastructure, such as roads that are needed for emergency response

Structural Mitigation Actions

Actions in this category directly protect people at risk. They are called “structural” because they involve construction of manmade structures or devices to control hazards.

Examples:

- Reservoirs to store drinking water
- Levees, floodwalls, and seawalls to reduce the likelihood of flooding
- Diversion of storm water away from developed areas
- Channel modifications to move storm water away from development more quickly

Chapter 7: Plan Maintenance and Adoption

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

Monitoring, Evaluating, and Updating Plan

Hazard Mitigation Planning Committee

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

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

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

The plan will be updated within five years if it is found during the evaluation process that the plan has become outdated. If the plan is not updated within five years, then it will be updated and resubmitted to HSEMD FEMA for approval. The Emergency Management Commission will be responsible for initiating and approving the hazard mitigation plan update process.

Procedures and Techniques for Future Reviews and Updates

Task A. Evaluate the effectiveness of the Planning Process

1. Reconvene the planning team
2. Review your planning process and items to discuss:
 - a. Building the planning team
 - b. Engaging the public
 - c. Data gathering and analysis
 - d. Coordinating with other agencies

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Task B. Evaluate the effectiveness of your actions

1. What were the results of the implementation action? Did the results achieve the goals/objectives outlined in the plan? Did the actions have the intended results?
2. Were the actions cost-effective? Did, or would, the project result in the reduction of potential losses?
3. Document actions that were slow to start, or not implemented.

Task C. Determine why actions worked or did not work. Possible reasons are, but are not limited to:

1. Lack of available resources
2. The political, or popular, support for, or against, the action
3. The availability of outside funding
4. The workloads of the responsible parties
5. The actual time necessary to implement the actions

Incorporation into Existing Planning Mechanisms

Where possible Wright County, and all incorporated cities, will use existing plans and/or programs to implement hazard mitigation actions. Based on the evaluation of the plan by the Wright County Emergency Management Commission, Wright County, and all incorporated cities, will continue to plan and implement programs to reduce the loss of life and property from hazards that affect the community. The mitigation actions in the plan could be incorporated with the following examples of other planning mechanisms:

- Incorporated City Codes
- Wright County Comprehensive Plan
- Wright County Code of Ordinances
- Other plans that could be developed in the future, such as water conservation plans, storm water management plans, and parks and recreation plans.

Continued Public Involvement

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. A public hearing(s) to receive public comment on the plan maintenance and updating will be held during the time that the plan is going through the update process. When the Wright County Emergency Management Commission reconvenes for the update, it will coordinate with all the members participating in the planning process, including those who joined the Wright County Emergency Management Commission after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available posting sources and press releases to local media outlets.

Appendix A: City of Belmond

Section 1: Risk Assessment

The Belmond Hazard Mitigation committee determined that the following additional hazards were not applicable or would have little effect on the City:

Drought was considered to have little effect on the City of Belmond. During the droughts that are recorded in Appendix L the City suffered very little. They didn't have any issues with the water supply, and even the surrounding farm land was minimally affected.

Earthquakes were considered to have little effect to the City of Belmond. The effects of an earthquake are possible of being felt in Belmond, however, due to the cities distance from the nearest fault line, if an earthquake did occur it would feel as though a large truck was passing by. This would cause little damage to utilities or structures throughout the City.

Expansive soils were considered not applicable to the City of Belmond due to the lack of historical data supporting expansive soils in the area. Expansive soils, and incidents related to expansive soils, are more commonly found in eastern Iowa near the Mississippi where more clay soils are found. Members of the community also didn't remember expansive soils occurring or presenting a problem to Belmond.

Extreme Heat Event was considered to have little effect on the City of Belmond due to the low impact and effects that are seen when there is a region-wide declared extreme heat event declared. Most of the housing in the City is air-conditioned, which would mean that almost all of the citizens would be able to take shelter from the heat in the event of an extreme heat event.

Hazardous Materials Incident – Transportation was considered to have little effect on the City of Belmond due to the lack of historical evidence of any Transportation HAZMAT related events occurring.

Human Disease Incident and Pandemic was considered to have little effect on the City of Belmond because generally only one person or small groups of people get it at a time. The City of Belmond has a smaller population that is not densely grouped, so if there was a pandemic disease it would spread slowly if people followed the recommendations of CDC (Centers for Disease Control and Prevention).

Landslide/Erosion/Slope Failure was not considered applicable to the City of Belmond since the topography in the immediate and surrounding area is very flat. There also isn't any historical evidence to support that there is any problems with erosion/slope failure.

Public Disorder/ Violent Demonstration was considered to have little effect on the City due to the lack of experiences of civil unrest within the City, let alone violent demonstrations. Since the City had no prior history of violent demonstrations, the chances of one occurring are very slim.

Structural Failure was considered to have a little effect on the City of Belmond due to the low impact of such an event. Historically in Belmond, the possibilities of structural failure occur only in old housing due to the wear of time. If there was a structural failure event, it would generally be only one structure that would be affected. Due to this low projected impact the hazard mitigation committee decided not to address it.

Terrorism (all) was considered not applicable to the City of Belmond due to the small size of the city.

Terrorism can occur anywhere at any time; however, looking at the situation from a different perspective the member of the committee thought that other places within the United States would serve as a stronger political statement than Belmond.

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Transportation Event (air, highway and rail) was considered to be not applicable to the City of Belmond due to the lack of large transportation events that have occurred in Belmond. There will always be accidents, but Belmond doesn't receive the traffic volume for transportation events to be a large cause of concern.

The following hazards were combined together:

- Flash flooding and River flooding into Flooding

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data. The results are organized from highest risk rating to lowest.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Structural Fire	5	4	3	3	4	5	24
Energy Failure	4	4	5	5	1	5	24
Windstorms/High winds	5	4	4	4	2	4	23
Severe Winter Storm	5	5	5	5	1	2	23
Tornado	2	3	4	4	4	5	22
Flooding	5	4	3	2	3	3	20
Thunderstorms & Lightening	5	5	2	2	2	4	20
Hailstorm	3	3	4	4	2	4	20
Communications Failure	2	3	5	3	1	3	17
Pipeline Incident	1	3	2	2	3	5	16
HAZMAT-Fixed Facility	2	3	2	2	2	5	16
Grass & Wild-land Fires	4	3	1	1	2	5	16

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of the City see Section 6 of this appendix.
Historical Occurrence	There have been more than 10 instances of structural fires. The City of Belmond's fire department is regularly called on to respond to structural fires every year.
Probability	There is always the possibility for structural fires to occur when you take into account human error and accidents that can occur. The hazard mitigation committee estimated that the possibility of a structural fire event to occur is between 76% - 99% each year.
Vulnerability	This really depends on the extent and severity of the structural fire. However, when you take into the random element that is a natural part of structural fires (fuel, wind direction, proximity to structures) it was estimated that anywhere between 26%-50% of properties would be vulnerable to structural fires. All critical facilities throughout the city are vulnerable to structural fires; however, the portion of the city that is most vulnerable to structural fires is the buildings & shops on main street. This increased vulnerability is due to the close proximity of the buildings to one another.
Maximum Threat	In accordance with the vulnerability, it was estimated that the maximum threat of structural fires would be contained to the estimated percentage of vulnerable properties. So, the hazard mitigation committee estimated that 26%-50% of the spatial extent of the city might be impacted by structural fires.
Severity of Impact	When looking through the history of Belmond, there have been some properties that have had structures completely gutted by structural fires, which threatened the structural stability of that structure. Every single structural fire has this same potential.
Speed of Onset	Structural fires can start incredibly fast, and there isn't any kind of warning that a structural fire can occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Energy Failure
Location	The entire community would generally be impacted by an energy disruption; see Section 6 of this appendix for a map of the City.
Historical Occurrence	The City of Belmond has experienced many energy disruptions with varying amounts of disruption time due to severe thunderstorms and lightning, high winds, winter storms, and pipeline incidents. There have been a few different kinds of energy disruption that has occurred in Belmond. An ice storm resulted in 3 days of power loss. Natural gas was once disrupted for a few days. Fiber optic lines have had problems which has adversely affected businesses.
Probability	The probability of some kind of energy disruption occurring each year is highly likely given the frequency of severe thunder and lightning, high winds, and winter storms.
Vulnerability	Everyone is vulnerable to power loss, but the population that is the most vulnerable is small children and the elderly, specifically in instances of extreme cold or heat. As the length of time draws on that civilians don't have electricity supplied to their homes, the degree of health risk continues to rise. The sudden loss of power can also cause the loss of computer based information. Businesses that rely on electricity to operate will not be able to do so in the event of an energy disruption event.
Maximum Threat	In the event of an energy disruption, such as electricity, the entire town would suffer from power loss.
Severity of Impact	Energy disruption has caused the shutdown of essential services for periods of 24-72 hours. The loss of electricity can cause a variety of serious problems, from the shutdown of water pumps in plants and homes, loss of communication between emergency services, and loss of heating and cooling within homes. The problems that come with power loss only grow for each day that a household or city goes without power. Things that depend on electricity such as appliances like refrigerators, air conditioning units, and sump pumps can be vital, and without electricity food will quickly go bad, homes can become overheated, and water levels can rise in people's basements.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Windstorms/High Winds
Location	The entire community would generally be impacted by a high wind event; see Section 6 of this appendix for a map of the City.
Historical Occurrence	There have been a total of 38 recorded instances of high winds that could have impacted the city of Belmond. Thus, according to the NCDC records, there is an average of 2 high wind events every year. These high winds have damaged property in a total of \$51,237,000 along with \$360,000 worth of crop damage. They also have caused power outages for short periods of time. Historic events are listed in Appendix L.
Probability	Winds at 10 meters/32.8 feet above ground level average about 11.5 mph. Highest average wind speeds are usually recorded in March and April with the annual minimum occurring in July and August. Winds of 55 mph or greater are recorded about once every other year at any one site while sustained speeds of 75 mph or greater occur about once every 22 years. The highest wind gusts typically occur with thunderstorms during the late spring and summer and are of very short duration. The typical thunderstorm severe wind event affects only a very small geographic area. However, a variety of thunderstorms, known as the <i>derecho</i> (Spanish for straight) can produce very widespread high winds with mid-summer being the preferred time of <i>derecho</i> occurrence. However, storm systems can generate widespread wind gusts in excess of 50 mph for several hours duration with the spring and fall being the most common time for these non-thunderstorm wind events. Iowa is one of the top 10 windiest states in the United States, so the probability of a high wind event occurring is likely. Given the history of wind events in Belmond, there is definitely a 76-99% chance that a high wind event will occur.
Vulnerability	The population of Belmond is generally protected by high wind events, as long as they stay within shelter and stay off the roads. High winds can often make it hazardous to drive as high winds can start blowing vehicles, and in doing so, can cause accidents. Limbs and branches from trees can be hazardous as they are torn off of trees from the strong gusts of wind. The facilities, or utilities, that are the most vulnerable to high winds are anything that is located above ground; typically this is power and telephone lines. There are generally downed by high wind events because limbs and branches from trees hanging over them may fall down on top of the lines, causing them to break, and causing power or telecommunication loss to those areas those utilities facilitated.
Maximum Threat	It is estimated that 51-75% of Belmond would be impacted by a single high wind event.
Severity of Impact	High winds have the ability to damage housing by blowing roofing off of roofs, damaging trees by breaking limbs or branches, downed power lines from falling branches and limbs, etc. The impact of high winds is similar to tornadoes, except that high winds are straight lined, so they are slightly less destructive than tornadoes because wind doesn't corkscrew like a tornado does.
Speed of Onset	Sustained high winds can be predicted; however, winds can change quickly, giving people only a few hours of warning time as the weather reports come in.

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Hazard	Severe Winter Storm
Location	The entire community would generally be impacted by severe winter storms; see Section 6 of this appendix for a map of the City.
Historical Occurrence	Tough winters are something that Iowans are used to dealing with, as snow, ice storms, and low temperatures are a common occurrence. Needless to say, winter storms occur every single year. Historic events for the county and for Belmond are listed in tables located in Appendix L.
Probability	Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. The snow season normally extends from late October through mid-April but significant snows have fallen as early as September 16 (1881) to as late as May 28 (1947). The average number of days per season with snow cover one inch or deeper varies from about 40 days along the Missouri border to around 85 days along the Minnesota border. In about half of fall winters, a daily snowfall of five to six inches or more is recorded in southern Iowa and seven to eight inches or more in northern Iowa. December, January and February are normally the snowiest months, averaging about seven inches each. However, late winter and early spring storms in March and April have produced as much as 27 inches of snow in a single storm and 24-hour amounts have reached 24 inches. The snowiest winter of record (since 1887-1888) was 1961-1962 with a statewide average of 59.0 inches while the lowest State average, only 11.9 inches, occurred in the winter of 1965-1966. Seasonal snowfall totals have varied from 2.4 inches at Keokuk in 19 to 93.1 inches at Elkader in 1950-1951. Every winter, there will be severe winter storms that will occur all throughout Iowa. The city of Belmond is no exception.
Vulnerability	Everyone is vulnerable to winter storms as it affects everyone throughout the city. Everyone has hazardous driving conditions in the event of a storm event and everyone must suffer through the bitter cold in the event of extreme cold. However, again, like all of the other hazards, the elderly are the susceptible to having problems. If an elderly person needed medical attention during blizzard conditions, emergency vehicles may not be able to get to them in time. The only vulnerable part to facilities during winter storms are frozen and exploding water pipes, as this would flood the structure and cause further damage.
Maximum Threat	Winter storms are a very broad event that would affect the entire extent of the city of Belmond.
Severity of Impact	The impact of winter storms can be wide ranging depending on what kind of winter storm hits the city. Any kind of snow can hinder travel and slow emergency response as well as cause concern in the event of a power outage. Blowing snow can also decrease visibility on the roads as well as cause snow drifts which can vary in height, from a few feet, to being able to block people inside their homes. Extreme cold can cause vehicles to have difficulty starting, possibility of frostbite to those venturing outside, and the freezing and bursting of water pipes. The worst case winter storm scenario is a heavy blizzard event where the roads and buildings are unable to be cleared in combination with power outage. This would cause some buildings unable to receive heat, and those unfortunate enough to not have generators would be locked in their rooms unable to get heat. This would be the most dangerous situation and would be dangerous for all age groups, both the young and the old. Given the historical frequency of low degrees of impact from winter storms, the committee decided that the severity of impact was minimal.
Speed of Onset	Weather services are able to accurately predict when winter storms are going to start having an effect on certain areas. This gives cities such as Belmond, about 12-24 hours of warning time.

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Hazard	Tornado
Location	Tornadoes can happen throughout the City at any time. See Section 6 of this appendix for a map of the City.
Historical Occurrence	According to the NCDC, there is a record of 16 tornadoes since 1964 (See Appendix L). 15 of those tornadoes were recorded as occurring in Wright county, which could have had impacted the city. There was one tornado that directly affected Belmond. On October 14, 1966 an F5 tornado, on the Fujita scale, resulted in six deaths, 172 injuries, and millions of dollars in property damage, leaving the City virtually incapacitated for days. While these are records of actual tornadoes touching down, there are about 4-6 events every year where the tornado sirens go off, and the citizens of Belmond take cover.
Probability	The potential for a tornado to occur in Iowa, and in Belmond, is always possible due to the favorable weather conditions in this region of the United States. The tornado sirens are sounded a handful of times every year.
Vulnerability	The entire population and facilities of Belmond are vulnerable to tornadoes. Both personal safety and structural stability would be a great concern. The Hazard Mitigation Committee felt that in the event of a tornado touching down in the city, that any properties that were affected would suffer an intense amount of damage, however, tornado paths can be random.
Maximum Threat	The committee estimated that somewhere between 51%-75% of the town would be impacted in the event of a tornado due to the potential size of the tornado and the relative size of Belmond.
Severity of Impact	The impact of a tornado varies with the strength of the tornado. If the tornado is of little strength, there will be light damage throughout the city. If there is a strong tornado that blows through the city, there will be a lot of damage as objects are lifted off the ground and thrown. Please refer to the table under the description section above for a more detailed explanation of typical damages displayed during certain strengths of tornadoes.
Speed of Onset	Weather conditions can be right for a tornado to occur, but when the tornado does form and touchdown, there is little warning.

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Hazard	Flooding (River and Flash Flooding)
Location	See section 6 of this appendix for a map of previous flood prone areas in the community. Also, low lying areas of the community and areas with poor drainage will experience problems from flash flooding. Although the details of locations of flash flooding events are not available at this time, more information will be gathered for the next plan update.
Historical Occurrence	The largest flood that Belmond has ever experienced was in the summer of 2008. There have been other larger floods that occurred in 1976, 1984, and in 1993; but it was the flood in 2008 was the largest flood yet. The City of Belmond also can experience flooding in the form of flash flooding due to heavy rains in a short period of time. This kind of rainfall happens regularly, as flash flooding is one of the most common hazard events in Iowa.
Probability	The probability of some kind of flooding event, whether it is from flash flooding or river flooding is expected to happen at least once every year. But, since there are some years where it doesn't flood, the committee estimated that the chance of a flooding event to occur in Belmond is anywhere between 76%-99% every year.
Vulnerability	The number of people that are affected by serious flooding in Belmond is, for the most part, limited to those that live in close proximity to the river. It was estimated that about 26%-50% of people and property are affected by Flooding. The vulnerable facilities during a flooding event are the wastewater plant, and other facilities in or near the flood plains. If the storm sewers get overwhelmed, the extra water can flow into the sanitary sewers, causing the water in the wastewater plant to overflow to nearby water sources without being properly treated.
Maximum Threat	Again, due to the smaller population of those living close to the river and in low lying areas, it was estimated that 10%-25% of the spatial extent of Belmond is affected by flooding.
Severity of Impact	The most severe impact of flooding is the economic damage that floodwaters can cause to homes and businesses. But generally speaking, flooding will cause minor or short term property damage that does not threaten the structural stability of the structure.
Speed of Onset	There is generally some kind of warning that some kind of flooding will occur. If there is a lot of rain upstream of Belmond, they will get some warning or notice that they might experience some flooding. With flash flooding, the national weather service can sometimes predict when there is going to be a large amount of rain. The committee estimated, given both kind of flooding events, they will get 6-12 hours of warning time.

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Hazard	Thunderstorms and Lightning
Location	Thunderstorms generally affect an entire area or region; therefore, if a thunderstorm event were to occur, a majority of the City would be exposed to the event. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Severe thunderstorms with lightning are a common occurrence in Iowa, and in Belmond. Severe thunderstorms occur every single year. Records of historic events are located in Appendix L.
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The southeastern U.S. has the greatest number per year. The central area of U.S. is home to the most severe thunderstorms in the world. About 85 percent of the 45 to 65 thunderstorms Iowa experiences annually occur between April and September with the peak month being June. At times, these thunderstorms become severe producing hail, high winds, torrential rains, and an occasional tornado. Frontal thunderstorms are common along the boundaries between warm and cold air masses in mid-latitudes. At an air mass boundary, warm air (which is less dense than cool air) is forced to rise over a mass of cool air. This movement of air can cause thunderstorms to form if enough moisture exists in the atmosphere. Based on historical evidence the hazard mitigation committee determined that there is a 100% chance that a thunderstorm and/or lightning event will occur in the City next year.
Vulnerability	Because thunderstorms and lightning are a regional event the committee determined all of the residences and critical facilities of Belmond are vulnerable to thunderstorm and lightning events. Winds, rain, and lightning affect everyone in Belmond. However, the number of people and property that are actually affected is minimal.
Maximum Threat	The committee looked at the maximum threat as the area of the community that actually is impacted by a severe thunderstorm. It's estimated that the community that is impacted by a severe thunderstorm is anywhere between 10%-25%.
Severity of Impact	Severe thunderstorms and lightning can impact a community in several ways, since thunderstorms generally consist of a number of things. Thunderstorms can generate high winds, causing damage typical of high wind events. The rain that falls down during a thunderstorm can cause flash flooding events if it occurs in high volume, or if it rains over a number days, flooding can occur. Lightning strikes can overwhelm electrical equipment which can result in equipment failure which can cause further damages depending on what equipment was rendered inoperable. There is generally little property damage that is associated with severe thunderstorms, other than fallen debris from vegetation.
Speed of Onset	Weather services are able to predict the weather in advance; however, severe storms can collect and bear down on a town in a relatively small amount of time.

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Hazard	Hailstorm
Location	When a hailstorm event happens in the City of Belmond, it usually affects the entire community. See Section 6 of this appendix for a map of the City.
Historical Occurrence	According to data collected from the NCDC (National Climatic Data Center) there have been a total of 25 hail events recorded since 1965 (see Appendix L for additional information). 18 of those events were recorded happening in Wright county, which could have impacted the city. 7 hailstorm events were recorded as specifically affecting Belmond.
Probability	Hail occurs most frequently in May throughout Iowa; however, nearly half of the crop-hail damage comes in July when crops are more susceptible to yield-reducing damage. In the average year, hail destroys about 1.4 percent of Iowa's corn crop and 4.5 percent of its soybean crop. Hail losses are greatest in the northwest where hail storms are typically more severe and also somewhat more frequent than in the southeast. In any one location, hail will occur on about two to four days per year. There have been 25 recorded instances since 1965. There is a 26-75% chance of a hail storm even occurring in Belmond during the coming year.
Vulnerability	Anyone that is caught outside in the event of a hailstorm is vulnerable to being injured. Otherwise, if people are safe inside some kind of shelter, they are generally protected from the effects of hailstorms. All facilities and buildings are vulnerable to hailstorms; however, the damage dealt by hailstones is generally light and aesthetic in nature. It was estimated by the committee that in a hailstorm event 51%-75% of the people and property of Belmond would be affected.
Maximum Threat	While not everyone's property will get damaged, almost all of Belmond's residents will be impacted by the hailstorm, probably between 51%-75%.
Severity of Impact	Damage from hailstorms can vary depending on how large the hailstones are. It is estimated that damage from hail approaches \$1 billion in the U.S. annually. U.S. Agriculture is typically the most affected by such hail storms, hail causes severe crop damage, and even a minor storm with relatively small size hailstones can have a devastating effect. As well, damage to vehicles, roofs (residential & commercial), and landscaping are the other things most commonly damaged by hail. Hailstones also can pose a health risk to anyone who is caught outside without shelter during a hailstorm, as larger hailstones could cause serious injury. There were severe hailstorms in Belmond in 1985 and 2001, which caused damage to siding, roofing, windows, cars, and crops. The largest hail that occurred was 3 in. in diameter. While there may be a lot of monetary damages to property, the kind of damage has very limited impact as described above.
Speed of Onset	Hailstorms can occur suddenly, and without warning, often resulting from a severe thunderstorm or even a tornado. There can be some prediction; however, they cannot predict specifically when hailstorms will occur. There is less than 5 hours of warning time.

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Hazard	Communications Failure
Location	A Communication Failure is a city wide event when it happens. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There have been some incidents of communications failure, but no records of events could be found by the Planning Committee. There have been instances of communication failures in one company while other services are online, but people are unaware to the problems that are occurring. Locator services miss-locate where utility lines are and long distance lines get cut. Lines have also been brought down due to natural hazard events.
Probability	Based on historical evidence, there is a 26-75% chance of a communications failure happening in the City of Belmond during the course of the next year.
Vulnerability	In the event of a communications failure, the entire population of Belmond would be affected. This is the result that a portion of town may not be able to communicate, and the rest of the town would not be able to communicate with that section. The part of the population that would be most vulnerable to communication failure are those are injured, sick, or need help, and require the services of emergency staff such as ambulances or law enforcement. Facilities that are most vulnerable to communications failure are emergency facilities that require proper communication to provide aid to the residents of Belmond. Without communications, their reaction time is slowed, or they are unable to help in time.
Maximum Threat	26%-50% of the spatial extent of Belmond would be impacted by a communications failure because of the interconnectivity of the electrical system.
Severity of Impact	In the event of a communications failure, there would be only minor quality of life lost and no property damage. However, when combined with a natural hazard, such as a tornado, the effects could be much worse. The impact of communications failure can lead to further injuries or death to those that are in need of medical attention and cannot get the call out to receive that attention.
Speed of Onset	The committee estimated that there would be anywhere between 6-12 hours of warning time in the event of a communications failure.

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Hazard	Pipeline Incident
Location	Belmond is ¼ of a mile from a natural gas pipe line See Section 6 of this appendix for a map of the City.
Historical Occurrence	There has been one incident where a pipeline ruptured known by the Planning Committee. There also a cause of concern for the anhydrous pipelines from nearby Alexander which could potentially threaten Belmond in the event of an easterly wind.
Probability	There is a 26-75% chance of a pipeline incident occurring in Belmond during the coming year.
Vulnerability	The percentage of people, property, and critical facilities that would be affected by a pipeline incident would be fairly minimal, as only those properties in the immediate vicinity would be affected. The committee estimated that anywhere between 10%-25% of the people and property of Belmond would be affected by any one pipeline.
Maximum Threat	The spatial extent of the city of Belmond that would be impacted by a pipeline incident is estimated to be 10%-25% of the city, which is in correlation to the amount of people and property that would be affected by a pipeline incident.
Severity of Impact	The severity of impact depends on what kind of pipeline has the incident, what is contained within the pipeline, and whether or not there is a leak, rupture, or an explosion of some kind. With the response time of emergency personnel and the procedures that are followed, it is estimated that there could possibly be moderate injuries or illness (depending on the substance) or minor property damage.
Speed of Onset	There is never any kind of warning time of when a pipeline incident will occur.

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Hazard	HAZMAT – Fixed Facility
Location	There are a few fixed Hazardous Materials locations in Belmond. See Section 6 of this appendix for a map of the HAZMAT facilities.
Historical Occurrence	According to the Iowa DNR (Department of Natural Resources) there have been 12 hazardous material spills, with about 4 of them being related to fixed facilities, since 1995. The materials that have been spilled are materials such as sludge, propane, surpass, and fertilizer.
Probability	Given the recorded data, there have been 4 incidents in the last 12 years. It can be calculated that there is a 33% chance of a spill occurring each year, which falls within the 26-75% range of an event occurring during any given year.
Vulnerability	The population that is the most vulnerable to fixed facility events are the residents of Belmond that live in close proximity to the facilities that handle hazardous materials. Potentially the entire town is vulnerable, but the area that would be most subject to leaks and spills would be those that are closest to the building. The most vulnerable facilities would be the fixed facilities themselves. If there was a hazardous material event, it would be their building that would be subject to the most damage. So given that the most vulnerable people and properties are those that are closest to the fixed facilities, the hazard mitigation committee estimated that 10%-25% would be affected.
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be about 10%-25% of Belmond, due to the location of fixed facilities that use, or house, hazardous materials.
Severity of Impact	The impact of hazardous of materials on the City of Belmond in the past has not amounted to many damages. However, with the highway that runs through town and the close proximity to facilities that house hazardous material, the potential of a dangerous spill event is great. The impact of such an event depends on what material is spilled. Some hazardous materials that are stored within the plants in town are gaseous, so if they leaked they could cause serious harm to anyone that breathed them in. Other hazardous materials are very flammable, and if somehow they were to
Speed of Onset	There is never any warning when there is going to be a traffic incident involving hazardous materials, or when there is an incident at a fixed facility.

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Hazard	Grass & Wild Land Fires
Location	Grass and Wild Land Fires can startup on any field or glass land area, many of which surrounds the entire town of Belmond. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Grass & wildfires have occurred in Belmond in the past. Corn field fires are another event that is looked at in this category. The hazard mitigation committee estimated that that have been 6-9 occurrences in the past 5 years.
Probability	There is a possibility of grass & wildfires, or more likely corn field fires, occurring in Belmond since the city is surrounded by cultivated land. Given the historical occurrences and the landscape in and surrounding Belmond, the hazard mitigation committee felt that that a grass & wildfire event is possible, meaning that there is a 26%-75% chance of this type of hazard occurring during any given year.
Vulnerability	Properties in the community are vulnerable to grass & wildfires, however, due to the fast response of the local fire department the committee decided that any fires that did occur would be quickly contained. Thus less than 10% of the community would be vulnerable to grass & wildfires. The majority of the critical facilities of Belmond are located centrally within town, so many of them have a low vulnerability to grass & wild fires.
Maximum Threat	In concurrence with the vulnerability rating, the committee decided that the overall spatial extent of a grass & wildfire would cover less than 10% of the community.
Severity of Impact	The damages that would be incurred by grass & wildfires are relatively minor. Examples would be minor property damage, burnt vegetation, and potential minor fire damage to structures. The reason why the severity of impact was estimated to be so small is due to the quick response of the fire department.
Speed of Onset	Grass and wildfires occur very quickly and often without any warning.

Section 2: Vulnerability Assessment & Loss Estimates

The Hazard Mitigation Committee determined that the entire community is vulnerable to wide range of hazards, including: Structural Fire, Energy Failure, Windstorms, Winter Storms, Tornado, Thunderstorm and Lightning, Hailstorm, Communication Failure, and Pipeline Incident.

For Structural Fire, every structure in the community could be subject to the potential of a structural fire. Every building is built with materials that are flammable, and in the event of an accident of one kind, or another, the materials inside of a home can catch light, causing a structural fire. While if one building has a fire, the entire town might not be a risk, but every structure is vulnerable to fire.

In the event of a pipeline incident, just that localized area will suffer the effects of a pipeline leak, rupture, failure, etc. However, in the event of a pipeline incident, everyone in the community will feel the effects of it; whether it is in the form of disabled services, evacuation, etc. In this way, everyone is affected in the event of a pipeline incident.

Vulnerability Assessment for Structural Fire, Energy Failure, Windstorms, Winter Storms, tornadoes, Flooding, Thunderstorm and Lightning, Hailstorm, Communication Failure, and Pipeline incident.

Type of Structure	Number in City	Value of Structures	Number of People
Residential	1,095	\$57,586,400	1,260
Commercial	234	\$16,563,700	
Industrial	9	\$1,923,100	
Agricultural	46	\$36,600	
Governmental	9	\$23,104,845	

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There are some hazards that have more defined area of vulnerability. For Belmond, these hazards are HAZMAT, flooding, and Grass and Wildfires.

For HAZMAT, this includes any building that has any kind of hazardous materials. For completing the vulnerability assessment, the spatial study that was mentioned previously in the risk analysis has been used to determine the number of structure that would be affected. Buildings that are located near facilities that store or use hazardous materials will be more vulnerable to HAZMAT hazard events than buildings that are located further away.

Grass and Wild-land Fires could potentially start anywhere in town where someone is burning their grass clippings and the fire gets out of hand. However, grass/wildfires/corn fires will more likely occur on the perimeter of town where there is more green space, or in the case of Belmond, farmland. Thus, those building that are located on the perimeter of Belmond are more vulnerable to Grass and Wildfires than buildings that are located in the center of town.

Vulnerability Assessment for HAZMAT and Grass and Wild-land Fires

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard Area	% in Hazard Area	# in City	# in Hazard area	% in Hazard area
Residential	1,095	107	9.7	\$57,586,400	\$5,413,000	9.4	2,560	379	14.8
Commercial	234	60	25.6	\$16,563,700	\$5,799,600	35			
Industrial	9	4	44.4	\$1,923,100	\$1,188,500	61.8			
Agricultural	46	34	74	\$36,600	\$32,100	87.7			
Government	9	5	55	\$23,104,845	\$10,407,570	45			

The following lost estimates were calculated using the assessed residential and commercial values of Belmond.

Below are some general statistics of Belmond upon which the estimates are based.

Total Acres = 1,753 (according to parcel map)
 Sum of assessed residential structures = \$57,586,400
 Sum of assessed commercial structures = \$16,563,700
 Sum of assessed industrial structures = \$1,923,100
 Sum of assessed agricultural structures = \$36,600
 Total assessed value = \$76,109,800

Loss Estimate Methodology

To calculate the loss estimates of some of the hazards, the risk assessment scoring results were used for the percentage of damages. The category that was looked at was the Vulnerability category, as this category was used to determine the percentage of people and property that would be affected by each hazard. This was only used for hazard events that don't have a specific focal point, such as high winds, flash flooding, etc. These events are so broad that they generally affect the entire city. The following are the vulnerability results for these very broad storm events.

Winter Storms – 75%+
 Flooding – 50% - 75%+
 Tornado – 50% - 75%
 Windstorms – 50% - 75%
 Severe Thunderstorm and Lightning – 10% - 25%

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The next step was to calculate the damages that each property might have due to each of the hazards above. Again, the risk analysis results were consulted to try to determine the percentage of the assessed value that could be damaged. The category that was looked at was the Severity of Impact category, as this category was used to assess the severity of the hazard in terms of fatalities, injuries, property losses, and economic losses. The following are the Severity of Impact results for the storm events.

- Tornado – 4pts
- Flooding – 3pts
- Severe Thunderstorm and Lightning – 2pts
- Windstorms – 2pts
- Winter Storm – 1pts

Severity of Impact: Assessment of the severity in terms of fatalities, injuries, property losses, and economic losses	
Score	Description
1 point =	Few if any injuries or illness, minor quality of life lost with little or no property damage. Brief interruption of essential facilities or services for less than four hours.
2 points =	Minor injuries or illness, limited impact on quality of life and some property damage which does not threaten structural stability, slight interruption in essential services.
3 points =	More serious injuries or illness, minor or short term property damage which does not threaten structural stability, shutdown of essential services for 24 hours or more
4 points =	Serious injury or illness, major or long term property damage which threatens structural stability, shutdown or essential services and facilities for 24-72 hours.
5 points =	Multiple deaths, property destroyed or damaged beyond repair, complete shutdown of essential facilities and services for 3 days or more.

Given all of the factors above and the damages that might take place in each hazard, the following loss estimate percentages were calculated. A more detailed explanation of the percentages is included under each specific storm event loss estimate calculation.

- Tornado – 40%
- Flooding – 20%
- Windstorms – 5%
- Severe Thunderstorm and Lightning – 3%
- Winter Storm – 1%

Tornado Loss Estimate Calculation (see attached spatial extent map in Appendix F)

It was estimated by the Belmont Hazard Mitigation Committee that in the event of a tornado that it might affect 50% - 75% of the city. This is because of the random nature of tornadoes, how they can jump from house to house in a random manner. The size of Belmont also plays a factor because only the largest of tornadoes would affect the entire city. The Hazard Mitigation Committee felt that in the event of a tornado touching down in the city, that any properties that were affected would suffer an intense amount of damage.

Given these results from the risk analysis, it was decided that that 40% of the total assessed value of both residential and commercial structures would be an accurate loss estimate to predict potential losses in the event of a tornado touching down in the City.

- Sum of assessed residential structures of Belmont = \$57,586,400
- Sum of assessed commercial structures of Belmont = \$16,563,700
- Sum of the assessed industrial structures of Belmont = \$1,923,100

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Sum of the assessed agricultural structures of Belmond = \$36,600

Estimated residential damage due to Tornado (40%) = \$23,034,560

Estimated commercial damage due to Tornado (40%) = \$6,625,480

Estimated industrial damage due to Tornado (40%) = \$1,923,100

Estimated agricultural damage due to Tornado (40%) = \$14,640

Total loss estimate of Tornado = **\$31,597,780**

In 1966 an F5 tornado did touchdown in the middle of Belmond and caused widespread damage. Not only did it kill 6 people and injured 172 others, but it did a total of \$25,000,000 in damages. Due to the development in Belmond since that time, the loss estimate above would be the amount of damages that could be seen if another tornado touched down in Belmond.

Flooding Loss Estimate Calculation (see attached spatial extent map in Appendix F)

In the summer of 2008 the Iowa River flooded and overflowed into the city of Belmond. The water forced businesses to close, flooded basements, destroyed the contents of both homes and businesses, and limited travel in and out of town. The sewer system also did not work for a time because it was underwater.

The map is the approximate level of flooding that occurred in the summer of 2008. The map is based off the peak flooding elevation study done by Bolton & Menk, Inc.

Because of the heavy amount of flooding from the river, the areas that are shown as being affected in the map are estimated to have lost about 40% of the estimated structure value on those properties.

Sum of affected residential structures of Belmond = \$1,569,100

Sum of affected commercial structures of Belmond = \$3,007,600

Sum of affected industrial structures of Belmond = \$1,554,700

Estimated affected residential damage due to flooding (40%) = \$627,640

Estimated affected commercial damage due to flooding (40%) = \$1,203,040

Estimated affected industrial damage due to flooding (40%) = \$621,880

Total loss estimate due to flooding = **\$2,452,560**

Flash flooding occurs throughout the city of Belmond when there are heavy rains in a short period of time. The amount of water can overwhelm the storm sewer and can cause the sanitary sewer to get backed up. The water also can cause basements to be flooded.

Basements often are used as a place to store belongings and they are also the home for the furnace, water heater, and potentially the washer & dryer units. Repairs and/or replacement of the items that are stored in a basement can often be expensive.

Because of this it was estimated that 20% of the assessed value of both residential and commercial structures could be damaged by flash flooding. This accounts not only for the potential structural damage due to the water, but also the value of the contents that are housed basements.

Sum of assessed residential structures of Belmond = \$57,586,400

Sum of assessed commercial structures of Belmond = \$16,563,700

Sum of the assessed industrial structures of Belmond = \$1,923,100

Sum of the assessed agricultural structures of Belmond = \$36,600

Estimated residential damage due to flash flooding (20%) = \$11,517,280

Estimated commercial damage due to flash flooding (20%) = \$3,312,740

Estimated industrial damage due to flash flooding (20%) = \$384,620

Estimated agricultural damage due to flash flooding (20%) = \$7,320

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Total loss estimate of flash flooding = **\$15,221,960**

Windstorms Loss Estimate Calculation (see attached spatial extent map in Appendix F)

Windstorm events are very similar to severe thunderstorm and lightning events, except the wind speed can be more severe as for a high wind event to be recorded, the wind has to be blowing 50mph or greater. The high winds can cause damages to roofs, trees, power lines, basically anything that is left outside as any debris can be blown.

The damage that can occur is widespread, and can occur in both residential and commercial areas. It was estimated that 5% of the assessed values of residential and commercial structures might occur due to high winds.

Sum of assessed residential structures of Belmont = \$57,586,400
Sum of assessed commercial structures of Belmont = \$16,563,700
Sum of the assessed industrial structures of Belmont = \$1,923,100
Sum of the assessed agricultural structures of Belmont = \$36,600

Estimated residential damage due to high winds (5%) = \$2,879,320
Estimated commercial damage due to high winds (5%) = \$828,185
Estimated industrial damage due to high winds (5%) = \$96,155
Estimated agricultural damage due to high winds (5%) = \$1,830
Total loss estimate of high winds = **\$3,805,490**

Severe Thunderstorm and Lightning Loss Estimate Calculation (see attached spatial extent map in Section 6)

Severe Thunderstorm and Lightning events is a hazard that is very broad, and during a storm, its affects would be felt throughout the entire city of Belmont. Thunderstorms can generate high winds, causing damage typical of high wind events which include damaging trees by breaking limbs or branches, downed power lines from falling branches, and even structural damages from falling debris, such as damage to roofs.

The damage that can occur is widespread, and can occur in both residential and commercial areas. It was estimated that 3% of the assessed values of residential and commercial structures might be occur due to severe thunderstorms and lightning. This also includes any contents that could be lost due to water damage, damages due to power surges, or content loss that might occur due to power failure.

Sum of assessed residential structures of Belmont = \$57,586,400
Sum of assessed commercial structures of Belmont = \$16,563,700
Sum of the assessed industrial structures of Belmont = \$1,923,100
Sum of the assessed agricultural structures of Belmont = \$36,600

Estimated residential damage due to severe thunderstorms and lightning (3%) = \$1,727,592
Estimated commercial damage due to severe thunderstorms and lightning (3%) = \$496,911
Estimated industrial damage due to severe thunderstorms and lightning (3%) = \$57,693
Estimated agricultural damage due to severe thunderstorms and lightning (3%) = \$1,098
Total loss estimate of high winds = **\$2,283,294**

Winter Storms Loss Estimate Calculation (see attached spatial extent map in Appendix F)

Winter Storms is another hazard that affects the entire town. When a winter storm hits the city of Belmont it affects the entire city. The effects of a winter can be wide ranging, including blizzard conditions, heavy snow, blowing snow, heavy sleet, extreme cold, ice storms and freezing rain. There can be high winds, power outages, downed tree limbs, and hindrance to travel.

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To determine the loss estimate of winter storms it was determined to take 1% of the assessed values of residential and commercial structures that might occur due to winter storms due to the damage that can occur during winter storm events. While everyone is vulnerable to winter storms, the severity of impact is often very low.

Sum of assessed residential structures of Belmond = \$57,586,400
Sum of assessed commercial structures of Belmond = \$16,563,700
Sum of the assessed industrial structures of Belmond = \$1,923,100
Sum of the assessed agricultural structures of Belmond = \$36,600

Estimated residential damage due to winter storms (1%) = \$575,864
Estimated commercial damage due to winter storms (1%) = \$165,637
Estimated industrial damage due to winter storms (1%) = \$19,231
Estimated agricultural damage due to winter storms (1%) = \$366
Total loss estimate of winter storms = **\$761,098**

Grass & Wild-land Fire Loss Estimate Calculation (see attached spatial extent map in Section 6)

A spatial analysis of Belmond was done to look at all of the properties in Belmond that is located next to agricultural land, and land that has lots of vegetation. It can be assumed that these properties in particular would have a greater potential of being affected by grass and wild-land fires since that are located in close proximity to land that can generate such events. Properties located in the center of town are surrounded by other homes and paved streets, which reduces the chance of such an event occurring there. As was described in the risk analysis results, the damages that would be incurred, if they are incurred at all, would be very minor. Thus, it was decided that the 2% of the assessed values of the potentially affected properties could possibly be damaged by grass and wild-land fires.

Sum of assessed residential of potential grass & wild-land fire affected properties in Belmond = \$61,848,600
Sum of assessed commercial of potential grass & wild-land fire affected properties in Belmond = \$8,548,700

Estimated residential damage due to grass & wild-land fires in Belmond (2%) = \$195,446
Estimated commercial damage due to grass & wild-land fires in Belmond (2%) = \$26,954
Total estimated damages due to grass & wild-land fires = **\$222,400**

HAZMAT Loss Estimate Calculation (see attached spatial extent map in Section 6)

The city of Belmond has industrial fixed facilities that are located within the center of town that contain hazardous materials. These materials are safely contained and there haven't been any issues of accidental releases or spills of materials. However, to perform a loss estimate due to a hazardous materials event a spatial analysis was done to see what kind of damages could be incurred.

The hazardous materials that are stored at the industries located in Belmond vary in physical state from liquid to gaseous. They also have different harmful effects from being flammable to poisonous. Therefore the damages that could occur in a hazardous materials event vary greatly. Some examples is that something could explode causing minor to major structural damage to buildings located within close proximity to the explosion. A release of anhydrous ammonia could cause injuries to those nearby to the release or even death.

To further elaborate on the damages anhydrous ammonia can do to the body, the description of different types of exposure, and how to try to treat it, is given below.

Skin

Anhydrous ammonia causes freezing and chemical burn wherever skin and clothing are moist. The subzero temperature of escaping anhydrous ammonia freezes clothing to the body. Do not attempt to

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remove any clothing that is frozen to the skin. It must be thawed loose first or skin tissue may be pulled from the victim.

The caustic nature of anhydrous ammonia causes skin and tissue burns similar to burns from heat. Do not apply salves, creams or ointments of any kind of the injury. The caustic burning can be stopped only by dilution with large quantities of water.

Eyes

Eyes are continually bathed in moisture. Anhydrous ammonia will seek this moisture. The burns will result in damage to the eyes, such as cataracts, glaucoma and possibly some permanent vision loss and disfigurement.

If eyes have been exposed to anhydrous ammonia, they must be flushed with water immediately and continually and the victim must be taken to a doctor immediately. Everyone who works with anhydrous ammonia should carry a 6-8 ounce squeeze bottle of fresh water on their person at all times. This small amount of water will last only long enough for the worker to get to a larger quantity of water, but it may make the difference between blindness and sight.

Initially, forcing the victim's eyelids open after the exposure may be necessary. The ammonia trapped under the eyelids must be flush out with water or it will continue to burn the eye and related tissues.

Lungs

At low concentrations, the odor of anhydrous ammonia usually will drive the unprotected worker away from the scene. At a higher level of concentration, the worker may not escape without inhaling a dangerous dose. The entire respiratory system is very moist, so anhydrous ammonia will be attracted naturally to that part of the body. When a concentrated level of anhydrous ammonia is inhaled, it will burn the respiratory system quickly. The victim may hurt too much to breathe. The respiratory system essentially may be paralyzed due to the pain.

First-response rescue workers may not be able to treat a serious inhalation exposure. Medical technicians may be able to administer oxygen to aid breathing after their arrival on the scene. Maintaining adequate respiration for the victim until delivery to a medical facility may be difficult. Respiratory protection is extremely important, but also limited in what equipment is available. A two cartridge respirator is effective only for exposure levels of less than 300 ppm. Canister type respirators may be effective for longer periods at higher concentrations, but without skin protection, walking through an ammonia cloud is generally no advisable. A self-contained breathing apparatus (SCBA), which supplies the air to be breathed and a sealed, protective HAZMAT suit are required for working in a cloud of escaping anhydrous ammonia. Anything less will not sufficiently protect a person in this situation.

To calculate the loss estimate due to a hazardous material event a buffer zone of a quarter mile was created around each property with an industrial use. The quarter mile was used as the buffer zone as it was estimated that this distance would contain the average area of the numerous amount of incidents that could occur. Once the buffer zone was established, it was estimated that 10% of the assessed structure value would be an appropriate amount to estimate the cost of damages.

Sum of assessed residential in potential hazmat zone (1/4 mile) in Belmond = \$26,137,900

Sum of assessed commercial in potential hazmat zone (1/4 mile) in Belmond = \$7,076,900

Estimated residential damages in potential zone due to hazmat in Belmond (10%) = \$2,613,790

Estimated commercial damages in potential zone due to hazmat in Belmond (10%) = \$707,690

Total estimated damages due to HAZMAT = **\$3,321,480**

Hailstorm Loss Estimate Calculation

A hailstorm is a widespread event that would have an effect on the entire city of Belmond. However, the size of the hail can vary vastly between each event, ranging from pea to softball size hail. Even when the

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size of the hail has the potential of damaging either structures or above ground utilities, the damages incurred are not constant throughout the town. Instead of taking a percentage of the assessed value of the residential and commercial structures, it was decided to instead take the averages of all the hailstorm events recorded by the NCDC. That process is shown below:

Size of Hail	Property Damage	Crop Damage
1.75 in	\$15,000	\$90,000
1.00 in	\$5,000	\$0
0.88 in	\$0	\$5,000
1.50 in	\$25,000	\$20,000
1.00 in	\$3,000	\$10,000
0.88 in	\$3,000	\$5,000
1.75 in	\$50,000	\$5,000
0.88 in	\$2,000	\$0
1.75 in	\$10,000	\$5,000
1.00 in	\$5,000	\$0

Total Property = \$118,000
Total Crop = \$140,000
Total Damages = \$258,000

Average Property = \$11,800
Average Crop = \$14,000
Average Total Damages = **\$25,800**

The following hazards cannot quite be quantified in monetary values as many of the following hazards don't directly cause structural or property damage. Instead a description of what could occur is given for each hazard.

Communication Failure Loss Estimate

Communications failure isn't going to cause any kind of structural damage or contents loss, so there really can't be any monetary value in damages that can be associated with it. However, in some situations communications failure can be the cause of loss of business, and in some cases, loss of life.

Widespread communications failure can cripple businesses that are dependent on constant communication, for example, businesses depend on the internet for servicing and communicating with customers. When this source of communication is lost or disabled for a short period of time that kind of business is unable to operate and begin to lose money.

Communications failure also can cause injuries or loss of life. In such an event, emergency staff would not be able to communicate with one another, but even more importantly, citizens would not be able to contact emergency staff. Someone in need of immediate attention might not get it, or if they do, it might be too late. Constant communication allows for multiple branches of emergency staff to operate cohesively, and when this communication breaks down, so can the efficiency in how well emergency staff serves the community.

Structural Fire Loss Estimate

Every year the Belmont Fire Department responds to more than 50 fires each year. However, there is a lack of data to show how much losses are incurred due to structural fires every year in Belmont. So instead, a description of potential damages will be given.

Damages due to structural fire can range from anything from minor aesthetic damage to potential endangering structural stability due to a fire completely gutting a house. There are many factors that

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determine the strength and magnitude of a fire: wind, fuel source, congestion of structures, etc. These factors, combined with how effectively the local fire department can respond and deal with the fire, determine the amount of damages that a structure will have at the end of a fire.

Energy Failure Loss Estimate

Energy failure can be the result of many different hazard events, such as High Winds, Winter Storms, Extreme Heat, Tornadoes, Severe Thunderstorm and Lightning, etc. Each of those events can cause energy failure to occur, mostly due to the downing of power lines either from high winds, ice, or downed transformers.

Energy failure can, and has, caused the shutdown of essential services for periods of 24-72 hours. This loss of electricity can cause many serious problems throughout town, from the shutdown of water pumps in plants and sump pumps in people's homes. This energy failure can cause communication loss, which makes it hard for emergency services to communicate with each other and the citizenry of Belmont; as well as making it hard for businesses to operate. The longer that the city goes without power, the greater the number of problems will begin to spring up.

Pipeline Incident Loss Estimate

There has only been one pipeline incident in Belmont, and thankfully no one was injured and there wasn't any kind of substantial property damage; however, the potential for such an event to occur is there.

The pipeline that was the main cause of concern for the committee was the anhydrous pipelines that run from Alexander, which could potentially threaten Belmont in the event of an easterly wind. If this happened, a large portion of Belmont would have to be evacuated to avoid any injuries, or more serious health issues, due to the anhydrous gas.

Anhydrous gas is often combined with ammonia to form anhydrous ammonia which is used in farming as a fertilizer. However, when pressure is released, liquid anhydrous ammonia quickly converts to a gas. Anhydrous means without water. So, when anhydrous ammonia comes in contact with any moisture, the water and ammonia rapidly combine. When that anhydrous ammonia gas comes into contact with your eyes, skin, or mucous membranes, ammonia will cause rapid dehydration and severe burns as it combines with the moisture that's present on the human body.

Anhydrous ammonia is caustic and causes severe chemical burns. Body tissues that contain a high percentage of water, such as the eyes, skin, and respiratory tract, are very easily burned. Victims exposed to even small amounts of ammonia require immediate treatment with large quantities of water to minimize the damage.

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Project	STAPLEE Results
Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance	15
Further training on how to handle pipeline incidents	13
Build communication between neighboring cities/counties	12
Investigate shelter locations	12
Designate shelters	11
Promote Code Red	10
More public education and awareness	10
Map all fiber optic lines	10
Work with Alliant Energy to mitigate energy disruption	9
Valve system in RV park, manholes, and clean out station	8
Smoke detectors & fire extinguisher program	7
Generator system for city hall & ambulance	7
Living snow fences	6
Work with NWS to get weather radio to function properly	6
Further flood analysis and building of any recommended projects	6
Building of tornado safe room	5
Replace fire truck	5
GPS mapping of all utility lines	2

City Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: To reduce or eliminate injury and property damage due to the natural hazards that afflicts the City of Belmond (High Winds, Winter Storms, Tornadoes, Flooding, Thunderstorm and Lightning, Hailstorm, and Grass & Wildfires)

Objective 1.1: High Winds

Mitigation Actions

1.1.1: Promote Code Red

1.1.2: Work with NWS to get weather radios to function properly

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Objective 1.2: Winter Storms

Mitigation Actions

- 1.2.1: Build communication between neighboring cities/counties
- 1.2.2: Investigate shelter locations
- 1.2.3: Designate shelters
- 1.2.4: Promote Code Red
- 1.2.5: Generator system for city hall & ambulance
- 1.2.6: Living snow fences
- 1.2.7: Work with the NWS to get weather radios to function properly

Objective 1.3: Tornadoes

Mitigation Actions

- 1.3.1: Build communication between neighboring cities/counties
- 1.3.2: Investigate shelter locations
- 1.3.3: Designate shelters
- 1.3.4: Promote Code Red
- 1.3.5: Work with the NWS to get weather radios to function properly
- 1.3.6: Building of tornado safe room

Objective 1.4: Flooding

Mitigation Actions

- 1.4.1: Build communication between neighboring cities/counties
- 1.4.2: Valve system in RV park, manholes, and clean out station
- 1.4.3: Debris removal from river
- 1.4.4: Further flood analysis and building of any recommended projects
- 1.4.5: Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance

Objective 1.5: Thunderstorms and Lightning

Mitigation Actions

- 1.5.1: Investigate shelter locations
- 1.5.2: Designate shelters
- 1.5.3: Promote Code Red
- 1.5.4: Lightning protection
- 1.5.5: Generator system for city hall & ambulance
- 1.5.6: Work with the NWS to get weather radios to function properly

Objective 1.6: Hailstorms

Mitigation Actions

- 1.6.1: Promote Code Red
- 1.6.2: Work with the NWS to get weather radios to function properly

Objective 1.7: Grass and Wildfires

Mitigation Actions

- 1.7.1: Promote Code Red
- 1.7.2: Replace fire truck

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Goal 2: To reduce or eliminate injury and property damage due to man-made hazards that could affect the City of Belmont (Structural Fire, Energy Disruption, Communications Failure, Pipeline Incident, and HAZMAT – Fixed Facility)

Objective 2.1: Structural Fire

Mitigation Actions

- 2.1.1: More public education and awareness
- 2.1.2: Smoke detectors & fire extinguisher program
- 2.1.3: Replace fire truck

Objective 2.2: Energy Disruptions

Mitigation Actions

- 2.2.1: Promote Code Red
- 2.2.2: Map all fiber optic lines
- 2.2.3: Work with Alliant energy to mitigate energy disruption
- 2.2.4: Generator system for city hall & ambulance
- 2.2.5: GPS mapping of all utility lines

Objective 2.3: Communications Failure

Mitigation Actions

- 2.3.1: Map all fiber optic lines
- 2.3.2: GPS mapping of all utility lines

Objective 2.4: Pipeline Incidents

Mitigation Actions

- 2.4.1: Further training on how to handle pipeline incidents
- 2.4.2: Promote Code Red
- 2.4.3: More public education and awareness

Objective 2.5: HAZMAT – Fixed Facility

Mitigation Actions

- 2.5.1: Promote Code Red

Section 4: Action Plan

The Belmont Hazard Mitigation Committee did do a cost-benefit review of each of the mitigation actions during their review of them. Each action was taken through the STAPLEE analysis, and in that analysis the committee looked at whether or not there would be an economic benefit or an economic cost, as well as; whether or not the community would accept it, could the community administer the action, is the action technically feasible, etc. It was also discussed during the meetings how much a hazard mitigation action might cost and how much benefit might come out of that spending.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance	
Description	The City of Belmont will continue participating in the NFIP, and will continue to update and enforce their floodplain ordinance.
Hazards Addressed	Flooding
Priority	I
Responsible Dept./Party	City of Belmont: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund, State and Federal Grants
Mitigation Measure Category	Prevention Action
Target Completion Date	Ongoing

Further training on how to handle pipeline incidents	
Description	The first responders to the scene of a pipeline incident are most likely to be the local emergency staff. This action is for the continued training of emergency staff so that they can safely and properly respond to a pipeline incident.
Hazards Addressed	Pipeline Incident
Priority	I
Responsible Dept./Party	Fire & Police Department
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Build communication between neighboring cities/counties	
Description	This action is to build communication between neighboring cities and counties so that in the event of a disaster, outside assistance could be a possibility.
Hazards Addressed	Flooding, Tornadoes, Winter Storms
Priority	I
Responsible Dept./Party	City Manager
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Public Education and Awareness Mitigation Action
Target Completion Date	Ongoing

Investigate shelter locations	
Description	This action is to investigate possible shelter locations throughout the city. These would most likely be existing structures that are either open to the public, or would be voluntarily open to the public in the event of a disaster where shelter may be needed.
Hazards Addressed	Tornadoes, Winter Storms, Thunderstorms and Lightning
Priority	I
Responsible Dept./Party	Wright County Emergency Management
Estimated Cost	Minimal
Potential Funding Source	Wright County Emergency Management
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Designate shelters	
Description	This action would be to designate the previously investigated locations as shelters.
Hazards Addressed	Tornadoes, Winter Storms, Thunderstorms and Lightning
Priority	I
Responsible Dept./Party	Wright County Emergency Management
Estimated Cost	Minimal
Potential Funding Source	Wright County Emergency Management
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

Promote Code Red	
Description	This action is to continue to promote the Code Red program, as well as to promote community participation in the program.
Hazards Addressed	Energy Disruption, High Winds, Tornadoes, Winter Storms, Thunderstorm and Lightning, Hailstorm, Pipeline Incident, Fixed Facility – HAZMAT, Grass & Wildfire
Priority	I
Responsible Dept./Party	Wright County Emergency Management
Estimated Cost	Minimal
Potential Funding Source	Wright County Emergency Management
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

More public education and awareness	
Description	This action is to increase awareness and educate the public on the proper actions to take in the event of a hazard.
Hazards Addressed	Structural Fire, Pipeline Incident, Fixed Facility – HAZMAT
Priority	I
Responsible Dept./Party	Fire & Police Department
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

Map all fiber optic lines	
Description	Mapping all of the fiber optic lines in town would reduce the number of energy disruptions and communications failure by reducing the frequency that lines are accidentally cut.
Hazards Addressed	Energy Disruption, Communication Failure
Priority	I
Responsible Dept./Party	Public Works
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Prevention Action
Target Completion Date	2016

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Work with Alliant energy to mitigate energy disruption	
Description	Communicate and work with Alliant Energy to mitigate energy disruptions.
Hazards Addressed	Energy Disruption
Priority	I
Responsible Dept./Party	City Manager
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

Valve system in RV park, manholes, and clean out station	
Description	Install a valve system in the RV park, manholes, and clean out stations that seals out the intake of water. This would reduce the amount of water taken in by the sanitary sewers.
Hazards Addressed	Flooding
Priority	II
Responsible Dept./Party	Public Works
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Structural Mitigation Actions
Target Completion Date	2014

Smoke detectors & fire extinguisher program	
Description	This program would consist of an educational program for how to use fire extinguishers and providing smoke detectors for those that don't have them in their home.
Hazards Addressed	Structural Fire
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Low
Potential Funding Source	Grant Funds, Association Funds, and General Fund
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

Generator system for city hall & ambulance	
Description	A generator system for the city hall and the ambulance building would allow these facilities to stay open and continue to serve the public in the event of a city wide power outage.
Hazards Addressed	Energy Disruption, Thunderstorm and Lightning, Winter Storms
Priority	II
Responsible Dept./Party	Public Works, City Manager, Trees Forever
Estimated Cost	Moderate
Potential Funding Source	General Fund
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2015

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Living snow fences	
Description	Living snow fences are living barriers (generally trees, bushes, and other varying vegetation) that are planted with the intention of mitigation the effects of drifting snow. These living snow fences would be planted in parts of town where there is the highest frequency of snow drifts.
Hazards Addressed	Winter Storms
Priority	II
Responsible Dept./Party	Public Works, City Manager, Trees Forever
Estimated Cost	Minimal
Potential Funding Source	General Fund, Grants
Mitigation Measure Category	Property Protection Actions
Target Completion Date	2015

Work with the NWS to get weather radio to function properly	
Description	Continue to work with the National Weather Service to get NOAA radios to function properly throughout Belmond and promote Code Red.
Hazards Addressed	High Winds, Tornadoes, Winter Storms, Thunderstorm and Lightning, Hailstorm
Priority	II
Responsible Dept./Party	Police Department
Estimated Cost	Minimal
Potential Funding Source	General Fund
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2017

Further flood analysis and building of any recommended projects	
Description	This action is to continue flood analysis and the building of any recommended projects that result from those flood analysis
Hazards Addressed	Flooding
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	High
Potential Funding Source	FEMA, CDBG, State HAS, and General Fund
Mitigation Measure Category	Structural Mitigation Action
Target Completion Date	2018

Building of tornado safe room	
Description	This action is for the building of a public accessible safe room for people in town that don't have access to basements or other safe places to go in the event of a tornado.
Hazards Addressed	Tornadoes
Priority	III
Responsible Dept./Party	City Council, Belmond Schools
Estimated Cost	High
Potential Funding Source	FEMA, USDA, School Budget, and General Fund
Mitigation Measure Category	Structural Mitigation Action
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Replace fire truck	
Description	Having a new fire truck would enable the fire department to better deal with structural and grass & wild fires
Hazards Addressed	Structural Fire, Grass & Wild Fire
Priority	III
Responsible Dept./Party	Fire Department, City Council
Estimated Cost	High
Potential Funding Source	General Fund, Bonds, and Local Option Sales Tax
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2018

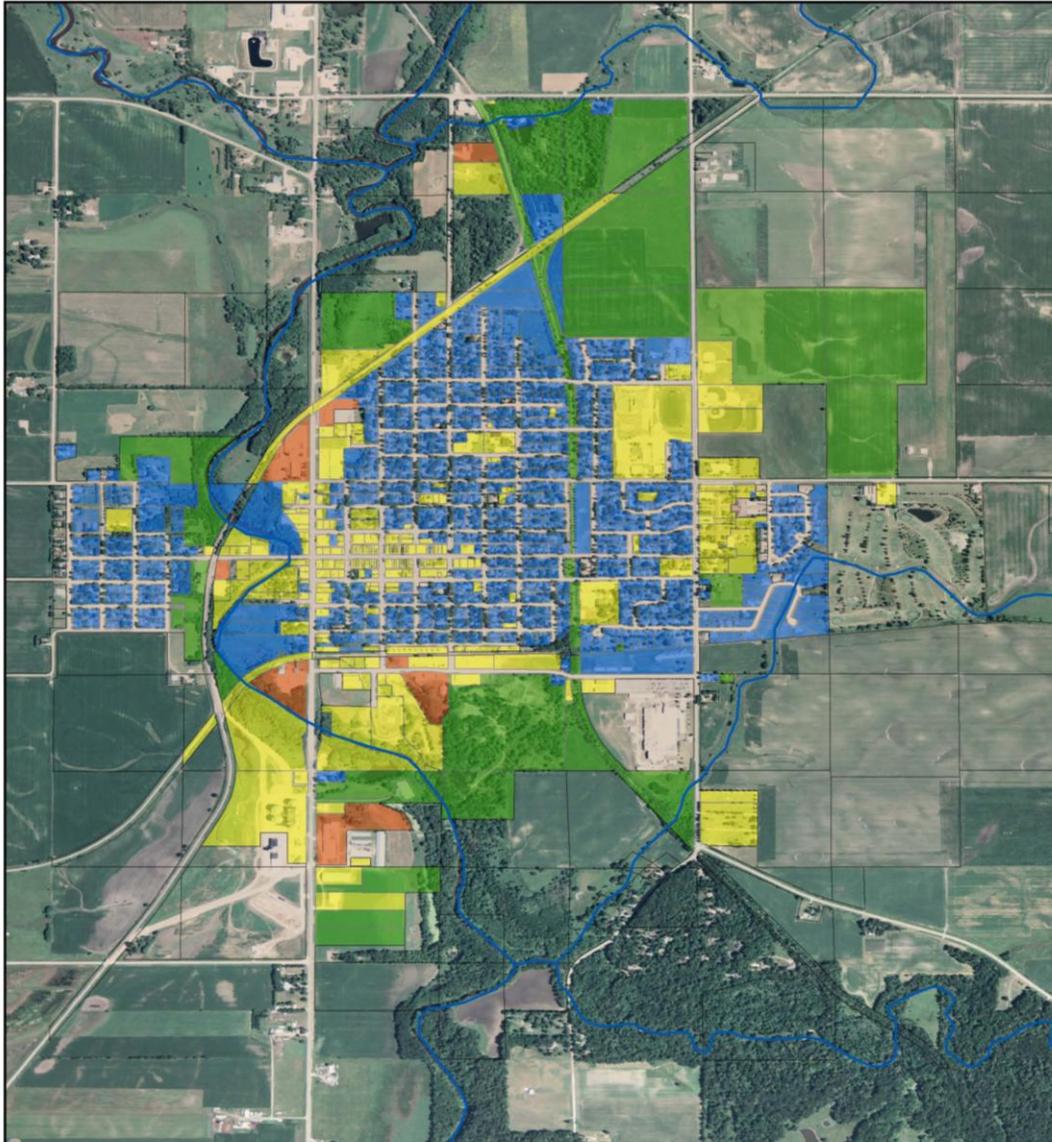
GPS mapping of all utility lines	
Description	The GPS mapping of all utility lines would not only be great information to have, but it would also lessen the chance of energy disruption and communications failure due to accidental cutting of lines.
Hazards Addressed	Energy Disruption, Communication Failure
Priority	III
Responsible Dept./Party	Public Works
Estimated Cost	Low
Potential Funding Source	General Fund
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

Section 5: Critical Facilities

- Belmond City Hall and Police Station
- Belmond Fire Station
- Ambulance Shed
- Belmond Hospital
- Belmond Water treatment Plant
- Belmond sewage treatment plant
- Lift stations
- Belmond public library
- Belmond public works shed

Section 6: Community Maps

Assessed Residential, Commercial, Industrial,
and Agricultural Properties



Legend

Rivers

parcels_Belmond_03192008_attributes

<all other values>

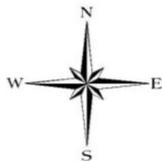
CLASS

Residential

Commercial

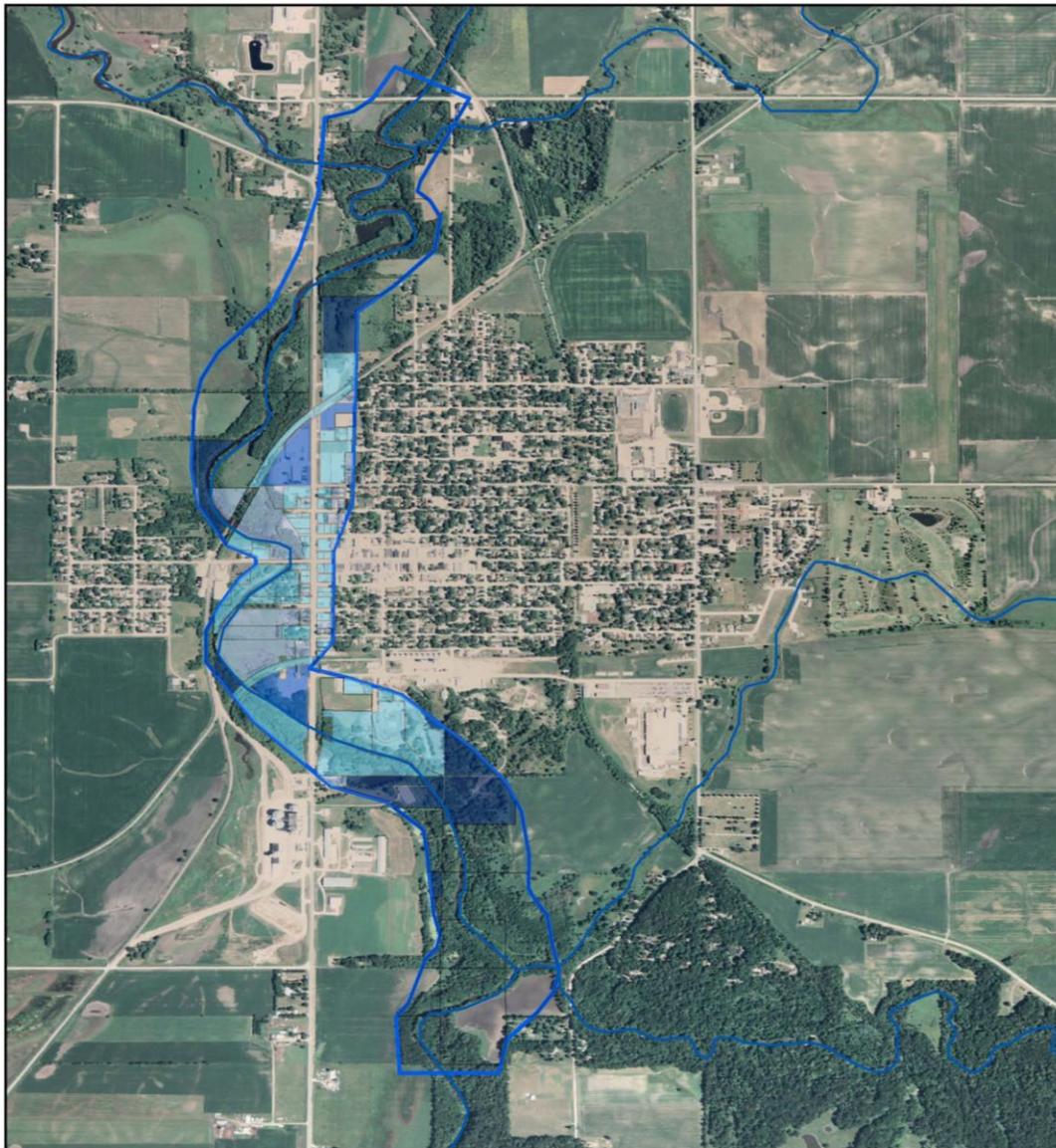
Industrial

Agricultural

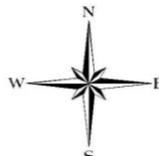


The assessed values of residential commercial, and industrial structures, which were used in the loss estimate for: Tornadoes, Flooding, High Wind, Severe Thunderstorm and Lightning, and Winter Storm

Approximate 2008 flooding based off of Bolton & Menk elevation analysis



- Legend**
- Rivers
 - Affected Properties**
 - <all other values>
 - CLASS**
 - Residential
 - Commercial
 - Industrial
 - Agricultural
 - Approximate Extent of Flooding



The assessed values of residential, commercial, and industrial structures shown, were used in the loss estimate for: Flooding

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49669858&IFTT=1

Intranetix Viewer [19197C0180C.png]

FEMA

Info

Scale: 4 %

Help

Zoom Win Zoom In 1:1 Zoom Out Pan Zoom In MAX Zoom Out

Make a FIRMette

FIRM - Flood Insurance Rate Map
WRIGHT COUNTY, MISSOURI

LEGEND

Legend

Legend

12/20/2012 6:36 PM

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49730163&IFIT=1

Intranetix Viewer [19197C0160C.png]

FEMA

Info

Scale: 4 %

HELP TOOLS

Zoom Win **Zoom In** **1:1 Zoom In** **MAX Zoom Out** **Make a FIRMette**

Pan **Zoom Out**

LEGEND

FIRM

12/20/2012 6:37 PM

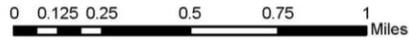
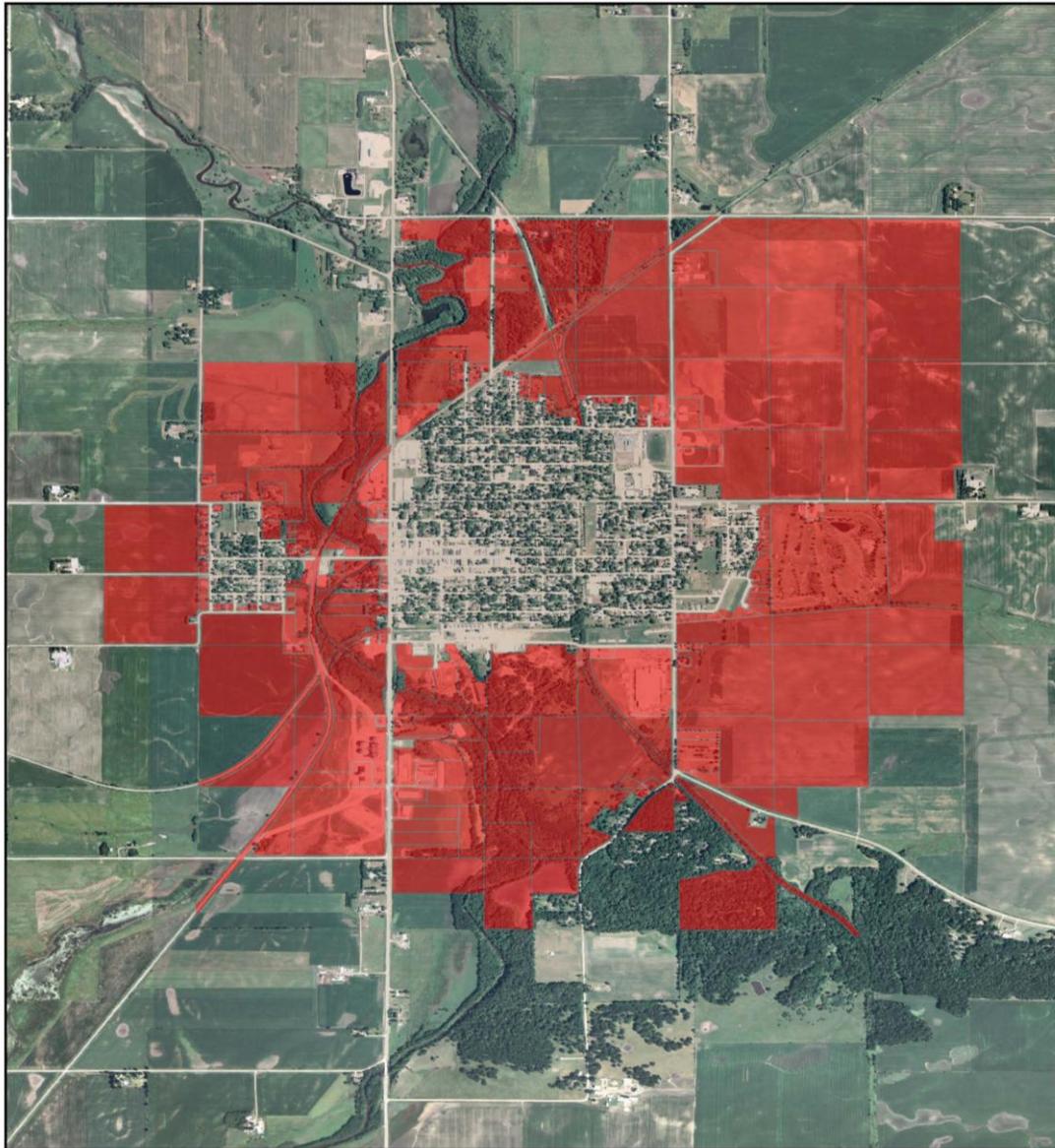
Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49730163&IFIT=1

Intranetix Viewer [19197C0160C.png]

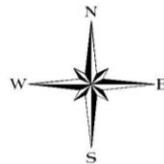
The screenshot displays the FEMA Intranetix Viewer interface. At the top left is the FEMA logo. Below it is a scale bar showing a scale of 4%. To the right of the scale bar is an information icon. The main area of the viewer is a map of Wright County, Minnesota, showing various flood hazard zones in shades of blue and green. The map is overlaid on a grid. Below the map, there is a toolbar with several navigation tools: a hand icon for 'Pan', a magnifying glass with a plus sign for 'Zoom In', a magnifying glass with a minus sign for 'Zoom Out', a magnifying glass with a double plus sign for '1:1', and a magnifying glass with a double minus sign for 'MAX'. Below the toolbar is a button labeled 'Make a FIRMette'. On the right side of the viewer, there is a legend titled 'LEGEND' and a title block containing the text 'FIRM' and 'WRIGHT COUNTY HAZARD MITIGATION PLAN'. The bottom of the viewer shows a status bar with the text '19197C0160C.png'.

Potential Properties Affected by Grass & Wild Fire



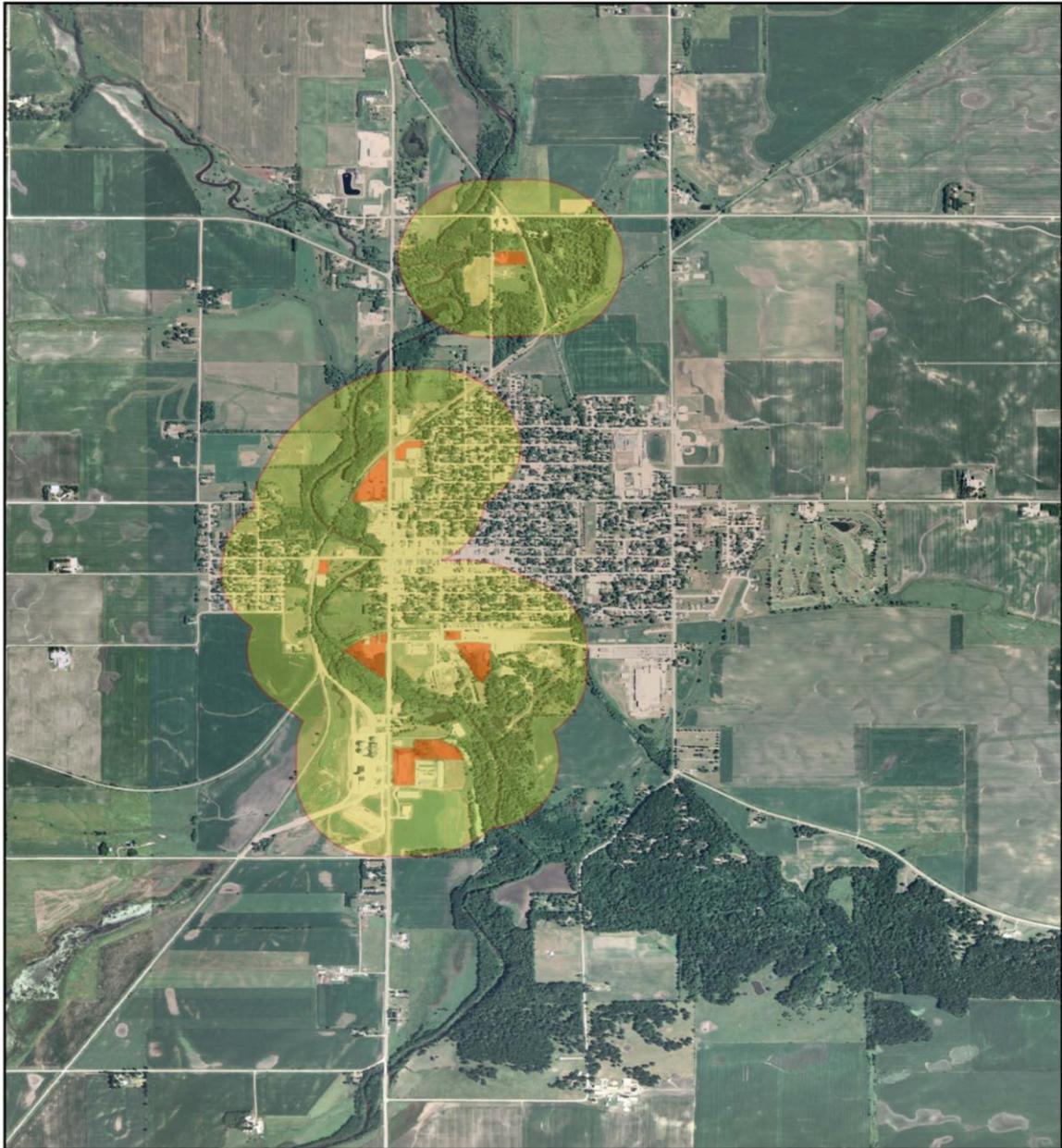
Legend

 Potential properties affected by grass and wild fires



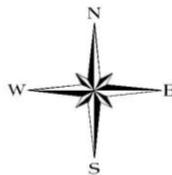
The assessed values of residential commercial, and industrial structures, which shown, were used in the loss estimate for: Grass & Wild Fire

Potential 1/4 Mile Hazard Zone & Potential Affected Properties



Legend
1/4 mile hazard zone
Industry

0 0.125 0.25 0.5 0.75 1 Miles



The assessed values of residential commercial, and industrial structures, which shown, were used in the loss estimate for: HAZMAT

Section 7: Hazard Mitigation Committee Meeting Minutes

First Hazard Mitigation Meeting, November 25, 2008

Meeting attended by: Frank Meninio, Wayne Bruggeman, Ron Schachtner, Jim Chelesvig, Mark Dirks, Rex Peterson, Steve Soma, Steve Been, and Lee Ann Waltzing

Meeting started at 7:00 pm

- Everyone introduced themselves
- Talked about how the flooding in 2008 affected the business of PSI
- Explained what exactly a hazard mitigation plan is
- Explained the responsibilities of the committee and explained the process of developing the hazard mitigation plan
- Explained how to involve the public
- Explained how soft match works
- Discussed the best way of communicating with the committee. It was decided that sending everything in advance via e-mail, and using e-mail as the primary source of communication would be the best way
- Discussed whether or not the City could get funds for work that is being done right now
- Discussed setting up a regular meeting time: Every 2nd Wednesday of the month at 12pm in City Hall

Meeting ended at 8:10 pm

Second Hazard Mitigation Meeting, December 17, 2008

Meeting attended by: Frank Bemnio, Ron Schachtner, Jim Chelesvig, Mark Dirks, Steve Soma, Steve Been, Lee Ann waltzing, Jim Lester, Marty Schuman, and Mark Bruns

Meeting started at 12:05 pm

- Introductions
- Looked at the critical facilities map and made edits
- Went through the hazard data and maps for the City of Belmond
- Discussed how each hazard had affected the City of Belmond in the past

Meeting ended at 1:50 pm

Third Hazard Mitigation Meeting, January 14, 2009

Meeting attended by: Steve Soma, Mark Dirks, Ron Schachtner, Lee Ann Waltzing, Him Chelesvig, Steve Been, Marty Schuman, and Frank Bemnio

Meeting started at 12:05 pm

- The hazard mitigation committee held a teleconference with NWS staff discussing possibilities of river gauges
- Belmond hired an engineering firm to do flood study of the 2008 flood. An engineer from the firm (Bolton & Menk) gave a presentation of those results
- The committee decided to perform the hazard risk analysis outside of a hazard mitigation meeting

Meeting ended at 2:00 pm

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Fourth Hazard Mitigation Meeting, February 11, 2009

Meeting attended by: Steve Soma, Ron Schachtner, Steve Been, Frank Beminio, Wayne Bruggeman, Mark Dirks, Sid Swenson, and Lee Ann Waltzing

Meeting started at 12:00 pm

- Discussed the changes that FEMA made to the requirements of the plan
- The committee went over the risk analysis results and decided to not make any changes, but to eliminate hazards from consideration that had a had a rating below 16
- Listed hazard mitigation actions for every hazard that will continue to be in the plan
- Determined objectives for those hazard mitigation actions
- Came up with goals to precede those objectives

Meeting ended at 1:45 pm

Fifth Hazard Mitigation Meeting, March 11, 2009

Meeting attended by: Mark Dirks, Sid Swenson, Wayne Bruggeman, Lee Ann Waltzing, Jeff Zogg, Steve Soma, Steve Been, and Marty Schuman.

Meeting started at 12:00 pm

- Started and finished the STAPLEE analysis for each of the hazard mitigation actions that the committee has listed out for the plan
- Discussed the time that I may need to perform an analysis of the critical facilities, loss estimates, and BCR of all the hazard mitigation actions

Meeting ended at 1:30 pm

Sixth Hazard Mitigation Meeting, May 13, 2009

Meeting attended by: Ron Schachtner, Wayne Bruggeman, Sid Swenson, Steve Soma, Mark Dirks, Frank Beminio, Marty Schuman, Lee Ann Waltzing, and Jim Chelesvig

Meeting started at 12:00 pm

- Discussed the prioritization of mitigation actions taking into consideration the results of the STAPLEE analysis as well as the realistic starting of hazard mitigation actions.

Priority I: Mitigation Actions that will be started/done in 1 year

Priority II: Mitigation actions that will be started/done in 2-4 years

Priority III: Mitigation actions that will be started/done in 5+ years

The results of that prioritization process are listed below:

Priority I Actions

Further training on how to handle pipeline incidents

Build communication between neighboring cities/counties

Series of river gauges

Designate shelters

Investigate shelter locations

Promote Code Red

Wright County Multi-Jurisdiction Hazard Mitigation Plan

More public education and awareness
 Map fiber optic lines
 Work with Alliant energy to mitigate energy disruption

Priority II Actions

Manhole rehabilitation on all flood-prone areas
 Valve system in RV park, manholes, and clean out station
 Lightning protection
 Debris removal from river
 Smoke detectors & fire extinguisher program
 New school wired for emergency generators
 Generator system for city hall & ambulance
 Upgrade of warning system
 Living snow fences
 Working with the NWS to get weather radios working properly
 Upgrade of walkie-talkie system
 Analyze how to increase communication between city & emergency

Priority III Actions

Replace fire truck
 GPS mapping of all utility lines
 Building of tornado safe room
 Further flood analysis and building of any recommended projects

Meeting ended at 1:00 pm

Seventh Hazard Mitigation Meeting, June 10, 2009

Meeting attended by: Frank Bemnio, Wayne Bruggeman, Lee Ann waltzing, Mark Dirks, Jim Chelavig, and Steve Been

Meeting started at 12:00 pm

- Completed the Implementation of Mitigation actions worksheet, the results are shown below:

Mitigation Action	Priority	Department/Party Responsible	Target Completion Date
Further training on how to handle pipeline incidents	I	Fire & Police Department	Ongoing
Build communication between neighboring cities/counties	I	City Manager	Ongoing
Series of river gauges	I	NWS, Wright County Emergency Management	2010
Investigate shelter locations	I	Wright County Emergency Management	Ongoing
Designate shelters	I	Wright County Emergency Management	Ongoing
Promote Code Red	I	Wright County Emergency Management	Ongoing
More public education and awareness	I	Fire & Police Department	2009
Map all fiber optic lines	I	Public Works	2009
Work with Alliant Energy to mitigate energy disruption	I	City Manager	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Manhole rehabilitation in all flood-prone areas	II	Public Works	Start 7/1/10, Ongoing
Valve system in RV park, manholes, and clean out station	II	Public Works	6/30/10
Lightning protection	II	Fire & Police Department	6/30/11
Debris removal from river	II	Union Pacific	2009
Smoke detectors & fire extinguisher program	II	Fire Department	6/30/11, Ongoing
New school wire for emergency generators	II	City Manager	8/30/10
Generators system for city hall & ambulance	II	Public Works	When the water plan gets completed, est. 2015
Upgrade of outdoor warning system	II	Fire & Police Department	Ongoing
Living snow fences	II	Public Works, City Manager, Trees Forever	6/30/11
Work with NWS to get weather radios to function properly	II	Police Department	6/30/10
Upgrade of walkie-talkie system	II	Police Department, Public Works, Fire Department, Ambulance	6/30/11
Analyze how to increase communication between city & emergency staff	II	Police Department, Public Works, Fire Department, Ambulance	Ongoing
Further flood analysis and building of any recommended projects	III	City Council	Ongoing
Building of tornado safe room	III	City council, Belmond Schools	Ongoing
Replace fire truck	III	Fire Department, City Council	6/30/15
GPS mapping of all utility lines	III	Public Works	6/30/12

- The committee then looked over an example of the plan maintenance section of the plan and made some edits

Meeting ended at 1:15 pm

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Section 8: Resolution

CITY OF BELMOND
RESOLUTION NUMBER 1764
ADOPTING HAZARD MITIGATION PLAN

WHEREAS, the City Council of the City of Belmond has adopted a Hazard Mitigation Plan for the City of Belmond; and,

WHEREAS, the Wright County chose to establish a plan which must include a plan from each individual city in the county as part of the overall Wright County plan; and,

WHEREAS, by virtue of the County establishing a plan, the city has the benefit of updating its plan to a more current date; and,

WHEREAS, city staff has completed a review of the 2009 City of Belmond Hazard Mitigation Plan (a plan which was developed and recommended by a group of five citizens, four staff members, the Wright County Emergency Management Coordinator, a City Council Member and the Fire Chiefs from Rowan and Goodell); and,

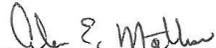
WHEREAS, the City staff is recommending that the City Council approve that plan (pages 51-93 of the Wright County Multi-Jurisdictional Hazard Mitigation Plan); and,

WHEREAS, a Public Hearing has been held during the Wright County Board of Supervisors meeting of January 7, 2013 in the Board of Supervisors Chambers in the Wright County Courthouse for purposes of obtaining citizen input on the Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Belmond, Iowa, hereby adopts said Plan, incorporating citizen comment and recommendations.

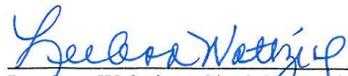
Passed and approved this 21st day of January, 2013.

CITY SEAL



Alan E. Mattison, Mayor

ATTEST:



Lee Ann Waltzing, City Manager/Clerk

Appendix B: Clarion

Section 1: Risk Assessment

The committee determined that the following additional hazards were not applicable or would have little effect on the City of Clarion due to reasons listed below:

Communication Failure: Since everyone has a cell phone all the cell phone towers would have to go for there to be a problem.

Earthquake: The effects of earthquakes may be felt in the City however due to the city’s distance from the nearest fault line an earthquake would feel like a large truck passing by and cause little if any damage.

Public Disorder was considered to have little effect on the City due to the lack of experiences of civil unrest within the City, let alone violent demonstrations. Since the City had no prior history of violent demonstrations, the chances of one occurring are very slim.

River Flooding: Since the closest body of water is located outside of the City limits it was decided to remove river flooding from further consideration.

Terrorism (all): Due to the size of the City and other places within the United States would serve as a stronger political statement it was decided to remove all terrorism from further consideration.

The following hazards were combined together:

- Human Disease Incident and Human disease Pandemic into Human Disease Incident
- Highway Transportation Incident and Railway Transportation Event into Transportation Event

Due to water quality concerns in the area Watershed Pollution was added to the list of hazards addressing.

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee’s scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Energy Failure	5	5	5	5	2	5	27
Severe Winter Storms	5	5	3	5	2	2	23
Thunderstorm and Lightning	5	5	3	3	3	4	23
Flash Flooding	4	3	4	3	3	5	22
HAZAMAT – Fix Facility	2	2	3	3	4	5	19
Structural Fire	5	5	1	1	2	5	19
Tornados	1	3	4	3	3	5	19
Windstorm/High Wind	5	5	1	1	1	5	18
HAZMAT – Transportation	1	3	1	3	3	5	16
Hailstorms	2	2	3	1	1	5	14
Pipeline Incident	1	1	2	2	2	5	13
Air Transportation Event	1	1	1	1	3	5	12

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Transportation Event	1	1	1	1	3	5	12
Watershed Pollution	2	2	1	1	1	5	12
Structural Failure	1	1	1	1	2	5	11
Human Disease Incident	1	2	2	2	2	1	10
Extreme Heat	2	2	1	1	1	2	9
Drought	1	1	1	1	1	1	6
Expansive Soils	1	1	1	1	1	1	6
Grass or Wild land Fire	1	1	1	1	1	1	6

Hazard	Energy Failure
Location	The entire community would generally be impacted by an energy failure. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	The City has experienced many incidents of energy failure with varying durations but most if not all were due to thunderstorms and lightening, high winds, ice/winter storms. The City reports that any amount of wind causes power outages. This kind of energy failure occurs many times every year, and the length of power outage varies from a couple of hours to many days. The experienced period of power loss has lasted from 3 hours to 4 days.
Probability	It is very likely that high winds will occur within the City each year due to this the probability of some kind of energy failures occurring in the next year is highly likely.
Vulnerability	The entire city is vulnerable to power loss, but the populations that are the most vulnerable are small children and the elderly, specifically in instances of extreme cold or heat. As the length of time draws on that civilians don't have electricity supplied to their homes, the degree of health risk continues to rise. Sudden loss of power can also cause the loss of computer based information.
Maximum Threat	In the event of an energy failures event the entire City would experience the effects. Most of the City is generally without power until it is able to be fixed.
Severity of Impact	Energy failures generally have a limited amount of impact on the structural stability of buildings and incur very few injuries to persons in the City. The most common types of impacts would take place in essential facilities or services.
Speed of Onset	Energy failures generally occur without any warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Winter Storms
Location	Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a severe winter storm occurs, the entire City is impacted. For a map of the City, which could potentially be impacted, see Section 6 of this appendix.
Historical Occurrence	Winter events of some type happen every year in the City. Historical data provided by the NCEM is presented in Appendix L shows that the City and Wright County have experienced more than 65 winter events and 6 freezing rain events from 1993 to 2010; therefore, the committee determined that winter storms have occurred more than 12 times in the City.
Probability	Severe winter storms commonly occur throughout the state of Iowa. Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. With the snow season extending from October to April, approximately 65 events have occurred in Wright County in 18 years which is over 3 events per year; therefore, the chance for a winter storm that may produce extreme cold temperatures along with large amounts snow, ice and wind, is very likely.
Vulnerability	Winter storms have a potential to impact the entire City however a majority of those affected are the elderly and those with health problems. The hazard mitigation committee determined that 25-50% of the people within the community would be affected.
Maximum Threat	As mentioned, winter storms affect entire regions and would impact the entire spatial extent of City. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the City's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property in the City. Because most residents are able to seek shelter during a winter storm event, the hazard mitigation committee determined that winter storms generally have a limited impact on the quality of life with low instances of injury, property damage or facility disruption.
Speed of Onset	Weather services can accurately predict when winter storms will occur and the conditions that may accompany the storm. Generally there are 12- 24 hours of warning when a winter storm is on its way.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Thunderstorms and Lightning
Location	Thunderstorms generally affect an entire City; therefore, if a thunderstorm event were to occur, a majority of the City would be exposed to the event. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	The National Climatic Data Cent (NCDC) historical data in Appendix L shows 59 thunderstorm wind events and 4 lighting events in Wright County and 8 in the City having been reported relating to thunderstorm winds and 1 event in the city reported due to lightning since 1973. However due to the number of thunderstorms in the county the committee felt that more events have occurred than have been reported.
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The central area of the United States is home to some of the most severe thunderstorms in the world. About 85 percent of Iowa thunderstorms occur between April and September, with most storms occurring during the month of June. With more than 63 events over a 38 year span, there is nearly a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	Though thunderstorms and lightning have the potential to affect the entire City, because of past experiences the committee determined that only 25% - 50% of the population of the City would actually be affected by the storm as they could be in automobiles, live in mobile homes.
Maximum Threat	The committee estimated that somewhere between 26%-50% of the City would be impacted by thunderstorms and lightning.
Severity of Impact	Severe thunderstorms and lightning can impact a community in several ways, since thunderstorms generally consist of a number of things. Thunderstorms can generate high winds, causing damage typical of high wind events. The rain that falls down during a thunderstorm can cause flash flooding events if it occurs in high volume, or if it rains over a number days, flooding can occur. Lightning strikes can overwhelm electrical equipment which can result in equipment failure which can cause further damages depending on what equipment was rendered inoperable. There is generally little property damage that is associated with severe thunderstorms; however the city has experienced loss of power for more than 24 hours because of winds.
Speed of Onset	The committee determined that while residents have an idea of when a storm may impact the community, the damages produced by the storm are often unpredictable. The committee felt that the warning time for thunderstorms is minimal.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Flash Flooding
Location	Section 6 of this appendix shows the area identified by the City where flash flooding most commonly occurs in the community.
Historical Occurrence	Flash flooding generally occurs when large amounts of rain fall in a short period of time. The NCDC data only 13 flash flood events and one excessive wetness event in Wright County, 3 of which occurred in the City. However the City Maintenance was able to recall at least three additional events where rains came so hard it caused backups in basements.
Probability	With six events happening in the past 15 years it is likely a flash flooding even will happen once in the next ten years.
Vulnerability	In the past flash flooding has flooded streets and some basements. The impacted areas account for approximately 10%-25% of the people and property in the City according to the hazard mitigation committee.
Maximum Threat	Because Flash Flooding generally impacts specific areas in town, less than 10% of the spatial extent of the community is estimated to be impacted by flash flooding.
Severity of Impact	Flash flooding causes backup in basements in parts of the community which in turn causes some property damage.
Speed of Onset	Flash flooding occurs quickly; the hazard mitigation committee estimated that citizens have less than 5 hours warning time when a flash flood event will occur.

Hazard	HAZMAT – Fixed Facility
Location	Hazardous materials events can occur anywhere where such materials are handled, stored, processed or transported. For a map of the City's hazardous materials locations see Section 6 of this appendix.
Historical Occurrence	Based on historical data shown in pages 447-456, 28 handling and storage hazardous material events were reported by DNR since 1995. While this data accounts for all incorporated and unincorporated areas, the hazard mitigation committee determined that this is evident enough that more than 12 hazard material events have occurred within the unincorporated area of Wright County but the committee could only identify 4 handling and storage incident where a city department had to respond.
Probability	Based on the number of uncontrolled hazardous material events that have occurred in the past, the hazard mitigation committee determined that a hazardous material event which would affect the community would occur at least once in the next 10 years.
Vulnerability	Areas of the community vulnerable to a HAZMAT event related to the fixed facilities are those located in close proximity to the facilities and the facilities themselves thus the committee estimates more than 25% of the town could be affected.
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be about 26%-50% of the City, due to the regularly used thoroughfares that run through the city in addition to the locations of facilities which store hazardous materials.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. Due to locations of facilities storing hazardous materials the hazard mitigation committee determined that a fixed hazardous materials event could cause serious injury and major property damage.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Tornadoes
Location	A tornado is a random event and could potentially impact the entire city. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	According to the NCDRC historical data shown in Appendix L, 24 tornado events have occurred within the County since 1964; however, only two specifically impacting the City.
Probability	There have been 21 tornado events in the county in the last 33 years which is an average of more than 3 per decade. The City had two events in the past 11 years which would average over one event a decade. Thus the committee determined there was at a chance of at least one tornado event in the next 10 years.
Vulnerability	The entire population of the City is vulnerable to tornadoes. Both personal safety and structural stability would be a great concern. The hazard mitigation committee determined that if a tornado did strike the community, with the closeness of all the residents and businesses, approximately 50-75% of the community would be impacted.
Maximum Threat	As the City has large vacant areas on the outskirts of the City limits the committee estimated that the area of somewhere between 26%-50% of the City would be impacted in the event of a tornado.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of the direct impact of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials. Historically there have been no deaths as a result of a tornado since 1966 thus the hazard mitigation committee determined that serious injury, property damage and interruption in services may occur during a tornado event.
Speed of Onset	Very little warning is given when a tornado occurs, especially for the area where a tornado watch transitions into a tornado warning.

Hazard	Structural Fire
Location	Structural fires are random and could take place anywhere in the community. There is no way of estimating where a structural fire failure might occur. For a map of the City see Section 6 of this Appendix.
Historical Occurrence	There have been more than 10 instances of structural fires. The City's fire department is regularly called on to respond to structural fires every year.
Probability	As the fire department responds to calls every year it is likely there will be a structure fire in the next year.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined that less than 10% of people and/or property in the City would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area and most fires can quickly be contained, the committee estimated less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	Structural fires are usually limited to the structure itself which is usually property damage and no loss of life.
Speed of Onset	Structural fires can start incredibly fast, and there isn't any kind of warning that a structural fire can occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Windstorms/High Winds
Location	Windstorms generally impact the entire area of the City. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	According to NCDC 41 wind events/windstorms have been recorded in Wright County since 1996 causing \$57,642,000 in property damage, 2 deaths and 13 injuries. Windstorms yearly in the City.
Probability	Because windstorms are such a common occurrence, having occurred more than 41 times since 1996, it is highly likely for a windstorm to occur in the next year.
Vulnerability	Everyone could be vulnerable to windstorms however on average most damage is downed tree limbs and some property damage.
Maximum Threat	The committee estimated that less than 10% of the City would be impacted by a high wind event as history shows most of the damage happens in isolated areas of the City.
Severity of Impact	The hazard mitigation committee determined that the severity in terms of fatalities, injuries, property loss, and economic is minor due to the ability to seek shelter.
Speed of Onset	Generally the conditions relating to wind may vary as the approaching storm develops; therefore, the hazard mitigation committee determined there is very minimal warning time for windstorms.

	HAZMAT - Transportation
Location	Hazardous materials transportation events can occur anywhere there is a road or railroad. To see a map of the City see Section 6 of this Appendix.
Historical Occurrence	The IDNR shows that 20 transportation hazardous spills occurred in Wright County since 1995 however only two occurred in or near the City of Clarion.
Probability	Based on the number of hazardous material events that have occurred in the it is possible that an event could occur at least once in the next 10 years.
Vulnerability	Areas of the community vulnerable to hazardous materials events based on their proximity to truck routes and railroads. Because different materials have different impacts, it was predicted that less than 10% of the community could potentially be affected by a hazardous materials event.
Maximum Threat	The committee estimated that less than 25-50% of the City would be impacted by a hazardous materials transportation event.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. An event could cause explosions, fire, burns to skin and much more.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time for when such an event will occur. If people are aware of the problem, they will fix it so the event does not have the potential to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Hailstorms
Location	Hailstorms have the potential to affect the entire City. See Section 6 of this appendix for a map of the City.
Historical Occurrence	According to data collected from the National Climatic Data Center (NCDC) in Appendix L, there have been 54 recorded hail events in Wright County between 1974 and 2008 which caused property damage other than crop damage. The NCDC data records 8 hail events in Clarion however two of these happened in the same day and 3 affected the rural area outside the City limits.
Probability	Three hail events affected the City in the past 10 years thus it is likely a hail event which affects the City will happen at least once in the next 10 years.
Vulnerability	Hail can damage power lines, trees and branches within the incorporated City. There are 1,055 residential properties which could be affected by hail events in the City. Those outside when it hails are the most at risk.
Maximum Threat	Based on the community's area of land cover, the hazard mitigation committee determined that less than 10% of the area of the City would be impacted by a hailstorm.
Severity of Impact	Severity of hail storms depends on the size of the hail. Downed branches and property damage can be experienced if the hail is large enough.
Speed of Onset	Hail storms often result from severe thunderstorms or tornadoes; therefore, they may occur without any warning.

Hazard	Pipeline Incidents
Location	A map showing where pipelines are located in the City can be found in section 6 of this appendix.
Historical Occurrence	There are 3 different areas where pipelines are located. The mitigation committee remembered a small pipeline incident between Clarion and Goldfield but caused no damage in the City.
Probability	The probability of a pipeline incident is always possible. There are just too many unknown variables to be able to really know the probability of it happening however based on the number of historical occurrences the hazard mitigation committee determined it would be rare for a pipeline incident which causes damage or illness to occur.
Vulnerability	The percentage of people, property, and critical facilities that would be affected by a pipeline incident would be fairly minimal, as only those properties in the immediate vicinity would be affected and most of the pipelines are located on the edge of town or outside the City limits. The committee estimated that anywhere between 10%-25% of the people and property in the City would be affected by any one pipeline.
Maximum Threat	The spatial extent of the City that would be impacted by a pipeline incident is estimated to be 10%-25% of the city, which is in correlation to the amount of people and property that would be affected by a pipeline incident.
Severity of Impact	The severity of impact depends on what kind of pipeline has the incident, what is contained within the pipeline, and whether or not there is a leak, rupture, or an explosion of some kind. Based on past occurrences, the response time of emergency personnel and the procedures that are followed, the mitigation committee estimated that there could possibly be minor injuries and property damage if an average pipeline incident occurred.
Speed of Onset	There is never any kind of warning time of when a pipeline incident will occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in the City, for a map of the City please see Section 6 of this appendix.
Historical Occurrence	Much of the watershed pollution that might occur within the City would most likely be due to nonpoint source pollution. A probable cause for this type of pollution would be the runoff of pollution that would flow into nearby water sources. While it is difficult to measure the number of times this kind of pollution occurs, the hazard mitigation committee only identified 4 events of the hazardous spills that affected the waterway.
Probability	The hazard mitigation committee determined that it is possible for watershed pollution to occur in the City but since no body of water runs through the City they estimated it to be unlikely.
Vulnerability	The city water source is an aquifer which provides good quality water that is supplied. However, watershed pollution can occur, but the committee believed that if it did occur, less than 10% of the population would be vulnerable to the watershed pollution.
Maximum Threat	Due to the adequate supply and protection of the water supply the committee estimated that less than 10% of the spatial extent of the City would be impacted in the event that there was watershed pollution.
Severity of Impact	Since the City monitors the water quality of their water supply in the event of a watershed pollution event it's estimated that there would be a few people that would fall ill.
Speed of Onset	There is minimal to no warning time of when a watershed reaches that critical pollutant level, there is a point where the water may not be dangerous, and then it breaches that point to make it dangerous.

Hazard	Disease
Location	There is no telling where disease might occur within the City; therefore, no specific location is established. For a map of the City see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee knew of no historical events of disease in the City.
Probability	Based on current vaccinations and treatment available, the hazard mitigation committee determined that it is unlikely that a major disease outbreak will impact the City in the next year.
Vulnerability	Most diseases occur in isolated households; however based on the size of the City the hazard mitigation committee estimated that 10-25% of the community would be impacted.
Maximum Threat	Again, because of the size of the City, the hazard mitigation committee estimated that 10-25% of the spatial extent of the community would be impacted.
Severity of Impact	Due to the treatment available, minor illness would occur within the community from a disease.
Speed of Onset	The hazard mitigation committee determined that there is no telling when disease may be spreading but normally there is notification before the event reaches such a rural area.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Transportation Event
Location	Transportation events have the potential to occur on any of the roadways or railways within City. For a map of the community see Section 6 of this Appendix.
Historical Occurrence	State Highway 3 and County Road R38 cross in the City. The hazard mitigation committee recalls very few accidents have occurred in the City, part of this may due to the small amount of regional/state travel on these roads and the lower speed limits placed within the City limits.
Probability	The hazard mitigation committee determined that based on the community's location, it is unlikely that a transportation event will occur in the next year.
Vulnerability	Transportation events generally only affect the motor vehicles and/or rail cars involved. Based on these impacts less than 10% of the people and property of the City would be impacted by transportation events.
Maximum Threat	Similar to the vulnerability of the community; if a transportation event were to occur less than 10% of the space in the community would be impacted.
Severity of Impact	A transportation event can occur in many forms. Based on the nature of traffic accidents and the speeds on the roads on the edge of the City the committee estimated that serious injuries and/or short term property damage could occur.
Speed of Onset	No prediction of a transportation event can be made; therefore, there is no warning time of the event.

Hazard	Structural Failure
Location	Currently the hazard mitigation committee did not identify structures that could fail within the community.
Historical Occurrence	The hazard mitigation committee could only remember one grain bin failure. Based on this information, the committee determined that less than 2 events had occurred.
Probability	Many of the structures in the community are sound; therefore, the committee determined that it is highly unlikely that a structural failure will occur.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Again, because most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that injuries and property damage would occur; however, impacts to the overall quality of life and essential facilities would not occur.
Speed of Onset	The hazard mitigation committee determined that there is no telling when a structure may fail; therefore, they noted that there is minimal or no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat conditions were to take place the entire community would feel the event. For a map of the City see Section 6 of this Appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; two excessive heat events have been recorded since 1995 in Wright County. According to the NCDC data the last excessive heat event was in 2001 however an extreme heat event occur this last year which was not on the list. Based on the NCDC report and the hazard mitigation committee's recollection of extreme heat, it was estimated that the City has seen less than 4 occurrences in its past.
Probability	The hazard mitigation committee estimated that it is unlikely that an extreme heat event will occur in the next year.
Vulnerability	When extreme heat conditions occur, it generally comes in a heat wave that impacts an entire region; however as most residents have access to air conditioned facilities the hazard mitigation committee estimated that less than 10% of the population would be impacted.
Maximum Threat	Even though extreme heat occurs regionally, since most residents have access to air conditioned facilities the hazard mitigation committee estimated less than 10% of the spatial extent of City would be impacted by the heat.
Severity of Impact	Most of the people in the City have access to air conditioned facilities; therefore, the impact of extreme heat is generally small. Few injuries occur, quality of life is generally not impacted, property is generally not damaged and services are generally efficient enough to handle the heat.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Hazard	Air Transportation Event
Location	An air transportation event could take place anywhere within the City due to life flight from the hospital and airplanes passing over from nearby airports. The Clarion Airport is located west of the City outside of the City limits. For a map of the airports, see Section 6 of this appendix.
Historical Occurrence	Historically there has been no incidence of an air transportation event occurring within the City.
Probability	As the City airport is located outside of the City limits the hazard mitigation committee determined that it is unlikely that an air transportation event will occur within the community.
Vulnerability	Due to the size of the planes which use the City airport and because of the size of the City, the hazard mitigation committee determined if an air transportation event did occur, less than 10% of the City would be impacted.
Maximum Threat	Similar to vulnerability, if air transportation event occurred within the community less than 10%, of the spatial extent of the community would be impacted.
Severity of Impact	An air transportation event in the form of a plane crashing in the community would cause serious injuries and short term property damage.
Speed of Onset	Air transportation events are generally accidental and no warning is given when such event is going to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The hazard mitigation committee decided not to identify mitigation strategies for those hazards which scored less than 7 points which would include drought, grass and wildfire, and expansive soils.

Section 2: Vulnerability Assessment & Loss Estimates

Clarion is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the City.

Those hazards that the entire city is exposed to includes Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Watershed Pollution, Extreme Heat, Drought, Structural Fire, Tornadoes, HAZMAT-Transportation, Human Disease Incident, Transportation Event, Structural Failure and Expansive Soils. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For Clarion, these hazards include Flash Flooding, HAZMAT-Fixed Facilities, Pipeline Incident, or Grass and Wild-land Fire. Their vulnerability assessments and loss estimates are discussed in Sections 2.2 through 2.5.

2.1 Exposure Assessment for Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Watershed Pollution, Extreme Heat, Drought, Structural Fire, Tornadoes, HAZMAT-Transportation, Human Disease Incident, Transportation Event, Structural Failure and Expansive Soils:

The City’s exposure to each hazard was determined based on the area of the city that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire City include Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Watershed Pollution, Extreme Heat and Drought. Those hazards that could potentially impact any one random site within the City include Structural Fire, Tornadoes, HAZMAT-Transportation, Human Disease Incident, Transportation Event, Structural Failure and Expansive Soils. With this, all of the above-listed hazards have the potential to impact any area of the City, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The following table depicts this exposure.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1055	1055	100%	\$63,829,700	\$63,829,700	100%	2,850	2,850	100%
Commercial	284	284	100%	\$30,069,200	\$30,069,200	100%			
Agricultural	7	7	100%	\$40,100	\$40,100	100%			
Industrial	44	44	100%	\$3,528,200	\$3,528,200	100%			
TOTAL	1390	1390	100%	\$97,467,200	\$97,467,200	100%			

2.1.1. Vulnerability Assessment for Energy Failure

Energy failure is an extended interruption of service in electric, petroleum or natural gas, which results in either an outage or shortage of usable energy. Energy shortages are rare in Clarion; however, outages are common. Outages are often caused by impacts to above-ground power lines from thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes and infrastructure failure.

The hazard mitigation determined, based on personal experience, that energy disruptions impact the entire community; however, impacts are generally mild. Generally the largest impact is to essential facilities or services; however, few if any injuries or illness occur, and little-to-no property damage results.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Energy failures are most threatening during extreme heat or winter conditions. During such time residents are not able to cook, store food, or run every-day appliances. Death and injuries due to power outages are very rare.

Loss Estimate Calculation:

As mentioned above, an energy disruption generally does not impact structures, and people are typically only at risk during extreme heat or winter conditions. Due to these circumstances, no loss estimate could be calculated.

2.1.2. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the City of Clarion is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that 25-50% of the people and property within the city are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice. Infrastructure failure occurs through power outages from ice, which has the potential to impact the entire County. Structural failure is also an impact that can occur due to large amounts of heavy snow. These impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person's exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the City are ill-advised to be outdoors for long periods of time during a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDL, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this amount represents reported damages throughout the County, it was used as a worst-case scenario for the City of Clarion. \$75,000 in damages that could potentially occur within the City of Clarion results in impacts to approximately 0.1% within the city. The loss estimate calculation for 0.1% in damages of all structures in Clarion is expressed below.

Estimated residential structural damage due to Severe Winter Storms (0.1%) = \$68,830
Estimated commercial structural damage due to Severe Winter Storms (0.1%) = \$30,069
Estimated agricultural structural damage due to Severe Winter Storms (0.1%) = \$40,100
Estimated industrial structural damage due to Severe Winter Storms (0.1%) = \$3,528,000
Total estimated structural damages due to Severe Winter Storms = **\$97,467,200**

2.1.3. Vulnerability Assessment for Thunderstorms & Lightning

Because Thunderstorms and Lightning are a regional event, 100% of Clarion is exposed to such hazard. The committee estimated that anywhere between 25-50% of the population of Clarion is susceptible to impacts or damages due to thunderstorms and lightning; however, this vulnerability is dependent on the extent of the storm and accompanying events that may occur.

Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts include downed limbs, power outages and heavy rain that may impair individuals' ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

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Loss Estimate Calculation:

Historical data from the NCDL displayed in Appendix C shows that the highest amount of property damages reported within Clarion due to Thunderstorms equaled \$50,000; however, the largest amount of property damages in the County equaled \$250,000. The average of these numbers was used as an estimate of losses to account for a worst-case-scenario of the impacts that the City could experience due to thunderstorm and lightning. The average damages, which equaled \$150,000 accounts for approximately 0.16% of the City's total assessed value of residential, commercial, agricultural and industrial structures. The loss estimates of this worst-case-scenario are displayed below.

Estimated residential structural damage due to Thunderstorm and Lightning (0.16%) = \$ 102,128
Estimated commercial structural damage due to Thunderstorm and Lightning (0.16%) = \$48,111
Estimated agricultural structural damage due to Thunderstorm and Lightning (0.16%) = \$64
Estimated industrial structural damage due to Thunderstorm and Lightning (0.16%) = \$5,645
Total estimated structural damages due to Thunderstorm and Lightning = **\$155,948**

2.1.4. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire City is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning, hailstorms or tornadoes; impacts are generally limited. The Clarion hazard mitigation committee determined that less than 10% of the people and property in the community are directly impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

Loss Estimate Calculation:

The NCDL historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996, which accounts for approximately 0.8% of the City's structural value. While this would be the amount normally used in the loss estimates for Clarion, the committee rated the impacts due to windstorms to be of low severity; therefore, the loss estimate amount used was .08%, meaning that each property would experience structural damages equaling approximately .08% of their assessed value. This amount of damage is indicated in the loss estimate, below.

Estimated residential structural damage due to Windstorms (.08%) = \$51,064
Estimated commercial structural damage due to Windstorms (.08%) = \$24,055
Estimated agricultural structural damage due to Windstorms (.08%) = \$32
Estimated industrial structural damage due to Windstorms (.08%) = \$2,823
Total estimated structural damages due to Windstorms = **\$77,974**

2.1.5. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms. According to the hazard mitigation committee, more than 25-50% of the people in the city could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDL reports 17 hailstorms having occurred in Wright County and 8 such events in Clarion. The maximum amount of property damage incurred in one recorded event within the City of Clarion equaled \$25,000, which accounts for about .02% of the city's assessed residential, commercial, agricultural and structural values. Because this number is rather low, it was determined based on holding the same severity rating (1) as windstorms, that .08% of the city's structures would be impacted by a hailstorm.

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Estimated residential structural damage due to Hailstorms (.08%) = \$51,064
Estimated commercial structural damage due to Hailstorms (.08%) = \$24,055
Estimated agricultural structural damage due to Hailstorms (.08%) = \$32
Estimated industrial structural damage due to Hailstorms (.08%) = \$2,823
Total estimated structural damages due to Hailstorms = **\$77,974**

2.1.6. Vulnerability Assessment for Watershed Pollution

While watershed pollution may occur within the County, the hazard mitigation committee determined that the main issue would relate to the contamination of key water sources. Residents of Clarion are most commonly exposed to watershed pollution if they come in contact with the nearby White Fox Creek. Impacts could result in impacts to nearby bodies of water (White Fox Creek) and their aquatic life. This could result in illness when directly exposed to the creek; however, no property damages would be felt. Accompanying events include thunderstorm and lightning, river flooding, severe winter storms, HAZMAT events relating to both transportation and fixed facilities and flash flooding.

Loss Estimate Calculation:

As mentioned above, watershed pollution generally does not impact structures; therefore, no loss estimate could be calculated.

2.1.7. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. While a majority of residents have air conditioning, the committee estimated that less than 10% of the City would be impacted due to the fact that most residents have access to air condition. However, residents must ensure they are not exposed to the heat for a long period of time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not cause structural damages.

2.1.8. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. While it may not directly impact the City of Clarion, drought impacts the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the City. Accompanying events include extreme heat and grass and wild-land fires.

Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in the unincorporated area where a majority of agriculture land exists.

2.1.9. Vulnerability Assessment for Structural Fire

A structural fire is an uncontrolled fire in populated areas that threatens life and property. Structural fires are very isolated events in the City of Clarion because most buildings outside of the downtown are detached. The committee estimated that less than 10% of people and property are affected in one event. Damages to buildings may be substantial or minimal, depending on whether the fire was controlled and responded to quickly. People inside a structure where a fire occurs could experience substantial injuries or death.

Loss Estimate Calculation:

Because structural fires are such an isolated event, it would be insignificant to provide a loss estimate. A structural fire could occur in any one structure within the City.

2.1.10. Vulnerability Assessment for Tornadoes

The entire population of Clarion is exposed to tornadoes. The hazard mitigation committee estimated that more than 75% of the City would be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent of the size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornado-project.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDRC, multiple tornado events have been reported in Wright County, with two recorded to have impacted the City of Clarion. The maximum amount of property damage incurred in the two tornado events in Clarion was \$0. The County reported \$25,000,000 in damages during its 1966 event, which accounts for approximately 26% of the city's assessed residential, commercial, agricultural and structural values.

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Estimated residential structural damages due to Tornado (26%) = \$16,595,722
Estimated commercial structural damages due to Tornado (26%) = \$7,817,992
Estimated agricultural structural damages due to Tornado (26%) = \$10,426
Estimated industrial structural damages due to Tornado (26%) = \$917,332
Total estimated structural damages due to Tornado (26%) = **\$25,341,472**

2.1.11. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the City; however, according to the hazard mitigation committee, such event would most likely impact less than 10% of the community depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the City.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks.

2.1.12. Vulnerability Assessment for Air Transportation Event

While no airport is located in Clarion's City limits, the hazard mitigation committee determined that an air transportation event could occur as planes pass over the city while crop dusting and/or landing in nearby airports, especially the airport located in the unincorporated area near the northwest corner of the City. If such event were to occur less than 10% of the community would be impacted due to the fact that such event only impacts an isolated area. Severity of impact depends on the size and speed of the aircraft when striking the city; however, the committee determined that multiple deaths would occur and structural damages would result. Structural damages would be as severe as to completely demolish multiple buildings and potentially set fire to structures; therefore, accompanying events would include structural fire, grass or wild-land fire. Such event could also occur due to windstorms, thunderstorm and lightning, tornado, winter storm or hailstorm.

Loss Estimate Calculation:

No air transportation events have been recorded to have occurred in Clarion. Because it is estimated that an air transportation event would generally be an isolated event, it would be insignificant to provide a loss estimate. There is no telling where such event would occur; however, if near the airport, very few structural damages would occur.

2.1.13. Vulnerability Assessment for Human Disease

The hazard mitigation committee estimated that 10-25% of the city would be impacted if a human disease was spread. The most common events that have taken place in recent years include the H1N1 virus. The flu and pneumonia are also two common viruses that impact residents of the City. Wright County Public Health constantly strives to provide shots and other preventable measures for such viruses. Other transferable diseases are generally transferred through direct interaction, which lessens the vulnerability of the County to such diseases.

Loss Estimate Calculation:

This hazard impacts the health and welfare of people. There would be no structural impacts due to human disease.

2.1.14. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles, rail cars and/or airplanes. Clarion is located at the intersection of a County road and a state road. The Union Pacific Railroad also splits off into three branches within the City. The location of all roads and railroads is identified in the Transportation Map located in Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Clarion would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.15. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires, structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.1.16. Vulnerability Assessment for Expansive Soils

Expansive soils most commonly result in damaged streets and infrastructure, basements and other structures due to constant movement from change in temperature, moisture and other environmental impacts. Accompanying events include severe winter storms, flash flooding, thunderstorm and lightning, river flooding and sink holes. Infrastructure failure may result from expansive soils when harm to basements, streets or other utilities occurs. Impacts usually result in a slight interruption in water services to the area where the water main was broken.

Loss Estimate Calculation:

Effects from expansive soils vary depending on the structure impacted. Impacts generally affect one isolated area in a basement, street or other utility. Because the committee was unable to identify specific areas, no loss estimates were calculated.

2.2 Exposure Assessment for Flash Flooding

Exposed Structures

The hazard mitigation committee estimated that 50-75% of the community is impacted by flash flooding. Flash flooding results from intense rainfall over a brief period of time; therefore, it was determined that the majority of flash flooding within the City of Clarion would occur in low-lying areas with poor drainage. Based on topography and wetland data, there are three major "pockets" of low-lying areas within the City, it's estimated that flash flooding would most likely occur in these pockets (contour 1170); therefore, these pockets, displayed in the flash flooding map in Section 6, was used to identify the "hazard area" for flash flooding. Based on this it was estimated that 439 dwellings, 116 commercial structures, 16 industrial structures and 5 agriculture structures were located in potential areas of flash flooding.

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Exposed Persons

The “Number of People” exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 1040 residents, 284 commercial persons, 16 industrial persons and 5 agricultural persons exposed to flash flooding; making a total of 1,375 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1055	439	42%	\$63,829,700	\$22,220,900	35%	2,850	1,375	48%
Commercial	284	116	41%	\$30,069,200	\$15,897,000	53%			
Agricultural	7	5	71%	\$40,100	\$12,100	30%			
Industrial	44	16	36%	\$3,528,200	\$2,738,300	78%			
TOTAL	1390	576	41%	\$97467200	\$40868300	42%			

2.2.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in areas with poor drainage. It is evident that a majority of areas exposed to flash flooding are in areas where White Fox Creek would potentially extend.

Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes’ value by 10%; therefore, damages might decrease a homes’ value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 1,111,045
- Estimated commercial structural damage due to Flash Flooding (5%) = \$794,850
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$605
- Estimated industrial structural damage due to Flash Flooding (5%) = \$ 136,915
- Total estimated structural damages of Flash Flooding = **\$2,043,415**

2.3 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were identified and positioned on the map displayed in Section 6. A ¼ mile buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that there were 2,545 residents exposed.

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Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1055	939	89%	63,829,700	55,982,800	88%	2,850	2,545	89%
Commercial	284	274	96%	30,069,200	28,866,400	96%			
Agricultural	7	2	29%	40,100	23,100	58%			
Industrial	44	44	100%	3,528,200	3,528,200	100%			
TOTAL	1390	1259	91%	97,467,200	88,400,500	91%			

2.3.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the City, different materials have different impacts. The majority of hazardous materials within Clarion are Underground Storage Tanks, which have an isolated impact due to an explosion or groundwater contamination, if leaking. The hazard mitigation committee estimated that less than 10% of the community would be impacted by such event, since they are generally isolated.

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on 10% of the hazard area being impacted at one time:

- Estimated residential structural damage due to HAZMAT – Fixed Facility = \$559,828
- Estimated commercial structural damage due to HAZMAT – Fixed Facility = \$288,664
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility = \$231
- Estimated industrial structural damage due to HAZMAT – Fixed Facility = \$0
- Total estimated structural damages of HAZMAT – Fixed Facility = **\$848,723**

2.4 Exposure Assessment for Pipeline Incident

Exposed Structures

The exposure numbers for Pipeline Incidents is shown in the table below. These numbers were determined based on the number of structures located in the pipeline zone. The pipeline zone was determined using a 1 mile buffer surrounding the natural gas pipeline that runs into the west side of town. All of the residential, commercial and agricultural structures located within the buffer, or “hazard zone”, account for the exposed “Number of Structures” and “Value of Structures”. For a map of this buffer see Section 6.

Exposed Persons

The “Number of People” exposed to a pipeline incident was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are

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approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 55 residents, 35 commercial persons, 10 industrial persons and 2 agricultural persons exposed to flash flooding; making a total of 102 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1055	23	2%	63,829,700	\$706,600	1%	2,850	102	4%
Commercial	284	35	12%	30,069,200	\$7,690,600	26%			
Agricultural	7	2	29%	40,100	\$1,500	4%			
Industrial	44	10	23%	3,528,200	\$1,970,100	56%			
TOTAL	1390	70	5%	97,467,200	\$10,368,800	11%			

2.4.1. Vulnerability Assessment for Pipeline Incident

According to the hazard mitigation committee; 10-25% of the city is vulnerable to pipeline failure. With natural gas, persons should be prepared to evacuate during a failure of the pipeline as leakage would cause health and environmental impacts. Impacts on health would most likely be due to an explosion, which could cause burns or even death; or inhalation, which would result in dizziness, headache, vomiting, irregular breathing or unconsciousness. Exposure to high levels of natural gas could also result in long-term effects such as respiratory disease. Symptoms include pneumonia, nausea, vomiting, irregular breathing, memory loss, fatigue, sinus pain and headache

Loss Estimate Calculation:

While approximately 11% of structures are exposed to pipeline failure, it's anticipated that such event would occur in an isolated area. It is estimated that only 25% of the hazard area would be directly impacted:

- Estimated residential structural damage due to Pipeline Failure (25%) = \$176,650
- Estimated commercial structural damage due to Pipeline Failure (25%) = \$1,922,650
- Estimated agricultural structural damage due to Pipeline Failure (25%) = \$375
- Estimated industrial structural damage due to Pipeline Failure (25%) = \$492,525
- Total estimated structural damages of Pipeline Failure (25%) = **\$2,592,200**

2.5 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that less than 10% of the community would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the City, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the "hazard zone", or the property that could potentially be impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 249 dwellings, 94 commercial structures, 11 industrial structures and 6 agriculture structures were located in the "hazard zone" for grass and wild-land fires.

Exposed Persons

The "Number of People" exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the "hazard zone". It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimates that there were 590 residents exposed, 94 commercial persons

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exposed, 11 industrial persons exposed and 6 agricultural persons exposed; making a total of 701 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1055	249	24%	63,829,700	\$19,239,200	30%	2,850	701	25%
Commercial	284	94	33%	30,069,200	\$14,984,000	50%			
Agricultural	7	6	86%	40,100	\$33,000	82%			
Industrial	44	11	25%	3,528,200	\$1,978,500	56%			
TOTAL	1390	360	26%	97,467,200	\$36,234,700	37%			

2.5.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land surrounds the perimeter of the City of Clarion; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

Loss Estimate Calculation:

Only a portion of those exposed structures within the City would actually be impacted during a grass and wild-land fire event. It is estimated that only a portion of structures located adjacent to the open space would be impacted; therefore, the following estimates were calculated:

- Estimated residential structural damage due to Grass & Wild-land Fire (10%) = \$ 1,923,920
- Estimated commercial structural damage due to Grass & Wild-land Fire (10%) = \$1,498,400
- Estimated agricultural structural damage due to Grass & Wild-land Fire (10%) = \$3,300
- Estimated industrial structural damage due to Grass & Wild-land Fire (10%) = \$197,850
- Total estimated structural damages of Grass & Wild-land Fire = **\$3,623,470**

Section 3: Mitigation Strategies and Priorities

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Project	STAPLEE Results
New wastewater treatment plant	17
Mock emergency scenarios	16
Trash pump	16
Slip-lining sanitary sewers to prevent infiltration	16
Communicating with media outlets and other public entities to warn citizens	16
Permanent backup power generator at lift stations	14
Tanker truck	11
Continue public education & Establish power point on fire safety program	11

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Update firefighters equipment / gear	11
Hydraulic analysis & Drainage and feasibility study	8
Get funding for regular inspections of properties to mitigate structural failure	8
Map out where all hazardous materials are located within the city & Have laptop computer for location of hazardous materials (to be put on fire truck)	14
Fuel containment and automatic pumping	17
Communicating with county health to get list of people who might need help & Setup fan distribution program & Window A/C units for people that need them	11
Tornado storm shelter	10
Geo-coding cities addresses (located at driveway of home) & GPS Units	7
Portable power generator	12
Additional signage and blockades / barricades & Traffic control for blocked streets & Additional personnel to block roads	12

City Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: To reduce or eliminate injury and property damage due to the natural hazards that afflicts the City (Extreme Heat, Flash Flooding, High Winds, Thunderstorm and Lightning, Tornadoes, Winter Storms,)

Objective 1.1: Extreme Heat

Mitigation Action

1.1.1: Communicating with county public health

Objective 1.2: Flash Flooding

Mitigation Action

1.2.1: Purchase trash pumps

1.2.2: Permanent backup power generator at lift stations

1.2.3: Portable power generator

1.2.4: Hydraulic analysis & Drainage and feasibility study

1.2.5: Slip lining sanitary sewers to prevent infiltration

Objective 1.3: High Winds

Mitigation Action

1.3.1: Permanent backup power generator at lift stations

1.3.2: Portable power generator

Objective 1.4: Thunderstorm and Lightning

Mitigation Action

1.4.1: Permanent backup power generator at lift stations

1.4.2: Portable power generator

Objective 1.5: Tornadoes

Mitigation Action

1.5.1: Build tornado/storm shelter

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- 1.5.2: Mock emergency scenarios
- 1.5.3: Geo-coding city addresses & purchase GPS units

Objective 1.6: Winter Storms

Mitigation Action

- 1.6.1: Build storm/Tornado shelter
- 1.6.2: Portable power generator
- 1.6.3: Mock emergency scenarios

Goal 2: To reduce or eliminate injury and property damage due to man-made hazards that could affect the City (Air Transportation Event, Energy Disruption, HAZMAT – Fixed Facility, HAZMAT-Transportation, Human Disease, Pipeline Incident, Structural Failure, Structural Fire, Transportation Event, and Watershed Pollution)

Objective 2.1: Air Transportation Event

Mitigation Action

- 2.1.1: Fuel containment and automatic pumping
- 2.1.2: Hydraulic analysis & drainage feasibility study
- 2.1.3: Portable power generator

Objective 2.2: Energy Disruption

Mitigation Action

- 2.2.1: Portable power generator
- 2.2.2: Permanent backup power generator for lift station
- 2.2.3: Mock emergency training scenarios

Objective 2.3: HAZMAT – Fixed Facilities

Mitigation Action

- 2.3.1: Map out where all hazardous materials are located within the City.
- 2.3.2: Purchase laptop computer for locations of hazardous materials located on fire truck

Objective 2.4: HAZMAT - Transportation

Mitigation Action

- 2.4.1: Mock emergency training scenarios

Objective 2.5: Human Disease

Mitigation Action

- 2.5.1: Communicating with media outlets and other public entities to warn citizens

Objective 2.6: Pipeline Incident

Mitigation Action

- 2.6.1: Mock emergency training scenarios

Objective 2.7: Structural Failure

Mitigation Action

- 2.7.1: Obtain funding for regular inspections of properties to mitigate structural failure

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Objective 2.8: Structural Fire

Mitigation Action

- 2.8.1: Purchase new Tanker Truck
- 2.8.2: Continue public education and establish power point on fire safety program
- 2.8.3: Update firefighters equipment/gear

Objective 2.9: Transportation Event

Mitigation Action

- 2.9.1: Purchase additional signage and blockades/barricades and traffic control for blocked streets and additional personnel to block roads.
- 2.9.2: Traffic control for blocked streets
- 2.9.3: Additional personnel to block roads

Objective 2.10: Watershed Pollution

Mitigation Action

- 2.10.1: New wastewater treatment plant

Section 4: Action Plan

The City Hazard Mitigation Committee did do a cost-benefit review of each of the mitigation actions during their review of them. Each action was taken through the STAPLEE analysis, and in that analysis the committee looked at whether or not there would be an economic benefit or an economic cost, as well as; whether or not the community would accept it, could the community administer the action, is the action technically feasible, etc. It was also discussed during the meetings how much a hazard mitigation action might cost and how much benefit might come out of that spending.

New wastewater treatment plant	
Description	Construction of a new wastewater treatment plant to control backflow into water tributaries
Hazards Addressed	Watershed pollution
Priority	High
Responsible Dept./Party	Wastewater Department
Estimated Cost	I
Potential Funding Source	FEMA, CDBG, Local, SRF, USDA
Mitigation Measure Category	Natural Resources Protection Action/Structural
Target Completion Date	2018

Mock emergency scenarios	
Description	Perform mock emergency scenarios to prepare first responders for various emergency incidents
Hazards Addressed	Energy Disruption, Winter Storms, Tornadoes, HAZMAT-Transportation, Pipeline Incidents
Priority	I
Responsible Dept./Party	Emergency Services, First Responders
Estimated Cost	Minimal
Potential Funding Source	Local/Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

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Trash pump	
Description	Purchase trash to allow the City to pump flood waters more safely.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	Wastewater Dept
Estimated Cost	Low
Potential Funding Source	Grants, Local
Mitigation Measure Category	Emergency Protective Services
Target Completion Date	2014

Slip-lining sanitary sewers to prevent infiltration	
Description	Lining sanitary sewer mains. When weather events produce significant amounts of rain water infiltrates into the sewer system. Slip lining the mains would help to minimize infiltration
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	Wastewater Dept
Estimated Cost	High
Potential Funding Source	Local, CDBG, Grants, HMGP
Mitigation Measure Category	Structural
Target Completion Date	Ongoing

Communicating with media outlets and other public entities to warn citizens of hazards	
Description	Warn citizens of potential disease events and to keep them informed of what is happening during such events to help them be prepared.
Hazards Addressed	Disease
Priority	I
Responsible Dept./Party	Administration (City Administrator)
Estimated Cost	Minimal
Potential Funding Source	Local
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Permanent backup power generator at lift stations	
Description	In the event of a power outage a fixed generator would be used to power lift stations to reduce flash flooding and sewer backups
Hazards Addressed	Energy Disruption, High Winds, Thunderstorms and Lightning, Flash Flooding
Priority	I
Responsible Dept./Party	Wastewater Dept
Estimated Cost	Moderate
Potential Funding Source	Local
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Tanker truck	
Description	Purchase a new tanker truck to have enough water available for those areas where water hookups are not available.
Hazards Addressed	Structural Fire
Priority	I
Responsible Dept./Party	Public Works Dept
Estimated Cost	Moderate
Potential Funding Source	Local
Mitigation Measure Category	Structural Mitigation Action
Target Completion Date	2014

Continue public education and establish power point on fire safety programs	
Description	Continue public education and establish a power point on fire safety programs to help citizens be aware of fire issues and what they can do to reduce the risk of a fire.
Hazards Addressed	Structural Fire, Hailstorms, Structural Failure
Priority	I
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	Local
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Update firefighters equipment/gear	
Description	Purchase new firefighter gear to make sure all gear is up to NFPA standards and keep fire fighters safe when fighting fires.
Hazards Addressed	Structural Fire
Priority	I
Responsible Dept./Party	Fire Department
Estimated Cost	Moderate
Potential Funding Source	Grants
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Hydraulic analysis & Drainage and feasibility study	
Description	Complete a drainage study to evaluate the cause and severity of surface drainage problems.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	Public Works
Estimated Cost	Moderate
Potential Funding Source	FEMA, Grants
Mitigation Measure Category	Preventive Action
Target Completion Date	2014

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Get funding for regular inspections of properties to mitigate structural failure	
Description	Establish a property inspection program to identify issues which can be addressed in order to reduce the number of properties with structural failure issues.
Hazards Addressed	Structural Failure
Priority	I
Responsible Dept./Party	Public Works, Housing Committee
Estimated Cost	\$50,000
Potential Funding Source	Local
Mitigation Measure Category	Preventive Action
Target Completion Date	Ongoing

Fuel containment and automatic pumping	
Description	Purchase airport fuel containment and automatic pump system.
Hazards Addressed	Air Transportation
Priority	II
Responsible Dept./Party	Airport
Estimated Cost	Low to Moderate
Potential Funding Source	IDOT, Local
Mitigation Measure Category	Property Protection Action
Target Completion Date	2016

Map out where all hazardous materials are located within the city and have laptop computers put on fire trucks for location of hazardous materials	
Description	Identify where hazardous materials are stored/used in the City, map locations, purchase laptop
Hazards Addressed	HAZMAT-Fixed Facility
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Low
Potential Funding Source	Local, Firefighter Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2015

Communicating with county health to get list of people who might need help & Setup fan distributing program & Window A/C units for people that need them	
Description	Identify individuals/homes which have no type of air conditioning, purchase fans and A/C units,
Hazards Addressed	Extreme Heat
Priority	II
Responsible Dept./Party	Administration/City Administrator
Estimated Cost	Minimal
Potential Funding Source	Local Organizations
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Tornado storm shelter	
Description	Construct a tornado shelter to be open to the public to use in case of tornados and when other storms lead to power outage.
Hazards Addressed	Tornadoes, Winter Storms, Extreme Heat
Priority	II
Responsible Dept./Party	Emergency Services
Estimated Cost	High
Potential Funding Source	Grants, Local
Mitigation Measure Category	Structural
Target Completion Date	2014

Geo-coding cities addresses (at driveway of homes & GPS Units & Mapping of utilities)	
Description	Mapping structures, key locations and facilities within the City will ensure that emergency responders are able to quickly respond to hazard incidents.
Hazards Addressed	All hazards
Priority	II
Responsible Dept./Party	Public Works, Emergency Services
Estimated Cost	Low
Potential Funding Source	FEMA, Grants
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Portable Generator	
Description	Purchase a portable generator to power an emergency shelters (schools, churches, etc)
Hazards Addressed	Flash Flooding, High Winds, Thunderstorm and Lighting, Tornados, Winter Storms, Air Transportation Event, Energy Disruption, HAZMAT-Fixed,
Priority	II-III
Responsible Dept./Party	Public Works, Emergency Services
Estimated Cost	Low
Potential Funding Source	FEMA, Grants
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	2015

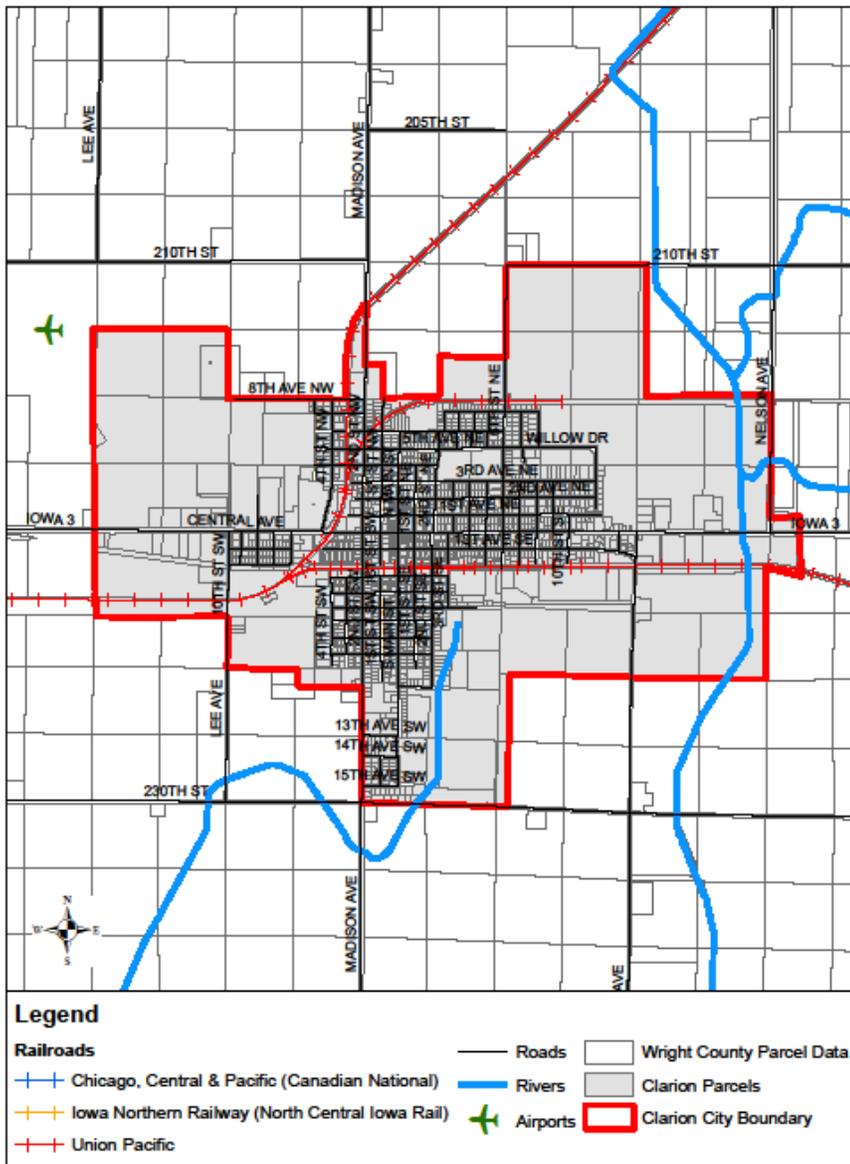
Traffic control for blocked streets, additional signage, blockades/barricades, and additional personnel	
Description	Purchase signage, blockades/barricades and establish agreements for additional personnel to be available during a transportation event.
Hazards Addressed	Transportation Event
Priority	II-III
Responsible Dept./Party	Public Works, Emergency Services
Estimated Cost	Minimal
Potential Funding Source	Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2014 - 2018

Section 5: Critical Facilities

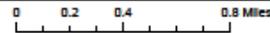
- City Hall
- Fire Station
- Hospital
- Water Treatment Plant
- Sewage Treatment Plant
- Lift Stations
- Schools

Section 6: Community Map(s)

City of Clarion

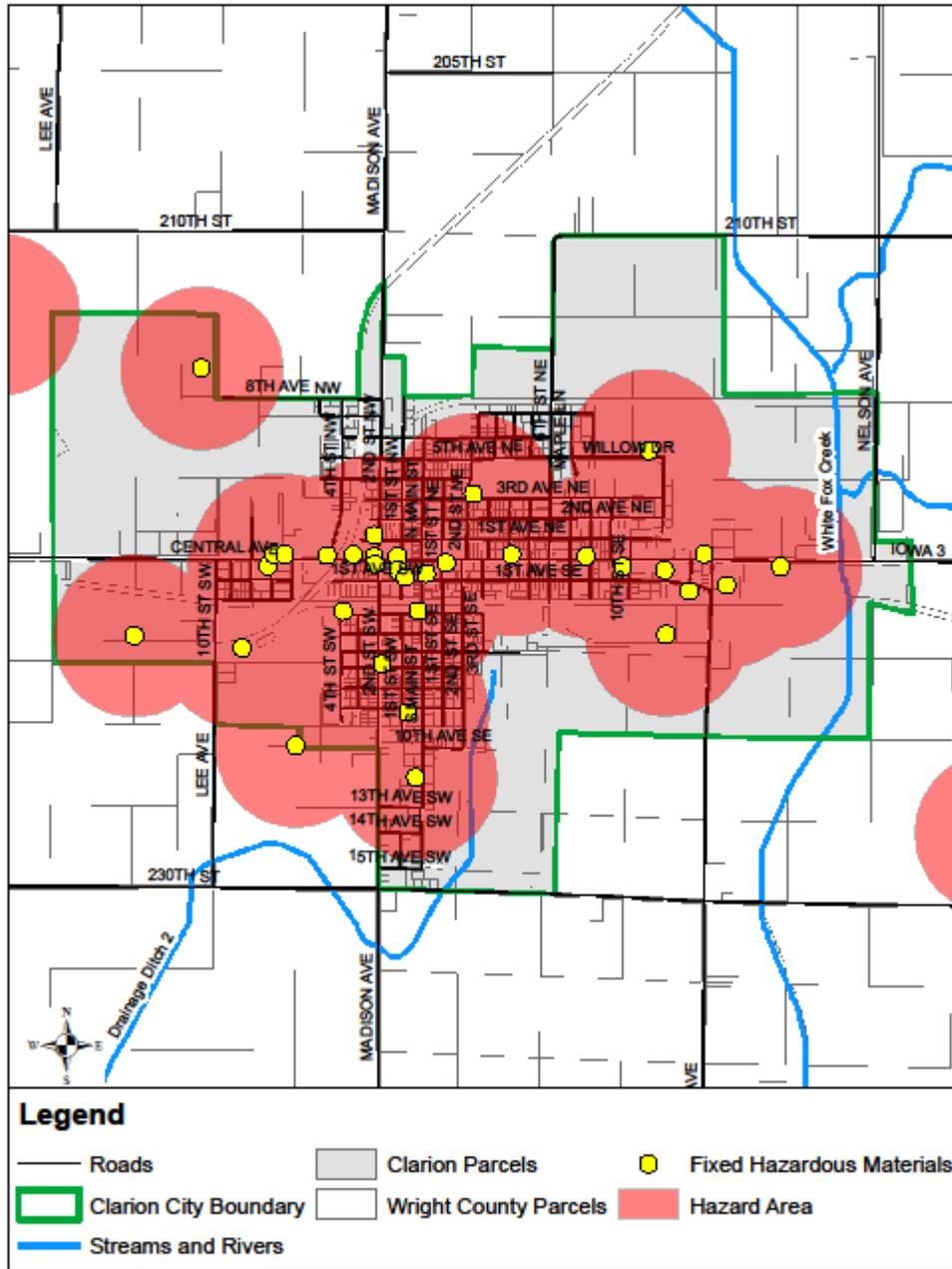


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



City of Clarion

Fixed Hazardous Materials Hazard Area

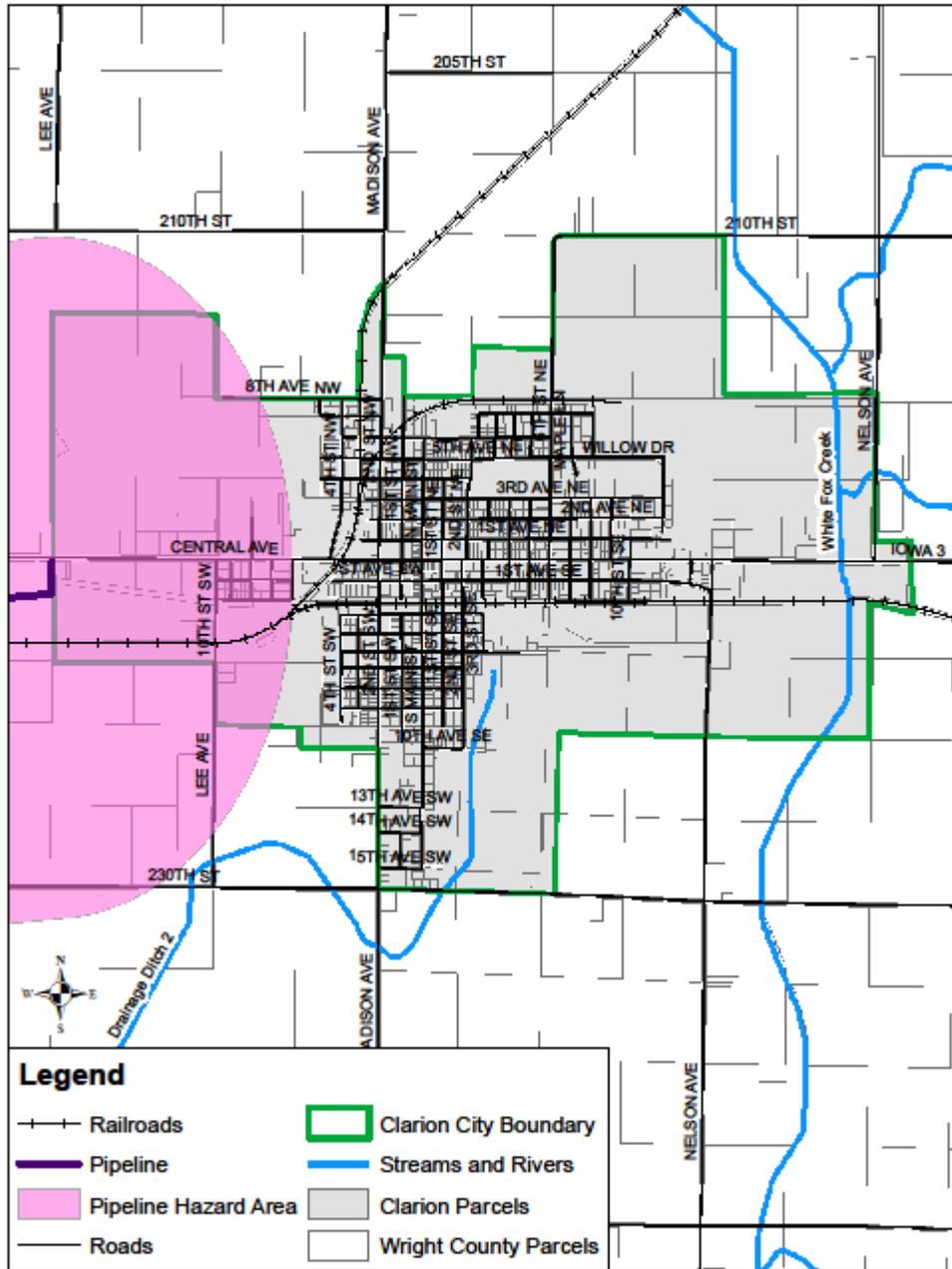


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

0 0.2 0.4 0.8 Miles

City of Clarion

Pipeline Hazard Area



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/ldms/IntraView.cgi?KEY=49787454&IFIT=1

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1 of 2

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49907797&IFIT=1

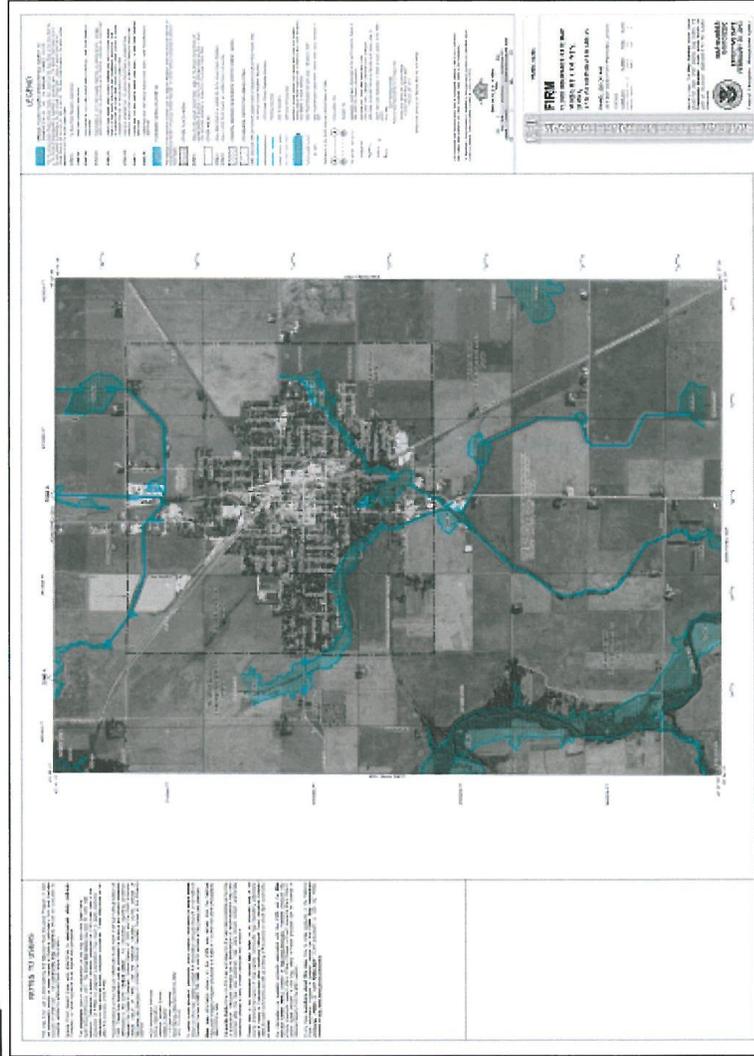
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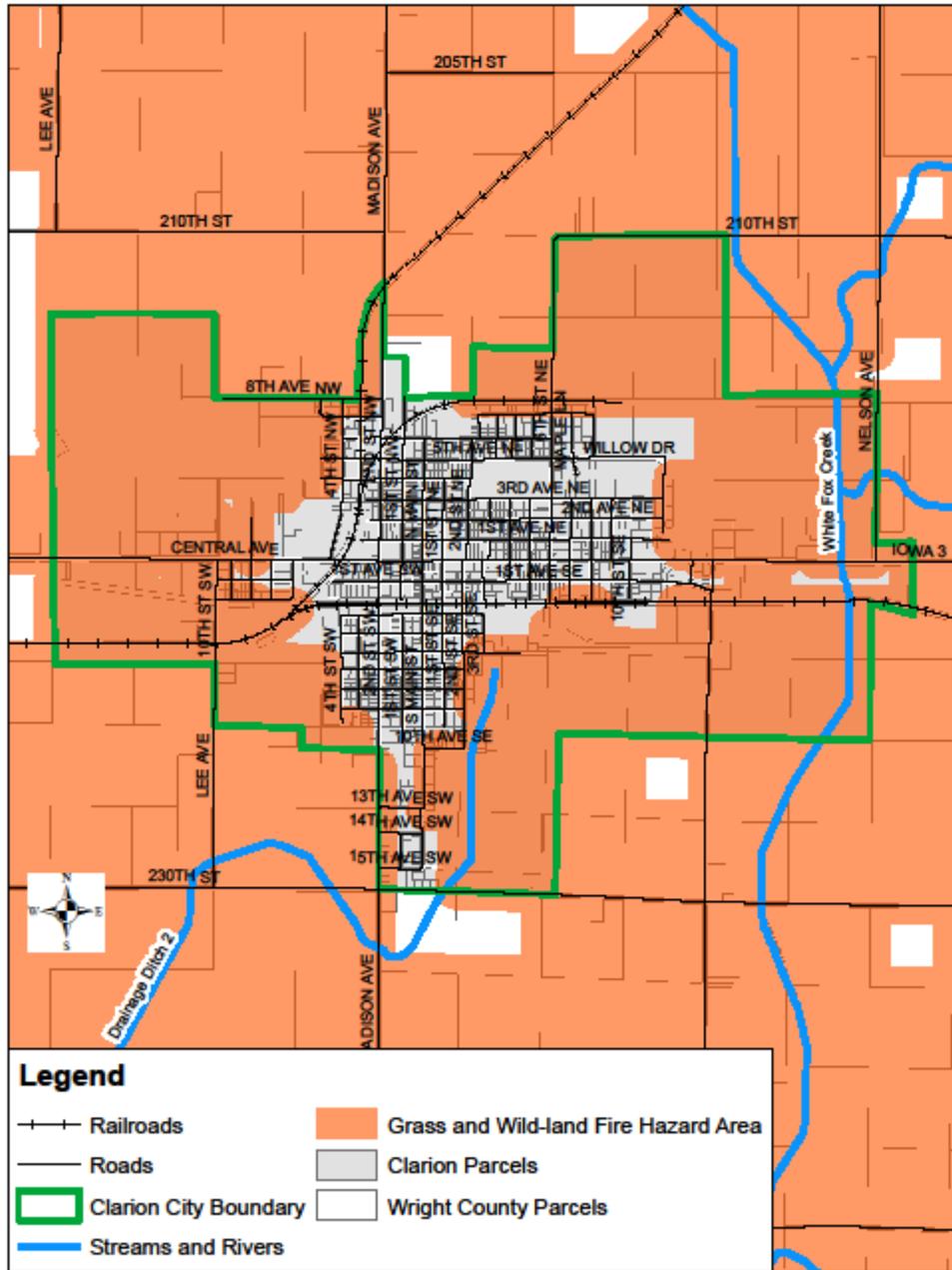
Help

Zoom Win Zoom In 1:1 Zoom In MAX Zoom Out Make a FRMette



City of Clarion

Grass and Wild-land Fire Hazard Area



Section 7: Hazard Mitigation Committee Meeting Minutes

Clarion Hazard Mitigation Meeting Minutes 4/13/10

Meeting attended by: Tim Fletcher, David Hill, Shelley Pohlman, Steve Henninger, Vicky Boyington, Mike Nail, Jim Redemske, Jim Lester, Bud Young, and Jim Dhillim

Tornadoes

- Nearly 43 years ago (Belmond tornado)
- Possible of occurring
- Parkersburg tornado was sighted north of town

Flash Flooding

- 4 ¾" of rain – flooded every street in town
- Flooding possibilities at airport

Winter Storms

- Yes
- Causes power outages
- In 1991 there was 3 days in Clarion that was out of power
- Outskirts of town experience drifting problems

High Wind Events

- Electricity outages
- Tree damages
- 3 public assistance through FEMA for high winds

Hailstorm

- Baseball size hail back in the 1970s
- Normal damages
- Hwy 20 got battered south of town
- Windows/crops/property damage

Severe Thunderstorm and Lightning

- Typical damages
- Isolated areas are the most affected
- Fires have been started in town due to lightning
- There have been entire blocks that have been affected by lightning (blown transformer and even threatening fires)

Extreme Heat Event

- Scattered throughout town there are buildings without A/C
- South town (have A/C if electricity is on)

Drought

- 88' – 89' – was the last severe drought
- Potential loss of water supply in the event of a drought

Grass or Wildfire

- Potential surrounding farmland, ditches, could spread to property

Expansive Soils

- Basement walls caving in

Earthquakes

- potential

HAZMAT – Transportation

- rail
- hwy 3
- explosives that travel through (company)
- chemicals deliveries to water department once a month
- chemicals go through town all the time
- diesel & gas

HAZMAT – Fixed

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- water plant
- gas stations
- swimming pool
- haggies – stronghold – paint
- 30k tank of LP
- Chemicals in combined areas

Watershed Pollution

- Cross-connections are always possible
- The aquifer could be polluted in different areas than what Clarion draws from
- This is a possibility

Pipeline Incidents

- Edge of town has 3 lines 6"-12" in close to 1500 PSI
- There have been a couple of incidents
- 6 miles north of town
- One at co-op

Energy Disruption

- Any amount of wind will cause power outages
 - When the wind was only blowing at 35mph, the city was experiencing outages
- Animals killing themselves on the lines
- Ice

Terrorism

- Always possible
- The water department would be a possible risk
- Any critical infrastructure taken out would hurt the town (utilities/school/government)

Violent Demonstration

- No history
- RAGBRI?

Disease

- Possible (other parts of the world bring it in)
- Public health plans for pandemic situations
- Chicken/hot sites are potential for disease

Structural Fire

- Industrial areas would have a bigger impact
- Equal risk threat spatially
- Co-op had a fire 5-6 years ago

Structural Failure

- 1 bin failure

Communications Failure

- Possible
- In big events – cell phone towers might go
- Communications failure could make it difficult to identify key personnel

Transportation Events

- Hwy 3
- Worst would be some kind of truck carrying chemicals to get into an accident
- School bus full of kids

Air Transportation Events

- Possible
- Especially since they have an airport
- Have aircraft coming in and out
- Choppers @ hospital

The following are hazards that the hazard mitigation committee decided is non-applicable to the City of Clarion:

- River Flooding

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Landslide
- Dam Failure
- Levee Failure

Clarion Hazard Mitigation Meeting Minutes 5/28/10

Meeting attended by: Tim Fletcher, David Hill, Shelley Pohlman, Steve Hemmigar, Jon Davries, Jim Redemske, and Bill Kem.

Meeting started at 12:00 pm

The hazard mitigation committee completed the hazard mitigation risk analysis. The results are shown below:

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Energy Disruption	5	5	5	5	2	5	27
Winter Storms	5	5	3	5	2	2	22
Tornadoes	1	3	4	3	3	5	19
HAZMAT – Fixed Facility	2	2	3	3	4	5	19
Structural Fire	5	5	1	1	2	5	19
High Wind Events	5	5	1	1	1	5	18
HAZMAT – Transportation	1	3	1	3	3	5	16
Hailstorms	2	2	3	1	1	5	14
Flash Flooding	2	2	2	1	1	5	13
Pipeline Incidents	1	1	2	2	2	5	13
Watershed Pollution	2	2	1	1	1	5	12
Disease	3	2	2	2	2	1	12
Transportation Event	1	1	1	1	3	5	12
Structural Failure	1	1	1	1	2	5	11
Extreme Heat Events	2	2	1	1	1	2	9
Severe Thunderstorms and Lightning	5	5	1	1	1	4	17
Air Transportation Event	1	1	1	1	3	5	12

The hazard mitigation meeting ended at 1:00 pm.

Clarion Hazard Mitigation Meeting Minutes 7/28/10

Meeting attended by: Cory Abels, Brian Marker, Jon DeVries, Vicky Boyington, Shelly Pohlman, Steve Hemmigar, Bud Young, and Mike Nail.

Meeting started at 11:00 am

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The hazard mitigation committee went through the list of hazards that they will be addressing in the plan and brainstormed hazard mitigation actions for each of them. The results of that brainstorm session are displayed below:

Energy Disruption

- Portable power generator
- Permanent backup power generator at lift stations
- Mock emergency scenarios

Winter Storms

- Build storm shelter (possibly added onto fire station)
- Portable power generator
- Mock emergency scenarios

Tornadoes

- Tornado storm shelter (storm shelter)
- Mock emergency scenarios
- Portable lighting
- Geo-coding cities addresses (located at driveway of home)
- GPS units

HAZMAT – Fixed Facility

- Map out where all hazardous materials are located within the city
- Laptop computer for location of hazardous materials (to be put on fire truck)

Structural Fire

- Tanker truck
- Continue public education
- Update firefighters equipment/gear
- Encourage citizens/training for fire prevention
- PowerPoint on fire safety program (computer, projector, screen)

High Winds

- Assistance to get trees trimmed around power lines
- Backup power generators at lift stations
- Portable generators

Severe Thunderstorms and Lightning

- Surge protection on all city buildings (for the phone lines)
- Assistance to get trees trimmed around power lines
- Backup power generators at lift stations
- Portable generator

HAZMAT – Transportation

- Mock training scenarios

Hailstorms

- Public education

Flash Flooding

- 18" trash pump
- Power generators at lift stations
- Portable power generators
- Hydraulic analysis
- Drainage and feasibility study
- Public education on flood waters
- Slip-lining sanitary sewers to prevent infiltration

Pipeline Incidents

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Mock emergency training

Watershed Pollution

- New wastewater treatment plant

Disease

- Communicating with media outlets and other public entities to warn citizens

Transportation Event

- Additional signage and blockades/barricades
- Traffic control for blocked streets
- Additional personnel to block roads

Air Transportation Event

- Fuel containment and automatic pumping
- Generator for keeping airport lines on
- Drainage feasibility study for airport runway

Structural Failure

- Get funding for regular inspections of properties to mitigate failure

Extreme Heat Events

- Storm shelter
- Communicating with county health to get list of people who might need help
- Setup fan distribution program
- Window A/C units for people that need them

The hazard mitigation meeting ended at 1:00 pm.

Clarion Hazard Mitigation Meeting Minutes 9/1/10

Meeting attended by: Cory Abels, Brian Marker, Tim Fletcher, Bill Kem, Vicky Boyington, Mike Nail, Jon Devries, and Shelley Pohlman.

Meeting started at 12:00 pm

The hazard mitigation committee went through and performed the STAPLEE analysis for each hazard mitigation action that they brainstormed during the last meeting. During the analysis, some mitigation actions were removed or combined, those changes are listed below:

- Portable lighting – removed
- Geo-coding city addresses (located at driveway of home) & GPS Units – combined
- Map out where all hazardous materials are located within the city & Laptop computer for location of hazardous materials (to be put on fire truck) – combined
- Continue public education & Power point on fire safety program (computer, projector, screen) – combined
- Encourage citizens/training for fire prevention – removed
- Assistance to get trees trimmed around power lines – removed
- Hydraulic analysis & drainage and feasibility study – combined
- Additional signage and blockades/barricades & traffic control for blocked streets & Additional personnel to block roads – combined
- Generator for keeping airport lights on – removed
- Communicating with county health to get list of people who might need help & Setup fan distribution program & Window A/C units for people that need them – combined

The results of the STAPLEE analysis are shown below:

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Mitigation Action	STAPLEE Score
New wastewater treatment plant	17
Fuel containment and automatic pumping	17
Mock emergency scenarios	16
Trash pump	16
Slip-lining sanitary sewers to prevent infiltration	16
Communicating with media outlets and other public entities to warn citizens	16
Permanent backup power generator at lift stations	14
Map out where all hazardous materials are located within the city & Have laptop computer for location of hazardous materials (to be put on fire truck)	14
Portable power generator	12
Additional signage and blockades/barricades & Traffic control for blocked streets & Additional personnel to block roads	12
Tanker truck	11
Continue public education & Establish power point on fire safety program (computer , projector, screen)	11
Update firefighters equipment/gear	11
Communicating with county health to get list of people who might need help & Setup fan distribution program & Window A/C units for people that need them	11
Tornado storm shelter (storm shelter)	10
Hydraulic analysis & Drainage and feasibility study	8
Get funding for regular inspections of properties to mitigate structural failure	8
Geo-coding cities addresses (located at driveway of homes) & GPS Units	7

The hazard mitigation meeting ended at 1:15 pm.

Clarion Hazard Mitigation Meeting Minutes 1/5/11

Meeting attended by: Steven Hennigar, Brian Marker, Michael Anderson, Bud Young, Shelley Pohlman, and Jon Devries.

Meeting started at 12:00 pm

The hazard mitigation committee went through reviewed all of the STAPLEE results and during the course of the review the hazard mitigation committee pointed out that they have already started making headway on some of their hazard mitigation actions.

The hazard mitigation committee then went through and completed the Prioritization and Implementation of Mitigation Actions Worksheet. The results are shown below:

Mitigation Action	Priority	Department/Party Responsible	Existing and Possible Funding Sources	Target Completion Date
New wastewater treatment plant	I	Wastewater	FEMA, CDBG, Tax Payer	2015
Fuel containment and automatic pumping	II	Airport	IDOT, Local	2013
Mock emergency scenarios	I	Emergency Services, First Responders	Local, Grants	Ongoing
Trash pump	I	Wastewater	Grants, Local	2011
Slip-lining sanitary sewers to prevent infiltration	I	Wastewater	Local, CDBG, Grants, HMGP	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Communicating with media outlets and other public entities to warn citizens of hazards	I	Administration	Local	Ongoing
Permanent backup power generator at lift stations	I	Wastewater	Local	Ongoing
Map out where all hazardous materials are located within the city and have laptop computers put on fire trucks for location of hazardous materials	II	Fire Department	Local, Firefighter grants	2012
Portable power generator to power an emergency shelter (schools, churches)	III	Public Works, Emergency Services	Grants	2014
Traffic control for blocked streets, additional signage, blockades/barricades, and additional personnel	III	Public Works, Emergency Services	Grants	2015
Tanker truck	I	Public Works	Local	2011
Continue public education and establish power point on fire safety programs	I	Fire Department	Local	Ongoing
Update firefighters equipment/gear	I	Fire Department	Grants	Ongoing
Communicating with county health to get list of people who might need help & Setup fan distributing program & Window A/C units for people that need them	II	Administration	Local Organizations	Ongoing
Tornado storm shelter	II	Emergency Services	Grants, Local	2014
Hydraulic analysis & Drainage and feasibility study	I	Public Works	FEMA, Grants	2011
Get funding for regular inspections of properties to mitigate structural failure	I	Public Works, Housing Committee	Local	Ongoing
Geo-coding cities addresses (located at driveway of homes & GPS Units & Mapping of Utilities	II	Public Works, Emergency Services	FEMA, Grants	Ongoing

The hazard mitigation meeting ended at 1:00 pm.

Section 8: Resolution

RESOLUTION NO. 13-04

**A RESOLUTION OF THE CLARION CITY COUNCIL ADOPTING A HAZARD
MITIGATION PLAN FOR CLARION, IOWA**

WHEREAS, the Clarion City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Clarion City Council has authorized the development of the City's portion of the Wright County Multi-Jurisdictional Hazard Mitigation Plan for the City of Clarion, Iowa; and,

WHEREAS, this plan will be the guidance and regarding future mitigation actions; an,

WHEREAS, the Clarion Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommend that the City Council approve the plan; and,

WHEREAS, the plan has been reviewed by City staff members and City Council; and

NOW THEREFORE BE IT RESOLVED, that the Clarion City Council; hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 4th day of February, 2013.



Rochelle E. Pohlman, City Administrator



Mike Nail, Mayor

Appendix C: Dows

Section 1: Risk Assessment

The committee decided that the following additional hazards were not applicable or would have little effect on the City of Dows:

Earthquakes were considered to have little effect to the City. The effects of an earthquake are possible of being felt in the City, however, due to the city’s distance from the nearest fault line, if an earthquake did occur it would feel as though a large truck was passing by. This would cause little damage to utilities or structures throughout the City.

Expansive soils were considered not applicable to the City due to the lack of historical data supporting expansive soils in the area. Expansive soils, and incidents related to expansive soils, are more commonly found in eastern Iowa near the Mississippi where more clay soils are found. Members of the community also didn’t remember expansive soils occurring or presenting a problem.

Railway Incidents was considered to be not applicable to the City due to the lack of large rail transportation events that have occurred and due to where the rail is located. If a rail incident did occur there it would not cause damage to property and there are other ways to get in and out of the City.

The following hazards were combined together:

- Human Disease Incident and Human Disease Pandemic were combined into Disease.
- Terrorism includes all terrorism addressed in the state plan.

Due to water quality concerns in the area Watershed Pollution was added to the list of hazards addressing

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee’s scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Thunderstorm and Lightning	5	5	5	5	2	4	26
Energy Failure	5	5	5	5	1	5	26
Severe Winter Storms	5	5	5	5	3	2	25
Hailstorm	5	3	5	5	2	5	25
Windstorm	5	5	5	5	2	2	24
Tornado	1	2	4	4	4	5	20
Flash Flooding	5	4	2	2	2	5	20
Communications Failure	2	2	5	5	1	5	20
HAZMAT – Fixed Facility	5	5	1	1	1	5	18
Watershed Pollution	5	5	1	1	1	5	18
River Flooding	5	4	2	2	2	2	17
Structural Fire	5	3	1	1	2	5	17
Transportation Incident	5	4	1	1	1	5	17
Extreme Heat	5	5	2	2	1	1	16
Terrorism	1	1	1	5	3	5	16
HAZMAT - Transportation	1	2	2	2	2	5	14
Structural Failure	2	2	1	1	2	5	13

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Disease	2	3	1	1	3	1	11
Grass or Wild land Fire	1	1	1	1	1	5	10
Pipeline Incident	1	1	1	1	1	5	10
Public Disorder	1	1	1	1	1	5	10
Air Transportation Event	1	1	1	1	1	5	10
Drought	3	2	1	1	1	1	9

Hazard	Thunderstorm and Lightning
Location	Thunderstorms generally affect an entire area or region; therefore, if a thunderstorm event were to occur, the entire City of Dows would be impacted. For a map of the City of Dows, see Section 6 of this Appendix.
Historical Occurrence	The NCDC historical data in Appendix L shows 59 thunderstorm events and 4 lightening events recorded in Wright County. A great percentage of these storms most likely impacted the City of Dows. Based on this data and the fact that thunderstorms and lightning are a common occurrence in the Midwest, the hazard mitigation committee determined that more than 10 thunderstorms and/or lightning strikes have been experienced in Dows.
Probability	The central area of the United States is home to some of the most severe thunderstorms in the world. Because of the frequency of severe thunderstorms and lightning that have continued to impact Dows in the past, the hazard mitigation committee determined that there is a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	Because thunderstorms are generally a regional event, the hazard mitigation committee determined that more than 75% of people and property feel the impacts.
Maximum Threat	Similar to the vulnerability, the hazard mitigation committee determined that if a thunderstorm were to occur, the entire spatial extent of the community would feel some impacts due to such event.
Severity of Impact	Thunderstorms and lightning impact the City of Dows in the form of high winds, heavy rains and lightning strikes. While each of these characteristics has the potential to cause injuries, damage to property or service interruptions, the committee determined these impacts would generally be limited.
Speed of Onset	A community generally has an idea of when a thunderstorm is approaching; however, the characteristics present within a storm may be difficult to predict. The hazard mitigation committee determined that the community of Dows generally has less than 5 hours warning that a thunderstorm which may generate lightning will occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Energy Failure
Location	The entire community would generally be impacted by an energy failure; see Section 6 of this Appendix for a map of Dows.
Historical Occurrence	Energy failure in the City of Dows are generally the result of electrical disruptions due to ice storms or high winds. While no official record of energy disruption is presented, the hazard mitigation committee determined that more than 10 occurrences have taken place within the City.
Probability	With the number of disruptions that have occurred in the past and the likelihood that ice storms or high winds will occur within Dows every year, the hazard mitigation committee determined that the probability of an energy disruption occurring is highly likely.
Vulnerability	An energy failure would impact the entire community and would become a particular concern during extreme heat or extreme cold temperatures. With very few generators located within the City of Dows, a majority of the community would feel the impacts of an energy disruption.
Maximum Threat	When an energy failure occurs within the community of Dows, the entire spatial extent of the community is generally without power until the electrical company is able to fix the issue.
Severity of Impact	Energy failure generally have a limited amount of impact on the structural stability of buildings and incur very few injuries to persons of Dows. The largest impacts would cause a failure in essential facilities or services.
Speed of Onset	Energy failure generally occurs without any warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Severe Winter Storms
Location	Severe Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a winter storm occurs, the entire community of Dows is impacted. For a map of the assessed structures that could potentially be impacted, see Section 6 of this Appendix.
Historical Occurrence	Historical data provided by the National Climatic Data Center (NCDC) is presented in Appendix L. This data shows that Dows and Wright County, combined, have experienced more than 65 instances of winter storm conditions since 1993. Based on this and the committee's common knowledge of winter storms, there have been more than 10 events take place in Dows.
Probability	Winter storms commonly occur throughout the state of Iowa. Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. With the snow season extending from October to April, the chance for a severe winter storm that may produce extreme cold temperatures along with large amounts snow, ice and wind, is highly likely.
Vulnerability	Winter storms are generally regional events that would impact the entire City of Dows. The hazard mitigation committee determined that more than 75% of the people and property within the community would be affected.
Maximum Threat	As mentioned, winter storms affect entire regions and would impact the entire spatial extent of Dows. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the City's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property of Dows. Because most residents are able to seek shelter during a winter storm event, the hazard mitigation committee determined that winter storms generally have a limited impact on the quality of life with low instances of injury, property damage or facility disruption.
Speed of Onset	Weather services can accurately predict when winter storms will occur and the conditions that may accompany the storm. Generally there is more than 24 hours of warning when a winter storm is on its way.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Hailstorm
Location	Hailstorms have the potential to affect all areas of Dows. See Section 6 of this Appendix for a map of the City of Dows.
Historical Occurrence	According to data collected from the National Climatic Data Center (NCDC) in Appendix L, there have been a total of 54 hail storms recorded in Wright County since 1974; 5 of which directly impacted the City of Dows. While not all instances were recorded to have directly impacted Dows, the hazard mitigation committee estimates that there have been more than 10 hailstorms that have impacted the community in the past.
Probability	Hailstorms have not impacted the City of Dows on an annual basis. Based on the history of hailstorms, the committee determined that there is a possibility that a significant hailstorm could occur within Dows in the next year.
Vulnerability	The entire community is vulnerable to being impacted by a hailstorm. People, if exposed to the event could be injured and property exposed is vulnerable to damage.
Maximum Threat	Based on the community's area of land cover, the hazard mitigation committee determined that the entire spatial extent of Dows would be impacted by a hailstorm.
Severity of Impact	The hazard mitigation committee determined that if directly exposed to a hailstorm, a person may be at risk of serious injuries, some short term property damage and essential services, such as energy could be disrupted; however, these impacts are generally minimal.
Speed of Onset	Hail storms often result from severe thunderstorms or tornadoes. While warning is available for such events, warning on hail within such may be limited.

Hazard	Windstorms
Location	Windstorms would generally impact the entire area of Dows as discussed in the Maximum Threat. For a map of the community see Section 6 of Appendix B.
Historical Occurrence	According to the NCDC, 41 wind events/windstorms have been recorded in Wright County since 1993; these windstorms may or may not have impacted the City of Dows. Windstorms may accompany other storms such as thunderstorms or winter storms; therefore, the hazard mitigation committee determined that windstorms have occurred more than 10 times within the community.
Probability	Iowa lies on the eastern edge of the Great Plains where winds blow strong, particularly in the winter and spring. The relative flatness of the terrain and cropland with few trees means that most areas of the city are well exposed to the wind. Because windstorms are such a common occurrence, the hazard mitigation committee determined that it is highly likely for a significant, damaging windstorm to occur.
Vulnerability	The hazard mitigation committee determined that because most windstorms occur in a regional manner, more than 75% of the people and property of Dows would be impacted by a windstorm.
Maximum Threat	Similar to the vulnerability of the community, because most windstorms occur in a regional manner, the entire spatial extent of Dows would be affected.
Severity of Impact	The hazard mitigation committee determined that because each of the residents of the City are able to seek shelter, the severity of wind storms in terms of injuries, property loss, and economic impacts is minor.
Speed of Onset	Sustained high winds can be predicted through the National Weather Service. According to the hazard mitigation committee they have approximately 12-24 hours of warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Tornado
Location	The entire City of Dows is vulnerable to a tornado; a map of the entire community is located in Section 6 of this Appendix.
Historical Occurrence	As seen in the NCDC data shown in Appendix L Wright County has been reported to have experienced tornadoes that have caused extensive property damage. With 24 tornadoes reported since 1964, one of which having specifically impacted the City of Dows, the hazard mitigation committee determined that less than 2 tornadoes have impacted the City.
Probability	There are on average about 46 tornadoes per year in the state of Iowa. Tornado events occur randomly and have the potential to affect any community within the State. Since tornadoes act in such a random manner, the Dows hazard mitigation committee determined that it is unlikely for a tornado to occur within the community.
Vulnerability	Realistically speaking, the entire population of Dows is vulnerable to tornadoes; however, unless the tornado directly struck the community, the hazard mitigation committee felt that on average anywhere between 50-75% of the community is at risk for major impacts.
Maximum Threat	Similar to the vulnerability, the hazard mitigation committee determined that if a tornado were to strike the City, approximately 50-75% of its spatial extent would be impacted.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of the direct impact of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials. The Dows hazard mitigation committee determined that serious injury, major property damage and interruption in services would occur during a tornado event.
Speed of Onset	Very little warning is given when a tornado occurs, especially when a tornado watch transitions into a tornado warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Flash Flooding
Location	Section 6 shows the area identified using 2 foot contours where flash flooding would most likely occur in the community.
Historical Occurrence	Flash flooding generally occurs in Dows when large amounts of rain fall in a short period of time Thirteen instances of flash flooding were recorded for the County; since 1993. Based on the committee's knowledge of community, it was determined that flash flooding has occurred more than 10 times in the community.
Probability	The hazard mitigation committee estimated, based on their familiarity with the City that it is very likely that flash flooding will occur in the City of Dows in the next year, the majority of flooding is due to the river; during periods of rain, the water generally flows into the river; however, when large amounts of rain falls in a short amount of time, the water cannot drain quickly enough to the river, causing backup.
Vulnerability	The number of people that are impacted by flash flooding in Dows is generally limited to those who are traveling during or right after the rain event, those who live in low-lying areas, areas that are paved or slow draining, or in those buildings with older foundations. These impacted areas account for approximately 10-25% of the people and property in Dows according to the hazard mitigation committee.
Maximum Threat	Similar to the percentage of people and property that are impacted, and because Flash Flooding generally impacts specific areas in town, approximately 10-25% of the spatial extent of the community is estimated to be impacted by flash flooding.
Severity of Impact	While flash flooding is a nuisance to the community there are generally a limited amount of injuries, property damage or interruption of services in Dows.
Speed of Onset	Flash flooding occurs quickly; however, the amount of rain gives some indication of when it may occur. The hazard mitigation committee estimated that citizens have less than 5 hours warning time when a flash flood event will occur.

Hazard	Communications Failure
Location	In the event of a communications failure, the entire community could be impacted. For a map of the community see Section 6 of this Appendix.
Historical Occurrence	No historic data on communications failure could be found for the City of Dows. However, the hazard mitigation committee determined based on their personal experience that there have been approximately 4-6 occurrences of communications failure within the community.
Probability	The communication failures that have occurred have been random events that were not expected within the City. Because communications failures have not occurred frequently, the hazard mitigation committee determined that it is unlikely that an event will occur in the next year.
Vulnerability	Because a communication failure may result in little warning to the community, the committee estimated that the entire community would be impacted.
Maximum Threat	While other devices are available to use for a communication loss, the entire spatial extent of the community would be impacted by a communications loss. This is because the emergency communications system serves the entire community.
Severity of Impact	Communications failure in itself doesn't cause any injuries or property damage and the committee feels services would not be interrupted for a significant amount of time.
Speed of Onset	Communication failures are sudden and occur without any kind of warning. In most cases, communication failures are generally a result of some sort of accident, terrorist act or other natural hazard.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	HAZMAT-Fixed Facility
Location	The locations of fixed facilities that are registered with Iowa DNR to produce, store or handle hazardous materials are illustrated in the map in Section 6 of this appendix.
Historical Occurrence	While the DNR record in Chapter 3 shows there has been 1 hazardous material spill in Dows since 1995, the committee estimated that with the Cooperative in town, there are more incidents than reported; therefore, the Hazard Mitigation committee estimated that there have been more than 10 incidents relating HAZMAT spills or leaks in Dows.
Probability	Because the Cooperative stores farm chemicals including anhydrous, the hazard mitigation committee determined that there is a high probability that a significant spill or leak might occur in the next year.
Vulnerability	Areas of the community vulnerable to a HAZMAT event related to the fixed facilities are determined based on their proximity to the facilities and the type of material that may be released. Generally spills and leaks are small. The hazard mitigation committee estimated that less than 10% of people and property are impacted.
Maximum Threat	Similar to vulnerability, because the spills and leaks are generally insignificant, less than 10% of the spatial extent of the community is impacted.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. The hazard mitigation committee determined that typical HAZMAT spills or leaks generally do not impact property. The most significant impact could be to people, if exposed; however, even this is rare. Therefore impacts were listed as negligible.
Speed of Onset	Because a hazardous material event occurs randomly, there is typically no warning time for when such an accidental event will occur.

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in Dows, especially due to its vicinity to the river, for a map of the City please see Section 6 of this Appendix.
Historical Occurrence	Much of the watershed pollution that might occur within Dows would most likely be due to nonpoint source pollution. A probable cause for this type of pollution would be the runoff of pollution that would flow into the river. While it is difficult to measure the number of times this kind of pollution occurs, the Dows hazard mitigation committee estimated that, due to HAZMAT events and surrounding agriculture there have been more than 10 instances of watershed pollution.
Probability	Because Dows is located near the Iowa River, the hazard mitigation committee determined that it is highly likely for watershed pollution to occur.
Vulnerability	While watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. Residents of Dows are on a City water system, which treats the drinking water. Because very few persons in the City come in direct contact with the river, where Watershed Pollution would have its highest impacts, the committee estimated that less than 10% of people and property would be impacted.
Maximum Threat	Similar to vulnerability, watershed pollution would most likely harm the river. Because less than 10% of the community generally comes in contact with the river, less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that watershed pollution is common. People are able to come into contact with polluted waters without harm. The pollution also does not impact structures and generally does not harm public facilities.
Speed of Onset	Because residents would be unaware that that pollution to the watershed is occurring there would be limited warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	River Flooding
Location	Dows rests near the banks of the Iowa River.
Historical Occurrence	Since 1993 there have been 4 flood events recorded in Wright County. While none of these events particularly say Dows, the City is often impacted by the nearby river; therefore, the committee the hazard mitigation committee estimated that there have been more than 10 river flooding events that have impacted the community.
Probability	Because flooding along the Iowa River has occurred more frequently in recent years and the river is beginning to expand out, according to the hazard mitigation committee it is likely that river flooding will take place in the next year.
Vulnerability	The eastern edge of the community is most vulnerable to flooding from the river. The hazard mitigation committee estimated that approximately 10-25% of the people and property in the community are impacted.
Maximum Threat	While the river flooding does not leave visible standing water throughout all impacted areas of Dows, damages to basements and roadways generally make up for approximately 10-25% of the spatial extent of the community.
Severity of Impact	The most severe impact of flooding is the economic damage that floodwaters can cause to homes and businesses. Generally speaking, flooding in Dows causes property damage and impacts public facilities; however, no substantial damages occur and generally very few injuries result.
Speed of Onset	There is generally some kind of warning that flooding will occur. If there is a lot of rain upstream to Dows, residents will get ample warning or notice that flooding may occur.

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of Dows see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee noted that they have seen more than 10 occurrences of structural fires in the entire history of the community.
Probability	There is always the chance for a structural fire to occur within the City. Based on past known events, the committee noted that it was possible for a structural fire to occur.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined that less than 10% of people and/or property would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area, the committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and major property damage; however, since these impacts are so isolated and generally do not impact public facilities, the committee rated the severity at a 2.
Speed of Onset	Structural fires may begin and spread incredibly fast; there is no warning when one might occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Transportation Incident
Location	Transportation events have the potential to occur on any of the roadways within Dows. For a map of the community and its transportation systems see Section 6 of this Appendix.
Historical Occurrence	County Roads S13, C54 and State Highway 72 all intersect within the City of Dows. The hazard mitigation committee recalls very few accidents having occurred in the City boundaries; however, local emergency personnel are often required to respond to calls on nearby Interstate 35. Because the City responds to such instances, the committee determined there have been more than 10 transportation incidents impacting the City.
Probability	The hazard mitigation committee determined that based on the community's location, it is unlikely that a transportation event will occur in the next year.
Vulnerability	Transportation events generally only affect the motor vehicles and/or rail cars involved. Based on these impacts less than 10% of the people and property of Dows would be impacted by transportation events.
Maximum Threat	Similar to the vulnerability of the community; if a transportation event were to occur less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	A transportation event can occur in many forms. Based on the few numbers of vulnerable areas within the City, the committee estimated that only minor injuries and/or property damage would occur.
Speed of Onset	No prediction of a transportation event can be made; therefore, there is no warning time given for the event.

Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat conditions were to take place in Dows, the entire community would feel the event. For a map of the City of Dows see Section 6 of this Appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; 2 extreme heat events have been recorded for having occurred in Wright County. The committee estimated that there have been more events than this that meet IHSEMD's definition of Extreme Heat. They feel extreme heat events occur each summer, which means that more than 10 event have impacted the City
Probability	The hazard mitigation committee estimated that it is very likely that an extreme heat event will occur in the future.
Vulnerability	When extreme heat conditions occur, it generally comes in a heat wave that impacts an entire region; however, a majority of residents are able to seek shelter in an air conditioned space. Therefore the committee estimated that there are a minimal amount of people and property directly impacted by extreme heat.
Maximum Threat	Similar to vulnerability, the committee determined that while extreme heat covers the entire spatial extent of the community, only a portion of the homes and business would feel the impacts.
Severity of Impact	The impacts of extreme heat is generally very mild for those who have air conditioning. Few injuries occur, quality of life is generally not impacted, property is generally not damaged and services are typically efficient enough to handle the heat.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Terrorism
Location	The committee cannot estimate where terrorism might occur within the City; therefore, no specific location is identified.
Historical Occurrence	The hazard mitigation committee could not recall any acts of terrorism occurring within the City in the past.
Probability	The committee did not see the City as a desired target for acts of terrorism; therefore, they determined that it is extremely unlikely that a terrorism event would occur.
Vulnerability	While it is not likely that an event would occur, because the City does not cover much area, such act could have a catastrophic impact on the community.
Maximum Threat	Because the community does not cover a great amount of space, the spatial extent of the community that might be impacted would consist of 75% or more.
Severity of Impact	Depending on the type of terrorism that might occur, the committee estimated that injuries and a limited impact on public facilities and structures might occur.
Speed of Onset	Terrorism is an act displayed without any warning. The City would have no warning of such event.

Hazard	HAZMAT-Transportation
Location	HAZMAT events related to transportation can occur anywhere within Dows; to see a map of the City please see Section 6 of this Appendix.
Historical Occurrence	The list of historical occurrences of HAZMAT events that have taken place in Wright County is shown in Chapter 3 of this plan; this list was provided by the Iowa Department of Natural Resources (DNR). The HAZMAT events relating to transportation are most likely due to the accidental release of hazardous materials during the transport of substances for agriculture uses, since the surrounding areas are of heavy agricultural use. The hazard mitigation committee determined that the release of substances being transported to and through Dows have occurred less than 2 times within the City limits.
Probability	While hazardous substances are regularly transported to and from the Cooperative in Dows, based on historical occurrences, the hazard mitigation committee determined that it is unlikely that a HAZMAT event related to transportation may occur.
Vulnerability	Areas of the community vulnerable to a HAZMAT event related to the fixed facilities are determined based on their proximity to the facilities and the type of material that may be released. Generally spills and leaks are small. The hazard mitigation committee estimated that approximately 10-25% of people and property could be impacted.
Maximum Threat	Similar to vulnerability, because the spills and leaks are generally insignificant, it is estimated that approximately 10-25% of the spatial extent of the community would be impacted.
Severity of Impact	Hazardous material spills or releases have the potential to result in injuries; especially in relation to hazardous material events due to transportation. Property damage is generally minimal and facilities generally not disrupted; therefore, the hazard mitigation committee estimated that minor injuries would occur with limited property damage and only a short interruption of services.
Speed of Onset	There is no prediction for when a release or spill of hazardous materials will occur when related to the transport of such materials; most events occur due to a sudden crash or unexpected leak.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Structural Failure
Location	The hazard mitigation committee was not able to specifically identify structures that could fail within the community.
Historical Occurrence	The hazard mitigation committee has seen very few structural failures in the past. While no record of such events is available, the committee estimated that there have been approximately 2-4 occurrences.
Probability	The hazard mitigation committee feels that many of the structures in the community are sound; therefore, the committee determined that it is highly unlikely that a structural failure will occur.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Again, because most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that injuries and property damage would occur; however, impacts to the overall quality of life and essential facilities would not occur.
Speed of Onset	The hazard mitigation committee determined that there is no telling when a structure may fail; therefore, they noted that there is minimal or no warning time.

Hazard	Disease
Location	There is no telling where disease might occur within the City of Dows; therefore, no specific location is established.
Historical Occurrence	There is no historical record of diseases specifically impacting the City of Dows; however, the committee estimated that 2-4 occurrences may have taken place since the city's establishment.
Probability	The hazard mitigation committee determined that it is possible that a major disease outbreak will impact the City in the next year; the committee estimated this because of recent cases of H1N1. There are also other outbreaks that the County may have to deal with, which could impact residents of the City.
Vulnerability	Most diseases occur in isolated households; based on this and the fact that there are multiple forms of treatment and vaccination, the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Again, because most diseases occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	While illness or even death may occur due to disease, no structural damages or impacts to public facilities would be anticipated.
Speed of Onset	The hazard mitigation committee determined that while disease may impact a person quickly, it would take time for the disease to spread. The committee anticipated that treatment would become available before the disease became out of control.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Grass or Wild-land Fire
Location	Dows is completely surrounded by agriculture land, except to the east where the river runs. During dry conditions a wild-land fire could occur anywhere around the City, for a map of the vulnerable area see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee noted that they have not seen major grass or wild-land fires occur within the community in the past; therefore, they gave historical occurrence a rating of 1; less than two events having occurred in the community.
Probability	There is always the possibility for a grass or wild-land fire to occur within the City of Dows; however, the hazard mitigation committee determined that it is unlikely because burning bans are generally enforced during very dry conditions when fields are most vulnerable to fires.
Vulnerability	Because the City has a fire department on hand, and events are generally kept isolated, the committee estimated that less than 10% of the City would be impacted by a grass or wild-land fire.
Maximum Threat	Similar to vulnerability, an isolated area of Dows would be impacted by a major grass or wild-land fire.
Severity of Impact	While fires can be dangerous and cause injuries and damages, the committee determined that because a grass or wild-land fire would occur in areas of open space, that very few persons or structure would be impacted.
Speed of Onset	Grass and wild-land fires may begin and spread incredibly fast; there is no warning when one might occur.

Hazard	Pipeline Incident
Location	The nearest major pipeline, which consists of liquid propane, is located in Franklin County, a little over 2 miles east of Dows. For a map of the pipelines in Wright County see Section 6 of this appendix.
Historical Occurrence	Historically there has been no incidence of a pipeline incident occurring nearby and having an impact on the City of Dows; therefore, the hazard mitigation committee determined that a rating of 1 should be given to historical occurrence.
Probability	Dows is located 2 miles east of a major liquid propane pipeline. The hazard mitigation committee determined that the chances of an event occurring that could impact the City are highly unlikely.
Vulnerability	If a major pipeline incident did occur, the hazard mitigation committee determined that in a worst case scenario there is barely a chance for such incident to impact less than 10% of people and property in Dows.
Maximum Threat	Similar to vulnerability, if a major incident occurred and it had an impact on the community, less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	Little-to-no impacts would be anticipated in the event of a pipeline failure near the City of Dows.
Speed of Onset	Pipeline incidents are generally accidental and no warning is given when such event is going to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Public Disorder
Location	Public disorder can occur throughout the City of Dows; however, it's anticipated that such event would usually be centered in the Downtown area. See Section 6 of this Appendix for a map of the City of Dows.
Historical Occurrence	The committee could not recall any public disorder having occurred within the City of Dows.
Probability	Because destructive civil disturbances are rare, the committee determined that it is highly unlikely that such event will occur in the next year.
Vulnerability	A disturbance in the City of Dows would affect less than 10% of the community.
Maximum Threat	Spatially, less than 10% of the City of Dows would be affected by a public disorder event, as the impacts would be isolated to the downtown area.
Severity of Impact	It is anticipated that if such event occurred, damages would be negligible because there are not enough people within the community to cause a major uproar. The community also has law enforcement that would respond to such event.
Speed of Onset	There would likely be no warning time in the event of public disorder.

Hazard	Air Transportation Event
Location	An air transportation event could take place anywhere within the City due to crop dusting, or airplanes passing over from nearby airports. For a map of the nearby airports, see Section 6.
Historical Occurrence	Historically there has been no incidence of an air transportation event occurring within the City; therefore, the hazard mitigation committee determined that a rating of 1 should be given to historical occurrence.
Probability	Dows is located approximately y miles from the nearest airport; therefore, the hazard mitigation committee determined that it is highly unlikely that an air transportation event will occur within the community.
Vulnerability	If an air transportation event did occur, the hazard mitigation committee determined that only an isolated area within the City would be impacted
Maximum Threat	Similar to vulnerability, if air transportation event occurred and it had an impact on the community, less than 10% of the community would be impacted.
Severity of Impact	An air transportation event in the form of a plane crashing in the community would cause a great amount of structural damages, injuries and possibly deaths; however, impacts would be so isolated that the hazard mitigation committee determined that the severity of impact would be low.
Speed of Onset	Air transportation events are generally accidental and no warning is given when such event is going to occur.

Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire City of Dows would be affected by the Drought conditions. For a map of the City of Dows see Section 6 of this Appendix.
Historical Occurrence	There are three recorded occurrences of droughts in the NCDC Database dating 1995, 2001 and 2003. Based on this and other known events by the committee, they determined that there have been 4-6 occurrences within the City.
Probability	Droughts generally do not occur on an annual or even every-other year, based on this the hazard mitigation committee determined that it is unlikely that a drought would occur in the next year.
Vulnerability	The most vulnerable to a drought situation is the crops, livestock and agriculture surrounding Dows. Because a majority of the impacts would be felt outside of the community, the committee estimated that less than 10% of the community would be directly impacted.
Maximum Threat	A drought impacts the region; however, in terms of damages the committee estimated that less than 10% of the community would experience loss.
Severity of Impact	Although a drought would have a major impact on the local/regional economy, the committee would not anticipate many illnesses, structural damages or interruption in services.
Speed of Onset	The onset of a drought would be very slow; therefore, the Hazard Mitigation Committee gave the speed of onset a 1, more than 24 hours warning time.

Section 2: Vulnerability Assessment & Loss Estimates

Dows is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the City.

Those hazards that the entire city is exposed to includes Thunderstorm & Lightning, Energy Failure, Winter Storms, Hailstorms, High Wind Events, Communications Failure, Watershed Pollution, Extreme Heat Event, Drought, Tornadoes, Structural Fire, Transportation Event, Terrorism, HAZMAT-Transportation, Structural Failure, Disease, Public Disorder and Air Transportation Event. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For Dows, these hazards include Flash Flooding, Hazardous Materials relating to Fixed Facilities, River Flooding, Grass or Wild-land Fires and Pipeline Incident. Their vulnerability assessments and loss estimates are discussed in sections 2.2 through 2.6.

2.1 Exposure Assessment for Thunderstorm & Lightning, Energy Failure, Winter Storms, Hailstorms, High Wind Events, Communications Failure, Watershed Pollution, Extreme Heat Event, Drought, Tornadoes, Structural Fire, Transportation Event, Terrorism, HAZMAT-Transportation, Structural Failure, Disease, Public Disorder and Air Transportation Event:

The City's exposure to each hazard was determined based on the area of the city that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire City include Thunderstorm & Lightning, Energy Failure, Winter Storms, Hailstorms, High Wind Events, Communications Failure, Watershed Pollution, Extreme Heat Event, and Drought. Those hazards that could potentially impact any one random site within the City include Tornadoes, Structural Fire, Transportation Event, Terrorism, HAZMAT-Transportation, Structural Failure, Disease, Public Disorder and Air Transportation Event. With this, all of the above-listed hazards have the potential to impact any area of the City, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The table below depicts this exposure.

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Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	306	306	100%	\$8,782,900	\$8,782,900	100%	635	635	100%
Commercial	93	93	100%	\$4,787,400	\$4,787,400	100%			
Agricultural	7	7	100%	\$33,600	\$33,600	100%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	406	406	100%	\$13,603,900	\$13,603,900	100%			

2.1.1. Vulnerability Assessment for Thunderstorms & Lightning

As determined by the hazard mitigation committee 100% of Dows is exposed to thunderstorms and lightning. Because thunderstorms and lighting are a regional event, the committee determined that more than 75% of the population of Dows is susceptible to impacts or damages due to thunderstorms and lightning; however, this vulnerability is dependent on the extent of the storm and accompanying events that may occur.

Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts include downed limbs, power outages and heavy rain that may impair individuals’ ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

Loss Estimate Calculation:

Historical data from the NCDRC displayed in Appendix L shows that the highest amount of property damages reported within Dows due to Thunderstorms equaled \$50,000; however, the largest amount of property damages in the County equaled \$250,000. The average of these numbers was used as an estimate of losses to account for a worst-case-scenario of the impacts that the City could experience due to thunderstorm and lightning. The average damages, which equaled \$150,000 accounts for approximately 1% of the City’s total assessed value of residential, commercial, agricultural and industrial structures. Based on this worst-case-scenario, it was estimated that each property would experience structural damages equaling 1% of their assessed value, or 1% of structures in the City would experience complete loss. The damages are dependent on the intensity and impacted area of the thunderstorm and lightning event. The results of this estimate are displayed below.

- Estimated residential structural damage due to Thunderstorm and Lightning (1%) = \$ 87,829
- Estimated commercial structural damage due to Thunderstorm and Lightning (1%) = \$47,874
- Estimated agricultural structural damage due to Thunderstorm and Lightning (1%) = \$336
- Estimated industrial structural damage due to Thunderstorm and Lightning (1%) = \$0
- Total estimated structural damages due to Thunderstorm and Lightning = **\$136,039**

2.1.2. Vulnerability Assessment for Energy Failure

Energy Failure is an extended interruption of service in electric, petroleum or natural gas, which occur from an outage or shortage of usable energy. Energy shortages are rare in Dows; however, outages are common. Outages are often caused by impacts to above-ground power lines from thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes and infrastructure failure.

The hazard mitigation determined based on personal experience that energy failures impact the entire community; however, impacts are generally mild. Generally the largest impact is to essential facilities or services; however, few if any injuries or illness occur, and little-to-no property damage.

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Energy failures are most threatening during extreme heat or winter conditions. During such time residents are not able to cook, store food, or run every-day appliances. Death and injuries due to power outages are very rare.

Loss Estimate Calculation:

As mentioned above, an energy failure generally does not impact structures and people are typically only at risk during extreme heat or winter conditions. Due to these circumstances, no loss estimate could be calculated.

2.1.3. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the City of Dows is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that more than 75% of the people and property within the city are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice. Infrastructure failure occurs through power outages from ice, which has the potential to impact the entire County. Structural failure is also an impact that can occur due to large amounts of heavy snow. These impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person's exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the City are ill-advised to be outdoors for long periods of time during a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDL, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this amount represents reported damages throughout the County, it was used as a worst-case scenario for the City of Dows. Therefore, based on \$75,000 in damages that could potentially occur within the City of Dows, which when rounded upwards means approximately .5% of the structures in the city would experience damages due to winter storms. The loss estimate calculation for .5% in damages of all structures in Dows is expressed below.

Estimated residential structural damage due to Severe Winter Storms (.5%) = \$43,915
Estimated commercial structural damage due to Severe Winter Storms (.5%) = \$23,937
Estimated agricultural structural damage due to Severe Winter Storms (.5%) = \$168
Estimated industrial structural damage due to Severe Winter Storms (.5%) = \$0
Total estimated structural damages due to Severe Winter Storms = **\$68,020**

2.1.4. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms and according to the hazard mitigation committee, more than 75% of the people in the city could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDL shows 17 hailstorms reported in Wright County and 5 such events reported in Dows. The maximum amount of property damage incurred in one recorded event within the City of Dows equaled \$75,000, which accounts for about .5% of the city's assessed residential, commercial, agricultural and

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structural values. Based on this historical data it was estimated that approximately .5% of the city's structures would be impacted by a hailstorm.

Estimated residential structural damage due to Hailstorms (.5%) = \$43,915
Estimated commercial structural damage due to Hailstorms (.5%) = \$23,937
Estimated agricultural structural damage due to Hailstorms (.5%) = \$168
Estimated industrial structural damage due to Hailstorms (.5%) = \$0
Total estimated structural damages due to Hailstorms = **\$68,020**

2.1.5. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire City is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning, hailstorms or tornadoes; impacts are generally limited. The Dows hazard mitigation committee determined that more than 75% of the people and property in the community are impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

Loss Estimate Calculation:

The NCDC historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996. While this would be the amount normal used in the loss estimates for Dows, the committee rated the impacts due to windstorms to be similar to that of Hailstorms; therefore, the loss estimate amount used was .5% meaning that each property would experience structural damages equaling approximately .5% of their assessed value. This amount of damage is indicated in the loss estimate, below.

Estimated residential structural damage due to Windstorms (.5%) = \$43,915
Estimated commercial structural damage due to Windstorms (.5%) = \$23,937
Estimated agricultural structural damage due to Windstorms (.5%) = \$168
Estimated industrial structural damage due to Windstorms (.5%) = \$0
Total estimated structural damages due to Windstorms = **\$68,020**

2.1.6. Vulnerability Assessment for Communications Failure

Communication failure is the widespread breakdown or disruption of normal communication capabilities. They could be caused by electrical outages, tower failures due to thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes, infrastructure failure or terrorism. Impacts could include economic impacts such as the failure to communicate with the staff or public regarding safety or emergency matters. Due to the rarity of this event and alternate forms of communication available to the City, its impacts are generally not extreme and no structural impacts are felt unless to the actual equipment.

Loss Estimate Calculation:

As mentioned above, a communications failure generally does not impact structures, and people are typically only at risk during such event when emergency situations arise. Due to these circumstances, no loss estimate could be calculated.

2.1.7. Vulnerability Assessment for Watershed Pollution

According to the Hazard Mitigation Committee, while watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. Residents of Dows are most commonly exposed to such hazard if in contact with the nearby Iowa River. This could result in illness when directly exposed to the river; however, no property damages would be felt. Accompanying events include thunderstorm and lightning, river flooding, severe winter storms, HAZMAT events relating to both transportation and fixed facilities and flash flooding.

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Loss Estimate Calculation:

As mentioned above, watershed pollution generally does not impact structures; therefore, no loss estimate could be calculated.

2.1.8. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. While a majority of residents have air conditioning, the committee estimated that approximately 10-25% of the City would be impacted due to the fact that most residents have access to air condition. However, residents must ensure they are not exposed to the heat for a long period in time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered to the crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not cause structural damages.

2.1.9. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. While it may not directly impact the City of Dows, drought impacts the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the City. Accompanying events include extreme heat and grass and wild-land fires.

Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in crops of the unincorporated area where a majority of agriculture land exists.

2.1.10. Vulnerability Assessment for Tornadoes

The entire population of Dows is exposed to tornadoes. The hazard mitigation committee estimated that 50-75% of the City would be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent, size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance;

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			cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornadoprospect.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDC, multiple tornado events have been reported in Wright County, with one directly impacting the City of Dows. The maximum amount of property damage incurred in one recorded event in Dows equaled \$30,000; however this number is much higher for the County, which was reported in 1966 for having \$25,000,000 in damages. Because of the variation of damages that could occur due to Tornadoes, it was determined that the average of these two amounts should be used for the loss estimate values for the City of Dows. Therefore, approximately \$12,500,000 in damages could occur, which equals 89% of the city's assessed residential, commercial, agricultural and structural values. This percentage would not be far off in a worst-case-scenario, as Iowa has experienced events that have impacted entire communities:

Estimated residential structural damages due to Tornado (89%) = \$7,816,781
 Estimated commercial structural damages due to Tornado (89%) = \$4,260,786
 Estimated agricultural structural damages due to Tornado (89%) = \$29,904
 Estimated industrial structural damages due to Tornado (89%) = \$0
 Total estimated structural damages due to Tornado (89%) = **\$12,107,471**

2.1.11. Vulnerability Assessment for Structural Fire

A structural fire is an uncontrolled fire in populated areas that threatens life and property. Structural fires are very isolated events in the City of Dows because most buildings outside of the downtown are detached. The committee estimated that less than 10% of people and property are affected in one event. Damages to buildings may be substantial or minimal, depending on whether the fire was controlled and responded to quickly. People inside a structure where a fire occurs could experience substantial injuries or death.

Loss Estimate Calculation:

Because structural fires are such an isolated event, it would be insignificant to provide a loss estimate. A structural fire could occur in any one structure within the City.

2.1.12. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles, rail cars and/or airplanes. Dows is located at the intersection of two County roads and a state road; their location is identified in the Transportation Map located in Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was

involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Dows would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.13. Vulnerability Assessment for Terrorism

While a large act of terrorism could potentially impact the entire community, the hazard mitigation determined that in general terrorism-type events, such as vandalism generally impact less than 10% of the people and property within the City. Risks to people, property and the economy vary depending on the methods of terrorism or vandalism used. Bombs, guns, explosives, biological weapons, chemical weapons, radiological and nuclear weapons, and cyber terrorism are the most common resources used for terrorism. And vandalism usually comes in the form of destroyed personal and public property. Injuries, economic and property loss could be experienced by any of the above.

Loss Estimate Calculation:

The committee determined that more than 75% of the community would be impacted by a terrorism or vandalism-event. No such event has occurred in the past, and as mentioned, impacts would vary depending on the method of terrorism. No loss estimate was calculated due to the unavailability of past impacts.

2.1.14. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the City, and according to the hazard mitigation committee, could impact 10-25% of the community depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the City.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks (See historical events in Chapter 3).

2.1.15. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires, structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.1.16. Vulnerability Assessment for Disease

The hazard mitigation committee estimated that less than 10% of the city would be impacted by disease. The most common events that have taken place in recent years include the H1N1 virus. The flu and pneumonia are also two common viruses that impact residents of the City. Wright County Public Health constantly strives to provide shots and other preventable measures for such viruses. Other transferable diseases are generally transferred through direct interaction, which lessens the vulnerability of the County to such diseases.

Loss Estimate Calculation:

This hazard impacts the health and welfare of people. There would be no structural impacts due to human disease.

2.1.17. Vulnerability Assessment for Public Disorder

Because of the small of population within the City of Dows, the committee estimated that less than 10% of people and property would be impacted by a public disorder. Risks to people, property and the economy vary depending on the weapons used for violence. Guns, knives, bats, fire and explosives are the most common resources used for public disorder. Injuries, economic and property loss would be experienced by any of the above.

Loss Estimate Calculation:

The committee determined that less than 10% of the community would be impacted by a public disorder event. No such event has occurred in the past, and as mentioned, impacts would vary depending on the method of violence. Based on the lack of historical data no loss estimate could be calculated, as it would vary on the event, number of people involved, facilities involved and amount of law enforcement that would be able to respond.

2.1.18. Vulnerability Assessment for Air Transportation Event

While no airport is located in Dows, the hazard mitigation committee determined that an air transportation event could occur as planes pass over the city while crop dusting and/or landing in nearby airports. If such event were to occur less than 10% of the community would be impacted due to the fact that such event only impacts an isolated area. Severity of impact depends on the size and speed of the aircraft when striking the city; however, the committee determined that multiple deaths would occur and structural damages would result. Structural damages would be as severe as to completely demolish multiple buildings and potentially set fire to structures; therefore, accompanying events would include structural fire, grass or wild-land fire. Such event could also occur due to windstorms, thunderstorm and lightning, tornado, winter storm or hailstorm.

Loss Estimate Calculation:

No air transportation events have been recorded to have occurred in Dows. Because it is estimated that an air transportation event would generally be an isolated event, it would be insignificant to provide a loss estimate. There is no telling where such event would occur; however, the aircraft would most likely be a small, personal-use aircraft.

2.2 Exposure Assessment for Flash Flooding

Exposed Structures

According to the hazard mitigation committee 10-25% of people and property are impacted by Flash Flooding. The hazard mitigation committee noted that the southern and eastern portions of the City would be most impacted, which is evident from the contour map shown in Section 6. It was determined that those contours of 1156 and less were the low-lying areas, based on this, it was estimated that 130 residential structures, 73 commercial structures, and 5 agriculture structures were located in the "hazard zone".

Exposed Persons

The "Number of People" exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the "hazard zone". It was estimated that

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each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that approximately 61% of the people are exposed.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	306	130	42%	\$8,782,900	\$3,062,700	35%	635	386	61%
Commercial	93	73	78%	\$4,852,400	\$4,206,100	87%			
Agricultural	7	5	71%	\$33,600	\$22,300	66%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	406	208	51%	\$13,668,900	\$7,291,100	53%			

2.2.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in areas with poor drainage. It is evident that a majority of areas exposed to flash flooding are in areas near the river.

Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes' value by 10%; therefore, damages might decrease a homes' value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 15,313
- Estimated commercial structural damage due to Flash Flooding (5%) = \$21,031
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$112
- Estimated industrial structural damage due to Flash Flooding (5%) = \$ 0
- Total estimated structural damages of Flash Flooding = \$36,456

2.3 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were identified and positioned on the map displayed in Section 6. A buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that 100% of residents exposed.

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Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	306	294	96%	\$8,782,900	\$8,402,900	96%	635	635	100%
Commercial	93	76	82%	\$4,852,400	\$2,926,900	60%			
Agricultural	7	7	100%	\$33,600	\$33,500	100%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	406	377	93%	\$13,668,900	\$11,363,300	83%			

2.3.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the City, different materials have different impacts. The majority of hazardous materials within Dows are Underground Storage Tanks, which have a limited impact such as an explosion or groundwater contamination, if leaking. The hazard mitigation committee estimated that less than 10% of the community would be impacted by such event, since they are generally isolated.

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on the hazard area:

- Estimated residential structural damage due to HAZMAT – Fixed Facility (10%) = \$840,290
- Estimated commercial structural damage due to HAZMAT – Fixed Facility (10%) = \$292,690
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility(10%) = \$3,350
- Estimated industrial structural damage due to HAZMAT – Fixed Facility (10%) = \$0
- Total estimated structural damages of HAZMAT – Fixed Facility = **\$1,136,330**

2.5 Exposure Assessment for River Flooding

Exposed Structures

According to the hazard mitigation committee 10-25% of people and property are impacted by River Flooding. The hazard mitigation committee noted that the southern and eastern portions of the City would be most impacted, which is evident from the future floodplain map displayed in Section 6. While these maps have not yet been adopted, they will eventually be the floodplain maps used within the County (some changes may be made). Since no GIS data was available for the future floodplain maps, an area similar to the area displayed was estimated. It was determined that those contours of 1156 and less drew a similar area of impact to the future floodplain map. See the River Flooding Hazard Area map developed in Section 6. Based on this map, it was estimated that 130 residential structures, 73 commercial structures, 0 industrial structures and 5 agriculture structures were located in the “hazard zone”.

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Exposed Persons

The “Number of People” exposed to river flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 308 residents, 73 commercial persons, 0 industrial persons and 5 agricultural person exposed to river flooding; making a total of 386 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	306	130	42%	\$8,782,900	\$3,062,700	35%	635	386	61%
Commercial	93	73	78%	\$4,852,400	\$4,206,100	87%			
Agricultural	7	5	71%	\$33,600	\$22,300	66%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	406	208	51%	\$13,668,900	\$7,291,100	53%			

2.5.1 Vulnerability Assessment for River Flooding

Impacts from river flooding typically take form in property damage to basements. Being located in the low-lying areas or near the river may put residents at risk for injuries. Accompanying hazard events that may result in river flooding include thunderstorms and lightning, hailstorms, windstorm, flash flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The river flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes’ value by 10%; therefore, damages might decrease a homes’ value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to River Flooding (5%) = \$ 15,313
- Estimated commercial structural damage due to River Flooding (5%) = \$21,031
- Estimated agricultural structural damage due to River Flooding (5%) = \$112
- Estimated industrial structural damage due to River Flooding (5%) = \$ 0
- Total estimated structural damages of River Flooding = \$36,456

2.5 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that less than 10% of the community would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the City, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the “hazard zone”, or the property that could potentially be impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 96 dwellings, 3 commercial structures, and 5 agriculture structures were located in the “hazard zone” for grass and wild-land fires.

Exposed Persons

The “Number of People” exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S.

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Census. Therefore it was estimates that there were 228 residents exposed, 3 commercial persons exposed, and 5 agricultural persons exposed; making a total of 236 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	306	96	31%	\$8,782,900	\$3,310,600	38%	635	236	37%
Commercial	93	3	3%	\$4,852,400	\$171,400	4%			
Agricultural	7	5	71%	\$33,600	\$14,200	42%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	406	104	26%	\$13,668,900	\$3,496,200	26%			

2.5.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land surrounds the northern, western and southern perimeter of the City of Dows; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

Loss Estimate Calculation:

Only a portion of those exposed structures within the City would actually be impacted during a grass and wild-land fire event. It is estimated that structures located adjacent to the open space consisting of either the north, south, or west portion of the community would be impacted; therefore, the following estimates were calculated:

- Estimated residential structural damage due to Grass & Wild-land Fire (10%) = \$331,060
- Estimated commercial structural damage due to Grass & Wild-land Fire (10%) = \$17,140
- Estimated agricultural structural damage due to Grass & Wild-land Fire (10%) = \$1,420
- Estimated industrial structural damage due to Grass & Wild-land Fire (10%) = \$0
- Total estimated structural damages of Grass & Wild-land Fire = **\$349,620**

2.6 Exposure Assessment for Pipeline Incident

The nearest pipeline is located 2 miles east of the City in Franklin County and 11 miles northwest of the City in Wright County. The exposure area for a liquid pipeline is generally estimated to be within 1 mile of the pipeline. While the hazard mitigation committee estimated that the community would be impacted by a pipeline incident, this is highly unlikely due to the distance to the pipeline; therefore, it is estimated that no person or structure located within the community would be directly impacted.

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the Dows hazard mitigation committee is shown below:

Mitigation Action	STAPLEE Rating
Inform City Officials on where to get cleanup kits for flooding	17
Encourage residents to sign up for 'Code Red'	16
Encourage all fire fighters to sign up for 'Code Red'	16
Encourage residents to purchase weather radios	14
Provide sandbags to residents for flooding	14
Improve the current warning siren	12
Place a protection system on the water tower	12
Expand the storm drainage to the east side of town and improve the drainage throughout town	12
Raise the elevation of the remainder of 'River Road'	12
Supply the fire department with new radios due to the frequency change in 2013	11
Build public awareness of residents' responsibility in tree trimming	10
Establish temporary shelter(s) for residents when flooding requires them to vacate	9
Build public awareness on how to react to various hazards including hailstorms and severe thunderstorm and lightning	8
Provide residents with numbers to call during various hazard events	8
Provide new self-contained breathing apparatus' (SCBA) to the fire department	8
Update rescue trucks so victims can be contained	8
Place snow fences near the perimeter of the City	8
Enhance the fire department's decontamination capabilities	6
Ensure goods are made available to already-established shelters	6
Develop storage facilities for essential goods	6
Supply jugs of water in case the community is running low	6
Inform the public when water conservation acts should be put into effect	5
Provide transportation for emergency response to get people off of the interstate during a tow ban	5
Ensure the fire department is equipped with maps and air monitoring devices for any pipeline incidents	5
Enforce the City Code of Ordinances -structural failure -burning ban	5
Ensure proper company identification numbers are in place on pipelines	5
Build a tornado safe-room near the pool/campground	4

Dows Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: *Ensure that all members of the community have an understanding of the available resources to plan for hazard events*

Objective 1.1: Warn residents of upcoming hazardous events

Mitigation Actions

- 1.1.1 Encourage residents to purchase weather radios
- 1.1.2 Encourage residents to sign up for 'Code Red'
- 1.1.3 Improve the current warning siren

Objective 1.2: Inform the general public of their responsibilities' during hazardous events

Mitigation Actions

- 1.2.1 Build public awareness on how to react to various hazards including hailstorms and severe thunderstorm and lighting.
- 1.2.2 Provide residents with numbers to call during various hazard events including; public health in case of disease, contacts to control hazardous material spills or leaks and contacts to call in during a transportation event.
- 1.2.3 Inform the public when water conservation acts should be put into effect

Goal 2: *Ensure the community is equipped with proper mitigation tools to reduce the effects of all hazards*

Objective 2.1: Ensure first responders/fire fighters are prepared and equipped as needed.

Mitigation Actions

- 2.1.1 Encourage all fire fighters to sign up for 'Code Red'
- 2.1.2 Supply the fire department with new radios due to the frequency change in 2013
- 2.1.3 Provide new self-contained breathing apparatus' (SCBA) for the Fire Department
- 2.1.4 Update rescue trucks so victims can be contained
- 2.1.5 Provide transportation for emergency response to get people off of the interstate during a tow ban
- 2.1.6 Ensure the fire department is equipped with maps and air monitoring devices for any pipeline incidents
- 2.1.7 Enhance the fire department's decontamination capabilities

Objective 2.2: Provide shelters with necessary supplies to better accommodate the public

Mitigation Actions

- 2.2.1 Ensure goods (food, water, toilet paper, etc.) are made available to already-established shelters
- 2.2.2 Develop storage facilities for essential goods
- 2.2.3 Supply jugs of water in case the community is lacking water

Objective 2.3: Protect residents from hazards by enforcing hazard mitigation policies that may already be in place

Mitigation Actions

- 2.3.1 Enforce the City Code of Ordinances to protect residents from the affects of structural failure & grass and wild land fires
- 2.3.2 Ensure proper company identification numbers are in place on pipelines

Objective 2.4: Implement projects and personnel to protect the public from manmade hazard events

Mitigation Action

- 2.4.1 Place a protection system on the water tower by locking the ladder

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Goal 3: *Reduce, or eliminate the loss of property and life due to all natural hazards that may affect the City*

Objective 3.1: Reduce the effects of extreme wind events and tornados on people and structures throughout the community.

Mitigation Actions

- 3.1.1 Build a tornado safe-room near the pool/campground area
- 3.1.2 Build public awareness of residents' responsibility in tree trimming

Objective 3.2: Implement projects and provide equipment that may help the community prevent or discourage damage due to flood events

Mitigation Actions

- 3.2.1 Expand the storm drainage to the east side of town and improve the storm drainage throughout the town
- 3.2.2 Raise the remainder of 'River Road' on the perimeter of town
- 3.2.3 Provide sandbags to residents for flooding
- 3.2.4 Inform City Officials on where to get cleanup kits for flooding
- 3.2.5 Establish temporary shelter(s) for residents when flooding requires them to vacate

Objective 3.3: Mitigate the effects of winter storm events

Mitigation Action

- 3.3.1 Put up snow fences near the perimeter of the City

Section 4: Action Plan

Inform City Officials on where to get cleanup kits for flooding	
Description	Cleanup kits are provided for residents and businesses after a flood event. Informing officials of the location of these kits will ensure residents and businesses have proper materials to prevent further damages or illness due to moisture from flooding, which could develop mold.
Hazards Addressed	River Flooding, Flash Flooding
Priority	I
Responsible Dept./Party	Wright County and Franklin County EMA/FEMA/Red Cross/City Council
Estimated Cost	Minimal
Potential Funding Source	FEMA/Red Cross/City
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Encourage residents & firefighters to sign up for CodeRED	
Description	CodeRED is an alert system available to everyone in Wright County. Person's can sign up online and receive phone calls of approaching hazards including tornadoes, hailstorms, thunderstorms and lightning, severe winter storms, river flooding, flash flooding and extreme heat.
Hazards Addressed	Tornadoes, Hailstorms, Thunderstorms and Lightning, Severe Winter Storms, River Flooding, Flash Flooding and Extreme Heat.
Priority	I

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Responsible Dept./Party	City Council/Wright County EMA
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Public Education and Awareness/Emergency Services Protection
Target Completion Date	2014 - Ongoing

Encourage residents to purchase weather radios	
Description	A weather radio, like CodeRED, is an alert system; however, the radio also provides weather updates at any time whether a storm is approaching or not. It is an individual's preference as to whether to sign up for CodeRED or own a weather radio; however, the City encourages residents to have one or the other.
Hazards Addressed	Tornadoes, Hailstorms, Thunderstorms and Lightning, Severe Winter Storms, River Flooding, Flash Flooding and Extreme Heat.
Priority	I
Responsible Dept./Party	City Council/EMA
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	2014 - Ongoing

Provide sandbags to residents for flooding	
Description	Sandbags provide a temporary barrier to protect structures from being damaged in a flood.
Hazards Addressed	River Flooding, Flash Flooding.
Priority	I
Responsible Dept./Party	Wright County and Franklin County EMA/FEMA/Red Cross/City Council
Estimated Cost	Low
Potential Funding Source	Wright County and Franklin County EMA/City/Red Cross
Mitigation Measure Category	Prevention
Target Completion Date	2014

Improve the current warning siren	
Description	The warning siren currently does not reach all areas of town, by updating the warning siren all residents will be warned of approaching hazards such as tornadoes.
Hazards Addressed	Tornadoes
Priority	I
Responsible Dept./Party	City Council/Wright County EMA
Estimated Cost	Minimal
Potential Funding Source	City of Dows/FEMA/other grants
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	2014

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Place a protection system on the water tower by locking the ladder	
Description	Locking the ladder to the water tower will ensure that vandalism of the water tower does not occur.
Hazards Addressed	Terrorism
Priority	I
Responsible Dept./Party	City Water Dept personnel/City Council
Estimated Cost	Minimal
Potential Funding Source	City Budget
Mitigation Measure Category	Prevention
Target Completion Date	2014

Supply the fire department with new radios to work with the 2013 narrowband mandate	
Description	In an effort to promote more efficient use of spectrum, the Federal Communications Commission (FCC) is mandating that all land mobile radio (LMR) systems migrate to narrowband 12.5 kHz efficiency technology by January 1, 2013. Because licenses will no longer be renewed for LMR system's beyond this date, the fire department and emergency personnel must update all land mobile radio systems.
Hazards Addressed	Structural Fires, Grass and Wild-land Fires, Transportation Incident, HAZMAT-Fixed Facility, HAZMAT-Transportation, Thunderstorms and Lightning, Windstorms, River Flooding, Flash Flooding, Tornadoes, Severe Winter Storms, Hailstorms, Terrorism, Extreme Heat.
Priority	I
Responsible Dept./Party	City Council & Rural Fire Department
Estimated Cost	Low
Potential Funding Source	Dows Rural Fire/Fire Grants/City EMS
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2013

Build public awareness of residents' responsibility to trim trees	
Description	Tree trimming is an important step in ensuring a minimal amount of energy disruptions within the Community. Loose limbs can cause downed lines and structural damages during multiple types of hazards.
Hazards Addressed	Thunderstorms and Lightning, Windstorms, Hailstorms, Tornadoes, and Severe Winter Storms.
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Public Awareness and Education
Target Completion Date	2014 - Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Establish temporary shelter(s) for residents when flooding requires them to vacate	
Description	Providing temporary shelters for residents ensures that those located in flood zones have a space to vacate to for safety.
Hazards Addressed	River Flooding and Flash Flooding.
Priority	I
Responsible Dept./Party	Wright County and Franklin County EMA/FEMA/Red Cross/City Council
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Structural Mitigation action
Target Completion Date	2014 - Ongoing

Build public awareness on how to plan for and react to various hazards	
Description	Ensuring residents know how to respond to all types of hazards serves as a tool for prevention and protection. The City will disperse information on various hazards in City water bills and fliers.
Hazards Addressed	All hazards
Priority	I
Responsible Dept./Party	City Council/Wright County EMA
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	2014 - Ongoing

Provide residents with numbers to call during various hazard events	
Description	Ensuring resident's know who to contact during emergencies relating to hazard events will ensure their safety and ensure that they recover quickly and efficiently.
Hazards Addressed	All hazards
Priority	I
Responsible Dept./Party	City Council/Wright County EMA
Estimated Cost	Minimal
Potential Funding Source	Wright County and Franklin County EMA/City
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	2014 - Ongoing

Place snow fences near the perimeter of the City	
Description	Snow fences assist in controlling the drifting of snow. Properly placed snow fences will ensure that areas where large amounts of snow are controlled, this could assist in preventing transportation incidents and the general nuisance of drifting.
Hazards Addressed	Severe Winter Storms
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	City Budget
Mitigation Measure Category	Prevention
Target Completion Date	2014 - Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Ensure goods are made available to already-established shelters	
Description	Shelters are important in providing residents with an area to retreat during hazard events. Effectively stocked shelters will ensure that the areas can efficiently serve residents.
Hazards Addressed	Thunderstorm & Lightning, Energy Disruption, Severe Winter Storms, Hailstorms, Windstorms, Extreme Heat Event, Tornadoes, Flash Flooding and River Flooding.
Priority	I
Responsible Dept./Party	City Council/Churches & Organizations
Estimated Cost	Minimal
Potential Funding Source	City Budget/Fundraisers
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2014 – Ongoing (as needed)

Supply jugs of water in case the community runs low	
Description	While the City typically does not have issues with water shortages, ensuring the City is prepared in such event will reduce the impacts on residents.
Hazards Addressed	Drought
Priority	I
Responsible Dept./Party	City Council/Red Cross
Estimated Cost	Minimal
Potential Funding Source	City/Wright County & Franklin County EMA/Red Cross
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2014 – Ongoing (as needed)

Inform the public when water conservations acts should be put into effect	
Description	Water conservation is important during times of water shortages. Communicating water conservation efforts during a drought will ensure that the City has an adequate amount of water to serve its residents. The City will communicate such efforts through public meetings, fliers and other notices.
Hazards Addressed	Drought
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	City Budget
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Ensure the fire department is equipped with maps and air monitoring devices for any pipeline incidents	
Description	Air monitoring devices and maps will ensure that the fire department can efficiently communicate any pipeline incidents to the HAZMAT Commission and to the pipeline owner. The air monitoring devices are especially important in protecting residents from dangerous inhalation.
Hazards Addressed	Pipeline Incident
Priority	I
Responsible Dept./Party	City Council & Rural Fire Department
Estimated Cost	Minimal
Potential Funding Source	Dows Rural Fire Department, Pipeline Association
Mitigation Measure Category	Emergency Protection
Target Completion Date	2014

Enforce the City Code of Ordinances (dilapidating structures and burning)	
Description	Enforcing the City Code of Ordinances will ensure that dilapidating buildings are either disposed of or rehabilitated properly. Enforcement of the code will also help to prevent grass and wild-land fires that may result. Enforcement will be imposed by City Staff, local Law Enforcement and the Fire Department.
Hazards Addressed	Structural Failure, Grass and Wild-land Fires
Priority	I
Responsible Dept./Party	City Council/Local Law Enforcement
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Prevention
Target Completion Date	2012 - Ongoing

Ensure proper company identification numbers are in place on pipelines	
Description	Renewable Identification Numbers (RIN's) are used to ensure that pipeline's meet certain standards set by that pipeline. Ensuring proper RIN's are placed on pipelines will ensure adequacy and use.
Hazards Addressed	Pipeline Incident
Priority	I
Responsible Dept./Party	Pipeline Company
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	2014 - Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Raise the elevation of the remainder of River Road	
Description	A portion of River Road was elevated to avoid wash outs during river flooding. By raising the elevation of the remainder of this Road, the City is taking a significant step in reducing the impacts of flooding on residents who use the road.
Hazards Addressed	River Flooding
Priority	II
Responsible Dept./Party	City Council
Estimated Cost	Moderate
Potential Funding Source	City Budget/grants
Mitigation Measure Category	Structural Mitigation
Target Completion Date	2016

Provide new self-contained breathing apparatus' (SCBA) to the fire department	
Description	Self-contained breathing apparatus' allow fire fighters to enter into dangerous areas where inhalation may severely harm individuals. In order to properly serve the community, all firefighters should be equipped with an SCBA.
Hazards Addressed	Structural Fire/Grass and Wild-land Fire
Priority	II
Responsible Dept./Party	Dows Rural Fire Department
Estimated Cost	Low
Potential Funding Source	Dows Rural Fire Department/FEMA Fire Grants/Other
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2016

Develop storage facilities for essential goods	
Description	Establishing storage space for essential goods will help the City to be prepared for potentials hazards and/or disasters. The City will ensure that a space is established for such goods and communicated when goods are needed.
Hazards Addressed	All hazards
Priority	II
Responsible Dept./Party	City Council/Dows Development/Churches & Organizations
Estimated Cost	Minimal
Potential Funding Source	City Budget/Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Expand the storm drainage to the east side of town and improve the drainage throughout town	
Description	The eastern portion of town has inadequate draining resulting in flash flooding, which can at times occur due to back-up from river flooding. Expanding the storm sewer is important in ensuring that these waters are sufficiently drained from vulnerable areas of the community.
Hazards Addressed	Flash Flooding, River Flooding
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	High
Potential Funding Source	City Budget/SRF/CDBG/USDA/FEMA
Mitigation Measure Category	Structural Mitigation
Target Completion Date	2027

Update rescue trucks so victims can be contained	
Description	Ensuring the City has the proper vehicles and emergency response equipment can help emergency responders to properly contain and treat victims.
Hazards Addressed	Transportation Incident
Priority	III
Responsible Dept./Party	Dows Rural Fire Department
Estimated Cost	Low
Potential Funding Source	Dows Rural Fire Department/Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2020

Enhance the fire department's decontamination capabilities	
Description	Decontamination is the reduction or removal of chemical agents. By providing training on such task, firefighters will be able to properly respond the HAZMAT events.
Hazards Addressed	HAZMAT-Fixed Facilities, HAZMAT-Transportation
Priority	III
Responsible Dept./Party	Dows Rural Fire Department
Estimated Cost	Minimal
Potential Funding Source	Dows Rural Fire Department/Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2017

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Provide transportation for emergency response to get people off of the interstate during a tow ban	
Description	During extreme winter conditions, there have been instances where Interstate 35 was closed and no towing was allowed. Therefore, person's stranded on the Interstate became stranded. Transportation will ensure that travelers are out of harm's way.
Hazards Addressed	Severe winter Storms
Priority	III
Responsible Dept./Party	Dows Rural Fire Department
Estimated Cost	Low
Potential Funding Source	Dows Rural Fire Department
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2020

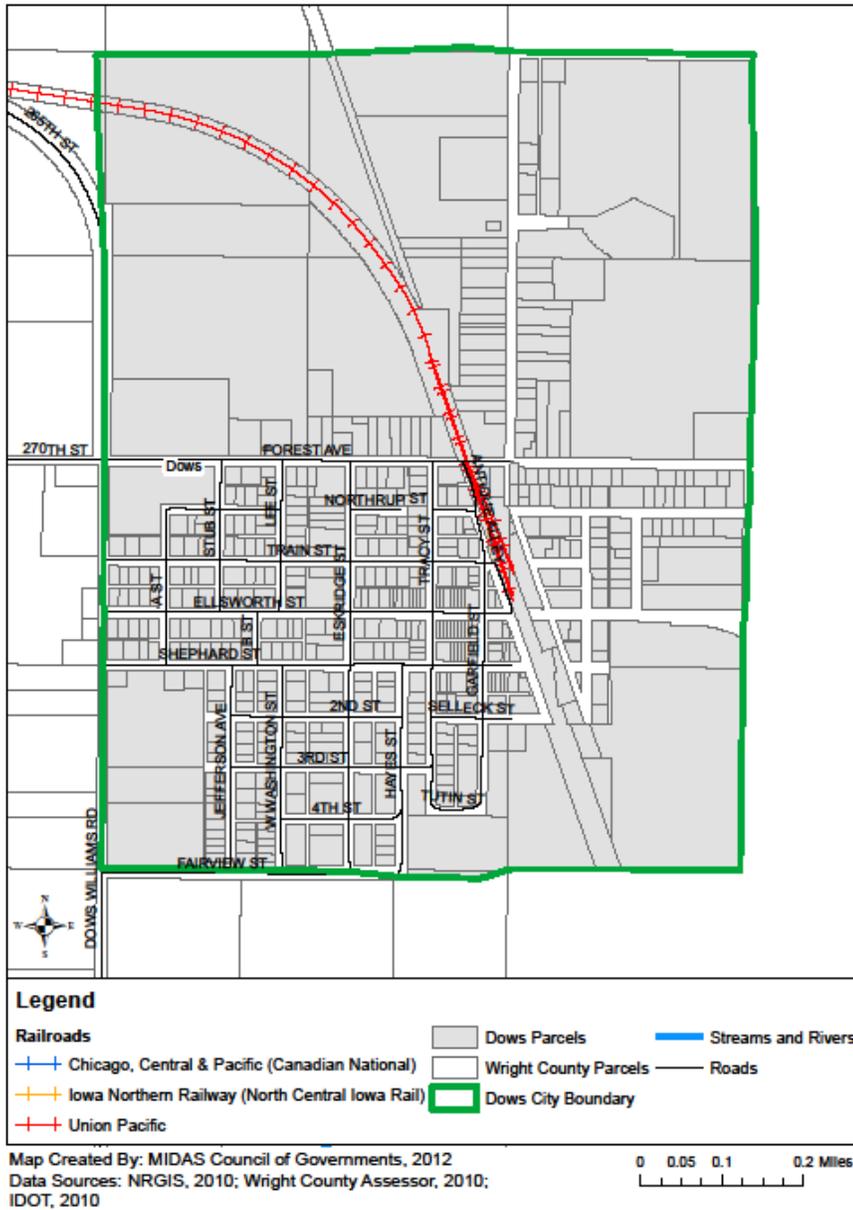
Build a tornado safe room near the pool/campground	
Description	The hazard mitigation committee determined that a tornado safe room should be developed for the pool and/or campground. While a feasibility study would need to be done for these sites, constructing tornado safe room near public gatherings is a priority for the Dows Hazard Mitigation Committee.
Hazards Addressed	Tornadoes
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	High
Potential Funding Source	City Budget/FEMA Grants
Mitigation Measure Category	Structural Mitigation
Target Completion Date	2020

Section 5: Critical Facilities

- City Hall/Community Center – 119 East Ellsworth Street
- Fire Station – 108 South Garfield Street
- School – 404 Park Avenue
- Day Cares – 200 South Garfield Street and 214 West Sheppard Street
- Lift Stations (2) – 106 Tutin Street and 401 Fairview Street
- Water Treatment Plan – 107 Lee Street
- Lutheran Church – 206 West Ellsworth
- Abundant Life Church – 202 Fairview Street

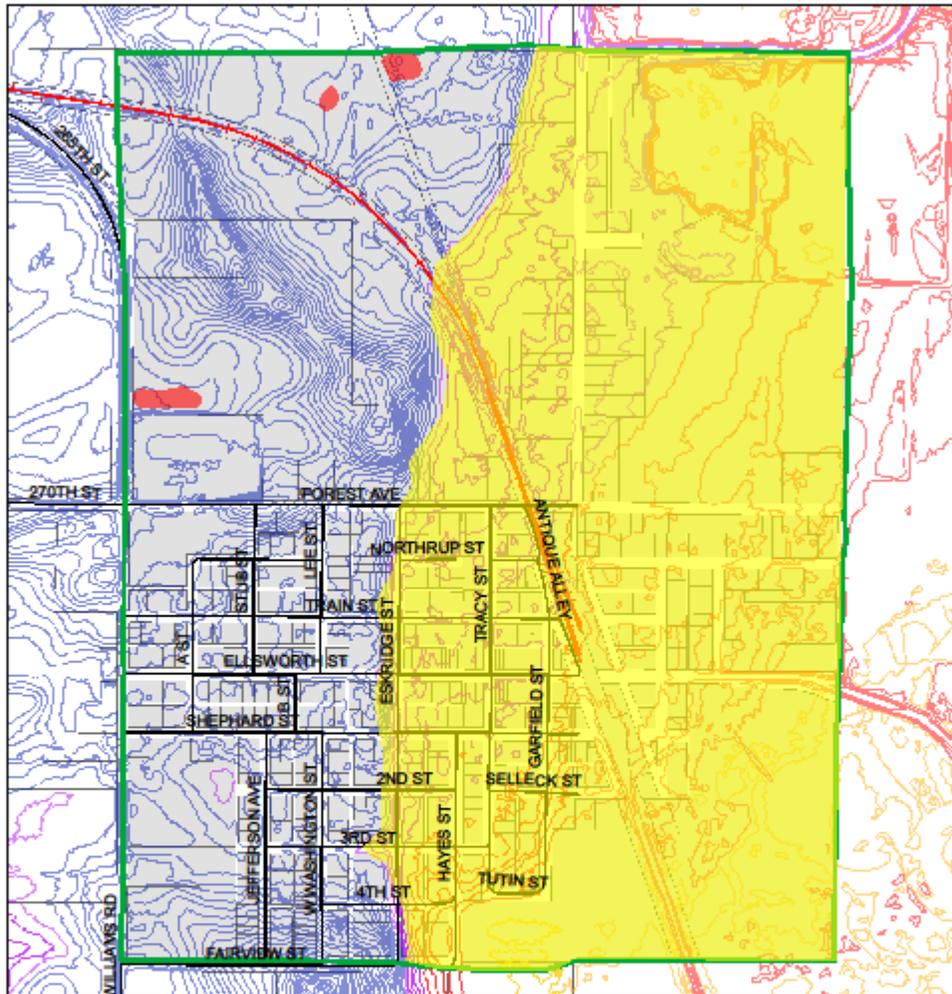
Section 6: Community Map(s)

City of Dows



City of Dows

Flash Flooding & River Flooding Hazard Area



Legend

CONTOUR		Hazard Area	Railroads
990 - 1126	Yellow line	Yellow shaded area	Chicago, Central & Pacific (Canadian National)
1127 - 1138	Orange line	Pink shaded area	Iowa Northern Railway (North Central Iowa Rail)
1137 - 1146	Red line	Green outlined area	Union Pacific
1147 - 1156	Purple line	Blue outlined area	Dows Parcels
1157 - 1290	Blue line	Red shaded area	Wright County Parcels
	Blue line	Blue line	
	Black line		

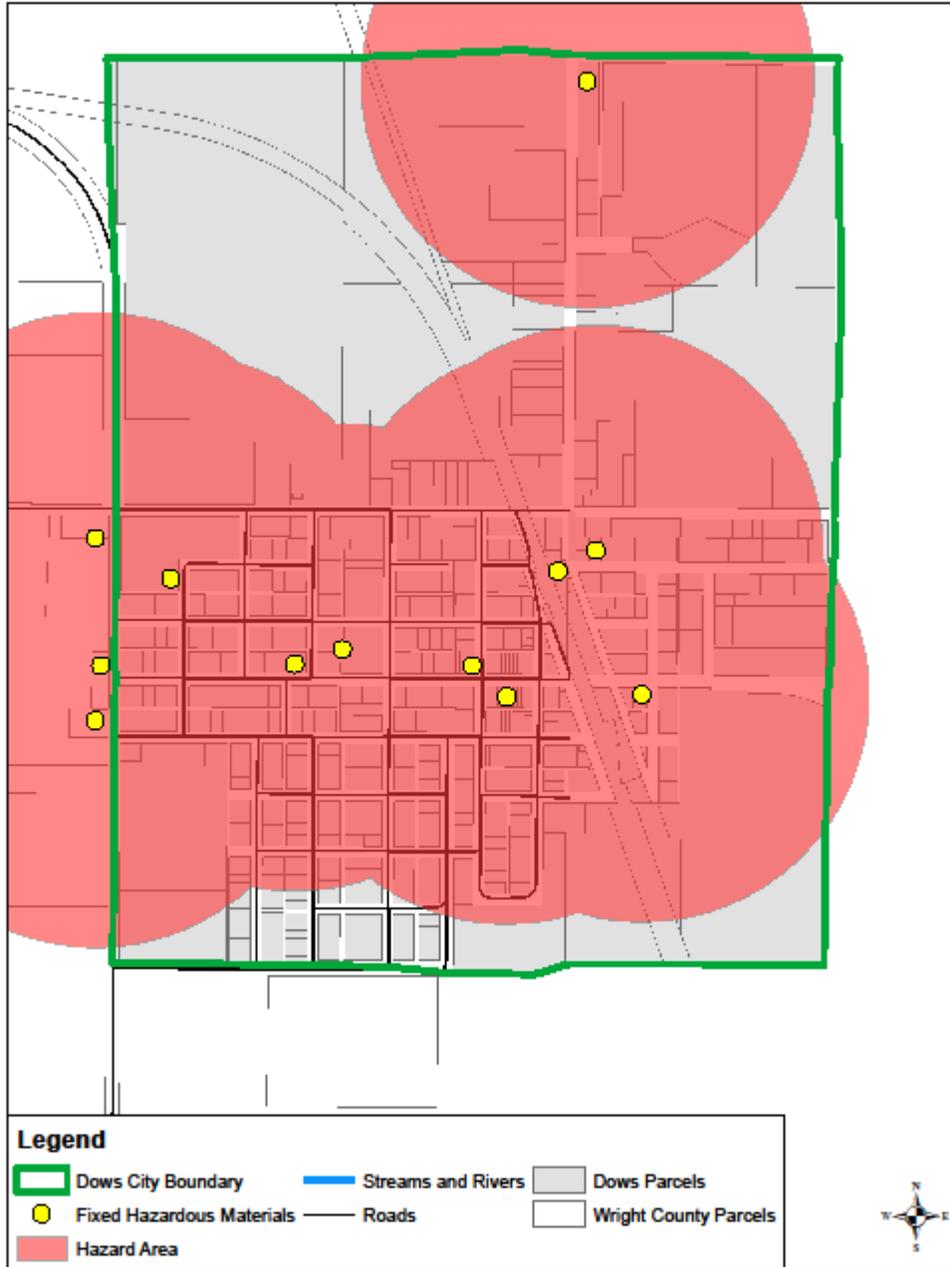


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



City of Dows

Fixed Facilities Hazardous Materials Hazard Area

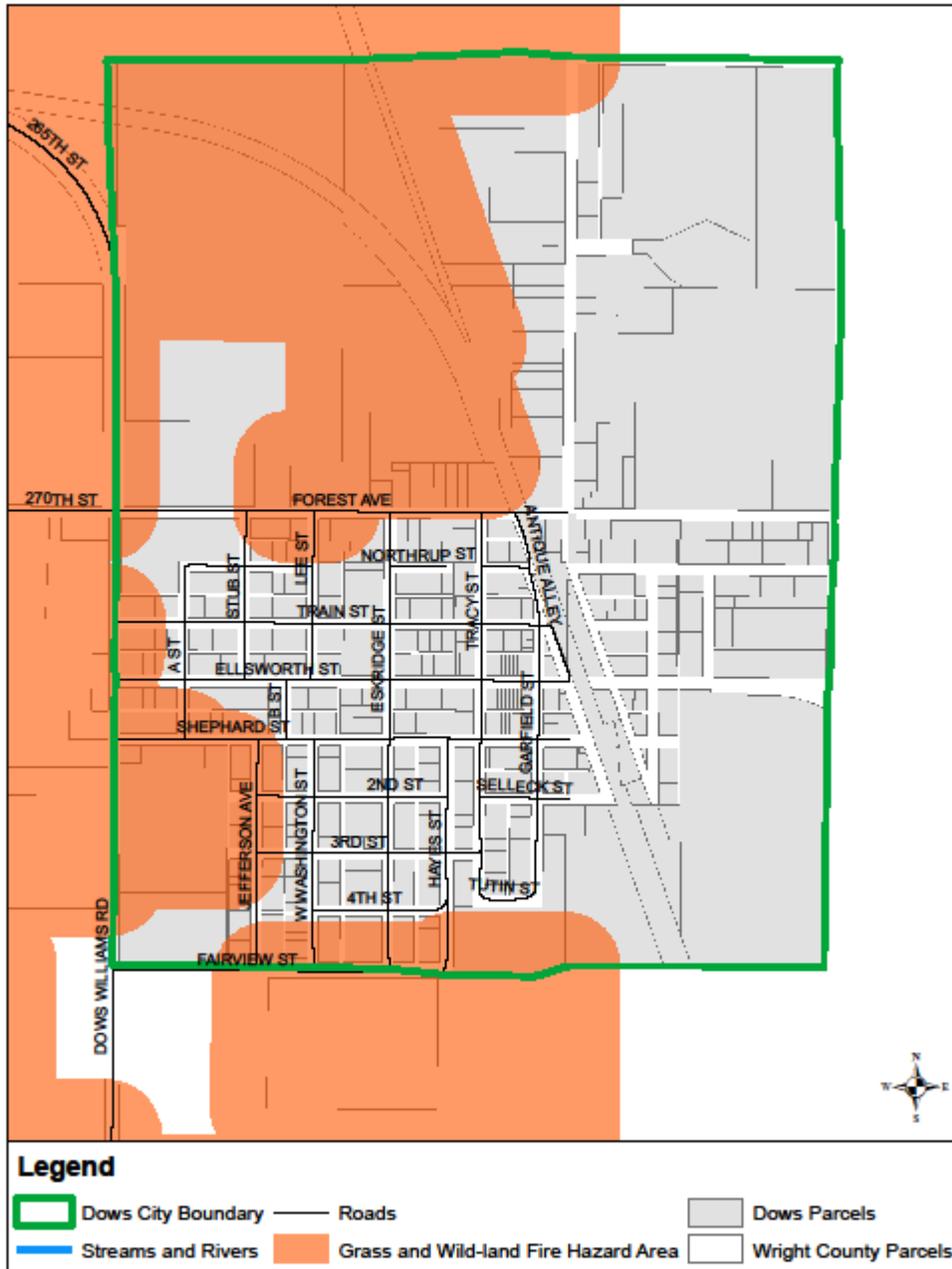


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Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
IDOT, 2010

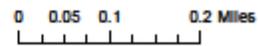
0 0.05 0.1 0.2 Miles

City of Dows

Grass and Wildland Fire Hazard Area

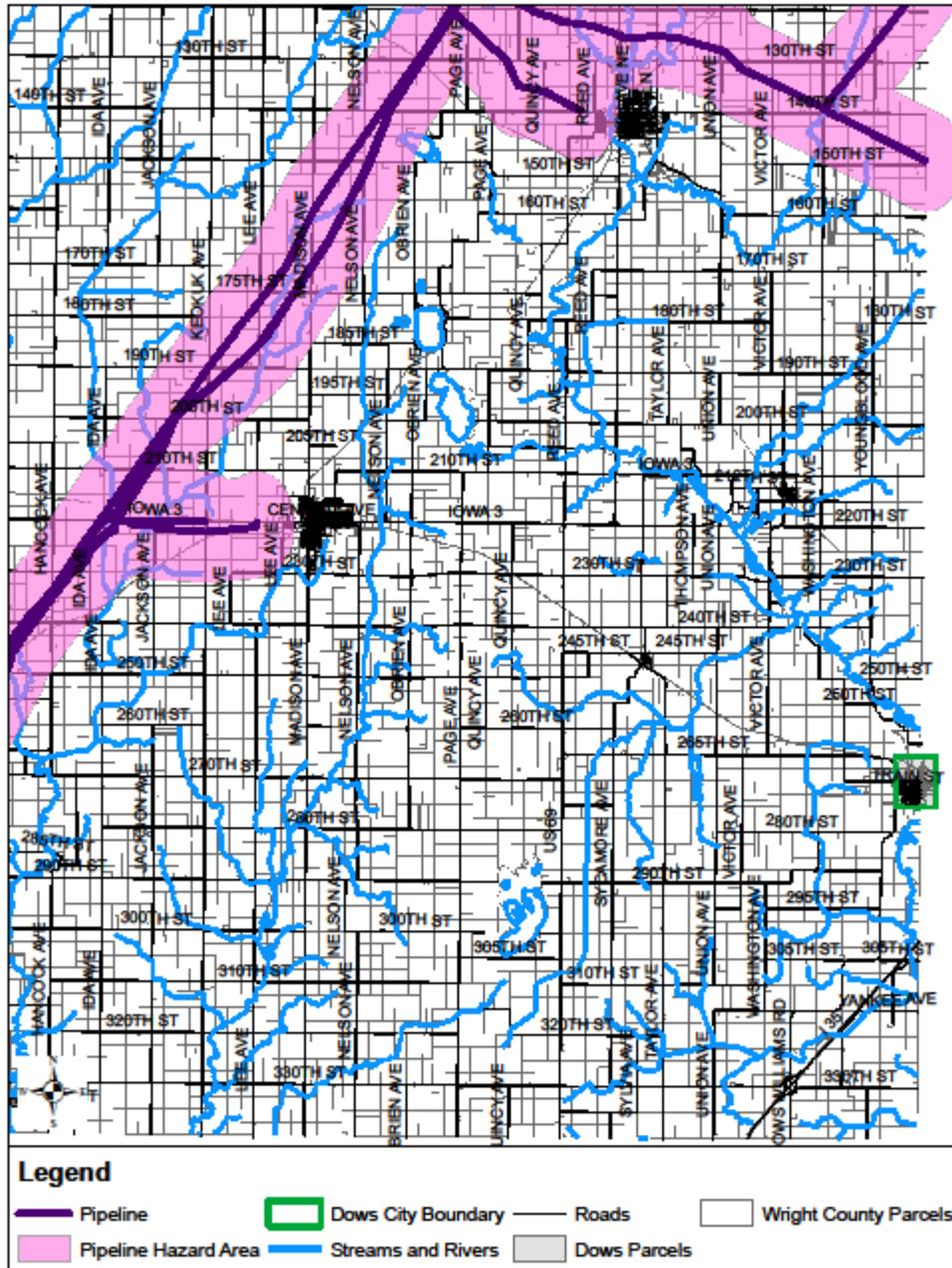


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



City of Dows

Pipeline Incident Hazard Area



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



Section 7: Hazard Mitigation Committee Meeting Minutes

Wright County Hazard Mitigation - Dows - Meeting Minutes #1 April 26, 2010 at 7:00 a.m. Dows Community Center

Meeting attended by: Ray Kracht, Don Lane, Linn Larson, Jeanette Wenzel, Rosanne Beyer, Shannon Muhlenbruch, Brian Butt, and Mike Schroeder

- Gave a brief summary of what the hazard mitigation plan is.
- Spoke about soft match, no member was receiving compensation; therefore each member that attended signed a letter stating that no compensation was being received and no one would be seeking reimbursement.
- Reviewed the list of storm events compiled by the National Climatic Data Center (NCDC)
 - Shows the history of weather events that have occurred in Wright County and Dows.
- Began examination of each hazard. Committee members were asked to identify any significant events that relate to each hazard and how each hazard may affect the City of Dows.
 - Tornadoes
 - In the past have had a minor effect on the City.
 - 2005 saw some damage from a tornado event.
 - Flash Flooding
 - Most frequently consists of basement flooding.
 - Occurs most frequently near the east end of town.
 - Usually yearly, but depends on the amount of rain.
 - River Flooding
 - A yearly occurrence with the Iowa River on the east side of town.
 - City residents are usually aware of this event.
 - Drainage and tiling is necessary to help mitigate this effect.
 - Winter Storms
 - Power outages often occur due to winter storms.
 - This past winter ('09-'10) interstate was shut down, causing some issues with transportation.
 - Snow removal is expensive.
 - Some medical facilities are available to elderly population, so injuries due to severe winter storms can be treated.
 - High Wind Events
 - Common event that can occur anytime within the city.
 - Most common effects are downed limbs and branches.
 - Hailstorms
 - Occasional hailstorms do occur.
 - Generally pea to quarter size hail.
 - Members of the committee remember no significant effects in the past.
 - Severe Thunderstorm and Lightning
 - Thunderstorms are common.
 - Trees and limbs are affected due to wind.
 - Lighting has been known to strike wastewater plant, bank, and a post on Ellsworth St.
 - Extreme Heat Event
 - No significant effects felt due to heat because most of the residents have air conditioning.
 - Drought
 - Last major drought remembered was in 1988; however, it didn't affect the City directly; was more of an issue for rural areas.
 - Landslide

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Take out of plan
- Grass or Wildfire
 - Not much grassland within the city; would be more of an issue with surrounding agriculture lands.
 - No occurrences remembered.
 - Not many preserved natural areas within the City.
- Dam Failure
 - Take out of plan – No dams in area.
- Levee Failure
 - Take out of plan – Some dikes, but only small channels built.
- Sink holes
 - Take out of plan
- Expansive Soils
 - Take out of plan
- Earthquakes
 - Take out of plan
- HAZMAT – Transportation
 - Manure being hauled in and out of town – also through town.
 - With highway 35 nearby, a lot of things being transported.
 - Liquid Propane and anhydrous tanks are often transported through town due to the co-op.
 - No specific events have occurred, but with all of the transport of such materials, the City should be prepared for such event.
- HAZMAT – Fixed Facility
 - With the co-op in town, anhydrous, LP, grain dust, fertilizers, and other chemicals are commonly stored.
 - No specific affects due to these chemicals.
- Watershed Pollution
 - The main cause of watershed pollution comes from the wastewater being pumped during floods – this is generally a yearly occurrence.
 - No contamination of the drinking water has occurred due to this because the wells are approximately 750 ft deep.
- Pipeline Incident
 - No incidents have occurred, but with lines nearby, the City should be prepared.
 - Propane line exists north of town.
 - 5 miles east of town is natural gas line that runs along I-35.
- Energy Disruption
 - Recently switched services.
 - Service from two areas.
 - A back-up generator exists within the community center, run on natural gas.
- Terrorism
 - Never been an issue in Dows.
 - It may not be a key target, but the affects would be severe in such a City.
- Violent Demonstration
 - No past violent demonstrations; however, they have had a demonstration in the past that made certain areas of town in accessible.
- Disease
 - While no particular cases have evolved, disease could affect the City's residents.
- Structural Fire
 - Grocery Store burnt down in the 80's – rebuilt.
 - Bar burnt down in the 90's and was never rebuilt.
 - House fire(s) in the past.
 - As the City has experienced, this hazard can occur anywhere and destroy any structure. Vulnerable structures exist throughout.
- Structural Failure

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- In the past the co-op has caved in, causing a grain dust explosion. The failure was repaired in the 1990's.
- Various older buildings have caving roofs.
- Some buildings have been condemned. One such building is south of the Bank (south of Ellsworth St)
- Communications Failure
 - Upon power outages, many members of the community may not have telephone communication due to wall-powered phones.
 - Fire and ambulance paging may have issues in a storm. The tower for such communications is located near the co-op.
- Transportation Event
 - Railroad event(s) have caused fatalities. Railroad is generally used for the co-op.
 - I-35 nearby; vehicular accidents occur.
 - City's fire and ambulance assist in response.
- Air Transportation Event
 - No airport in area; however, a plane accident could occur in town.
- When discussion about hazards subsided, we discussed meeting times
 - The committee decided to meet every-other Monday at 7:00 a.m. in the Dows Community Center.
 - Meeting #2 will be held Monday May 10, 2010 at 7:00 a.m.
- Meeting concluded at 8:00 a.m.

**Wright County Hazard Mitigation - Dows - Meeting #2 Minutes
May 10, 2010 at 7:00 a.m.
Dows Community Center**

Meeting attended by: Rosanne Beyer, Don Lane, Linn Larson, Mike Schroeder, Bran Butt, Ray Kracht, Shannon Muhlenbruch, and Jeanette Wenzel.

- The committee was asked if there were any questions regarding the previous meeting or hazard mitigation planning in general.
 - No questions
- The hazard risk analysis process was explained to the committee.
- As a group, the hazard mitigation committee completed the risk analysis for the following hazards:
 - Tornadoes
 - Flash Flooding
 - River Flooding
 - Winter Storms
 - High Wind Events
 - Hailstorms
 - Severe Thunderstorm and Lightning
 - Extreme Heat Event
 - Drought
 - Grass or Wildfire
 - HAZMAT - Transportation
 - HAZMAT – Fixed Facility
 - Watershed Pollution
 - Pipeline Incident
 - Energy Disruption
 - Terrorism
 - Violent Demonstration
 - Disease
 - Structural Fire
 - Structural Failure
 - Communications Failure
 - Transportation Event
 - Air Transportation Event

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- The committee’s ratings are summarized in the following table.
- Extra comments in regards to hazards were:
 - The warning siren is sometimes difficult to hear depending on the direction of the wind.
 - Storm drainage is slow throughout town. This is especially evident near the Coop
 - 1991 Winter Storm: power down for 3-5 days
 - HAZMAT – Fixed facilities include:
 - Water plant
 - Swimming pool storage shed
 - Coop
 - Underground gas tanks
 - Personal propane tanks
 - Committee determined approximately 95% of residents have personal propane tanks.
 - The two different power feeds that feed town can be combined; however, are used separate unless an emergency. Alliant supplies energy for the entire City.
 - House fires occur about once every two years.

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Severe Thunderstorm and Lightning	5	5	5	5	2	4	26
Energy Disruption	5	5	5	5	1	5	26
Winter Storms	5	5	5	5	3	2	25
Hailstorms	5	3	5	5	2	5	25
High Wind Events	5	5	5	5	2	2	24
Tornadoes	1	2	4	4	4	5	20
Flash Flooding	5	4	2	2	2	5	20
Communications Failure	2	2	5	5	1	5	20
HAZMAT - Fixed Facility	5	5	1	1	1	5	18
Watershed Pollution	5	5	1	1	1	5	18
River Flooding	5	4	2	2	2	2	17
Structural Fire	5	3	1	1	2	5	17
Transportation Event	5	4	1	1	1	5	17
Extreme Heat Event	5	5	2	2	1	1	16
Terrorism	1	1	1	5	3	5	16
HAZMAT - Transportation	1	2	2	2	2	5	14

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Structural Failure	2	2	1	1	2	5	13
Disease	2	3	1	1	3	1	11
Grass or Wildfire	1	1	1	1	1	5	10
Pipeline Incident	1	1	1	1	1	5	10
Violent Demonstration	1	1	1	1	1	5	10
Air Transportation Event	1	1	1	1	1	5	10
Drought	3	2	1	1	1	1	9

- After the hazard mitigation committee finished going through the risk assessment, the committee scheduled the next meeting to be held Monday, May 24, 2010 at 7:00 am in the Dows Community Center.
- Meeting ended at 8:05 am.

**Wright County Hazard Mitigation - Dows - Meeting #3 Minutes
May 24, 2010 at 7:00 a.m.
Dows Community Center**

Meeting attended by: Jeanette Wenzel, Dean Lane, Ray Kracht, Linn Larson, Mike Schroeder, Rosanne Beyer

- The committee looked over the risk analysis results
- Using all of the hazards in the plan, the committee developed hazard mitigation actions for each hazard as follows:
 - Severe Thunderstorm & Lightning
 - ACTION: Generate a public awareness of the hazard
 - Give warning by encouraging residents to purchase weather radios
 - Encourage residents to sign up for 'Code Red'
 - Energy Disruption
 - City already has a code to protect from building trees under power lines
 - ACTION: Build a public awareness of residents' responsibility. Don't rely on others to trim trees near power lines.
 - Winter Storms
 - A snow ordinance has already placed on streets, where parking is prohibited in such event
 - ACTION: Put up snow fences around the perimeter of the City.
 - Hailstorms
 - ACTION: Build a public awareness about the hazard
 - Promote 'Code Red' to provide residents with an early warning
 - High Wind Events
 - An ordinance is currently in place that requires manufactured homes to be placed on a permanent foundation
 - ACTION: Build public awareness – tree trimming, building
 - Tornadoes

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- ACTION: Tie down the existing manufactured homes to minimize affects of this.
- ACTION: Expand upon the current warning siren. It is currently not heard throughout town.
- ACTION: Build a tornado safe-room near the pool/campground.
- Flash Flooding
 - City is already in the process of becoming part of the National Flood Insurance Program (NFIP)
 - ACTION: Expand the storm drainage to the east side of town and improve the storm drainage throughout the town.
- Communications Failure
 - ACTION: Provide the fire and ambulance with their own paging system
 - ACTION: Get all fire fighters to be a part of 'Code Red'.
- HAZMAT Fixed Facility
 - Fire Department has some HAZMAT training
 - Coop has meetings regarding hazardous materials
 - ACTION: Build public awareness of numbers to call if something were to happen
- Watershed Pollution
 - ACTION: Improve storm sewer system
- River Flooding
 - ACTION: Improve storm sewer system
 - ACTION: Raise 'River Road' on the perimeter of town
 - Only part of this road was elevated, the rest needs to be done
 - ACTION: Provide temporary shelter for residents when flooding requires residents to vacate
 - ACTION: Build public awareness
 - Inform City Officials on where to get cleanup kits
 - ACTION: Provide sandbags to residents
- Structural Fire
 - Currently the Fire Department provides public education for the younger population
 - A rental inspection code now limited the number of people allowed in each home
 - ACTION: New radios/paging because the frequency will change in 2013
 - ACTION: Provide new self-contained breathing apparatus' (SCBA) for the Fire Department
 - They currently have 10 outdated SCBA's.
- Transportation Event
 - ACTION: Updating rescue trucks to victims can be contained
 - ACTION: Transportation to get people off of the interstate during a tow ban
 - ACTION: Update shelter facilities with necessary goods to maintain people
 - ACTION: Develop a storage facility in case of emergencies
 - ACTION: Provide necessary goods (food, tp, water, etc) to shelters.

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- Extreme Heat Event
 - ACTION: Update shelter facilities
- Terrorism
 - Already have anti-virus software in place at the City Hall
 - ACTION: Place a protection system on the water tower
 - Lock the ladder
 - ACTION: Enhance the Fire Departments decontamination capabilities
- HAZMAT – Transportation
 - ACTION: Build public awareness
- Structural Failure
 - ACTION: Enforce the already present zoning code
- Disease
 - ACTION: Provide contact information to residents for public health
 - ACTION: Provide public with information for inoculation
- Grass or Wildfire
 - Currently the City already has water stored for this
 - The City also has a code that has a permanent burning ban
 - ACTION: Stricter enforcement of the already-present burning ban
- Pipeline Incident
 - ACTION: Ensure proper company identification numbers are in place
 - ACTION: Ensure the Fire Department is equipped with maps and air monitoring devices
- Violent Demonstration
 - ACTION: Have an officer present in town
- Air Transportation Event
 - ACTION: Public Awareness of who to call
- Drought
 - ACTION: Build a public awareness of water conservation
 - ACTION: Provide jugs of water to residents when necessary
- After actions were developed the committee determined that goals and objectives should be established prior to the next meeting. The next meeting is to be held June 7, 2010 at 7:00 am.

Meeting ended at 8:30 am.

**Wright County Hazard Mitigation - Dows - Meeting #4 Minutes
June 7, 2010 at 7:00 a.m.
Dows Community Center**

Meeting attended by: Donald Lane, Ray Kracht, Jeanette Wenzel, Linn Larson, Mike Schroeder, Rosanne Beyer, and Brian Butt.

Meeting began at 7:00 am.

- Reviewed goals, objectives and mitigation actions.
- Started and finished the STAPLEE analysis for each of the hazard mitigation actions that the committee has listed out for the plan
 - Took out "Hire a police officer to protect the community" & "Tie down the existing manufactured homes"
- Discussed next meeting date: June 14, 2010 at 7:00 am.

Meeting ended at 8:15 am.

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**Wright County Hazard Mitigation - Dows - Meeting #5 Minutes
June 14, 2010 at 7:00 a.m.
Dows City Hall**

Meeting attended by: Jeanette Wenzel, Rosanne Beyer, Mike Schroeder, Linn Larson, Don Lane, and Shannon Muhlenbrach

Meeting began at 7:00 am.

- The hazard mitigation committee reviewed the STAPLEE results and decided to take out “Provide fire and ambulance with their own paging system” of their mitigation actions.
- The committee then completed the Prioritization and Implementation of Mitigation Actions worksheet. The results of the worksheet are shown below:

Mitigation Action	Priority	Department/Party Responsible	Target Completion Date
Encourage residents to purchase weather radios	I	City Offices/Wright County EMA	Spring 2012
Encourage residents to sign up for 'Code Red'	I	City Offices/Wright County EMA	Spring 2012
Improve the current warning siren	I	City Offices/Wright County EMA	Spring 2012
Build public awareness on how to react to various hazards including hailstorms and severe thunderstorm and lightning	I	City Offices/Wright County EMA	Spring 2012
Provide residents with numbers to call during various hazard events	I	City Offices/Wright County EMA	Spring 2012
Inform the public when water conservation acts should be put into effect	I	City Offices	Spring 2012
Encourage all fire fighters to sign up for 'Code Red'	I	Wright County EMA	Spring 2012
Supply the fire department with new radios due to the frequency change in 2013	I	City & Rural Fire Department	2013
Provide new self-contained breathing apparatus' (SCBA) to the fire department	II	City & Rural Fire Department	2014
Update rescue trucks so victims can be contained	III	City & Rural Fire Department	2016
Provide transportation for emergency response to get people off of the interstate during a tow ban	III	City & Rural Fire Department	2016
Ensure the fire department is equipped with maps and air monitoring devices for any pipeline incidents	I	City & Rural Fire Department	2012
Enhance the fire department's decontamination capabilities	III	City & Rural Fire Department	2016

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Ensure goods are made available to already-established shelters	I	City Offices/Churches & Organizations	2012
Develop storage facilities for essential goods	II	City Offices/Dows Development/Churches & Organizations	2013
Supply jugs of water in case the community is running low	I	City Offices/Red Cross	2012
Enforce the zoning code -structural failure -burning ban	I	City Offices/Local Law Enforcement	2012
Ensure proper company identification numbers are in place on pipelines	I	Pipeline Companies	2012
Place a protection system on the water tower	I	City Offices	2012
Build a tornado safe-room near the pool/campground	III	City Offices/MIDAS	2016
Build public awareness of residents' responsibility in tree trimming	I	City Offices	2012
Expand the storm drainage to the east side of town and improve the drainage throughout town	III	City Offices	2025
Raise the elevation of the remainder of 'River Road'	II	City Office	2014
Provide sandbags to residents for flooding	I	Wright County and Franklin County EMA/FEMA/Red Cross/City of Dows	Continue initiative - 2012
Inform City Officials on where to get cleanup kits for flooding	I	Wright County and Franklin County EMA/FEMA/Red Cross/City of Dows	Continue initiative - 2012
Establish temporary shelter(s) for residents when flooding requires them to vacate	I	Wright County and Franklin County EMA/FEMA/Red Cross/City of Dows	Continue initiative - 2012
Place snow fences near the perimeter of the City	I	City Offices	2012

Meeting ended at 7:30

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Section 8: Resolution

RESOLUTION
NO. 13-1

A RESOLUTION OF THE DOWS CITY COUNCIL ADOPTING A HAZARD MITIGATION PLAN FOR DOWS, IOWA

WHEREAS, the Dows City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Dows City Council has authorized the development of the City's portion of the Wright County multi-jurisdictional Hazard Mitigation Plan for the City of Dows, Iowa; and

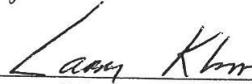
WHEREAS, this plan will be the guidance regarding future mitigation actions; and

WHEREAS, the Dows Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommended that the City Council approve the plan; and

WHEREAS, the plan has been reviewed by City staff members and the City Council,

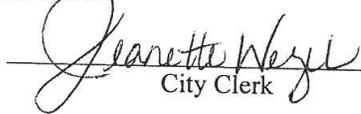
NOW THEREFORE BE IT RESOLVED, that the Dows City Council hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 4 day of February, 2013



Mayor

ATTEST.



City Clerk

Appendix D: Eagle Grove

Section 1: Risk Assessment

The committee decided that the following additional hazards were not applicable or would have little effect on the City of Eagle Grove:

Expansive soils were considered not applicable to the City of Eagle Grove due to the lack of historical data supporting expansive soils in the area. Expansive soils, and incidents related to expansive soils, are more commonly found in eastern Iowa near the Mississippi where more clay soils are found. Members of the community also didn't remember expansive soils occurring or presenting a problem to Eagle Grove.

River Flooding was not addressed as there is no river in the City.

The following hazards were combined together:

- Human Disease Incident and Human Disease Pandemic were combined into Disease.
- Terrorism includes all terrorism addressed in the state plan.
- Highway Transportation Incident and Railway Transportation Incident were combined into Transportation Event.

Due to water quality issues in the area Watershed Pollution was added to the list of hazards addressing

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Flash Flooding	5	5	5	5	5	4	29
Thunderstorm and Lightning	5	5	5	5	4	4	28
Windstorm/High Wind	5	5	5	5	3	5	28
Energy Failure	5	5	4	4	3	5	26
Winter Storm	5	5	5	5	4	2	26
Hailstorm	5	4	5	5	2	5	26
Transportation – HAZMAT	5	4	2	2	4	5	24
Communications Failure	2	4	5	4	3	5	23
Tornado	3	4	3	3	5	4	22
Extreme Heat Event	5	4	5	5	2	1	22
Fixed Facility – HAZMAT	5	4	2	2	4	5	22
Terrorism	1	1	3	3	5	5	18
Watershed Pollution	5	4	1	1	1	5	17
Disease	1	1	4	4	4	1	16
Structural Fire	2	2	1	1	4	5	15
Structural Failure	2	3	1	1	1	5	15
Pipeline Incident	3	3	1	1	1	5	14
Earthquake	1	1	1	5	1	5	14
Transportation Event	2	2	1	1	1	5	12
Grass or Wild-land Fire	1	1	1	1	1	5	10

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Public Disorder	1	1	1	1	1	5	10
Air Transportation Event	1	1	1	1	1	5	10
Drought	1	1	2	2	1	1	8

Hazard	Flash Flooding
Location	Many areas throughout the city are susceptible to flash flooding. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Flash floods are the most common and widespread of all natural disasters in Iowa. Some flash flooding occurs in Eagle Grove every time they get heavy rain in a brief period of time. Due to the level topography of the area, every time the ground becomes oversaturated, flooding starts to occur evenly throughout the city. According to the NCDC, there have been 5 flash flooding events in Eagle Grove since 2004.
Probability	The probability of flash flooding in Eagle Grove is 100% every year.
Vulnerability	<p>The entire population of Eagle Grove is vulnerable to flash flooding. The topography, as stated before, is very level. This means that for the most part the entire city experiences flooding equally. Every resident's basement has the potential to be flooded.</p> <p>The vulnerable facilities during a flash flood event are the wastewater plant, and other facilities that normally control the amount of water generated by rainfall. If the storm sewers get overwhelmed, the extra water can flow into the sanitary sewers, causing the water in the wastewater plant to overflow to nearby water sources without being properly treated.</p>
Maximum Threat	Because of how flat the area is in and around Eagle Grove the flooding that occurs affects the whole area equally.
Severity of Impact	Almost all of the City of Eagle Grove is impacted by flash flooding, about 75% or more of the community. This includes all of Eagle Grove's critical facilities. Due to the flat terrain of Eagle Grove, any significant amount of rain fall can result in some level of flash flooding. Most people that have basements might experience some kind of flooding which puts the structural stability of their home at risk. Flood waters also can cause water to flow from the storm water sewers to the sanitary sewers which causes a chain reaction with the end result having water from the wastewater plant overflowing into the nearby water sources and polluting the watershed. This is a major health hazard for humans and the environment.
Speed of Onset	There is generally not a lot of time for people to react to a flash flood; however there is some warning time that a flash flood could occur.

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Hazard	Severe Thunderstorms and Lightning
Location	Severe Thunder Storms and Lighting is usually a regional event, therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Severe thunderstorms with lightning are a common occurrence in Iowa, and in Eagle Grove. According to the NCDC, there have been 50 events since 1959, which means that there is a 100% chance that 1 thunderstorm wind even every year. In the past, high winds have caused electrical problems due to interfering with power lines. However, one of the largest problems is that the lift stations shuts down at least twice per year due to power surges from the lightning, which causes about one half of the town to flood.
Probability	<p>Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The southeastern U.S. has the greatest number per year, with some areas in Florida experiencing an average of 90 days of thunderstorm activity per year. This is mostly due to the proximity to the Gulf of Mexico and the Atlantic Ocean, which provide an ample amount of warm, moist air. This central area of U.S. is home to the most severe thunderstorms in the world. About 85 percent of the 45 to 65 thunderstorms Iowa experiences annually occur between April and September with the peak month being June. At times, these thunderstorms become severe producing hail, high winds, torrential rains, and an occasional tornado.</p> <p>Frontal thunderstorms are common along the boundaries between warm and cold air masses in mid-latitudes. At an air mass boundary, warm air (which is less dense than cool air) is forced to rise over a mass of cool air. This movement of air can cause thunderstorms to form if enough moisture exists in the atmosphere.</p> <p>Every year there are going to be, at the very least, several severe thunder and lightning storms that will blow through Iowa, and in doing so, will affect Eagle Grove.</p>
Vulnerability	<p>All of the residences of Eagle Grove are vulnerable to thunderstorm and lightning events. Winds, rain, and lightning affect everyone in Eagle Grove. The winds can cause widespread damage throughout the city</p> <p>Power lines are vulnerable due to the high winds and lightning strikes that are generated by a thunderstorm. Storm sewer systems can also be overwhelmed by the amount of water that is generated by heavy rainfall.</p>
Maximum Threat	The greatest threat that Eagle Grove faces, due to thunder and lightning storms, is power outage. Any other kind of damage that may occur is generally negligible. It is estimated that more than 75% of the community is impacted.
Severity of Impact	<p>Severe thunderstorms and lightning can impact a community in several ways, since thunderstorms generally consist of a number of things. Thunderstorms can generate high winds, causing damage typical of high wind events. The rain that falls down during a thunderstorm can cause flash flooding events if it occurs in high volume, or if it rains over a number days, flooding can occur. Lightning strikes can overwhelm electrical equipment which can result in equipment failure which can cause further damages depending on what equipment was rendered inoperable.</p> <p>During a recent thunderstorm, it took the city 2 ½ days to clean up the tree and other vegetation debris that was the result of the storm.</p>
Speed of Onset	Weather services are able to predict the weather in advance, however, severe storms can collect and bear down on a town in a relatively small amount of time, giving the residents little to no warning time.

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Hazard	Windstorm/High Winds
Location	A High Wind event is a regional event; therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There have been a total of 38 recorded instances of high winds that could have impacted the city of Eagle Grove. Thus, according to the NCDC records, there is an average of 2 high wind events every year. These high winds have damaged property in a total of \$58,000 along with \$20,000 worth of crop damage. They also have caused power outages for short periods of time.
Probability	<p>Winds at 10 meters/32.8 feet above ground level average about 11.5 mph. Highest average wind speeds are usually recorded in March and April with the annual minimum occurring in July and August. Winds of 55 mph or greater are recorded about once every other year at any one site while sustained speeds of 75 mph or greater occur about once every 22 years. The highest wind gusts typically occur with thunderstorms during the late spring and summer and are of very short duration. The typical thunderstorm severe wind event affects only a very small geographic area. However, a variety of thunderstorms, known as the <i>derecho</i> (Spanish for straight) can produce very widespread high winds with mid-summer being the preferred time of <i>derecho</i> occurrence. However, storm systems can generate widespread wind gusts in excess of 50 mph for several hours duration with the spring and fall being the most common time for these non-thunderstorm wind events.</p> <p>Iowa is one of the top 10 windiest states in the United States, so the probability of a high wind event occurring is likely. Given the history of wind events in Eagle Grove, there is a 100% chance that a high wind event will occur.</p>
Vulnerability	<p>Eagle Grove is generally protected by high wind events, as long as residents stay within shelter and stay off the roads. High winds can often make it hazardous to drive as high winds can start blowing vehicles, and in doing so, can cause accidents. Limbs and branches from trees can be hazardous as they are torn off of trees from the strong gusts of wind.</p> <p>The facilities, or utilities, that are the most vulnerable to high winds are anything that is located above ground; typically this is power and telephone lines. There are generally downed by high wind events because limbs and branches from trees hanging over them may fall down on top of the lines, causing them to break, and causing power or telecommunication loss to those areas those utilities facilitated.</p>
Maximum Threat	Due to the size of Eagle Grove, and the large area that high winds can affect, all of Eagle Grove would be impacted by a high wind event.
Severity of Impact	High winds have the ability to damage housing by blowing roofing off of roofs, damaging trees by breaking limbs or branches, downed power lines from falling branches and limbs, etc. The impact of high winds is similar to tornadoes, except that high winds are straight lined, so they are slightly less destructive than tornadoes because wind doesn't corkscrew like a tornado does.
Speed of Onset	Sustained high winds can be predicted; however, high wind events such as microburst and downburst are unpredictable and can occur without any warning.

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Hazard	Energy Failure
Location	An Energy Failure is going to be a city wide event due to the small size of Eagle Grove; therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	The City of Eagle Grove experiences frequent energy failure. Members of the hazard mitigation committee described that with high wind, thunderstorms, ice storms, and winter storms the electricity often goes out. This kind of energy failure occurs many times every year, and the length of power outage varies from a couple of hours to many days, as it did in one instance. The experienced period of power loss has lasted from 3-4 hours to 3-4 days.
Probability	The probability of some kind of energy failure occurring each year is highly likely given the frequency of severe thunder and lightning and winter storms.
Vulnerability	Everyone is vulnerable to power loss, but the population that is the most vulnerable is small children and the elderly, specifically in instances of extreme cold or heat. As the length of time draws on that civilians don't have electricity supplied to their homes, the degree of health risk continues to rise. The sudden loss of power can also cause the loss of computer based information.
Maximum Threat	If 51%-75% of the properties don't have access to essential services, then 51%-75% of the community would be impacted by such a hazard.
Severity of Impact	Energy failure has caused the shutdown of essential services for periods of 24-72 hours. The loss of electricity can cause a variety of serious problems, from the shutdown of water pumps in plants and homes, loss of communication between emergency services, and loss of heating and cooling within homes. The problems that come with power loss only grow for each day that a household or city goes without power. Things that depend on electricity such as appliances like refrigerators, air conditioning units, and sump pumps can be vital, and without electricity food will quickly go bad, homes can become overheated, and water levels can rise in people's basements.
Speed of Onset	With energy failure, there isn't any kind of warning.

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Hazard	Winter Storm
Location	A Winter Storm is a regional event; therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Tough winters are something that Iowans are used to dealing with, as snow, ice storms, and low temperatures are a common occurrence. However, there have been two winter events that have had a significant impact on Eagle Grove, and that was in 1992 and 1993. These winter storms caused power outages, which took a long time for the city to get operating effectively since it took such a long time due to weather conditions.
Probability	<p>Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. The snow season normally extends from late October through mid-April but significant snows have fallen as early as September 16 (1881) to as late as May 28 (1947). The average number of days per season with snow cover one inch or deeper varies from about 40 days along the Missouri border to around 85 days along the Minnesota border. In about half of fall winters, a daily snowfall of five to six inches or more is recorded in southern Iowa and seven to eight inches or more in northern Iowa. December, January and February are normally the snowiest months, averaging about seven inches each. However, late winter and early spring storms in March and April have produced as much as 27 inches of snow in a single storm and 24-hour amounts have reached 24 inches. The snowiest winter of record (since 1887-1888) was 1961-1962 with a statewide average of 59.0 inches while the lowest State average, only 11.9 inches, occurred in the winter of 1965-1966. Seasonal snowfall totals have varied from 2.4 inches at Keokuk in 19 to 93.1 inches at Elkader in 1950-1951.</p> <p>Every winter, there will be severe winter storms that will occur all throughout Iowa.</p>
Vulnerability	<p>Everyone is vulnerable to winter storms as it affects everyone throughout the city. Everyone has hazardous driving conditions in the event of a storm event and everyone must suffer through the bitter cold in the event of extreme cold. However, again, like all of the other hazards, the elderly are the susceptible to having problems. If an elderly person needed medical attention during blizzard conditions emergency vehicles may not be able to get to them in time.</p> <p>The only vulnerable part to facilities during winter storms are frozen and exploding water pipes, as this would flood the structure and cause further damage.</p>
Maximum Threat	Winter storms affect the entire spatial extent of the City of Eagle Grove.
Severity of Impact	<p>The impact of winter storms can be wide ranging depending on what kind of winter storm hits the city. Any kind of snow can hinder travel and slow emergency response as well as cause concern in the event of a power outage. Blowing snow can also decrease visibility on the roads as well as cause snow drifts which can vary in height, from a few feet, to being able to block people inside their homes. Extreme cold can cause vehicles to have difficulty starting, possibility of frostbite to those venturing outside, and the freezing and bursting of water pipes.</p> <p>The worst case winter storm scenario is a heavy blizzard event where the roads and buildings are unable to be cleared in combination with power outage. This would cause some buildings unable to receive heat, and those unfortunate enough to not have generators would be locked in their rooms unable to get heat. This would be the most dangerous situation and would be dangerous for all age groups, both the young and the old.</p>
Speed of Onset	Weather services are able to accurately predict when winter storms are going to start having an effect on certain areas. This gives cities such as Eagle Grove, about 12-24 hours of warning time.

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Hazard	Hailstorm
Location	During a Hailstorm in a small town like Eagle Grove, usually the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	According to data collected from the NCDC (National Climatic Data Center) there have been a total of 27 hail events recorded since 1965. 17 of those events were recorded happening in Wright county, which could have impacted the city. 10 hailstorm events were recorded as specifically affecting Eagle Grove. There was one event in which 4in hail came down, but it fell just outside of the city, so there wasn't a lot of damage. Most damage, historically, has been moderate, with residential roofing and siding being damaged.
Probability	<p>Hail occurs most frequently in May throughout Iowa; however, nearly half of the crop-hail damage comes in July when crops are more susceptible to yield-reducing damage. In the average year, hail destroys about 1.4 percent of Iowa's corn crop and 4.5 percent of its soybean crop. Hail losses are greatest in the northwest where hail storms are typically more severe and also somewhat more frequent than in the southeast. In any one location, hail will occur on about two to four days per year.</p> <p>There have been 27 recorded instances since 1965. Given this information, that means that there is a 62% chance that a hailstorm event can occur each year.</p>
Vulnerability	<p>Anyone that is caught outside in the event of a hailstorm is vulnerable to being injured. Otherwise, if people are safe inside some kind of shelter, they are generally protected from the effects of hailstorms.</p> <p>All facilities and buildings are vulnerable to hailstorms; however, the damage dealt by hailstones is generally light and aesthetic in nature.</p>
Maximum Threat	While not everyone's property will get damaged, almost all of Eagle Grove's residents will be impacted by the hailstorm, more than 75%.
Severity of Impact	Damage from hailstorms can vary depending on how large the hailstones are. It is estimated that damage from hail approaches \$1 billion in the U.S. annually. U.S. Agriculture is typically the most affected by such hail storms, hail causes severe crop damage, and even a minor storm with relatively small size hailstones can have a devastating effect. As well, damage to vehicles, roofs (residential & commercial), and landscaping are the other things most commonly damaged by hail. Hailstones also can pose a health risk to anyone who is caught outside without shelter during a hailstorm, as larger hailstones could cause serious injury.
Speed of Onset	Hailstorms can occur suddenly, and without warning, often resulting from a severe thunderstorm or even a tornado. There is little to no time to prepare for a hailstorm.

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Hazard	Communications Failure
Location	Communications is a community wide event; therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There have been 2-4 occurrences of communications failure in Eagle Grove. In one instance, a cable was accidentally cut, which knocked out communications for a couple of days as repairmen attempted to reconnect the wire.
Probability	The probability of communications failure is likely, or 76-99% chance that it will occur in the next year due to human error.
Vulnerability	<p>The part of the population that would be most vulnerable to communication failure are those individuals that are injured, sick, or need help, and require the services of emergency staff such as ambulances or law enforcement.</p> <p>Facilities that are most vulnerable to communications failure are emergency facilities that require proper communication to provide aid to the residents of Eagle Grove. Without communications, their reaction time is slowed, or they are unable to help in time.</p>
Maximum Threat	51%-75% of the spatial extent of Eagle Grove would be impacted by a communications failure because of the interconnectivity of the electrical system.
Severity of Impact	The impact of communications failure can lead to further injuries or death to those that are in need of medical attention and cannot get the call out to receive that attention. The severity of this problem of loss of communication is only compounded in the event of a natural hazard combined with communications failure, such as a tornado.
Speed of Onset	Communication failures are sudden and occur without any kind of warning.

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Hazard	HAZMAT
Location	There are many areas within the City of Eagle Grove that house Hazardous Materials. To see a map of HAZMAT areas see Section 6 of this appendix for a map of the City.
Historical Occurrence	According to the Iowa DNR (Department of Natural Resources) there have been 17 hazardous material spills, with about 7 of them being transportation related and 5 of them related to fixed facilities, since 1996. The materials that have been spilled are materials such as diesel fuel, transformer oil, transformer mineral oil, manure, and anhydrous ammonia.
Probability	There is a 76-99% chance of this type of hazard occurring within Eagle Grove during the course of the following year.
Vulnerability	<p>The individuals that are most vulnerable to a hazardous material spill via a transportation event are those that live nearby major thoroughfares that trucking companies may use. Given that the highway runs through town and industrial facilities are located throughout Eagle Grove, this could be a major portion of the town.</p> <p>The population that is the most vulnerable to fixed facility events are the residents of Eagle Grove that live in close proximity to the facilities that handle hazardous materials. Potentially the entire town is vulnerable, but the area that would be most subject to leaks and spills would be those that are closest to the building.</p> <p>The most vulnerable facilities would be the fixed facilities themselves. If there was a hazardous material event, it would be their building that would be subject to the most damage.</p>
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be about 26%-50% of Eagle Grove, due to the regularly used thoroughfares that run through the city in addition to the centrally located large industry buildings.
Severity of Impact	The impact of hazardous of materials on the City of Eagle Grove in the past has not amounted to many damages. However, with the highway that runs through town and the close proximity to facilities that house hazardous material, the potential of a dangerous spill event is great. The impact of such an event depends on what material is spilled. Some hazardous materials that are stored within the plants in town are gaseous, so if they leaked they could cause serious harm to anyone that breathed them in. Other hazardous materials are very flammable, and if somehow they were to catch light, there could be explosions.
Speed of Onset	There is never any warning when there is going to be a traffic incident involving hazardous materials, or when there is an incident at a fixed facility

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Hazard	Tornado
Location	A Tornado is a random event that could take place anywhere in the community, therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	According to the NCDC, there is a record of 16 tornadoes since 1964. 15 of those tornadoes were recorded as occurring in Wright county, which could have had impacted the city. 1 tornado was recorded as having directly affecting Eagle Grove. While these are records of actual tornadoes touching down, there are about 4-6 events every year where the tornado sirens go off, and the citizens of Eagle Grove take cover.
Probability	The potential for a tornado to occur in Iowa, and in Eagle Grove, is always likely due to the favorable weather conditions for such an event. The tornado sirens are sounded a handful of times every year.
Vulnerability	The entire population and facilities of Eagle Grove are vulnerable to tornadoes. Both personal safety and structural stability would be a great concern. The Hazard Mitigation Committee felt that in the event of a tornado touching down in the city, that any properties that were affected would suffer an intense amount of damage, however, tornado paths can be random
Maximum Threat	The committee estimated that somewhere between 26%-50% of the town would be impacted in the event of a tornado due to the potential size of the tornado and the relative size of Eagle Grove.
Severity of Impact	The impact of tornado varies with the strength of the tornado. If the tornado is of little strength, there will be light damage throughout the city. If there is a strong tornado that blows through the city, there will be a lot of damage as objects are lifted off the ground and thrown. Please refer to the table under the description section above for a more detailed explanation of typical damages displayed during certain strengths of tornadoes.
Speed of Onset	The weather services are able to predict when the weather is favorable to producing tornadoes. This gives some warning, generally less than 5 hours, to when a tornado has a chance to occur.

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Hazard	Extreme Heat Event
Location	Extreme Heat is a regional event; therefore the entire city would be affected. See Section 6 of this appendix for a map of the City.
Historical Occurrence	Being in the Midwest region, the state of Iowa can get both extreme cold temperatures during the winter and extreme heat temperatures during the summer. According to the NCDC, there have been 2 recorded extreme heat events since 1995 that would have affected Eagle Grove.
Probability	The probability for an extreme heat event is always likely from year to year, about a 76%-99% chance. The conditions during the summer in Iowa are always there that an extreme heat event can occur, it just depends if high heat combines with high humidity.
Vulnerability	<p>The most vulnerable population to an extreme heat event is anyone that is outside that is unable to get into a cool shelter, or those that are working outside. The elderly are also more susceptible to heat disorders as generally the older one is, the more medical problems they may have.</p> <p>Vulnerable facilities are those facilities that may suffer technical difficulties due to the extreme heat. One facility that should be properly looked after is any facility that is responsible for electricity distribution. Because if this facility fails, then it will put many people at risk since it will take away their ability to cool themselves with appliances that rely on electricity to power them; such as air conditions, fans, etc</p>
Maximum Threat	The entire spatial extent of Eagle Grove would be impacted by an extreme heat event.
Severity of Impact	The impact of extreme heat events is that it can cause health problems to those that are outside for long periods of time, or who are performing some kind of strenuous activity. Extreme heat can also cause power failures. This compounds the danger of extreme heat events since most people rely on electricity to power their air conditioning units in their homes.
Speed of Onset	High temperatures and high humidity can generally be forecasted more than 24 hours ahead of time, giving everyone an ample amount of time to prepare.

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Hazard	Watershed Pollution
Location	Watershed Pollution is going to include the whole city because the entire city drains into a waterway. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There is watershed pollution that occurs every year, and this is when the public works conduct bypasses into the stream. This happens about once every year.
Probability	The probability that of some kind of watershed pollution, or at least an act of watershed pollution, is anywhere from 76-99%. As stated earlier, the city performs bypasses at least once every year.
Vulnerability	The city has and great supply and quality of water that is supplied to the residents in town. However, watershed pollution can occur, but the committee believed that if it did occur; only 10% of the population would be vulnerable to the watershed pollution.
Maximum Threat	Due to the adequate supply and protection of the water supply that is distributed to the residents throughout town. It's estimated that less than 10% of the spatial extent of Eagle Grove would be impacted in the event that there was watershed pollution.
Severity of Impact	The City of Eagle Grove monitors the water quality of their water supply. In the event of a watershed pollution event it's estimated that there would be a small amount of people that would fall ill.
Speed of Onset	There is minimal to no warning time of when a watershed reaches that critical pollutant level, there is a point where the water may not be dangerous, and then it breaches that point to make it dangerous.

Hazard	Disease
Location	The entire city would be affected if a Disease Event took place. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There have been less than 2 occurrences of widespread human disease outbreaks in Eagle Grove during recent decades.
Probability	There is a rare chance that a human disease outbreak will occur in Eagle Grove during the coming year.
Vulnerability	If there was a disease outbreak, the committee estimated that 51%-75% of the population would be infected before the disease could be successfully contained. The most vulnerable part of the population would be those whose immune system is weak due to previous being sick, the young, and the old.
Maximum Threat	Since it's estimated that 51%-75% of the population would be affected by the disease 51%-75% of the spatial extent of the community would be impacted.
Severity of Impact	If a disease outbreak did occur it would have to be serious enough for people to pay attention, such as the H1N1 outbreak in Mexico. If a disease outbreak took a true hold on Eagle Grove the severity of impact would be similar to that of what happened to Mexico City. The entire city would shut down for a period of time to wait out the infectious period of the disease to reduce the spread of the disease through the community. This would not only impact the health of the city of Eagle Grove, but it would also hurt the city economically, as people would either not be able to open businesses, or if they were open they may not have enough staff. The same thing goes for customers to a business.
Speed of Onset	Disease outbreaks generally start off slowly; affecting only a small group of people, allowing for experts to be able to identify that there is a problem going on. This means that there is generally more than 24 hours of warning time before the effects of a disease outbreak would be felt by the community of Eagle Grove.

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Hazard	Structural Failure
Location	As stated below, a majority of the homes in Eagle Grove are over 75 years old. This ageing home stock makes almost all homes in the community susceptible to Structural failure. See Section 6 of this appendix for a map of the City
Historical Occurrence	A lot of the building stock in Eagle Grove is fairly old, with a lot of the housing being built in the first half of the 20 th century. There have been some buildings that have fallen down, and there are currently some buildings in town that structural problems can be clearly seen.
Probability	The probability of some buildings failing in Eagle Grove is possible as there are some several older buildings throughout town, as well as older structures.
Vulnerability	When a structure fails, the only person that it affects are those that own that building and property. So, in the event of structure failure, less than 10% of the people of Eagle Grove would be affected.
Maximum Threat	As generally only one building fails at a time, less than 10% of the spatial extent of Eagle Grove would be impacted by a structural failure.
Severity of Impact	When a building is aged to a degree that its structural stability can be questioned, generally there aren't people who live, or work, out of such structures. In the event that a building structurally failed, it is believe that there would be few, if any, injuries and generally little property damage to any nearby structures.
Speed of Onset	Anyone can see that a building might be structurally unsound from exterior damage or wear, but it's what cannot be seen that can be hard to predict. If a load-bearing support gives out due to age, deterioration, or poor design, it can happen suddenly and without much warning if the problem wasn't sighted previously. One can identify that a structure is structurally unsound, however, it is hard to predict when that structure will fail.

Hazard	Grass & Wild-Land Fires
Location	Grass and Wild Land Fires can startup on any field or glass land area, many of which surround the entire town of Eagle Grove. See Section 6 of this appendix for a map of the City.
Historical Occurrence	There hasn't been any record of wild & grass fires occurring in Eagle Grove.
Probability	There is a possibility of grass & wildfires, or more likely corn fires, occurring in Eagle Grove since the city is surrounded by cultivated land. However, due to the lack of historical events, it was estimated that the probability of a grass fire/wildfire/corn fire affecting the City of Eagle Grove is rare.
Vulnerability	Properties in the community are vulnerable to grass & wildfires, however, due to the fast response of the local fire department the committee decided that any fires that did occur would be quickly contained. Thus less than 10% of the community would be vulnerable to grass & wildfires.
Maximum Threat	In concurrence with the vulnerability rating, the committee decided that the overall spatial extent of a grass & wildfire would cover less than 10% of the community.
Severity of Impact	The damages that would be incurred by grass & wildfires are relatively minor. Examples would be minor property damage, burnt vegetation, and potential minor fire damage to structures. The reason why the severity of impact was estimated to be so small is due to the quick response of the fire department.
Speed of Onset	Grass and wildfires occur very quickly and often without any warning.

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The following hazards were evaluated and assessed, but after the assessment it was decided that they'd no longer be looked at further for the course of the plan.

- Air Transportation Event
- Drought
- Earthquake
- Pipeline Incident
- Structural fire
- Terrorism
- Transportation Event
- Violent Demonstration

Section 2: Vulnerability Assessment & Loss Estimates

Vulnerability

The entire community is vulnerable to wide range of hazards, including: Flash Flooding, Severe Thunderstorms and Lightning , Windstorms, Energy Failure, Winter Storms, Hailstorms, Communications Failure, Tornadoes, Extreme Heat Event, Disease, and Structural Failure. Some of these hazards might not immediately be associated with affecting an entire community, such as Flash Flooding and Structural Failure.

Eagle Grove may not have any large bodies of water or rivers that run near the community, but it does have very flat and level topography. The community is built in an area that used to be considered marsh-like; this is because when there was any kind of rainfall, and water would collect where it landed because of the flat topography. This means when there is a lot of rain in a short period of time the entire community is vulnerable to flash flooding, especially when you take into consideration basement flooding.

For Structural Failure, every structure throughout the community is subject to the degrading ability of time. Every building is built with materials, that over time, will decay and become less structurally sound. While not every building may have failure points in an area at the same time, every building is vulnerable to structural failure.

Vulnerability Assessment for Flash Flooding, Severe Thunderstorms and Lightning, Windstorms, Energy Failure, Winter Storms, Hailstorms, Communications Failure, Tornadoes, Extreme Heat Event, Disease and Structural Failure

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1412	1412	100	\$61,848,600	\$61,848,600	100	3,360	3,360	100
Commercial	142	142	100	\$8,548,700	\$8,548,700	100			
Government	10	10	100	\$1,750,797	\$1,750,797	100			

There are some hazards that have more defined area of vulnerability. For Eagle Grove, these hazards are HAZMAT and Grass and Wild-land fires.

For HAZMAT, this includes any building that has any kind of hazardous materials. For completing the vulnerability assessment, the spatial study that was mentioned previously in the risk analysis has been used to determine the number of structure that would be affected. Buildings that are located near facilities that store or use hazardous materials will be more vulnerable to HAZMAT hazard events than buildings that are located further away.

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Grass and Wild-land fires could potentially start anywhere in town where someone is burning their grass clippings and the fire gets out of hand. However, grass/wild-land fires/corn fires will more likely occur on the perimeter of town where there is more green space, or in the case of Eagle Grove, farmland. Thus, those building that are located on the perimeter of Eagle Grove are more vulnerable to Grass and Wild-land fires than buildings that are located in the center of town.

Vulnerability Assessment for HAZMAT and Grass and Wild-land fires

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	1412	978	69	\$61,848,600	\$37,153,200	60	3,360	2,957	88
Commercial	142	133	94	\$8,548,700	\$7,076,900	83			
Government	10	10	100	\$1,750,797	\$1,750,797	100			

Loss Estimates

The following lost estimates were calculated using the assessed residential and commercial values of Eagle Grove.

Below are some general statistics of Eagle Grove. These general statistics is what all of the data that was gathered was based off of.

- Total Acres = 3,355 (according to parcel map)
- Sum of assessed residential structures = \$61,848,600
- Sum of assessed commercial structures = \$8,548,700
- Total assessed value = **\$70,397,300**

Loss Estimate Methodology

To calculate the loss estimates of some of the hazards, the risk analysis results were used to estimate the percentage of damages. The category that was looked at was the Vulnerability category, as this category was used to determine the percentage of people and property that would be affected by each hazard. This was only used for hazard events that don't have a specific focal point, such as high winds, flash flooding, etc. These events are so broad that they generally affect the entire city of Eagle Grove. The following are the vulnerability results for these very broad storm events.

- Flash Flooding = 75%+
- Severe Thunderstorm and Lightning = 75%+
- Windstorm = 75%+
- Winter Storms = 75%+
- Tornado = 25% - 50%

The next step was to calculate the extent of damages that each property might have due to each of the hazards above. Again, the risk analysis results were consulted to try to determine the percentage of the assessed value that could be damaged. The category that was looked at was the Severity of Impact category, as this category was used to assess the severity of the hazard in terms of fatalities, injuries, property losses, and economic losses. The following are the Severity of Impact results for the storm events.

- Flash Flooding = 5pts
- Severe Thunderstorm and Lightning = 5pts
- Tornado = 5pts

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Winter Storm = 4pts
 Windstorms = 3pts

Severity of Impact: Assessment of the severity in terms of fatalities, injuries, property losses, and economic losses	
Score	Description
1 point =	Few if any injuries or illness, minor quality of life lost with little or no property damage. Brief interruption of essential facilities or services for less than four hours
2 points =	Minor injuries or illness, limited impact on quality of life and some property damage which does not threaten structural stability, slight interruption in essential services.
3 points =	More serious injuries or illness, minor or short term property damage which does not threaten structural stability, shutdown of essential services for 24 hours or more
4 points =	Serious injury or illness, major or long term property damage which threatens structural stability, shutdown or essential services and facilities for 24-72 hours.
5 points =	Multiple deaths, property destroyed or damaged beyond repair, complete shutdown of essential facilities and services for 3 days or more.

Given all of the factors above and the damages that might take place in each hazard, the following loss estimate percentages were calculated. A more detailed explanation of the percentages is included under each specific storm event loss estimate calculation.

Tornado = 40%
 Flash Flooding = 20%
 Winter Storm = 10%
 Severe Thunderstorm and Lightning = 5%
 Windstorms = 3%

Tornado Loss Estimate Calculation (see attached spatial extent map in Appendix F)

It was estimated by the Eagle Grove Hazard Mitigation Committee that in the event of a tornado that it might affect 26%-50% of the city. This is because of the random nature of tornadoes, how they can jump from house to house in a random manner. The size of Eagle Grove also plays a factor because only the largest of tornadoes would affect the entire city. The Hazard Mitigation Committee felt that in the event of a tornado touching down in the city, that any properties that were affected would suffer an intense amount of damage.

Given the results from the risk analysis, it was decided that 40% of the total assessed value of both residential and commercial structures would be an accurate loss estimate to predict potential losses in the event of a tornado touching down in the City.

Sum of assessed residential of Eagle Grove = \$61,848,600
 Sum of assessed commercial of Eagle Grove = \$8,548,700

Estimated residential damage due to Tornado (40%) = \$24,739,440
 Estimated commercial damage due to Tornado (40%) = \$3,419,480
 Total loss estimate of Tornado = **\$28,158,920**

Flash Flooding Loss Estimate Calculation (see attached spatial extent map in Section 6)

Flash flooding occurs throughout the entire City of Eagle Grove due to the relatively flat topography of the area. The primary thing that occurs is that storm water begins to overwhelm

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the storm sewer utility, which causes water to begin to backup into people's basements. Because some of the sanitary sewer lines are believed to be connected to the storm sewer lines, sewage is often intermixed with the storm water.

Basements often are used as a place to store belongings and they are also the home for the furnace, water heater, and potentially the washer & dryer units. Repairs and/or replacement of the items that are stored in a basement can often be expensive.

Because of this it was estimated that 20% of the assessed value of both residential and commercial structures could be damaged by flash flooding. This accounts not only for the potential structural damage due to the water, but also the value of the contents that are housed basements.

Sum of assessed residential of Eagle Grove = \$61,848,600

Sum of assessed commercial of Eagle Grove = \$8,548,700

Estimated residential damage due to Flash Flooding (20%) = \$12,369,720

Estimated commercial damage due to Flash Flooding (20%) = \$1,709,740

Total loss estimate of Flash Flooding = **\$14,709,460**

Winter Storms Loss Estimate Calculation (see attached spatial extent map in Section 6)

Winter storms are another hazard that affects the entire town. When a winter storm hits the city of Eagle Grove it affects the entire city. The effects of a winter can be wide ranging, including blizzard conditions, heavy snow, blowing snow, heavy sleet, extreme cold, ice storms and freezing rain. There can be high winds, power outages, downed tree limbs, and hindrance to travel.

To determine the loss estimate of winter storms it was determined to take 10% of the assessed values of residential and commercial structures that might occur due to winter storms, extreme cold, and the bearing weight of ice and snow.

Sum of assessed residential of Eagle Grove = \$61,848,600

Sum of assessed commercial of Eagle Grove = \$8,548,700

Estimated residential damage due to Winter Storms (10%) = \$6,184,860

Estimated commercial damage due to Winter Storms (10%) = \$854,870

Total loss estimate of Winter Storms = **\$7,039,730**

Severe Thunderstorm and Lightning Loss Estimate Calculation (see attached spatial extent map in Section 6)

Severe thunderstorm and lightning events is a hazard that is very broad, and during a storm, its affects would be felt throughout the entire city of Eagle Grove. Thunderstorms can generate high winds, causing damage typical of high wind events which include damaging trees by breaking limbs or branches, downed power lines from falling branches, and even structural damages from falling debris, such as damage to roofs.

The damage that can occur is widespread, and can occur in both residential and commercial areas. It was estimated that 5% of the assessed values of residential and commercial structures might be occur due to severe thunderstorms and lightning. This also includes any contents that could be lost due to water damage, damages due to power surges, or content loss that might occur due to power failure.

Sum of assessed residential of Eagle Grove = \$61,848,600

Sum of assessed commercial of Eagle Grove = \$8,548,700

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Estimated residential damage due to Severe Thunderstorm and Lightning (5%) = \$3,092,430
Estimated commercial damage due to Severe Thunderstorm and Lightning (5%) = \$427,435
Total loss estimate of Severe Thunderstorm and Lightning = **\$3,519,865**

Windstorms Loss Estimate Calculation (see attached spatial extent map in Appendix F)

High wind events are very similar to severe thunderstorm and lightning events, except the wind speed can be more severe as for a high wind event to be recorded, the wind has to be blowing 50mph or greater. The windstorm can cause damages to roofs, trees, power lines, basically anything that is left outside as any debris can be blown.

The damage that can occur is widespread, and can occur in both residential and commercial areas. It was estimated that 5% of the assessed values of residential and commercial structures might occur due to windstorm.

Sum of assessed residential of Eagle Grove = \$61,848,600
Sum of assessed commercial of Eagle Grove = \$8,548,700

Estimated residential damage due to Windstorm (3%) = \$1,855,458
Estimated commercial damage due to Windstorm (3%) = \$256,461
Total loss estimate of Windstorm = **\$2,111,919**

Potential Flooding Loss Estimate Calculation (see attached spatial extent map in Section 6)

FEMA recently did a flooding analysis for Wright County, which analyzed potential flood zones. This map was used to calculate any potential flooding from a water body source that could affect Eagle Grove. A map of the potential flooding analysis as well as the properties that could be impacted is attached in Appendix F.

The potential flooding that could occur in Eagle Grove would be primarily agricultural, but there were some properties that could be potentially suffer some damages that held residential and commercial structures. As with flash flooding, it was estimated that 20% of the assessed value of the buildings could be damaged. This estimate also includes any potential contents loss that could take place as well.

Total acres of Eagle Grove that would could potential be affected by the flooding (primarily agricultural) - 158 acres or 5% of Eagle Grove
Total sum of assessed value of residential structures in potential flood zone = \$4,245,700
Total sum of assessed value of commercial structures in potential flood zone = \$554,000

Estimated residential damage due to Flooding (20%) = \$849,140
Estimated commercial damage due to Flooding (20%) = \$110,800
Total loss estimate of potential Flooding in Eagle Grove = **\$959,940**

Grass & Wild-land fire Loss Estimate Calculation (see attached spatial extent map in Section 6)

A spatial analysis of Eagle Grove was done to look at all of the properties in Eagle Grove that is located next to agricultural land, and land that has lots of vegetation. It can be assumed that these properties in particular would have a greater potential of being affected by grass and wild-land fires since that are located in close proximity to land that can generate such events. Properties located in the center of town are surrounded by other homes and paved streets, which reduces the chance of such an event occurring there. As was described in the risk analysis results, the damages that would be incurred, if they are incurred at all, would be very

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minor. Thus, it was decided that the 2% of the assessed values of the potentially affected properties could possibly be damaged by grass and wild-land fires.

Sum of assessed residential of potential grass & wild-land fire affected properties in Eagle Grove = \$61,848,600

Sum of assessed commercial of potential grass & wild-land fire affected properties in Eagle Grove = \$8,548,700

Estimated residential damage due to grass & wild-land fires in Eagle Grove (2%) = \$195,446

Estimated commercial damage due to grass & wild-land fires in Eagle Grove (2%) = \$26,954

Total estimated damages due to grass & wild-land fires = **\$222,400**

HAZMAT Loss Estimate Calculation (see attached spatial extent map in Section 6)

The city of Eagle Grove has industrial fixed facilities that are located within the center of town that contain hazardous materials. These materials are safely contained and there haven't been any issues of accidental releases or spills of materials. However, to perform a loss estimate due to a hazardous materials event a spatial analysis was done to see what kind of damages could be incurred.

The hazardous materials that are stored at the industries located in Eagle Grove vary in physical state from liquid to gaseous. They also have different harmful effects from being flammable to poisonous. Therefore the damages that could occur in a hazardous materials event vary greatly. Some examples is that something could explode causing minor to major structural damage to buildings located within close proximity to the explosion. A release of anhydrous ammonia could cause injuries to those nearby to the release or even death.

To calculate the loss estimate due to a hazardous material event a buffer zone of a quarter mile was created around each property with an industrial use. The quarter mile was used as the buffer zone as it was estimated that this distance would contain the average area of the numerous amount of incidents that could occur. Once the buffer zone was established, it was estimated that 10% of the assessed structure value would be an appropriate amount to estimate the cost of damages.

Sum of assessed residential in potential hazmat zone (1/4 mile) in Eagle Grove = \$26,137,900

Sum of assessed commercial in potential hazmat zone (1/4 mile) in Eagle Grove = \$7,076,900

Estimated residential damages in potential zone due to hazmat in Eagle Grove (10%) = \$2,613,790

Estimated commercial damages in potential zone due to hazmat in Eagle Grove (10%) = \$707,690

Total estimated damages due to HAZMAT = **\$3,321,480**

Hailstorm Loss Estimate Calculation

A hailstorm is a widespread event that would have an effect on the entire city of Eagle Grove. However, the size of the hail can vary vastly between each event, ranging from pea to softball size hail. Even when the size of the hail has the potential of damaging either structures or above ground utilities, the damages incurred are not constant throughout the town. Instead of taking a percentage of the assessed value of the residential and commercial structures, it was decided to instead take the averages of all the hailstorm events recorded by the NCDC. That process is shown below:

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Size of Hail	Property Damage	Crop Damage
1.75 in	\$15,000	\$90,000
1.00 in	\$5,000	\$0
0.88 in	\$0	\$5,000
1.50 in	\$25,000	\$20,000
1.00 in	\$3,000	\$10,000
0.88 in	\$3,000	\$5,000
1.75 in	\$50,000	\$5,000
0.88 in	\$2,000	\$0
1.75 in	\$10,000	\$5,000
1.00 in	\$5,000	\$0

Total Property = \$118,000
 Total Crop = \$140,000
 Total Damages = \$258,000

Average Property = \$11,800
 Average Crop = \$14,000
 Average Total Damages = **\$25,800**

The following hazards cannot quite be quantified in monetary values as many of the following hazards don't directly cause structural or property damage. Instead a description of what could occur is given for each hazard.

Communication Failure Loss Estimate

Communications failure isn't going to cause any kind of structural damage or contents loss, so there really can't be any monetary value in damages that can be associated with it. However, in some situations communications failure can be the cause of loss of business, and in some cases, loss of life.

Widespread communications failure can cripple businesses that are dependent on constant communication, for example, businesses depend on the internet for servicing and communicating with customers. When this source of communication is lost or disabled for a short period of time that kind of business is unable to operate and begin to lose money

Communications failure also can cause injuries or loss of life. In such an event, emergency staff would not be able to communicate with one another, but even more importantly, citizens would not be able to contact emergency staff. Someone in need of immediate attention might not get it, or if they do, it might be too late. Constant communication allows for multiple branches of emergency staff to operate cohesively, and when this communication breaks down, so can the efficiency in how well emergency staff serves the community.

Extreme Heat Event Loss Estimate

Extreme heat might not cause any structural damages, or really any damages that are recorded, but it can cause health issues and can even cause some energy distribution issues.

The first concern in the event of extreme heat is making sure that everyone is able to keep cool. This is particularly important in the young and elderly populations of a community. If an individual is unable to keep cool they could possible suffer from heat exhaustion or heatstroke.

Heat exhaustion happens when a person's body gets too hot. The symptoms of heat exhaustion is feelings of weakness, dizziness, worried, headache, increased heart rate, dehydration, and little urine.

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Heatstroke also happens when a person's body gets too hot, or can occur after heat exhaustion. Heatstroke can cause people to have seizures, go into a coma, or even death.

Besides health issues, extreme heat can cause power outages by overheating power generators and shutting down power to homes. The potential for power outages further compounds the issue with staying cool, because if there is no electricity running to homes people are unable to run air-conditioning to keep cool.

Disease Loss Estimate

There aren't any structural, contents, or loss of function that can really be calculated for diseases. However, there are some diseases that can be more probably given certain conditions. Given the recent flooding, and some of the flooding and standing water problems that the city has experienced last summer, below are some diseases that clinicians look out for during flood conditions.

Leptospirosis – commonly presents with fever of sudden onset, headache, chills, and severe myalgia (especially in the calves and thighs). Cases can be confused with meningitis, encephalitis, or influenza. *Leptospira interrogans* can be found in the urine of cattle, pigs, horse, and other domestic and wild animals. Human infection occurs when contaminated water is ingested, aerosolized droplets are inhaled, or water enters the body through skin abrasions.

During flood clean up, people can be exposed to mud contaminated by the urine of animals infected with the spirochete *Leptospira interrogans*. Systemic illness occurs if the leptospiral bacteria enter the body through broken skin or mucous membranes.

West Nile fever and *encephalitis* is transmitted by the bite of an infected mosquito. Less than 1 percent of those bitten by infected mosquitoes become severely ill. Symptoms include high fever, stiff neck, or severe headache.

Another mosquito-borne illness is *LaCrosse encephalitis*. The majority of LaCrosse virus infections are sub-clinical or mild; but it can rarely cause severe illness such as encephalitis progressing to seizures and coma.

Another disease that has sprung up recently that has given the entire world a cause for concern is the H1N1 virus (swine flu) which has had cases that have popped up throughout the world. The reason why countries were/are tensed for the potential outbreak for the flu was the strain was new. No one has any immunity to the disease, so the potential for it to pass quickly to everyone is high.

According to the Centers for Disease Control and Prevention (CDC), in humans the symptoms of the 2009 "swine flu" H1N1 virus are similar to those of influenza and of influenza-like illness in general. Symptoms include fever, cough, sore throat, body aches, headache, chills and fatigue. The 2009 outbreak has shown an increase percentage of patients reporting diarrhea and vomiting. The 2009 H1N1 virus is not zoonotic swine flu, as it is not transmitted from pigs to humans, but from person to person.

Because these symptoms are not specific to swine flu, a differential diagnosis of probable swine flu requires not only symptoms but also a high likelihood of swine flu due to the person's recent history. For example, during the 2009 swine flu outbreak in the United States, CDC advised physicians to "consider sine influenz infection in the differential diagnosis of patients with acute febrile respiratory illness who have either been in contact with persons with confirmed swine flu, or who were in one of the five U.S. states that have reported swine flu

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cases or in Mexico during the 7 days preceding their illness onset.” A diagnosis of confirmed swine flu requires laboratory testing of a respiratory sample.

Watershed Pollution Loss Estimate

Watershed pollution doesn't cause structural loss, contents loss, or loss of function. Instead, research was done to see what some of the damages that have been caused by pollutants to the watershed. There are three identified waters by the Environmental Protection Agency that are impaired nearby the city of Eagle Grove.

Buttermilk Creek – 5.8 miles

Lake Cornelia – 19.7 miles

Lyons Creek – 19.4 miles

Lake Cornelia suffers from suspended soils. Suspended soils are caused by a combination of runoff and soil erosion. This occurs naturally, but can be intensified and accelerated by poor farming practices.

Lyons Creek has biological impairment. Biological impairment can range from fallen branches, trees, uprooted bushes, etc. These biological debris can gather and impair the flow of the creek, forming a natural dam, which can cause further flooding and change how the creek acts.

Buttermilk Creek has organic enrichment. Organic enrichment of a creek can occur when fertilizers, and or manure, are either introduced into the creek through runoff or when there is an accidental spill into the stream. Organic enrichment can cause great harm to the native wildlife in that stream, and depending on the amount of organic enrichment, it can be fatal.

Structural Failure Loss Estimate

Structural failure can occur as a result of any number of reasons, but the result is almost always the same, in that structural failure will make a home or condo uninhabitable, as the walls and/or foundation of a home need to be devoid of structural failure in order to meet safety code standards. Because there was only one incident in Eagle Grove that happened more than 10 years ago, it was hard to gather information on how much that structure was worth at the time. So below are the descriptions of different kinds to structural failure that could occur

Structural Damage: Wood Rot

Wood rot and structural damage are inter-related issues, as wood rot in the lumber used to build your home or condo will lead to structural damage that can make your home uninhabitable. Wood rot and structural damage can also cause walls and frames to collapse, which will almost always cause serious injuries.

Collapse

Any undiscovered problems such as those described above could result in collapse of not only walls but the entire structure. Obviously, if your walls or entire structure collapse, your home is uninhabitable, and immediate action needs to be taken.

Often times, the appearance of one problem in a home signifies the existence of another that could be much more serious. If you've suffered damage as a result of a construction defect, contact an attorney immediately to protect your rights.

Partial or Total Collapse of the Framing System

There is no mistaking or overlooking a partial or total collapse of the framing system in your home. A partial collapse of the framing system almost immediately makes your home or condo

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unlivable, and if you're in the wrong place at the wrong time, you could be seriously injured as a result.

Soil/Pavement Buckling in Front of a Wall

Soil/pavement buckling in front of a wall could also be due to several causes. If you notice soil/pavement buckling in front of a wall, it could be fault craftsmanship in building the wall itself, subgrade problems or any number of other issues that were not handled properly by the contractor.

System Failure

System failure is a term that can involve several construction defects. A home could suffer from electrical system failure, septic system failure or many other system failures that teach will make a home uninhabitable and could lead to injuries or health problems. If you notice a system failure, you need to take action immediately.

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Project	STAPLEE Results
Reconstruct / repair / redirect DD 94	17
Reconstruct / repair DD 15/15A	17
Separating storm & sanitary sewer, eliminating connections	19
Identify, pinpoint, and fix I/I sources	17
Pursue ordinance to address inflow / outflow	18
Continue all mitigation activities / ordinances	14
Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance	15
Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.	18
Portable generator(s) for lift stations	17
Development of a response & evacuation plan	15
Educational assistance to homeowners to prevent / mitigate flooded basements	18
Create wellhead protection programs	13
Continue monitoring current industrial discharges and consider ordinance to address future industrial discharge scenarios	13
Establish ordinance to bury power lines in future development	6
Tornado shelter	14
Emergency shelter	10
Promotion and disposing safely of hazardous chemicals and toxic waste	13

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Equipment purchases, and training, to deal with hazardous materials for Fire Department	15
Purchasing radios (radio system) for all government positions	14

These results were then used as a basis to further determine the prioritization of the hazard mitigation actions.

The second stage of the prioritization process was to then to look at the results of the STAPLEE analysis and decide which actions would have the highest priority due to the need of the community and the feasibility for the action could be completed.

The Eagle Grove Hazard Mitigation Committee was then presented with the results of the STAPLEE analysis. They then took that information, and looking at all of the presented hazard mitigation actions, and went through and decided how long they thought each project might realistically be started, and which projects were really a priority for the city of Eagle Grove.

The level of priority was determined by the urgency of the city to complete the project. Priority I projects were projects that would be started and/or completed within 1 year of the plan being adopted by the city. Priority II projects were actions that would be started and/or completed within 2-4 years of the plan being adopted by the city. Priority III projects were actions that would be started and/or completed within 5 or more years of the plan being adopted by the city. The list of the hazard mitigation actions along with their final priority determinations is shown below:

City Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: To reduce or eliminate injury and property damage due to the natural hazards that afflicts the City of Eagle Grove. (Flash Flooding, Severe Thunderstorms and Lightning, High Wind Events, Winter Storms, Hailstorms, Tornadoes, Extreme Heat Events and Wild & Grass Fires)

Objective 1.1 Flash Flooding

Mitigation Actions

- 1.1.1 Reconstruct/repair/redirect DD 94
- 1.1.2 Reconstruct/repair DD 15/15A
- 1.1.3 Separate storm & sanitary sewer, eliminating connections
- 1.1.4 Identify, pinpoint, and fix I/I sources
- 1.1.5 Pursue ordinance to address inflow/outflow
- 1.1.6 Portable generator(s) for lift stations
- 1.1.7 Educational assistance to homeowners to prevent/mitigate flooded basements
- 1.1.8 Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance

Objective 1.2 Severe Thunderstorms and Lightning

Mitigation Actions

- 1.2.1 Continue all mitigation activities/ordinances
- 1.2.2 Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.
- 1.2.3 Portable generator(s) for lift stations
- 1.2.4 Tornado shelter
- 1.2.5 Emergency shelter

Objective 1.3 High Wind Events

Mitigation Actions

- 1.3.1 Continue all mitigation activities/ordinances

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- 1.3.2 Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.
- 1.3.3 Portable generator(s) for lift stations
- 1.3.4 Establish ordinance to bury power lines in future development

Objective 1.4 Winter Storms

Mitigation Actions

- 1.4.1 Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.
- 1.4.2 Establish ordinance to bury power lines in future development
- 1.4.3 Emergency shelter

Objective 1.5 Hailstorms

Mitigation Actions

- 1.5.1 Tornado shelter
- 1.5.2 Emergency shelter

Objective 1.6 Tornadoes

Mitigation Actions

- 1.6.1 Continue all mitigation activities/ordinances
- 1.6.2 Development of a response & evacuation plan
- 1.6.3 Establish ordinance to bury power lines in future development
- 1.6.4 Tornado shelter
- 1.6.5 Emergency shelter

Objective 1.7 Extreme Heat Events

Mitigation Actions

- 1.7.1 Emergency shelter

Objective 1.8 Wild & Grass Fire

Mitigation Actions

- 1.8.1 Continue all mitigation activities/ordinances

Goal 2: *To reduce or eliminate injury and property damage due to man-made hazards that could affect the City of Eagle Grove (Energy Disruptions, HAZMAT, Communications Failure, Disease, and Watershed Pollution)*

Objective 2.1 Energy Disruptions

Mitigation Actions

- 2.1.1 Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.
- 2.1.2 Portable generator(s) for lift stations
- 2.1.3 Development of a response & evacuation plan
- 2.1.4 Establish ordinance to bury power lines in future development

Objective 2.2 HAZMAT

Mitigation Actions

- 2.2.1 Development of a response & evacuation plan
- 2.2.2 Equipment purchases, and training, to deal with hazardous materials for Fire Department

Objective 2.3 Communications Failure

Mitigation Actions

- 2.3.1 Purchasing radios (radio system) for all government positions

Objective 2.4 Disease

Mitigation Actions

- 2.4.1 Separating storm & sanitary sewer, eliminating connections

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- 2.4.2 Identify, pinpoint, and fix I/I sources
- 2.4.3 Continue all mitigation activities/ordinances
- 2.4.4 Portable generator(s) for lift stations
- 2.4.5 Educational assistance to homeowners to prevent/mitigate flooded basements
- 2.4.6 Create wellhead protection programs
- 2.4.7 Continue monitoring current industrial discharges and consider ordinances to address future industrial discharge scenarios
- 2.4.8 Promotion and disposing safely of hazardous chemicals and toxic waste

Objective 2.5 Watershed Pollution

Mitigation Actions

- 2.5.1 Separating storm & sanitary sewer, eliminating connections
- 2.5.2 Create wellhead protection programs
- 2.5.3 Continue monitoring current industrial discharges and consider ordinances to address future industrial discharge scenarios
- 2.5.4 Promotion and disposing safely of hazardous chemicals and toxic waste

Objective 2.6 Structural Failure

Mitigation Actions

- 2.6.1 Continue all mitigation activities/ordinances

Section 4: Action Plan

Reconstruct/repair/redirect DD 94	
Description	This action is to reconstruct/repair/redirect DD 94 to reduce the amount of flash flooding that occurs within town.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	City of Eagle Grove: Public Works, City Administrator
Estimated Cost	High
Potential Funding Source	Local Options Sale Tax, Bonds, State and Federal Grants
Mitigation Measure Category	Structural
Target Completion Date	2014

Reconstruct/repair DD 15/15A	
Description	This action is to reconstruct/repair DD 15/15A to reduce the amount of flash flooding that occurs within town.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	City of Eagle Grove: Public Works, City Administrator
Estimated Cost	High
Potential Funding Source	Local Option Sale Tax, Bonds, State and Federal Grants
Mitigation Measure Category	Structural
Target Completion Date	2016

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Separating storm & sanitary sewer, eliminating connections	
Description	Currently there are portions of the storm and sanitary sewer which is thought might be connected. This could be why the sanitary sewer to backup into people's basements when there is a large amount of rainfall in a short period of time. Separating them would reduce or eliminate this from happening.
Hazards Addressed	Flash Flooding, Disease, Watershed Pollution
Priority	I
Responsible Dept./Party	City of Eagle Grove: Public Works, City Administrator
Estimated Cost	Minimal
Potential Funding Source	Local Option Sale Tax, Bonds, State and Federal Grants
Mitigation Measure Category	Structural
Target Completion Date	Ongoing

Identify, pinpoint, and fix I/I sources	
Description	This action pinpoints all of the inflow and infiltration of water into the tile system and its effect on the storm sewer. Knowing where all of these sources are throughout town, project could then be developed to reduce flash flooding and sewer backups.
Hazards Addressed	Flash Flooding, Disease
Priority	I
Responsible Dept./Party	City of Eagle Grove: Public Works
Estimated Cost	Minimal
Potential Funding Source	Local Option Sale Tax, Bonds, State and Federal Grants
Mitigation Measure Category	Prevention
Target Completion Date	Ongoing

Enforce ordinance addressing inflow/outflow	
Description	Enforce the inflow/outflow ordinance which addresses the inflow/outflow of water into the storm sewer system.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	City of Eagle Grove: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund
Mitigation Measure Category	Prevention
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Continue all mitigation activities/ordinances	
Description	Continue all mitigation activities/ordinances, which are identified as follows: sky warn, tree ordinance, danger building ordinance, grass ordinance, open burning ordinance, junk ordinance, burn barrels, junk & garbage removal, and mosquito spraying.
Hazards Addressed	Severe Thunderstorm and Lightning, High Winds, Tornadoes, Structural Failure, Grass & Wild Fires, Disease
Priority	I
Responsible Dept./Party	City of Eagle Grove: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund, Local, State and Federal Grants
Mitigation Measure Category	Prevention, Public Education and Awareness
Target Completion Date	Ongoing

Continue participating in the NFIP, and continue to update and enforce the floodplain ordinance	
Description	The City of Eagle Grove will continue participating in the NFIP, and will continue to update and enforce their floodplain ordinance.
Hazards Addressed	Flash Flooding
Priority	I
Responsible Dept./Party	City of Eagle Grove: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund, Local, State and Federal Grants
Mitigation Measure Category	Prevention Action
Target Completion Date	Ongoing

Install a fixed generator for City Hall, EMS, Fire Dept., and Street Dept.	
Description	City Hall, EMS, Fire Dept. and the Street Dept. all provide vital services to the city of Eagle Grove. In the event of a city-wide power outage, their services could be hampered by the loss of electricity, especially for a long period of time. A fixed generator would allow the services that these departments provide to continue even in the event of an energy disruption.
Hazards Addressed	Energy Disruption, Severe Thunderstorm and Lightning, High Winds, Winter Storm
Priority	II
Responsible Dept./Party	City of Eagle Grove: City Administrator
Estimated Cost	Moderate
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2016

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Portable generator(s) for lift stations	
Description	In the event of an energy disruption, portable generators could be used to power lift stations to reduce flash flooding and sewer backups.
Hazards Addressed	Energy Disruption, Severe Thunderstorm and Lightning, High Winds, Flash Flooding, Disease
Priority	II
Responsible Dept./Party	City of Eagle Grove: City Administrator
Estimated Cost	Low
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2015

Development of a response & evacuation plan	
Description	Eagle Grove does not currently have a comprehensive response or evacuation plan. Having one would help to make the evacuation of the city or the response to a hazard/disaster organized and effective.
Hazards Addressed	Energy Disruption, Tornadoes, HAZMAT
Priority	II
Responsible Dept./Party	City of Eagle Grove: All Departments
Estimated Cost	Minimal
Potential Funding Source	City General Fund, Local, State and Federal Grants
Mitigation Measure Category	Prevention
Target Completion Date	2014

Educational assistance to homeowners to prevent/mitigate flooded basements	
Description	Educational assistance to homeowners would help to reduce the amount of damages due to flooded basements and how to properly clean up after an event.
Hazards Addressed	Flash Flooding, Disease
Priority	II
Responsible Dept./Party	City of Eagle Grove: All Departments
Estimated Cost	Minimal
Potential Funding Source	City General Fund, Local, State, and Federal Grants
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Create wellhead protection programs	
Description	Wellhead protection programs are programs to prevent contaminants from entering public drinking water sources.
Hazards Addressed	Watershed Pollution, Disease
Priority	II
Responsible Dept./Party	City of Eagle Grove: Water Department
Estimated Cost	Minimal
Potential Funding Source	Water Rates
Mitigation Measure Category	Natural Resources Protection
Target Completion Date	2014

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Continue monitoring current industrial discharges and consider ordinance to address future industrial discharge scenarios	
Description	Maintain monitoring of current industrial discharges. In the event that future industries come to Eagle Grove, this would allow the city to monitor industrial discharge to make sure that there aren't any pollutants entering the watershed.
Hazards Addressed	Watershed Pollution, Disease
Priority	II
Responsible Dept./Party	City of Eagle Grove: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund
Mitigation Measure Category	Natural Resources Protection
Target Completion Date	Ongoing

Establish ordinance to bury power lines in future development	
Description	For future development, this ordinance would require developers to bury the power lines underground to greatly reduce the probability of power loss in that area due to ice, tree debris, and high winds.
Hazards Addressed	Energy Disruption, Tornadoes, Winter Storm, High Winds
Priority	II
Responsible Dept./Party	City of Eagle Grove: City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund
Mitigation Measure Category	Prevention
Target Completion Date	2015

Tornado shelter	
Description	This action is to build a FEMA approved tornado shelter, which is a building that is designed to withstand 250mph winds and debris projectiles.
Hazards Addressed	Tornadoes, Hailstorm, Severe Thunderstorm and Lightning
Priority	III
Responsible Dept./Party	City of Eagle Grove: City Administrator, Parks and Recreation Board
Estimated Cost	High
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Structural
Target Completion Date	2018

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Emergency shelter	
Description	This action is to designate emergency shelters for people to take refuge in the event of a power outage, extreme temperatures, and hazardous weather.
Hazards Addressed	Tornadoes, Winter Storm, Severe Thunderstorm and Lightning, Hailstorm, Extreme Heat Event
Priority	III
Responsible Dept./Party	City of Eagle Grove: City Administrator, Parks and Recreation Board
Estimated Cost	Low
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Structural
Target Completion Date	2018

Promotion and disposing safely of hazardous chemicals and toxic waste	
Description	This action would be a program to promote and dispose safely of hazardous chemicals, such as paint, and toxic waste
Hazards Addressed	Disease, Watershed Pollution
Priority	III
Responsible Dept./Party	City of Eagle Grove: All Departments
Estimated Cost	Minimal
Potential Funding Source	City Funds, Local, State, and Federal Grants
Mitigation Measure Category	Public Education and Awareness
Target Completion Date	Ongoing

Equipment purchases, and training, to deal with hazardous materials for Fire Department	
Description	This action is to continue the training of the fire department to deal with hazardous materials as well as purchase equipment for the fire department so that they could be the first responders to a hazmat and safely handle the situation.
Hazards Addressed	HAZMAT
Priority	III
Responsible Dept./Party	City of Eagle Grove: Fire Department, City Administrator
Estimated Cost	Low
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Prevention, Emergency Services Protection
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

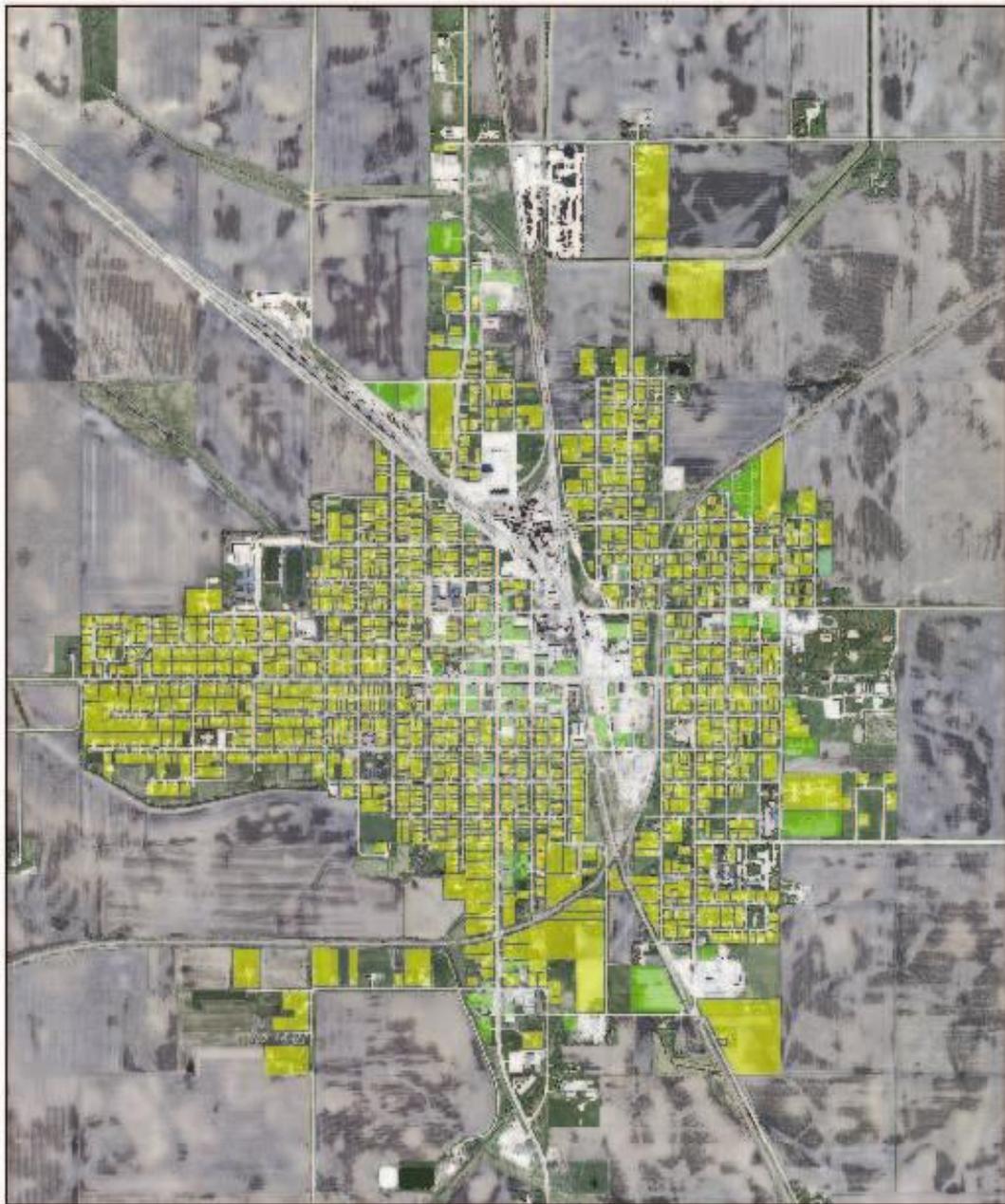
Purchasing radios (radio system) for all government positions	
Description	This action is to purchase radios for all government positions to increase communication and efficiency.
Hazards Addressed	Communications Failure
Priority	III
Responsible Dept./Party	City of Eagle Grove: City Administrator
Estimated Cost	Low
Potential Funding Source	Bonds, State and Federal Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2018

Section 5: Critical Facilities

- Eagle Grove City Hall
- Eagle Grove memorial hall
- Eagle Grove Fire Station
- Eagle Grove Police Dept
- Eagle Grove Memorial Library
- Ambulance Shed
- Eagle Grove Water Treatment Plant
- Lift Station
- Eagle Grove Streets Department

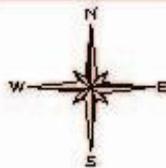
Section 6: Community Maps

Assessed Residential and Commercial Properties



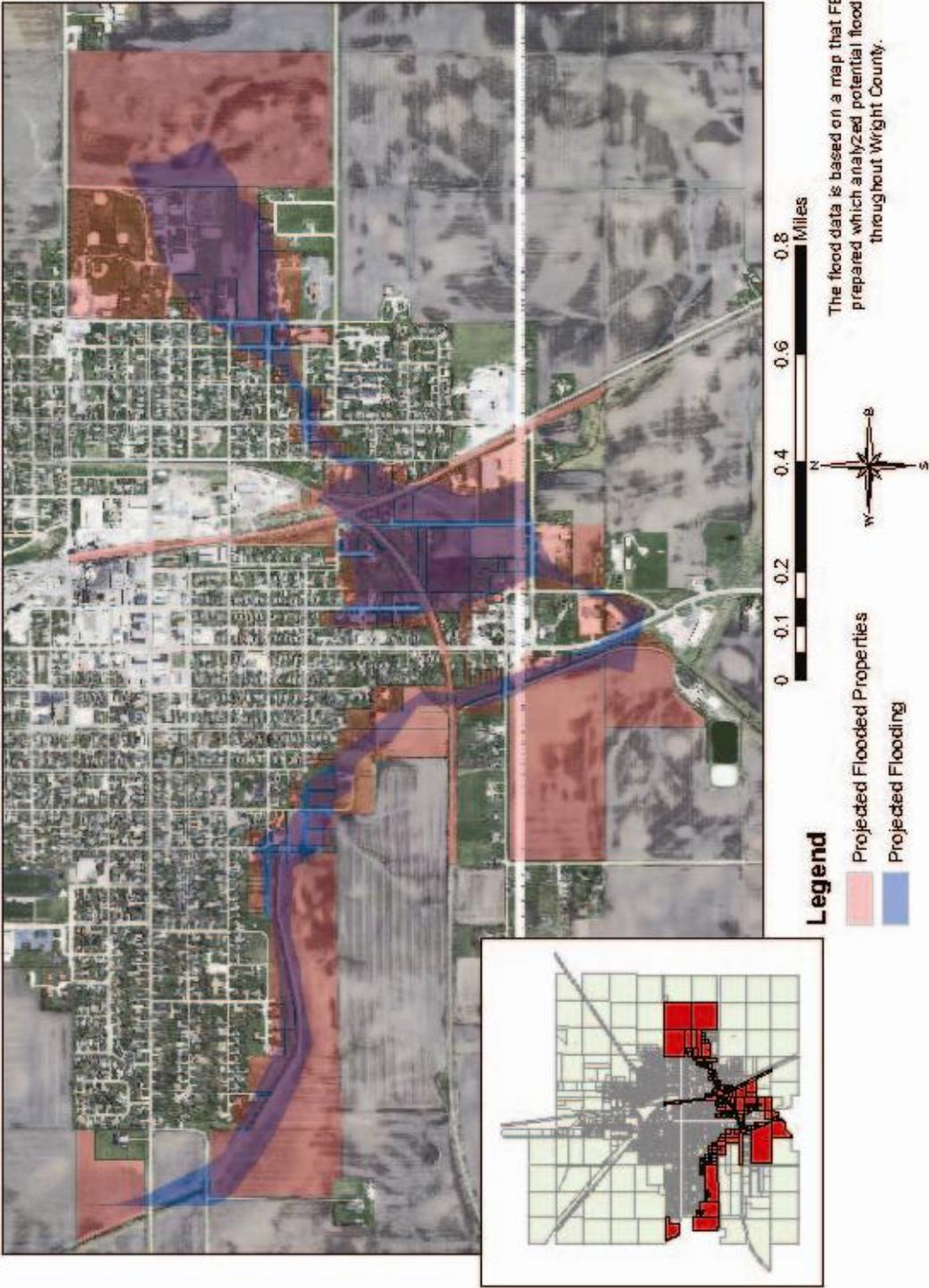
Legend

-  Residential
-  Commercial
-  Both Residential & Commercial



The assessed values of residential and commercial structures, which shown, were used in the loss estimates for: Flash Flooding, Severe Thunderstorm and Lightning, High Winter Storms, and Tornadoes

Projected Flooded Properties of Eagle Grove



Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgr?KEY=49907797&IPT=1

Intranetix Viewer [19197C0220C.png]

The screenshot displays the FEMA Intranetix Viewer interface. At the top left is the FEMA logo. Below it is a help menu with icons for 'Help', 'Zoom In', 'Zoom Out', '1:1', and 'Make a FIRette'. To the right of the help menu is a scale bar showing 'Scale: 4 %'. The main area is a map of Wright County, Missouri, with various flood zones highlighted in blue and green. A legend on the right side of the map provides details for the different flood zones, including 'Special Flood Hazard Area (SFHA) - 1% Annual Chance Flood', 'SFHA - 1% Annual Chance Flood', 'SFHA - 1% Annual Chance Flood', and 'SFHA - 1% Annual Chance Flood'. The map also shows a grid of latitude and longitude coordinates.

12/20/2012 6:39 PM

1 of 2

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49974963&IFTI=]

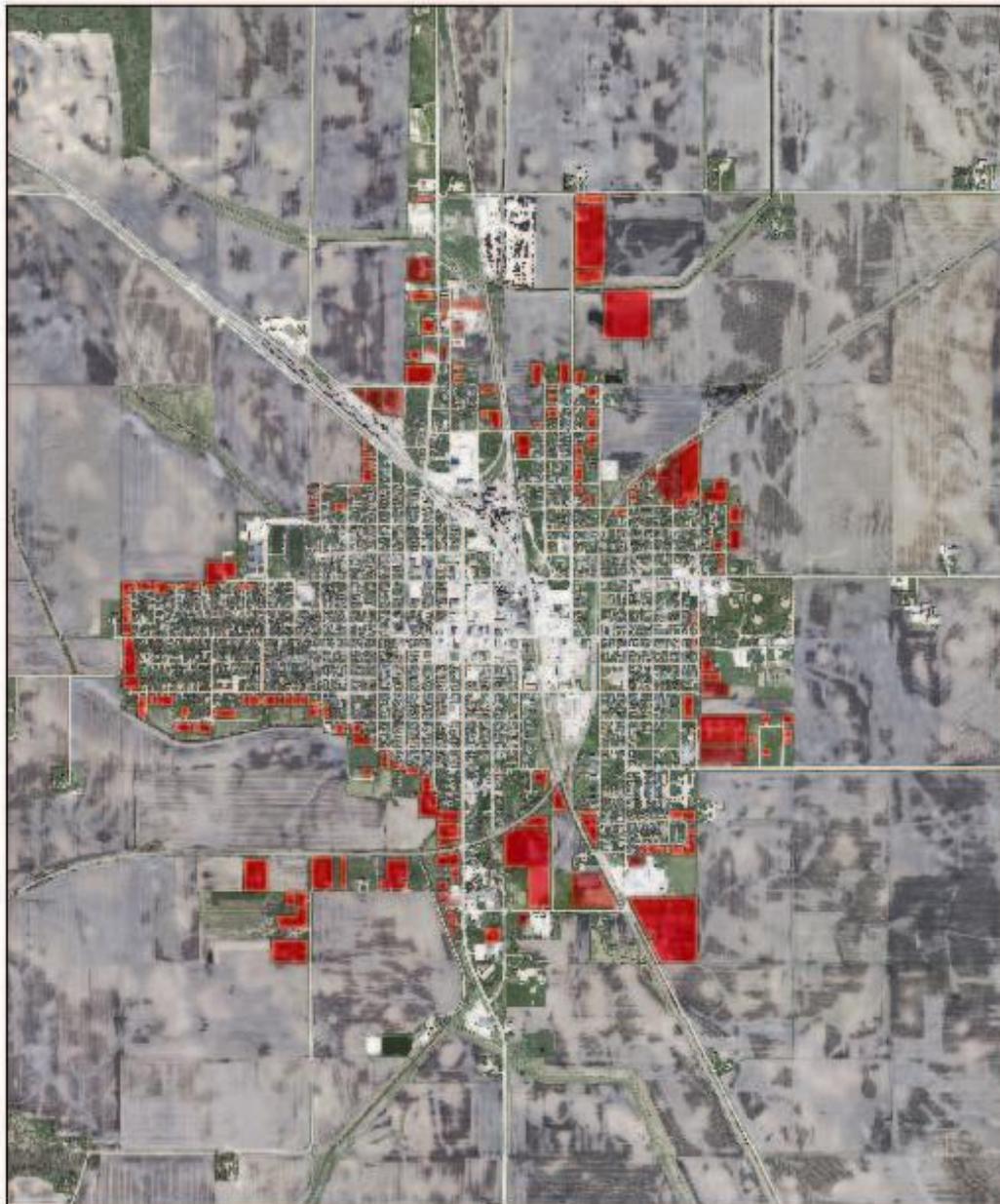
Intranetix Viewer [19197C0210C.png]

The screenshot displays the FEMA Intranetix Viewer interface. At the top left is the FEMA logo. Below it are navigation controls: a 'Help' button with a question mark, a 'Pan' button with a hand icon, and zoom controls including 'Zoom In', 'Zoom Out', '1:1', and 'MAX'. A scale bar shows 'Scale: 4 %'. The main map area shows an aerial view of a rural area with blue and green overlays representing hazard mitigation zones. A legend on the right side of the map lists various categories and their corresponding colors. At the bottom right, there is a 'Make a FIRLetter' button.

12/20/2012 6:40 PM

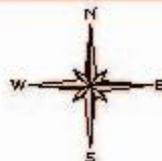
1 of 2

Potential Properties Affected by Grass & Wild Fires



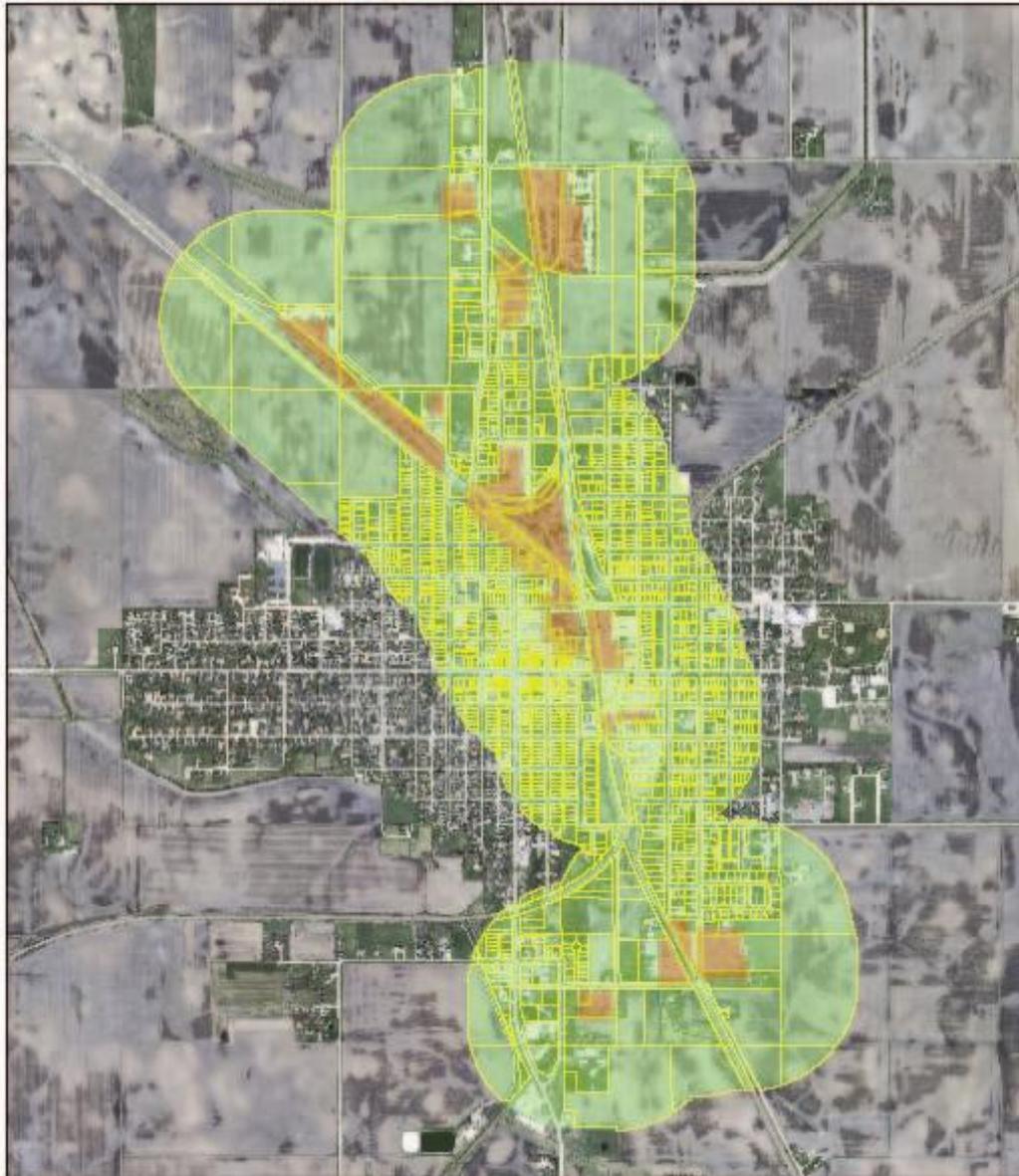
Legend

- Commercial selection
- Residential selection



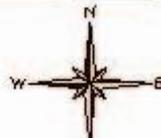
The assessed values of reside and commercial structures, which shown, were used in the loss est for: Grass & Wild Fires

Potential 1/4 Mile Hazard Zone & Potential Affected Properties



Legend

-  Potentially affected properties
-  1/4 mile hazard zone
-  Industry



The assessed values of residential and commercial structures, where shown, were used in the loss assessment for: HAZMAT

Section 7: Hazard Mitigation Committee Meeting Minutes

First Hazard Mitigation Meeting, October 2, 2008

Attended by: Jeff Clabaugh, Curtis Nesvold, Jeff Denclan, Jordan Fuller, Gary Schultz, Jim Christ, Brian Kelley, Paul Kuenning, Robert Lunda, Mitch Kirkland, Ketzrv Amonson, Mike Kruger, and Tom Anderson

Meeting started at 2:00 pm

- Everyone introduced themselves
- Shirley explained what a hazard mitigation plan is
 - Explained the process of how a mitigation plan is formed
 - Explained the purpose of the committee
 - Explained how hazard mitigation plans are comprehensive and every potential hazard will be looked at
 - Talked about the implementation of the strategy
- Explained the function of the committee
- Talked about how Eagle Grove is on the fast track, and that the plan needs to be done in a year
 - Discussed the timeline for Eagle Grove
 - Discussed that you need a hazard mitigation plan to be able to apply for funds
- Explained how soft-match works
- Discussed what hazard assessment consists of and what the committee will be doing to contribute to that process
 - Talked about the reported hazard date and who collected that data
 - Talked about what information and data the committee will get, what will be provided, and exactly what the committee will be doing
- The committee decided on what days to meet
 - The Hazard Mitigation Committee will meet every second Thursday, once a month, at 2pm.
 - Decided that generally meetings will be held for 2 hours
- The next Hazard Mitigation Committee will be on October 9th, at 2pm.

Meeting ended at 3:00 pm

Second Hazard Mitigation Meeting, October 9, 2008

Meeting attended by: Nathan Brockman, Jordan Fuller, Mike Kruger, Jeff Denclan, Jim Christ, and Paul Kuenning.

Meeting started at 2:10 pm

- We identified critical facilities throughout Eagle Grove.
 - General business area
 - Ammonia tanks
 - All Lift stations
 - Gold Eagle and AGP locations, big open spot in the middle for AGP
 - Identifying support buildings and potential hazards
 - Senior center and assisted living buildings
 - All the churches
 - Municipal airport
 - Fall-out shelters? School, church, assisted living?
 - Egg places, hatcheries outside of town
 - Wells

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- The committee then went over each listed hazard and talked about how that hazard has affected the City of Eagle Grove in the past
 - Which parts of the city are affected
 - Whether or not utilities are lost
 - The extent of damage that has been caused in the past
 - If a particular event didn't happen, we identified how that event might affect Eagle Grove

Meeting ended at 3:25 pm

Third Hazard Mitigation Meeting, November 13, 2008

Meeting attended by: Ray Kellogg, Jordan Fuller, Tom Anderson, Curtis Nesvold, Jeff Deucklan, Mitch Kirkland, Jim Christ, and Robert Lunda.

Meeting started at 2:05

- The committee went through and did a risk analysis for each hazard
- The following are the results of the risk analysis:
 1. Severe Thunderstorm and Lightning.....29pts
 2. High Wind Event.....28pts
 3. Flash Flooding.....27pts
 4. Hailstorm.....26pts
 5. Winter Storm.....24pts
 6. Transportation – HAZMAT.....24pts
 7. Tornado.....22pts
 8. Extreme Heat Event.....22pts
 9. Fixed Facility – HAZMAT.....22pts
 10. Terrorism.....18pts
 11. Disease.....18pts
 12. Watershed Pollution.....17pts
 13. Energy Disruption.....16pts
 14. Structural Fire.....15pts
 15. Structural Failure.....15pts
 16. Pipeline Incident.....14pts
 17. Earthquake.....14pts
 18. Transportation Event.....12pts
 19. Wild & Grass Fire.....10pts
 20. Communications Failure.....10pts
 21. Violent Demonstration.....10pts
 22. Air Transportation Event.....10pts
 23. Drought.....8pts

According to the list above, the top 5 hazards are:

1. Severe Thunderstorm and Lightning
2. High Wind Event
3. Flash Flooding
4. Hailstorm
5. Winter Storm

Meeting ended at 3:33 pm

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Fourth Hazard Mitigation Meeting, December 11, 2008

Meeting attended by: Ray Kellogg, Clay Hansen, Jordan Fuller, Curtis Nesvold, Bryan Baker, Matt Hill, Robert Lunda, and Mitch Kirkland

Meeting started at 2:05

- Reviewed Eagle Grove's Risk Analysis Results and determined that there were a several hazards that the committee decided to revisit. The hazards that the committee decided to revisit are listed below:
 - Flash Flooding = changed composite score from 27 to 29
 - Winter Storm = changed composite score from 24 to 26
 - Energy Disruption = changed composite score from 16 to 26
 - Communications Failure = changed composite score from 10 to 23
- Explained that we are currently in the process of doing loss estimations and need some more information including contents value of government buildings as well as contents of major companies like Gold Eagle Coop.
- Discussed what goals and objectives are and gave some examples from other plans.
- Listed mitigation projects that would help alleviate some of the problems that Eagle Grove
- Next meeting, will review mitigation projects and then start coming up with objectives.

Meeting ended at 4:15 pm

Fifth Hazard Mitigation Meeting, February 12, 2009

Meeting attended by: Curtis Nesvold, Jordan Fuller, Tom Anderson, Bryan Baker, Matt Hill, Carl Steil, and Karry Amonson.

Meeting started at 2:00

- Explained how FEMA changed requirements
- Decided to concentrate on all the natural hazards that affect Eagle Grove as well as the serious man-made hazards that could have an affect
- Added to the list of hazard mitigation actions for each hazard.
- Below is the current list of all the hazard mitigation actions that the hazard mitigation committee has identified so far:

Flash Flooding Mitigation projects

- Identify I/I sources, pinpointing
- Redirect DD 94
- Separating storm/sanitary sewer
 - Eliminating connections
- Improve sanitary sewer
- Pursue ordinance to address inflow/outflow
- Educational assistance to homeowners to prevent/mitigate flooded basements

Energy Disruption Mitigation projects

- Generators – replacing and/or repairing both at water and sanitary plants
- Portable generators
 - Lift stations
 - City hall
 - Shelters

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Small generators
 - Cell phone/radio chargers
- Response plan
 - Evacuation plan
- Public education for what to do in a energy disruption
- Pursue agreement (research possibility) with AGP/Mid American to connect government buildings in the event of a power outage
- Bury power lines

Communications Failure

- Purchasing radios (radio system) for all government positions
- Improve or update warning sirens
 - Get them to on to the same frequency as the rest of the county so that they can be set off by the county via radio
- Encouraging residents to purchase own NOAA radios
- Bury power lines

Tornadoes

- Educational program for both residents and visitors
- Tornado/emergency shelter or appointing tornado/public shelters
 - Upgrade or install tornado shelters in parks and residential areas
 - Enter agreements/memorandum for shelter access
 - Armory
 - Churches
 - Etc.
- Evacuation plan
- Additional tornado sirens
- Bury power lines

Hazmat

- Equipment purchase to deal with hazardous materials for EMS/Fire department

Transportation

- Study to research feasibility of an overpass
 - Across railroads on 2nd street

Winter Storm

- New plows for clearing snow
- Emergency/tornado shelter
- Bury power lines

Severe Thunderstorm and Lightning

- Surge protection of building
- Shelter(s) houses designated
- Maintain proper sky warn up & running
- Bury power lives during new development
- Emergency power generators

High Wind Event

- Bury power lines
- Maintain tree ordinance
- Emergency power generators

Hailstorms

- Emergency shelter/tornado shelter
- Public awareness

Extreme Heat Events

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- Emergency shelter/tornado shelter

Disease

- Give city employees flu shots (or any other shots)
- Promote immunizations to the public
- Emergency generators/backup generators
- Separation of storm/sanitary sewers
- Fixing I/I, separating of lines
- Junk & garbage removal
- Mosquito spraying
- Disposing of hazardous & toxic waste

Watershed Pollution

- Separation of storm & sanitary sewer lines
- Monitor industrious discharge (consider ordinance)
- Promote disposal of hazardous chemicals (old paint/chemicals)
- Wellhead protection programs

Structural Failure

- Maintain & enforce dangerous building ordinance
- Maintain bridges in town

Pipeline Incident

- Encourage MidAmerican to maintain protection of their pipelines (waste water, chambers, library)
- One call, public awareness
- Promote calling in before digging

Wild & Grass Fire

- Maintain grass ordinance
- Maintain open burning ordinance
- Maintain junk ordinance
- Burn barrels

Meeting ended at 3:05 pm

Sixth Hazard Mitigation Meeting, March 12, 2009

Meeting attended by: Jim Lester, Jordan Fuller, Curtis Nesvold, Matt Hill, Robert Lunda.

Meeting started at 2:00

- Started the STAPLEE analysis
- Evaluated the mitigation actions for Flash Flooding, Energy Disruption, Communication Failure, and Tornadoes except for the Cost of Action and Effect on HAZMAT/Waste Categories (waiting to hear back from someone from AGP or Gold Eagle Coop)
- Would communicate with FEMA to provide further clarification on some of the rating criteria.
- The STAPLEE analysis will be finished by Jordan Fuller and faxed upon completion

Meeting ended at 4:00 pm

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Seventh Hazard Mitigation Meeting, April 30, 2009

Meeting attended by: Ray Kellogg, Curtis Nesvold, Bob Johannsen, Clay Hansen, Robert Lunda, Jordan Fuller, Jim Christ, and Jeff Clabaugh

Meeting started at 12:00

- Reviewed Loss Estimates that had been calculated so far
- Reviewed and prioritized mitigation actions with considering the STAPLEE analysis and the realism of which actions will be completed

Priority I: Mitigation actions that will be started/done in 1 year

Priority II: Mitigation actions that will be started/done in 2-3 years

Priority III: Mitigation actions that will be started/done in 5+ years

Priority I Actions:

- Separating storm & sanitary sewer, eliminating connections
- Improve sanitary sewer
- Pursue ordinance to address inflow/outflow
- Identify and pinpoint I/I sources
- Reconstruct/repair/redirect DD 94
- Reconstruct/repair DD 15/15A
- Continue all mitigation ordinances

Priority II Actions:

- Educational assistance to homeowners to prevent/mitigate flooded basements
- Fixed generator for City Hall, EMS, Fire Dept., and Street Department
- Generators – replace and/or repair both at water and sanitary plants
- Portable generator(s) for lift stations
- Improve or update warning sirens (getting them on the same frequency to be set off by radio)
- Development of a response & evacuation plan
- Additional tornado sirens
- Create ordinance to monitor industrious discharge
- Create wellhead protection programs
- Establish ordinance to bury power lines in future development

Priority III Actions:

- Equipment purchases, and training, to deal with hazardous materials for Fire Department
- Purchasing radios (radio system) for all government positions
- Tornado shelter
- Promotion and disposing safely of hazardous chemicals and toxic waste
- Emergency shelter

Meeting ended at 1:20 pm

Eighth Hazard Mitigation Meeting, May 14, 2009

Meeting attended by: Matt Hill, Jim Christ, Curtis Nesvold, Clay Hansen, Ray Kellogg, Jordan Fuller, Bryan Baker, Mitch Kirkland, Robert Lunda, Bob Johannsen, and Tom Anderson

Meeting started at 12:00

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Identified responsible department(s)/party(s) to implement the mitigation actions, as well as identified target completion date (the year that the action is estimated to be completed)

Mitigation Action	Responsible Department	Estimated Completion Year
Separating storm & sanitary sewer, eliminating connections	City of Eagle Grove: Public Works and City Administrator	Ongoing
Improve sanitary sewer	City of Eagle Grove: Public Works	Ongoing
Pursue ordinance to address inflow/outflow	City of Eagle Grove: City Council	2009, Ongoing
Identify and pinpoint I/I sources	City of Eagle Grove: Public Works	Ongoing
Reconstruct/repair/redirect DD 94	City of Eagle Grove: Public Works and City Administrator	2011
Reconstruct/repair DD 15/15A	City of Eagle Grove: Public Works and City Administrator	2011
Continue all mitigation ordinances	City of Eagle Grove: City Council	Ongoing
Educational assistance to homeowners to prevent/mitigate flooded basements	City of Eagle Grove: All Departments	Ongoing
Fixed generator for City Hall, EMS, Fire Dept., and Street Dept.	City of Eagle Grove: City Administrator	2012
Generators – replace and/or repair both at water and sanitary plants	City of Eagle Grove: City Administrator	2012
Portable generator(s) for lift stations	City of Eagle Grove: City Administrator	2012
Improve or update warning sirens (getting them on the same frequency to be set off by radio)	City of Eagle Grove: City Administrator	2012
Development of a response & evacuation plan	City of Eagle Grove: All Departments	2012
Additional tornado sirens	City of Eagle Grove: City Administrator	2012
Create ordinance to monitor industrious discharge	City of Eagle Grove: City Council	Ongoing
Create wellhead protection programs	City of Eagle Grove: Water Department	2011
Establish ordinance to bury power lines in future development	City of Eagle Grove: City Council	2010

Meeting ended at 12:50 pm

Section 8: Resolution

2013-06

A RESOLUTION OF THE EAGLE GROVE CITY COUNCIL ADOPTING A HAZARD MITIGATION PLAN FOR EAGLE GROVE, IOWA.

WHEREAS, the Eagle Grove City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Eagle Grove City Council has authorized the development of the City's portion of the Wright County Multi-jurisdictional Hazard Mitigation Plan for the City of Eagle Grove, Iowa; and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, The Eagle Grove Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommended that the City Council approve the plan; and,

WHEREAS, the plan has been reviewed by City staff members and the City Council,

NOW THEREFORE BE IT RESOLVED, that the Eagle Grove City Council; hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 4th day of February, 2013


Darrell Determann, Mayor

Attest:


Michael Boyd, City Administrator

Appendix E: Galt (See Wright County Unincorporated)

The City of Galt accepts the Wright County Unincorporated area Risk Assessment.

A RESOLUTION OF THE GALT CITY COUNCIL ADOPTING A HAZARD MITIGATION PLAN FOR GALT, IOWA.

WHEREAS, the Galt City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Galt City Council has authorized the development of the Unincorporated area of Wright County's portion of the Wright County Multi-jurisdictional Hazard Mitigation Plan for the City of Galt, Iowa; and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

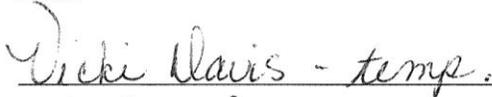
WHEREAS, the plan has been reviewed by City staff members and the City Council,

NOW THEREFORE BE IT RESOLVED, that the Galt City Council; hereby adopts the Unincorporated area of Wright County's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 14th day of January, 2013.


_____, Mayor

Attest:


_____, Iowa
_____, City Clerk

Appendix F: Goldfield

Section 1: Risk Assessment

The committee determined that the following additional hazards were not applicable or would have little effect on the City due to reasons listed below:

Communications Failure: Since everyone has a cell phone all the cell phone towers would have to go for there to be a problem.

Cyber Terrorism: As the City is small and no large industry is located in the City the committee did not feel cyber terrorism was an issue.

Earthquakes: Nearest fault line south of Saint Louis Missouri and on history of any affecting the City.

Expansive Soils: No history of any in incidents the area.

Radiological Terrorism was not considered as there are no radiological facilities in the city and because the City is so small they did not feel it was an issue.

Due concern of natural gas leaks and response to such incidents the committee did add "Natural Gas Incident" to the list.

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Tornados	5	5	4	4	5	5	28
Severe Winter Storms	5	5	5	5	3	2	25
Flash Flooding	5	4	4	4	3	4	24
Windstorm	5	4	4	3	3	5	24
Energy Failure	1	2	5	5	3	5	21
Structural Fire	5	5	1	1	4	5	21
Drought	4	3	4	4	3	1	19
River Flooding	5	4	2	2	2	4	19
Thunderstorm & Lightning	5	5	1	1	2	5	19
Bioterrorism/Chemical	1	2	1	5	4	5	18
HAZMAT – Transportation	1	3	2	4	3	5	18
Grass or Wild land Fire	3	4	1	1	2	5	16
Hailstorms	3	4	1	2	2	4	16
Rail Transportation Event	1	3	2	2	3	5	16
Extreme Heat	4	4	2	2	2	1	15
Human Disease Pandemic	1	2	4	4	3	1	15
Transportation Event	2	3	1	1	2	5	14
Human Disease Incident	1	2	3	4	3	1	14
Agro Terrorism	1	2	1	2	2	5	13
HAZAMAT – Fix Facility	1	2	1	1	2	5	12
Natural Gas	1	1	1	1	3	5	12
Pipeline Incident	1	1	1	1	3	5	12
Structural Failure	1	2	1	1	2	5	12
Air Transportation Incident	1	1	1	1	2	5	11

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Conventional Terrorism	1	1	1	1	1	5	10
Public Disorder	1	1	1	1	1	5	10
Animal/Plant/Crop Disease	1	2	1	2	2	1	9
Landslide	1	1	1	1	2	1	7

Hazard	Tornadoes
Location	A tornado is a random event and could potentially impact the entire city. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	According to the NCDC historical data shown in Appendix L, 13 tornado events have occurred in Wright County, and one specifically for the City of Goldfield since 1990.
Probability	There are, on average, about 46 tornadoes per year in the state of Iowa. Tornado events occur randomly and have the potential to affect any area within the State. A tornado is always possible due to the favorable weather conditions in this region of the United States. Since the county has averaged a recordable tornado every other year through 2005 and the City has experienced tornados since then the hazard mitigation committee determined it was highly likely there would be a tornado event in the next year.
Vulnerability	The entire City is exposed to tornados and since the area of the city is not very large the committee estimated that more than 50% of the area could be impacted by a tornado.
Maximum Threat	The committee estimated that somewhere between 50% - 75% of the town could be impacted in the event of a tornado due to the potential size of the tornado and the relative size of the City.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of the direct impact of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials. The committee determined that deaths, property damage beyond repair and complete shutdown of services could occur during a tornado event.
Speed of Onset	Very little warning is given when a tornado occurs, especially for the area where a tornado watch transitions into a tornado warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Severe Winter Storms
Location	Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a severe winter storm occurs, the entire City is impacted. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	Historical data provided by the NCDC is presented in Appendix based on this Wright County, experienced 65 winter storm conditions events since 1993.
Probability	Winter storms commonly occur throughout the state of Iowa. Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. Since 1993 there have been 66 recorded winter storm events in Wright County which averages more than 3 per year.
Vulnerability	Winter storms are generally regional events that would impact the entire City. The hazard mitigation committee determined that more than 75% of the people and property within the community would be affected.
Maximum Threat	Winter storms affect entire regions and would impact the entire spatial extent of the City. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the City's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property of the City. Though most residents are able to seek shelter during a winter storm event, however there have been times when the City has been without power for more than 24 hours.
Speed of Onset	Weather services can accurately predict when winter storms will occur and the conditions that may accompany the storm. Generally there is 12-24 hours of warning when a winter storm is on its way.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Flash Flooding
Location	Section 6 shows the area identified by the City where flash flooding most commonly occurs in the community.
Historical Occurrence	The City experiences flooding in the form of flash flooding due to heavy rains in a short period of time. This kind of rainfall happens regularly, as flash flooding is one of the most common hazard events in Iowa. The NCDC Historical Data in Appendix L shows that 13 flash flood events have occurred in Wright County and two in Goldfield; however, the City Utilities Supervisor identified additional events which led to backups in basements. Based on this, the hazard mitigation committee determined that there have been more than 10 flash flood events in the City in the past.
Probability	The City experienced flash flooding events in 2008, 2009 and 2010. Based on this the hazard mitigation committee determined that it was likely they would experience another event in the next year.
Vulnerability	The City Utilities Superintendent estimated that more than 50% of the properties in the City experienced basement backups due to flash flooding.
Maximum Threat	The committee identified that more than 50% of the City has been impacted by flash flooding.
Severity of Impact	The impact is most due to property damage as a result of flash flooding. The type of property usually experienced is fixed within a matter of months.
Speed of Onset	Because flash flooding occurs at an extremely fast rate, there is little warning for such event.

Hazard	Windstorm/High Wind
Location	Windstorms would generally impact the entire area of the City. For a map of the community see section 6 of this appendix.
Historical Occurrence	According to NCDC (Appendix L), 41 wind events/windstorms have been recorded in Wright County since 1996.
Probability	Iowa lies on the eastern edge of the Great Plains where winds blow strong and steady, particularly in the winter and spring. The relative flatness of the terrain means that most areas of the state are well exposed to the wind. In addition, most of the state consists of cropland with few trees to reduce wind speeds near the ground. Based on NCDC data there has been an average of more than 2 windstorms per year in the County thus it is likely the City will experience a windstorm in the next year.
Vulnerability	Windstorms are a regional event that could impact the entire City. In the past windstorms have downed electrical lines and tree limbs over 50% of the City.
Maximum Threat	Windstorms have affected more than 50% of the property in the City however there are large open areas in the City limits thus it was determined that only 25-50% of the spatial extent of the City would be affected.
Severity of Impact	In the past windstorms have downed electrical lines and citizens have been without electricity for more than 24 hours.
Speed of Onset	While the City has some warning regarding a rain or snow event, generally the conditions relating to wind may vary as the approaching storm develops; therefore, the hazard mitigation committee determined there is very minimal warning time for windstorms.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Energy Failure
Location	Energy failure affects the entire area of the City. For a map of the community see section 6 of this appendix.
Historical Occurrence	Energy disruptions in the City are generally the result of electrical disruptions due to ice storms or high winds. Those on the committee could remember when the City experienced two such disruptions.
Probability	With the number of disruptions that have occurred in the past it is unlikely that the City will experience such disruptions next year.
Vulnerability	When the City experienced energy disruptions in the past the entire City was without power.
Maximum Threat	When the City experienced energy disruptions in the past the entire City was without power.
Severity of Impact	In past events the City has been without power for more than 24 hours.
Speed of Onset	Energy disruption generally occurs without any warning.

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of Goldfield see Section 6 of this appendix.
Historical Occurrence	The representative from the City fire department noted that there were 5 fire calls in the previous year and just as many the past two years.
Probability	There is always the chance for a structural fire to occur within the City. Based on past events, the committee noted it was highly likely there would be a fire call next year.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined less than 10% of people and/or property would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area, the committee estimated less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and long term property damage, as determined by the hazard mitigation committee.
Speed of Onset	Structural fires may begin and spread incredibly fast; there is no warning when one might occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire City would be affected by the Drought conditions. For a map of the City of Goldfield see Section 6 of this Appendix.
Historical Occurrence	There are three occurrences of droughts in the NCDC Database dating 1995, 2001 and 2003 however drought conditions have been reported in the state for the past couple of years which are not included in the NCDC data.
Probability	Based on state and weather reports it was determined that it is possible there could be a drought at least once in the next 10 years.
Vulnerability	The most vulnerable to a drought situation is the crops, livestock, agriculture and water supply. Fires are also more prevalent in drought conditions. Many of the businesses in the City are agricultural related which is why the committee decided that a drought situation would be catastrophic and affect 50-75% of the population and property.
Maximum Threat	A drought is not a spatially isolated event. If a drought is present then most of the community will be affected.
Severity of Impact	Although a drought would have a major impact on the economy, the committee would not anticipate many illnesses, structural damages or interruption in services.
Speed of Onset	The onset of a drought would be very slow; therefore, the Hazard Mitigation Committee gave the speed of onset a 1, more than 24 hours warning time.

Hazard	River Flooding
Location	The Boone River is just west of the city limits. The City is part of the National Flood Insurance Program (NFIP). See map flood plain map in section 6 of this annex.
Historical Occurrence	Since 1993, there have been 48 flood events recorded which affected Wright County none were specifically identified to the City. Recent events that have had an impact on the County include the flood events of 2010 and 2011.
Probability	Because flooding has occurred more frequently in recent years the hazard mitigation committee believes it is likely it will flood in the next year.
Vulnerability	When river flooding occurs the main black top ___ gets flooded and is closed, the park gets flooded and some homes around the area get water into basements.
Maximum Threat	Impacts of river flooding affected 10-25% of the spatial extent of the community according to the Hazard Mitigation Committee.
Severity of Impact	When it floods the biggest impact is to the homes nearest the river. There is some property damage but usually does not threat structural stability.
Speed of Onset	There is generally some kind of warning that flooding will occur however if rains come down fast enough it is not a lengthy warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Thunderstorm and Lightning
Location	Thunderstorms generally affect an entire area; therefore, if a thunderstorm event were to occur, a majority of the County would be exposed to the event. For a map of the City see section 6 of this appendix.
Historical Occurrence	The National Climatic Data Cent (NCDC) historical data in Appendix L shows 59 events relating to thunderstorm winds and lightening in Wright county since 1973.
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The central area of the United States is home to some of the most severe thunderstorms in the world. About 85 percent of lowa thunderstorms occur between April and September, with most storms occurring during the month of June. Based on historical evidence the hazard mitigation committee to determine that there is nearly a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	The vulnerability to a thunderstorm and lightning is dependent on the extent of the storm; past experience indicates that usual damaged caused by thunderstorms is downed tree limbs and sometimes loss of power. Because of the limited affect thunderstorms have had in the past the hazard mitigation committee determined less than 10% of the property in the City is affected in the City.
Maximum Threat	Similar to vulnerability, the hazard mitigation committee determined that less than 10% of the spatial area of the City is impacted by thunderstorms/lightning.
Severity of Impact	The hazard mitigation committee determined that a majority of thunderstorm and lightning events cause very little damage within the City. While a worst-case scenario would cause few, if any injuries, little-to-no property damage and only a brief interruption of essential facilities and services.
Speed of Onset	The committee determined that though there is warning of possible rain and storms there is little or no warning before a thunderstorm and lightning event, would occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	HAZMAT – Transportation
Location	Hazardous materials transportation events can occur anywhere there is a road or railroad. To see a map of the City see Section 6 of this Appendix.
Historical Occurrence	The IDNR shows that 20 transportation hazardous spills occurred in Wright County but do not indicate where in the County they take place. The hazard mitigation committee could not remember any such incidents happening in the City. For a list of the hazard materials spills/leaks, see pages 30-34.
Probability	Because hazardous substances are regularly transported to and from the Coop it is possible that a hazardous materials transportation incident could occur at least once in the next 10 years
Vulnerability	Areas of the community vulnerable to hazardous materials events based on whether rail or road transportation is used and if road transportation is used what roads are being traveled. Because different materials have different impacts, and based on what hazardous materials are known to be transported through town, it was predicted that than 10-25% of the community could potentially be affected by a hazardous materials transportation event.
Maximum Threat	The committee estimated that less than 50-85% of the spatial area of the City would be impacted by a hazardous materials transportation event.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. The hazard mitigation committee determined that most events related to transportation in the City could cause serious injuries, minor property damage and short term interruption of facilities or services within the community
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time for when such an event will occur. If people are aware of the problem, they will fix it so the event does not have the potential to occur.

Hazard	Grass or Wild land Fire
Location	The community is completely surrounded by agriculture land. During dry conditions a wildfire could occur anywhere around the City, for a map of the vulnerable area see Section 6 of this appendix.
Historical Occurrence	The hazard mitigation committee noted that there have been more than 4 crop fires in the past though not large ones.
Probability	There is always the possibility for a grass or crop fires to occur near the City; based on past experience it is likely that there will be crop fire in the next year.
Vulnerability	Due to past experience the hazard mitigation committee felt that a small part of the City if vulnerable to crop fires.
Maximum Threat	Similarly a small portion of the spatial area of the City would be affected by crop fires.
Severity of Impact	When any type of fire takes place, it has the potential to cause injury and some property damage.
Speed of Onset	Grass and crop fires may begin and spread incredibly fast; there is no warning when one might occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Hailstorm
Location	Hailstorms have the potential to affect the entire City. See Section 6 of this appendix for a map of the County.
Historical Occurrence	According to data collected from the NCDC (Appendix L), there have been a total of 54 hail storms recorded in Wright County of those 5 were recorded in the city since 1995.
Probability	Based on the number of hail storms affected the county in the past it is like the City will experience a hail storm next year.
Vulnerability	Based on NCDC information only \$21,000 worth of property damage was done in the 5 recorded hail storms thus the committee determined that less than 10 of the property in town are vulnerable to hailstorms.
Maximum Threat	Though there was limited property damage in past hailstorms there is a potential for 10-25% of the spatial area to be affected due to the agriculture land in the City.
Severity of Impact	There has been some property damage during hailstorms in the past but nothing major except for crops.
Speed of Onset	Hail storms often result from severe thunderstorms or tornadoes which have little warning time.

Hazard	Rail Transportation Event
Location	Rail transportation events have the potential to occur on any of the railways within City. For a map of the community see Section 6 of this Appendix.
Historical Occurrence	The Union Pacific Railroad runs through the City but no one recalls there ever being a rail incident in the City
Probability	The hazard mitigation committee determined that because a railroad runs through the middle of the City it is possible there could be a rail incident in the next ten years.
Vulnerability	Based on where the railroad is located and what would be affected if there was a non-hazardous materials railroad incident only 10-25% of the City is vulnerable to a rail transportation incident.
Maximum Threat	Similar to the vulnerability of the community; if a rail transportation event were to occur less only 10-25%% of the special area in the community would be impacted.
Severity of Impact	Based on the speeds which the trains run through town and the fact there are some properties near enough to the railway that could experience property damage if there was a derailment there could be minor property damage if a rail incident occurred.
Speed of Onset	No prediction of a rail transportation event can be made; therefore, there is no warning time of the event.

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Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat conditions were to take place in Webster County, the entire county would feel the event. For a map of the City see Section 6 of this appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; two extreme heat events have been recorded for having occurred in Wright County and the State of Iowa in 1995 and 2001. The hazard mitigation committee multiple events having 90+ degree weather for 3 or more days more many since 2001. Because the NCDC's definition of extreme heat may be different the IHSEM's, the committee determined that extreme heat events have occurred more than 6 times within the County.
Probability	While extreme heat events have occurred multiple times in the past, the committee mentioned that it depends on the summer. In a cooler summer such events occur less often; therefore, based on historical evidence of such events, the committee estimated that there would be a 76-99% chance that one will occur in the next year.
Vulnerability	When extreme heat conditions occur, it generally comes in a heat wave that impacts an entire region. While there is very little property damage (besides crop damage in drought conditions) a few people are impacted especially those without air conditioning. Therefore the committee estimated that 10-25 of the City would be impacted.
Maximum Threat	Other than crops the committee felt only 10-25%% of the special area in the community would be impacted.
Severity of Impact	When extreme heat events occur there is very little structural damage and interruption in services is slight.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Hazard	Human Disease Pandemic
Location	There is no telling where disease might occur within the City; therefore, no specific location is established. For a map of the City see Section 6 of this appendix.
Historical Occurrence	There is no historical record of human disease pandemic impacting the City. The hazard mitigation committee recollected no such events and felt that H1N1 may be the only issue at this time anywhere.
Probability	Based on current vaccinations and treatment available, the hazard mitigation committee determined that it is unlikely that a human disease pandemic would impact the City in the next year.
Vulnerability	Most diseases occur in isolated households; however if a pandemic were to take place in the City the committee felt due to the City size the event would affect 50-74% of the community before the event was over.
Maximum Threat	Since this is human disease it would mostly impact people, the committee felt the spatial effect would be the same as vulnerability.
Severity of Impact	If the pandemic came on suddenly there would be serious illness before treatment was given.
Speed of Onset	The hazard mitigation committee determined symptoms would start more than a day before getting ill.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Transportation Event
Location	The committee looked at transportation events as only road events as air and rail would be assessed separately. Road transportation events can occur wherever there is a road. For a map of the transportation networks, see Section 6 of this appendix.
Historical Occurrence	The Hazard Mitigation committee remembered less than 4 road transportation events in the past one which closed the highway.
Probability	Based on past occurrences, the hazard mitigation committee determined there was a 26-75% chance a road transportation event would happen in the next year.
Vulnerability	While transportation events happen, they generally only affect the motor vehicles. Based on these impacts less than 10% of the people and property in the City would be impacted by a road transportation incident.
Maximum Threat	Similar to the vulnerability of the community; if a transportation event were to occur less than 10% of the space in the community would be impacted.
Severity of Impact	Based on the low amount of vulnerable areas, the committee estimated that the average road transportation event would cause only minor injuries and/or property damage.
Speed of Onset	No prediction of a transportation incident can be made; therefore, there is no warning time of the event.

Hazard	Human Disease Incident
Location	There is no telling where disease might occur within the City; therefore, no specific location is established. For a map of the City see Section 6 of this appendix.
Historical Occurrence	The only human illness the committee could think of would be the flu, chicken pox, etc. The most recent threat may be H1N1 virus but no one knew of anyone in the City having this.
Probability	With current vaccinations and medical treatment available, the hazard mitigation committee determined that it was unlikely that human disease would spread throughout the City.
Vulnerability	Because of the available vaccinations and treatment the committee felt only 25-50% of the people would be affected in a human disease incident.
Maximum Threat	Because disease spreads and with the small size of the City the hazard mitigation committee estimated that 50-70% of the spatial extent of the community would be impacted if an incident occurred.
Severity of Impact	Serious illness could happen if a human disease incident occurred in the City.
Speed of Onset	As soon as a contamination, epidemic or plague is suspected, residents are warned to take cover; therefore, there is more than 24 hours of warning.

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Hazard	HAZMAT – Fixed Facility
Location	Hazardous materials events can occur anywhere where such materials are handled, stored, and/or processed. For a map of the City's hazardous materials locations see Section 6 of this appendix.
Historical Occurrence	Based on historical data shown in pages 447-456, over 40 hazardous materials fixed facility events were reported by DNR since 1995. However the data accounts for all incorporated and unincorporated areas, and the hazard mitigation committee which includes representation from the fire department, does not recall any hazardous materials events being reported in the community.
Probability	Based on the number of uncontrolled hazardous material events that have occurred in the past, and based on the number of facilities which store/handle hazardous materials it is unlikely a hazardous materials fixed facility event will happen in the next year.
Vulnerability	Areas of the community vulnerable to a HAZMAT event is dependent upon where the fixed facilities are located and on the type of material handled stored. Because different materials have different impacts it was predicted less than 10% of the community could potentially be affected by a HAZMAT event resulting from a fixed facility.
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be less than 10% of the City.
Severity of Impact	Based on the locations of the fixed facilities, the past events and the type of materials handled/stored the hazards mitigation committee determined that a fixed hazardous materials event may cause minor injuries and some property damage.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time.

Hazard	Natural Gas Incident
Location	Natural Gas incidents can occur anywhere where such materials are handled, stored, and/or processed. For a map of the City's hazardous materials locations see Section 6 of this appendix.
Historical Occurrence	There have been no natural gas incidents in the City that any of the committee could remember.
Probability	Based on the past number of incidents it is rare that an incident would occur.
Vulnerability	Based on the lack of past natural gas incidents the committee determined less than 10% of people or property would be affected by an incident.
Maximum Threat	The spatial extent of the community that would be impacted by a natural gas incident is predicted to be less than 10% of the City.
Severity of Impact	If a natural gas incident occurred serious injuries and property damage could occur.
Speed of Onset	Because natural gas incidents occur randomly, there is no warning time.

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Hazard	Pipeline Incident
Location	The nearest major pipeline, which consists of liquid propane, is located east of the City. For a map of the pipeline see Section 6 of this appendix.
Historical Occurrence	Historically there was one pipeline which the committee could remember.
Probability	Based on past occurrences the hazard mitigation committee determined it would be rare for an event to occur once every 50 years.
Vulnerability	Based on past occurrences and the location of the pipeline the hazard mitigation committee determined that less than 10% of the people and property in the City would be affected by a pipeline incident.
Maximum Threat	Similar to vulnerability, if an incident occurred less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee estimated that if a pipeline incident occurred there could be serious injuries and property damage.
Speed of Onset	Pipeline incidents are generally accidental and no warning is given when such event is going to occur.

Hazard	Structural Failure
Location	There have been buildings that were falling down and bricks coming off.
Historical Occurrence	The hazard mitigation committee has seen very few structural failures in the past. Based on the number of events the hazard mitigation committee could remember of buildings collapsing they determined that less than 2 events had occurred.
Probability	Many of the structures in the community are sound; therefore, the committee determined that it is unlikely that a structural failure will occur.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Due to the fact that most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that minor injuries and property damage could occur; however, impacts to the overall quality of life and essential facilities would not occur.
Speed of Onset	The hazard mitigation committee determined that there is no telling when a structure may fail; therefore, they noted that there is minimal or no warning time.

Hazard	Animal/Plant/Crop Disease
Location	Outbreak of disease could happen anywhere in the City.
Historical Occurrence	There is no record of major animal/plant/crop disease in the City and the hazard mitigation committee recalls no major instances of such.
Probability	Animal/Plant/Crop disease has not happened in the past and with the amount of preventative measures that are now available it is unlikely it would occur in the next year.
Vulnerability	If an event took place, less than 10% of the City would be impacted due to the potential areas it could affect.
Maximum Threat	Since 10-25% of the spatial area of the City contains animals/crops/plans that is what the committee identified as the spatial extent which could be affected by animal/plant/crop disease.
Severity of Impact	Impacts would be minimal to residents. The majority would result in damage of crops and livestock. While it could impact the local economy, as mentioned it is estimated that less than 25% of the unincorporated area would be impacted.
Speed of Onset	Animals are regularly tested and crops are regularly sprayed to reduce the chances of animal/plant/crop disease.

*Since Animal/Plant/Crop Disease and Landslide rated so low it was taken out of consideration of hazards. Also, the likelihood of any terrorist/public disorder event happening in the City is felt to be low so terrorist events were taken out of consideration. Since the City does not have an airport Air Transportation was taken out of consideration.

Section 2: Vulnerability Assessment & Loss Estimates

Goldfield is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the City.

Those hazards that the entire city is exposed to includes Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Extreme Heat, Drought, Structural Fire, Tornadoes, HAZMAT-Transportation, Human Disease Incident, Transportation Incident, Rail Transportation, Natural Gas Incident and Structural Failure. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For Goldfield, these hazards include Flash Flooding, HAZMAT-Fixed Facilities, Pipeline Incident, and Grass or Wild-land Fire. Their vulnerability assessments and loss estimates are discussed in sections 2.2 through 2.5.

2.1 Exposure Assessment for Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Extreme Heat, Drought, Structural Fire, Tornadoes, HAZMAT-Transportation, Human Disease Incident, Transportation Incident, Rail Transportation Incident, Air Transportation Incident Natural Gas Incident, and Structural Failure:

The City's exposure to each hazard was determined based on the area of the city that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire City include Energy Failure, Severe Winter Storms, Thunderstorm and Lightning, Windstorms, Hailstorms, Extreme Heat, Drought. Those hazards that could potential impact any one random site within the City include Structural Fire,

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Tornadoes, HAZMAT-Transportation, Human Disease Incident, Air/Rail/Transportation Incident, Natural Gas, and Structural Failure. With this, all of the above-listed hazards have the potential to impact any area of the City, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The table below depicts this exposure.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	297	297	100%	\$14,491,300	\$14,491,300	100%	635	635	100%
Commercial	86	86	100%	\$4,852,400	\$4,852,400	100%			
Agricultural	14	14	100%	\$79,600	\$79,600	100%			
Industrial	16	16	100%	\$12,068,300	\$12,068,300	100%			
TOTAL	413	413	100%	\$31,491,600	\$31,491,600	100%			

2.1.1. Vulnerability Assessment for Energy Failure

Energy failure is an extended interruption of service either electric, petroleum or natural gas, which by an actual or impending acute shortage of usable energy. Energy shortages are rare in Goldfield; however, outages are common. Outages are often caused by impacts to above-ground power lines from thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes and infrastructure failure.

The hazard mitigation determined based on personal experience that energy failures impact the entire community; however, impacts are generally mild. Generally the largest impact is to essential facilities or services; however, few if any injuries or illness occur, and little-to-no property damage.

Energy failures are most threatening during extreme heat or winter conditions. During such time residents are not able to cook, store food, or run every-day appliances. Death and injuries due to power outages are very rare.

Loss Estimate Calculation:

As mentioned above, an energy failure generally does not impact structures and people are typically only at risk during extreme heat or winter conditions. Due to these circumstances, no loss estimate could be calculated.

2.1.2. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the City of Goldfield is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that approximately 25-50% of the people and property within the city are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice. Infrastructure failure occurs through power outages from ice, which has the potential to impact the entire County. Structural failure is also an impact that can occur due to large amounts of heavy snow. These impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person's exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the City are ill-advised to be outdoors for long periods of time during

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a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDC, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this amount represents reported damages throughout the County, it was used as a worst-case scenario for the City of Goldfield. Therefore, based on \$75,000 in damages that could potentially occur within the City of Goldfield which when rounded upwards means approximately .3% of the structures in the city would experience damages due to winter storms. The loss estimate calculation for .3% in damages of all structures in Dows is expressed below.

Estimated residential structural damage due to Severe Winter Storms (.3%) = \$43,473
Estimated commercial structural damage due to Severe Winter Storms (.3%) = \$1,289
Estimated agricultural structural damage due to Severe Winter Storms (.3%) = \$239
Estimated industrial structural damage due to Severe Winter Storms (.3%) = \$36,204
Total estimated structural damages due to Severe Winter Storms = **\$81,205**

2.1.3. Vulnerability Assessment for Thunderstorms & Lightning

100% of Goldfield is exposed to thunderstorms and lightning. While thunderstorms and lightning are generally a regional event, the hazard mitigation committee estimated that 10-25% of the population of Goldfield is susceptible to impacts or damages due to thunderstorms and lightning; however, this vulnerability is dependent on the extent of the storm and accompanying events that may occur.

Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts include downed limbs, power outages and heavy rain that may impair individuals' ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

Loss Estimate Calculation:

Historical data from the NCDC displayed in Appendix C shows that the highest amount of property damages reported within Goldfield due to Thunderstorms equaled \$15,000; however, the largest amount of property damages in the County equaled \$250,000. The average of these numbers was used as an estimate of losses to account for a worst-case-scenario of the impacts that the City could experience due to thunderstorm and lightning. The average damages, which equaled \$132,500, accounted for approximately .5% of the City's total assessed value of residential, commercial, agricultural and industrial structures. Based on this worst-case-scenario, it was estimated that each property would experience structural damages equaling .5% of their assessed value, or .5% of structures in the City would experience complete loss. The damages are dependent on the intensity and impacted area of the Thunderstorm and Lightning event. The results of this estimate are displayed below.

Estimated residential structural damage due to Thunderstorm and Lightning (.5%) = \$ 72,457
Estimated commercial structural damage due to Thunderstorm and Lightning (.5%) = \$2,149
Estimated agricultural structural damage due to Thunderstorm and Lightning (.5%) = \$398
Estimated industrial structural damage due to Thunderstorm and Lightning (.5%) = \$60,341
Total estimated structural damages due to Thunderstorm and Lightning = **\$135,345**

2.1.4. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire City is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning,

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hailstorms or tornadoes; impacts are generally limited. The Goldfield hazard mitigation committee determined that less than 10% of the people and property in the community are impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

Loss Estimate Calculation:

The NCDC historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996. While this would be the amount normal used in the loss estimates for Goldfield, the committee rated the impacts due to windstorms to be quite limited; therefore, it was estimated that only .2% of the City's total assessed value of residential, commercial agricultural and industrial structures would be impacted.

Estimated residential structural damage due to Windstorms (.2%) = \$28,982
Estimated commercial structural damage due to Windstorms (.2%) = \$860
Estimated agricultural structural damage due to Windstorms (.2%) = \$159
Estimated industrial structural damage due to Windstorms (.2%) = \$24,136
Total estimated structural damages due to Windstorms = \$54,137

2.1.5. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms; however, according to the hazard mitigation committee approximately 25-50% of the people in the city could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDC shows 17 hailstorms reported in Wright County and 5 such events reported in Goldfield. The maximum amount of property damage incurred in one recorded event within the City of Goldfield equaled \$10,000; however, in the risk assessment, the hazard mitigation committee anticipated that hailstorms would have a similar extent of damages to windstorms; therefore, it's estimated that each structure within the City would face damages equaling approximately .2% of the buildings' value.

Estimated residential structural damage due to Hailstorms (.2%) = \$28,982
Estimated commercial structural damage due to Hailstorms (.2%) = \$860
Estimated agricultural structural damage due to Hailstorms (.2%) = \$159
Estimated industrial structural damage due to Hailstorms (.2%) = \$24,136
Total estimated structural damages due to Hailstorms = \$54,137

2.1.6. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. A majority of residents have air conditioning; therefore, the committee estimated that less than 10% of the City would be impacted by extreme heat. However, residents must ensure they are not exposed to the heat for a long period in time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered to the crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not cause structural damages.

2.1.7. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. While it may not directly impact the City of Goldfield, drought impacts the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the City. Accompanying events include extreme heat and grass and wild-land fires.

Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in the unincorporated area where a majority of agriculture lands exist.

2.1.8. Vulnerability Assessment for Structural Fire

A structural fire is an uncontrolled fire in populated areas that threatens life and property. Structural fires are very isolated events in the City of Goldfield because most buildings outside of the downtown are detached. The committee estimated that less than 10% of people and property are affected in one event. Damages to buildings may be substantial or minimal, depending on whether the fire was controlled and responded to quickly. People inside a structure where a fire occurs could experience substantial injuries or death.

Loss Estimate Calculation:

Because structural fires are such an isolated event, it would be insignificant to provide a loss estimate. A structural fire could occur in any one structure within the City.

2.1.9. Vulnerability Assessment for Tornadoes

The entire population of Dows is exposed to tornadoes. The hazard mitigation committee estimated that 50-75% of the City would be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent of the size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.

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F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornadoproject.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDC, multiple tornado events have been reported in Wright County, with one directly impacting the City of Goldfield. The maximum amount of property damage incurred in one recorded event in Goldfield was not recorded and that of the County is \$25,000,000 in damages; which almost equals the City of Goldfield’s overall structural values. Because of the variation of damages that could occur due to Tornadoes, it was determined that the 25,000,000 in damages could occur within the City, which equals 92% of the city’s assessed residential, commercial, agricultural and structural values. This percentage would not be far off in a worst-case-scenario, as Iowa has experienced events that have impacted entire community:

Estimated residential structural damages due to Tornado (92%) = \$13,331,996
 Estimated commercial structural damages due to Tornado (92%) = \$395,416
 Estimated agricultural structural damages due to Tornado (92%) = \$73,232
 Estimated industrial structural damages due to Tornado (92%) = \$11,102,836
 Total estimated structural damages due to Tornado (92%) = \$24,903,480

2.1.10. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the City; however, according to the hazard mitigation committee such event would mostly likely impact less than 10% of the community depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the City.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous

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material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks (See historical events in Chapter 3).

2.1.11. Vulnerability Assessment for Disease (Incident/Pandemic)

The hazard mitigation committee estimated that less than 10% of the city would be impacted. The most common events that have taken place in recent years include the H1N1 virus. The flu and pneumonia are also two common viruses that impact residents of the City. Wright County Public Health constantly strives to provide shots and other preventable measures for such viruses. Other transferable diseases are generally transferred through direct interaction, which lessens the vulnerability of the County to such diseases.

Loss Estimate Calculation:

This hazard impacts the health and welfare of people. There would be no structural impacts due to human disease.

2.1.13. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles, rail cars and/or airplanes. Goldfield is located at the intersection of two State Highways; their location is identified in the Transportation Map located in Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Goldfield would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.14. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires, structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.2 Exposure Assessment for Flash Flooding

Exposed Structures

The hazard mitigation committee estimated that 50-75% of the community would be impacted by flash flooding. Flash flooding results from intense rainfall over a brief period of time; therefore, it was determined that the majority of flash flooding within the City of Goldfield would occur in low-lying areas with poor drainage, which generally exists near the Boone River and Buttermilk Creek. Based on topography and wetland data, there is one major pocket of low-lying area within the City. Within this area are multiple wetlands. It's estimated that flash flooding would most likely occur in these pockets (contour 1120); therefore, these pockets,

Wright County Multi-Jurisdiction Hazard Mitigation Plan

displayed in the flash flooding map in Section 6, was used to identify the “hazard area” for flash flooding. Based on this it was estimated that 85 dwellings, 13 commercial structures, 0 industrial structures and 10 agriculture structures were located in potential areas of flash flooding.

Exposed Persons

The “Number of People” exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 201 residents, 13 commercial persons, 0 industrial persons and 10 agricultural persons exposed to flash flooding; making a total of 224 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	298	85	29%	\$14,491,300	\$4,674,600	32%	635	224	35%
Commercial	86	13	15%	\$4,852,400	\$744,600	15%			
Agricultural	14	10	71%	\$79,600	\$60,900	77%			
Industrial	16	0	0%	\$12,068,300	\$0	0%			
TOTAL	414	108	26%	\$31,491,600	\$5,480,100	17%			

2.2.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in areas with poor drainage. It is evident that a majority of areas exposed to flash flooding are in areas near the Boone River or Buttermilk Creek.

Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes’ value by 10%; therefore, damages might decrease a homes’ value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 233,730
- Estimated commercial structural damage due to Flash Flooding (5%) = \$ 37,230
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$3,045
- Estimated industrial structural damage due to Flash Flooding (5%) = \$ 0
- Total estimated structural damages of Flash Flooding = **\$274,500**

2.3 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were

Wright County Multi-Jurisdiction Hazard Mitigation Plan

identified and positioned on the map displayed in Section 6. A buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that there were 635 residents exposed.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	297	234	79%	\$14,491,300	\$10,909,900	75%	635	635	100%
Commercial	86	82	95%	\$4,852,400	\$4,587,600	95%			
Agricultural	14	2	14%	\$79,600	\$2,600	3%			
Industrial	16	16	100%	\$12,068,300	\$12,068,300	100%			
TOTAL	413	334	81%	\$31,491,600	\$27,568,400	88%			

2.3.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the City, different materials have different impacts. The majority of hazardous materials within Goldfield are Underground Storage Tanks, which have a limited impact such as an isolated explosion or groundwater contamination, if leaking. However, in a worst-case scenario the hazard mitigation committee estimated that 25-50% of the community would be impacted by such event.

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on 10% of the hazard area:

- Estimated residential structural damage due to HAZMAT – Fixed Facility = \$190,990
- Estimated commercial structural damage due to HAZMAT – Fixed Facility = \$458,760
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility = \$260
- Estimated industrial structural damage due to HAZMAT – Fixed Facility = \$206,830
- Total estimated structural damages of HAZMAT – Fixed Facility = **\$2,756,840**

2.4 Exposure Assessment for Pipeline Incident

Exposed Structures

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The exposure numbers for Pipeline Incidents is shown in the table below. These numbers were determined based on the number of structures located in the pipeline zone. The pipeline zone was determined using a 1 mile buffer surrounding the natural gas pipeline that runs into the southern edge of town. All of the residential, commercial and agricultural structures located within the buffer, or “hazard zone”, account for the exposed “Number of Structures” and “Value of Structures”. For a map of this buffer see Section 6.

Exposed Persons

The “Number of People” exposed to a pipeline incident was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were a total of 635 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	297	292	98%	\$14,491,300	\$13,891,000	96%	635	635	100%
Commercial	86	85	99%	\$4,852,400	\$4,829,900	100%			
Agricultural	14	2	14%	\$79,600	\$50,000	63%			
Industrial	16	16	100%	\$12,068,300	\$12,068,300	100%			
TOTAL	413	395	96%	\$31,491,600	\$30,839,200	98%			

2.4.1. Vulnerability Assessment for Pipeline Failure

According to the hazard mitigation committee; 10-25% of the city is vulnerable to pipeline failure. With natural gas, persons should be prepared to evacuate during a failure of the pipeline as leakage would cause health and environmental impacts. Impacts on health would most likely be due to explosion, which could cause burns or even death; or inhalation, which would result in dizziness, headache, vomiting, irregular breathing or unconsciousness. Exposure to high levels of natural gas could also result in long-term effects such as respiratory disease. Symptoms include pneumonia, nausea, vomiting, irregular breathing, memory loss, fatigue, sinus pain and headache

Loss Estimate Calculation:

While approximately 98% of structures are exposed to pipeline failure, it’s anticipated that such event would occur in an isolated area. It is estimated that only 10% of the hazard area would be directly impacted:

- Estimated residential structural damage due to Pipeline Failure (10%) = \$1,389,100
- Estimated commercial structural damage due to Pipeline Failure (10%) = \$482,990
- Estimated agricultural structural damage due to Pipeline Failure (10%) = \$5,000
- Estimated industrial structural damage due to Pipeline Failure (10%) = \$1,206,830
- Total estimated structural damages of Pipeline Failure (25%) = **\$3,083,920**

2.5 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that less than 10% of the community would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the City, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the “hazard zone”, or the property that could potentially be

Wright County Multi-Jurisdiction Hazard Mitigation Plan

impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 86 dwellings, 17 commercial structures, 13 industrial structures and 16 agriculture structures were located in the “hazard zone” for grass and wild-land fires.

Exposed Persons

The “Number of People” exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimates that there were 204 residents exposed, 17 commercial persons exposed, 16 industrial persons exposed and 13 agricultural persons exposed; making a total of 250 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	297	86	29%	\$14,491,300	\$4,686,100	32%	635	250	39%
Commercial	86	17	20%	\$4,852,400	\$1,050,100	22%			
Agricultural	14	13	93%	\$79,600	\$76,500	96%			
Industrial	16	16	100%	\$12,068,300	\$12,068,300	100%			
TOTAL	413	132	32%	\$31,491,600	\$17,881,000	57%			

2.5.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land surrounds the entire perimeter of the City of Goldfield; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

Loss Estimate Calculation:

Only a portion of those exposed structures within the City would actually be impacted during a grass and wild-land fire event. It is estimated that structures located adjacent to the open space consisting of either the north, south, east or west portion of the community would be impacted; therefore, the following estimates were calculated:

- Estimated residential structural damage due to Grass & Wild-land Fire (10%) = \$468,610
- Estimated commercial structural damage due to Grass & Wild-land Fire (10%) = \$105,010
- Estimated agricultural structural damage due to Grass & Wild-land Fire (10%) = \$7,650
- Estimated industrial structural damage due to Grass & Wild-land Fire (10%) = \$1,206,830
- Total estimated structural damages of Grass & Wild-land Fire (10%) = **\$1,788,100**

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Action	STAPLEE Rating
Continue HazMat Operations training for fire fighters	14
Continue Incident Command training for fire fighters	14
Continue weather spotters training	12
Continue as part of Region V HazMat	11
Keep HazMat kit in fire station	9
Replace fire hydrants (15)	8
Offer flu clinic in town	6
Make list of locations which could serve as community shelter	9
Construct a dry hydrant for incoming businesses located in outlined areas	7
Purchase portable trash pumps (2)	7
Purchase gas detector for fire department	3
Purchase new battery backup warning sirens (2)	6
Purchase generators for water plant and lift station	10
Construct larger storm sewer on Locus	9

City Hazard Mitigation Goal, Objectives, and Mitigation Actions

Goal 1: *Reduce or eliminate injury to or loss of lives and reduce or eliminate property damage or loss due to hazards that afflict the City.*

Objective 1.1 Provide the community with the means to mitigate the effects of hazards on the community.

Mitigation Actions:

- 1.1.1 Continue to keep HazMat kit in the fire station and keep kit updated
- 1.1.2. Replace fire hydrants
- 1.1.3 Construct a dry hydrant on the edge of town to provide water flow for businesses locating in the industrial park
- 1.1.3 Offer flu shot clinic in the city
- 1.1.4 Purchase portable trash pumps to pump flood water from streets, lift station, and other areas where it ponds.
- 1.1.5 Purchase gas detector to locate areas where natural gas may be leaking
- 1.1.6 Purchase new battery backup warning sirens so the sirens will still sound if electricity fails.
- 1.1.7 Purchase generators for water plant and lift station so they will still operate if electricity fails.

Objective 1.2 Improve and build upon the storm sewer system of the community to prevent major effects caused by flooding and flash flooding.

Mitigation Actions:

- 1.2.1 Construct larger storm sewer on Locus to eliminate flooding in the area

Objective 1.3 Provide residents of the City with a facility to seek shelter during a natural hazard event.

Mitigation Actions:

- 1.3.1 Make a list of locations which could serve as a storm shelter during weather events.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Objective 1.4 Maintain current mitigation actions being taken

Mitigation Actions:

- 1.4.1 Continue to train firefighters to hazardous materials operations level.
- 1.4.2 Continue to train firefighters in incident command
- 1.4.2 Continue weather spotters training
- 1.4.3 Encourage County to continue to belong the Region V HazMat
- 1.4.3 Keep HAZMAT kit in fire station

Section 4: Action Plan

Continue HAZMAT Operations training for fire fighters	
Description	Continue to have fire fighters attend hazardous materials operations training provided by Region V LEPC in order to keep the fire fighters prepared to respond to a Hazardous Materials Incident
Hazards Addressed	Hazardous Materials Incident – Fixed and Transportation
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget/City
Mitigation Measure Category	Emergency Services Protection , Property Protection
Target Completion Date	Ongoing

Continue Incident Command Training for Fire Fighters and City Leaders	
Description	Continue to send new fire fighters and City leaders to Incident Command Training when offered in order to be ready to respond to emergency incidents
Hazards Addressed	Hazardous Materials – Fixed and Transportation, Terrorism, Disease, transportation incident
Priority	III
Responsible Dept./Party	Fire Department, City Council
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget/City
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	Ongoing/As offered

Continue Weather Spotter Training	
Description	Continue to send interested participants to weather spotter training so that training individuals are available to provide watch during weather events
Hazards Addressed	Tornados, Severe Winter Storms, Windstorms, Thunderstorms & Lightning, River Flooding, Hail Storms
Priority	III
Responsible Dept./Party	County EMD
Estimated Cost	Minimal
Potential Funding Source	County/Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Encourage County to Continue to Belong to Region V HAZMAT	
Description	Encourage County to continue to be part of Region V HAZMAT so that the Region V HAZMAT team will be available to respond to hazardous materials incidents
Hazards Addressed	Hazardous Materials Incident – Fix and Transportation
Priority	II
Responsible Dept./Party	County EMD
Estimated Cost	Low
Potential Funding Source	County/HSEMD
Mitigation Measure Category	Emergency Services Protection, Property Protection
Target Completion Date	Ongoing

Keep Hazardous Materials Kit in Fire Station	
Description	Keep basic hazardous material kit in fire station and keep kit updated to use in a hazardous materials incident until the Region V HAZMAT team arrives.
Hazards Addressed	Hazardous Materials Incident – Fixed and Transportation
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget
Mitigation Measure Category	Emergency Services Action, Property Protection
Target Completion Date	Ongoing

Replace Fire Hydrants	
Description	Replace 17 fire hydrants
Hazards Addressed	Structural fire
Priority	I
Responsible Dept./Party	City Council/Fire Department
Estimated Cost	Minimal
Potential Funding Source	City
Mitigation Measure Category	Property Protection
Target Completion Date	Begin purchasing and replacing process within one year of approval of the plan.

Offer Flu Clinic in Town	
Description	Encourage Wright County Public Health to offer flu clinics in town for residents.
Hazards Addressed	Disease
Priority	III
Responsible Dept./Party	County Public Health
Estimated Cost	Minimal
Potential Funding Source	County/State
Mitigation Measure Category	Preventive Action
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Identify facility to serve as a storm shelter	
Description	Identify potential facilities in the City which could serve as shelters during weather events and begin discussions with owners of the facilities.
Hazards Addressed	Extreme Heat, Drought, River Flooding, Severe Winter Storms, Thunderstorms and Lightning, Windstorms, Energy Failure.
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	Start within 5 years of plan approval

Construct Dry Hydrant for incoming Businesses located on the edge of town	
Description	Construct a dry hydrant in an area with sitting water to provide a water supply to those businesses located on the edge of town where there are no fire hydrants.
Hazards Addressed	Structural Fire, Grass and Wild land Fires
Priority	III
Responsible Dept./Party	Fire Department/City Council/Businesses
Estimated Cost	Minimal
Potential Funding Source	City/Businesses/Grants
Mitigation Measure Category	Property Protection
Target Completion Date	When funding becomes available

Purchase portable Trash Pumps	
Description	Purchase trash to allow the City to pump flood waters from lift station and flooded streets.
Hazards Addressed	Flash Flood
Priority	II
Responsible Dept./Party	City
Estimated Cost	Low
Potential Funding Source	City/Grants
Mitigation Measure Category	Emergency Services Protection; Property Protection
Target Completion Date	When funding becomes available

Purchase Gas Detector for Fire Department	
Description	Purchase gas detector for fire department to locate natural gas leaks and pipeline leaks.
Hazards Addressed	Pipeline, Natural Gas
Priority	III
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget
Mitigation Measure Category	Preventive Action, Property Protection
Target Completion Date	Start purchase within 5 years of plan approval

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Purchase new Sirens with Battery Backup	
Description	Purchase tornado/storm sirens with battery backup to replace current sirens without battery backup.
Hazards Addressed	Tornados
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Low
Potential Funding Source	City/Grant
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	When funding becomes available

Purchase Generators for Water Plant and Lift Station	
Description	Purchase fixed generators for Water Plant and Lift Station so that they will continue to operate when electricity fails.
Hazards Addressed	Flash Flooding, Severe Winter Storms, Thunderstorms and Lightning, Windstorms, Energy Failure, Tornado.
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Moderate
Potential Funding Source	City/Grants
Mitigation Measure Category	Preventive Action, Emergency Services Protection, Property Protection
Target Completion Date	When funding becomes available

Construct Storm Sewer on Locus	
Description	Replace current storm sewer on Locust Street with larger storm sewer.
Hazards Addressed	Flash Flood
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	High
Potential Funding Source	City/Grants
Mitigation Measure Category	Property Protection
Target Completion Date	When funding becomes available

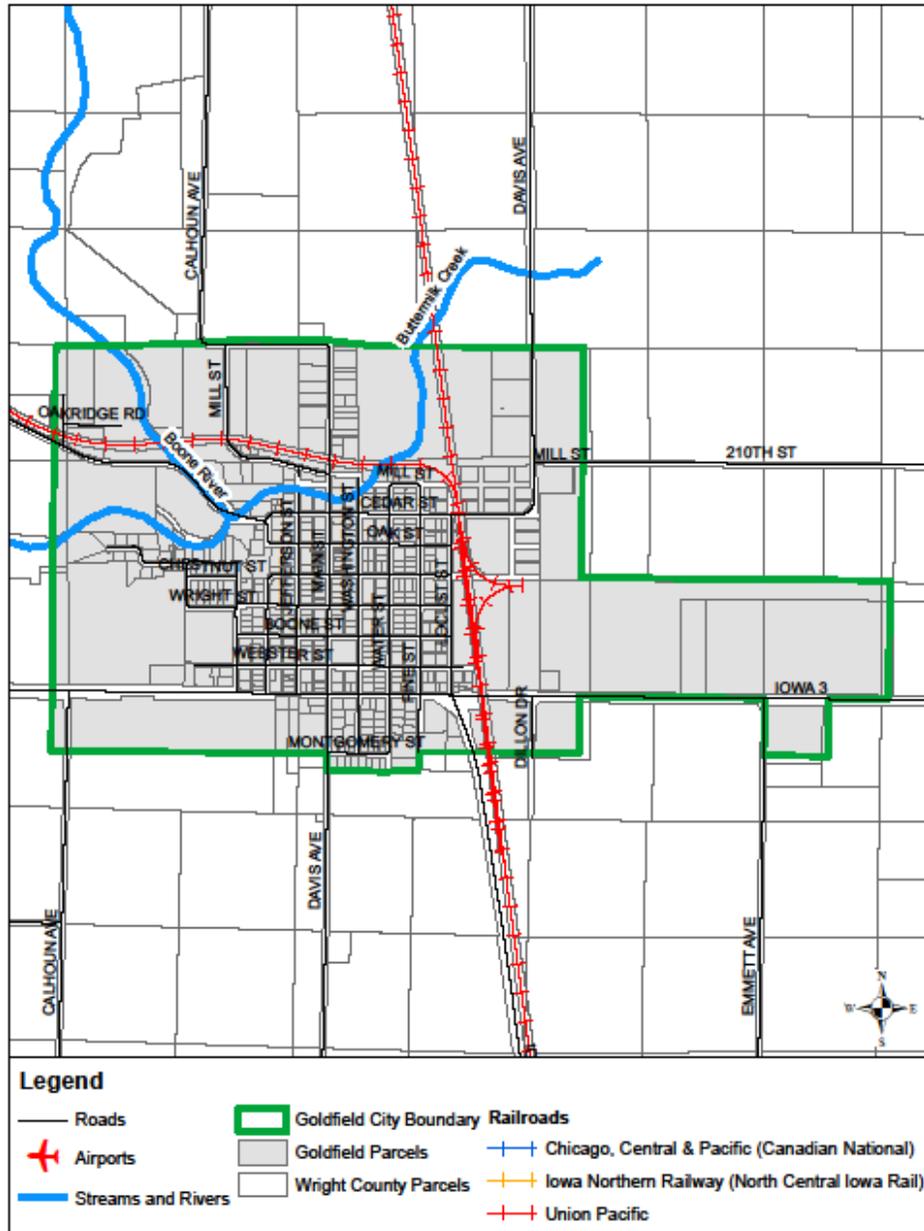
Continue participating in the NFIP, and enforce the floodplain ordinance	
Description	The City of Goldfield will continue participating in the NFIP, and enforce their floodplain ordinance.
Hazards Addressed	Flooding
Priority	I
Responsible Dept./Party	City of Goldfield City Council
Estimated Cost	Minimal
Potential Funding Source	City General Fund, State and Federal Grants
Mitigation Measure Category	Prevention Action
Target Completion Date	Ongoing

Section 5: Critical Facilities

- Goldfield City Hall
- Goldfield Water Treatment Plant
- Goldfield Telecom

Section 6: Community Maps

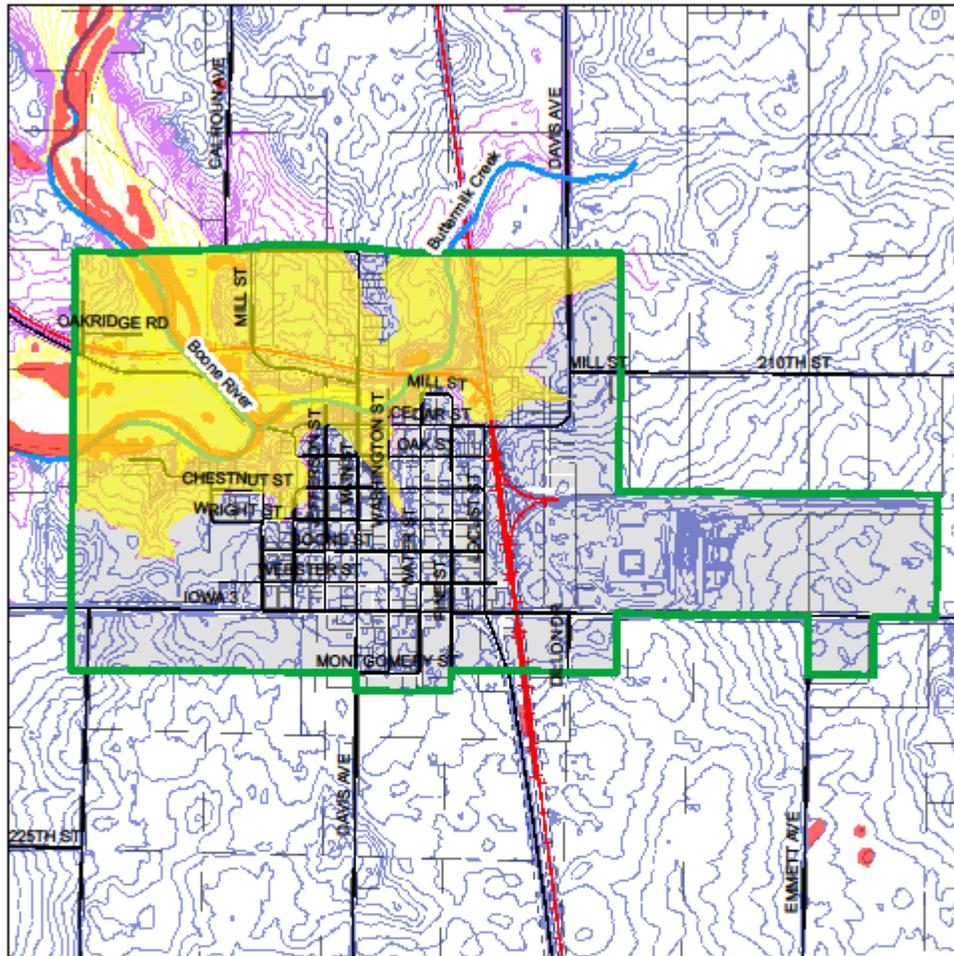
City of Goldfield



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

City of Goldfield

Flash Flood Hazard Area

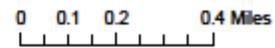


Legend

2ft Contours	City Boundary	Railroads
CONTOUR	Hazard Area	Chicago, Central & Pacific (Canadian National)
958 - 1090	Wetlands	Iowa Northern Railway (North Central Iowa Rail)
1091 - 1100	Streams and Rivers	Union Pacific
1101 - 110	Roads	
111 - 1120	Wright County Parcels	
1121 - 1300	Goldfield Parcels	



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49974963&IFTI=]

Intranetix Viewer [19197C0210C.png]

The screenshot displays the FEMA Intranetix Viewer interface. At the top left is the FEMA logo. Below it are navigation controls: a 'Help' button with a question mark, a 'Zoom In' button with a red cross, a 'Zoom Out' button with a red cross, a '1:1' button, a 'MAX' button, and a 'Pan' button with a hand icon. A 'Make a FIRlette' button is also present. To the right of these buttons is a small thumbnail of the current map. Below the navigation tools is an 'Info' button with an 'i' icon and a scale bar showing 'Scale: 4 %'. The main area of the viewer is a large map showing a satellite-style aerial view of a rural area with a river. Overlaid on the map are blue and green lines representing hazard mitigation zones. To the right of the map is a legend with various colored boxes and text descriptions. At the bottom right of the map area, there is a 'FIRM' (Flood Insurance Rate Map) information box with details about the map's date and version.

12/20/2012 6:40 PM

1 of 2

Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=49974963&IFTI=]

Intranetix Viewer [19197C0210C.png]

FEMA

Help

Zoom In Zoom Out 1:1 Zoom In Zoom Out

Pan

Make a FIRlette

Scale: 4%

Info

LEGEND

- Blue lines: Flood Hazard
- Green lines: Flood Hazard
- Yellow lines: Flood Hazard
- Orange lines: Flood Hazard
- Red lines: Flood Hazard
- Blue lines: Flood Hazard
- Green lines: Flood Hazard
- Yellow lines: Flood Hazard
- Orange lines: Flood Hazard
- Red lines: Flood Hazard

FIRM

FLOOD INSURANCE RATE MAP

DATE: 10/15/2010

SCALE: 1:10000

PROJECT: WRIGHT COUNTY

DATE: 10/15/2010

SCALE: 1:10000

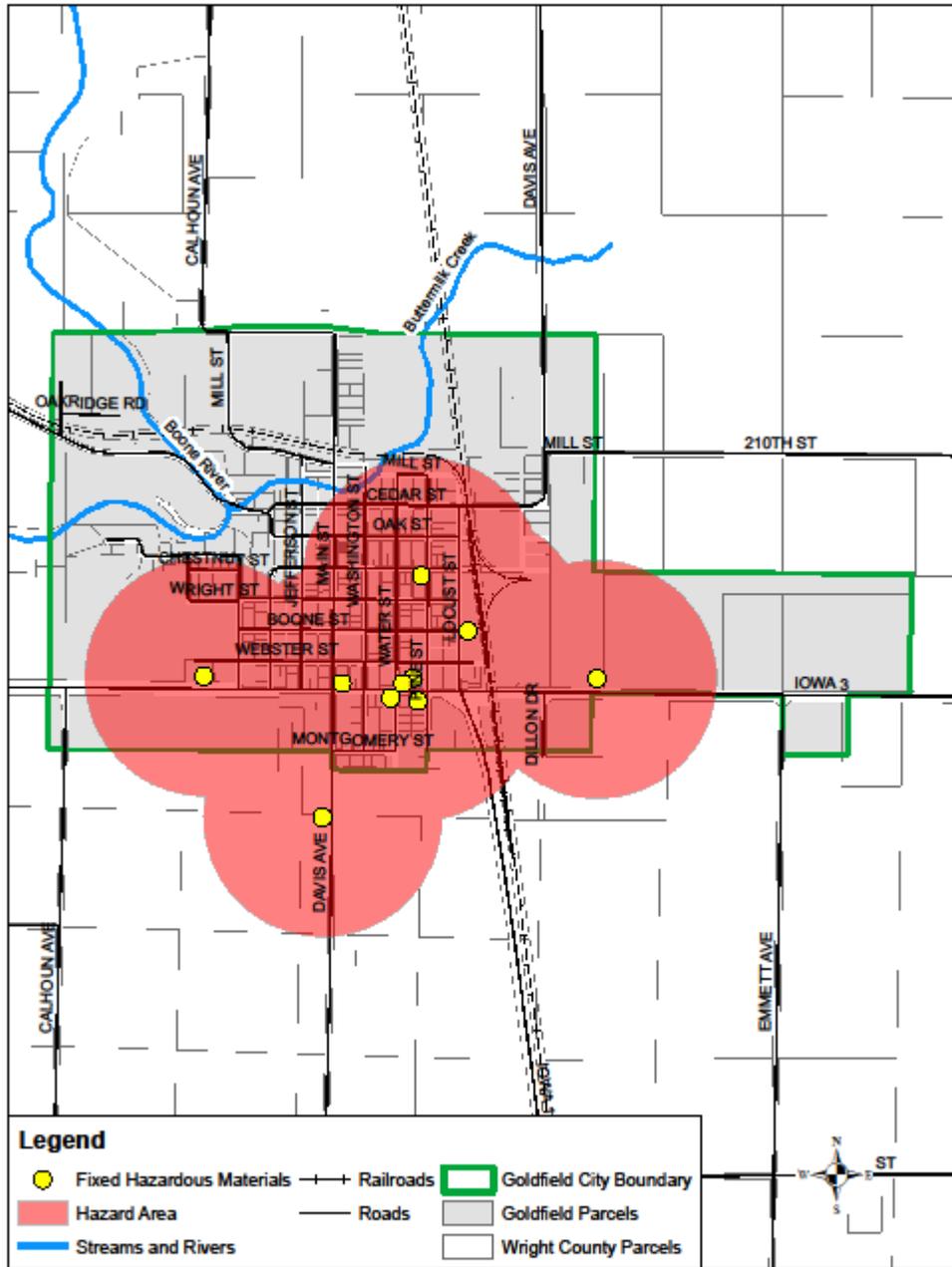
PROJECT: WRIGHT COUNTY

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1 of 2

City of Goldfield

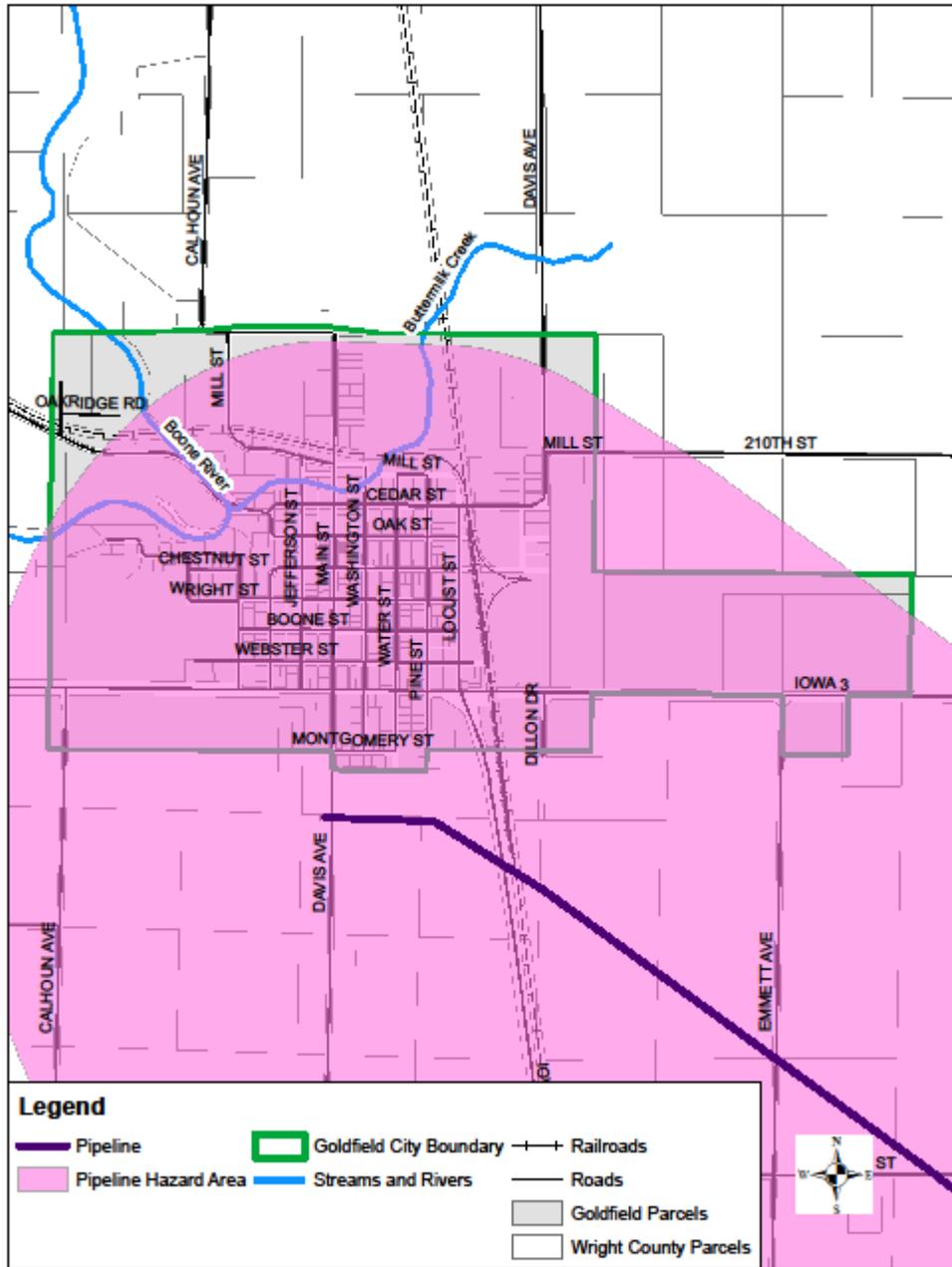
Fixed Hazardous Materials Hazard Area



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

City of Goldfield

Pipeline Hazard Area

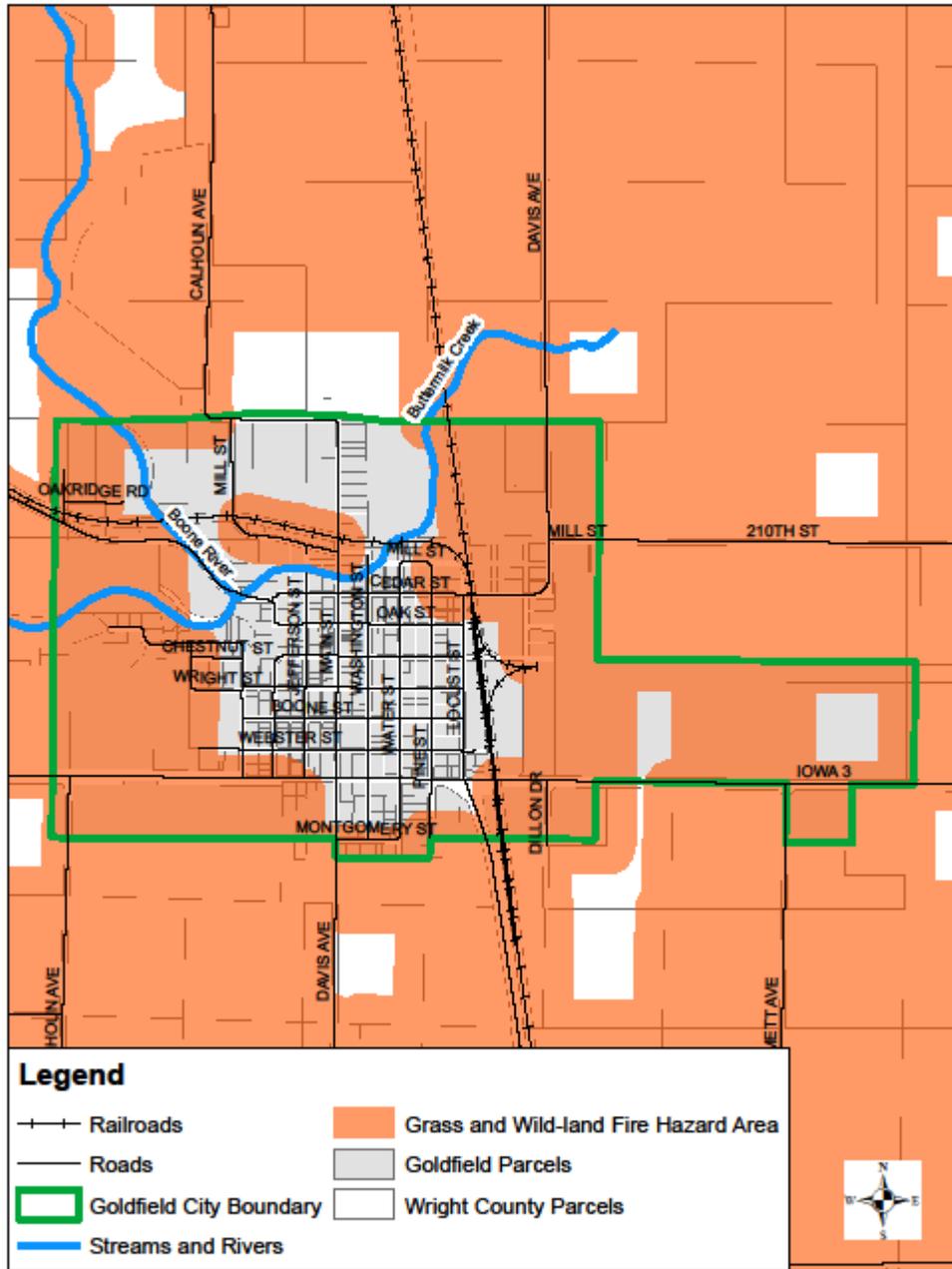


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

0 0.125 0.25 0.5 Miles

City of Goldfield

Grass and Wild-land Fire Hazard Area



Section 7: Hazard Mitigation Committee Meeting Minutes

GOLDFIELD HAZARD MITIGATION MEETING MINUTES May 18, 2010

Meeting began at 7:00 PM.

Present: Barbara Jergenson, Tom Stevenson, Jeff Slaikeu, Jim Lester, Randy Purcell, and Shirley Helgevold

Everyone introduced themselves.

Identified who should be invited to meetings. It was decided that a letter should go to following asking them to be part of the City's Hazard Mitigation Committee:

- City of Clarion
- City of Eagle Grove
- Clarion School
- Ethanol Plant
- Coop
- Telecommunications Group

Meeting notices will also be posted around town.

The draft community profile was distributed and missing items identified.

Information on past hazards was handed out for the committee members to review before the next meeting.

The committee established the fourth Tuesday of the month at 6:00 PM as their meeting times.

Meeting concluded at 8:00 PM.

GOLDFIELD HAZARD MITIGATION MEETING MINUTES June 22, 2010

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Andy Miller, Steve White, Craig Carlson, Jim Lester, Kelly Sorensen, Rick Rasmussen, and Shirley Helgevold

Discussed critical facilities and which facilities should be included. Follow facilities were identified:

- Lagoon
- School
- Lift Station (2)
- Water tower
- Water plant
- City Hall
- Maintenance facility
- Presbyterian and Methodist Churches that serve as shelters
- School bus barn
- Electrical/switching stations
- Gas stations

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Coop
- Ethanol plant
- Communication lines?
- Goldfield Communications facility
- Veterinarian?

Past hazard data was reviewed. List of state hazards was reviewed. Past effects of hazards on the City were identified. Potential hazards of each hazard were identified.

- Air Transportation Event
- Animal/plant/crop Disease
- Communications Failure
- Dam Failure
- Drought
- Earthquake
- Enemy Attack
- Energy Failure
- Expansive Soils
- Extreme Heat
- Fixed Radiological Incident
- Flash Flooding
- Grass or Wild land Fire
- Hailstorms
- HAZMAT – Fixed Facility
- HAZMAT – Transportation
- Human Disease Incident
- Human Disease Pandemic
- Landslide
- Levee Failure
- Pipeline Incident
- Public Disorder
- Radiological Transportation
- Rail Transportation Event
- River Flooding
- Severe Winter Storm
- Sink Holes
- Structural Failure
- Structural Fire
- Terrorism (Cyber, Bioterrorism, Radiological, Chemical, Agro, Conventional)
- Thunderstorm and Lightning
- Tornadoes
- Transportation Event
- Waterway Incident
- Windstorm

The committee decided to remove dam failure, earthquakes, expansive soils, landslides, levee failure, conventional terrorism, enemy attack, fixed radiological incident, radiological incident and waterway incident from the assessment as there have been no past occurrences or the hazard is not present in the City. Due to concerns with natural gas incidents the City added “Natural Gas Incident” to the assessment.

Meeting concluded at 7:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
July 27, 2010**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Andy Miller, Jeff Slaikeu, and Shirley Helgevold

The committee removed sink holes, air transportation incident, cyber terrorism from the assessment as there is no airport in the city and there have been incidents of sink holes or cyber terrorism.

The Risk Analysis worksheet was completed.

GOLDFIELD RISK INDEX WORKSHEET

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	TOTALS
Drought	4	3	4	4	3	1	19
Extreme Heat	4	4	4	4	2	1	19
Flash Flood	4	3	4	4	3	4	23
River Flooding	4	4	2	2	2	3	17
Grass and Wild Land Fires	2	4	1	1	1	4	17
Hail Storms	4	4	1	2	2	4	21
Severe Winter Storms	4	4	4	4	3	2	21
Thunderstorms & Lightning	4	4	1	1	2	4	16
Tornados	4	4	4	2	4	4	22
Windstorms/High Winds	4	4	4	3	3	4	22
Ag Terrorism	1	2	1	2	2	4	12
Animal/Plant/Crop Disease	1	1	1	4	3	1	11
Bioterrorism	1	2	1	4	4	4	16
Chemical Terrorism	1	2	1	4	4	4	16
Energy Failure	1	2	4	4	3	4	18
Fixed HAZMAT Facility	1	2	1	1	2	4	11
Highway Transportation Incident	1	2	1	1	1	4	10
Human Disease Incident	1	1	1	4	3	4	14
Human disease Pandemic	1	1	1	4	3	1	11
Natural Gas Incident	1	1	1	1	4	4	12
Pipeline Transportation Incident	1	1	1	1	4	4	12
Public Disorder	1	1	1	1	2	4	10
Radiological Transportation	1	1	1	4	4	4	15
Rail Transportation Incident	1	2	2	2	3	4	14
Structural Failure	1	1	1	1	2	4	10
Structural Fire	4	4	1	1	3	4	17
Transportation HAZMAT	1	2	2	4	3	4	16

Meeting concluded at 8:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
August 24, 2010**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Tom Stevenson, Doug Helgevold, Steve Whyte, Jeff Slaikeu, and Shirley Helgevold

The committee discussed the possibility of sending surveys to residents to get an idea of what issues they have had when there is a weather event.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Reviewed Risk Analysis worksheet and decided to score landslides.

GOLDFIELD RISK INDEX WORKSHEET							
Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	TOTALS
Flash Flood	4	3	4	4	3	4	22
Tornados	4	4	4	2	4	4	22
Windstorms/High Winds	4	4	4	3	3	4	22
Severe Winter Storms	4	4	4	4	3	2	21
Drought	4	3	4	4	3	1	19
Extreme Heat	4	4	4	4	2	1	19
Energy Failure	1	2	4	4	3	4	18
River Flooding	4	4	2	2	2	3	17
Hails Storms	4	4	1	2	2	4	17
Structural Fire	4	4	1	1	3	4	17
Thunderstorms and Lightning	4	4	1	1	2	4	16
Bioterrorism	1	2	1	4	4	4	16
Transportation Hazardous Materials	1	2	2	4	3	4	16
Radiological Transportation	1	1	1	4	4	4	15
Human Disease Incident	1	1	1	4	3	4	14
Rail Transportation Incident	1	2	2	2	3	4	14
Grass and Wild Land Fires	2	4	1	1	1	4	13
Agro Terrorism	1	2	1	2	2	4	12
Natural Gas	1	1	1	1	4	4	12
Pipeline Transportation Incident	1	1	1	1	4	4	12
Animal/Plan/Crop Disease	1	1	1	4	3	1	11
Fixed Hazardous Materials	1	2	1	1	2	4	11
Human Disease Pandemic	1	1	1	4	3	1	11
Highway Transportation Incident	1	2	1	1	1	4	10
Public Disorder	1	1	1	1	2	4	10
Structural Failure	1	1	1	1	2	4	10
Landslide	1	1	1	1	2	1	7

The process of assessing hazard vulnerability was discussed.

Meeting concluded at 6.45 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
September 28, 2010**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Andy Miller, and Shirley Helgevold

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Reviewed facility maps and started identify which are critical.

Meeting concluded at 7:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
October 26, 2010**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Jeff Slaiken, and Shirley Helgevold

Reviewed critical facilities map and eliminated those that were not considered critical. The final 3 facilities were identified as critical.

- Goldfield City Hall
- Goldfield water treatment plant
- Goldfield Telecom

Reviewed mitigation strategies in “Mitigation Ideas” Mitigation Planning Tool provided by FEMA.

Meeting concluded at 7:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
January 25, 2011**

Meeting began at 6:15 PM.

Present: Barbara Jergenson, Jeff Slaiken, and Shirley Helgevold

Started Revising Risk Assessment using scoring used by other cities. Decided to remove Radiological Transportation incident as do not have much if any of this transported through the City.

GOLDFIELD RISK INDEX WORKSHEET							
Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	TOTALS
Agro Terrorism	1	2	1	2	2	5	13
Air Transportation Incident	1	1	1	1	2	5	11
Animal/Plant/Crop Disease	1	2	1	2	2	1	9
Bioterrorism	1	2	1	5	4	5	18
Conventional Terrorism	1	1	1	1	1	5	10
Drought	4	3	4	4	3	1	19
Energy Failure	1	2	5	5	3	5	21
Extreme Heat	4	4	2	2	2	1	15
Fixed HAZMAT	1	2	1	1	2	5	12
Flash Flood	5	4	4	4	3	4	24
Grass and Wild Land Fires	3	4	1	1	2	5	16
Hail Storms	3	4	1	2	2	4	16
Highway Transportation Incident	2	3	1	1	2	5	14
Human Disease Incident	1	2	3	4	3	1	14
Human Disease Pandemic	1	2	4	4	3	1	15

*Chemical Terrorism was put with Bioterrorism

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Meeting concluded at 7:45 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
March 29, 2011**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Jeff Slaiken, and Shirley Helgevold

Determined public meeting will be held at the next committee meeting.

Revised Risk Assessment was completed.

GOLDFIELD RISK INDEX WORKSHEET							
Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	TOTALS
Natural Gas	1	1	1	1	2	1	7
Pipeline Incident	1	1	1	1	3	5	12
Public Disorder	1	1	1	1	1	5	10
Rail Transportation Incident	1	3	2	2	3	5	16
River Flooding	5	4	2	2	2	4	19
Severe Winter Storm	5	5	5	5	3	2	25
Structural Failure	1	2	1	1	2	5	12
Structural Fire	5	5	1	1	4	5	21
Thunderstorms and Lightening	5	5	1	1	2	5	19
Tornados	5	5	4	4	5	5	28
Transportation HAZMAT	1	3	2	4	3	5	18
Windstorms/High Winds	5	4	4	3	3	5	24

Began identifying mitigation actions, it would be helpful to have the city employee in charge of public utilities at the meeting to identify projects which may help to mitigation any disasters.

Meeting concluded at 7:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
April 19, 2011**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Jeff Slaiken, and Shirley Helgevold

No one from the public attended so those present proceeded with the other items on the agenda.

Mitigation actions were identified.

Tornados

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Purchase 3 sirens with batter backup
- Severe Winter Storms
 - Identify facility to service as safe shelter
 - Purchase generator for safe shelter
 - Permanent generator for water plant
 - City has a snow ordinance
- Flash Flood
 - Inspect/evaluate/televise sanitary sewer system to determine where issues are
 - Establish sump pump ordinance
- Windstorms
 - City has insurance
- Energy Failure
 - Permanent generator for water plant
- Structural fire
 - Replace inadequate and old fire hydrants
 - Additional volunteer fire fighter
 - City has fireworks ordinance
- Drought
 - Develop water use ordinance
- River Flooding
 - City has Barricades to close road
- Thunderstorms and Lightning
 - Generators
 - Weather spotters training
- Bioterrorism/Chemical Terrorism
 - Locks on wellheads
- Transportation HAZMAT
 - Continue to belong to Region V HazMat
 - Continue to train firefighters to operations level
 - Most fire fighters trained in incident command
 - Keep HazMat kit updated
- Grass and Wild land fires
 - County issues burn restrictions
 - Construct dry hydrant for new businesses coming into area not near water source
 - Weather spotters treating
- Hail storms
 - City stores City vehicles inside
- Rail Transportation Incident
 - Install rail arms on railway crossing on Hwy 3
 - City has rail ordinance
- Extreme Heat
 - Identify facility to service a storm shelter
 - Generator for storm shelter
- Highway Transportation Incident
 - City has barricades to use when there is an accident
- Human Disease Incident
 - Offer flue clinic in town
- Agro Terrorism
 - Locks currently on anhydrous tanks
 - Granulars are locked up at Coop
 - Coop has surveillance cameras
- Fixed HAZMAT
 - Continue to train fire fighters to operations level
 - Keep HAZMAT kit at fire station updated
 - Encourage County to continue to belong to Region V HazMat
- Natural Gas/Pipeline

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Purchase gas detector
- Educate public on issues
- Structural Failure
 - City has a nuisance ordinance
- Animal/Plant/Crop Disease
 - Insurance
 - Spraying is currently being done

The following mitigation goal was identified:

- Reduce or eliminate injury to or loss of lives and reduce or eliminate property damage or loss due to hazards that afflict the City.

Meeting concluded at 7:00 PM.

**GOLDFIELD HAZARD MITIGATION MEETING MINUTES
May 24, 2011**

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Jeff Slaiken, and Shirley Helgevold

Added Mitigation actions received from City Works department.

- Tornados
 - New standby generator
- Flash flood
 - Larger storm sewer on Locust Street
- Energy Failure
 - New standby generator

Completed STAPLEE on mitigation actions identified to include in the plan.

Goldfield STAPLEE Results

<i>Mitigation Strategies</i>	TOTAL POINTS
Continue HazMat Operations training for fire fighters	14
Continue Incident Command training for fire fighters	14
Continue weather spotters training	12
Continue as part of Region V HazMat	11
Purchase generator for shelter	10
Purchase generators for water plant and lift station	10
Keep HazMat kit in fire station	9
Identify/select facility to serve as community shelter	9
Construct larger storm sewer on Locus	9
Replace fire hydrants (15)	8
Construct a dry hydrant for incoming businesses located in outlined areas	7
Purchase portable trash pumps (2)	7
Offer flu clinic in town	6
Purchase new battery backup warning sirens (2)	6
Purchase gas detector for fire department	3

Meeting concluded at 7:00 PM.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

GOLDFIELD HAZARD MITIGATION MEETING MINUTES
July 26, 2011

Meeting began at 6:00 PM.

Present: Barbara Jergenson, Jeff Slaiken, Steve Whyte, and Shirley Helgevold

Reviewed the STAPLEE and compared to the Risk Analysis. Developed the following Prioritization and Implementation plan:

Mitigation Action	Priority	Department/Party Responsible	Potential Funding Sources	Target Completion Date
Continue HazMat Operations training for fire fighters	M	Fire Department	City	Ongoing
Continue Incident Command training for fire fighters	L	Fire Department	City	Ongoing
Continue weather spotters training	L	County EMD	N/A	Ongoing
Work with Region V HazMat	M/L	Fire Department	N/A	Ongoing
Purchase generators for water plant and lift station	H	City	FEMA, HUD, USDA, City	When funding becomes available
Keep HazMat kit in fire station	M	Fire Department	Fire Department budget	Ongoing
Make list of locations serve as community shelter	L	City	N/A	2014
Construct larger storm sewer on Locus	L	City	FEMA, USDA, City	When funding becomes available
Replace fire hydrants (17)	H	City/Fire Depart	FEMA, USDA, City	2013/2014
Construct a dry hydrant for incoming businesses located in outlined areas	L	Fire Dept/Business Benefiting	FEMA, USDA, City	2014
Purchase portable trash pumps (2)	M	City	FEMA, USDA, City	2013
Continue to offer flu clinic in town	L	County Health	N/A	Ongoing
Purchase new battery backup warning sirens (2)	L	City	FEMA, USDA, City	When funding becomes available
Purchase gas detector for fire department	L	Fire Department	Fire Department Budget	2013

*Priority at this time was based on City's rank of project with hazard.

Meeting concluded at 6:45 PM.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Section 8: Resolution

RESOLUTION NO. 581

**A RESOLUTION OF THE GOLDFIELD CITY COUNCIL ADOPTING
A HAZARD MITIGATION PLAN FOR GOLDFIELD, IOWA.**

WHEREAS, the Goldfield City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Goldfield City Council has authorized the development of the City's portion of the Wright County Multi-jurisdictional Hazard Mitigation Plan for the City of Goldfield, Iowa; and,

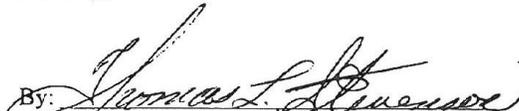
WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, The Goldfield Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommended that the City Council approve the plan; and,

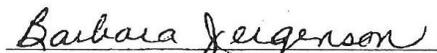
WHEREAS, the plan has been reviewed by City staff members and the City Council,

NOW THEREFORE BE IT RESOLVED, that the Goldfield City Council; hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADDOPTED this 14th day of January, 2013.

By: 
Thomas Stevenson, Mayor

Attest:


Barbara Jergenson, City Clerk

Appendix G: Rowan

Section 1: Risk Assessment

The City of Rowan Hazard Mitigation committee decided that the following additional hazards were not applicable or would have little effect on the City:

Railway Incidents was considered to be not applicable as there is no rail in the City.

Terrorism (all) was considered not applicable to the City due to the small size of the city.

Terrorism can occur anywhere at any time; however, looking at the situation from a different perspective the member of the committee thought that other places within the United States would serve as a stronger political statement than Rowan.

The following hazards were combined together:

- Human Disease Incident and Human Disease Pandemic were combined into Disease.

Due to water quality concerns in the area Watershed Pollution was added to the list of hazards addressing

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Hailstorm	5	5	5	5	3	5	28
Energy Failure	5	5	5	5	3	5	28
Severe Winter Storms	5	5	5	5	3	2	25
Tornado	1	3	5	5	5	5	24
Flash Flooding	5	5	4	3	2	4	23
Thunderstorm & Lightning	5	5	3	3	3	4	23
Windstorms	5	5	2	3	2	5	22
Earthquakes	1	1	5	5	5	5	22
HAZMAT - Transportation	1	3	4	5	4	5	22
HAZMAT – Fixed Facility	1	3	5	5	3	5	22
Pipeline Incident	1	1	5	5	2	5	19
Extreme Heat	5	4	2	5	1	1	18
Watershed pollution	1	4	2	5	1	5	18
Structural Fire	5	3	1	1	3	5	18
Communication Failure	5	5	1	1	1	5	18
Highway Transportation Event	4	5	1	1	2	5	18
Disease	1	3	3	3	3	3	16
Structural Failure	2	3	1	1	2	5	14
Air Transportation Event	1	1	1	2	3	5	13
Drought	1	2	2	5	1	1	12
Grass or Wild land Fire	1	1	2	1	2	5	12
Expansive Soils	1	1	1	1	1	5	10
Public Disorder	1	1	1	1	1	5	10
River Flooding	1	1	3	1	1	2	9

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The following are the results of the Hazard Risk Analysis that the committee completed, with a detailed explanation for each of the resulting scores. The results are organized from highest risk rating to lowest.

Hazard	Hailstorm
Location	Hailstorms have the potential to affect all areas of Rowan. See Section 6 of this Appendix for a map of the City.
Historical Occurrence	According to data collected from the National Climatic Data Center (NCDC) displayed in Appendix L, there have been a total of 54 hailstorms that have been reported in Wright County since 1957 3 of which directly impacted the City of Rowan. The hazard mitigation committee determined that some events may have not been recorded by NCDC; therefore, they decided that more than 10 events have occurred within the City.
Probability	According to the hazard mitigation committee at least one hailstorm occurs each year. While they vary in severity, the committee determined that it is highly likely that one will occur in the next year.
Vulnerability	The entire community is vulnerable to being impacted by a hailstorm. People, if exposed to the event could be injured and property exposed is vulnerable to damage.
Maximum Threat	Based on the community's area of land cover, the hazard mitigation committee determined that the entire spatial extent of Rowan would be impacted by a hailstorm.
Severity of Impact	The hazard mitigation committee determined that if directly exposed to a hailstorm, a person may be at risk of serious injuries, some short term property damage could take place and essential services, such as energy could be disrupted.
Speed of Onset	Hail storms often result from severe thunderstorms or tornadoes; therefore, they may occur with very little warning.

Hazard	Energy Failure
Location	The entire community would generally be impacted by an energy failure; see Section 6 of this Appendix for a map of Rowan.
Historical Occurrence	Energy failures in the City of Rowan are generally the result of electrical failures due to ice storms or high winds. While no official record of energy failure is presented, the hazard mitigation committee determined that more than 10 occurrences have taken place within the City of Rowan.
Probability	With the number of failures that have occurred in the past and the likelihood that ice storms or high winds will occur within Rowan every year, the hazard mitigation committee determined that the probability of an energy failure occurring is highly likely.
Vulnerability	An energy failure would impact the entire community and would become a particular concern during extreme heat or extreme cold temperatures. With very few generators located within the City of Rowan, the majority of the community would feel the impacts of an energy failure.
Maximum Threat	When an energy failure occurs within the community of Rowan, the entire community is impacted. The entire spatial extent of the community is generally without power until the electrical company is able to fix the issue.
Severity of Impact	Energy failures generally have a limited amount of impact on the structural stability of buildings and incur very few injuries to persons of Rowan. The largest impacts would cause the failure of essential facilities or services.
Speed of Onset	Energy failures generally occur without any warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Severe Winter Storms
Location	Severe Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a winter storm occurs, the entire community of Rowan is impacted. For a map of the assessed structures that could potentially be impacted, see Section 6 of this Appendix.
Historical Occurrence	Historical data provided by the National Climatic Data Center (NCDC) is presented in Appendix L. Based on this data Rowan and Wright County, combined, have experienced more than 65 instances of winter storm conditions since 1993. Based on this and the committee's common knowledge of winter storms, it was determined that there have been more than 10 events take place in Rowan.
Probability	Winter storms commonly occur throughout the state of Iowa. Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. With the snow season extending from October to April, the chance for a severe winter storm that may produce extreme cold temperatures along with large amounts snow, ice and wind, is highly likely.
Vulnerability	Winter storms are generally regional events that would impact the entire City of Rowan. The hazard mitigation committee determined that more than 75% of the people and property within the community would be affected.
Maximum Threat	As mentioned, winter storms affect entire regions and would impact the entire spatial extent of Rowan. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the City's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property of Rowan. Because most residents are able to seek shelter during a winter storm event, the hazard mitigation committee determined that winter storms generally have a limited impact on the quality of life with low instances of injury, property damage or facility disruption.
Speed of Onset	Weather services can accurately predict when winter storms will occur and the conditions that may accompany the storm. Generally there is more than 24 hours of warning when a winter storm is on its way.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Tornado
Location	The entire City of Rowan is exposed to a tornado; a map of the entire community is located in Section 6 of this Appendix.
Historical Occurrence	As seen in the NCDC data shown in Appendix L, Wright County has been reported to have experienced tornadoes that have caused extensive property damage. 24 tornadoes have been reported since 1964, with only one of which having specifically impacted the City of Rowan, the hazard mitigation committee determined that less than 2 tornadoes have impacted the City.
Probability	There are on average about 46 tornadoes per year in the state of Iowa. Tornado events occur randomly and have the potential to affect any community within the State. Because tornadoes act in such a random manner, the Rowan hazard mitigation committee determined that it is possible for a tornado to occur within the community.
Vulnerability	The entire population of Rowan is vulnerable to tornadoes. Both personal safety and structural stability would be a great concern. The hazard mitigation committee felt that if a tornado directly struck the community, more than 75% of the people and property would be affected.
Maximum Threat	Similar to the vulnerability, the committee determined that if a tornado directly struck the City of Rowan, more than 75% of its spatial extent would be impacted.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials. The Rowan hazard mitigation committee determined that a tornado would cause serious injury, even death; major property damage and interruption in services.
Speed of Onset	Very little warning is given when a tornado occurs, especially when a tornado watch transitions into a tornado warning.

Hazard	Flash Flooding
Location	The map in Section 6 displays the low lying areas within Rowan where flash flooding would most likely occur.
Historical Occurrence	Flash flooding generally occurs in Rowan when large amounts of rain fall in a short period of time. While the NCDC data only reports 13 flash flood events and 2 urban flood event in Wright County, the hazard mitigation committee recalls more events. The committee determined that there have been more than 10 occurrences of flash flooding in the community.
Probability	The hazard mitigation committee estimated, based on their familiarity with the City that it is likely that flash flooding will occur in the City of Rowan in the next year. The majority of issues result from slow storm sewer intakes.
Vulnerability	The impacts of flash flooding occur throughout the City of Rowan. The hazard mitigation committee estimated that 50-75% of residents are impacted.
Maximum Threat	The spatial extent of flash flooding is somewhat lower than that of those impacted; this is because the flash flooding occurs in more dense areas of town where houses exist. The committee estimated that 25-50% of the spatial extent of the City is impacted.
Severity of Impact	While flash flooding is a nuisance to the community there are generally a limited amount of injuries, property damage or interruption of services in Rowan.
Speed of Onset	Flash flooding occurs quickly; however, the amount of rain gives some indication of when it may occur. The hazard mitigation committee estimated that citizens have less than 5 hours warning time when a flash flood event will occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Thunderstorm and Lightning
Location	Thunderstorms generally affect an entire area or region; therefore, if a thunderstorm event were to occur, the entire City of Rowan would be impacted. For a map of the City of Rowan, see Section 6 of this Appendix.
Historical Occurrence	The NCDC historical data in Appendix L displays how many events relating to thunderstorms have been recorded in Wright County. 59 thunderstorm events since 1973 have been recorded. A great percentage of these storms most likely impacted the City of Rowan. Based on this data and the fact that thunderstorms and lightning are a common occurrence in the Midwest, the hazard mitigation committee determined that more than 10 thunderstorms and/or lightning strikes have been experienced in Rowan.
Probability	The central area of the United States is home to some of the most severe thunderstorms in the world. Because of the frequency of severe thunderstorms and lightning that have continued to impact Rowan in the past, the hazard mitigation committee determined that there is a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	While thunderstorms are a regional event, the hazard mitigation committee estimated that only approximately 25-50% of people and property are directly impacted. Impacts are discussed below in severity of impact.
Maximum Threat	Similar to the vulnerability, the hazard mitigation committee determined that if a thunderstorm were to occur, approximately 25-50% of the spatial extent of the community would feel the impacts.
Severity of Impact	Thunderstorms and lightning impact the City of Rowan due to high winds, heavy rains and lightning strikes. While each of these characteristics has the potential to cause injuries, damage to property or service interruptions, the committee determined these impacts would be limited.
Speed of Onset	A community generally has an idea of when a thunderstorm is approaching; however, the characteristics present within a storm may be difficult to predict. The hazard mitigation committee determined that the community of Rowan generally has less than 5 hours warning that a thunderstorm which may generate lightning will occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Windstorms
Location	Windstorms would generally impact the entire area of Rowan as discussed in the Maximum Threat. For a map of the community see Section 6 of Appendix B.
Historical Occurrence	According to the NCDC, 41 wind events/windstorms have been recorded in Wright County & Rowan since 1993; these windstorms may or may not have impacted the City. Windstorms may accompany other storms such as thunderstorms or winter storms; therefore, the hazard mitigation committee determined that windstorms have occurred more than 10 times within the community.
Probability	Iowa lies on the eastern edge of the Great Plains where winds blow strong, particularly in the winter and spring. The relative flatness of the terrain and cropland with few trees means that most areas of the city are well exposed to the wind. Because windstorms are such a common occurrence, the hazard mitigation committee determined that it is highly likely for a significant, damaging windstorm to occur.
Vulnerability	The hazard mitigation committee determined that because most windstorms occur in a regional manner, more than 75% of the people and property of Rowan would experience the windstorm; however, only about 10-25% of the community would feel the impacts, as discussed in the severity of impacts.
Maximum Threat	While only 10-25% of the community would feel the impacts of a windstorm; approximately 25-50% of the spatial extent would experience impacts. This includes wooded areas where structures and/or people are not present.
Severity of Impact	The hazard mitigation committee determined that because each of the residents of the City are able to seek shelter, the severity of wind storms in terms of fatalities, injuries, property loss, and economic is minor. The majority of results are downed limbs and energy disruptions.
Speed of Onset	Sustained high winds can be predicted; however, gusts can quickly change, giving people a minimal amount of warning.

Hazard	Earthquakes
Location	An earthquake would most likely impact the entire community. For a map of the community, see Section 6 of this appendix.
Historical Occurrence	Members of the Rowan Hazard Mitigation Committee recall feeling the effects of earthquakes that occurred outside of the area; however, the committee determined the ground shaking has reached the City less than 2 times in the past.
Probability	Because there have been very few instances where an earthquake was felt in the community, the committee determined that it is highly unlikely that an event will impact the City.
Vulnerability	An earthquake is a regional event, if one were to impact the City, the entire City would feel the effects
Maximum Threat	Similar to vulnerability, the entire spatial extent of the community would feel the impacts of an earthquake.
Severity of Impact	The hazard mitigation committee determined that a major earthquake event would severely impact the City. Such event could cause injuries, substantial structural damages and impacts to the public facilities; however, such event at this extremity is very unlikely within Rowan.
Speed of Onset	Earthquakes occur with little warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	HAZMAT-Transportation
Location	HAZMAT events related to transportation can occur anywhere within Rowan; to see a map of the City please see Section 6 of this Appendix.
Historical Occurrence	The list of historical occurrences of HAZMAT events that have taken place in Wright County is shown in Chapter 3 of this plan; this list was provided by the Iowa Department of Natural Resources (DNR). The HAZMAT events relating to transportation are most likely due to the accidental release of hazardous materials during the transport of substances for agriculture uses, since the surrounding areas are of heavy agricultural use. The hazard mitigation committee determined that very few substances are transported through the community; therefore, less than 2 events have occurred.
Probability	While very few HAZMAT incidents relating to transportation have impacted the community, the committee determined that because the surrounding area is an agriculture area, it is possible for such event to occur.
Vulnerability	The percentage of people and property that could be impacted depends on the material, amount, time of day and temperature. While most HAZMAT incidents that have taken place in Rowan in the past have been of low caliber, the committee determined that 50-75% of the people and property could be impacted in a major HAZMAT event.
Maximum Threat	While the hazard mitigation committee determined that 50-75% of people and property would be impacted by a HAZMAT event related to transportation, they determined that more than 75% of the spatial extent would be impacted because the extent of such incident would be larger than can be detected.
Severity of Impact	Hazardous material spills or releases most commonly have the potential to result in injuries; especially in relation to hazardous material events due to transportation. Property damage is generally minimal and facilities generally not disrupted.
Speed of Onset	There is no prediction for when a release or spill of hazardous materials will occur when related to the transport of such materials; most events occur due to a sudden crash or unexpected leak.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	HAZMAT-Fixed Facility
Location	The locations of fixed facilities that produce, store or handle hazardous materials are illustrated in the map in Section 6 of this appendix.
Historical Occurrence	While hazardous material spills do commonly occur in and around Rowan, the spills that have occurred have not had a significant impact on the community. The hazard mitigation committee determined that based on the insignificance of past impacts that the historical occurrence of hazardous material spills is less than two major occurrences.
Probability	While very few HAZMAT incidents relating to fixed facilities have impacted the community, the committee determined that because the surrounding area is an agriculture area, it is possible for such event to occur.
Vulnerability	Areas of the community vulnerable to a HAZMAT event related to the fixed facilities are determined based on their proximity to the facilities and the type of material that may be released. If a major event were to occur in the community, it is possible that more than 75% of people and property could be impacted.
Maximum Threat	Because the land area that consists of the City of Rowan is so small, the hazard mitigation committee estimated that if a major HAZMAT event occurred, the entire spatial extent of the community could be impacted.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. The hazard mitigation committee determined that a significant HAZMAT event could result in more serious injuries or illness, minor property damage and possible shutdown of essential services for a day or more.
Speed of Onset	Because a hazardous material event occurs randomly, there is typically no warning time for when such an accidental event will occur.

Hazard	Pipeline Incident
Location	The nearest major pipeline, which consists of liquid propane, is located a little over a half a mile southeast of Rowan. For a map of the pipeline see Section 6 of this appendix.
Historical Occurrence	Historically there has been no incidence of a pipeline incident occurring nearby and having an impact on the City of Rowan; therefore, the hazard mitigation committee determined that a rating of 1 should be given to historical occurrence.
Probability	Rowan is located a little over a half a mile northwest of a major liquid propane pipeline. The hazard mitigation committee determined that there is less than a 10% chance that a pipeline incident would occur and impact the City in the next year; due to both the City's distance from the pipeline and the policies and inspections the pipeline association is required to meet.
Vulnerability	If a major pipeline incident did occur, the hazard mitigation committee determined that in a worst case scenario there is a chance for such incident to impact more than 75% of the people and property in Rowan.
Maximum Threat	Similar to vulnerability, if a major incident occurred and it had an impact on the community, more than 75% of the spatial extent of the community would be impacted.
Severity of Impact	While a majority of residents could be impacted, the hazard mitigation committee estimated that the severity of such impact could result in serious injuries or illness; however, structural damages and impacts to public facilities would be negligible.
Speed of Onset	Pipeline incidents are generally accidental and no warning is given when such event is going to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat event were to take place in Rowan the entire community would feel the event. For a map of the City see Section 6 of this Appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; 2 extreme heat events have been recorded for having occurred in Wright County. The committee estimated that there have been more events than this that meet IHSEMD's definition of Extreme Heat. They feel extreme heat events occur each summer, which means that more than 10 event have impacted the City
Probability	Based on past occurrences, the hazard mitigation committee estimated that it is likely that an extreme heat event will occur in the next year.
Vulnerability	When extreme heat conditions occur, it generally comes in a heat wave that impacts an entire region; however, a majority of Rowan residents have air conditioning. Therefore the committee determined only approximately 10-25% of the community is negatively impacted.
Maximum Threat	Because extreme heat occurs regionally, the entire spatial extent of Rowan would experience the event.
Severity of Impact	Most of the people in Rowan have air conditioners; therefore, the impact of extreme heat is generally very mild. Few injuries occur, quality of life is generally not impacted, property is generally not damaged and services are generally efficient enough to handle the heat.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in Rowan, see Section 6.
Historical Occurrence	Much of the watershed pollution that might occur within Rowan would most likely be due to nonpoint source pollution. While it is difficult to measure the number of times this kind of pollution occurs, the Rowan hazard mitigation committee estimated that, due to HAZMAT events there have been reported, less than 2 significant events may have caused watershed pollution.
Probability	While very few events have been reported in the past, the hazard mitigation committee estimated that it is likely that watershed pollution will occur in the next year, since many unknown events do occur.
Vulnerability	The Iowa River runs through the southern portion of the City. Because this is not a developed area of the City, it was determined that 10-20% of the community is vulnerable to watershed pollution.
Maximum Threat	Damages from watershed pollution are difficult to measure; however, since the river runs through the southern portion of the community and waters drain into this waterway from the north, it's anticipated that more than 75% of the spatial extent of the community is impacted by watershed pollution.
Severity of Impact	As mentioned, specific damages relating to watershed pollution are difficult to measure; however, in Rowan it's anticipated that no major impacts would occur unless directly exposed to the body of water.
Speed of Onset	Because residents would be unaware that that pollution to the watershed is occurring there would be limited warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of Rowan see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee noted that they have seen more than 10 structural fires occur within the City in the past.
Probability	There is always the chance for a structural fire to occur within the City. Based on past known events, the committee noted that it was possible for a structural fire to occur.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined that less than 10% of people and/or property would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area, the committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and major property damage, as determined by the hazard mitigation committee; however, public facilities would generally not be threatened.
Speed of Onset	Structural fires may begin and spread incredibly fast; there is no warning when one might occur.

Hazard	Communications Failure
Location	In the event of a communications failure, the entire community could be impacted. For a map of the community see Section 6 of this Appendix.
Historical Occurrence	No data on communications failure could be found for the City of Rowan; however, the hazard mitigation committee recalls many instances when the power was out and no telephone service was available.
Probability	The communication failures that have occurred have been random events that were not expected within the City. Because communications failures have occurred frequently the committee estimated that it is highly likely that a communications failure in the form of telephone outages would occur every year.
Vulnerability	While power outages lose phone landlines, the majority of residents and emergency personnel have other means of communication they may use in emergencies; therefore, the area of impact is very low.
Maximum Threat	Because there are many means of communication available to residents and emergency personnel, less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	Communications failure in itself doesn't cause any injuries or property damage and the committee feels services would not be interrupted for a significant amount of time.
Speed of Onset	Communication failures are sudden and occur without any kind of warning. In most cases, communication failures are generally a result of some sort of accident, energy outage, vandalism or other natural hazard.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Transportation Event
Location	Transportation events have the potential to occur on any of the roadways within Rowan. For a map of the community and its transportation systems see Section 6 of this Appendix.
Historical Occurrence	County Roads C26 and P19 cross in the City of Rowan. The hazard mitigation committee recalls around 6-9 accidents having occurred in the City boundaries, part of this may due to the small amount of regional/state travel on these roads and the lower speed limits placed within the City Boundaries.
Probability	The hazard mitigation committee determined that based on the community's location, it is highly likely that a transportation event will occur in the next year, especially during a severe winter storm.
Vulnerability	Transportation events generally only affect the motor vehicles and/or rail cars involved. Based on these impacts less than 10% of the people and property of Rowan would be impacted by transportation events.
Maximum Threat	Similar to the vulnerability of the community; if a transportation event were to occur less than 10% of the space in the community would be impacted.
Severity of Impact	A transportation event can occur in many forms. Based on the low amount of vulnerable areas, the committee estimated that only minor injuries and/or property damage would occur.
Speed of Onset	No prediction of a transportation event can be made; therefore, there is no warning time of the event.

Hazard	Disease
Location	There is no telling where disease might occur within the City of Rowan; therefore, no specific location is established.
Historical Occurrence	There is no historical record of diseases specifically impacting the City of Rowan. The hazard mitigation committee recollected no such events; therefore, they determined that the rating of historical occurrence is 1.
Probability	Because of recent H1N1 outbreaks, the hazard mitigation committee determined that it is possible that a disease outbreak will impact the City in the next year.
Vulnerability	Because the City has a low population, the committee estimated that 25-50% of residents could be impacted.
Maximum Threat	Again, because the city has so very few residents, the hazard mitigation committee estimated that 25-50% of the spatial extent of the community would be impacted.
Severity of Impact	Due to the treatment available, few if any major illnesses might occur within the community from disease.
Speed of Onset	The hazard mitigation committee determined that there is no telling when disease may be spreading; however, with current treatment and vaccination, residents would be aware of symptoms as soon as they occur in others.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Structural Failure
Location	The hazard mitigation committee was not able to specifically identify structures that could fail within the community.
Historical Occurrence	The hazard mitigation committee determined based on their own knowledge of the City that approximately 2-4 events had occurred.
Probability	The committee discussed a few buildings within the community, which are at risk of structural failure; however, a majority of the community seems structurally sound.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Again, because most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that injuries and property damage would occur; however, impacts to the overall quality of life and essential facilities would not occur.
Speed of Onset	The hazard mitigation committee determined that there is no telling when a structure may fail; therefore, they noted that there is minimal or no warning time.

Hazard	Air Transportation Event
Location	An air transportation event could take place anywhere within the City due to crop dusting, or airplanes passing over from nearby airports. For a map of the nearby airports, see Section 6.
Historical Occurrence	Historically there has been no incidence of an air transportation event occurring within the City; therefore, the hazard mitigation committee determined that a rating of 1 should be given to historical occurrence.
Probability	Rowan is located approximately ten miles from the nearest airport; therefore, the hazard mitigation committee determined that there is less than a 10% chance that an air transportation event will occur within the community in the next year.
Vulnerability	If an air transportation event did occur, the hazard mitigation committee determined that only an isolated area would be impacted.
Maximum Threat	While the committee determined that less than 10% of the people and property would be impacted, the committee estimated that around 10-25% of its spatial extent would be impacted. This is due to the high amount of agriculture land that lies within the City boundaries; it would be anticipated that a plane crashing would be able to avoid structures within the community.
Severity of Impact	While the crash could potentially avoid the community, the hazard mitigation committee estimated that such event would injury or cause death to the pilots and passengers.
Speed of Onset	Air transportation events are generally accidental and no warning is given when such event is going to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire City of Rowan would be affected by the Drought conditions. For a map of the City of Rowan see Section 6 of this Appendix.
Historical Occurrence	There are three recorded occurrences of droughts in the NCDC Database dating 1995, 2001 and 2003; however, the committee does not recall such events having an impact on the City; therefore, the committee estimated that less than 2 events have occurred.
Probability	The hazard mitigation committee recalls very few droughts having occurred. Based on this they determined that it is unlikely that a drought that would have many impacts would occur in the next year.
Vulnerability	Crops, livestock and agriculture are most vulnerable to a drought. Because these impacts would be felt outside of the city in the unincorporated area, it's estimated that approximately 10-25% of the community would be impacted.
Maximum Threat	A drought is not a spatially isolated event. If a drought is present then the entire community will be affected.
Severity of Impact	Although a drought would have a major impact on the economy, the committee would not anticipate many illnesses, structural damages or interruption in services.
Speed of Onset	The onset of a drought would be very slow; therefore, the Hazard Mitigation Committee gave the speed of onset a 1, more than 24 hours warning time.

Hazard	Grass or Wild-land Fire
Location	Rowan is completely surrounded by agriculture land. During dry conditions a wild-land fire could occur anywhere around the City, for a map of the vulnerable area see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee noted that they have not seen major grass or wild-land fires occur within the community in the past; therefore, they gave historical occurrence a rating of 1; less than two events having occurred in the community.
Probability	There is always the possibility for a grass or wild-land fire to occur within the City of Rowan; however, the hazard mitigation committee determined that it is unlikely because burning bans are generally enforced during very dry conditions when fields are most vulnerable to fires.
Vulnerability	Because the land area of Rowan is so small, the hazard mitigation committee estimated that approximately 10-25% of residents would, in some way, be impacted by a wild-land fire through smoke inhalation, burning, etc.
Maximum Threat	The physical impacts of a grass or wild-land fire would result in a smaller spatial extent than there are vulnerable people. This is because the spatial extent of impacts would be isolated to the burn area.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and major property damage; however, facilities would most likely not be greatly impacted.
Speed of Onset	Grass and wild-land fires may begin and spread incredibly fast; there is no warning when one might occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Expansive Soils
Location	Expansive soils may occur anywhere within the City of Rowan. For a map of the community see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee decided that historically there have been very few instances of expansive soils affecting the community. However, those that have occurred have taken place in the form of basement walls buckling.
Probability	Based on historical occurrences, the hazard mitigation committee determined that there is less than a 10% chance that expansive soils will occur in Rowan within the next year.
Vulnerability	Expansive soils are generally an isolated event; therefore, less than 10% of people and property would be impacted.
Maximum Threat	Similar to the vulnerability, because of such event's isolation, less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The majority of impacts from expansive soils would not inflict injuries or illness; however, long term property damage that threatens structural stability may take place.
Speed of Onset	Expansive soils provide no warning to residents; therefore, the hazard mitigation committee determined that the speed of onset was minimal to no warning time.

Hazard	Public Disorder
Location	Public disorders can occur throughout the City of Rowan, but is usually centered throughout the Downtown area. See Section 6 of this Appendix for a map of the City of Rowan.
Historical Occurrence	There were no events that the committee could recall as a public disorder.
Probability	Because destructive civil disturbances have not occurred in the past, the committee estimated that there is less than a 10% chance that such event would occur in the next year.
Vulnerability	A disturbance in the City of Rowan would affect less than 10% of the community.
Maximum Threat	Spatially, less than 10% of the City of Rowan would be affected, due to the nature of disturbances being contained in on area of town.
Severity of Impact	Minor injuries and slight interruption of services would result from a public disorder or civil disturbance.
Speed of Onset	There will be no warning time in the event of a public disorder.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	River Flooding
Location	The City is part of the National Flood Insurance Program (NFIP). See Section 6 of this Appendix for the flood map.
Historical Occurrence	Since 1993 there have been 48 flood events recorded in Wright County; however, river flooding in Rowan most commonly occurs in the undeveloped area, where structures and people are few. Because the flooding has not directly impacted the community, the committee determined less than 2 events have occurred.
Probability	Again, because river flooding occurs in the undeveloped area, it's estimated that river flooding would not have impacts on the community any time soon.
Vulnerability	While the river flooding does not leave visible standing water throughout Rowan, impacts to basements make up for around 25-50% of the community according to the hazard mitigation committee.
Maximum Threat	While the river flooding does not leave visible standing water throughout Rowan, its spatial extent impacts less than 10% of the community.
Severity of Impact	The most severe impact of flooding is the economic damage that floodwaters can cause to homes and businesses. Generally speaking, flooding in Rowan causes very little property damage.
Speed of Onset	There is generally some kind of warning that flooding will occur. If there is a lot of rain upstream to Rowan, residents will get ample warning or notice that flooding may occur.

Section 2: Vulnerability Assessment & Loss Estimates

Rowan is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the City.

Those hazards that the entire city is exposed to includes Hailstorms, Energy Disruption, Severe Winter Storms, Thunderstorms & Lightning, Windstorms, Earthquakes, Extreme Heat, Watershed Pollution, Communications Failure, Drought, Tornadoes, HAZMAT-Transportation, Disease, Structural Failure, Air Transportation Event, Expansive Soils, and Violent Demonstration. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For Rowan, these hazards include Flash Flooding, HAZMAT-Fixed Facilities, Pipeline Incident, Grass or Wild-land Fire, and River Flooding. Their vulnerability assessments and loss estimates are discussed in sections 2.2 through 2.6.

2.1 Exposure Assessment for Hailstorms, Energy Failure, Severe Winter Storms, Thunderstorms & Lightning, Windstorms, Earthquakes, Extreme Heat, Watershed Pollution, Communications Failure, Drought, Tornadoes, HAZMAT-Transportation, Disease, Structural Failure, Air Transportation Event, Expansive Soils, and Public Disorder:

The City's exposure to each hazard was determined based on the area of the city that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire City include Hailstorms, Energy Failure, Severe Winter Storms, Thunderstorms & Lightning, Windstorms, Earthquakes, Extreme Heat, Watershed Pollution, Communications Failure, and Drought. Those hazards that could potential impact any one random site within the City include Tornadoes, HAZMAT-Transportation, Disease, Structural Failure, Air Transportation Event, Expansive Soils, and Public Disorder. With this, all of the above-listed hazards have the potential to impact any area of the City, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The table below depicts this exposure.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	91	91	100%	\$2,834,600.00	\$2,834,600.00	100%	157	157	100%
Commercial	29	29	100%	\$903,500.00	\$903,500.00	100%			
Agricultural	4	4	100%	\$50,000.00	\$50,000.00	100%			
Industrial	8	8	100%	\$206,100.00	\$206,100.00	100%			
TOTAL	132	132	100%	\$3,994,200.00	\$3,994,200.00	100%			

2.1.1. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms and according to the hazard mitigation committee, more than 75% of the people in the city could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDC shows 17 hailstorms reported in Wright County and 3 such events reported in Rowan. The maximum amount of property damage incurred in one recorded event within the City of Rowan equaled \$10,000, which accounts for about .7% of the city’s assessed residential, commercial, agricultural and structural values. Based on this historical data it was estimated that approximately .3% of the city’s structures would be impacted by a hailstorm.

- Estimated residential structural damage due to Hailstorms (.3%) = \$8,504
- Estimated commercial structural damage due to Hailstorms (.3%) = \$2,710
- Estimated agricultural structural damage due to Hailstorms (.3%) = \$150
- Estimated industrial structural damage due to Hailstorms (.3%) = \$618
- Total estimated structural damages due to Hailstorms = \$11,982

2.1.2. Vulnerability Assessment for Energy Failure

Energy failure is an extended interruption of service either in electric, petroleum or natural gas, which is caused by an outage or shortage of usable energy. Energy shortages are rare in Rowan; however, outages are common. Outages are often caused by impacts to above-ground power lines from thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes and infrastructure failure.

The hazard mitigation determined based on personal experience that energy failures impact the entire community; however, impacts are generally mild. Generally the largest impact is to essential facilities or services; however, few if any injuries or illness occur, and little-to-no property damage.

Energy failures are most threatening during extreme heat or winter conditions. During such time residents are not able to cook, store food, or run every-day appliances. Death and injuries due to power outages are very rare.

Loss Estimate Calculation:

As mentioned above, an energy failure generally does not impact structures and people are typically only at risk during extreme heat or winter conditions. Due to these circumstances, no loss estimate could be calculated.

2.1.3. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the City of Rowan is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that more than 75% of the people and property within the city are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice. Infrastructure failure occurs through power outages from ice, which has the potential to impact the entire County. Structural failure is also an impact that can occur due to large amounts of heavy snow. These impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person's exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the City are ill-advised to be outdoors for long periods of time during a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDC, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this amount represents reported damages throughout the County, it was used as a worst-case scenario for the City of Rowan. Therefore, based on \$75,000 in damages that could potentially occur within the City of Rowan, which when rounded upwards means approximately 2 % of the structures in the city would experience damages due to winter storms. The loss estimate calculation for .2% in damages of all structures in Rowan is expressed below.

Estimated residential structural damage due to Severe Winter Storms (2%) = \$56,692
Estimated commercial structural damage due to Severe Winter Storms (2%) = \$18,070
Estimated agricultural structural damage due to Severe Winter Storms (2%) = \$1,000
Estimated industrial structural damage due to Severe Winter Storms (2%) = 4,122
Total estimated structural damages due to Severe Winter Storms = **\$79,884**

2.1.4. Vulnerability Assessment for Thunderstorms & Lightning

As determined by the hazard mitigation committee 100% of Rowan is exposed to thunderstorms and lightning. While thunderstorms and lightning are a regional event, the committee determined that only around 25-50% of the population is susceptible to impacts or damages due to thunderstorms and lightning; however, this vulnerability is dependent on the extent of the storm and accompanying events that may occur.

Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts include downed limbs, power outages and heavy rain that may impair individuals' ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

Loss Estimate Calculation:

Historical data from the NCDC displayed in Appendix C shows that the highest amount of property damages reported within Rowan due to Thunderstorms equaled \$2,000; however, the largest amount of property damages in the County equaled \$250,000. The average of these numbers was used as an estimate of losses to account for a worst-case-scenario of the impacts that the City could experience due to thunderstorm and lightning. The average damages, which equaled \$126,000, accounts for approximately 3% of the City's total assessed value of residential, commercial, agricultural and industrial structures. Based on this worst-case-scenario, it was estimated that each property would experience

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structural damages equaling 3% of their assessed value, or 3 % of structures in the City would experience complete loss. The damages are dependent on the intensity and impacted area of the Thunderstorm and Lightning event. The results of this estimate are displayed below.

Estimated residential structural damage due to Thunderstorm and Lightning (3%) = \$ 85,038
 Estimated commercial structural damage due to Thunderstorm and Lightning (3%) = \$27,105
 Estimated agricultural structural damage due to Thunderstorm and Lightning (3%) = \$1,500
 Estimated industrial structural damage due to Thunderstorm and Lightning (3%) = \$6,183
 Total estimated structural damages due to Thunderstorm and Lightning = **\$119,826**

2.1.5. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire City is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning, hailstorms or tornadoes; impacts are generally limited. The Rowan hazard mitigation committee determined that 10-25% of the people and property in the community are impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

Loss Estimate Calculation:

The NCDC historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996. While this would be the amount normal used in the loss estimates for Rowan, the committee rated the impacts due to windstorms to be of a lower extent than that of Hailstorms; therefore, the loss estimate amount used was 2% meaning that each property would experience structural damages equaling approximately 2 % of their assessed value . This amount of damage is indicated in the loss estimate, below.

Estimated residential structural damage due to Windstorms (2%) = \$56,692
 Estimated commercial structural damage due to Windstorms (2%) = \$18,070
 Estimated agricultural structural damage due to Windstorms (2%) = \$1,000
 Estimated industrial structural damage due to Windstorms (2%) = \$4,122
 Total estimated structural damages due to Windstorms = \$79,884

2.1.6. Vulnerability Assessment for Earthquake

Earthquake is a regional event that occurs abruptly. While the nearest fault line is Missouri, if a large enough magnitude, an earthquake can be felt throughout the state. The hazard mitigation committee determined that the magnitude within Rowan would stay near a 1 to 3, as indicated in the chart below. It is anticipated that no major impacts to structures or people would be experienced.

Magnitude	Typical Maximum Modified Mercalli Intensity
1.0 - 3.0	I - Not felt except by a very few under especially favorable conditions.
3.0 - 3.9	II - Felt only by a few persons at rest, especially on upper floors of buildings. III - Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
4.0 - 4.9	IV - Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably. V - Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
5.0 - 5.9	VI - Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

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	VII - Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
6.0 - 6.9	VIII - Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. IX - Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
7.0 and higher	X - Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. XI - Few, if any (masonry) structures remain standing. Bridges destroyed. Rails bent greatly. XII - Damage total. Lines of sight and level are distorted. Objects thrown into the air.

http://earthquake.usgs.gov/learn/topics/mag_vs_int.php

Loss Estimate Calculation:

Because the magnitude of an earthquake within Rowan would be so low, no damages or injuries would be anticipated.

2.1.7. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. While a majority of residents have air conditioning, the committee estimated that approximately 10-25% of the City would be impacted due to the fact that most residents have access to air condition. However, residents must ensure they are not exposed to the heat for a long period in time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered to the crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not cause structural damages.

2.1.8. Vulnerability Assessment for Watershed Pollution

According to the Hazard Mitigation Committee, while watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. Residents of Rowan are most commonly exposed to such hazard if in contact with the nearby Iowa River. Impacts could result in impacts to nearby bodies of water (the Iowa River) and their aquatic life. This could result in illness when directly exposed to the river; however, no property damages would be felt. Accompanying events include thunderstorm and lightning, river flooding, severe winter storms, HAZMAT events relating to both transportation and fixed facilities and flash flooding.

Loss Estimate Calculation:

As mentioned above, watershed pollution generally does not impact structures; therefore, no loss estimate could be calculated.

2.1.9. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. While it may not have direct impacts on the City of Rowan, drought impacts the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the City. Accompanying events include extreme heat and grass and wild-land fires.

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Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in the unincorporated area where a majority of agriculture land exists.

2.1.10. Vulnerability Assessment for Tornadoes

The entire population of Rowan is exposed to tornadoes. The hazard mitigation committee estimated that more than 75% of the City would be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent of the size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornadoprospect.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDC, multiple tornado events have been reported in Wright County, with one funnel cloud reported to have been in the City of Rowan. With no record of property damage in Rowan, the

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highest amount of damages reported to have been obtained by the County is equal to \$25,000,000 and occurred in 1966. Because of the variation of damages that could occur due to Tornadoes, it was determined that in a worst-case-scenario 90% of the community could be impacted by a tornado. This percentage would not be far off in a worst-case-scenario, as Iowa has experienced events that have impacted entire community:

Estimated residential structural damages due to Tornado (100%) = \$2,551,140
Estimated commercial structural damages due to Tornado (100%) = \$813,150
Estimated agricultural structural damages due to Tornado (100%) = \$45,000
Estimated industrial structural damages due to Tornado (100%) = \$185,490
Total estimated structural damages due to Tornado (100%) = \$3,594,780

2.1.11. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the City, and according to the hazard mitigation committee, could impact 50-75% of the community depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the City.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks (See historical events in Chapter 3).

2.1.13. Vulnerability Assessment for Structural Fire

A structural fire is an uncontrolled fire in populated areas that threatens life and property. Structural fires are very isolated events in the City of Rowan because most buildings are detached. The committee estimated that less than 10% of people and property would be affected in one event. Damages to buildings may be substantial or minimal, depending on when the fire was controlled. People inside a structure where a fire occurs could experience substantial injuries or death.

Loss Estimate Calculation:

Because structural fires are such an isolated event, it would be insignificant to provide a loss estimate. A structural fire could occur in any one structure within the City.

2.1.14. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles, rail cars and/or airplanes. Rowan has one State road that runs along the northern edge of the community. This road is identified in the Transportation Map located in Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Rowan would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.15. Vulnerability Assessment for Disease

The hazard mitigation committee estimated that less than 25% of the city would be impacted. The most common events that have taken place in recent years include the H1N1 virus. The flu and pneumonia are also two common viruses that impact residents of the City. Wright County Public Health constantly strives to provide shots and other preventable measures for such viruses. Other transferable diseases are generally transferred through direct interaction, which lessens the vulnerability of the County to such diseases.

Loss Estimate Calculation:

This hazard impacts the health and welfare of people. There would be no structural impacts due to human disease.

2.1.16. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.1.17. Vulnerability Assessment for Communications Failure

Communication failure is the widespread breakdown or disruption of normal communication capabilities. They could be caused by electrical outages, tower failures due to thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes, infrastructure failure or terrorism. Impacts could include economic impacts such as the failure to communicate with the staff or public regarding safety or emergency matters. Due to the rarity of this event and alternate forms of communication available to the City, its impacts are generally not extreme and no structural impacts are felt unless to the actual equipment.

Loss Estimate Calculation:

As mentioned above, a communications failure generally does not impact structures, and people are typically only at risk during emergency situations when lines of communication may be down. Due to these circumstances, no loss estimate could be calculated.

2.1.18. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles, rail cars and/or airplanes. Rowan is located at the intersection of two County roads and a state road; their location is identified in the Transportation Map located in Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Rowan would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.19. Vulnerability Assessment for Disease

The hazard mitigation committee estimated that less than 10% of the city would be impacted. The most common events that have taken place in recent years include the H1N1 virus. The flu and pneumonia are also two common viruses that impact residents of the City. Wright County Public Health constantly strives to provide shots and other preventable measures for such viruses. Other transferable diseases are generally transferred through direct interaction, which lessens the vulnerability of the County to such diseases.

Loss Estimate Calculation:

This hazard impacts the health and welfare of people. There would be no structural impacts due to human disease.

2.1.20. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires, structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.1.21. Vulnerability Assessment for Air Transportation Event

While no airport is located in Rowan, the hazard mitigation committee determined that an air transportation event could occur as planes pass over the city while crop dusting and/or landing in nearby airports. If such event were to occur less than 10% of the community would be impacted due to the fact that such event only impacts an isolated area. Severity of impact depends on the size and speed of the aircraft when striking the city; however, the committee determined that multiple deaths would occur and structural damages would result. Structural damages would be as severe as to completely demolish multiple buildings and potentially set fire to structures; therefore, accompanying events would include structural fire, grass or wild-land fire. Such event could also occur due to windstorms, thunderstorm and lightning, tornado, winter storm or hailstorm.

Loss Estimate Calculation:

No air transportation events have been recorded to have occurred in Rowan. Because it is estimated that an air transportation event would generally be an isolated event, it would be insignificant to provide a loss estimate. There is no telling where such event would occur; however, the aircraft would most likely be "small" in nature.

2.1.22. Vulnerability Assessment for Expansive Soils

Expansive soils most commonly result in damaged streets and infrastructure, basements and other structures due to constant movement from change in temperature, moisture and other environmental impacts. Accompanying events include severe winter storms, flash flooding, thunderstorm and lightning, river flooding and sink holes. Infrastructure failure may result from expansive soils when harm to basements, streets or other utilities occurs. Impacts usually result in a slight interruption in water services to the area where the water main was broken.

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Loss Estimate Calculation:

Effects from expansive soils vary depending on the structure impacted. Impacts generally affect one isolated area in a basement, street or other utility. Because the committee was unable to identify specific areas, no loss estimates were calculated.

2.1.23. Vulnerability Assessment for Public disorder

Because of the small of population within the City of Rowan, the committee estimated that less than 10% of people and property would be impacted by a public disorder. Risks to people, property and the economy vary depending on the weapons used for violence. Guns, knives, bats, fire and explosives are the most common resources used for public disorder. Injuries, economic and property loss would be experienced by any of the above.

Loss Estimate Calculation:

The committee determined that less than 10% of the community would be impacted by a public disorder event. No such event has occurred in the past, and as mentioned, impacts would vary depending on the method of violence. Based on the lack of historical data no loss estimate could be calculated, as it would vary on the event, number of people involved, facilities involved and amount of law enforcement that would be able to respond.

2.2 Exposure Assessment for Flash Flooding

Exposed Structures

The hazard mitigation committee estimated that 50-75% of the community is impacted by flash flooding. Flash flooding results from intense rainfall over a brief period of time and while areas of flash flooding can generally be estimated based on those low-lying areas, the City of Rowan has its highest point within the main portion of the community. However, a majority of the community rests on the same contour as the lands located northeast of the community, which would typically drain to the lands south of the community. Because the City takes on the drainage from north of the community area, it is estimated that all areas within the same contour (1206) and below would experience flash flooding, as displayed in the flash flooding map in Section 6, which was used to identify the “hazard area” for flash flooding. Based on this it was estimated that 53 dwellings, 14 commercial structures, 8 industrial structures and 4 agriculture structures were located in potential areas of flash flooding.

Exposed Persons

The “Number of People” exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that approximately 100% of the people are impacted.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	91	53	58%	\$2,834,600	\$1,638,800	58%	157	157	100%
Commercial	29	14	48%	\$903,500	\$606,500	67%			
Agricultural	4	4	100%	\$50,000	\$50,000	100%			
Industrial	8	8	100%	\$206,100	\$206,100	100%			
TOTAL	132	79	60%	\$3,994,200	\$2,501,400	63%			

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2.2.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in areas with poor drainage. It is evident that a majority of areas exposed to flash flooding are in areas where White Fox Creek would potentially extend.

Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes' value by 10%; therefore, damages might decrease a homes' value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 1,111,045
- Estimated commercial structural damage due to Flash Flooding (5%) = \$794,850
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$605
- Estimated industrial structural damage due to Flash Flooding (5%) = \$ 136,915
- Total estimated structural damages of Flash Flooding = \$2,043,415

2.3 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were identified and positioned on the map displayed in Section 6. A buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that 100% of residents are exposed.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	91	91	100%	\$2,834,600	\$2,834,600	100%	157	157	100%
Commercial	29	29	100%	\$903,500	\$903,500	100%			
Agricultural	4	3	75%	\$50,000	\$49,600	99%			
Industrial	8	8	100%	\$206,100	\$206,100	100%			
TOTAL	132	131	99%	\$3,994,200	\$3,993,800	100%			

2.3.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the City, different materials have different impacts. The majority of hazardous materials within Rowan consist of Underground Storage Tanks, which have a limited impact such as an isolated explosion or groundwater contamination, if leaking; however, the hazard mitigation committee estimated that more than 75% of the community could be impacted by such event..

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A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on the hazard area:

- Estimated residential structural damage due to HAZMAT – Fixed Facility = \$283,460
- Estimated commercial structural damage due to HAZMAT – Fixed Facility = \$90,350
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility = \$4,960
- Estimated industrial structural damage due to HAZMAT – Fixed Facility = \$20,610
- Total estimated structural damages of HAZMAT – Fixed Facility = \$399,380

2.4 Exposure Assessment for Pipeline Incident

The nearest pipeline is located 6 ½ miles north of the City. The exposure area for a natural gas pipeline is generally estimated to be within 1 mile of the pipeline. While the hazard mitigation committee estimated that more than 75% of the community would be impacted by a pipeline failure, this is highly unlikely due to the distance to the pipeline; therefore, it is estimated that no person or structure located within the community would be directly impacted.

2.5 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that 10-25% of the community would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the City, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the “hazard zone”, or the property that could potentially be impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 55 dwellings, 16 commercial structures, 8 industrial structures and 4 agriculture structures were located in the “hazard zone” for grass and wild-land fires.

Exposed Persons

The “Number of People” exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimates that there were 130 residents exposed, 16 commercial persons exposed, 8 industrial persons exposed and 4 agricultural persons exposed; making more than 100% of potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area

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Residential	91	55	60%	\$2,834,600	\$1,894,500	67%	157	157	100%
Commercial	29	16	55%	\$903,500	\$822,700	91%			
Agricultural	4	4	100%	\$50,000	\$50,000	100%			
Industrial	8	8	100%	\$206,100	\$206,100	100%			
TOTAL	132	83	63%	\$3,994,200	\$2,973,300	74%			

2.4.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land surrounds the northern, southern, eastern and western perimeters of the City of Rowan; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

Loss Estimate Calculation:

Only a portion of those exposed structures within the City would actually be impacted during a grass and wild-land fire event. It is estimated that structures located adjacent to the open space consisting of either the north, south, east or west portion of the community would be impacted; therefore, the following estimates were calculated:

- Estimated residential structural damage due to Grass & Wild-land Fire (10%) = \$189,450
- Estimated commercial structural damage due to Grass & Wild-land Fire (10%) = \$82,270
- Estimated agricultural structural damage due to Grass & Wild-land Fire (10%) = \$5,000
- Estimated industrial structural damage due to Grass & Wild-land Fire (10%) = \$20,610
- Total estimated structural damages of Grass & Wild-land Fire (10%) = **\$297,330**

2.5 Exposure Assessment for River Flooding

Exposed Structures

According to the hazard mitigation committee 25-50% of people and property are impacted by River Flooding. The hazard mitigation committee noted that the southern portion of the City would be most impacted, which is evident from the future floodplain map displayed in Section 6. While these maps have not yet been adopted, they will eventually be the floodplain maps used within the County (some changes may be made). Since no GIS data was available for the future floodplain maps, an area similar to the area displayed was estimate. It was determined that those contours of 1196 and less drew a similar area of impact to the future floodplain map. See the River Flooding Hazard Area map developed in Section 6. Based on this map, it was estimated that 4 residential structures, 4 commercial structures, 0 industrial structures and 1 agriculture structures were located in the “hazard zone”.

Exposed Persons

The “Number of People” exposed to river flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 10 residents, 4 commercial persons, 0 industrial persons and 1 agricultural person exposed to flash flooding; making a total of 157 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	91	4	4%	\$2,834,600	\$183,400	6%	157	15	10%
Commercial	29	4	14%	\$903,500	\$68,700	8%			
Agricultural	4	1	25%	\$50,000	\$400	1%			

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Industrial	8	0	0%	\$206,100	\$0	0%			
TOTAL	132	9	7%	\$3,994,200	\$252,500	6%			

2.5.1 Vulnerability Assessment for River Flooding

Impacts from river flooding typically take form in property damage to basements. Being located in the low-lying areas or near the river may put residents at risk for injuries. Accompanying hazard events that may result in river flooding include thunderstorms and lightning, hailstorms, windstorm, flash flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The river flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes' value by 10%; therefore, damages might decrease a homes' value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to River Flooding (5%) = \$9,170
- Estimated commercial structural damage due to River Flooding (5%) = \$3,435
- Estimated agricultural structural damage due to River Flooding (5%) = \$20
- Estimated industrial structural damage due to River Flooding (5%) = \$0
- Total estimated structural damages of River Flooding = **\$12,625**

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Mitigation Action	STAPLEE Rating
Establish an ordinance on water conservation during a drought	16
Develop a section in the community newsletter that includes information on how to react and plan for hazards that may affect Rowan	14
Work with Alliant energy to have tree trimming done regularly	14
Purchase commercial leaf blowers for the fire department to blow out grassfires	13
Develop a plan for setting up the portable generator	11
Purchase new radios for the fire department due to the frequency change in 2013	10
Buy new self contained breathing apparatus' (SCBA) for the fire department	10
Provide the fire department with mask and filtering systems for grassfires	10
Provide the fire department with a fire hose cleaning apparatus	10
Locate funding to tear down dilapidating structures	10
Improve/expand on the storm sewer system	10
Designate a shelter within the community (request the church facilities)	9
Purchase a permanent generator for the church shelter	8
Improve the warning siren so it reaches all areas of Rowan	8
Provide window blockades to residents and businesses	7

Rowan Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: *Ensure the community has all of the physical resources necessary to reduce the effects of hazards.*

Objective 1.1: Provide residents of Rowan with facilities to seek shelter in during a hazard event

Mitigation Actions

1.1.1 Designate a shelter within the community (request the church facilities)

Objective 1.2: Supply the community with equipment to reduce the effects of hazards

Mitigation Actions

1.2.1 Provide window blockades to residents and businesses

1.2.2 Purchase a permanent generator for the water pump

Objective 1.3: Ensure the fire department is prepared and equipped as needed to respond to wildfires and structural fires

Mitigation Actions

1.3.1 Purchase new radios for the fire department due to the frequency change in 2013

1.3.2 Buy new self contained breathing apparatus' (SCBA) for the fire department

1.3.3 Provide the fire department with mask and filtering systems for grassfires

1.3.4 Purchase commercial leaf blowers for the fire department to blow out grassfires

1.3.5 Provide the fire department with a fire hose cleaning apparatus

Goal 2: *Protect the life, health, safety and property of the community by preparing residents and businesses for all potential hazards*

Objective 2.1 Educate citizens on how to respond to, and plan for hazards

Mitigation Action

2.1.1 Develop a section in the community newsletter that includes information on how to react and plan for hazards that may affect Rowan. Information will include:

- Encouragement to purchase surge protectors
- Information and encouragement to sign up for 'Code Red'
- Encouragement to purchase weather radios and information on potential funding for these
- Information on the shelter space that is available in the event of hazards such as power outages, winter storms, extreme heat event, etc.
- Information on residents' responsibility in tree trimming
- Awareness of the loss of phone service due to electronic phones during a power outage

Objective 2.2: Develop and enforce plans and policies to address hazards

Mitigation Actions

2.2.1 Develop a plan for setting up the portable generator at the church or community center

2.2.2 Establish an ordinance on water conservation during a drought

Objective 2.3: Ensure the community has the necessary funds to prepare for hazards

Mitigation Actions

2.3.1 Locate funding to tear down dilapidating structures

Objective 2.4: Provide residents with ample warning of hazards to help prevent injuries and loss of life

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Mitigation Actions

2.4.1 Improve the warning siren so it reaches all areas of Rowan

Objective 2.5: Implement projects that may help the community prevent or discourage damage due to hazards

Mitigation Actions

2.5.1 Improve/expand on the storm sewer system

2.5.2 Work with Alliant energy to have tree trimming done regularly

Section 4: Action Plan

Develop a section in the community newsletter that includes information on how to react and plan for hazards that may affect Rowan	
Description	The city will designate a section of the city newsletter for announcing local hazards that may affect Rowan.
Hazards Addressed	All
Priority	I
Responsible Dept./Party	City Council, Mayor
Estimated Cost	Minimal
Potential Funding Source	City Funds
Mitigation Measure Category	Prevention Action
Target Completion Date	Ongoing

Purchase commercial leaf blowers for the fire department to blow out grassfires	
Description	This action will purchase commercial blowers and other grass firefighting equipment for the Rowan Fire Department
Hazards Addressed	Grass and Wild Land Fires
Priority	I
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	Local option sales tax, Fundraising, Grants
Mitigation Measure Category	Property Protection Action
Target Completion Date	2014

Develop a plan for setting up the portable generator for the church or community center.	
Description	This action will allow the city to plan a project that will provide backup power to the church and community center in Rowan in the case of a power outage.
Hazards Addressed	Energy Disruption, Severe Winter Storm, High Wind Events, Tornados, Extreme Heat
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	City Funds
Mitigation Measure Category	Property Protection, Prevention
Target Completion Date	2013

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Improve, expand and maintain the storm sewer system	
Description	This action would expand and improve the storm sewer system in the city of rowan. The city would also put together and routine maintenance program for the system.
Hazards Addressed	Flash Flooding, River Flooding, Severe Thunderstorm and Lightning
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Moderate
Potential Funding Source	City Utility Fees, State and Federal Grants
Mitigation Measure Category	Prevention Action, Property Protection Action
Target Completion Date	2013, Ongoing

Designate a shelter within the community (request the church facilities)	
Description	This action will designate the local church as a shelter during storm events.
Hazards Addressed	Winter Storms, Severe Thunderstorm and Lighting
Priority	I
Responsible Dept./Party	Church Council, City Council
Estimated Cost	Minimal
Potential Funding Source	City Funds
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2013

Improve the warning siren so it reaches all areas of Rowan	
Description	This action will purchase and install a new warning siren for the City.
Hazards Addressed	Tornado, Severe Thunderstorm and Lightning
Priority	I
Responsible Dept./Party	City Council, County Emergency Management
Estimated Cost	Low
Potential Funding Source	State, Federal Grants
Mitigation Measure Category	Public Education Awareness Action
Target Completion Date	2014

Work with Alliant energy to have tree trimming done regularly	
Description	This action would create a agreement with the local energy provider, Alliant Energy to keep trees within the city trimmed away from power lines.
Hazards Addressed	High Wind Events, Thunderstorm and Lightning, Winter Storms
Priority	II
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	City Funds, Alliant Energy
Mitigation Measure Category	Prevention Action, Property Protection
Target Completion Date	2015

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Purchase new radios for the fire department due to the frequency change in 2013	
Description	The fire department will need to meet federal banding requirements in 2013; this action will help purchase and upgrade equipment for that deadline.
Hazards Addressed	Communication Failure, All Hazards
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Minimal
Potential Funding Source	State, Federal Grants
Mitigation Measure Category	Emergency Services Protection
Target Completion Date	2013

Buy new self contained breathing apparatus' (SCBA) for the fire department	
Description	This action would purchase a SCBA apparatus' for the fire department, because the current equipment is out of date.
Hazards Addressed	Structure Fires, Grass and Wild Land Fires, HAZMAT Fixed, HAZMAT Transportation
Priority	III
Responsible Dept./Party	Fire Department
Estimated Cost	Low
Potential Funding Source	State, Federal Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2018

Provide the fire department with mask and filtering systems for grassfires	
Description	This action would purchase a mask filtering systems for the fire department for grass and wildfires.
Hazards Addressed	Grass and Wild Land Fires, Structure Fires
Priority	II
Responsible Dept./Party	Fire Department
Estimated Cost	Low
Potential Funding Source	Local option sales tax, State, Federal Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2016

Provide window blockades to residents and businesses	
Description	This action would purchase and provide blockades or shutters for businesses and residents in that event of a hailstorm.
Hazards Addressed	Hailstorm
Priority	II
Responsible Dept./Party	City Council, County Emergency Management
Estimated Cost	Minimal
Potential Funding Source	City, Residents
Mitigation Measure Category	Prevention Action, Structural Mitigation Action
Target Completion Date	2015

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Provide the fire department with a fire hose cleaning apparatus	
Description	This action would purchase a hose cleaning apparatus for the fire department, because the current hoses are very expensive to replace if not cleaned and maintained properly.
Hazards Addressed	Structure Fires, Grass and Wild Land Fires, HAZMAT Fixed, HAZMAT Transportation
Priority	III
Responsible Dept./Party	Fire Department
Estimated Cost	Low
Potential Funding Source	Local funding, State, Federal Grants
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2018

Locate funding to tear down dilapidating structures	
Description	This action would be utilized to purchase and demolish many of the degraded or abandoned homes throughout the city.
Hazards Addressed	Structural Failure
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Moderate
Potential Funding Source	State, Federal Grants
Mitigation Measure Category	Structural Mitigation Action, Prevention Action
Target Completion Date	2018

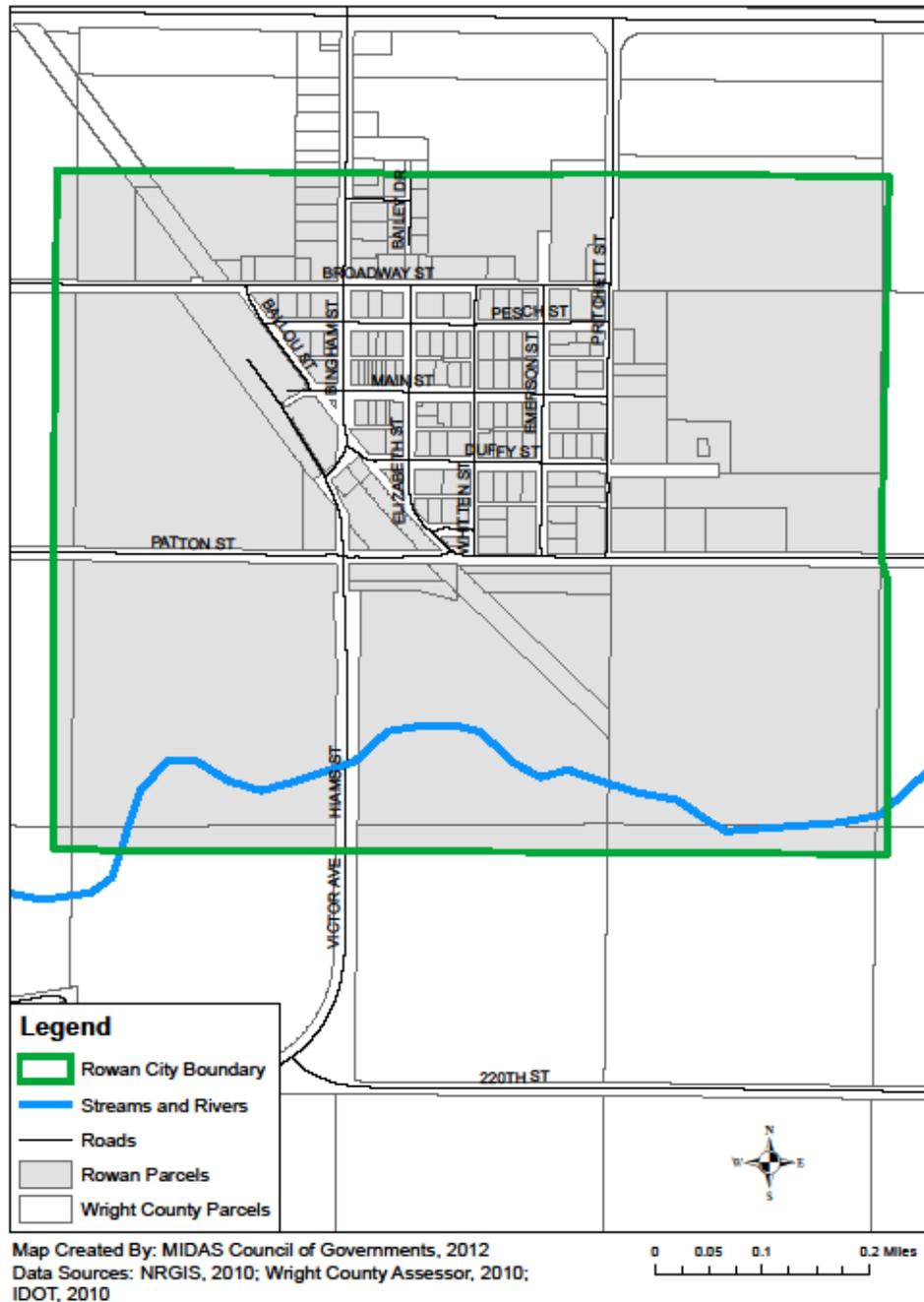
Purchase a permanent generator for the water pump	
Description	This action would purchase and install a generator for the city water system. If power fails the city does not have a way to continue to provide water to the community.
Hazards Addressed	Energy Disruption
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Low
Potential Funding Source	State, Federal Funding
Mitigation Measure Category	Prevention Action
Target Completion Date	2018

Section 5: Critical Facilities

City Hall/Community Center/Library – 101 Main Street
 Fire Station – 118 ½ Main Street
 Water Tower and Pump House – 118 ½ Main Street
 United church of Rowan – 811 Pesch Street

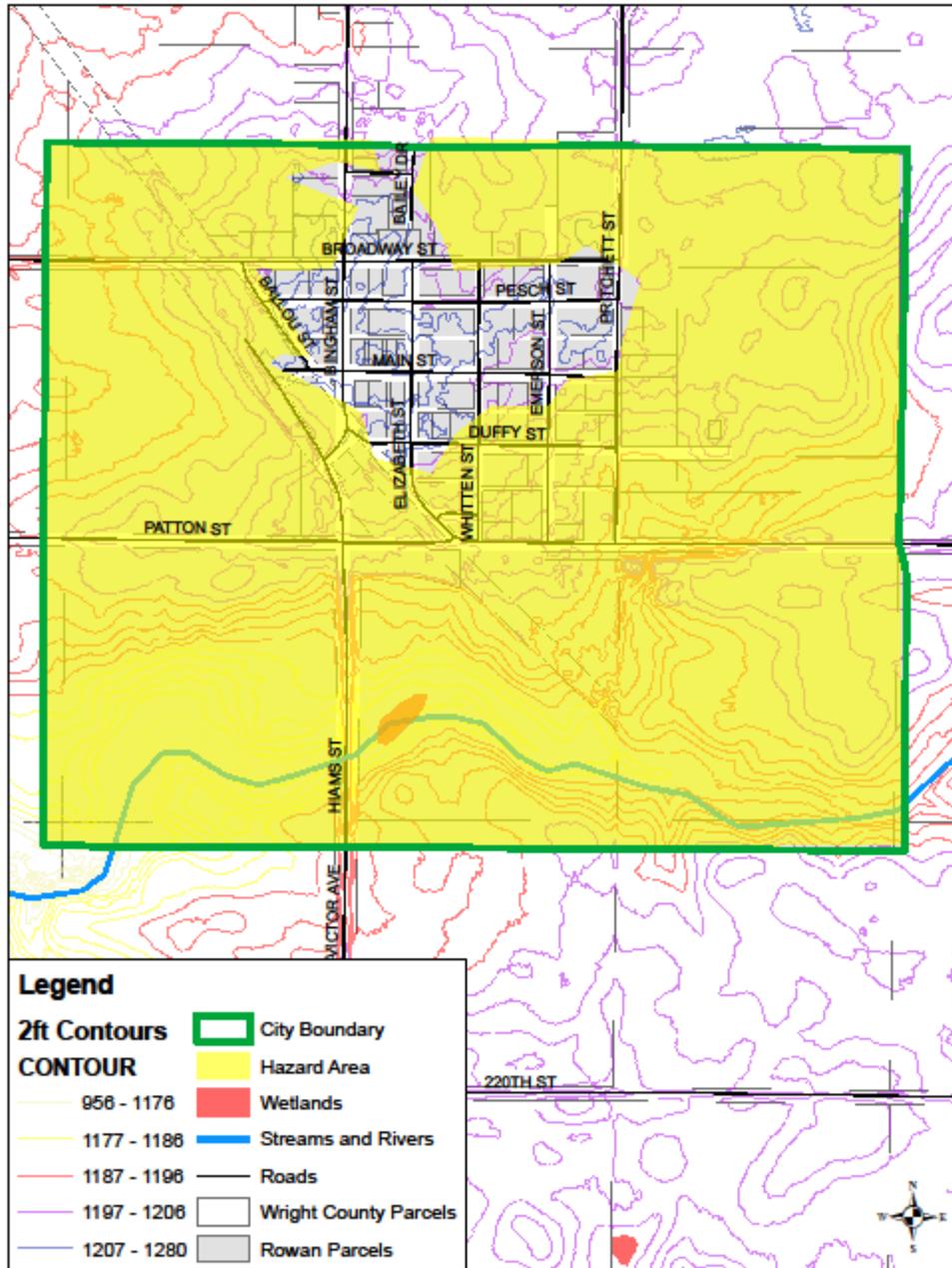
Section 6: Community Maps

City of Rowan



City of Rowan

Flash Flood Hazard Area

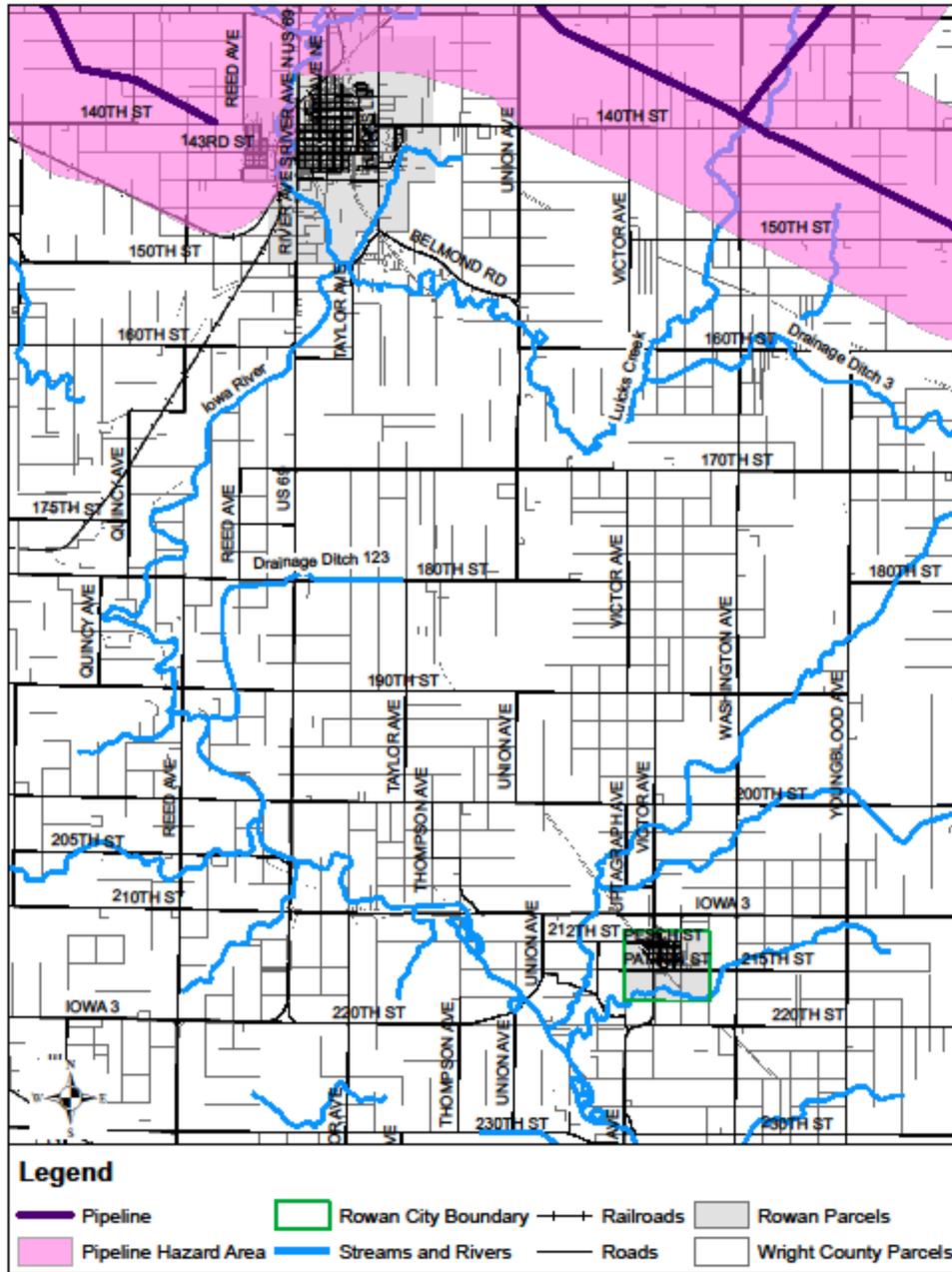


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

0 0.045 0.09 0.18 Miles

City of Rowan

Pipeline Hazard Area

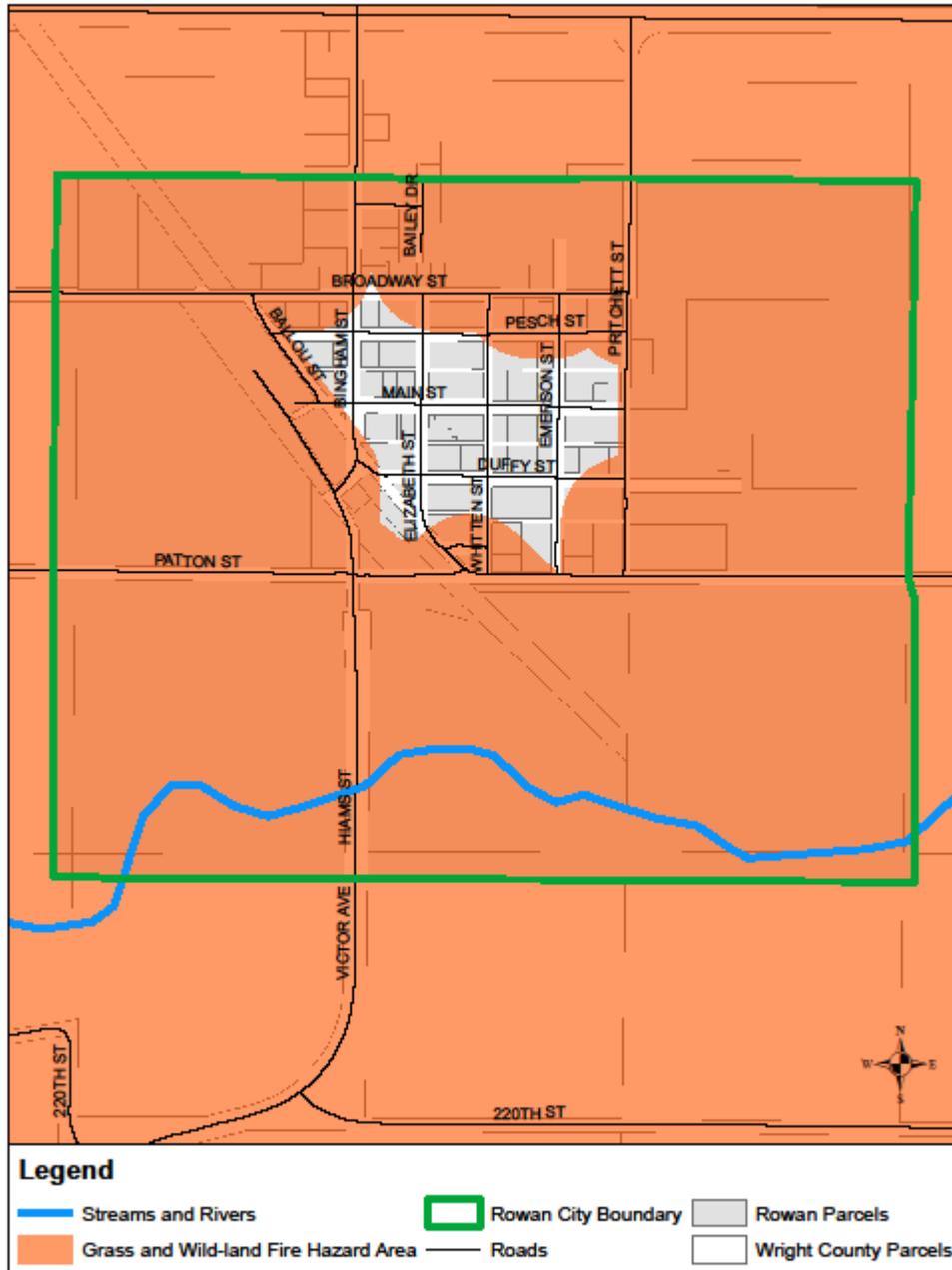


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



City of Rowan

Grass and Wild-land Fire Hazard Area

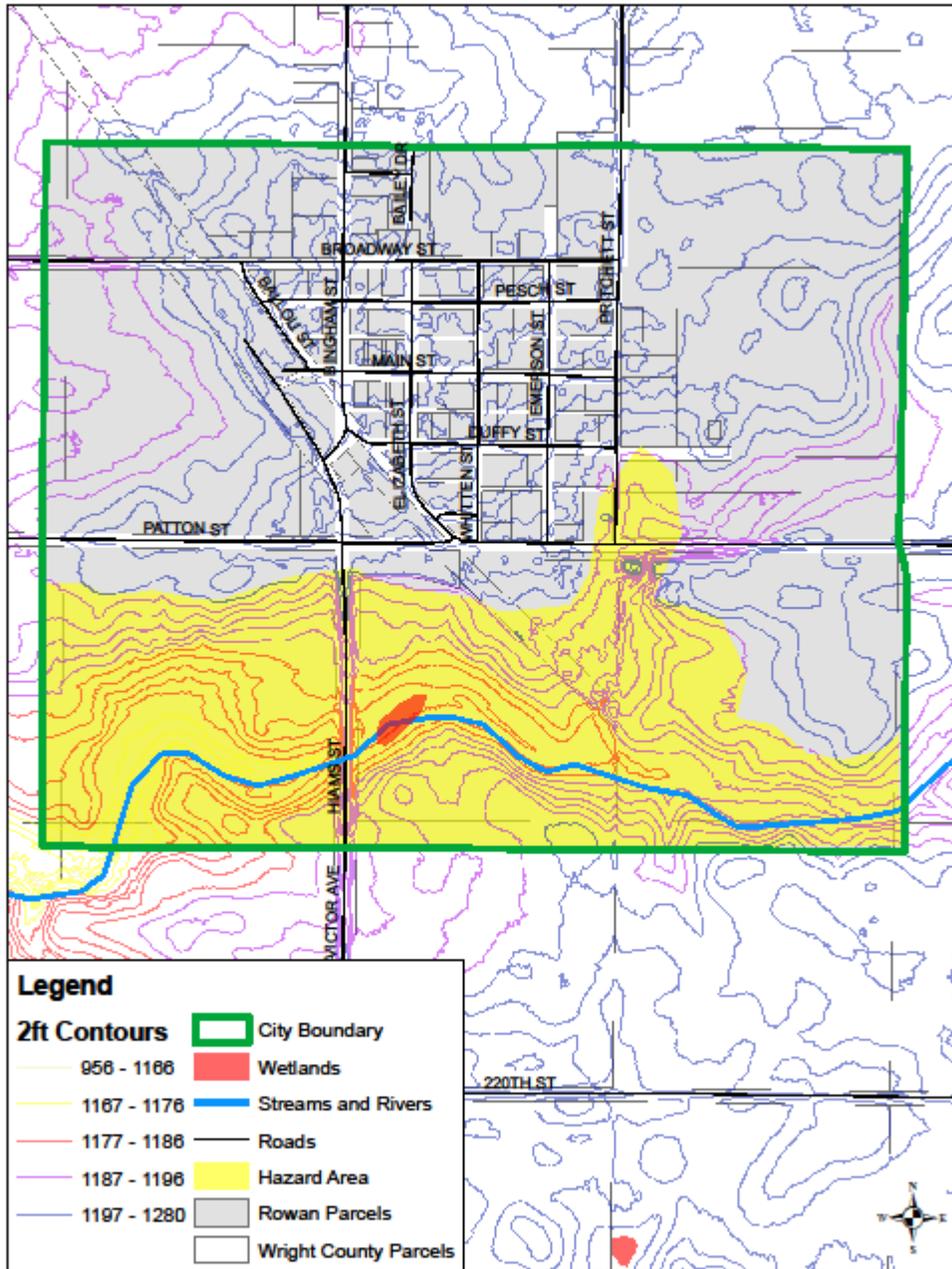


Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
IDOT, 2010

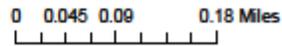


City of Rowan

River Flooding Hazard Area



Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



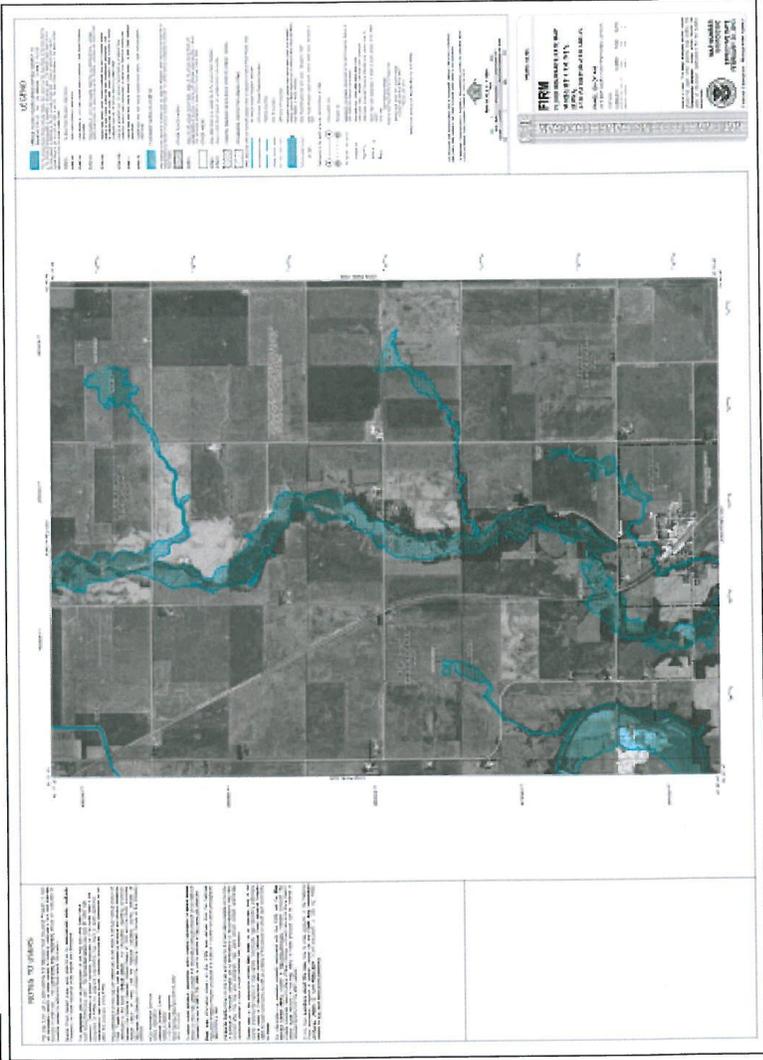
Wright County Multi-Jurisdiction Hazard Mitigation Plan

http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=50048882&IFIT=1

197C0330C.png



Scale: 4 %



Help

ZoomWin **Pan**

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1:1 **MAX**

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Section 7: Hazard Mitigation Committee Meeting Minutes

Wright County Hazard Mitigation - Rowan - Meeting Minutes #1

April 29, 2010 at 7:00 p.m.

Rowan City Hall

Meeting attended by: Vicki Box, Berne Ketchum, Mark Bruns, Nancy Hofmeister, Larry Heaberlin and Dale Hollman.

- Began meeting by discussing soft match. No member was receiving compensation; therefore, each member that attended signed a letter stating that no compensation was being received and no one would be seeking reimbursement.
- Reviewed the list of storm events compiled by the National Climatic Data Center (NCDC)
 - Shows the history of weather events that have occurred in Wright County and Rowan.
- Began examination of each hazard. Committee members were asked to identify any significant events that relate to each hazard and how each hazard may potentially affect the City of Rowan.
 - Tornadoes
 - While no tornado has directly impacted the City, the committee determined that the potential is there.
 - Indirect damage typically consists of tree, branch and limb damage.
 - Some power outages may occur due to above-ground power lines. Above-ground phone lines may also be affected.
 - Nearby cell towers could be ruined.
 - Flash Flooding
 - Occurs throughout the city.
 - Generally occurs with flooding in the basement and yards.
 - Basement flooding was most prevalent in the 2008 disasters.
 - The church basement had significant damage in 2007, which was repaired.
 - Due to the city's slow intakes, flash flooding generally occurs when there is more than 3 inches in a ½ hour.
 - Committee members stated that specific years when the flash flooding has occurred are in 1953, 1993 and 2007.
 - River Flooding
 - The Iowa River exists a few miles away; therefore, the committee does not feel that river flooding is too much of a threat to the City.
 - When the river floods severely, State Highway 3 is closed down/blocked. This most recently occurred in 2008. Highway 3 runs on the north end of Rowan, and is the main highway access to Rowan.
 - Gravel roads in the area become hazardous due to flooding. Heavy vehicles are not advised to drive on them due to softening of the soils.
 - Winter Storms
 - A common occurrence for the City that occurs in various forms.
 - Power outages often occur; however, they generally last less than 24 hours.
 - 1991 ice storm caused a power outage of about 4-5 days.
 - Approximately 2006 or 2007 a March storm struck causing an outage of about 3-5 days. In this event people, generally the elder, were bused to Clarion for shelter.
 - The water tower has come close to freezing. In this event, the City tries to keep the water circulating by running extra water.
 - High Wind Events
 - These hazardous events generally cause power outages, downed trees and limbs, and roof damage.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Power line disruption has also occurred when a streetlight fell.
- Hailstorms
 - Do occur each year within the City; however, no extensive damage has been experienced.
 - Nearby areas have experienced large hail causing window breakage, tree and branch damage and roof damage. There is potential for this kind of damage in Rowan.
- Severe Thunderstorm and Lightning
 - This common event occurs throughout the town.
 - Lightning strikes within Rowan have been known cause power outages as well as damage to TV's, phones, and computers within the City.
- Extreme Heat Event
 - In the 1990's fans were brought to the City during a heat wave.
 - With an abundance of shade from trees in town, this event seems to have a minor effect on the City.
 - The church has a portable generator that runs off of diesel fuel. This would be a place where people could possibly seek shelter.
- Drought
 - Dry weather tends to occur later in the summer.
 - While this affects more rural areas, Rowan could be impacted by surrounding fires.
 - A drought occurred in 1988 and affected the water supply. After this event, the city added to the well; therefore, a water shortage in a drought is not a concern for the City.
- Landslide
 - The area in around Rowan is relatively flat; therefore, the committee determined that this hazard could be taken out of the plan.
- Grass or Wildfire
 - Generally occurs outside of the City because no CRP lands exist within the city.
 - A single occurrence that the committee can remember is when a resident's garbage fire got out of hand and burnt down his garage.
 - When it is very dry a burning ban is and will be enforced by the County. This type of ban was used in the 1990's.
- Dam Failure
 - The river is quite a ways away and no dams exist nearby; therefore, the committee decided to exclude this event from their plan.
- Levee Failure
 - Because there are no levees, the committee eliminated this hazard from their plan.
- Sink holes
 - The area has not existed as a mining area, and the community has never experienced natural hazards due to sinkholes; therefore, take out of plan.
- Expansive Soils
 - Soils become heavy when moisture accumulates. This has caused one specific basement to cave in.
 - Other structures in the city may be vulnerable to basement walls collapsing due to heavy, expanding soils.
- Earthquakes
 - Have felt some very minor affects from elsewhere.
 - While there is not a great potential; fault lines can be found in the bordering state of Wisconsin.
- HAZMAT – Transportation
 - With Hwy 3 passing by the north end of the City, many kinds of hazardous materials are transported through.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Commonly transported materials include anhydrous tanks, propane, fuel oil, fertilizers, grains, etc.
- Railroad to the south commonly carries granular (dry) fertilizer.
- HAZMAT – Fixed Facility
 - With the Coop in town, anhydrous, propane and other farm chemicals are commonly stored. Leaks have occurred and were promptly addressed before any impact was experienced by the community.
 - Water treatment area, which is in the old fire station, stores chemicals.
 - According to the committee, approximately 75% of houses within the city have their own LP tanks.
 - A waste operation, which recycles fuels, exists within the city. Many hazardous materials are brought here to be recycled.
- Watershed Pollution
 - Heavy rain can cause run-off into the Iowa River to the west.
 - A few septic tanks have had to be pumped in the past.
 - The city is currently working towards improving their wastewater treatment system.
 - Agriculture can cause some pollution (mostly rural), as well as lawn fertilizers.
 - No contamination of drinking water has been experienced due to any of the watershed pollution.
- Pipeline Incident
 - Nearest pipeline runs along I-35. A break could potentially affect Rowan depending on the direction of the wind.
 - Anhydrous line runs near Alexander which is about 8 miles northeast of the City.
- Energy Disruption
 - Power is provided by Alliant Energy.
 - Often caused by severe winter storms, thunder and lightning storms.
 - 3-4 days in 2006-2007 due to winter storms
 - Lightning strikes cause outages
 - Animals get in transformer, but problems are generally fixed in a quick time.
 - Surge protectors may be necessary.
- Terrorism
 - The committee sees this hazard as a possibility anywhere. The committee feels the most vulnerable areas to terrorism would be vandalizing of the food or water supply within the City.
- Violent Demonstration
 - While not as significant due to a small population, the committee felt as though this hazard could affect the City. If a strong issue arose, the City would need to be prepared.
- Disease
 - No past occurrences that the committee remembers, but with people working outside of Rowan, disease could be brought into the City.
 - A lot of out-of-state visitors that could bring something with them.
- Structural Fire
 - A manufactured home burnt in 2006 or 2007.
 - Old wiring within a lot of the homes could give the City a greater chance for structural fires.
 - No particular areas of concern.
- Structural Failure
 - Buildings within the City are older. The foundations may not be as structurally sound.
 - No buildings are inspected within town; therefore, the residents and businesses need to be prepared.
- Communications Failure

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Electricity may go out and most people don't remember that a lot of phones are now run on electricity. Without a phone, "Code Red" would not be able to contact residents.
- Fire trucks have radios. Handheld fire radios are good when outside.
- Transportation Event
 - Some minor events have occurred in town, but more stop signs were put in place.
 - Not many accidents have occurred, but with Highway 3 to the north, the city may be impacted if a major accident were to occur.
- Air Transportation Event
 - No airport; however, when fields are sprayed airplanes travel low over Rowan.
 - According the committee, many air routes follow I-35; therefore, there is a potential for a plane crash to occur in the City.
- When discussion about hazards subsided, we discussed meeting times
 - The committee decided to meet every-other Tuesday at 7:00 p.m. in the Rowan City Hall.
 - Meeting #2 will be held Tuesday, May 11, at 7:00 p.m.
- Meeting concluded at 8:30 p.m.

**Wright County Hazard Mitigation - Rowan - Meeting Minutes #2
May 11, 2010 at 7:00 p.m.
Rowan City Hall**

Meeting attended by: Eugene Drury, Ron Bailey, David Eriksen, Kay Jacobson, Dale Hollman, Tami Hollman, Larry Heaberlin, Berne Ketchum, Harlan Dorenkamp, Sean Fogarty, and Mark Burns.

Meeting started at 7:00 pm.

- The hazard risk analysis process was explained to the committee.
- As a group, the hazard mitigation committee completed the risk analysis for the following hazards:
 - tornadoes
 - flash flooding
 - river flooding
 - winter storms,
 - high wind events
 - hailstorms
 - severe thunderstorm and lightning
 - extreme heat event
 - drought
 - grass or wildfire
 - expansive soils
 - earthquakes
 - HAZMAT – transportation
 - HAZMAT – fixed facility
 - watershed pollution
 - pipeline incident
 - energy disruption
 - terrorism
 - violent demonstration
 - disease
 - structural fire
 - structural failure
 - communications failure
 - transportation event
 - air transportation event
- The committee's ratings are summarized on the following page.
- Extra comments in regards to hazards were:
 - The warning siren is sometimes difficult to hear.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- In regards to river flooding; it doesn't directly affect the community, but it may limit access to the community because Hwy 3 may be closed.
- The committee determined their ratings base on a worst case scenario.

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Hailstorms	5	5	5	5	3	5	28
Energy disruption	5	5	5	5	3	5	28
Winter storms	5	5	5	5	3	2	25
Tornadoes	1	3	5	5	5	5	24
Flash flooding	5	5	4	3	2	4	23
Severe thunderstorm and lightning	5	5	3	3	3	4	23
High wind events	5	5	2	3	2	5	22
Earthquakes	1	1	5	5	5	5	22
HAZMAT – transportation	1	3	4	5	4	5	22
HAZMAT – fixed facility	1	3	5	5	3	5	22
Terrorism	1	1	5	5	5	5	22
Pipeline incident	1	1	5	5	2	5	19
Extreme heat event	5	4	2	5	1	1	18
Watershed pollution	1	4	2	5	1	5	18
Structural fire	5	3	1	1	3	5	18
Communications failure	5	5	1	1	1	5	18
Transportation event	4	5	1	1	2	5	18
Disease	1	3	3	3	3	3	16
Structural failure	2	3	1	1	2	5	14
Air transportation event	1	1	1	2	3	5	13
Drought	1	2	2	5	1	1	12
Grass or wildfire	1	1	2	1	2	5	12
Expansive soils	1	1	1	1	1	5	10
Violent demonstration	1	1	1	1	1	5	10
River flooding	1	1	3	1	1	2	9

- After the hazard mitigation committee finished going through the risk assessment, the committee scheduled the next meeting to be held Tuesday, May 25, 2010 at 7:00 pm in the Rowan City Hall.
- Meeting ended at 8:30 am.

**Wright County Hazard Mitigation - Rowan - Meeting Minutes #3
May 25, 2010 at 7:00 p.m.
Rowan City Hall**

Meeting attended by: Berne Ketchum, Eugene Drury, Vicki Box, Ron Bailey, and Dale Hollman
Meeting began at 7:00 pm.

- The committee reviewed the risk assessment results and determined that Terrorism should be removed from the plan because it has no real impact on the community. It would most likely not be a target.
- The committee also discussed that earthquake should not be so high on the assessment. Upon reassessing the hazard, they decided it would stay in the same place on the assessment. The committee determined that if this event occurred and it was a measurable event it could affect the community. With fault lines in Missouri and Wisconsin, they felt as though this event does have the potential to occur.
- Using the remaining hazards in the plan, the committee developed hazard mitigation actions for each hazard as follows:
 - Hailstorms:
 - ACTION: Provide window blockades to residents and businesses to prevent further damage from affecting buildings with broken windows due to hailstorms
 - Energy Disruption
 - Rowan currently has a shelter, located in the church, with a portable generator hookup
 - ACTION: Inform residents of the available shelter space
 - ACTION: Purchase a permanent generator
 - ACTION: Develop a plan for the portable generator in the meantime
 - ACTION: Inform residents of their responsibility in tree trimming
 - Winter Storms
 - The City's snow removal is currently sufficient
 - ACTION: Generator actions
 - ACTION: Inform residents of resources
 - Newsletters
 - Tornadoes
 - ACTION: Construct a tornado safe room for the community
 - ACTION: Improve the warning system
 - ACTION: Encourage residents to sign up for code red
 - Newsletter
 - Utility Bill
 - Flash flooding
 - A project is currently in the works to improve the wastewater system. Will help so that no waste will back up, but still the likelihood of mud and water seeping into basements.
 - ACTION: Improve/expand on the storm sewer system

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Severe Thunderstorm and Lightning
 - ACTION: Establish a maintenance plan for storm sewer
 - ACTION: Provide residents with surge protectors
 - Service entrance protection (on meter)
 - Point-of-use surge protection device (use on single appliances)
 - ACTION: Encourage residents to purchase weather radios
 - ACTION: Establish grant or subsidy program for weather radios
- High Wind Events
 - Have attempted City cleanup (tree trimming, areas for branches), but residents have abused the service in the past.
 - ACTION: Provide City Council and Fire Department for City cleanup
- HAZMAT – Transportation & Fixed
 - Spills and/or leaks are taken care of by Belmond
 - ACTION: Encourage Coop to keep up with policies
 - ACTION: Educate the public on Hazardous Facilities and who to call with emergencies
- Pipeline Disruption
 - ACTION: Place a speaker on the community's fire truck to warn residents on the actions to take
- Extreme Heat Event
 - A shelter has already been established
 - ACTION: Construct signs directing residents to shelters
- Structural Fire
 - Speak with fire department on needs
- Communications Failure
 - ACTION: Build public awareness of the loss of phone service due to electronic phones during a power outage
 - Speak with fire department on needs
- Transportation Event
 - Speak with fire department on needs
- Disease
 - Public health currently provides immunization
- Structural Failure
 - Currently have ordinance about deteriorating buildings
 - ACTION: Locate funding to tear down dilapidating housing
- Air Transportation Event
 - Speak with fire department on needs
- Drought
 - ACTION: Establish an ordinance on water conservation
- Grass/Wildfire
 - Fire department currently has 2 portable water tanks
 - Speak with fire department on needs

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Expansive Soils
 - Re-address action - Improve/expand storm sewer system
- Violent Demonstration
 - Re-address actions
- River Flooding
 - Re-address action – Storm Sewer

Upon the development of Mitigation Actions, the committee decided the next meeting would be held Wednesday June 9th at 7:00 in the Rowan City Hall.

Meeting ended 9:30 pm

Additional comments regarding mitigation actions were given by Mark Bruns, Rowan Fire Chief on a conversation held Friday, June 4, 2010 over the phone. The conversation lasted from 8:30 am-8:45 am.

- **ACTIONS:**
 - Provide the fire department with new radios due to the frequency change in 2013
 - Provide the fire department with new self contained breathing apparatus' (SCBA)
 - Provide the fire department with mask and filtering systems for grassfires
 - Purchase commercial leaf blowers to blow out grassfires.

**Wright County Hazard Mitigation - Rowan - Meeting #4 Minutes
June 9, 2010 at 7:00 p.m.
Rowan City Hall**

Meeting attended by: Ron Bailey, Gene Drury, Vicki Box, Berne Ketchum, David Eriksen, and Dale Hollman

Meeting began at 7:00 pm.

- Reviewed goals, objectives and mitigation actions.
 - Added "Designate a Shelter within the community"
 - For informing the residents on tree trimming, also want to include working with Alliant to get tree trimming done as often as stated on the Alliant web-page
 - Decided not to PROVIDE residents with surge protectors, but ENCOURAGE residents to purchase surge protectors
 - Take out "Encourage Coop to keep up with policies
 - Take out "Educate the public on hazardous material spills
 - Take out "Encourage residents to do tree trimming around power lines and other structures by providing the City Council and Fire Department for assistance"
- Started and finished the STAPLEE analysis for each of the hazard mitigation actions that the committee has listed out for the plan
 - Decided to combine any actions that started with "informing the public" or "encourage residents to", into one action
- Discussed next meeting date: July 6, 2010 at 7:00 pm.

Meeting ended at 9:00 pm.

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**Wright County Hazard Mitigation - Rowan - Meeting Minutes #5
July 6, 2010 at 7:00 p.m.
Rowan City Hall**

Meeting attended by: Berne Ketchum, Mark Bruns, Vicki Box, Ron Bailey, and Dale Hollman
Meeting began at 7:00 pm.

- The committee prioritized the actions
- The next meeting will be scheduled when the plan is ready for review

Meeting ended at 8:30

Section 8: Resolution

City of Rowan

101 Main Street • PO Box 182 • Rowan, IA • 50470 • 641-853-2258 • cityofrowan@yahoo.com

February 4, 2013

RESOLUTION NO. 2013-01

A RESOLUTION OF THE ROWAN CITY COUNCIL
ADOPTING A HAZARD MITIGATION PLAN FOR ROWAN, IOWA

WHEREAS, the Rowan City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan, and,

WHEREAS, the Rowan City Council has authorized the development of the City's portion of the Wright County Multi-Jurisdictional Hazard Mitigation Plan for the City of Rowan, Iowa, and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, The Rowan Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommended that the City Council approve the plan; and,

WHEREAS, the plan has been reviewed by City staff members and the City Council,

NOW THEREFORE BE IT RESOLVED, that the Rowan City Council hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 4th day of February, 2013.



Berne Ketchum, Mayor

Attest:



Vicki Box, City Clerk

Appendix H: Woolstock

Section 1: Risk Assessment

The committee determined that the following additional hazards were not applicable or would have little effect on the City due to reasons listed below:

Earthquake: The hazard mitigation committee decided that if a earthquake were to occur, it would cause minimal damages. Therefore the committee removed earthquakes from further consideration in the plan.

Human Disease (Incident and Pandemic): Due to the lack of farmland and small population within the city limits. The hazard mitigation committee decided to remove Disease from further consideration in the plan.

Pipeline Incident: The hazard mitigation decided to leave Pipeline incident out of the plan because the nearest pipe line to the city is 4.5 miles away.

Public Disorder: The hazard mitigation committee decided that violent demonstration was not an issue in the small community. Therefore, violent demonstration was removed from current consideration in the plan.

Terrorism (all): The hazard mitigation committee decided that because of the small size of the community, terrorism was not a threat to the city, therefore it was left out of the plan.

The following hazards were combined together:

- Highway Transportation Event and Rail Transportation Event combined into Transportation Event.

Due to water quality concerns in the area Watershed Pollution was added to the list of hazards addressing

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COMMUNITY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Severe Winter Storms	5	5	5	5	4	5	29
Thunderstorm and Lightning	5	5	5	5	3	4	27
Energy Failure	5	5	4	5	1	5	24
Tornados	1	3	4	4	5	5	22
HAZAMAT – Fix Facility	2	3	4	4	3	5	21
Communications Failure	1	3	3	5	3	5	20
Flash Flooding	3	3	3	3	4	4	20
HAZMAT – Transportation	1	3	4	4	3	5	20
Structural Failure	3	4	2	2	4	5	20
Structural Fire	3	4	2	2	4	5	20
Hailstorms	1	3	4	4	2	5	19
River Flooding	3	3	3	4	2	4	19

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Transportation Event	2	3	3	3	2	5	18
Watershed Pollution	1	3	2	3	2	5	16
Windstorm/High Wind	2	3	3	2	1	5	16
Air Transportation Event	1	3	1	1	2	5	13
Grass or Wild land Fire	1	1	1	2	1	5	11
Drought	1	1	3	3	1	1	10
Extreme Heat	1	1	3	3	1	1	10
Expansive Soils	1	1	1	1	1	1	6

Hazard	Severe Winter Storms
Location	Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a severe winter storm occurs, the entire City is impacted. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	Historical data provided by the NCDC shows that based on this area of Wright County it has experienced over 60 winter storm conditions events since 1993.
Probability	Winter storms commonly occur throughout the state of Iowa. Seasonal snowfall averages 32 inches across Iowa and varies from around 40 inches in northeast Iowa to about 20 inches in the extreme southeast corner of the State. This is why the Woolstock Hazard Mitigation Committee rated probability as a 5.
Vulnerability	Winter storms are generally regional events that would impact the entire City. The hazard mitigation committee determined that more than 75% of the people and property within the community would be affected.
Maximum Threat	Winter storms affect entire regions and would impact the entire spatial extent of the City. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the City's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property of the City. The hazard mitigation committee determined that winter storms generally shutdown services for 24 – 72 hours during the storm event..
Speed of Onset	Generally there is minimal or no warning time when a winter storm hits the area, that is why that hazard mitigation committee rated severe winter storms as a 5.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Thunderstorm and Lightning
Location	Thunderstorms generally affect an entire area; therefore, if a thunderstorm event were to occur, a majority of the County would be exposed to the event. For a map of the City see section 6 of this appendix.
Historical Occurrence	The National Climatic Data Cent (NCDC) historical data in Appendix L shows 63 events relating to thunderstorm winds and lightening in Wright county since 1973.
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The central area of the United States is home to some of the most severe thunderstorms in the world. About 85 percent of Iowa thunderstorms occur between April and September, with most storms occurring during the month of June. Based on historical evidence the Woolstock hazard mitigation committee to determine that there is nearly a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	The vulnerability to a thunderstorm and lightning is dependent on the extent of the storm; past experience indicates that usual damaged caused by thunderstorms is downed tree limbs and loss of power. Because of the overall affect thunderstorms have had in the past the hazard mitigation committee determined more than 75% of the property in the City is affected by thunderstorms and lightning.
Maximum Threat	Similar to vulnerability, the hazard mitigation committee determined that 75% of the spatial area of the City is impacted by thunderstorms/lightning.
Severity of Impact	The hazard mitigation committee determined that a majority of thunderstorm and lightning events cause very little damage within the City. While a worst-case scenario would cause serious injuries, and shutdown of essential services and services for 24 hours.
Speed of Onset	The committee determined that though there is warning of possible rain and storms there is less than 5 hrs of warning before a thunderstorm and lightning event, would occur.

Hazard	Energy Failure
Location	Energy failure affects the entire area of the City. For a map of the community see section 6 of this appendix.
Historical Occurrence	Energy disruptions in the City are generally the result of electrical disruptions due to ice storms or high winds. Those on the committee could remember when the City experienced more than 10 such disruptions.
Probability	With the number of disruptions that have occurred in the past it is highly likely that the City will experience such disruptions next year.
Vulnerability	When the City experienced energy disruptions in the past the entire 50 – 75% of the population was without power.
Maximum Threat	When the City experienced energy disruptions in the past over 75% of the spatial community was without power
Severity of Impact	In past events the City has been without power for an average of 4 hours per outage.
Speed of Onset	Energy disruption generally occurs without any warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Tornadoes
Location	A tornado is a random event and could potentially impact the entire city. A map of the City is located in Section 6 of this appendix.
Historical Occurrence	NCDC data shows there have been 24 tornado events in the County since 1964. According to the hazard mitigation committee there have been less than two past tornado events specifically in the City of Woolstock.
Probability	There are, on average, about 46 tornadoes per year in the state of Iowa. Tornado events occur randomly and have the potential to affect any area within the State. A tornado is always possible due to the favorable weather conditions in this region of the United States. Since the county has experienced tornados in the past, the hazard mitigation committee determined it was possible that there would be a tornado event in the next year.
Vulnerability	The entire City is exposed to tornados and since the area of the city is not very large the committee estimated that 50% - 75% of the area could be impacted by a tornado.
Maximum Threat	The committee estimated that somewhere between 50% - 75% of the town spatially could be impacted in the event of a tornado due to the potential size of the tornado and the relative size of the City.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of the direct impact of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials. The committee determined that deaths, property damage beyond repair and complete shutdown of services could occur during a tornado event.
Speed of Onset	Minimal or no warning is given when a tornado occurs, especially for the area where a tornado watch transitions into a tornado warning.

Hazard	HAZMAT – Fixed Facility
Location	Hazardous materials events can occur anywhere where such materials are handled, stored, and/or processed. For a map of the City's hazardous materials locations see Section 6 of this appendix.
Historical Occurrence	The Woolstock Hazard Mitigation committee recalls 2 – 4 hazardous materials events being reported in the community. These events were usually contained in the Coop area of town.
Probability	Based on the number of uncontrolled hazardous material events that have occurred in the past, and based on the number of facilities which store/handle hazardous materials it is possible that a hazardous materials fixed facility event will happen in the next year.
Vulnerability	Areas of the community vulnerable to a HAZMAT event is dependent upon where the fixed facilities are located and on the type of material handled stored. Because of the small size of the community it was predicted 50 - 75% of the community could potentially be affected by a HAZMAT event resulting from a fixed facility.
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be between 50 - 75% of the City.
Severity of Impact	Based on the locations of the fixed facilities, the past events and the type of materials handled/stored the hazard mitigation committee determined that a fixed hazardous materials event may cause serious injuries and some property damage and shut down of services for 24 hours or more.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Communication Failure
Location	Communication Failures happen throughout the City of Woolstock. See Section 6 for a map of the City.
Historical Occurrence	The Hazard mitigation Committee decided that historically there were less than two occurrences of communication failures. Locally the only incidents were due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner.
Probability	Widespread communications losses are possible due to unexpected power loss.
Vulnerability	25 – 50% of citizens of the community would be impacted indirectly. Phone and data transmission could be impacted, which in an emergency could slow response time and emergency communications, which would affect a limited amount of citizens.
Maximum Threat	The hazard mitigation committee decided that spatially speaking; in the event of a communication interruption over 75% of the community would be affected. This is due to the small size of the city and the lack of surplus communication services.
Severity of Impact	If there were an interruption of communication, or communication failure, the committee decided that it would only be a 24 hour interruption of essential services for the community.
Speed of Onset	There is no warning time in the event of a communication failure.

Hazard	Flash Flooding
Location	Flash flooding most commonly occurs in the low lying areas of roadway in the community as well as at the city waste water lagoon.
Historical Occurrence	The City experiences flooding in the form of flash flooding due to heavy rains in a short period of time. This kind of rainfall happens regularly, as flash flooding is one of the most common hazard events in Iowa. There have been 13 flash flooding events in the County since 1995. The hazard mitigation committee decided that throughout the past years in the Woolstock, that 4-6 times the city has encountered flash flooding.
Probability	Based on historical occurrences and climate patterns the hazard mitigation committee determined that it was possible they would experience another event in the next year.
Vulnerability	The hazard mitigation committee estimated that 25 - 50% of the people and properties in the City are affected by flash flooding.
Maximum Threat	The committee identified that 25 - 50% of the spatial community has been impacted by flash flooding.
Severity of Impact	The impact is most due to property damage as a result of flash flooding. During a flash flood event, services and facilities could be down for 24 – 72 hours, depending on the severity of the event.
Speed of Onset	Because flash flooding occurs at an extremely fast rate, there is less than 5 hours of warning for a flash flood event.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	HAZMAT – Transportation
Location	Hazardous materials transportation events can occur anywhere there is a road or railroad. To see a map of the City see Section 6 of this Appendix.
Historical Occurrence	The IDNR shows that 20 transportation hazardous spills occurred in Wright County but do not indicate where in the County they take place. The hazard mitigation committee could only remember two such incidents happening in the City.
Probability	Because hazardous substances are regularly transported to and from the Coop it is possible that a hazardous materials transportation incident could occur in the next year.
Vulnerability	Areas of the community vulnerable to hazardous materials events based on whether rail or road transportation is used and if road transportation is used what roads are being traveled. Because different materials have different impacts, and based on what hazardous materials are known to be transported through town, it was predicted that than 50 - 75% of the community could potentially be affected by a hazardous materials transportation event.
Maximum Threat	The committee estimated that 50-75% of the spatial area of the City would be impacted by a hazardous materials transportation event.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. The hazard mitigation committee determined that most events related to transportation in the City could cause serious injuries, minor property damage and short term interruption of facilities or services for 24 -72 hours within the community.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time for when such an event will occur. If people are aware of the problem, they will fix it so the event does not have the potential to occur.

Hazard	Structural Failure
Location	There are buildings throughout the community that are slowly deteriorating and falling down.
Historical Occurrence	The hazard mitigation committee has seen 4 – 6 structural failures in the past.
Probability	Many of the structures in the community are structurally sound yet there are many that have been in disrepair for many years; therefore, the committee determined that it is likely that a structural failure will occur.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10 - 25% of the community would be impacted.
Maximum Threat	Due to the fact that most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10 - 25% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that serious injuries and property damage could occur if a building were to fail with people inside of it. This could shut down services for 24 – 72 hours.
Speed of Onset	The hazard mitigation committee determined that there is no warning when a structure may fail; therefore, they noted that there is minimal or no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of Woolstock see Section 6 of this appendix.
Historical Occurrence	The representative from the City fire department noted that there were 4 - 6 structures that were destroyed by fire in the past.
Probability	There is always the chance for a structural fire to occur within the City. Based on past events, the committee noted it was likely there would be a structure destroyed by fire next year.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined less than 10- 25% of people and/or property would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area, the committee estimated less than 10 - 25% of the spatial extent of the community would be impacted.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and long term property damage, as determined by the hazard mitigation committee.
Speed of Onset	Structural fires may begin and spread incredibly fast; there is no warning when one might occur.

Hazard	Hailstorm
Location	Hailstorms have the potential to affect the entire City. See Section 6 of this appendix for a map of Woolstock.
Historical Occurrence	According to data collected from the NCDL (Appendix L), there have been a total of 54 hail storms recorded in Wright County since 1974. Of those recorded in the county, the Woolstock Hazard Mitigation Committee decided that less than two of those occurrences have affected Woolstock.
Probability	Based on the number of hail storms, the hazard mitigation committee decided that it is possible that the City will experience a hailstorm next year.
Vulnerability	The mitigation committee determined that 50 – 75% of the people and property in town is vulnerable to hailstorms.
Maximum Threat	Though there was limited property damage in past hailstorms there is a potential for 50 - 75% of the spatial area of the community to be affected.
Severity of Impact	Damage from hailstorm can vary depending on how large the hailstones are. Agriculture is typically the most affected by such hailstorms, hail causes severe crop damage, and even a minor storm with relatively small size hailstones can have a devastating effect. Damage to vehicles, roofs (residential & commercial), and landscaping are the other things most commonly affected by hail. Hailstones also can pose a health risk to anyone who is caught outside without shelter, as larger hailstone could cause serious bodily harm. While there may be a lot of monetary damages done to structures, the human damage done is limited minor injuries and slight interruption of services.
Speed of Onset	Hailstorms can occur suddenly, and without warning, often resulting from a severe thunderstorm or even a tornado. Since even those events can occur quickly, there is minimal warning time, usually none.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	River Flooding
Location	Eagle Creek cuts through the NW and SW corners of the city limits. See map flood plain map in section 6 of this annex.
Historical Occurrence	Since 1993, there have been 48 flood events recorded which affected Wright County none were specifically identified to the City. The hazard mitigation committee decided that there have been 4 – 6 river flooding occurrences in past history.
Probability	Because flooding has occurred more frequently in recent years the hazard mitigation committee believes it is possible that Eagle Creek will flood in the next year.
Vulnerability	The hazard mitigation committee estimated that the percentage of people and property that would be affected by flash flooding was anywhere between 26%-50%. The hazard mitigation committee took into consideration the amount of basements that would be impacted by large amounts of rainfall and river flooding. Past floods have led to contaminated water, sewers overflowing, cracked foundations, and other property damage.
Maximum Threat	Impacts of river flooding would affect 50 - 75% of the spatial extent of the community according to the Hazard Mitigation Committee.
Severity of Impact	When it floods the biggest impact is to the homes nearest the river. There is some property damage but usually does not threat structural stability with minor injuries and slight interruption of services.
Speed of Onset	There is usually 5 hours of warning that river flooding will occur.

Hazard	Transportation Event
Location	The committee looked at transportation events as road and rail events as air would be assessed separately. Transportation events can occur wherever there is a road and rail. For a map of the transportation networks, see Section 6 of this appendix.
Historical Occurrence	The Hazard Mitigation committee remembered less than 4 transportation events in the past one which incident was an explosion that closed down the rail and road for a day.
Probability	Based on past occurrences, the hazard mitigation committee determined there was a 26-75% chance a road and rail transportation event would be possible in the next year.
Vulnerability	When transportation events happen, they generally affect the vehicles as well as homes near the event area. Based on these impacts the hazard mitigation committee decided that 25 - 50% of the people and property in the City would be impacted by a road transportation incident.
Maximum Threat	Similar to the vulnerability of the community; if a transportation event were to occur 25 - 50% of the space in the community would be impacted.
Severity of Impact	Based on the low amount of vulnerable areas, the committee estimated that the average transportation event would cause only minor injuries and/or property damage with slight interruption of essential services.
Speed of Onset	No prediction of a transportation incident can be made; therefore, there is no warning time of the event.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in Woolstock, due to the close proximity to Eagle Creek, for a map see Section 6 of this Appendix.
Historical Occurrence	The committee determined that less than two watershed pollution events have occurred because while spills may occur, a significant watershed pollution event is one that could potentially affect the City's water source; no recordings of such events have been recorded.
Probability	While materials may be released into the ground, the Iowa DNR does its best to clean up such spills before they enter the watershed area. But if there were to be an unnoticed spill the probability that watershed pollution will occur is possible according to the hazard mitigation committee.
Vulnerability	While watershed pollution may occur within the City, the main issue would relate to the contamination of key water sources. Since the majority of the population is on the City water system, the vulnerability of infiltration is minimal.
Maximum Threat	The spatial extent of the City that would be impacted by watershed pollution would be low; this is due to the depth of drinking water wells and not having a body of water within city limits.
Severity of Impact	Watershed pollution is an underlying hazard that most people are unaware of. The committee determined that there would be minor injuries or illness, little property damage and a slight interruption of essential services.
Speed of Onset	Pollution could be a gradual problem that can be monitored regularly. When pollutants increase, the city will have to address issues right away, and will have no warning.

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Hazard	Windstorm/High Wind
Location	Windstorms would generally impact the entire area of the City. For a map of the community see section 6 of this appendix.
Historical Occurrence	According to NCDC (Appendix L), 41 wind events/windstorms have been recorded in Wright County since 1996. The hazard mitigation committee decided that 4 of these events have affected Woolstock.
Probability	Iowa lies on the eastern edge of the Great Plains where winds blow strong and steady, particularly in the winter and spring. The relative flatness of the terrain means that most areas of the state are well exposed to the wind. In addition, most of the state consists of cropland with few trees to reduce wind speeds near the ground. Based on the committees past experience in Woolstock, they decided that it is possible that the City will experience a windstorm in the next year.
Vulnerability	<p>The population of Woolstock is generally protected from Windstorms, as long as citizens stay within shelter and stay off the roads. Windstorms often make it hazardous to drive, as Windstorms can start blowing vehicles, and cause accidents. Limbs and branches from trees can be hazardous as they are torn off of trees from the strong gusts of winds.</p> <p>The facilities or utilities, that are the most vulnerable to Windstorms is anything that is located above ground. Typically this is power and telephone lines. These are generally downed by Windstorms because limbs and branches from trees hanging over them may fall down on top of the lines, causing them to break, and causing power or telecommunication loss to the areas those utilities facilitated.</p> <p>The hazard mitigation committee estimated that on average 25% - 50% of the people and property in the community are affected by Windstorms. The thing that most people have to worry about is damage from falling and flying debris.</p>
Maximum Threat	Due to the total amount of people being affected by Windstorms, the hazard mitigation committee estimated that the spatial area of people affected would be from anywhere between 10 - 25%.
Severity of Impact	In the past windstorms have downed electrical lines and citizens have been without electricity for less than 4 hours.
Speed of Onset	While the City has some warning regarding a rain or snow event, generally the conditions relating to wind may vary as the approaching storm develops; therefore, the hazard mitigation committee determined there is very minimal warning time for windstorms.

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Hazard	Air Transportation Incident
Location	Air Transportation Events can happen throughout the City, but it is more probable that the outsides of town are more likely to be affected, as most crashes will try to land in a field or open area. For a map of the airports in the County, see Section 6 of this appendix.
Historical Occurrence	According to the hazard mitigation committee there has been one occurrence of a plane crash. It occurred outside of town in a field.
Probability	As the City has no airport but the hazard mitigation committee determined that it is possible that an air transportation event will occur within the community because of the many crop dustings planes in the area.
Vulnerability	Less than 10% of population would be affected by an air transportation event, because the planes that fly over the City are fairly small in size.
Maximum Threat	Less than 10% of the community spatially would be affected by a air transportation event.
Severity of Impact	An air transportation event in the form of a plane crashing in the community would cause minor injuries and short term property damage and slight interruption of essential services.
Speed of Onset	There is not a warning time for air transportation events in most cases.

Hazard	Grass or Wild land Fire
Location	The community is completely surrounded by agriculture land. During dry conditions a wild-land fire could occur anywhere around the City, for a map of the vulnerable area see Section 6 of this appendix.
Historical Occurrence	The hazard mitigation committee noted that there have been less than two wild land fires in the past though not large ones.
Probability	There is always the possibility for a grass or crop fires to occur near the City; but based on past experience it is rare that there be damage by the fire in the next year.
Vulnerability	Due to past experience the hazard mitigation committee felt that less than 10% of people and property in the City are vulnerable to wild land fires.
Maximum Threat	The spatial extent of the community that wild/grass fires could impact is 10% - 25% of the community. Mainly because the local volunteer fire department is very responsive.
Severity of Impact	There may be few injuries or illness, caused by a wild/grass fire; as well as little or no property damage if the fire spreads within the community. Some examples include burnt vegetation, and potential damage to residential and commercial buildings. The reason why the severity of impact is minor the spreading is usually contained out of town and community is affected by smoke pollution and inhalation.
Speed of Onset	Wild/grass generally may start out as small, but that can quickly get out of control if wind and dry conditions exist, so there is no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire City would be affected by the Drought conditions. For a map see Section 8 of this Appendix.
Historical Occurrence	There are three occurrences of droughts in the NCDC Database dating 1995, 2001 and 2003 however drought conditions have been reported in the state for the past couple of years which are not included in the NCDC data.
Probability	The probability of a drought is rare, where Woolstock would see an occurrence once every 50 years.
Vulnerability	Although Woolstock is such a small community, the measure of people affected by a drought would be minimal. This is due to the deep wells water wells. The committee decided that 25 - 50% of the people would be affected..
Maximum Threat	A drought is not a spatially isolated event. If a drought is present then 25 – 50% of the community will be affected.
Severity of Impact	Few injuries would be reported and services would be only slightly interrupted in the instance of a drought in the community.
Speed of Onset	The onset of a drought would be very slow; therefore, the Hazard Mitigation Committee gave the speed of onset a 1, more than 24 hours warning time.

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Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat conditions were to take place in Wright County, the entire county would feel the event. For a map of the City see Section 6 of this appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; two extreme heat events have been recorded for having occurred in Wright County and the State of Iowa in 1995 and 2001. The hazard mitigation committee agreed that the 2 extreme heat events have occurred within the County.
Probability	While extreme heat events have occurred multiple times in the past, the committee mentioned that it depends on the summer. In a cooler summer such events occur less often; therefore, based on historical evidence of such events, the committee estimated that rare that one will occur in the next year.
Vulnerability	<p>The most vulnerable population in an Extreme Heat is anyone that is outside and unable to get into a cool shelter, or those that are working outside. The elderly are also more susceptible to heat disorders as generally the older a person is, the more medical problems they may have.</p> <p>Vulnerable facilities are those facilities that may suffer technical difficulties due to the extreme heat. Facilities that should be properly looked after is any facility that is responsible for electricity distribution. If this facility fails it will put many people at risk since it will take away their ability to cool themselves with appliances that rely on electricity; such as air conditions, fans, etc.</p> <p>However, due to many people having air conditioning and/or fans, the percentage of people that would be affected by an Extreme Heat was estimated to be 25 - 50% of the population of Woolstock.</p>
Maximum Threat	Other than crops the committee felt only 25 – 50 % of the special area in the community would be impacted.
Severity of Impact	The severity of impact from extreme heat is low because a lot of buildings and citizens have air conditioning, or are able to get a building that is cool if they don't have air conditioning. This makes the severity of impact low with maybe a brief interruption of essential services.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Hazard	Expansive Soils
Location	Expansive Soils exist throughout the City. For a map of the City see Section 6 of this appendix.
Historical Occurrence	Historically in the City of Woolstock there have not been many issues with expansive soils, except minor basement cracks and heaves. The committee decided that heaving roads and potholes are largely due to expansive soils throughout the City, and there have been 2 major occurrences in the past.
Probability	The probability of a major expansive soil event is rare for the City. This is due to the geological structure and soil structure. Therefore the committee gave a rating of 1, for expansive soils.
Vulnerability	Little human impacts come from expansive soil events. Impacts commonly involve swelling clays beneath areas covered by buildings and slabs of concrete and asphalt, such as those used in construction of highways and sidewalks.
Maximum Threat	As mentioned above, less than 10% of the spatial extent of Woolstock would be impacted by expansive soils.
Severity of Impact	An expansive soil event would cause a brief interruption of essential services in the City of Woolstock.
Speed of Onset	The committee decided that the onset of an expansive soil event would have a long warning time.

Section 2: Vulnerability Assessment & Loss Estimates

Woolstock is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the City.

Those hazards that the entire city is exposed to includes Severe Winter Storms, Thunderstorms and Lightning, Energy Failure, Communications Failure, Hailstorms, Watershed Pollution, Windstorms, Drought, Extreme Heat, Transportation Incident, Tornadoes, HAZMAT-Transportation, Structural Failure, Structural Fire, Air Transportation Event and Expansive Soils. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For Woolstock, these hazards include HAZMAT-Fixed Facilities, Flash Flooding, River Flooding, and Grass or Wild-land Fires. Their vulnerability assessments and loss estimates are discussed in sections 2.2 through 2.6.

2.1 Exposure Assessment for Severe Winter Storms, Thunderstorms and Lightning, Energy Failure, Communications Failure, Hailstorms, Watershed Pollution, Windstorms, Drought, Extreme Heat, Transportation Incident, Tornadoes, HAZMAT-Transportation, Structural Failure, Structural Fire, Air Transportation Event and Expansive Soils:

The City’s exposure to each hazard was determined based on the area of the city that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire City include Severe Winter Storms, Thunderstorms and Lightning, Energy Failure, Communications Failure, Hailstorms, Watershed Pollution, Windstorms, Drought, and Extreme Heat,. Those hazards that could potential impact any one random site within the City include Transportation Incident, Tornadoes, HAZMAT-Transportation, Structural Failure, Structural Fire, Air Transportation Event and Expansive Soils. With this, all of the above-listed hazards have the potential to impact any area of the City, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The table below depicts this exposure.

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Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	88	88	100%	\$4,699,900	\$4,699,900	100%	168	168	100%
Commercial	34	34	100%	\$1,962,700	\$1,962,700	100%			
Agricultural	5	5	100%	\$21,200	\$21,200	100%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	127	127	100%	\$6,683,800	\$6,683,800	100%			

2.1.1. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the City of Woolstock is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that more than 75% of the people and property within the city are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice. Infrastructure failure occurs through power outages from ice, which has the potential to impact the entire County. Structural failure is also an impact that can occur due to large amounts of heavy snow. These impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person's exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the City are ill-advised to be outdoors for long periods of time during a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDC, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this amount represents reported damages throughout the County, it was used as a worst-case scenario for the City of Woolstock. Therefore, based on \$75,000 in damages that could potentially occur within the City of Woolstock, which when rounded upwards means approximately .8% of the structures in the city would experience damages due to winter storms. The loss estimate calculation for .8% in damages of all structures in Woolstock is expressed below.

Estimated residential structural damage due to Severe Winter Storms (.8%) = \$65,106
 Estimated commercial structural damage due to Severe Winter Storms (.8%) = \$17,074
 Estimated agricultural structural damage due to Severe Winter Storms (.8%) = \$9
 Estimated industrial structural damage due to Severe Winter Storms (.8%) = \$0
 Total estimated structural damages due to Severe Winter Storms = **\$82,189**

2.1.2. Vulnerability Assessment for Thunderstorms & Lightning

As determined by the hazard mitigation committee 100% of Woolstock is exposed to thunderstorms and lightning. Because thunderstorms and lightning are a regional event, the committee determined that more than 75% of the population of Woolstock is susceptible to impacts or damages due to thunderstorms and lightning; however, this vulnerability is dependent on the extent of the storm and accompanying events that may occur.

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Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts include downed limbs, power outages and heavy rain that may impair individuals' ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

Loss Estimate Calculation:

Historical data from the NCDL displayed in Appendix C shows that the highest amount of property damages reported within Woolstock due to Thunderstorms equaled \$50,000; however, the largest amount of property damages in the County equaled \$250,000. The average of these numbers was used as an estimate of losses to account for a worst-case-scenario of the impacts that the City could experience due to thunderstorm and lightning. The average damages, which equaled \$150,000 accounts for approximately 1.5 % of the City's total assessed value of residential, commercial, agricultural and industrial structures. Based on this worst-case-scenario, it was estimated that each property would experience structural damages equaling 1.5% of their assessed value, or 1.5 % of structures in the City would experience complete loss. The damages are dependent on the intensity and impacted area of the Thunderstorm and Lightning event. The results of this estimate are displayed below.

Estimated residential structural damage due to Thunderstorm and Lightning (1.5%) = \$ 122,075
Estimated commercial structural damage due to Thunderstorm and Lightning (1.5%) = \$24,391
Estimated agricultural structural damage due to Thunderstorm and Lightning (1.5%) = \$13
Estimated industrial structural damage due to Thunderstorm and Lightning (1.5%) = \$0
Total estimated structural damages due to Thunderstorm and Lightning = **\$146,479**

2.1.3. Vulnerability Assessment for Energy Failure

Energy failure is an extended interruption of service either electric, petroleum or natural gas, which by an actual or impending acute shortage of usable energy. Energy shortages are rare in Woolstock; however, outages are common. Outages are often caused by impacts to above-ground power lines from thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes and infrastructure failure.

The hazard mitigation determined based on personal experience that energy failures impact the entire community; however, impacts are generally mild. Generally the largest impact is to essential facilities or services; however, few if any injuries or illness occur, and little-to-no property damage.

Energy failures are most threatening during extreme heat or winter conditions. During such time residents are not able to cook, store food, or run every-day appliances. Death and injuries due to power outages are very rare.

Loss Estimate Calculation:

As mentioned above, an energy failure generally does not impact structures and people are typically only at risk during extreme heat or winter conditions. Due to these circumstances, no loss estimate could be calculated.

2.1.4. Vulnerability Assessment for Communications Failure

Communication failure is the widespread breakdown or disruption of normal communication capabilities. They could be caused by electrical outages, tower failures due to thunderstorms and lightning, severe winter storms, windstorms, hailstorms, transportation incidents, tornadoes, infrastructure failure or terrorism. Impacts could include economic impacts such as the failure to communicate with the staff or public regarding safety or emergency matters. Due

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to the rarity of this event and alternate forms of communication available to the City, its impacts are generally not extreme and no structural impacts are felt unless to the actual equipment.

Loss Estimate Calculation:

As mentioned above, a communications failure generally does not impact structures, and people are typically only at risk during emergency situations when lines of communication may be down. Due to these circumstances, no loss estimate could be calculated.

2.1.5. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms and according to the hazard mitigation committee, more than 75% of the people in the city could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDC shows 17 hailstorms reported in Wright County and 5 such events reported in Woolstock. The maximum amount of property damage incurred in one recorded event within the City of Woolstock equaled \$75,000, which accounts for about .7% of the city's assessed residential, commercial, agricultural and structural values. Based on this historical data it was estimated that approximately .7% of the city's structures would be impacted by a hailstorm.

Estimated residential structural damage due to Hailstorms (.7%) = \$56,968
Estimated commercial structural damage due to Hailstorms (.7%) = \$17,074
Estimated agricultural structural damage due to Hailstorms (.7%) = \$9
Estimated industrial structural damage due to Hailstorms (.7%) = \$0
Total estimated structural damages due to Hailstorms = \$74,051

2.1.6. Vulnerability Assessment for Watershed Pollution

According to the Hazard Mitigation Committee, while watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. Residents of Woolstock are most commonly exposed to such hazard if in contact with the nearby Iowa River. Impacts could result in impacts to nearby bodies of water (the Iowa River) and their aquatic life. This could result in illness when directly exposed to the river; however, no property damages would be felt. Accompanying events include thunderstorm and lightning, river flooding, severe winter storms, HAZMAT events relating to both transportation and fixed facilities and flash flooding.

Loss Estimate Calculation:

As mentioned above, watershed pollution generally does not impact structures; therefore, no loss estimate could be calculated.

2.1.7. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire City is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning, hailstorms or tornadoes; impacts are generally limited. The Woolstock hazard mitigation committee determined that more than 75% of the people and property in the community are impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

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Loss Estimate Calculation:

The NCDC historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996. While this would be the amount normal used in the loss estimates for Woolstock, the committee rated the impacts due to windstorms to be similar to that of Hailstorms; therefore, the loss estimate amount used was .7% meaning that each property would experience structural damages equaling approximately .7% of their assessed value. This amount of damage is indicated in the loss estimate, below.

Estimated residential structural damage due to Windstorms (.7%) = \$56,968
Estimated commercial structural damage due to Windstorms (.7%) = \$17,074
Estimated agricultural structural damage due to Windstorms (.7%) = \$9
Estimated industrial structural damage due to Windstorms (.7%) = \$0
Total estimated structural damages due to Windstorms = \$74,051

2.1.8. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. While it may not directly impact the City of Woolstock, drought impacts the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the City. Accompanying events include extreme heat and grass and wild-land fires.

Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in the unincorporated area where a majority of agriculture land exists.

2.1.9. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. While a majority of residents have air conditioning, the committee estimated that approximately 10-25% of the City would be impacted due to the fact that most residents have access to air condition. However, residents must ensure they are not exposed to the heat for a long period in time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered to the crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not cause structural damages.

2.1.10. Vulnerability Assessment for Transportation Incidents

A transportation incident can occur in many forms resulting from failure or impact of motor vehicles or rail cars. County Road C70 runs along the north edge of Woolstock. Union Pacific Railroad also passes through the City. For a map of all modes of transportation see Section 6 of this Appendix.

Transportation events generally result in substantial injuries, death and property damage. Property damage usually results in the form of damages to the mode of transport and/or structure that was involved. Injuries and property damage depend on the extent of the event and its cause. The impacts are generally isolated and less than 10% of the people and property of Woolstock would be impacted.

Loss Estimate Calculation:

The impacts from a transportation incident are generally very isolated. Most impacts are to drivers and vehicles. Impacts are dependent on the cause of the incident, number of vehicles, drivers and other structures involved.

2.1.11. Vulnerability Assessment for Tornadoes

The entire population of Woolstock is exposed to tornadoes. The hazard mitigation committee estimated that 50-75% of the City would be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent of the size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornadoproject.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDC, multiple tornado events have been reported in Wright County, with one directly impacting the City of Woolstock. The maximum amount of property damage incurred in one recorded event in Woolstock equaled \$30,000; however this number is much higher for the County, which was reported in 1966 for having \$25,000,000 in damages. Because of the variation of damages that could occur due to Tornadoes, it was determined that

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the average of these two amounts should be used for the loss estimate values for the City of Woolstock. Therefore, approximately \$12,500,000 in damages could occur, which equals 100% of the city's assessed residential, commercial, agricultural and structural values. This percentage would not be far off in a worst-case-scenario, as Iowa has experienced events that have impacted entire community:

Estimated residential structural damages due to Tornado (100%) = \$8,138,300
Estimated commercial structural damages due to Tornado (100%) = \$2,439,100
Estimated agricultural structural damages due to Tornado (100%) = \$1,340
Estimated industrial structural damages due to Tornado (100%) = \$0
Total estimated structural damages due to Tornado (100%) = \$10,577,400

2.1.12. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the City, and according to the hazard mitigation committee, could impact 10-25% of the community depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the City.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks (See historical events in Chapter 3).

2.1.13. Vulnerability Assessment for Structural Failure

The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings is considered a structural failure. Structural failures only impact the space surrounding the failure. Heavily traveled roads and bridges are regularly inspected for stability. Structural failure most commonly occurs in dilapidating structures. Accompanying events include windstorms, thunderstorms and lightning, severe winter storms and tornadoes. Structures that cannot withstand such events result in shambles. Person's inside could experience substantial injuries or death.

Loss Estimate Calculation:

Similar to structural fires, structural failure is such an isolated event, it would be insignificant to provide a loss estimate. A structural failure could occur in any one structure within the City.

2.1.14. Vulnerability Assessment for Structural Fire

A structural fire is an uncontrolled fire in populated areas that threatens life and property. Structural fires are very isolated events in the City of Woolstock because most buildings outside of the downtown are detached. The committee estimated that less than 10% of people and property are affected in one event. Damages to buildings may be substantial or minimal, depending on whether the fire was controlled and responded to quickly. People inside a structure where a fire occurs could experience substantial injuries or death.

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Loss Estimate Calculation:

Because structural fires are such an isolated event, it would be insignificant to provide a loss estimate. A structural fire could occur in any one structure within the City.

2.1.15. Vulnerability Assessment for Air Transportation Event

While no airport is located in Woolstock, the hazard mitigation committee determined that an air transportation event could occur as planes pass over the city while crop dusting and/or landing in nearby airports. If such event were to occur less than 10% of the community would be impacted due to the fact that such event only impacts an isolated area. Severity of impact depends on the size and speed of the aircraft when striking the city; however, the committee determined that multiple deaths would occur and structural damages would result. Structural damages would be as severe as to completely demolish multiple buildings and potentially set fire to structures; therefore, accompanying events would include structural fire, grass or wild-land fire. Such event could also occur due to windstorms, thunderstorm and lightning, tornado, winter storm or hailstorm.

Loss Estimate Calculation:

No air transportation events have been recorded to have occurred in Woolstock. Because it is estimated that an air transportation event would generally be an isolated event, it would be insignificant to provide a loss estimate. There is no telling where such event would occur; however, the aircraft would most likely be “small” in nature.

2.1.16. Vulnerability Assessment for Expansive Soils

Expansive soils most commonly result in damaged streets and infrastructure, basements and other structures due to constant movement from change in temperature, moisture and other environmental impacts. Accompanying events include severe winter storms, flash flooding, thunderstorm and lightning, river flooding and sink holes. Infrastructure failure may result from expansive soils when harm to basements, streets or other utilities occurs. Impacts usually result in a slight interruption in water services to the area where the water main was broken.

Loss Estimate Calculation:

Effects from expansive soils vary depending on the structure impacted. Impacts generally affect one isolated area in a basement, street or other utility. Because the committee was unable to identify specific areas, no loss estimates were calculated.

2.2 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were identified and positioned on the map displayed in Section 6. A buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that there were 168 residents exposed.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area

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Residential	88	78	89%	\$4,699,900	\$4,216,600	90%	168	168	100%
Commercial	34	34	100%	\$1,962,700	\$1,962,700	100%			
Agricultural	5	5	100%	\$21,200	\$21,200	100%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	127	117	92%	\$6,683,800	\$6,200,500	93%			

2.2.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the City, different materials have different impacts. The majority of hazardous materials within Woolstock are Underground Storage Tanks, which have a limited impact such as an explosion or groundwater contamination, if leaking. The hazard mitigation committee estimated that less than 50-75% of the community would be impacted by such event, since they are generally isolated.

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on the hazard area:

- Estimated residential structural damage due to HAZMAT – Fixed Facility = \$421,660
- Estimated commercial structural damage due to HAZMAT – Fixed Facility = \$196,270
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility = \$2,120
- Estimated industrial structural damage due to HAZMAT – Fixed Facility = \$0
- Total estimated structural damages of HAZMAT – Fixed Facility = **\$620,050**

2.3 Exposure Assessment for Flash Flooding

Exposed Structures

The hazard mitigation committee estimated that 25-50% of the community would be impacted by flash flooding. Flash flooding results from intense rainfall over a brief period of time; therefore, it was determined that the majority of flash flooding within the City of Woolstock would occur in low-lying areas with poor drainage, which generally exists along Eagle Creek. It’s estimated that flash flooding would most likely occur in the low lying areas near the creek; therefore, all areas with a contour of 1088 or less were estimated to be the “hazard area” for flash flooding. Based on this it was estimated that 29 dwellings, 8 commercial structures, 0 industrial structures and 5 agriculture structures were located in potential areas of flash flooding.

Exposed Persons

The “Number of People” exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there would be 69 residents, 8

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commercial persons and 5 agricultural persons exposed to flash flooding; making a total of 82 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	88	29	33%	\$4,699,900	\$1,346,600	29%	168	82	49%
Commercial	34	8	24%	\$1,962,700	\$1,002,300	51%			
Agricultural	3	5	167%	\$21,200	\$9,600	45%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	125	42	34%	\$6,683,800	\$2,358,500	35%			

2.3.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in low-lying areas. It is evident that a majority of areas exposed to flash flooding are in areas where near and southwest of Eagle Creek.

Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes' value by 10%; therefore, damages might decrease a homes' value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 67,330
- Estimated commercial structural damage due to Flash Flooding (5%) = \$50,115
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$480
- Estimated industrial structural damage due to Flash Flooding (5%) = \$ 0
- Total estimated structural damages of Flash Flooding = **\$117,925**

2.4 Exposure Assessment for River Flooding

Exposed Structures

According to the hazard mitigation committee 25-50% of people and property are impacted by River Flooding. The hazard mitigation committee noted that the northwestern portion of the City would be most impacted, which is evident from the future floodplain map displayed in Section 6. While these maps have not yet been adopted, they will eventually be the floodplain maps used within the County (some changes may be made). Since no GIS data was available for the future floodplain maps, an area similar to the area discussed in flash flooding was used as an estimated area for river flooding. It was determined that those contours of 1088 and less drew a similar area of impact to the future floodplain map. See the Flash Flooding and River Flooding Hazard Area map developed in Section 6. Based on this map, it was estimated that 29 residential structures, 8 commercial structures and 5 agriculture structures were located in the "hazard zone".

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Exposed Persons

The “Number of People” exposed to river flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 69 residents, 8 commercial persons, and 5 agricultural persons exposed to flash flooding; making a total of 82 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	88	29	33%	\$4,699,900	\$1,346,600	29%	168	82	49%
Commercial	34	8	24%	\$1,962,700	\$1,002,300	51%			
Agricultural	3	5	167%	\$21,200	\$9,600	45%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	125	42	34%	\$6,683,800	\$2,358,500	35%			

2.4.1 Vulnerability Assessment for River Flooding

Impacts from river flooding typically take form in property damage to basements. Being located in the low-lying areas or near the river may put residents at risk for injuries. Accompanying hazard events that may result in river flooding include thunderstorms and lightning, hailstorms, windstorm, flash flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The river flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes’ value by 10%; therefore, damages might decrease a homes’ value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to River Flooding (5%) = \$ 67,330
- Estimated commercial structural damage due to River Flooding (5%) = \$50,115
- Estimated agricultural structural damage due to River Flooding (5%) = \$480
- Estimated industrial structural damage due to River Flooding (5%) = \$ 0
- Total estimated structural damages of River Flooding = **\$117,925**

2.5 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that less than 10% of the community would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the City, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the “hazard zone”, or the property that could potentially be impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 35 dwellings, 6 commercial structures, 0 industrial structures and 5 agriculture structures were located in the “hazard zone” for grass and wild-land fires.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Exposed Persons

The “Number of People” exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimates that there were 130 residents exposed, 16 commercial persons exposed, 8 industrial persons exposed and 4 agricultural persons exposed; making more than 100% of potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in City	# in Hazard Area	% in Hazard Area	\$ in City	\$ in Hazard area	% in Hazard area	# in City	# in Hazard area	% in Hazard area
Residential	88	35	40%	\$4,699,900	\$2,003,700	43%	168	94	56%
Commercial	34	6	18%	\$1,962,700	\$327,400	17%			
Agricultural	5	5	100%	\$21,200	\$21,200	100%			
Industrial	0	0	-	\$0	\$0	-			
TOTAL	127	46	36%	\$6,683,800	\$2,352,300	35%			

2.5.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land surrounds the northern, southern, eastern and western perimeters of the City of Woolstock; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

Loss Estimate Calculation:

Only a portion of those exposed structures within the City would actually be impacted during a grass and wild-land fire event. It is estimated that structures located adjacent to the open space consisting of either the north, south, east or west portion of the community would be impacted; therefore, the following estimates were calculated:

- Estimated residential structural damage due to Grass & Wild-land Fire (10%) = \$200,370
- Estimated commercial structural damage due to Grass & Wild-land Fire (10%) = \$32,740
- Estimated agricultural structural damage due to Grass & Wild-land Fire (10%) = \$2,120
- Estimated industrial structural damage due to Grass & Wild-land Fire (10%) = \$0
- Total estimated structural damages of Grass & Wild-land Fire = **\$235,2300**

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Action	STAPLEE Rating
No burning bans in dry weather ordinance	22
Public Education and Awareness (hail, transportation emergencies, watershed pollution, grassfires)	20
Water rationing ordinance for City	17

Enforcing chemical containment and chemical spill response	16
Road closure and traffic control signage for emergencies	15
Tree trimming	15
Retrofit Community Hall with emergency supplies for sheltering	13
Fire Department Inspections and Structural Inspections	13
Inspecting strobe lighting on tall buildings	13
Install line power line and generator to Community Hall	12
Install more sirens and early warning systems	12

Woolstock Hazard Mitigation Goals, Objectives and Mitigation Actions

Goal 1: *Ensure that all members of the City are aware and prepared for potential hazards*

Objective 1.1: *Warn residents of potential hazardous events*

Mitigation Actions

- 1.1.1 Road closure and traffic control signage for emergencies
- 1.1.2 Install more sirens and early warning systems

Objective 1.2: *Inform the general public of available resources and their responsibilities' during hazardous events*

Mitigation Actions

- 1.2.1 Public Education and Awareness (hail, transportation emergencies, watershed pollution, grassfires)

Objective 1.3 *Construct areas for the general public to escape from hazards in the county*

Mitigation Actions

- 1.3.1 Retrofit the Woolstock Community Hall with emergency supplies for sheltering
- 1.3.2 Install line power line and generator to Community Hall

Goal 2: *Implement projects/ actions to reduce or eliminate the loss of property and life due to hazards that may affect the City*

Objective 2.1: *Protect residents from hazards by initiating and enforcing hazard mitigation policies*

Mitigation Actions

- 2.1.1 No burning bans in dry weather ordinance
- 2.1.2 Water rationing ordinance for City
- 2.1.3 Fire Department Inspections and Structural Inspections

Objective 2.2: *Ensure vulnerable areas are secure from potential hazards*

Mitigation Actions

- 2.2.1 Enforcing chemical containment and chemical spill response
- 2.2.2 Tree trimming
- 2.2.3 Inspecting strobe lighting on tall buildings

Section 4: Action Plan

Adopt a burning ban ordinance	
Description	The city would like to adopt an ordinance that prohibits open burning in dry weather.
Hazards Addressed	Structural Fires, Drought, Grass and Wild Land Fires
Priority	I
Responsible Dept./Party	Fire Department, City Council
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Emergency Services Protection, Property Protection
Target Completion Date	2014

Public Education and Awareness	
Description	The city would inform the public through mailings or public announcements about the dangers of these hazards.
Hazards Addressed	Hailstorm, Transportation Event, Watershed Event, Grass and Wild Land Fires
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	General Funds, Local Grants
Mitigation Measure Category	Public Education and Awareness Action, Preventative Action, Emergency Services Protection, Property Protection
Target Completion Date	2018

Water rationing ordinance for city	
Description	The city would initiate and adopt a water rationing ordinance in times of extreme drought and heat in order to conserve water supplies.
Hazards Addressed	Drought, Extreme Heat
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	N/A
Mitigation Measure Category	Prevention Action
Target Completion Date	2017

Enforcing chemical containment and chemical spill response	
Description	Train and enforce the use of the basic hazardous material containment and response (operations level) until the Region V HAZMAT team arrives.
Hazards Addressed	Hazardous Materials Incident – Fixed and Transportation
Priority	I
Responsible Dept./Party	Fire Department/ City Council
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget, State/ Federal and Local Grants
Mitigation Measure Category	Emergency Services Action, Property Protection, Natural Resource Protection Action
Target Completion Date	2015

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Road closure and traffic control signage for emergencies	
Description	Purchase road closure signs and other emergency signage to be used in emergencies to close roads and divert traffic.
Hazards Addressed	Expansive soils, Tornados, Severe Winter Storms, Windstorms, Thunderstorms & Lightning, River Flooding, Flash Flooding
Priority	II
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	General Fund, DOT, State/ Federal/ Local Grants
Mitigation Measure Category	Emergency Services Protection, Preventative Action
Target Completion Date	2015

Tree Trimming	
Description	Purchase tree trimming equipment and/or contract with outside entity to trim trees away from power lines throughout the city.
Hazards Addressed	Energy Failure, Communication Failure,
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	General Funds
Mitigation Measure Category	Property Protection, Prevention Action
Target Completion Date	Ongoing.

Retrofit Community Hall with supplies to serve as a shelter	
Description	This action would retrofit the Woolstock Community Hall and supply it to serve as a warming and cooling shelter during emergencies or outages.
Hazards Addressed	Extreme Heat, Drought, Severe Winter Storms, Tornados, Thunderstorms and Lightning, Windstorms, Energy Failure.
Priority	III
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	State, Federal, or Local Grants
Mitigation Measure Category	Prevention Action, Public Education and Awareness Action
Target Completion Date	2015

Fire Department inspections	
Description	Initiate an inspection program so that the fire department is able to inspect city buildings and provide recommendations for fire safety.
Hazards Addressed	Structural Failure, Structural Fire
Priority	III
Responsible Dept./Party	Fire Department/ City Council
Estimated Cost	Minimal
Potential Funding Source	Fire Department Budget
Mitigation Measure Category	Preventive Action, Property Protection
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Inspect strobe lighting on tall buildings	
Description	Inspect and install strobe lighting on the tops of tall building throughout the town of Woolstock.
Hazards Addressed	Air Transportation Event
Priority	III
Responsible Dept./Party	City Council (City buildings)/ Businesses (buildings they own)
Estimated Cost	Minimal
Potential Funding Source	City/ Local Grants
Mitigation Measure Category	Prevention Action
Target Completion Date	Ongoing

Install power line and generator to Community Hall	
Description	Purchase and install generator and wiring to Community Hall so that the Hall will continue to operate when electricity fails.
Hazards Addressed	Severe Winter Storms, Thunderstorms and Lightning, Windstorms, Energy Failure, Tornado, Extreme Heat
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Minimal
Potential Funding Source	City/General Funds
Mitigation Measure Category	Preventive Action, Emergency Services Protection, Property Protection
Target Completion Date	2013

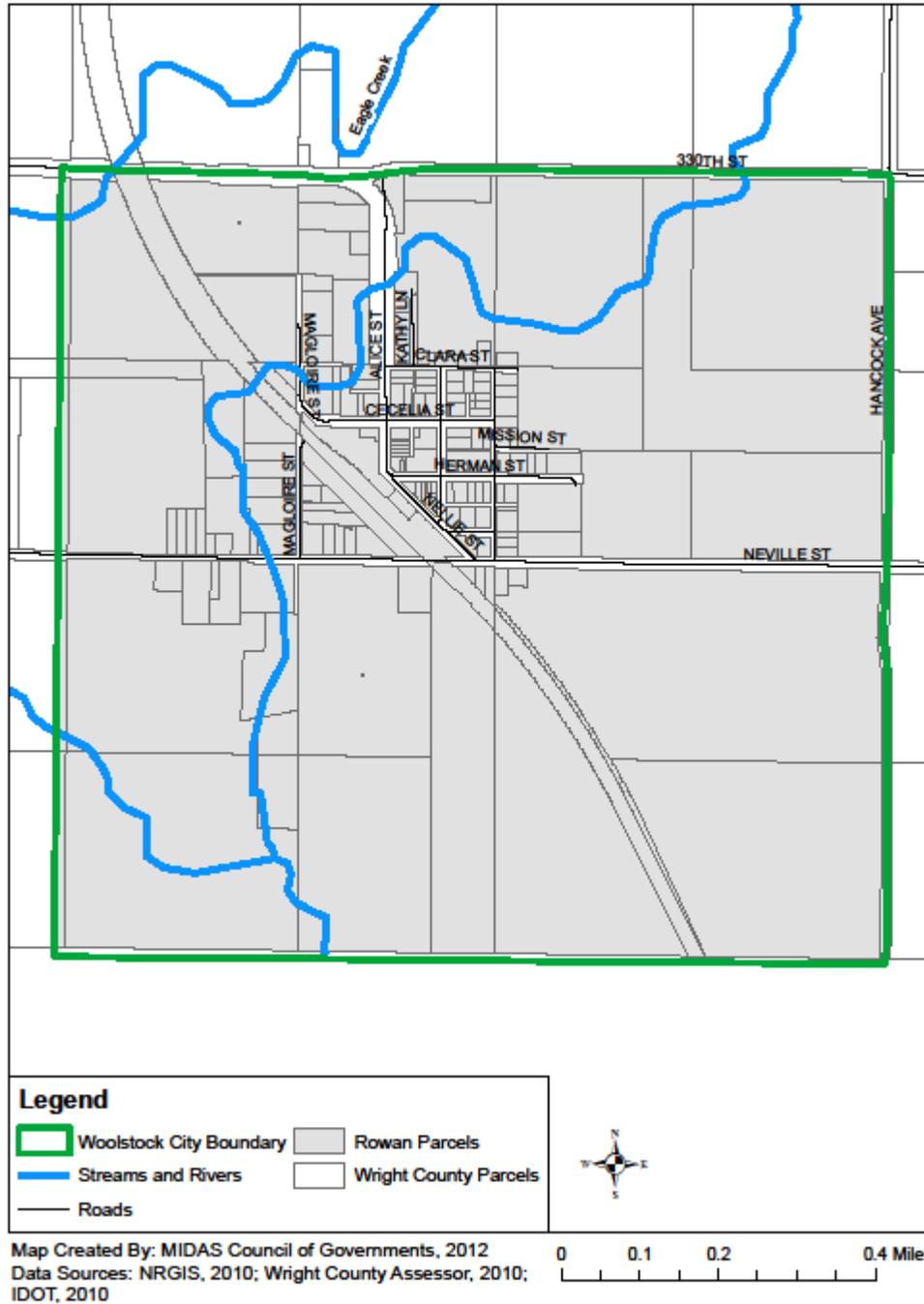
Install more sirens and early warning systems	
Description	Purchase and install more early warning sirens throughout the city of Woolstock.
Hazards Addressed	Tornado, Thunderstorms and Lightning
Priority	I
Responsible Dept./Party	City Council
Estimated Cost	Low
Potential Funding Source	City/ General Funds, State, Federal and Local Grants
Mitigation Measure Category	Property Protection
Target Completion Date	2013

Section 5: Critical Facilities

- Woolstock water tower and water plant
- Sewer siphon at the Woolstock city lagoons
- WM Tel – Woolstock Mutual Telephone/ Internet Substation
- Woolstock Fire Station
- Natural Gas pipe lines on the west edge of town

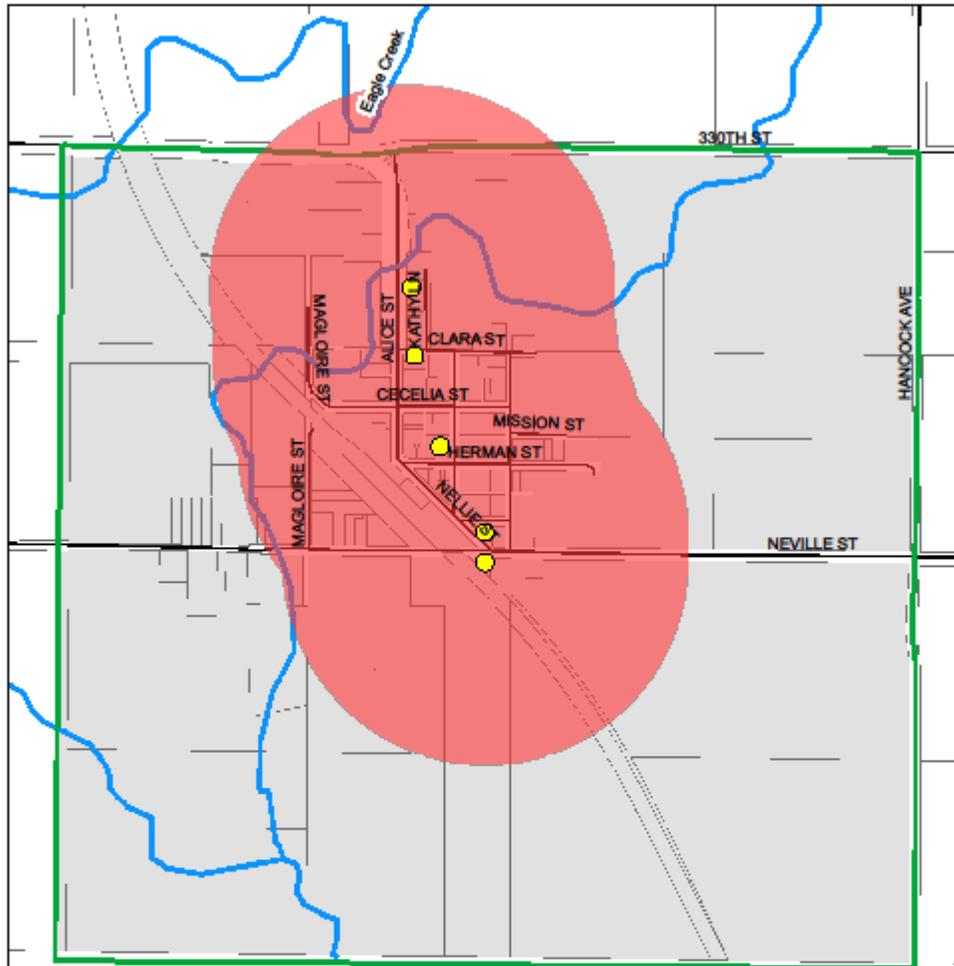
Section 6: Community Maps

City of Woolstock



City of Woolstock

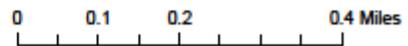
Fixed Hazardous Materials Hazard Area



Legend

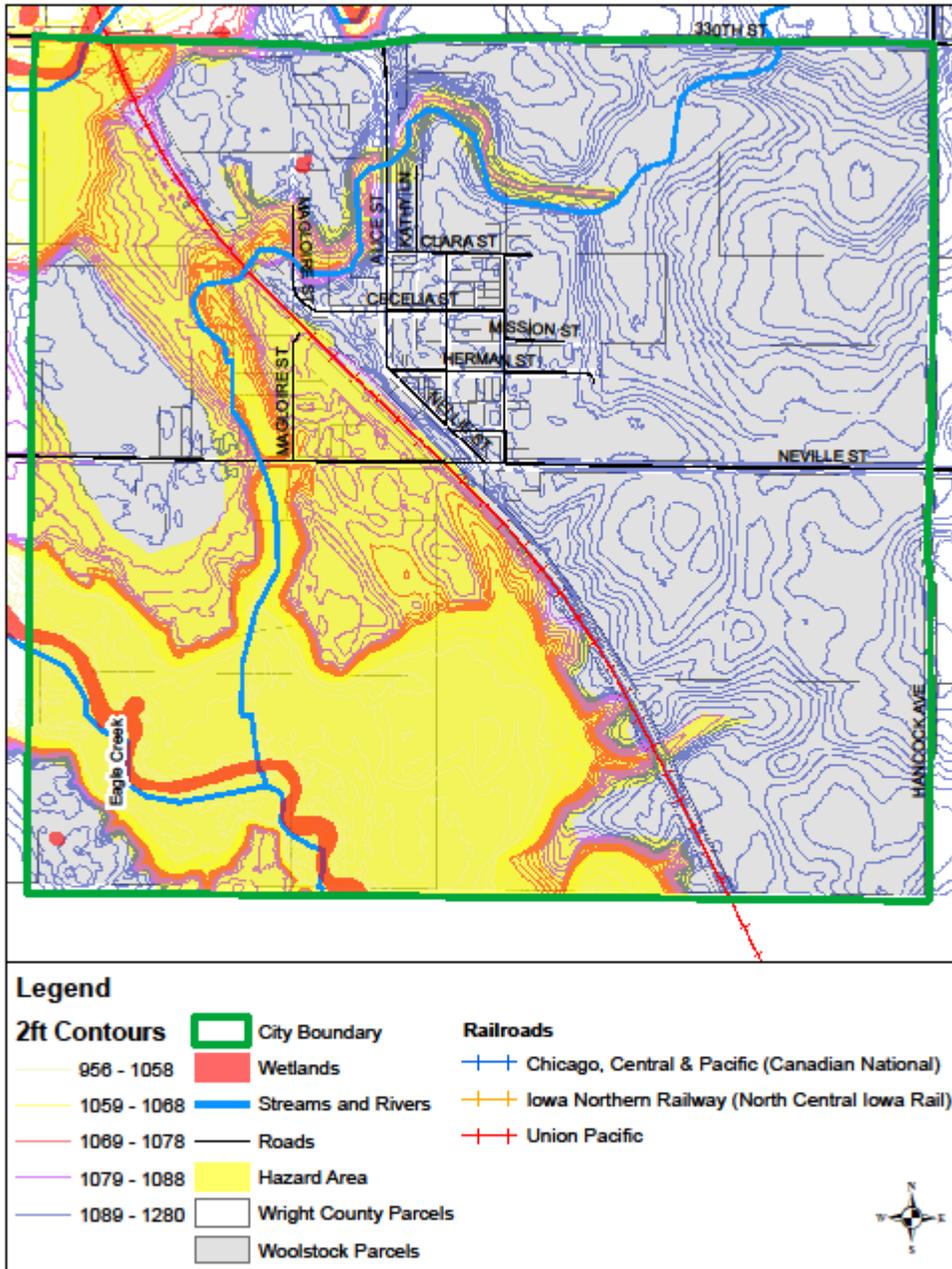
- | | | | | | |
|---|---------------------------|---|--------------------|---|-----------------------|
|  | Woolstock City Boundary |  | Streams and Rivers |  | Rowan Parcels |
|  | Hazard Area |  | Roads |  | Wright County Parcels |
|  | Fixed Hazardous Materials | | | | |

Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010

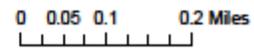


City of Woolstock

River Flooding & Flash Flooding Hazard Area

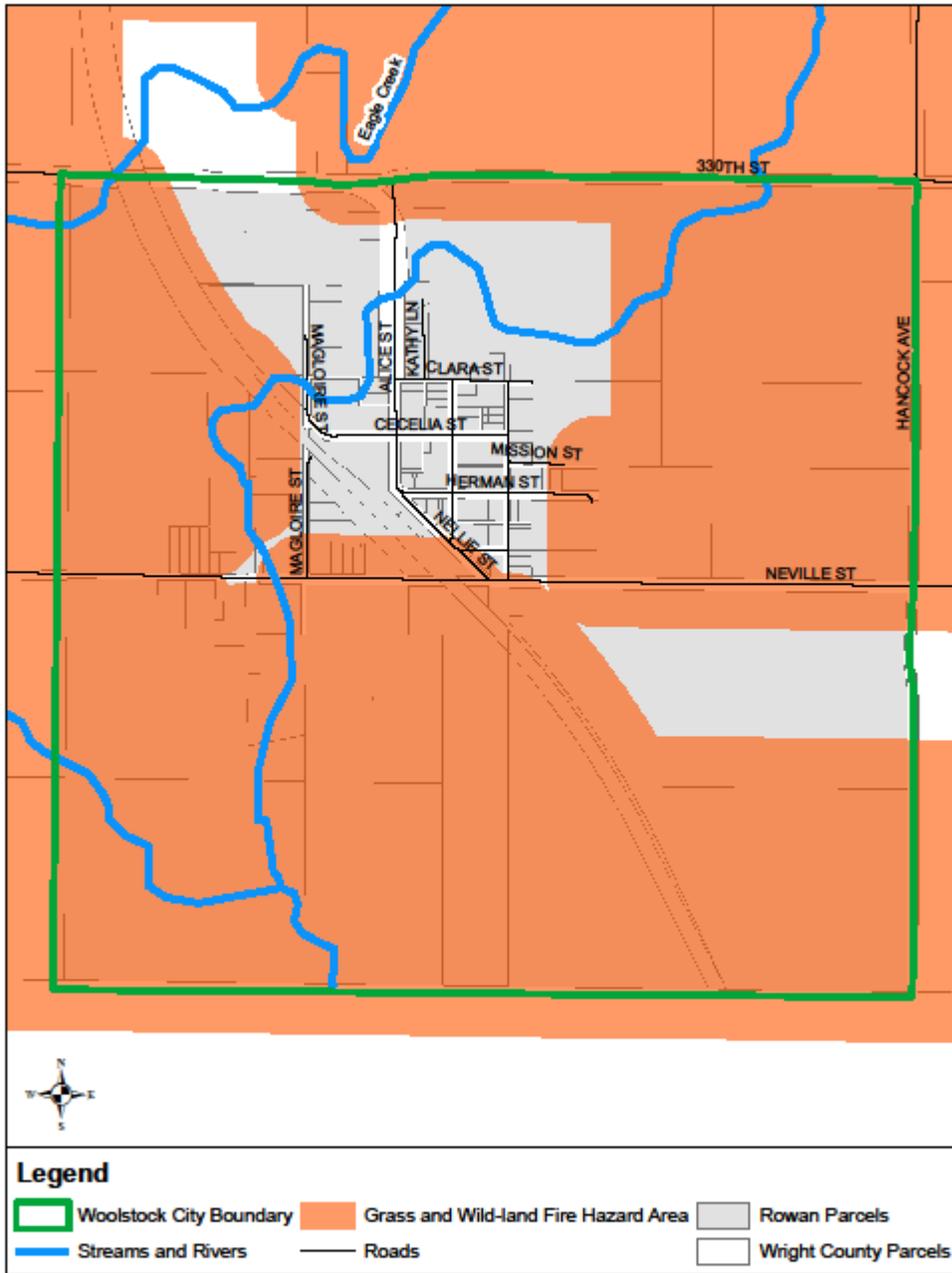


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
 IDOT, 2010



City of Woolstock

Grass and Wild-land Fire Hazard Area



Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010; IDOT, 2010

0 0.1 0.2 0.4 Miles

Section 7: Hazard Mitigation Committee Meeting Minutes

WOOLSTOCK HAZARD MITIGATION MEETING

June 8, 2010

6:15 PM

Woolstock Community Hall

Meeting lead by: Justin Harvey

Attending meeting included: Mary Weisberg, Logan Harrison, Robin Hamer, Chance Pruismann, Brian Anderson, Bryan Claude,

Minutes

- Introduced Hazard Mitigation to new individuals
- Go through list of hazards and discuss what effects they have on Woolstock
- Identify any potential hazards that are not included in the list
- Set time for next meeting and future meeting times

Meeting ended @ 7:15

WOOLSTOCK HAZARD MITIGATION MEETING

July 6, 2010

6:30 PM

Woolstock Community Hall

Meeting lead by: Justin Harvey

Attending meeting included: Mary Weisberg, Logan Harrison, Bryan Claude

Minutes

- Performed the Hazard Risk Analysis
- Set time for next meeting and future meeting times

Meeting ended @ 7:30pm.

WOOLSTOCK HAZARD MITIGATION MEETING

August 3, 2010

6:30 PM

Woolstock Community Hall

Meeting lead by: Justin Harvey

Attending meeting included: Mary Weisberg, Bryan Claude, Logan Harrison, Brian Anderson

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Minutes

- Identified Mitigation actions for each Hazard
- Set time for next meeting and future meeting times

Meeting ended @ 7:30pm.

WOOLSTOCK HAZARD MITIGATION MEETING

April 19th, 2011

7:00 PM

Woolstock Community Hall

Meeting lead by: Justin Harvey

Attending meeting included: Logan Harrison, Brian Claude, Pam Gearhart, Brian Anderson

Minutes

- Reviewed Hazard Mitigation Actions
- Performed the STAPLEE Analysis
- Set time for next meeting and future meeting times

Meeting ended @ 8:45pm.

WOOLSTOCK HAZARD MITIGATION MEETING

May 16th, 2011

7:00 PM

Woolstock Community Hall

Meeting lead by: Justin Harvey

Attending meeting included: Pam Gearhart, Logan Harrison

Minutes

- Reviewed the STAPLEE Analysis
- Performed Prioritization and Implementation worksheet
- Discussed next meetings and remaining steps of planning process

Meeting ended @ 8:00pm.

Section 8: Resolution

A RESOLUTION OF THE WOOLSTOCK CITY COUNCIL
ADOPTING A HAZARD MITIGATION PLAN FOR WOOLSTOCK, IOWA.

WHEREAS, the Woolstock City Council has authorized being part of the Wright County Multi-Jurisdictional Hazard Mitigation Plan; and

WHEREAS, the Woolstock City Council has authorized the development of the City's portion of the Wright County Multi-jurisdictional Hazard Mitigation Plan for the City of Woolstock, Iowa; and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, The Woolstock Hazard Mitigation Committee, consisting of local officials and community members, has presented a plan and recommended that the City Council approve the plan; and,

WHEREAS, the plan has been reviewed by City staff members and the City Council,

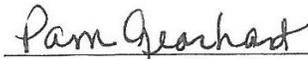
NOW THEREFORE BE IT RESOLVED, that the Woolstock City Council; hereby adopts the City's portion of the Wright County Multi-Jurisdiction Hazard Mitigation Plan.

PASSED AND ADOPTED this 12th day of Feb, 2013.



Mayor

Attest:



Pam Gearhart, City Clerk

Appendix I: Wright County Unincorporated Area

Section 1: Risk Assessment

The committee determined that the following additional hazards were not applicable or would have little effect on the County due to reasons listed below:

Earthquakes are any shaking or vibration of the earth caused by the sudden release of energy that may impose a direct threat on life and property. It is a sudden, rapid shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface. The committee determined that this hazard was inapplicable because the nearest fault line exists outside of the state.

The following hazards were combined together:

- Highway Transportation Event and Rail Transportation Event combined into Transportation Event.
- Human Disease Incident and Human Disease Pandemic combined into Disease.
- Terrorism includes all terrorism.

Due to water quality concerns in the area Watershed Pollution was added to the list of hazards addressing

The following table lists the overall results of the Hazard Risk Analysis that the committee completed. Following the results each hazard is addressed in detail. The Planning Committee's scoring activity was based on local records and first-hand knowledge, subject matter expertise, local and national records, and best available data.

COUNTY RISK ASSESSMENT SCORING

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	Total Score
Severe Winter Storms	5	5	5	5	4	4	28
River Flooding	5	5	4	5	3	4	26
Watershed pollution	5	5	3	3	4	5	25
Transportation Event	5	5	3	2	5	5	25
Tornados	5	4	3	3	4	5	24
HAZMAT – Fixed Facility	5	4	2	3	4	5	23
Flash Flooding	5	5	3	2	2	5	22
Thunderstorms & Lightning	5	5	1	5	2	4	22
Pipeline Incident	2	4	4	3	4	5	22
Windstorms	5	5	2	5	2	2	21
Hailstorms	5	5	2	2	2	5	21
Extreme Heat	5	5	2	5	3	1	21
Drought	3	4	5	5	3	1	21
Energy Failure	5	5	2	2	2	5	21
Expansive Soils	5	5	3	1	1	5	20
Structural Fire	5	5	1	1	3	5	20
Structural Failure	5	5	1	1	2	5	19
Grass & Wild-land Fire	5	5	1	1	1	5	18
Communications Failure	2	3	3	3	2	5	18
HAZMAT - Transportation	4	4	1	1	2	5	17
Terrorism	1	3	2	1	4	5	16
Disease	3	3	3	3	3	1	16

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Air Transportation Event	2	3	1	1	3	5	15
Public Disorder	1	3	1	1	3	3	12

Hazard	Winter Storms
Location	Winter storms are generally a regional event that can impact several-to-all counties within Iowa. When a severe winter storm occurs, the entire extent of Webster County is impacted. For a map of the County, which could potentially be impacted, see Section 6 of this appendix.
Historical Occurrence	NCDC data shows there were 65 winter events in the County and 6 freezing rain events between 1993 and 2010.
Probability	Severe winter storms commonly occur throughout the state of Iowa. Because the county averages 4 winter event each year it is highly likely there will be a winter event in the county next year.
Vulnerability	Winter storms have the likelihood of impacting the entire extent of the County. Homes are located far from each other and many are located on gravel or dirt roads.
Maximum Threat	Winter storms affect entire regions and would impact the entire spatial extent of the County. Winter storms that reach Iowa tend to develop over southeast Colorado and move east using the southward plunge of cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow, and sometimes blizzard conditions that could impact the entire region; therefore, the hazard mitigation committee determined that more than 75% of the County's spatial extent would be impacted.
Severity of Impact	The impact of severe winter storms can vary depending on the conditions. Severe winter storms are generally accompanied by strong winds, extremely cold temperatures, ice, or large amounts of snow; each of these characteristics has an effect on people and property of the County. In the past winter storm events have caused loss of power.
Speed of Onset	Weather services predict when winter storms will occur but are not necessarily accurate on the extent of the event.

Hazard	River Flooding
Location	There are multiple tributaries throughout the County. For a map of these tributaries, as well as FIRM's and Flood Inundation Maps see Section 6 of this appendix.
Historical Occurrence	Since 1993, there have been 48 flood events recorded in the County. Events that have had a major impact on the County include the flood events of 1993, 2008, 2010 and 2011.
Probability	The County has averaged over 2 flood events per year over the past 17 years thus it is likely there will be a flood event in the next year.
Vulnerability	The vulnerable population to river flooding in the unincorporated area is typically limited to those that live in close proximity to the rivers and creeks the crops located near these areas.
Maximum Threat	While the river flooding does not leave visible standing water throughout all impacted areas damages to basements and roadways generally make up for approximately 75% or higher of the spatial extent of the community.
Severity of Impact	The most severe impact of flooding is the economic damage that floodwaters can cause to homes, businesses and crops. Over \$48,000,000 in crop damage has occurred since 1993 due to flooding.
Speed of Onset	There is generally some kind of warning that flooding will occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Watershed Pollution
Location	Watershed pollution has the potential to occur anywhere in the County, especially due to its vicinity to the river, for a map of the County please see Section 6 of this Appendix.
Historical Occurrence	Much of the watershed pollution that might occur within the County would most likely be due to nonpoint source pollution. A probable cause for this type of pollution would be the runoff of pollution that would flow into nearby water sources. While it is difficult to measure the number of times this kind of pollution occurs, because of the number of farms and hog facilities in the county the hazard mitigation committee estimated that, due to HAZMAT events and surrounding agriculture there have been more than 10 instances of watershed pollution.
Probability	Because the County has many water tributaries, the hazard mitigation committee determined that it is highly likely for watershed pollution to occur.
Vulnerability	While watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. Most of the residents in the County have wells and could be affected by watershed pollution. The committee estimated that 25-50% of people and property would be impacted by watershed pollution.
Maximum Threat	Similar to vulnerability, watershed pollution would most likely harm the river and ground water sources. The committee estimated that 25-50% of people and property would be impacted by watershed pollution.
Severity of Impact	The hazard mitigation committee determined that severe watershed pollution could cause serious illness for those in the county as residents have wells as their water source.
Speed of Onset	Because residents would be unaware that that pollution to the watershed is occurring there would be limited warning.

Hazard	Transportation Event
Location	Transportation events have the potential to occur anywhere in the County. For a map of the transportation networks, see a map of the County in Section 6 of this appendix.
Historical Occurrence	Iowa DOT reports more than 1,000 crashes having been reported in the County between 2004 and 2008, while this data includes both incorporated and unincorporated areas, the Hazard Mitigation committee determined that it was safe to say that there have been more than 12 transportation incidents within the unincorporated area of the County, ranging from vehicular, air and railroad incidents.
Probability	More than 1,000 crashes reported in the County from 2004 to 2008 results in approximately 250 crashes per year throughout the County (incorporated and unincorporated). Based on this information, the hazard mitigation committee determined that it is highly likely to have at least one transportation event in the next year.
Vulnerability	While transportation events are common within the county, they generally only affect the motor vehicles, rail cars and/or airplanes involved. Based on these impacts 25-50% of the people and property in the County would be impacted by a transportation incident.
Maximum Threat	Since transportation events usually happen near a transportation site the committee determined that 10-25% of the spatial area could be affected.
Severity of Impact	A transportation incident can occur in many forms. With multiple modes of transportation in the County, a transportation event may result in substantial injuries, death and property damage.
Speed of Onset	No prediction of a transportation incident can be made; therefore, there is no warning time of the event.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Tornadoes
Location	A tornado is a random event and could potentially impact the entire county. A map of the County parcels is located in Section 6 of this appendix.
Historical Occurrence	According to the NCDC historical data shown in Appendix L, more than 15 tornado events have been reported in the County since 1964.
Probability	There are, on average, about 46 tornadoes per year in the state of Iowa. Tornado events occur randomly and have the potential to affect any area within the State. Because tornadoes act in such a random manner, the County hazard mitigation committee determined it is likely that a tornado would occur within the county in the next year.
Vulnerability	The entire population of the County is exposed to tornadoes; however, the actual impacts would affect smaller area of the County; therefore the committee estimated that less than 25-50% of the unincorporated area of the County would be impacted.
Maximum Threat	The entire population of the County is exposed to tornadoes; however, it is estimated that damage would only affect 25-50% of the spatial area of the County.
Severity of Impact	Injuries, property damage and the interruption of services are each common results of the direct impact of tornadoes. The severity of impact depends on the intensity of the tornado, the area struck, and the preparedness of the people and officials
Speed of Onset	Very little warning is given when a tornado occurs, especially for the area where a tornado watch transitions into a tornado warning.

Hazard	HAZMAT – Fixed Facility
Location	Hazardous materials events can occur anywhere where such materials are handled, stored, processed or transported. For a map of the County's hazardous material locations see Section 6 of this appendix.
Historical Occurrence	Based on historical data shown in pages 30-34, 28 hazardous material fixed events were reported by DNR. While this data accounts for all incorporated and unincorporated areas, the hazard mitigation committee determined that this is evident enough that more than 12 hazard material events have occurred within the unincorporated area of the County.
Probability	With 28 hazardous material events being reported since 1995 which is more than one per year. Also with the number of farmers transporting anhydrous ammonia it is highly likely there will be a spill in the county in the next year.
Vulnerability	Areas of the county vulnerable to a HAZMAT event related to the fixed facilities are determined based on their proximity to the facilities and the type of material that may be released. Because different materials have different impacts and the area of the County is rather large, it was predicted that 10- 25% of the County could potentially be affected by a HAZMAT event resulting from a fixed facility.
Maximum Threat	The spatial extent of the community that would be impacted by a hazardous material spill is predicted to be 25-50% of the County.
Severity of Impact	Based on the locations of the fixed facilities, the past events and the type of materials handled/stored the hazards mitigation committee determined that a fixed hazardous materials event may serious injury or illness and a shutdown of essential services for up to 72 hours.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time for when such an event will occur. If people are aware of the problem, they will fix it so the event does not have the potential to occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Flash Flooding
Location	Flash flooding occurs in multiple areas of the County; however, the committee was unable to identify specific areas.
Historical Occurrence	Flash flooding generally occurs when large amounts of rain fall in a short period of time. The NCDC Historical Data in Appendix L shows that 11 flash flood events have been reported in the County between 2000 and 2008; however, the hazard mitigation committee recalls more events as there are a few problem areas in the unincorporated portion of the County where flash flooding is imminent. Based on this, the hazard mitigation committee determined that there have been more than 10 flash flood events in the County.
Probability	There have been 11 reported occurrences of flash flooding in the County since 2000 and 2008, which would indicate that there is flash flooding approximately one time every year.
Vulnerability	The number of people that are impacted by flash flooding in the County is generally limited to those who are traveling during or right after the rain event, those who live in low-lying areas or areas that are paved or slow draining and those buildings with older foundations.
Maximum Threat	The committee identified that spatially 10-25% of the County has been impacted by flash flooding.
Severity of Impact	Impacts from flash flooding include substantial property damage and some impacts to public roads and/or bridges.
Speed of Onset	Because flash flooding occurs when water levels rise at an extremely fast rate, there is little or no warning for such event.

Hazard	Thunderstorms and Lightning
Location	Thunderstorms generally affect an entire area or region; therefore, if a thunderstorm event were to occur, a majority of the County would be exposed to the event. For a map of the County see Section 6 of this Appendix.
Historical Occurrence	The National Climatic Data Cent (NCDC) historical data (Appendix L) shows 55 events having been reported relating to thunderstorm winds between 1973 and 2008
Probability	Thunderstorms are one of the most common natural hazards throughout the world. In the United States, approximately 100,000 thunderstorms occur each year. The central area of the United States is home to some of the most severe thunderstorms in the world. About 85 percent of Iowa thunderstorms occur between April and September, with most storms occurring during the month of June. Based on 55 events having been reported relating to thunderstorm over a 35 year period, the hazard mitigation committee to determine that there is nearly a 100% chance that a thunderstorm and lightning event will occur in the next year.
Vulnerability	Based on the results of past events the hazard mitigation committee determined less than 10% of the property in the County is affected by a thunderstorm event.
Maximum Threat	The hazard mitigation committee determined that if the event was bad enough and because most of the County spatial area consists of crops 75% or more of the County spatial area could be affected by a thunderstorm/lightning event.
Severity of Impact	Majority of the damage in the county because of thunderstorms and lightning is crop damage.
Speed of Onset	The committee determined that via television and radio, the County's residents have approximately less than 5 hours of warning before a thunderstorm and lightning event, would occur.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Pipeline Incidents
Location	Different pipelines run through the County. For a map of the pipeline see Section 6 of this appendix.
Historical Occurrence	The committee could recall three different incidents involving pipelines one major pipeline break was 5 miles north of Clarion.
Probability	Based on the number of pipelines in the County the committee determined it was likely there could be some sort of pipeline incident in the next year.
Vulnerability	Based on the number of pipelines in the County and where they are located the committee estimated that 50-75% of the County could be vulnerable to a pipeline incident.
Maximum Threat	Due to the amount of unoccupied land in the County the committee determined that 25-50% of the spatial area of the County would be impacted.
Severity of Impact	The hazard mitigation committee estimated that if a pipeline incident occurred there could be serious injuries and property damage.
Speed of Onset	Pipeline incidents are generally accidental and no warning is given when such event is going to occur.

Hazard	Windstorms
Location	Windstorms would generally impact the entire area of the County. For a map of the County see Section 6 of this appendix
Historical Occurrence	According to NCDL (Appendix L), 41 wind events/windstorms have been recorded in the County between 1996 and 2008.
Probability	Iowa lies on the eastern edge of the Great Plains where winds blow strong and steady, particularly in the winter and spring. The relative flatness of the terrain means that most areas of the state are well exposed to the wind. In addition, most of the state consists of cropland with few trees to reduce wind speeds near the ground. With 41 wind events in 12 years, the hazard mitigation committee determined that it is likely for a windstorm to occur in the next year.
Vulnerability	Windstorms are a regional event that would impact the entire county. Effects of windstorms is lost of power and crop damage if the winds are high enough.
Maximum Threat	Windstorms have can affect crops greatly with a large area of the County farmed more than 75% of the spatial area of the County could be affected.
Severity of Impact	Windstorms may cause some property damage and slight interruption of services.
Speed of Onset	While the County has some warning regarding a rain or snow event, generally the conditions relating to wind may vary as the approaching storm develops; therefore, the hazard mitigation committee determined there is usually less than 5 hours of warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Hailstorms
Location	Hailstorms have the potential to affect any area within the County. See Section 6 of this appendix for a map of the County.
Historical Occurrence	According to data collected from the NCDC (Appendix L), there have been a total of 56 hail storms recorded in the County since 1995.
Probability	Hailstorms that take place in Iowa occur most frequently in May; however, most crop damage due to hail occurs in July when crops are more susceptible to damage. Hail losses are greatest in the northwestern part of the state, due to the severity and frequency of such events. Based on this statement and the historical occurrence of significant hail events in the County, the committee determined it is highly likely that a hailstorm could occur within the unincorporated area of the County.
Vulnerability	Based on the amount of area the County covers the committee determined that 10-25% of the property in the County are vulnerable to hailstorms.
Maximum Threat	Again based on the amount of area the County covers there are a potential for 10-25% of the spatial area of the County to be affected.
Severity of Impact	There has been some property damage during hailstorms in the past but nothing major except for crops.
Speed of Onset	Hail storms often result from severe thunderstorms or tornadoes which have little warning time.

Hazard	Extreme Heat
Location	Extreme heat generally occurs in a regional manner. If an extreme heat conditions were to take place in the County, the entire county would feel the event. For a map of the County see Section 6 of this appendix.
Historical Occurrence	Extreme heat commonly occurs in the State of Iowa during the summer months. July and August bring about the hottest conditions for the region, with prolonged periods of heat that impact the entire state. While the most severe events occur less-often, it is common to have at least one significant heat event each summer. As shown on the NCDC report in Appendix L; two extreme heat events have been recorded for having occurred in the County and the State of Iowa. The hazard mitigation committee recalls multiple events having 90+ degree weather for 3 or more days. Because the NCDC's definition of extreme heat may be different the IHSEM's, the committee determined that extreme heat events have occurred more than 10 times within the County.
Probability	While extreme heat events have occurred multiple times in the past, the committee mentioned that it depends on the summer. Based on past experience the committee determined it was highly likely there would be temperatures above average next year.
Vulnerability	Because most residents and businesses have air conditioning of some sort the committee determined only 10-25% of the people and property is affected by extreme heat.
Maximum Threat	Because of the amount of crops the committee felt 75% or higher of the County's spatial area could be impacted
Severity of Impact	The hazard mitigation committee stated that impacts due to extreme heat include health impacts, such as heat stroke or heat exhaustion; so there could be serious illness and short term property damage.
Speed of Onset	The National Weather Service can generally predict when higher temperatures will occur days in advance.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Drought
Location	When a drought happens it affects an entire region, therefore the entire County would be affected by the Drought conditions. For a map of the County see Section 6 of this Appendix.
Historical Occurrence	There are three occurrences of droughts in the NCDC Database dating 1995, 2001 and 2003 however drought conditions have been reported in the state for the past couple of years which are not included in the NCDC data.
Probability	Based on state and weather reports it was determined that it is likely there could be a drought next year.
Vulnerability	The most vulnerable to a drought situation is the crops, livestock, agriculture and water supply. Fires are also more prevalent in drought conditions. Much of the County is agricultural thus more than 75% of the County is vulnerable to drought.
Maximum Threat	Much of the County is agricultural thus more than 75% of the County is vulnerable to drought.
Severity of Impact	Although a drought would have a major impact on the economy, the committee would not anticipate any structural damage or long term shutdown of essential services.
Speed of Onset	The onset of a drought would be very slow and there is more than 24 hours warning time.

Hazard	Energy Failure
Location	There is no way of estimating where, energy failure might occur; because of this, locations of energy failure were not determined.
Historical Occurrence	Members of the hazard mitigation committee remember more than 10 occurrences of energy failure in the past.
Probability	Based on energy failures in the past the hazard mitigation committee determined that the probability of an infrastructure failure occurring is highly likely.
Vulnerability	Energy failures generally occur in specific areas of the County dependent on the cause of such event, because of this, the hazard mitigation committee determined that, in general, between 10-25% of the County would be impacted by an energy failure.
Maximum Threat	Energy failures generally occur in specific areas of the County dependent on the cause of such event, because of this, the hazard mitigation committee determined that, in general, between 10-25% of the County would be impacted by an energy failure.
Severity of Impact	While energy failure may have more severe, physical impacts they are generally isolated events. With energy failure there may be a brief interruption of services or a long-term interruption. Because of these discrepancies, the hazard mitigation determined that residents of the County have the potential to experience slight interruption on essential services.
Speed of Onset	Energy failure generally occurs without any warning.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Expansive Soils
Location	Expansive soils are prevalent throughout the County. For a map of the County see Section 6 of this Appendix.
Historical Occurrence	The hazard mitigation committee remembered several basement issues.
Probability	With all the noted basement issues the committee determined it was highly likely there would be issues next year.
Vulnerability	Because the expansive soil issues have mostly related to basements the committee determined that 25-50% of the property was affected in the county.
Maximum Threat	As expansive soils most effect basements less than 10% of the spatial area of the County would be affected.
Severity of Impact	The majority of impacts from expansive soils would not inflict injuries or illness; however, structural property damage can occur but no very often.
Speed of Onset	Expansive soils provide no warning to residents; therefore, the hazard mitigation committee determined that the speed of onset was minimal to no warning time.

Hazard	Structural Fire
Location	Structural fires are a random event that could at any time take place within the community. For a map of County see Section 6 of this appendix.
Historical Occurrence	The committee remembered two elevator explosions, a grain bin fire and several tractor fires on top of crop fires.
Probability	There is always the chance for a structural fire to occur within the County. Based on past events, the committee noted it was highly likely there would be a fire call next year.
Vulnerability	Structural fires generally only impact an isolated area when they occur; therefore, the committee determined less than 10% of people and/or property would be impacted.
Maximum Threat	Similar to vulnerability, because structural fires would impact an isolated area, the committee estimated less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	When any type of fire takes place, it has the potential to cause serious injury and long term property damage, as determined by the hazard mitigation committee.
Speed of Onset	Structural fires may begin and spread incredibly fast; there is no warning when one might occur.

Hazard	Structural Failure
Location	Structure failure could happen anywhere in the County for a map of the County see Section 6 of this appendix.
Historical Occurrence	The hazard mitigation committee remembered corn coming out of silos, blades coming off windmills. In the County you see old abandoned buildings all over.
Probability	With all the abandoned properties in the County it is highly likely one will fall down next year.
Vulnerability	Structural failures are an isolated event; based on this the hazard mitigation committee estimated that less than 10% of the community would be impacted.
Maximum Threat	Due to the fact that most structural failures occur in isolated areas, the hazard mitigation committee estimated that less than 10% of the spatial extent of the community would be impacted.
Severity of Impact	The hazard mitigation committee determined that minor injuries and property damage could occur; however, impacts to the overall quality of life and essential facilities would not occur.
Speed of Onset	The hazard mitigation committee determined that there is no telling when a structure may fail; therefore, they noted that there is minimal or no warning time.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Hazard	Grass & Wild-land fire
Location	Grass and Wild Land Fires are most likely to occur in grassy or wooded areas, for a map of the County see Section 6 of this appendix.
Historical Occurrence	Burn bans are common in the rural area during dry times; it has been especially common in recent years with the dry harvest season.
Probability	With amount of crop covered land mitigation committee determined that it is likely that a grass and wild land fire will occur in the next year.
Vulnerability	The fire departments that serve the unincorporated are equipped to sufficiently respond to grass and wild land fires; therefore, the committee determined that less than 10% of people and property would be impacted by a wild land fire.
Maximum Threat	The fire departments that serve the unincorporated are equipped to sufficiently respond to grass and wild land fires; therefore, the committee determined that less than 10% of people and property would be impacted by a wild land fire.
Severity of Impact	Most impacts due to wild land fires exist in natural areas where structures are not present. The hazard mitigation committee determined that there are generally minimal damages and injuries that result from wild land fires.
Speed of Onset	Fires spread quickly, especially if under the right conditions. The hazard mitigation committee determined that there is no telling when a wild land fire may occur.

Hazard	Communications Failure
Location	There is no way of estimating where, communications failure might occur; because of this, locations of communications failure were not determined.
Historical Occurrence	Members of the hazard mitigation committee identified that in major events this is a problem. Members could remember when the antennas were downed because of lightning.
Probability	Based on past lightning events the committee determined that is possible that there could be a communications failure once in the next ten years.
Vulnerability	Communication failures generally occur in specific areas of the County dependent on the cause of such events. Based Because of this, the hazard mitigation committee determined that, in general, 25-50% of the County would be impacted by communications failure.
Maximum Threat	Same as vulnerability communication failures generally occur in specific areas of the County dependent on the cause of such events. Based Because of this, the hazard mitigation committee determined that, in general, 25-50% of the County would be impacted by communications failure
Severity of Impact	While communications failure may have more severe, physical impacts they are generally isolated events communication have impacts that may be a brief interruption of services or a long-term interruption. Because of these discrepancies, the hazard mitigation determined that residents of the County have the potential to experience slight interruption on essential services.
Speed of Onset	Communications failure generally occurs without any warning.

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Hazard	HAZMAT - Transportation
Location	Hazardous materials transportation events can occur anywhere there is a road or railroad. To see a map of the County see Section 6 of this appendix.
Historical Occurrence	The IDNR shows that 20 transportation hazardous spills occurred in Wright County but do not indicate where in the County they take place. The hazard mitigation committee could not remember spills occurring in Dows and north of Clarion. See hazardous spills summary on pages 30-34.
Probability	Based on the number of hazardous material events that have occurred in the past the hazard mitigation committee determined that a hazardous materials transportation event is likely to occur next year.
Vulnerability	Areas of the community vulnerable to hazardous materials events based on their proximity to truck routes and railroads. Because different materials have different impacts, it was predicted that less than 10% of the community could potentially be affected by a hazardous materials event.
Maximum Threat	The committee estimated that less than 10% of the County would be impacted by a hazardous materials transportation event.
Severity of Impact	Depending on the type of material spilled, the extent of injuries and property damage may vary. Because of how spread out the County is and where transportation runs through the County the committee deterred there may be minor injuries and some property damage if a HAZMAT transportation event occurred.
Speed of Onset	Because a hazardous material event occurs randomly, there is no warning time for when such an event will occur. If people are aware of the problem, they will fix it so the event does not have the potential to occur.

Hazard	Terrorism
Location	Terrorism can occur anywhere within the county. A map of the County can be found in Section 6 of this annex.
Historical Occurrence	Acts of terrorism have indirectly impacted the unincorporated area, since acts are generally placed on people. The hazard mitigation committee could not remember any acts of terrorism in the County.
Probability	With all the agriculture in the County the hazard mitigation committee felt there is a limited potential for agro terrorism.
Vulnerability	Because the unincorporated area is sparsely populated in most areas, the committee determined that only 10-25% of the County would be impacted.
Maximum Threat	Because terrorism is usually limited to highly populated areas the committee felt that less than 10% of the spatial area of the County would be affected.
Severity of Impact	If a terrorism event were to occur the severity of impact could result in injuries, shutdown of public facilities and multiple property damages.
Speed of Onset	Terrorism events are unpredictable, therefore, there is no warning time before such event may occur.

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Hazard	Disease
Location	Disease could happen anywhere in the County. See map of the County in Section 6 of this appendix.
Historical Occurrence	There have been several flu outbreaks in the County's recent past. The County has had 2 H1N1 clinics to help prevent the spread of this sickness.
Probability	The probability of a disease outbreak is always possible of occurring. Take in consideration the spread of the H1N1 in the early part of 2009, the entire world saw how quickly a disease can break out and spread among the population.
Vulnerability	If there was a disease outbreak, the committee estimated that 25-50% of the population would be infected before the disease could be successfully contained. The most vulnerable part of the population would be those whose immune system is weak due to previous being sick, the young, and the old.
Maximum Threat	Since it's estimated that 25-50% of the population would be affected by the disease then 25-50% of the spatial extent of the community would be impacted.
Severity of Impact	If a disease outbreak did occur suddenly there would be serious illness before treatment was given.
Speed of Onset	Disease outbreaks generally start off slowly; affecting only a small group of people, allowing for experts to be able to identify that there is a problem going on. This means that there is generally more than 24 hours of warning time before the effects of a disease outbreak.

Hazard	Air Transportation
Location	An air transportation event could take place anywhere within the County as most city airports are located in the unincorporated area of the County. For a map of the airports, see Section 6 of this appendix.
Historical Occurrence	Historically there has been incidence of small planes going down near airports.
Probability	Because most of the city airports are located in the unincorporated area of the County the committee determined that it possible that an air transportation event could occur within the County at least once in the next ten years.
Vulnerability	As there are only 3 airports in the county they are located away from people and structures that if an air event did occur, less than 10% of the County would be impacted.
Maximum Threat	Similar to vulnerability, if air transportation event occurred within the community less than 10%, of the spatial extent of the community would be impacted.
Severity of Impact	An air transportation event in the form of a plane crashing in the County would cause serious injuries.
Speed of Onset	Air transportation events are generally accidental and no warning is given when such event is going to occur.

Hazard	Public disorder
Location	Public disorders can occur throughout the County. See Section 6 of this Appendix for a map of the County.
Historical Occurrence	The committee could not recall any public disorders having occurred within the County.
Probability	Because destructive tendencies are hard to predict, the committee determined that it is possible such an event could occur in the next ten years.
Vulnerability	A disturbance in the County would affect less than 10% of the community.
Maximum Threat	Spatially, less than 10% of the County would be affected by a public disorder, due to the large unpopulated area of the County.
Severity of Impact	If such an event did occur there could be serious injuries.
Speed of Onset	Usually those who are unhappy usually make it known and the committee felt there would be some indication that event would happen prior to it happening.

Section 2: Vulnerability Assessment & Loss Estimates

The unincorporated area is exposed to a wide range of hazards. The following subsections discuss the exposure, vulnerability and loss estimates for each hazard that could impact the County.

Those hazards that the entire unincorporated area is exposed to includes Winter Storms, Watershed Pollution, Severe Thunderstorm and Lightning, Windstorms, Extreme Heat, Drought, Tornadoes, Hailstorms, Expansive Soils, HAZMAT-Transportation. Their vulnerability assessments and loss estimates are discussed in section 2.1.

There are some hazards that have a more defined area of exposure. For the unincorporated area, these hazards include River Flooding, HAZMAT-Fixed Facilities, Flash flooding, Pipeline Incidents and Grass and Wild-land Fire. Their vulnerability assessments and loss estimates are discussed in sections 2.2 through 2.6.

2.1. Exposure Assessment for Winter Storms, Watershed Pollution, Severe Thunderstorm and Lightning, Windstorms, Extreme Heat, Drought, Tornadoes, Hailstorms, Expansive Soils, HAZMAT-Transportation:

The Unincorporated area's exposure to each hazard was determined based on the area of the county that has the potential to feel the effects from the hazard. Those hazards that do not have a defined area of impact and could potentially impact the entire area include Winter Storms, Watershed Pollution, Severe Thunderstorm and Lightning, Windstorms, Extreme Heat, and Drought. Those hazards that could potential impact any one random site within the unincorporated area include Tornadoes, Hailstorms, Expansive Soils, HAZMAT-Transportation. With this, all of the above-listed hazards have the potential to impact any area of the County, which means 100% of the structures and people are exposed to the hazards, or located in the hazard area. The table below depicts this exposure.

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Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in Uninc Area/Galt	# in Hazard Area	% in Hazard Area	\$ in Uninc Area/Galt	\$ in Hazard area	% in Hazard area	# in Uninc Area/Galt	# in Hazard area	% in Hazard area
Residential	1580	1580	100%	\$124,840,900	\$124,840,900	100%	8,913	8,913	100%
Commercial	158	158	100%	\$8,638,000	\$8,638,000	100%			
Agricultural	1,599	1,599	100%	\$46,893,200	\$46,893,200	100%			
Industrial	8	8	100%	\$124,800	\$124,800	100%			
TOTAL	3345	3345	100%	\$180,496,900	\$180,496,900	100%			

2.1.1. Vulnerability Assessment for Severe Winter Storms

As determined in the exposure assessment, 100% of the unincorporated area is exposed to severe winter storms. Winter storms generally cause frigid temperatures, the accumulation of snow or ice and high winds. Events that may accompany severe winter storms include windstorms, transportation incidents and infrastructure failure; for specific impacts of such events see their vulnerability assessment.

The hazard mitigation committee determined that more than 75% of the people and property within the unincorporated area are affected by severe winter storms. This is mostly due to the reduced mobility from snow and ice, infrastructure failure such as power outages from ice and structural failure, which can occur due to large amounts of heavy snow. Structural impacts generally occur in dilapidated/condemned buildings; however, there is potential for structural failure to occur with other more seemingly stable structures.

Person’s exposed to severe winter storms are to be properly dressed to prevent frostbite or hypothermia. Residents of the County are ill-advised to be outdoors for long periods of time during a severe winter storm. If outdoors without proper attire persons may experience frostbite and/or hypothermia, which could result in death.

Loss Estimate Calculation:

Based on historical data from the NCDC, the maximum amount of property damages reported in one severe winter storm equaled \$75,000 for Wright County. While this accounts for the most damage reported from such event, it would only account for approximately 0.04% of damages per property within the County; therefore, it was determined that the NCDC data should not be used as a base in this case. It’s estimated that a severe winter storm could result in \$900,000 in damages, which could cause impacts to up to .5% of each structure within the County. The loss estimate calculation for .5% in damages of all structures in the unincorporated area, including Galt is expressed below.

- Estimated residential structural damage due to Severe Winter Storms (.4%) = \$624,205
- Estimated commercial structural damage due to Severe Winter Storms (.4%) = \$43,190
- Estimated agricultural structural damage due to Severe Winter Storms (.4%) = \$234,466
- Estimated industrial structural damage due to Severe Winter Storms (.4%) = \$624
- Total estimated structural damages due to Severe Winter Storms = **\$902,485**

2.1.2. Vulnerability Assessment for Watershed Pollution

According to the Hazard Mitigation Committee, while watershed pollution may occur within the County, the main issue would relate to the contamination of key water sources. The majority of unincorporated residents use water from their own personal well systems. Resident’s concern would be that if watershed pollution of a critical component occurred that would impact wells throughout the County.

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Impacts would result in contaminated drinking water, impacts to bodies of water located within the County and their aquatic life. This could result in illness or an interruption in water service; however, no property damages would be felt. Accompanying events include thunderstorm and lightning, river flooding, severe winter storms, HAZMAT events relating to both transportation and fixed facilities and flash flooding.

Loss Estimate Calculation:

As mentioned above, watershed pollution generally does not impact structures; therefore, no loss estimate could be calculated.

2.1.3. Vulnerability Assessment for Thunderstorms & Lightning

As determined by the hazard mitigation committee less than 10% of the unincorporated area experiences damages due to thunderstorms and lightning; however, 100% of the county is exposed. Hazard events that may accompany a thunderstorm and lightning event include river flooding, flash flooding, hailstorms, windstorms, communications failure or energy disruption; for specific impacts of such events see their Vulnerability Assessments, discussed throughout Section 2. Under a worst-case scenario each of the accompanying events may cause damages and injuries. Additional impacts from thunderstorm and lightning include downed limbs, power outages and heavy rain that may impair individuals' ability to see. All residents would be required to take shelter, otherwise injuries; even death could occur if struck by lightning or directly exposed to flash flooding, wind and/or hail.

Loss Estimate Calculation:

Very little historical data on damages was available for Wright County; therefore, it's estimated that the County could experience \$150,000 in damages; which accounts for approximately .1% of the total assessed value of residential, commercial, agricultural and industrial structures in the County. Based on this worst-case-scenario, it was estimated that each property would experience structural damages equaling .1% of their assessed value, or .1% of structures in the unincorporated area, including Galt would experience complete loss. The damages are dependent on the intensity and impacted area of the Thunderstorm and Lightning event. The results of this estimate are displayed below.

Estimated residential structural damage due to Thunderstorm and Lightning (.1%) = \$124,840
Estimated commercial structural damage due to Thunderstorm and Lightning (.1%) = \$8,638
Estimated agricultural structural damage due to Thunderstorm and Lightning (.1%) = \$46,893
Estimated industrial structural damage due to Thunderstorm and Lightning (.1%) = \$124
Total estimated structural damages due to Thunderstorm and Lightning = **\$180,497**

2.1.4. Vulnerability Assessment & Loss Estimates for Windstorms

Windstorms are a regional event that the entire County is exposed to; however, unless accompanying another event such as severe winter storms, thunderstorms and lightning, hailstorms or tornadoes; impacts are generally limited. The hazard mitigation committee determined that between 10-25% of the people and property in the unincorporated area are directly impacted by a windstorm. Impacts generally result in downed limbs, infrastructure failure in the form of power outages or structural failure, and difficulty driving, especially for large trucks. Very few deaths would occur; however, injuries could occur if persons fail to find shelter.

Loss Estimate Calculation:

The NCDC historical data indicates that the maximum reported amount of property damage due to high winds in Wright County was equal to \$750,000 in 1996, which accounts for approximately .4% of the County's structural value. This amount of damage is indicated in the loss estimate, below.

Estimated residential structural damage due to Windstorms (.4%) = \$499,364
Estimated commercial structural damage due to Windstorms (.4%) = \$34,552

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Estimated agricultural structural damage due to Windstorms (.4%) = \$187,573
 Estimated industrial structural damage due to Windstorms (.4%) = \$499
 Total estimated structural damages due to Windstorms = \$721,988

2.1.5. Vulnerability Assessment for Extreme Heat

Extreme heat generally comes in a wave that impacts the entire region and occurs seasonally throughout the state. The committee estimated that 10-25% of the unincorporated area would be impacted due to the fact that most residents have access to air condition. However, residents must ensure they are not exposed to the heat for a long period in time as it may cause heat exhaustion or heat stroke. Extreme heat may also impact the local and regional economy due to a lowered to the crop yield, which may cause a shortage of crop for livestock, food and fuel/energy.

Loss Estimate Calculation:

Extreme heat generally does not generally cause structural damages.

2.1.6. Vulnerability Assessment for Drought

Drought is a regional event that occurs slowly. Drought impacts farmers and the local and regional economy because without a sufficient yield of crops, there may be a shortage of crop for livestock, food and fuel/energy. Water may become a concern, when the event extends over a large period of time; however, water shortage was not seen as a major concern for the unincorporated area. Most residents are on their own well systems, which on average have an abundance of available water. Accompanying events include extreme heat and grass and wild-land fires.

Loss Estimate Calculation:

There are generally no structural impacts due to drought; therefore, no loss estimate can be calculated. The majority of losses would be experienced in the unincorporated area where a majority of agriculture land exists.

2.1.7. Vulnerability Assessment for Tornadoes

The entire population of Wright County is exposed to tornadoes. The hazard mitigation committee estimated that 25-50% of the unincorporated area could be impacted by a tornado. Such events often accompany thunderstorms and lightning, hailstorms and windstorms. The impacts depend on the extent of the size and intensity of the tornado. Impacts are discussed in the following Fujita Scale:

The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.

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F3	Severe tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-enforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Source: <http://www.tornadoproject.com/fscale/fscale.htm>

Loss Estimate Calculation:

As recorded by the NCDC, multiple tornado events have been reported in Wright County. In 1966 an event equaling \$25,000,000 in damages was recorded. The amount of damages accounts for approximately 14% of the County's assessed residential, commercial, agricultural and structural values. Based on this number it was estimated that 15% of the county could experience impacts due to a tornado.

Estimated residential structural damages due to Tornado (15%) = \$18,726,135
 Estimated commercial structural damages due to Tornado (15%) = \$1,295,700
 Estimated agricultural structural damages due to Tornado (15%) = \$7,033,980
 Estimated industrial structural damages due to Tornado (15%) = \$18,720
 Total estimated structural damages due to Tornado (15%) = \$27,074,535

2.1.8. Vulnerability Assessment for Hailstorms

All facilities and buildings are exposed to hailstorms and according to the hazard mitigation committee, more than 25-50% of the people in the County could be impacted by a hailstorm. Accompanying events include thunderstorms and lightning, windstorms, infrastructure failure in the form of power outages and at times flash flooding.

The impacts of hailstorms depend on the size of hail. Large hail stones cause property damage in the form of dents and broken windows in vehicles, broken windows in homes and damages to rooftops. It can cause an interruption of public services due to power outages. Also, persons must seek shelter from such events or injuries or death may occur.

Loss Estimate Calculation:

The NCDC shows 17 hailstorms reported in Wright County. The amount of property damages incurred in each event is limited in this data; therefore, it was estimated that impacts would be similar to that of a windstorm. Therefore it was determined that each property would experience structural damages equaling .4% of their assessed value, or .4% of structures in the unincorporated area, including Galt would experience complete loss. The damages are dependent on the size and intensity the event. The results of this estimate are displayed below.

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Estimated residential structural damage due to Hailstorms (.4%) = \$499,364
Estimated commercial structural damage due to Hailstorms (.4%) = \$34,552
Estimated agricultural structural damage due to Hailstorms (.4%) = \$187,573
Estimated industrial structural damage due to Hailstorms (.4%) = \$499
Total estimated structural damages due to Hailstorms = \$721,988

2.1.9. Vulnerability Assessment for Expansive Soils

Expansive soils most commonly result in damaged streets and infrastructure, basements and other structures due to constant movement from change in temperature, moisture and other environmental impacts. Accompanying events include severe winter storms, flash flooding, thunderstorm and lightning, river flooding and sink holes.

Loss Estimate Calculation:

Effects from expansive soils vary depending on the structure impacted. Impacts generally affect one isolated area in a basement, street or other utility. Because the committee was unable to identify specific areas, no loss estimates were calculated.

2.1.10. Vulnerability Assessment & Loss Estimates for HAZMAT related to Transportation

Hazardous substances that are transported via vehicle could impact any area of the County; however, according to the hazard mitigation committee, such event would most likely impact less than 10% of the unincorporated area depending on the type of material transported. Accompanying events include transportation incidents. See Section 6 for a map of all transportation routes throughout the County.

The release of HAZMAT materials in transportation may be due to old or inadequate transport equipment, a traffic accident with a vehicle transporting hazardous material(s), or human error relating to filling/emptying hazardous materials from transport equipment. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant. According to the hazard mitigation committee serious injuries or illness, short term property and/or a shutdown of essential facilities could occur. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is severe enough a person would not survive the incident. Structural damages would most likely take place in the form of a fire.

Loss Estimate Calculation:

The loss estimates for hazardous materials events relating to transportation were not estimated because impacts would vary depending on the source of the incident, the type of hazardous material involved and the extent of the spill or leak. In the past, the majority of events may have resulted in environmental impacts due to spills or leaks (See historical events in Chapter 3).

2.2 Exposure Assessment for River Flooding

Exposed Structures

The floodplain maps are used as the area exposed to river flooding in the unincorporated area. Because too many maps exist for the unincorporated portion of the County, they were not included in this plan. The maps can be found on the FEMA website at www.msc.fema.gov. Because no current floodplain data is available in GIS format, it was determined that the NCDC data would provide sufficient loss estimates.

2.2.1 Vulnerability Assessment for River Flooding

Impacts from river flooding typically take form in property damage to basements. Being located in the low-lying areas or near the river may put residents at risk for injuries. Accompanying hazard events that may result in river flooding include thunderstorms and lightning, hailstorms,

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windstorm, flash flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The river flooding loss estimates were developed based on NCDC data, which showed that the highest amount of damages due to Flooding in Wright County was recorded at \$50,000,000. Based on this approximately 27% of the County would experience damages. The following estimate displays potential losses:

- Estimated residential structural damage due to River Flooding (27%) = 33,707,043
- Estimated commercial structural damage due to River Flooding (27%) = \$2,332,260
- Estimated agricultural structural damage due to River Flooding (27%) = \$12,661,164
- Estimated industrial structural damage due to River Flooding (27%) = \$33,696
- Total estimated structural damages of River Flooding = **\$48,734,163**

2.3 Exposure Assessment for Hazardous Materials relating to Fixed Facilities

Exposed Structures

The area exposed to Hazardous Materials relating to Fixed Facilities (HAZMAT – Fixed Facilities) was identified using the Iowa DNR Facility Explorer. HAZMAT facilities were identified and positioned on the map displayed in Section 6. A buffer was placed around each facility to identify the exposed area.

Exposed Persons

The “Number of People” exposed to Hazardous Materials at Fixed Facilities was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. There are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census; therefore, it was estimated that there were 896 residents, commercial, agricultural and industrial persons exposed.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in Uninc Area/Galt	# in Hazard Area	% in Hazard Area	\$ in Uninc Area/Galt	\$ in Hazard area	% in Hazard area	# in Uninc Area/Galt	# in Hazard area	% in Hazard area
Residential	1580	297	19%	\$124,840,900	\$6,787,600	5%	8,913	896	10%
Commercial	158	63	40%	\$8,638,000	\$3,332,000	39%			
Agricultural	1,599	122	8%	\$46,893,200	\$14,121,800	30%			
Industrial	8	8	100%	\$124,800	\$124,800	100%			
TOTAL	3345	490	15%	\$180,496,900	\$24,366,200	13%			

2.3.1. Vulnerability Assessment for Hazardous Materials related to Fixed Facilities

While hazardous substances may be present throughout the County, different materials have different impacts. The majority of hazardous materials within Wright County are Underground Storage Tanks, which have a limited impact such as an explosion or groundwater contamination, if leaking. The hazard mitigation committee estimated that 10-25% of the county could potentially be impacted by such event.

A hazardous substance may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as “hazardous chemicals.” And each year over 1,000 new synthetic chemicals are introduced and transported across the country via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, explosive or as an irritant.

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Anyone who is located in proximity to a fixed facility is vulnerable to hazardous material spills or leaks. Persons directly exposed to HAZMAT events could face breathing problems and/or physical burns. If the event is major a person would not survive the incident. Accompanying events to HAZMAT events include structural fires, structural failure and transportation incident.

Loss Estimate Calculation:

While a majority of the community would be impacted if all fixed facilities had a HAZMAT event, it is anticipated that only one event would occur at a time; therefore the following loss estimates were calculated based on the hazard area:

- Estimated residential structural damage due to HAZMAT – Fixed Facility = \$678,760
- Estimated commercial structural damage due to HAZMAT – Fixed Facility = \$333,200
- Estimated agricultural structural damage due to HAZMAT – Fixed Facility = \$1,412,180
- Estimated industrial structural damage due to HAZMAT – Fixed Facility = \$12,480
- Total estimated structural damages of HAZMAT – Fixed Facility = **\$2,436,620**

2.4 Exposure Assessment for Flash Flooding

Exposed Structures

Flash flooding results from intense rainfall over a brief period of time. The hazard mitigation committee estimated that 25-50% of the unincorporated area is impacted by flash flooding. It was determined that the majority of flash flooding occurs in low-lying areas with poor drainage. Based on topography and wetland data, there are multiple “pockets” of wetland areas within the County, it’s estimated that flash flooding would most likely occur near these pockets; therefore, these pockets, displayed in the flash flooding map in Section 6, were used to identify the “hazard area” for flash flooding. Based on this it was estimated that 817 dwellings, 94 commercial structures, 7 industrial structures and 704 agriculture structures were located in potential areas of flash flooding.

Exposed Persons

The “Number of People” exposed to flash flooding was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 1,936 residents, 94 commercial persons, 7 industrial persons and 704 agricultural persons exposed to flash flooding; making a total of 2,741 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in Uninc Area/Galt	# in Hazard Area	% in Hazard Area	\$ in Uninc Area/Galt	\$ in Hazard area	% in Hazard area	# in Uninc Area/Galt	# in Hazard area	% in Hazard area
Residential	1580	817	52%	\$124,840,900	\$33,630,000	27%	8,913	2,741	31%
Commercial	158	94	59%	\$8,638,000	\$4,495,800	52%			
Agricultural	1,599	704	44%	\$46,893,200	\$22,434,200	48%			
Industrial	8	7	88%	\$124,800	\$116,400	93%			
TOTAL	3345	1622	48%	\$180,496,900	\$60,676,400	34%			

2.4.1 Vulnerability Assessment for Flash Flooding

According to the hazard mitigation committee the vulnerable population to flash flooding is typically limited to those that live in areas with poor drainage. Impacts from flash flooding typically take form in property damage to structures. Accompanying hazard events that may

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result in flash flooding include thunderstorms and lightning, hailstorms, windstorms river flooding and severe winter storms; see their vulnerability assessment for additional impacts.

Loss Estimate Calculation:

The flash flooding loss estimates were developed based on the hazard area derived in the exposure assessment and vulnerability assessment, above. Because most flooding impacts basements and foundations, it was estimated that each structure within the hazard zone would incur about 5% of its structural value in damages. This was based on the idea that a basement remodel may increase a homes' value by 10%; therefore, damages might decrease a homes' value by about half of that. Based on this the following loss estimates were calculated:

- Estimated residential structural damage due to Flash Flooding (5%) = \$ 1,681,500
- Estimated commercial structural damage due to Flash Flooding (5%) = \$224,790
- Estimated agricultural structural damage due to Flash Flooding (5%) = \$1,121,710
- Estimated industrial structural damage due to Flash Flooding (5%) = \$5,820
- Total estimated structural damages of Flash Flooding = **\$3,033,820**

2.5 Exposure Assessment for Pipeline Incident

Exposed Structures

The exposure numbers for Pipeline Incidents is shown in the table below. These numbers were determined based on the number of structures located in the pipeline zone. The pipeline zone was determined using a 1 mile buffer surrounding the natural gas pipeline that runs into the west side of town. All of the residential, commercial and agricultural structures located within the buffer, or "hazard zone", account for the exposed "Number of Structures" and "Value of Structures". For a map of this buffer see Section 6.

Exposed Persons

The "Number of People" exposed to a pipeline incident was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the "hazard zone". It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimated that there were 639 residents, 43 commercial persons, 7 industrial persons and 290 agricultural persons exposed to flash flooding; making a total of 979 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in Uninc Area/Galt	# in Hazard Area	% in Hazard Area	\$ in Uninc Area/Galt	\$ in Hazard area	% in Hazard area	# in Uninc Area/Galt	# in Hazard area	% in Hazard area
Residential	1580	270	17%	\$124,840,900	\$594,000	0%	8,913	979	11%
Commercial	158	43	27%	\$8,638,000	\$4,733,600	55%			
Agricultural	1,599	290	18%	\$46,893,200	\$11,436,000	24%			
Industrial	8	7	88%	\$124,800	\$116,400	93%			
TOTAL	3345	610	18%	\$180,496,900	\$16,880,000	9%			

2.5.1. Vulnerability Assessment for Pipeline Incident

According to the hazard mitigation committee; 50-75% of the County is vulnerable to pipeline failure. With natural gas, persons should be prepared to evacuate during a failure of the pipeline as leakage would cause health and environmental impacts. Impacts on health would most likely be due to explosion, which could cause burns or even death; or inhalation, which would result in dizziness, headache, vomiting, irregular breathing or unconsciousness. Exposure to high levels of natural gas could also result in long-term effects such as respiratory

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disease. Symptoms include pneumonia, nausea, vomiting, irregular breathing, memory loss, fatigue, sinus pain and headache

Loss Estimate Calculation:

While approximately 11% of structures are exposed to pipeline failure, it's anticipated that such event would occur in an isolated area. It is estimated that only 25% of the hazard area would be directly impacted:

- Estimated residential structural damage due to Pipeline Failure (25%) = \$148,500
- Estimated commercial structural damage due to Pipeline Failure (25%) = \$1,183,400
- Estimated agricultural structural damage due to Pipeline Failure (25%) = \$2,859,000
- Estimated industrial structural damage due to Pipeline Failure (25%) = \$29,100
- Total estimated structural damages of Pipeline Failure (25%) = **\$4,220,000**

2.6 Exposure Assessment for Grass and Wild-land Fires

Exposed Structures

The hazard mitigation committee estimated that less than 10% of the County would be impacted by grass and wild-land fires. To determine the most susceptible areas to grass and wild-land fires within the unincorporated area, areas of open space (lands equaling one acre or more with no structures) identified using ArcGIS. Once this area was identified a 100 meter buffer was placed around the area to signify the “hazard zone”, or the property that could potentially be impacted by a grass or wild-land fire. The resulting map is shown in Section 6. Based on this map, it was estimated that 1,539 dwellings, y commercial structures, z industrial structures and z agriculture structures were located in the “hazard zone” for grass and wild-land fires.

Exposed Persons

The “Number of People” exposed to grass and wild-land fires was based on the number of residential, commercial, industrial and agriculture structures estimated to be located in the “hazard zone”. It was estimated that each commercial, industrial and agriculture structure had one owner. And there are approximately 2.37 people per dwelling (household) in Wright County, according to the 2010 U.S. Census. Therefore it was estimates that there were 3,647 residents exposed, 156 commercial persons exposed, 8 industrial persons exposed and 1,598 agricultural persons exposed; making a total of 5,409 potentially exposed persons.

Type of Structure	Number of Structures			Value of Structures			Number of People		
	# in Uninc Area/Galt	# in Hazard Area	% in Hazard Area	\$ in Uninc Area/Galt	\$ in Hazard area	% in Hazard area	# in Uninc Area/Galt	# in Hazard area	% in Hazard area
Residential	1580	1539	97%	\$124,840,900	\$72,514,600	58%	8,913	5,409	61%
Commercial	158	156	99%	\$8,638,000	\$8,637,100	100%			
Agricultural	1,599	1,598	100%	\$46,893,200	\$46,886,100	100%			
Industrial	8	8	100%	\$124,800	\$124,800	100%			
TOTAL	3345	3301	99%	\$180,496,900	\$128,162,600	71%			

2.6.1 Vulnerability Assessment for Grass and Wild-land Fires

The exposure area shows that grass and wild-land fires would most likely occur in areas where grass or agriculture lands exist. Agricultural land exists throughout the unincorporated area; therefore, structures could be set on fire if the fire department is unable to respond immediately. Persons within vicinity to the fire could be impacted with smoke inhalation, burns if directly exposed or even death. Accompanying events include drought and a resulting event may be structural fire.

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Loss Estimate Calculation:

Only a portion of those exposed structures within the County would actually be impacted during a grass and wild-land fire event. It is estimated that structures located adjacent to the open space would be impacted; therefore, the following estimates were calculated:

Estimated residential structural damage due to Grass & Wild-land Fire (1%) = \$ 725,146
 Estimated commercial structural damage due to Grass & Wild-land Fire (1%) = \$86,371
 Estimated agricultural structural damage due to Grass & Wild-land Fire (1%) = \$468,861
 Estimated industrial structural damage due to Grass & Wild-land Fire (1%) = \$1,248
 Total estimated structural damages of Grass & Wild-land Fire = **\$1,281,626**

Section 3: Mitigation Strategies and Priorities

STAPLEE Analysis

Chapter 5 explained the STAPLEE process and how mitigation actions were prioritized. The list of the hazard mitigation actions along with their final priority, as determined by the hazard mitigation committee is shown below:

Project	STAPLEE Results
Continue support for Region 5 HAZMAT and Region 2 Bio-Emergency	21
Continue pipeline safety training and support One Call	21
Generators to provide power for power outages	18
Continue to implement training for environmental health	17
Look at establishing a burn location in DNR approved the county (centralized or many) to mitigate fires	17
Support law enforcement and public health and their bio-emergency/anti-terrorism plans	17
Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards	16
Encourage manure pumping rather than hauling and umbilical cords	15
Continuous evaluation of drainage structures upon reconstruction of facilities	15
Establish flood zoning in comprehensive plans	14
Promote getting flood insurance for those in FIRM mapped areas	14
Establish collection centers/winter shelters for people	13
Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems	13
Upgrade signage to 6" letter signs due to federal regulations	13
Strategic flood response plan (dikes, sandbags & placement of bags, etc.)	12
Tornado shelter at the lake for campers (enough for 400-500 people)	12
Continue promoting fire education	12
Bringing communication capabilities up to narrowband standards	12
Install metal detectors at the court house	11

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Coordinate with law enforcement to be present during instances of large crowd gatherings	11
Continue analyzing traffic data to decrease the amount of accidents	8

County Hazard Mitigation Goals, Objectives, and Mitigation Actions

Goal 1: To reduce or eliminate injury and property damage due to the natural hazards that afflicts the County (Winter Storms, River Flooding, Tornados, Flash Flooding, Thunderstorms and Lightning, High Winds, Hailstorms, Extreme Heat, Drought, Expansive Soils)

Objective 1.1: Winter Storms

Mitigation Actions

- 1.1.1 Generators to provide power for power outages
- 1.1.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.1.3 Bringing communication capabilities up to narrowband standards

Objective 1.2: River Flooding

Mitigation Actions

- 1.2.1 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.2.2 Establish flood zoning in comprehensive plans
- 1.2.3 Strategic flood response plan (dikes, sandbags & placement of bags, etc.)
- 1.2.4 Bringing communication capabilities up to narrowband standards
- 1.2.5 Continuous evaluation of drainage structures upon reconstruction of facilities
- 1.2.6 Promote getting flood insurance for those in FIRM mapped areas

Objective 1.3: Tornados

Mitigation Actions

- 1.3.1 Generators to provide power for power outages
- 1.3.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.3.3 Bringing communication capabilities up to narrowband standards
- 1.3.4 Tornado shelter at the lake for campers (enough for 400-500 people)

Objective 1.4: Flash Flooding

Mitigation Actions

- 1.4.1 Generators to provide power for power outages
- 1.4.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.4.3 Establish flood zoning in comprehensive plans
- 1.4.4 Bringing communication capabilities up to narrowband standards
- 1.4.5 Continuous evaluation of drainage structures upon reconstruction of facilities

Objective 1.5: Thunderstorms and Lightning

Mitigation Actions

- 1.5.1 Generators to provide power for power outages
- 1.5.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.5.3 Bringing communication capabilities up to narrowband standards

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Objective 1.6: High Winds

Mitigation Actions

- 1.6.1 Generators to provide power for power outages
- 1.6.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.6.3 Bringing communication capabilities up to narrowband standards
- 1.6.4 Tornado shelter at the lake for campers (enough for 400-500 people)

Objective 1.7: Hailstorms

Mitigation Actions

- 1.7.1 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.7.2 Bringing communication capabilities up to narrowband standards

Objective 1.8: Extreme Heat

Mitigation Actions

- 1.8.1 Generators to provide power for power outages
- 1.8.2 Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards
- 1.8.3 Bringing communication capabilities up to narrowband standards
- 1.8.4 Establish collection centers/winter shelters for people

Objective 1.9: Expansive Soils

Mitigation Actions

- 1.9.1 Bringing communication capabilities up to narrowband standards
- 1.9.2 Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems

Goal 2: To reduce or eliminate injury and property damage due to man-made hazards that could affect the County (Water Shed Pollution, Transportation Event, HAZMAT-Fixed Facility, Pipeline Incident, Energy Disruption, Structural Fire, Structural Failure, , HAZMAT-Transportation, Human Disease,)

Objective 2.1: Transportation Event

Mitigation Actions

- 2.1.1 Encourage manure pumping rather than hauling and umbilical cords
- 2.1.2 Bringing communication capabilities up to narrowband standards
- 2.1.3 Continue analyzing traffic data to decrease the amount of accidents
- 2.1.4 Establish a Manure Pumping Permit policy
- 2.1.5 Upgrade signage to 6" letter signs due to federal regulations

Objective 2.2: HAZMAT – Fixed Facility

Mitigation Actions

- 2.2.1 Continue Support for Region 5 HAZMAT and Region 2 Bio-Emergency
- 2.2.2 Bringing communication capabilities up to narrowband standards

Objective 2.3: Pipeline Incident

Mitigation Actions

- 2.3.1 Continue pipeline safety training and support One Call
- 2.3.2 Bringing communication capabilities up to narrowband standards

Objective 2.4: Energy Disruption

Mitigation Actions

- 2.4.1: Generators to provide power for power outages

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Objective 2.5: Structural Fire

Mitigation Actions

2.5.1: Continue promoting fire education

2.5.2: Bringing communication capabilities up to narrowband standards

Objective 2.6: Grass and Wild land Fires

Mitigation Actions

2.6.1: Look at establishing a burn location in DNR approved the county (centralized or many)

2.6.2: Continue promoting fire education

2.6.3: Bringing communication capabilities up to narrowband standards

Objective 2.7: Communications Failure

Mitigation Actions

2.7.1: Bringing communication capabilities up to narrowband standards

Objective 2.8: HAZMAT - Transportation

Mitigation Actions

2.8.1: Continue Support for Region 5 HAZMAT and Region 2 Bio-Emergency

2.8.2: Bringing communication capabilities up to narrowband standards

Objective 2.9: Terrorism

Mitigation Actions

2.9.1: Support law enforcement and public health and their bio-emergency/anti-terrorism plans

2.9.2: Bringing communication capabilities up to narrowband standards

2.9.3: Install metal detectors at the court house

Objective 2.10: Disease

Mitigation Actions

2.10.1: Continue to implement training for environmental health

Objective 2.11: Air Transportation Event

Mitigation Actions

2.11.1: Bringing communication capabilities up to narrowband standards

Objective 2.12: Violent Demonstration

Mitigation Actions

2.12.1: Bringing communication capabilities up to narrowband standards

2.12.2: Coordinate with law enforcement to be present during instances of large crowd gatherings

Section 4: Action Plan

Continue support for Region 5 HAZMAT and Region 2 Bio-Emergency	
Description	Region V HAZMAT team responds to all hazardous materials events in the County as Wright County is a member.
Hazards Addressed	Hazardous Materials Events Fixed and Transportation
Priority	I
Responsible Dept./Party	Supervisors, Public Health, EMA
Estimated Cost	Low
Potential Funding Source	County, Grants (Fed & State), FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Continue pipeline safety training and support One Call	
Description	Members of the county attend pipeline safety training. County representatives stress the use of One Call.
Hazards Addressed	Pipeline incidents
Priority	I
Responsible Dept./Party	Secondary Roads, Pipeline Utility
Estimated Cost	Minimal
Potential Funding Source	Secondary Roads, Private Company, FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Generators to provide power for power outages	
Description	Purchase additional generators for courthouse and essential county services.
Hazards Addressed	Thunderstorm and Lightning, High Wind Events, Extreme Heat Events, Energy disruption, Tornados
Priority	I
Responsible Dept./Party	Supervisors
Estimated Cost	Low
Potential Funding Source	Property Tax, FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	2013

Continue to implement training for environmental health	
Description	Continue environmental health training to minimize the risks to public health and environment
Hazards Addressed	Disease
Priority	I
Responsible Dept./Party	Public Health
Estimated Cost	Minimal
Potential Funding Source	Property Tax, Grants, FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

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Look at establishing a burn location in DNR approved the county (centralized or many)	
Description	Identify a safe location(s) to burn yard waste, seek DNR approval for site, set up site to limit chance of fires starting elsewhere.
Hazards Addressed	Grass and Wild land fires
Priority	I
Responsible Dept./Party	Landfill Commission
Estimated Cost	Low
Potential Funding Source	Landfill Commission, Tax-based, FEMA
Mitigation Measure Category	Property protection
Target Completion Date	Ongoing

Support law enforcement and public health and their bio-emergency/anti-terrorism plans	
Description	Support law enforcement and public health and bio-emergency/anti-terrorism plans by providing the means to continue the agency and to develop the plans.
Hazards Addressed	Terrorism
Priority	I
Responsible Dept./Party	Public Health, Sheriffs Dept., EMA
Estimated Cost	Low to Moderate
Potential Funding Source	Property Tax, Grants, Emergency Management, FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards	
Description	CodeRED/Inspiron is a service provided to the County to warn residents of potential hazards and threats. Notifications are sent via text message, email and/or phone call. Ensuring that residents are aware of these services will prevent injuries due to oncoming hazards
Hazards Addressed	Thunderstorm & Lightning, Severe Winter Storms, Hazardous Materials, Flash Flood, Hailstorms, Windstorms, Extreme Heat, Grass or Wild land Fire, Tornadoes, River Flooding.
Priority	I
Responsible Dept./Party	County EMA, City of Galt
Estimated Cost	Minimal
Potential Funding Source	Public Health, Divided Funding (cities, hospitals, county), FEMA
Mitigation Measure Category	Public Education and Awareness Mitigation Actions
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Encourage manure pumping rather than hauling and umbilical cords	
Description	Manure pumping to reduce the transportation of manure
Hazards Addressed	Transportation Event
Priority	I
Responsible Dept./Party	Private Businesses, Secondary Roads
Estimated Cost	Low to Moderate
Potential Funding Source	Secondary Roads, FEMA
Mitigation Measure Category	Emergency Services Protection Action
Target Completion Date	Ongoing

Establish flood zoning in comprehensive plans	
Description	Revise comprehensive plans to include flooding to mitigate the number of buildings that could be damaged.
Hazards Addressed	River flooding and flash flooding
Priority	I
Responsible Dept./Party	Planning & Zoning, Supervisors
Estimated Cost	Low
Potential Funding Source	Grants, County, FEMA
Mitigation Measure Category	Prevention Action
Target Completion Date	2015

Strategic flood response plan (dikes, sandbags & placement of bags, etc.)	
Description	Develop a flood response plan to be prepared in case of a flooding event.
Hazards Addressed	River Flooding
Priority	I
Responsible Dept./Party	Emergency Management, Public Health, Secondary Roads
Estimated Cost	Minimal
Potential Funding Source	FEMA, County Taxes
Mitigation Measure Category	Emergency Services Protection Action and Property Protection Action
Target Completion Date	Ongoing

Continue promoting fire education	
Description	Ensuring that the public is aware of what happens if a fire event occurs and how to respond. Education for the public may include, but is not limited to radio and television announcements, reading materials and training events.
Hazards Addressed	Structural Fire and Grass and Wild land Fires
Priority	I
Responsible Dept./Party	Rural Fire Association
Estimated Cost	Minimal
Potential Funding Source	City & townships (tax payer dollars)
Mitigation Measure Category	Public Education and Awareness Mitigation Action
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Bringing communication capabilities up to narrowband standards	
Description	All radios will be reprogrammed to meet federal requirements.
Hazards Addressed	Thunderstorm and Lightning, High Wind Events, Extreme Heat Events, Energy disruption, Tornados, Winter Storms, Flooding, Hailstorms, Pipeline Incident, Transportation Event, Structural Fire, Grass & Wild land Fire, HAZMAT Event, Terrorism, Air transportation Event, Violent Demonstration,
Priority	I
Responsible Dept./Party	Fire Departments, EMS, Secondary Roads, Public Health, Law Enforcement
Estimated Cost	Low
Potential Funding Source	Property Tax, Phone Sur-Charge, FEMA, 911, Grants, Tax Payers, City
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2013

Install metal detectors at the court house	
Description	Install metal detectors at the court house to limit the possibility of bringing in fire arms and explosive devices.
Hazards Addressed	Terrorism
Priority	I
Responsible Dept./Party	Sheriff Departments, Supervisors
Estimated Cost	Low
Potential Funding Source	Sheriff Department, Jail Revenue
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	As Needed/Lease

Coordinate with law enforcement to be present during instances of large crowd gatherings	
Description	Primary enforcement agency to coordinate with other law enforcement entities to ensure enough law enforcement personnel is present when there are events where there will be large crowds.
Hazards Addressed	Violent demonstration
Priority	I
Responsible Dept./Party	Law Enforcement
Estimated Cost	Minimal
Potential Funding Source	County
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Continue analyzing traffic data to decrease the amount of accidents	
Description	Obtain traffic and crash data, review data and determine actions which could reduce accidents in large crash areas.
Hazards Addressed	Transportation incidents
Priority	I
Responsible Dept./Party	IDOT, Secondary Roads
Estimated Cost	Minimal
Potential Funding Source	State, County, Road-Use Tax Fund
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	Ongoing

Establish a Manure Pumping Permit policy	
Description	Establish a permit policy in order to be able to pump manure.
Hazards Addressed	Transportation incidents
Priority	I
Responsible Dept./Party	Secondary Roads, Supervisors
Estimated Cost	Minimal
Potential Funding Source	Fee-assessed, FEMA
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2013

Continuous evaluation of drainage structures upon reconstruction of facilities	
Description	When roads, ditches etc are reconstructed evaluate the condition of the drainage tile
Hazards Addressed	Flooding
Priority	II
Responsible Dept./Party	Secondary Roads
Estimated Cost	Low
Potential Funding Source	Secondary Roads, FEMA
Mitigation Measure Category	Prevention
Target Completion Date	Ongoing

Promote getting flood insurance for those in FIRM mapped areas	
Description	Promote all residents obtaining flood insurance.
Hazards Addressed	Flooding
Priority	I - II
Responsible Dept./Party	Supervisors, EMA, Insurance Committee
Estimated Cost	Minimal
Potential Funding Source	Supervisors, General Funds, FEMA
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2013

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems	
Description	Review present building codes and revise to include soil testing.
Hazards Addressed	Expansive soils
Priority	II
Responsible Dept./Party	Planning & Zoning, Supervisors
Estimated Cost	Minimal
Potential Funding Source	Fee-based, FEMA
Mitigation Measure Category	Protection
Target Completion Date	2016

Tornado shelter at the lake for campers (enough for 400-500 people)	
Description	Construct a tornado shelter at lake facility(ies) to provide shelter for those camping.
Hazards Addressed	Tornados, High winds
Priority	II
Responsible Dept./Party	Conservation, Supervisors
Estimated Cost	High
Potential Funding Source	State, FEMA, county
Mitigation Measure Category	Structural
Target Completion Date	2016

Establish collection centers/winter shelters for people	
Description	Establish centers where citizens can go if the they have not heat, air etc.
Hazards Addressed	Winter storm events, high wind events, Extreme Heat
Priority	III
Responsible Dept./Party	Public Health, Hospitals, Cities, EMA
Estimated Cost	Low
Potential Funding Source	FEMA, Supervisors, Cities, Red Cross
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2018

Upgrade signage to 6" letter signs due to federal regulations	
Description	Replace street signs to the standards required by the Manual on Uniform Traffic Control Devices.
Hazards Addressed	Traffic Incidents
Priority	III
Responsible Dept./Party	E911 Department
Estimated Cost	Moderate
Potential Funding Source	Sur-charge monies, Cities (for own), FEMA
Mitigation Measure Category	Emergency Services Protection Actions
Target Completion Date	2018

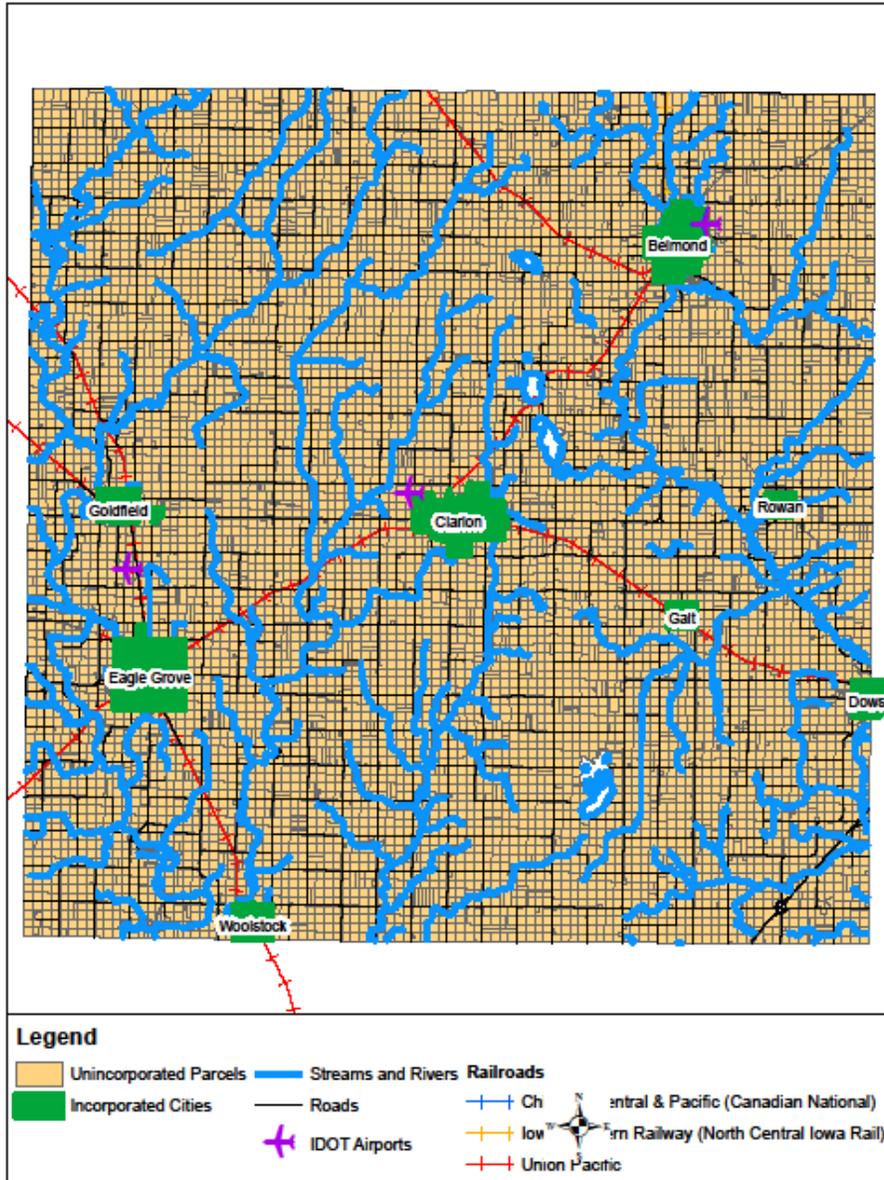
Section 5: Critical Facilities

- Wright County Courthouse
- Wright County Public Health Annex
- Wright County Social Services Building
- Wright County Sheds
 - Belmond
 - Clarion
 - Dows
 - Eagle Grove
- Wright County Sheriff's Office
- Fire Departments
 - Belmond
 - Clarion
 - Dows
 - Eagle Grove
 - Goldfield
 - Rowan
 - Woolstock
- Hospitals
 - Iowa Specialty Hospital – Belmond
 - Iowa Specialty Hospital - Clarion
- Power/Electrical Substations in the County

Section 6: Community Maps

Wright County

Unincorporated Area

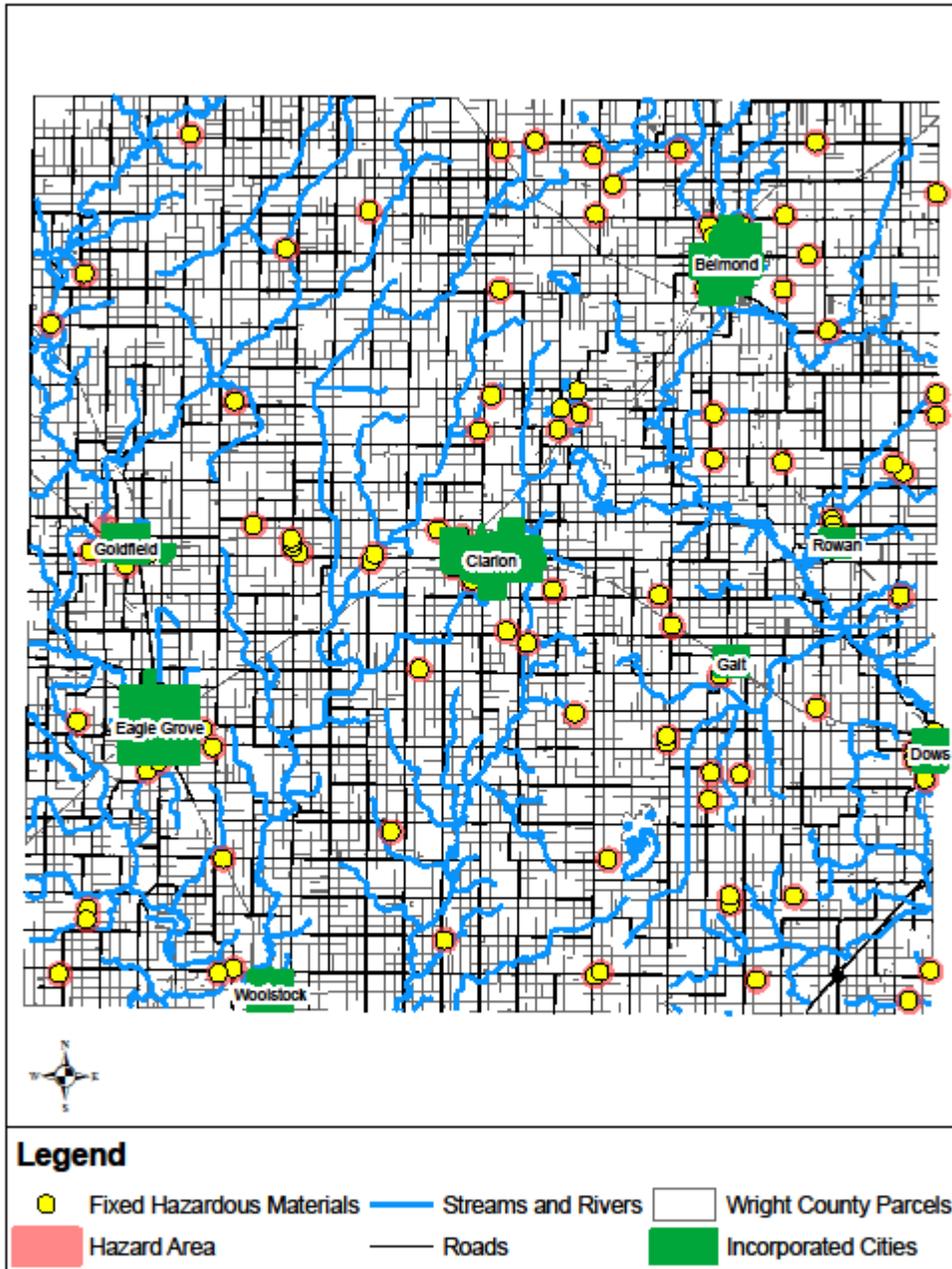


Map Created By: MIDAS Council of Governments, 2012
 Data Sources: NRGIS, 2010; Wright County Assessor, 2010; IDOT, 2010

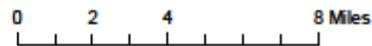
0 2 4 8 Miles

Wright County

Fixed Hazardous Materials Hazard Area

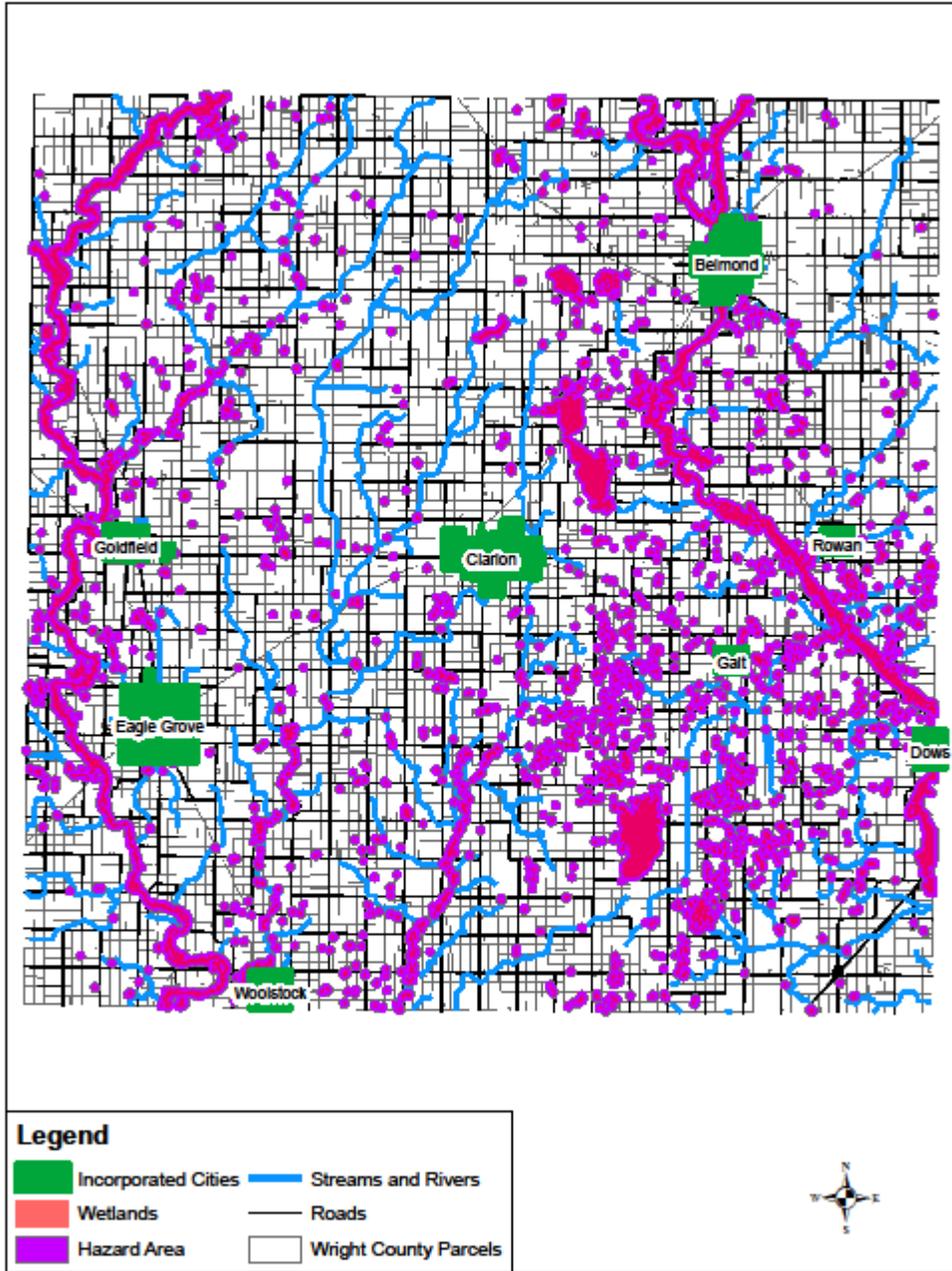


Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
IDOT, 2010

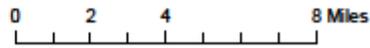


Wright County

Flash Flood Hazard Area

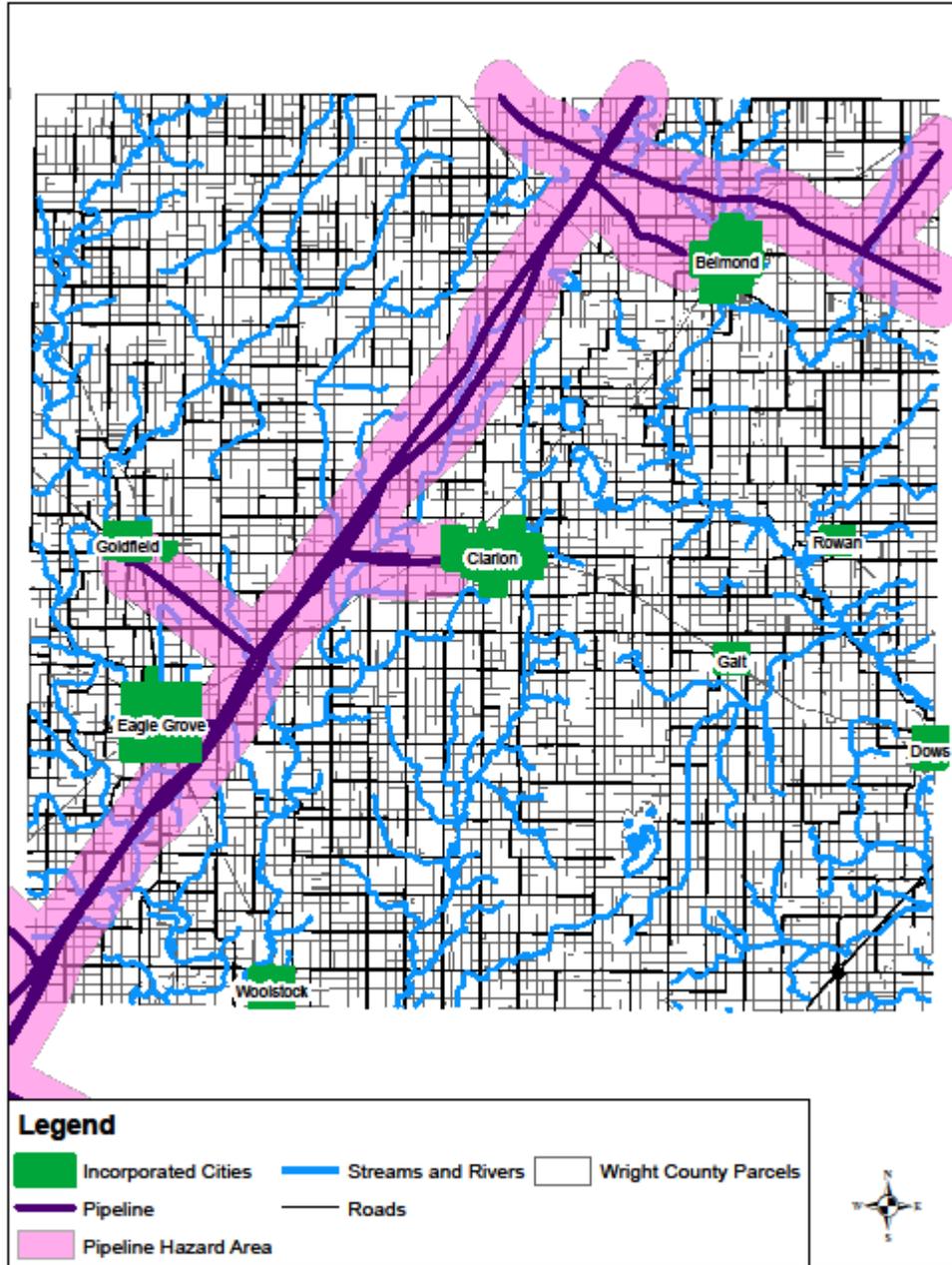


Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010; IDOT, 2010



Wright County

Pipeline Hazard Area

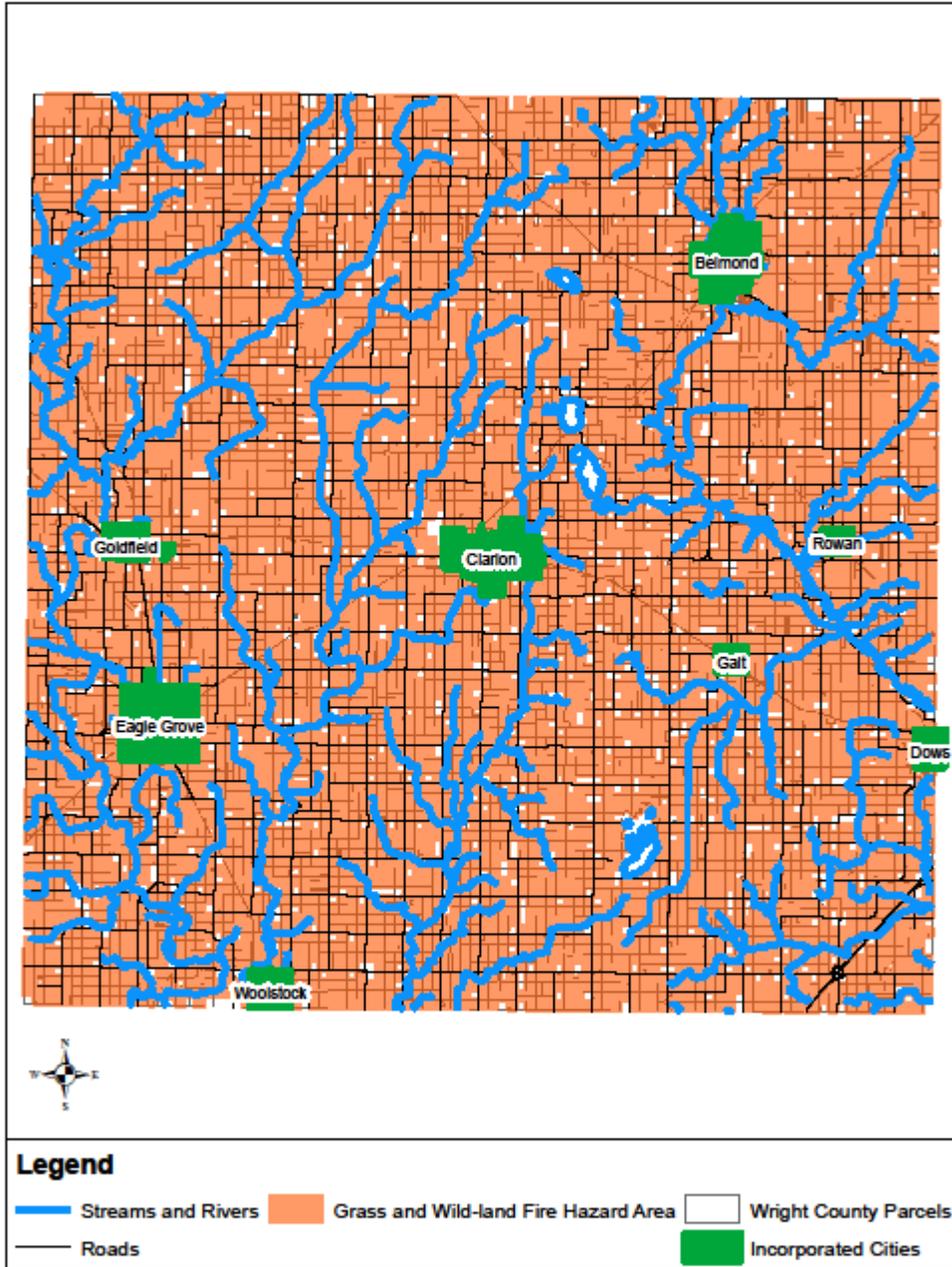


Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
IDOT, 2010

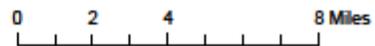
0 2 4 8 Miles

Wright County

Grass and Wild-land Fires Hazard Area



Map Created By: MIDAS Council of Governments, 2012
Data Sources: NRGIS, 2010; Wright County Assessor, 2010;
IDOT, 2010



Section 7: Agendas, Minutes and Sign In Sheets

WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES March 29, 2010

Meeting attended by: Bruce Linder, Bud Young, Linda Klehm, Dennis Bowman, Paul Kirstein, Danny Waid, Adam Clemons, Lorie Patrick, Paul Shultz, Betty Ellis, Troy Watne, and Stan Watne

Meeting started at 12:00pm

The hazard mitigation committee went through the list of hazards and discussed what effects each of them have had on Wright County

Past History of Hazards for Wright County

Tornadoes

- Belmond was the last tornado
- Goldfield experienced a tornado
- 8-9 years ago there was a tornado in the rural area
- Most of the rural homes have basements

Flooding

- This is a big problem throughout the county
- 93'-08'
- 11 roads closed in 10'
- 1 death contributed to flooding
- 500k of funding was assigned to drainage districts (this shows how large of a problem this is)

Winter Storms

- Secondary roads
- Primary-interstate-main roads... all closed
- Loss of power last year
- Property damage – roof and ice dams
- Ice building up on power lines cause the largest power outages

High Winds

- Affected crops (southern Wright County)
- Over the last 20 years lots of damages due to high winds
- Western Wright County (stripped roofs right off)
- Damages similar to a tornado

Hailstorms

- Roof, siding, crop, trees, and vehicles
- Not as many that cause major window damage
- Livestock can be affected severely

Severe Thunderstorm and Lightning

- Short term power outages
- About 4 hours of power loss in the last few years
- Lightning hit a tanker and cause a fire

Extreme Heat Events

- Shelters opened for cooling
- Livestock problems (chickens)

Drought

- Been about 20 years since the last drought 83' and 88'

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Livestock concern
- Wells are

Landslide

- 1 event in cemetery (Wall Lake Township Cemetery)
- Walls caving in basements (foundation)

Grass & Wildfire

- Hasn't damaged buildings
- Crop damages with corn fires

Dam Failure

- Low-head dams, but if they're breached not that big of a deal

Levees

- Same thing as dams

Sink Holes

- Not really a problem experienced anywhere in the county

Expansive Soils

- Minor soil expansion problems
- Basement issues since the soil can have lots of clay – this results in caved in basement walls and foundation erosion.

HAZMAT – Transit

- Interstate
- Nitrogen
- Anhydrous tanks
- Farm chemicals
- Anhydrous spills in Dows, north of Clarion
- HAZMAT goes to Eagle Grove
- The possibility of an ethanol plant catching on fire (almost all on rail)
- No control on major chemicals that travel through the county
- Liquid manure

HAZMAT – Fixed

- Lots of chemicals
- Ethanol plant
- Storage facilities

Watershed Pollution

- Manure spills
- Cities have to limit release
- Hog facilities (lagoons)
- Ag drainage wells (a lot of them still open)
- Have to upgrade old septic systems (leech fields)

Pipeline Incidents

- 5 miles north of Clarion there was a major bust
- 3 major lines that run through the county
- There have been breaks in the past
- There was that one incident that happened in the building downtown in Eagle Grove
- There are a total of 8 lines in the county (5 are located along the interstate)

Energy Disruption

- Ice storm events
- Black out – brown outs
- Exposure if the grid went down
- All large facilities have back-up generators
- Some cities have back-up generators
- Problem is to find place to put people if the energy disruption

Terrorism

- There is a potential for this to happen

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Craig Decker? – Dows
- The greatest possibility is agricultural terrorism (crops/livestock)

Violent Demonstration

- This is also a potential (especially working for the government)
- PETA is a possibility for violent demonstration. The county has received threats, but never has anyone committed to those threats
- The County is thinking about installing security measures
- RAGBRI – always possible for violence to occur

Disease

- There is always the potential for this to occur
- The County held 2 clinics to distribute vaccinations for H1N1
- Avian influenza (it's a possibility that this could happen)
- There have been studies done to combat avian flu, this is a big issue with all of the poultry industry located in Wright County
- The county has done education notices on diseases
- There is also a potential with immigrants (less immune to diseases and thus can be a greater carrier threat)
- There was an outbreak of measles (from immigrants)
- There's also a greater chance of spread of disease with the increase of people not getting vaccinated

Structural Fire

- 2 elevator explosions
- Goldfield
- Grain bin fire (AGP-Eagle Grove)
- Tractor fires
- Significant downtown fires (especially with fires w/apartments) threat

Communications Failure

- Antenna have gone down with lightning
- Tornadoes are a risk, because if they knock out communication it most likely will be out for a while
- There is a potential for widespread communications failure
- In major events, this is a problem (phone lines get overwhelmed, busy signals, etc.)

Transportation Event

- There is the potential for large transportation events, but there hasn't been any as of yet
- There is the potential for rail, school buses, interstate

Air Transportation Event

- There is the potential for an air transportation incident to occur
- There have only been a few incidents of air transportation events, generally dealing with crop dusters. One incident was that a crop duster accidentally sprayed someone while spraying crops.

After finishing going through the list, the committee was asked to identify any potential hazards that were not on the list. They were unable to identify any.

The meeting ended at 1:00pm

WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES April 26, 2010

Meeting attended by: Bruce Linder, Paul Kirstein, Adam Clemons, Dennis Bowman, Troy Watne, Betty Ellis, Bud Young, and Stan Watne

Meeting started at 12:00pm

Wright County Multi-Jurisdiction Hazard Mitigation Plan

The hazard mitigation committee started the process of going through the hazards and completing the hazard risk analysis. The hazard mitigation committee got through to Pipeline Incidents. The results of the risk analysis so far are shown below:

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Winter Storms	5	5	5	5	4	4	28
River Flooding	5	5	4	5	3	4	26
Watershed Pollution	5	5	3	3	4	5	25
Tornadoes	5	4	3	3	4	5	24
HAZMAT – Fixed Facility	5	4	2	3	4	5	23
Flash Flooding	5	5	3	2	2	5	22
Severe Thunderstorms and Lightning	5	5	1	5	2	4	22
Pipeline Incidents	2	4	4	3	4	5	22
High Wind Events	5	5	2	5	2	2	21
Hailstorms	5	5	2	2	2	5	21
Extreme Heat Events	5	5	2	5	3	1	21
Drought	3	4	5	5	3	1	21
Expansive Soils	5	5	3	1	1	5	20
Grass & Wildfire	5	5	1	1	1	5	18
HAZMAT – Transportation	4	4	1	1	2	5	17

The hazard mitigation committee has thus far removed 3 hazards from further consideration in the plan:

Landslide: There aren't any hills significant enough throughout the county that landslides would be cause for concern.

Dam Failure: There aren't any functional dams within the county. There are dams, but they don't work and haven't been rebuilt. Thus the hazard mitigation committee decided to remove dam failure from further consideration in the plan.

Levee Failure: There aren't any levees within the county. Due to the lack of levees, and the lack of levees that would have any effect on the county, the hazard mitigation committee decided to remove levee failure from further consideration in the plan.

The rest of the hazards in the hazard risk analysis will be completed at the next meeting.

The meeting ended at 1:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
May 24, 2010**

Meeting attended by: Bruce Linder, Bud Young, Linda Klehm, Paul Kirstein, Danny Waid, and Adam Clemons

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Meeting started at 12:00pm

The hazard mitigation committee finished the hazard risk analysis, and the results of the entirety of that analysis is displayed below:

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Winter Storms	5	5	5	5	4	4	28
River Flooding	5	5	4	5	3	4	26
Watershed Pollution	5	5	3	3	4	5	25
Transportation Event	5	5	3	2	5	5	25
Tornadoes	5	4	3	3	4	5	24
HAZMAT – Fixed Facility	5	4	2	3	4	5	23
Flash Flooding	5	5	3	2	2	5	22
Severe Thunderstorms and Lightning	5	5	1	5	2	4	22
Pipeline Incidents	2	4	4	3	4	5	22
High Wind Events	5	5	2	5	2	2	21
Hailstorms	5	5	2	2	2	5	21
Extreme Heat Events	5	5	2	5	3	1	21
Drought	3	4	5	5	3	1	21
Energy Disruption	5	5	2	2	2	5	21
Expansive Soils	5	5	3	1	1	5	20
Structural Fire	5	5	1	1	3	5	20
Structural Failure	5	5	1	1	2	5	19
Grass & Wildfire	5	5	1	1	1	5	18
Communications Failure	2	3	3	3	2	5	18
HAZMAT – Transportation	4	4	1	1	2	5	17
Terrorism	1	3	2	1	4	5	16
Disease	3	3	3	3	3	1	16
Air Transportation Event	2	3	1	1	3	5	15
Violent Demonstration	1	3	1	1	3	3	12

The meeting ended at 1:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
June 28, 2010**

Meeting attended by: Stan Watne, Troy Watne, Sandi Reitz, Jerry Johnson, Debra Johnson, Dennis Bowman, Bradley Berg, Bruce Linder, and Bud Young

Wright County Multi-Jurisdiction Hazard Mitigation Plan

Meeting started at 12:00pm

Due to the amount of flooding that occurred in Clarion, and throughout Wright County, the hazard mitigation committee first went through what were the effects of the flooding:

- Worse flooding than in 2008
- Rain came in 7" overnight
- Every town had problems with power outages
- Tornadoes (funnel clouds) were spotted all throughout the county
- 600 places where there was water covered roads

The hazard mitigation committee then went through the hazard risk analysis and made a change to the Flash Flooding hazard, the change is displayed below:

Hazard	Historical Occurrence	Probability	Vulnerability	Maximum Threat	Severity of Impact	Speed of Onset	Total Score
Flash Flooding	5	5	3	3	3	5	24

This then puts flash flooding on par with tornadoes.

The hazard mitigation committee then started to brainstorm hazard mitigation actions. The results of the brainstorm session are below:

Winter Storms

- Add preliminary warning for Winter Storms to Code Red warnings
- Closing roads on exits out of town
- Establish collection centers/winter shelters for people
- Building winter shelters (or add-ons to established collection areas)

River Flooding

- Zoning (flood zoning) in comprehensive plan
- Measuring sticks along roads
- Better measuring devices of flood indicators (electronic)
- Pre-made sandbags at county stations/shelters/sheds
- Strategic flood response plan (dikes, sandbags & placement of bags, etc.)
- Establish collection center/system for equipment/volunteers (generators or volunteers)

Watershed Pollution

- Generator for lift stations
- Extension of containment dikes (to account for rain)

Energy Disruption

- Natural gas generators to provide power for power outages
- Education on populace on calling sheriff to let them know you're out of power

The meeting ended at 1:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
July 26, 2010**

Meeting attended by: Bruce Linder, Bud Young, Dennis Bowman, Paul Kirstein, Danny Waid, Adam Clemons, Paul Shultz, Betty Ellis, and Stan Watne

Meeting started at 12:00pm

The hazard mitigation committee continued to brainstorm mitigation actions for the hazards that they did not get a chance to cover in the previous meeting.

Transportation Events

- Continue analyzing traffic data to decrease the amount of accidents

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Encourage manure pumping rather than hauling
- Promote umbilical cords for manure
- Utilize code red to warn citizens of spills that may affect them

Tornadoes

- Tornado shelter at the lake for campers (enough for 400-500 people)
- Update Eagle Grove's warning sirens to be set off remotely

HAZMAT- Fixed Facility

- Continue support for Region 5

Flash Flooding

- Promote getting flood insurance for those in FIRM mapped areas
- Prioritize culverts/drainage locations to mitigate flash flooding
- Include in comprehensive plan flood zoning to mitigate the number of buildings that can be damaged

Severe Thunderstorms and Lightning

- Continue using Code Red to warn people

Pipeline Incidents

- Continue pipeline safety training
- Support One Call

High Winds

- Promote and continue using Code Red
- Restrictions on trees planted in town to reduce debris

Hailstorms

- Continue promoting Code Red
- Storm shelters

Extreme Heat Events

- Establish cooling shelters
- Promote cooling shelters
- Establish a fan distribution program (through Public Health)
- Continue promoting generators at animal sheds

Drought

- Monitor aquifers to establish water levels
- Promote limiting water usage in times of drought

Energy Disruption

- Have contracts with energy companies to ensure multiple channels for energy coming into town
- Emergency generator for Wright County courthouse (and essential county services)

Expansive Soils

- Establish building codes to require getting soil borings to test for expansive soils to mitigate any potential problems

Structural Fires

- Look at building codes
- Continue promoting fire education
- Upgrade signage to 6" letter signs due to federal regulations

Structural Failure

- Continue implement training for inspection on buildings

Grass & Wildfires

- Continue to do burn bans throughout the county during dry conditions
- Look at establishing a burn location in DNR approved the county (centralized or many) to mitigate fires
- Establish burn days

Communication Failure

- Update pagers for emergency personnel due to upgrading radios
- Brining communication capabilities up to narrowband capabilities

HAZMAT – Transportation

Wright County Multi-Jurisdiction Hazard Mitigation Plan

- Encourage manure pumping rather than hauling
- Promote umbilical cords for manure
- Utilize code red to warn citizens of spills that may affect them

Terrorism

- Continue bio-terrorism planning
- Support law enforcement and their terrorism plans
- Continue training for terrorism
- Install metal detectors at the court house

Disease

- Support public health on BT plan

Air Transportation Event

- Establish flight plan communication for crop duster activity

Violent Demonstration

- Police presence during events with large crowds
- Coordinate with law enforcement to be there during instances where violence can be expected
- Anticipate when crowds might be present

The meeting ended at 2:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
August 30, 2010**

Meeting attended by: Bruce Lindner, Dennis Bowman, Troy Watne, Stan Watne, Sandra McGrath, Paul Kirstein, Paul Schultz, Jim Lester, Adam Clemons, and Danny R. Waid

Meeting started at 12:00pm

The hazard mitigation started the STAPLEE analysis, but wasn't able to finish in the designated meeting time. They decided that they would finish the rest of the STAPLEE analysis at the next meeting.

The meeting ended at 1:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
September 27, 2010**

Meeting attended by: Adam Clemons, Danny R. Waid, Paul Kirstein, Betty Ellis, Bud Young, Bruce Lindner, Linda Klehm, and Stan Watne

Meeting started at 12:00pm

The hazard mitigation committee continued the STAPLEE analysis from where they left off at the previous meeting. The results of the STAPLEE analysis are displayed below:

Hazard Mitigation Action	STAPLEE Analysis
Continue support for Region 5 HAZMAT and Region 2 Bio-Emergency	21
Continue pipeline safety training and support One Call	21
Generators to provide power for power outages	18
Continue to implement training for environmental health	17
Look at establishing a burn location in DNR	17

Wright County Multi-Jurisdiction Hazard Mitigation Plan

approved the county (centralized or many) to mitigate fires	
Support law enforcement and public health and their bio-emergency/anti-terrorism plans	17
Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards	16
Encourage manure pumping rather than hauling and umbilical cords	15
Prioritize culverts/drainage locations to mitigate flash flooding	15
Establish flood zoning in comprehensive plans	14
Promote getting flood insurance for those in FIRM mapped areas	14
Establish collection centers/winter shelters for people	13
Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems	13
Upgrade signage to 6" letter signs due to federal regulations	13
Strategic flood response plan (dikes, sandbags & placement of bags, etc.)	12
Tornado shelter at the lake for campers (enough for 400-500 people)	12
Development of storm shelters	12
Establish cooling shelters	12
Promote cooling shelters	12
Continue promoting generators at animal sheds	12
Continue promoting fire education	12
Bringing communication capabilities up to narrowband standards	12
Install metal detectors at the court house	11
Coordinate with law enforcement to be present during instances of large crowd gatherings	11
Establish a fan distribution program (through Public Health)	9
Continue analyzing traffic data to decrease the amount of accidents	8
Closing roads on exits out of town during severe winter weather conditions	6
Better measuring devices of flood indicators (electronic)	6
Establish collection center/system for equipment/volunteers	6
Measuring sticks along roads	4
Building winter shelters (for add-ons to establish collection areas	2

The meeting ended at 1:00 pm.

Wright County Multi-Jurisdiction Hazard Mitigation Plan

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
October 25, 2010**

Meeting attended by: Bruce Linder, Bud Young, Linda Klehm, Dennis Bowman, Paul Kirstein, Danny Waid, Adam Clemons, and Stan Watne

Meeting started at 12:00pm

- The hazard mitigation committee reviewed the STAPLEE results and found that they, for the most part, reflected the priority in which the hazard mitigation actions should be taken.
- The hazard mitigation committee then started to work on the *Prioritization and Implementation of Mitigation Actions* worksheet. The work that has been done so far is shown below:

Mitigation Action	Priority	Department/Party Responsible	Existing and Possible Funding Sources	Target Completion Date
Continue support for region 5 HAZMAT and Region 2 Bio-Emergency	I	Supervisors Public Health EMA	Dollar per Capita Grants (Fed & State) FEMA	Ongoing
Continue pipeline safety training and support One Call	I	Secondary Roads Pipeline Utility	Secondary Roads Private Company FEMA	Ongoing
Generators to provide power for power outages	I	Supervisors	Property Tax FEMA	2011
Continue to implement training for environmental health	I	Public Health	Property Tax Grants FEMA	Ongoing
Look at establishing a burn location that's DNR approved in the county (centralized or many) to mitigate fires	I	Landfill Commission	Landfill Commission Tax-based FEMA	2012
Support law enforcement and public health and their bio-emergency/anti-terrorism plans	I	Public Health Sheriffs Dept. EMA	Property Tax Grants Emergency Management FEMA	Ongoing
Continue supporting and promoting Code red and utilize the system to warn citizens of hazards	I	EMA	Public Health Divided Funding (cities, hospitals, county) FEMA	Ongoing
Encourage manure pumping rather than hauling	I	Private Businesses Secondary Roads	Private Businesses FEMA	Ongoing

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Continuous evaluation of drainage structures upon reconstruction of facilities	II	Secondary Roads	Secondary Roads FEMA	Ongoing
Establish flood zoning in the comprehensive plans	I	Planning & Zoning Supervisors	Grants County FEMA	2013
Establish a Manure Pumping Permit policy	I	Secondary Roads County	Fee-assessed FEMA	2011
Promote getting flood insurance for those in FIRM mapped areas	II	Supervisors EMA Insurance Committee	Supervisors (General Budgets) FEMA	2012
Establish collection centers/winter shelters for people	III	Public Health Hospitals Cities EMA	FEMA Supervisors Cities Red Cross	2013
Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems	II	Planning & Zoning Supervisors	Fee-based FEMA	2014
Upgrade signage to 6" letter signs due to federal regulations	III	E911 Department	Sur-charge monies Cities (for own) FEMA	2014

The rest of the worksheet will be filled out at the next meeting.
The meeting ended at 1:00 pm.

**WRIGHT COUNTY HAZARD MITIGATION MEETING MINUTES
October 25, 2010**

Meeting attended by: Paul Schultz, Betty Ellis, Troy Watne, Stan Watne, Danny Bowmen, Bruce Lindon, Paul Kirstein, Dan Waid, and Adam Clemons

Meeting started at 12:00pm

- The hazard mitigation committee finished the work that they had started on the *Prioritization and Implementation of Mitigation Actions* worksheet. The completed worksheet is as follows:

Mitigation Action	Priority	Department/Party Responsible	Existing and Possible Funding Sources	Target Completion Date
Continue support for Region 5 HAZMAT and Region 2 Bio-Emergency	I	Supervisors Public Health EMA	Dollar per Capita Grants (Fed & State) FEMA	Ongoing

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Continue pipeline safety training and support One Call	I	Secondary Roads Pipeline Utility	Secondary Roads Private Company FEMA	Ongoing
Generators to provide power for power outages	I	Supervisors	Property Tax FEMA	2011
Continue to implement training for environmental health	I	Public Health	Property Tax Grants FEMA	Ongoing
Look at establishing a burn location in DNR approved the county (centralized or many) to mitigate fires	I	Landfill Commission	Landfill Commission Tax-based FEMA	Ongoing
Support law enforcement and public health and their bio-emergency/anti-terrorism plans	I	Public Health Sheriffs Dept. EMA	Property Tax Grants Emergency Management FEMA	Ongoing
Continue supporting and promoting Code Red and utilize the system to warn citizens of hazards	I	EMA	Public Health Divided Funding (cities, hospitals, county) FEMA	Ongoing
Encourage manure pumping rather than hauling and umbilical cords	I	Private Businesses Secondary Roads	Secondary Roads FEMA	Ongoing
Continuous evaluation of drainage structures upon reconstruction of facilities	II	Secondary Roads	Secondary Roads FEMA	Ongoing
Establish flood zoning in comprehensive plans	I	Planning & Zoning Supervisors	Grants County FEMA	2013
Establish a Manure Pumping Permit policy	I	Secondary Roads County	Fee-assessed FEMA	2011
Promote getting flood insurance for those in FIRM mapped areas	II	Supervisors EMA Insurance Committee	Supervisors (General Budgets) FEMA	2012
Establish collection centers/winter shelters for people	III	Public Health Hospitals Cities EMA	FEMA Supervisors Cities Red Cross	2013
Establish building codes to recommend getting soil borings to test for expansive soils for rural residential and commercial buildings to mitigate any potential problems	I	Planning & Zoning Supervisors	Fee-based FEMA	2014
Upgrade signage to 6" letter signs due to federal regulations	III	E911 Department	Sur-charge monies Cities (for own) FEMA	2014
Development of a strategic flood response plan (dikes, sandbags, placement of bags, etc.)	I	Emergency Management Public Health Secondary Roads	FEMA County Taxes	Ongoing

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Tornado shelter at the lake for campers	II	Conservation County	State FEMA County	2014
Continue promoting fire education	I	Rural Fire Associations	City & Townships (tax payer dollars)	Ongoing
Bringing communication capabilities up to narrowband standards	I	Fire Departments Secondary Roads Public Health Law Enforcement Emergency Services	Property Tax Sur-Charge FEMA-Fire 911 Grants Tax Payers City	2013
Install metal detectors at the court house	I	Sheriff Department Board of Supervisors	Sheriff Department Jail Revenue	As Needed/Lease
Coordinate with law enforcement to be present during instances of large crowd gatherings	I	Law Enforcement	County	Ongoing
Continue analyzing traffic data to decrease the amount of accidents	I	IDOT Secondary Roads	State County Road-base Tax Fund	Ongoing

The following mitigation actions were removed. The reasons why they were removed are given with each action:

- Development of storm shelters – the building of a structure specifically for the purpose of a storm shelter was seen as unrealistic by the hazard mitigation committee, so it was removed as a hazard mitigation action
- Establish cooling shelters – it was decided that establishing cooling shelters was unnecessary do to the fact that the vast majority of residents have A/C and that the building or establishment of a center expressly for cooling
- Promote cooling shelters – without the cooling shelters as mentioned directly above then there is no need to promote them
- Continue promoting generators at animal sheds – the committee thought that putting generators in animal sheds is something that is already taken care of by the private sector, especially since without generators people would lose large amounts of money when their livestock would die from the heat or cold if the generators failed.
- Establish a fan distribution program (through Public Health) – a member of the hazard mitigation committee, a representative from public health, thought it would be best to remove this hazard mitigation action
- Closing roads on exists out of town during severe winter weather conditions – the hazard mitigation committee discussed this mitigation action at length, but there were several arguments that were made against it. One of which is that whether or not the road is closed or not there are still going to be people that will drive in the storm, or go to less traveled, less clear roads and then get stuck there. The second argument was that if roads are closed on exits out of town, which means that people would be unable to get into town unless there was someone stationed at the exits (which would also put that person at risk). So with many unknowns and uncertainties the hazard mitigation committee decided to remove it from the list than do something that may not work.
- Better measuring devices of flood indicators (electronic) – this mitigation action was brainstormed to help better with flooding issues, however, the hazard mitigation committee later decided this really only helps with river flooding which is already covered by measuring devices. This mitigation action would have no bearing on flash flooding events. Thus the hazard mitigation committee decided to strike it from the list.

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- Establish collection center/system for equipment/volunteers – this mitigation action is already covered by different organizations, and the development of an individual county system may conflict with that which is already in place.
- Measuring sticks along roads – this mitigation action was to allow the secondary roads crew to see how much water was above the road during flash flooding situations. There were hundreds of places along which water flooded over the road this summer. Upon further discussion, the hazard mitigation committee decided that knowing how much water was over the road wasn't very helpful, the fact that there is water over the road is enough.
- Building winter shelters (for add-ons to established collection areas) – with the mitigation action “establish collection center/system for equipment/volunteers” being taken out of the plan this action was no longer seen as necessary. In addition, it wasn't seen as necessary for building multiple winter shelters expressly for the want of shelters.

The hazard mitigation committee then went through Chapter 8: Plan Maintenance and Adoption. That chapter is shown in detail below:

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

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

The primary duty of the Wright County Multi-Jurisdictional hazard Mitigation Committee, in relation to maintaining and updating this plan, is to see that the plan is successfully carried out and report of the Board of Supervisors and make information available to the public, on the status of the plan and the progress of hazard mitigation actions.

The plan will be updated within five years if it is found during the evaluation process that the plan has become outdated. If the plan is not updated within five years, then it will be updated and resubmitted to HSEMD FEMA for approval. The Emergency Management Commission will be responsible for initiating and approving the hazard mitigation plan update process.

Incorporation into Existing Planning Mechanisms

Where possible, Wright County and all incorporated cities will use existing plans and/or programs to implement hazard mitigation actions. Based on the evaluation of the plan by the Wright County Emergency Management Commission, Wright County and all incorporated cities

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will continue to plan and implement programs to reduce the loss of life and property from hazards that affect the community. The mitigation actions in the plan could be incorporated with the following examples of other planning mechanisms:

- Incorporated City Codes
- Wright County Comprehensive Plan
- Wright County Code of Ordinances
- Other plans that could be developed in the future, such as water conservation plans, stormwater management plans, and parks and recreation plans.

Continued Public Involvement

The update process provides an opportunity to publicize success stories from the plan's implementation and seek additional public comment. A public hearing(s) to receive public comment on the plan maintenance and updating will be held during the time that the plan is going through the update process. When the Wright County Emergency Management Commission reconvenes for the update, it will coordinate with all the members participating in the planning process, including those who joined the Wright County Emergency Management Commission after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available posting sources and press releases to local media outlets.

The meeting ended at 1:30 pm.

Section 8: Resolution

RESOLUTION NO. 2013-05

A RESOLUTION OF THE WRIGHT BOARD OF SUPERVISORS ADOPTING A MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR WRIGHT COUNTY, IA.

WHEREAS, the Wright County Board of Supervisors has authorized the development of a Hazard Mitigation Plan for Wright County, Iowa; and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, updates to the plan will be made after plan adoption, as required by IHSEM/FEMA.

NOW THEREFORE BE IT RESOLVED, that the Wright County Board of Supervisors; hereby adopts the Wright County Multi-Jurisdictional Hazard Mitigation Plan contingent upon committee recommendation and City Council adoption by the Cities of Dows, Rowan, Galt, Belmond, Clarion, Goldfield, Eagle Grove, and Woolstock.

PASSED AND ADOPTED this 7th day of January, 2013.



Stan Watne, Chairman

Attest:



Betty Ellis, Auditor

Appendix J: References

<http://www.nws.noaa.gov/>

<http://www.fema.gov>

http://www.zetnet.co.uk/sigs/weather/Met_Codes/beaufort.htm

<http://www.spc.noaa.gov/faq/tornado/beaufort.html>

<http://www.infoplease.com/ipa/A0001374.html>

<http://www.weather.gov/os/windchill/index.shtml>

<http://www.weather.gov/om/heat/index.shtml>

http://en.wikipedia.org/wiki/Heat_Index

<http://water.weather.gov>

<https://programs.iowadnr.gov/hazardousspills/Reports/SpillSummary.aspx>

<http://nld.usace.army.mil/egis/f?p=471:1:>

Appendix K: Glossary of Hazard Mitigation Terms

Acceleration: The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared (9.8 m²). That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.

Anchoring: Special connections made to ensure that a building will not float off, blow off or be pushed off its foundation during a flood or storm.

Asset: Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood: Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.

Base Flood Elevation (BFE): Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.

Basement: Any floor level below grade.

Bedrock: The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Building: A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Community Rating System (CRS): A National Flood Insurance Program (NFIP) that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.

Computer-Aided Design and Drafting (CADD): A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross-section drawings.

Consequences: The damages, injuries, and loss of life, property, environment, and business that can be quantified by some unit of measure, often in economic or financial terms.

Contour: A line of equal ground elevation on a topographic (contour) map.

Critical Facility: Facilities that are critical to the health and welfare of the population and that are especially important during and following hazard events. Critical facilities include shelters, police and fire stations, schools, childcare centers, senior citizen centers, hospitals, disability centers, vehicle and equipment storage facilities, emergency operations centers, and city hall. The term also includes buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities, vulnerable facilities, day care centers, nursing homes, and housing likely to contain occupants who are not very mobile. Other critical city infrastructure such as telephone exchanges and water treatment plants are referred to as lifelines. See Lifelines.

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Crosswalk: The crosswalk is a tool for jurisdictions to use in developing hazard mitigation plans, providing guidance concerning the requirements and recommendations to ensure the plans are in compliance with Section 322 of the Disaster Mitigation Act of 2000. The latest crosswalk should always accompany each plan when submitted to the State and FEMA Region offices. It is then used by the State and FEMA Region plan reviewers in the plan review process of evaluating the plans from local or multi-jurisdiction entities to record comments on whether the plans satisfactorily meet or do not meet the required criteria for approval by FEMA.

Dam Breach Inundation Area: The area flooded by a dam failure or programmed release.

Debris: The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.

Development: Any man-made change to real estate.

Department of Homeland Security (DHS): commonly known in the United States as "Homeland Security", is a Cabinet department of the U.S. federal government with the responsibility of protecting the territory of the U.S. from terrorist attacks and responding to natural disasters. The Department of Homeland Security works in the civilian sphere to protect the United States within, at, and outside its borders. Its goal is to prepare for, prevent, and respond to domestic emergencies, particularly terrorism. On March 1, 2003, DHS absorbed the now defunct United States Immigration and Naturalization Service and assumed its duties. In doing so, it divided the enforcement and services functions into two separate and new agencies – U.S. Immigration and Customs Enforcement and U.S. Citizenship and Immigration Services. The creation of DHS constitutes the biggest reorganization of U.S. government in American history and the most substantial reorganization of federal government agencies since the National Security Act of 1947, which placed the different military departments under a secretary of defense and created the National Security Council and Central Intelligence Agency. DHS also constitutes the most diverse merger of federal functions and responsibilities, incorporating 22 government agencies into a single organization.

Digitize: To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer applications

Duration: How long a hazard event lasts.

Earthquake: A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.

Emergency: Any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other catastrophe in any part of the United States which requires federal emergency assistance to supplement State and local efforts to save lives and protect property, public health and safety, or to avert or lessen the threat of a disaster. Defined in Title V of Public Law 93-288, Section 102(1).

Emergency Operations Center (EOC): A facility that houses communications equipment that is used to coordinate the response to a disaster or emergency.

Emergency Operations Plan (EOP): Sets forth actions to be taken by State or local governments for response to emergencies or major disasters.

Emergency Response Plan: A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

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Extent: The size of an area affected by a hazard or hazard event.

Fault: A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.

Federal Emergency Management Agency (FEMA): An agency of the United States government that helps anticipate, prepare for, and respond to disasters and major civil emergencies. FEMA's main function is to coordinate federal disaster relief activities for natural hazards and terrorist attacks. It coordinates disaster preparedness programs with state and local authorities with nonprofit organizations setup for response. FEMA was created in 1979 by executive order and in 2003, became part of the Department of Homeland Security.

FIPS: Stands for Federal Information Processing Standards. Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the National Institute of Standards and Technology (NIST) for Federal computer systems. These standards and guidelines are issued by NIST as Federal Information Processing Standards (FIPS) for use government-wide. NIST develops FIPS when there are compelling Federal government requirements such as for security and interoperability and there are no acceptable industry standards or solutions.

Fire Potential Index (FPI): Developed by United States Geological Survey (USGS) and United States Forest Service (USFS) to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.

Flash Flood: A flood event occurring with little or no warning where water levels rise at an extremely fast rate.

Flood: A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Depth: Height of the flood water surface above the ground surface.

Flood Elevation: Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.

Flood Hazard Area: The area shown to be inundated by a flood of a given magnitude on a map.

Flood Insurance Rate Map (FIRM): Map of a community, prepared by the Federal Emergency Management Agency, which shows both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study (FIS): A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.

Flood Mitigation Assistance Program (FMA): A planning and project implementation grant program funded by the National Flood Insurance Program. Provides pre-disaster grants to

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State and local governments for both planning and implementation of mitigation strategies. Grant funds are made available from NFIP insurance premiums, and therefore are only available to communities participating in the NFIP.

Flood of Record: The highest known flood level for the area, as recorded in historical documents.

Floodplain: Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Flood proofing: Protective measures added to or incorporated in a building to prevent or minimize flood damage. “Dry flood proofing” measures are designed to keep water from entering a building. “Wet flood proofing” measures minimize damage to a structure and its contents from water that is allowed into a building.

Floodway: The stream channel and that portion of the adjacent floodplain which must remain open to permit conveyance of the base flood. Floodwaters are generally the swiftest and deepest in the floodway. The floodway should remain clear of buildings and impediments to the flow of water.

Freeboard: A margin of safety added to a protection measure to account for waves, debris, miscalculations, lack of scientific data, floodplain fill, or upstream development.

Frequency: A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Fujita Scale of Tornado Intensity: Rates tornadoes with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained. This scale was updated in 2007 to the **Enhanced Fujita Scale**, with changes to the speeds and rating designations. The scale ratings are now referred to as EF0 through EF5.

Functional Downtime: The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.

Geographic Area Impacted: The physical area in which the effects of the hazard are experienced.

Geographic Information System (GIS): A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Ground Motion: The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Hazard: A source of potential danger or adverse condition. An event or physical condition that has the potential to cause fatalities, injuries, property and infrastructure damage, agriculture loss, damage to the environment, interruption of business, or other types of harm or loss. Hazards, as defined in this study, will include naturally occurring events such as floods, dam failures, levee failures, tornadoes, Windstorms, hailstorms, lightning, Severe Winter Storms, extreme heat, drought, expansive soils, urban fires, wildfires

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that strike populated areas, and earthquakes. A natural event is a hazard when it has the potential to harm people or property. For purposes of this study, hazardous materials events are also included.

Hazard Event: A specific occurrence of a particular type of hazard.

Hazard Identification: The process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

Hazard Mitigation: Sustained actions taken to reduce or eliminate long-term risk to human life and property from natural and technological hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 404 of the Stafford Act; a FEMA disaster assistance grant program that funds mitigation projects in conformance with post-disaster mitigation plans required under Section 409 of the Stafford Act. The program is available only after a Presidential disaster declaration.

Hazard Mitigation Plan: The plan resulting from a systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards present in society that includes the actions needed to minimize future vulnerability to hazards. Section 409 of the Stafford Act requires the identification and evaluation of mitigation opportunities, and that all repairs be made to applicable codes and standards, as condition for receiving Federal disaster assistance. Enacted to encourage identification and mitigation of hazards at all levels of government.

Hazard Profile: A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

HAZUS-MH (Hazards U.S. – Multi-Hazards): A GIS-based nationally standardized estimation tool developed by FEMA for losses from the hazard events of earthquake, hurricane winds and flooding. Other hazards, such as, tornadoes, are being considered to be added.

Hydrology: The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

Infrastructure: The public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots, and waterways, canals, locks, and regional dams.

Insurance Service Office, Inc. (ISO): An insurance organization that administers several programs that rate a community's hazard mitigation activities.

Iowa Homeland Security and Emergency Management Division (HSEMD): The Iowa Homeland Security and Emergency Management Division (HSEMD) plans for and responds to both natural and human-caused disasters. The Division helps to coordinate activities before, during and after emergencies through partnerships with local, state, federal and private agencies. The Division's main objectives are to preserve life and reduce the impact of disasters.

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Intensity: A measure of the effects of a hazard event at a particular place.

Landslide: Downward movement of a slope and materials under the force of gravity.

Lifelines: Transportation and utility systems that are essential to the function of a region and to the well being of its inhabitants. Transportation systems include highways, air, rail, and waterways, ports, and harbors. Utility systems include electric power, gas and liquid fuels, telecommunications, water, and wastewater.

Liquefaction: The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Lowest Floor: Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.

Magnitude: A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Mitigation: Sustained action taken to reduce or eliminate the long-term risk to human life and property from natural and technological hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery (Burby, 1998).

National Flood Insurance Program (NFIP): A federal program created by Congress in 1968 that provides the availability of flood insurance to communities in exchange for the adoption and enforcement of a minimum floodplain management ordinance specified in 44 CFR §60.3. The ordinance regulates new and substantially damaged or improved development in identified flood hazard areas.

National Geodetic Vertical Datum of 1929 (NGVD): Datum established in 1929 and used in the NFIP as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.

National Weather Services (NWS): Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.

Planimetric: Describes maps that indicate only man-made features like buildings.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Planning for Post-Disaster Reconstruction: The process of planning (preferably prior to an actual disaster) those steps the community will take to implement long-term reconstruction with one of the primary goals being to reduce or minimize its vulnerability to future disasters. These measures can include a wide variety of land-use planning tools, such as acquisition, design review, zoning, and subdivision review procedures. It can also involve coordination with other types of plans and agencies but is distinct from planning for emergency operations, such as restoration of utility services and basic infrastructure.

Preparedness: Activities to ensure that people are ready for a disaster and respond to it

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effectively. Preparedness requires figuring out what will be done if essential services break down, developing a plan for contingencies, and practicing the plan.

Probability: A statistical measure of the likelihood that a hazard event will occur.

Project Impact: A program that encourages business, government agencies and the public to work together to build disaster-resistant communities.

Reconstruction: The long-term process of rebuilding the community's destroyed or damaged buildings, public facilities, or other structures.

Recovery: The process of restoring normal public or utility services following a disaster, perhaps starting during but extending beyond the emergency period to that point when the vast majority of such services, including electricity, water, communications, and public transportation have resumed normal operations. Recovery activities necessary to rebuild after a disaster include rebuilding homes, businesses and public facilities, clearing debris, repairing roads and bridges, and restoring water, sewer and other essential services. Short-term recovery does not include the reconstruction of the built environment, although reconstruction may commence during this period.

Recurrence Interval: The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Repetitive Loss Property: A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1000 each have been paid within any 10-year period since 1978. While Repetitive Loss Properties constitute only 2% of insured properties, they account for 40% of flood damage claims against the NFIP.

Replacement Value: The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality.

Retrofitting: Modifications to a building or other structure to reduce its susceptibility to damage by a hazard.

Richter Scale: A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure and consequences. Also defined as: "The process of measuring the potential loss of life, personal property, housing, public facilities, equipment, and infrastructure; lost jobs, business earnings, and lost revenues, as well as indirect losses caused by interruption of business and production; and the public cost of planning, preparedness, mitigation, response, and recovery. (Burby, 1998).

Riverine: Of or produced by a river.

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Scale: A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.

Scarp: A steep slope.

Scour: Removal of soil or fill material by the flow of flood waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.

Seismicity: Describes the likelihood of an area being subject to earthquakes.

Special Flood Hazard Area (SFHA): An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.

State Hazard Mitigation Team: Composed of key State agency representatives, the team evaluates hazards, identifies strategies, coordinates resources, and implements measures that will reduce the vulnerability of people and property to damage from hazards. The Oklahoma State Hazard Mitigation Team is convened by the Oklahoma Department of Emergency Management (ODEM), and includes the State departments of Agriculture, Climatological Survey, Commerce, Environmental Quality, Health, Human Services, Insurance, Transportation, Wildlife Conservation, Conservation Commission, Corporation Commission, Historical Society, Insurance Commission, Water Resources Board, Association of County Commissioners (AACCO), Oklahoma Municipal League (OML), Department of Housing and Urban Development (HUD), and the U.S. Army Corps of Engineers (USACE).

State Hazard Mitigation Officer (SHMO): The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Stormwater Management: Efforts to reduce the impact of stormwater or snowmelt runoff on flooding and water quality.

Stormwater Detention: The storing of stormwater runoff for release at a restricted rate after the storm subsides, or the flood crest passes.

Substantial Damage: Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Surface Faulting: The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Tectonic Plate: Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.

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Topographic: Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include man-made features.

Tornado: A violently rotating column of air extending from a thunderstorm to the ground.

Vulnerability: Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment: The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Wildfire: An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Zone: A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Appendix L: Historical Occurrences

Key

Mag = magnitude damage **Dth** = deaths **Inj** = Injuries **PrD** = (\$) property damage **CrD** = (\$) crop

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Multiple Counties in Iowa	1/11/1993	9:00 AM	Snow And Heavy Snow	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	1/20/1993	4:30 AM	Ice Storm	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	2/20/1993	2:00 PM	Heavy Snow	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	1/2/1994	6:00 AM	Snow/heavy Snow	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	1/26/1994	4:00 PM	Snow and Heavy Snow	N/A	0	0	\$ 50,000	\$ -
Much of Northern Iowa	2/22/1994	10:00 AM	Heavy Snow	N/A	0	0	\$ 500,000	\$ -
All of Iowa	2/24/1994	10:00 PM	Ground Blizzard	N/A	0	0	\$ 50,000	\$ -
Southern Iowa	12/6/1994	0	Ice Storm	N/A	0	0	\$ 15,000,000	\$ -
Multiple Counties in Iowa	12/7/1994	6:00 AM	Heavy Snow	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	3/6/1995	9:00 AM	Heavy Snow	N/A	0	0	\$ 25,000	\$ -
Most of Iowa	11/27/1995	5:00 AM	Snow	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	12/8/1995	10:00 AM	Blizzard	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	12/8/1995	2:00 AM	Snow	N/A	0	0	\$ 20,000	\$ -
Multiple Counties in Iowa	1/18/1996	9:00 AM	Blizzard	N/A	1	0	\$ -	\$ -
Multiple Counties in Iowa	1/26/1996	12:00 PM	Blizzard	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	1/26/1996	12:00 AM	Heavy Snow	N/A	2	0	\$ 600,000	\$ -
Multiple Counties in Iowa	1/28/1996	8:00 PM	Blizzard	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	3/24/1996	10:00 PM	Blizzard	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	11/14/1996	4:00 PM	Ice Storm	N/A	0	0	\$ 150,000	\$ -
Multiple Counties in Iowa	1/9/1997	6:30 PM	Blizzard	N/A	0	0	\$ 75,000	\$ -
Wright County	1/9/1997	6:30 PM	Blizzard	N/A	0	0	\$ 75,000	\$ -
Multiple Counties in Iowa	1/15/1997	6:00 PM	Blizzard	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	2/3/1997	2:00 PM	Heavy Snow	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	12/21/1997	2:00 PM	Ice Storm	N/A	0	0	\$ 88,000	\$ -
Multiple Counties in Iowa	1/4/1998	6:30 AM	Ice Storm	N/A	0	0	\$ 1,000,000	\$ -
Multiple Counties in Iowa	3/7/1998	9:00 PM	Heavy Snow	N/A	1	0	\$ 2,000,000	\$ -
Multiple Counties in Iowa	3/17/1998	2:00 AM	Ice Storm	N/A	0	0	\$ 300,000	\$ -
Multiple Counties in Iowa	1/1/1999	3:00 PM	Winter Storm	N/A	2	0	\$ 440,000	\$ -
Multiple Counties in Iowa	1/17/1999	11:00 PM	Blizzard	N/A	0	0	\$ 70,000	\$ -
Wright County	1/17/1999	11:00 PM	Blizzard	N/A	0	0	\$ 70,000	\$ -
Multiple Counties in Iowa	2/11/1999	9:00 AM	Ice Storm	N/A	0	0	\$ 230,000	\$ -
Multiple Counties in Iowa	1/19/2000	7:00 AM	Winter Storm	N/A	0	0	\$ 22,000	\$ -
Multiple Counties in Iowa	2/17/2000	11:00 PM	Winter Storm	N/A	0	0	\$ 280,000	\$ -
Multiple Counties in Iowa	4/7/2000	5:00 AM	Heavy Snow	N/A	0	0	\$ 60,000	\$ -

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Multiple Counties in Iowa	12/10/2000	9:00 PM	Winter Storm	N/A	0	0	\$ 1,300,000	\$ -
Multiple Counties in Iowa	12/16/2000	8:00 AM	Blizzard	N/A	0	0	\$ 1,000,000	\$ -
Multiple Counties in Iowa	12/18/2000	9:00 AM	Blizzard	N/A	0	0	\$ 925,000	\$ -
Multiple Counties in Iowa	12/21/2000	12:00 PM	Blizzard	N/A	0	0	\$ 540,000	\$ -
Multiple Counties in Iowa	12/28/2000	8:00 AM	Heavy Snow	N/A	0	0	\$ 55,000	\$ -
Multiple Counties in Iowa	2/25/2001	3:00 AM	Blizzard	N/A	0	0	\$ 275,000	\$ -
Multiple Counties in Iowa	3/8/2002	4:00 PM	Ice Storm	N/A	0	0	\$ 375,000	\$ -
Multiple Counties in Iowa	3/9/2002	7:00 AM	Blizzard	N/A	0	0	\$ 80,000	\$ -
Multiple Counties in Iowa	3/4/2003	10:00 AM	Heavy Snow	N/A	0	0	\$ 20,000	\$ -
Multiple Counties in Iowa	4/4/2003	8:00 AM	Ice Storm	N/A	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	4/6/2003	3:00 PM	Winter Storm	N/A	0	0	\$ 95,000	\$ -
Multiple Counties in Iowa	12/2/2003	8:00 PM	Heavy Snow	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	2/2/2004	4:00 AM	Heavy Snow	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	1/1/2005	8:00 AM	Ice Storm	N/A	0	0	\$ 75,000	\$ -
Multiple Counties in Iowa	1/4/2005	5:00 PM	Heavy Snow	N/A	0	0	\$ 510,000	\$ -
Multiple Counties in Iowa	1/20/2007	23:00 PM	Heavy Snow	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	2/24/2007	3:00 AM	Winter Storm	N/A	0	0	\$ 250,000	\$ -
Multiple Counties in Iowa	3/1/2007	4:00 AM	Blizzard	N/A	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	12/1/2007	8:00 AM	Ice Storm	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	12/1/2007	8:00 AM	Winter Storm	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	12/8/2008	14:00 PM	Winter Storm	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	12/18/2008	21:30 PM	Winter Storm	N/A	0	0	\$ 5,000	\$ -
Multiple Counties in Iowa	12/20/2008	12:00 PM	Blizzard	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	4/5/2009	5:00 AM	Winter Storm	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	12/8/2009	2:00 AM	Heavy Snow	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	12/9/2009	1:00 AM	Blizzard	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	12/23/2009	16:00 PM	Ice Storm	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	1/6/2010	13:00 PM	Winter Storm	N/A	0	0	\$ 25,000	\$ -
Multiple Counties in Iowa	1/20/2010	6:00 AM	Ice Storm	N/A	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	1/25/2010	9:00 AM	Blizzard	N/A	0	0	\$ 75,000	\$ -
Multiple Counties in Iowa	2/8/2010	7:00 AM	Winter Storm	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	2/8/1993	2230	Freezing Rain	N/A	0	0	\$ 1,000	\$ -
Multiple Counties in Iowa	11/24/1993	9:00 AM	Freezing Rain	N/A	0	0	\$ 5,000	\$ -
Multiple Counties in Iowa	12/1/1993	5:00 AM	Freezing Rain	N/A	0	0	\$ 5,000	\$ -
Multiple Counties in Iowa	1/26/1995	11:00 PM	Freezing Rain	N/A	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	4/10/1995	6:00 AM	Freezing Rain	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	1/28/2003	5:00 AM	Freezing Rain	N/A	0	0	\$ -	\$ -

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Multiple Counties in Iowa	5/1/1995	12:00 AM	Cold and Wet Conditions	N/A	0	0	\$ -	\$ 66,000,000
Wright County	8/1/1995	12:00 AM	Drought	N/A	0	0	\$ -	\$ 5,000,000,000
Multiple Counties in Iowa	8/1/2001	12:00 AM	Drought	N/A	0	0	\$ -	\$ 578,900,000
Multiple Counties in Iowa	8/1/2003	12:00 AM	Drought	N/A	0	0	\$ 645,200	\$ -
Multiple Counties in Iowa	8/5/2001	10:00 AM	Excessive Heat	N/A	1	0	\$ -	\$ -
Multiple Counties in Iowa	7/12/1995	11:00 AM	Heat Wave	N/A	3	0	\$ 3,800,000	\$ -
Multiple Counties in Iowa	2/10/2008	4:00 AM	Cold/wind Chill	N/A	0	0	\$ -	\$ -
All of Iowa	1/14/1994	3:00 AM	Extreme Cold	N/A	1	0	\$ 500,000	\$ -
All of Iowa	1/17/1994	6:00 AM	Extreme Cold	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	12/23/1996	6:00 PM	Extreme Cold	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	9/21/1999	1:00 AM	Extreme Cold	N/A	0	0	\$ -	\$ 15,000,000
All of Iowa	2/10/1995	10:00 PM	Extreme Wind Chill	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	12/8/1995	1:00 PM	Extreme Wind Chill	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	1/18/1996	2:00 AM	Extreme Windchill	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	2/1/1996	4:00 PM	Extreme Windchill	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	1/9/1997	9:00 PM	Extreme Windchill	N/A	0	0	\$ -	\$ -
Multiple Counties in Iowa	1/15/1997	9:00 PM	Extreme Windchill	N/A	0	0	\$ 750,000	\$ -
Multiple Counties in Iowa	6/1/1995	12:00 AM	Excessive Wetness	N/A	0	0	\$ -	\$ 142,000,000
Rowan	6/22/1997	9:30 PM	Flash Flood	N/A	0	0	\$ 100,000	\$ 50,000
Wright County	7/10/2000	12:30 AM	Flash Flood	N/A	0	0	\$ 75,000	\$ 100,000
Eagle Grove	5/21/2004	11:35 PM	Flash Flood	N/A	0	0	\$ 50,000	\$ 20,000
Wright County	6/26/2005	1:45 AM	Flash Flood	N/A	0	0	\$ 50,000	\$ 5,000
Clarion	6/22/2007	3:20 PM	Flash Flood	N/A	0	0	\$ 100,000	\$ 250,000
Eagle Grove	8/19/2007	5:30 PM	Flash Flood	N/A	0	0	\$ 30,000	\$ 5,000
Goldfield	8/28/2007	17:51 PM	Flash Flood	N/A	0	0	\$ 10,000	\$ 10,000
Clarion Apt	5/6/2008	11:30 PM	Flash Flood	N/A	0	0	\$ 25,000	\$ -
Eagle Grove	6/4/2008	10:54 PM	Flash Flood	N/A	0	0	\$ 50,000	\$ -
Goldfield	6/4/2008	22:54 PM	Flash Flood	N/A	0	0	\$ 25,000	\$ -
Clarion Apt	6/8/2008	3:26 AM	Flash Flood	N/A	0	0	\$ 20,000	\$ -
Eagle Grove	6/8/2008	3:26 AM	Flash Flood	N/A	1	0	\$ 25,000	\$ -
Multiple Counties in Iowa	5/7/1993	6:00 PM	Flood	N/A	0	0	\$ 5,000,000	\$ 5,000,000
Multiple Counties in Iowa	8/1/1993	12:00 AM	Flood	N/A	0	0	\$ 500,000	\$ 500,000
Multiple Counties in Iowa	8/14/1993	12:00 AM	Flood	N/A	0	0	\$ 5,000,000	\$ 5,000,000

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Multiple Counties in Iowa	8/16/1993	6:00 AM	Flood	N/A	0	0	\$ 5,000,000	\$ 5,000,000
Multiple Counties in Iowa	8/29/1993	3:00 AM	Flood	N/A	0	0	\$ 5,000,000	\$ 5,000,000
All of Iowa	9/1/1993	12:00 AM	Flood	N/A	0	0	\$ 500,000	\$ 500,000
Multiple Counties in Iowa	6/6/1995	11:00 PM	Flood	N/A	0	0	\$ 50,000	\$ 100,000
Multiple Counties in Iowa	3/9/1997	6:00 AM	Flood	N/A	0	0	\$ 150,000	\$ -
Multiple Counties in Iowa	3/19/1997	12:00 PM	Flood	N/A	0	0	\$ 50,000	\$ -
Multiple Counties in Iowa	6/21/1997	3:00 PM	Flood	N/A	0	0	\$ 60,000	\$ 100,000
Multiple Counties in Iowa	4/6/1999	6:00 PM	Flood	N/A	0	0	\$ 210,000	\$ -
Multiple Counties in Iowa	4/22/1999	6:00 AM	Flood	N/A	0	0	\$ 370,000	\$ -
Multiple Counties in Iowa	5/16/1999	9:00 PM	Flood	N/A	0	0	\$ 7,600,000	\$ 875,000
Multiple Counties in Iowa	5/21/1999	3:00 PM	Flood	N/A	0	0	\$ 1,400,000	\$ 280,000
Multiple Counties in Iowa	6/9/1999	6:00 AM	Flood	N/A	0	0	\$ 1,800,000	\$ 2,700,000
Multiple Counties in Iowa	6/9/2000	6:00 PM	Flood	N/A	0	0	\$ 325,000	\$ 325,000
Multiple Counties in Iowa	6/13/2000	3:00 PM	Flood	N/A	0	0	\$ 220,000	\$ 550,000
Multiple Counties in Iowa	7/10/2000	6:00 AM	Flood	N/A	0	0	\$ 500,000	\$ 250,000
Multiple Counties in Iowa	3/23/2001	6:00 PM	Flood	N/A	0	0	\$ 383,000	\$ -
Multiple Counties in Iowa	4/1/2001	12:00 AM	Flood	N/A	0	0	\$ 65,000	\$ -
Multiple Counties in Iowa	4/7/2001	9:00 PM	Flood	N/A	0	0	\$ 4,700,000	\$ -
Multiple Counties in Iowa	5/1/2001	12:00 AM	Flood	N/A	0	0	\$ 2,000,000	\$ -
Multiple Counties in Iowa	6/12/2001	3:00 PM	Flood	N/A	0	0	\$ 825,000	\$ 1,700,000
Multiple Counties in Iowa	5/4/2003	12:00 PM	Flood	N/A	0	0	\$ 200,000	\$ -
Multiple Counties in Iowa	5/9/2003	6:00 AM	Flood	N/A	0	0	\$ 155,000	\$ -
Multiple Counties in Iowa	6/27/2003	6:00 AM	Flood	N/A	0	0	\$ 75,000	\$ 150,000
Multiple Counties in Iowa	7/5/2003	12:00 PM	Flood	N/A	0	0	\$ 350,000	\$ 550,000
Multiple Counties in Iowa	5/22/2004	6:00 PM	Flood	N/A	0	0	\$ 5,100,000	\$ 15,200,000
Multiple Counties in Iowa	5/13/2005	2:00 AM	Flood	N/A	0	0	\$ 960,000	\$ -
Multiple Counties in Iowa	6/26/2005	12:00 AM	Flood	N/A	0	0	\$ 2,000,000	\$ 1,400,000
Wright County	7/23/2005	9:00 PM	Flood	N/A	0	0	\$ 210,000	\$ 630,000
Multiple Counties in Iowa	7/26/2005	9:00 PM	Flood	N/A	0	0	\$ 210,000	\$ 630,000
Wright County	4/1/2006	12:00 AM	Flood	N/A	0	0	\$ 5,000	\$ -
Central Iowa	10/1/1993	12:00 AM	Flooding	N/A	0	0	\$ 50,000	\$ 50,000
Much of Iowa	2/19/1994	6:00 AM	Flooding	N/A	0	0	\$ 500,000	\$ -
Much of Iowa	3/3/1994	12:00pm	Flooding	N/A	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	6/13/1994	4:00 AM	Flooding	N/A	0	0	\$ 500,000	\$ 500,000
Multiple Counties in Iowa	6/22/1994	11:30 PM	Flooding	N/A	0	0	\$ 500,000	\$ 500,000
Much of Northern Iowa	7/15/1994	3:00 AM	Flooding	N/A	0	0	\$ 50,000	\$ 500,000
Multiple Counties in Iowa	5/27/1995	9:00 PM	Flooding	N/A	0	0	\$ 100,000	\$ 10,000
Multiple Counties in Iowa	2/21/1995	12:00 PM	Ice Jam Flooding	N/A	0	0	\$ 10,000	\$ -
Multiple Counties in Iowa	3/22/1993	6:00 AM	Major Flood	N/A	0	0	\$ 50,000,000	\$ -

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Multiple Counties in Iowa	4/1/1993	0	Major Flood	N/A	0	0	50.0M	\$ -
Wright County	4/1/1993	12:00 AM	Major Flood	N/A	0	0	\$ 50,000,000	\$ -
Multiple Counties in Iowa	4/20/1993	6:00 AM	Major Flood	N/A	0	0	\$ 5,000,000	\$ -
Wright County	6/12/1994	9:15 PM	Urban Flooding	N/A	0	0	\$ 50,000	\$ 5,000
Clarion	6/20/1998	2:00 PM	Urban/Small Stream Flood	N/A	0	0	\$ 75,000	\$ 10,000
Clarion	6/29/1998	12:00 PM	Urban/Small Stream Flood	N/A	0	0	\$ 50,000	\$ 10,000
Multiple Counties in Iowa	9/14/1996	2:00 AM	Early Frost	N/A	0	0	\$ -	\$ 42,000,000
Much of Northern Iowa	10/2/1993	2:00 AM	Frost	N/A	0	0	\$ -	\$ 500,000
Multiple Counties in Iowa	5/13/1997	12:00 AM	Frost/freeze	N/A	0	0	\$ 1,000,000	\$ 100,000
Multiple Counties in Iowa	10/10/2009	2:00 AM	Frost/freeze	N/A	0	0	\$ -	\$ 3,000,000
Most of Iowa	9/21/1995	11:00 PM	Freeze	N/A	0	0	\$ -	\$ 200,000,000
Multiple Counties in Iowa	5/1/1996	12:00 AM	Unseasonable Cold	N/A	0	0	\$ -	\$ 5,100,000
Wright County	5/5/1965	5:00 PM	Hail	1.50 in	0	0	\$ -	\$ -
Wright County	5/7/1965	5:00 PM	Hail	4.00 in	0	0	\$ -	\$ -
Wright County	6/21/1974	11:50 PM	Hail	2.75 in	0	0	\$ -	\$ -
Wright County	6/13/1976	3:05 PM	Hail	1.75 in	0	0	\$ -	\$ -
Wright County	8/7/1977	5:40 PM	Hail	1.75 in	0	0	\$ -	\$ -
Wright County	4/3/1978	7:00 PM	Hail	1.25 in	0	0	\$ -	\$ -
Wright County	6/15/1978	12:53 AM	Hail	0.75 in	0	0	\$ -	\$ -
Wright County	6/6/1980	3:55 PM	Hail	1.75 in	0	0	\$ -	\$ -
Wright County	4/3/1981	4:30 PM	Hail	0.75 in	0	0	\$ -	\$ -
Wright County	9/19/1983	4:00 PM	Hail	1.75 in	0	0	\$ -	\$ -
Wright County	8/6/1985	3:20 PM	Hail	1.50 in	0	0	\$ -	\$ -
Wright County	9/26/1986	5:30 PM	Hail	1.50 in	0	0	\$ -	\$ -
Wright County	7/11/1987	7:30 PM	Hail	1.75 in	0	0	\$ -	\$ -
Wright County	8/26/1990	5:47 AM	Hail	0.75 in	0	0	\$ -	\$ -
Wright County	5/14/1991	4:15 PM	Hail	0.75 in	0	0	\$ -	\$ -
Wright County	10/23/1991	6:57 PM	Hail	0.75 in.	0	0	\$ -	\$ -
Wright County	5/5/1995	5:00 PM	Hail	1.50 in	0	0	\$ -	\$ -
Dows	5/13/1995	1:45 PM	Hail	1.75 in.	0	0	\$ 75,000	\$ -
Goldfield	5/13/1995	12:55 PM	Hail	2.00 in.	0	0	\$ 10,000	\$ -
Goldfield	5/13/1995	12:58 PM	Hail	1.00 in.	0	0	\$ 5,000	\$ -
Belmond	7/8/1995	8:50 PM	Hail	1.75 in	0	0	\$ 5,000	\$ 5,000
Clarion	5/17/1996	11:00 PM	Hail	1.75 in	0	0	\$ 10,000	\$ -
Rowan	5/17/1996	11:14 PM	Hail	1.25 in.	0	0	\$ 10,000	\$ -
Belmond	6/15/1997	8:53 PM	Hail	1.00 in	0	0	\$ 5,000	\$ 20,000

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Clarion	6/20/1997	4:30 AM	Hail	0.75 in	0	0	\$ -	\$ 5,000
Eagle Grove	6/20/1997	9:12 PM	Hail	1.75 in	0	0	\$ 15,000	\$ 90,000
Belmond	6/22/1997	8:05 PM	Hail	0.75 in	0	0	\$ -	\$ 5,000
Belmond	5/15/1998	1:30 PM	Hail	0.75 in	0	0	\$ -	\$ 5,000
Clarion	8/24/1998	7:55 AM	Hail	1.00 in	0	0	\$ 2,000	\$ 40,000
Clarion	8/24/1998	8:50 AM	Hail	2.75 in	0	0	\$ 25,000	\$ 100,000
Rowan	8/24/1998	8:12 AM	Hail	1.75 in.	0	0	\$ 5,000	\$ 25,000
Clarion	9/26/1998	6:03 AM	Hail	0.75 in	0	0	\$ -	\$ 1,000
Eagle Grove	5/16/1999	10:29 AM	Hail	1.00 in	0	0	\$ 5,000	\$ -
Rowan	5/16/1999	11:03 AM	Hail	1.25 in.	0	0	\$ 5,000	\$ -
Woolstock	5/16/1999	10:45 AM	Hail	0.75 in.	0	0	\$ 1,000	\$ -
Goldfield	6/8/1999	5:35 PM	Hail	0.75 in.	0	0	\$ -	\$ 5,000
Eagle Grove	6/13/2000	1:10 PM	Hail	0.88 in	0	0	\$ -	\$ 5,000
Eagle Grove	9/13/2000	8:30 PM	Hail	1.50 in	0	0	\$ 25,000	\$ 20,000
Eagle Grove	9/13/2000	9:15 PM	Hail	1.00 in	0	0	\$ 3,000	\$ 10,000
Goldfield	9/13/2000	8:20 PM	Hail	1.00 in.	0	0	\$ 3,000	\$ 10,000
Belmond	6/1/2001	12:35 PM	Hail	3.00 in	0	0	\$ 150,000	\$ 10,000
Belmond	6/1/2001	12:40 PM	Hail	1.00 in	0	0	\$ 5,000	\$ 5,000
Clarion	9/20/2001	3:30 PM	Hail	1.00 in	0	0	\$ 5,000	\$ 2,000
Goldfield	9/20/2001	3:17 PM	Hail	1.75 in.	0	0	\$ 10,000	\$ 10,000
Eagle Grove	6/19/2002	1:00 AM	Hail	0.88 in	0	0	\$ 3,000	\$ 5,000
Eagle Grove	6/19/2002	1:00 AM	Hail	1.75 in	0	0	\$ 50,000	\$ 5,000
Clarion	8/17/2002	2:37 AM	Hail	0.75 in	0	0	\$ -	\$ 5,000
Belmond	5/8/2004	5:10 AM	Hail	1.00 in	0	0	\$ 5,000	\$ 2,000
Dows	5/8/2004	6:24 PM	Hail	0.88 in.	0	0	\$ 2,000	\$ 5,000
Clarion	5/21/2004	6:35 PM	Hail	0.88 in	0	0	\$ 1,000	\$ 5,000
Dows	8/16/2004	8:13 PM	Hail	0.88 in.	0	0	\$ 2,000	\$ 5,000
Eagle Grove	4/13/2006	5:26 PM	Hail	0.88 in	0	0	\$ 2,000	\$ -
Eagle Grove	5/8/2006	8:05 PM	Hail	1.75 in	0	0	\$ 10,000	\$ 5,000
Eagle Grove	8/20/2007	9:42 PM	Hail	1.00 in	0	0	\$ 5,000	\$ -
Dows	4/24/2008	7:44 PM	Hail	1.75 in.	0	0	\$ 10,000	\$ -
Dows	5/25/2008	3:05 PM	Hail	0.88 in.	0	0	\$ 2,000	\$ -
Multiple Counties in Iowa	1/17/1996	9:00 PM	High Wind	63 mph	0	0	\$ 250,000	\$ -
Multiple Counties in Iowa	2/10/1996	12:00 PM	High Wind	64 mph	0	0	\$ 350,000	\$ -
Multiple Counties in Iowa	3/24/1996	5:00 PM	High Wind	62 mph	0	0	\$ 300,000	\$ -
Wright County	4/22/1996	9:30 AM	High Wind	68 mph	0	0	\$ 750,000	\$ -
Multiple Counties in Iowa	4/25/1996	9:30 AM	High Wind	68 mph	0	0	\$ 750,000	\$ -
Multiple Counties in Iowa	10/29/1996	11:00 AM	High Wind	66 mph	0	0	\$ 500,000	\$ 100,000

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Multiple Counties in Iowa	4/6/1997	9:00 AM	High Wind	55 kts.	0	0	\$ 1,800,000	\$ -
Multiple Counties in Iowa	5/5/1997	12:30 PM	High Wind	60 mph	0	1	\$ 75,000	\$ -
Multiple Counties in Iowa	4/12/1998	8:00 AM	High Wind	54 kts.	0	0	\$ 2,600,000	\$ -
Multiple Counties in Iowa	11/10/1998	2:00 AM	High Wind	70 mph	1	0	\$ 17,300,000	\$ 260,000
Multiple Counties in Iowa	3/17/1999	12:00 PM	High Wind	58 mph	0	0	\$ 890,000	\$ -
Multiple Counties in Iowa	5/10/1999	5:00 PM	High Wind	70 mph	0	1	\$ 640,000	\$ -
Multiple Counties in Iowa	4/5/2000	12:30 PM	High Wind	55 kts.	0	0	\$ 700,000	\$ -
Multiple Counties in Iowa	4/7/2001	4:00 AM	High Wind	72 kts.	0	4	\$ 3,200,000	\$ -
Multiple Counties in Iowa	3/9/2002	6:00 AM	High Wind	54 kts.	0	0	\$ 2,600,000	\$ -
Multiple Counties in Iowa	5/11/2002	10:30 AM	High Wind	51 kts.	0	0	\$ 1,400,000	\$ -
Multiple Counties in Iowa	2/11/2003	1:15 PM	High Wind	65 kts.	0	0	\$ 257,000	\$ -
Multiple Counties in Iowa	5/30/2003	2:00 PM	High Wind	50 kts.	1	0	\$ 700,000	\$ -
Multiple Counties in Iowa	11/12/2003	9:00 AM	High Wind	63 mph	0	2	\$ 2,600,000	\$ -
Multiple Counties in Iowa	3/20/2004	12:30 PM	High Wind	58 mph	0	0	\$ 350,000	\$ -
Multiple Counties in Iowa	4/18/2004	3:10 PM	High Wind	66mph	0	0	\$ 3,600,000	\$ -
Multiple Counties in Iowa	4/27/2004	12:30 PM	High Wind	64mph	0	0	\$ 3,500,000	\$ -
Multiple Counties in Iowa	5/24/2004	5:30 PM	High Wind	63 mph	0	0	\$ 325,000	\$ -
Multiple Counties in Iowa	12/12/2004	10:00 AM	High Wind	64 mph	0	0	\$ 1,400,000	\$ -
Multiple Counties in Iowa	1/22/2005	12:15 AM	High Wind	64 mph	0	0	\$ 440,000	\$ -
Multiple Counties in Iowa	5/12/2005	9:30 AM	High Wind	71 mph	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	11/12/2005	6:00 PM	High Wind	57 kts.	0	0	\$ 2,000,000	\$ -
Multiple Counties in Iowa	11/15/2005	7:00 PM	High Wind	58 mph	0	0	\$ 510,000	\$ -
Multiple Counties in Iowa	1/24/2006	9:30 AM	High Wind	69 mph	0	2	\$ 550,000	\$ -
Multiple Counties in Iowa	5/6/2007	4:30 AM	High Wind	64 mph	0	0	\$ 25,000	\$ -
Multiple Counties in Iowa	10/26/2008	9:30 AM	High Wind	60 mph	0	0	\$ 25,000	\$ 25,000
Multiple Counties in Iowa	2/9/2009	18:00 PM	High Wind	57 mph	0	0	\$ 30,000	\$ -
Multiple Counties in Iowa	3/9/1993	10:30 PM	High Winds	0 mph	0	0	\$ 500,000	\$ -
Multiple Counties in Iowa	4/19/1993	11:00 AM	High Winds	0 mph	0	0	\$ 50,000	\$ -
All of Iowa	4/14/1994	10:00 PM	High Winds	0 mph	0	0	\$ 500,000	\$ -
Most of Iowa	4/26/1994	9:00 AM	High Winds	0 mph	0	3	\$ 5,000,000	\$ -
Multiple Counties in Iowa	11/17/1994	5:00 AM	High Winds	0 mph	0	0	\$ 150,000	\$ -
Multiple Counties in Iowa	11/18/1994	2:30 AM	High Winds	0 mph	0	0	\$ 200,000	\$ -
Wright County	2/10/1995	12:00 AM	High Winds	0	0	0	\$ 100,000	\$ -
Multiple Counties in Iowa	4/3/1995	1:00 PM	High Winds	0 mph	0	0	\$ 125,000	\$ -
Multiple Counties in Iowa	4/18/1995	7:00 AM	High Winds	0 mph	0	0	\$ 500,000	\$ -
Wright County	7/7/1956	11:00 AM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	6/18/1973	2:45 AM	Tstm Wind	71 mph	0	0	\$ -	\$ -
Wright County	6/21/1974	11:50 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -

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Wright County	8/24/1975	7:35 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	7/14/1977	5:15 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	4/17/1978	1:40 PM	Tstm Wind	64 mph	0	0	\$ -	\$ -
Wright County	4/17/1978	1:45 PM	Tstm Wind	80 mph	0	0	\$ -	\$ -
Wright County	4/17/1978	1:50 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	4/17/1978	2:00 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	6/26/1979	9:45 PM	Tstm Wind	60 mph	0	0	\$ -	\$ -
Wright County	7/26/1979	7:03 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	7/3/1983	3:00 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	6/22/1984	5:15 PM	Tstm Wind	62 mph	0	0	\$ -	\$ -
Wright County	6/22/1984	6:50 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	9/5/1985	3:00 AM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	11/7/1986	11:20 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	9/14/1987	4:06 PM	Tstm Wind	69 mph	0	0	\$ -	\$ -
Wright County	4/22/1989	9:30 AM	Tstm Wind	75 mph	0	0	\$ -	\$ -
Wright County	5/23/1989	10:20 PM	Tstm Wind	58 mph	0	0	\$ -	\$ -
Wright County	6/28/1990	11:25 AM	Tstm Wind	64 mph	0	0	\$ -	\$ -
Wright County	6/28/1990	10:34 PM	Tstm Wind	58 mph	0	0	\$ -	\$ -
Wright County	4/29/1991	1:40 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	4/29/1991	1:45 PM	Tstm Wind	58 mph	0	0	\$ -	\$ -
Wright County	4/29/1991	1:55 PM	Tstm Wind	0 mph	0	0	\$ -	\$ -
Wright County	6/19/1991	5:00 PM	Tstm Wind	92 mph	0	0	\$ -	\$ -
Wright County	4/15/1992	3:40 PM	Tstm Wind	70 mph	0	0	\$ -	\$ -
Wright County	5/16/1992	4:18 PM	Tstm Wind	70 mph	0	0	\$ -	\$ -
Wright County	10/6/1994	9:01 PM	Tstm Wind	58 mph	0	0	\$ 2,000	\$ 50,000
Belmond	6/15/1997	8:35 PM	Tstm Wind	60 mph	0	0	\$ 10,000	\$ -
Dows	6/20/1997	10:00 PM	Tstm Wind	79 mph	0	0	\$ 50,000	\$ 5,000
Belmond	5/15/1998	3:10 PM	Tstm Wind	64 mph	0	0	\$ 5,000	\$ -
Clarion Arpt	5/15/1998	2:38 PM	Tstm Wind	58 mph	0	0	\$ 1,000	\$ -
Belmond	6/27/1998	9:23 PM	Tstm Wind	70 mph	0	0	\$ 15,000	\$ 1,000
Belmond	7/15/1998	12:55 AM	Tstm Wind	70 mph	0	0	\$ 30,000	\$ 15,000
Belmond	7/15/1998	1:08 AM	Tstm Wind	59 mph	0	0	\$ 3,000	\$ -
Clarion Arpt	7/15/1998	1:05 AM	Tstm Wind	69 mph	0	0	\$ 5,000	\$ 1,000
Eagle Grove	6/5/1999	8:25 PM	Tstm Wind	65 kts	0	0	\$ 30,000	\$ -
Eagle Grove	5/31/2000	8:05 AM	Tstm Wind	52 kts	0	0	\$ 10,000	\$ -
Dows	7/10/2000	12:15 AM	Tstm Wind	60 mph	0	0	\$ 5,000	\$ -
Clarion	6/18/2001	8:15 PM	Tstm Wind	58 mph	0	0	\$ 2,000	\$ -
Clarion	6/11/2002	12:20 AM	Tstm Wind	70 mph	0	0	\$ 10,000	\$ -
Eagle Grove	6/11/2002	12:10 AM	Tstm Wind	56 kts	0	0	\$ 15,000	\$ -

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Belmond	7/4/2003	12:50 AM	Tstm Wind	64 mph	0	0	\$ 15,000	\$ -
Dows	7/5/2003	12:30 AM	Tstm Wind	70 mph	0	0	\$ 5,000	\$ -
Clarion	5/21/2004	6:30 PM	Tstm Wind	60 mph	0	0	\$ 2,000	\$ -
Dows	5/21/2004	7:05 PM	Tstm Wind	66 mph	0	0	\$ 10,000	\$ -
Clarion	6/11/2004	6:15 PM	Tstm Wind	58 mph	0	0	\$ -	\$ -
Clarion	6/16/2004	2:20 PM	Tstm Wind	60 mph	0	0	\$ 5,000	\$ -
Dows	6/29/2005	8:05 PM	Tstm Wind	57 mph	0	0	\$ 2,000	\$ -
Dows	3/30/2006	7:00 PM	Tstm Wind	66 mph	0	0	\$ 10,000	\$ -
Goldfield	9/8/2006	6:05 PM	Tstm Wind	57 kts.	0	0	\$ 5,000	\$ 2,000
Clarion Apt	6/23/2009	1:38 PM	Tstm Wind	69 mph	0	0	\$ 2,000	\$ -
Woolstock	8/10/1995	12:00 AM	Tstm Winds	50 kts.	0	0	\$ 10,000	\$ 1,000
Belmond	5/15/1998	3:05 PM	Lighting	N/A	0	1	\$ 2,000	\$ -
Belmond	3/25/2004	3:00 PM	Lighting	N/A	0	0	\$ 20,000	\$ -
Eagle Grove	6/19/1994	4:30 PM	Lightning	N/A	1	1	\$ -	\$ -
Clarion	8/3/1994	10:35 AM	Lightning	N/A	0	0	\$ 50,000	\$ -
Goldfield	6/15/2008	1:00 AM	Thunderstorm Wind	57 kts.	0	0	\$ 15,000	\$ -
Belmond	7/19/2008	5:49 PM	Thunderstorm Wind	66 mph	0	0	\$ 15,000	\$ -
Rowan	6/23/2009	1:45 PM	Thunderstorm Wind	60 mph	0	0	\$ 2,000	\$ -
Eagle Grove	6/23/1995	7:10 PM	Thunderstorm Winds	50 kts	0	0	\$ 10,000	\$ -
Eagle Grove	7/18/2007	4:16 PM	Thunderstorm Winds	52 kts	0	0	\$ 5,000	\$ -
Eagle Grove	8/21/2007	8:10 PM	Thunderstorm Winds	57 kts	0	0	\$ 10,000	\$ -
Eagle Grove	6/15/2008	1:05 AM	Thunderstorm Winds	57 kts	0	0	\$ 15,000	\$ -
Rowan	7/8/1995	12:00 AM	Funnel Cloud	N/A	0	0	\$ -	\$ -
Wright County	4/26/1964	11:30 PM	Tornado	F2	0	0	\$ 25,000	\$ -
Wright County	10/14/1966	1:55 PM	Tornado	F5	6	172	\$ 25,000,000	\$ -
Wright County	6/24/1968	6:00 PM	Tornado	F1	0	0	\$ 3,000	\$ -
Wright County	9/12/1972	6:31 PM	Tornado	F1	0	0	\$ 25,000	\$ -
Wright County	9/26/1973	2:40 AM	Tornado	F2	0	0	\$ 25,000	\$ -
Wright County	5/30/1974	5:30 PM	Tornado	F0	0	0	\$ -	\$ -
Wright County	6/15/1978	12:01 AM	Tornado	F0	0	0	\$ -	\$ -
Wright County	6/28/1979	6:55 PM	Tornado	F1	0	0	\$ 250,000	\$ -
Wright County	7/13/1979	6:15 PM	Tornado	F1	0	0	\$ 25,000	\$ -
Wright County	6/16/1984	4:43 PM	Tornado	F1	0	0	\$ 25,000	\$ -
Wright County	6/12/1990	6:40 PM	Tornado	F0	0	0	\$ 25,000	\$ -
Wright County	6/29/1990	6:41 PM	Tornado	F0	0	0	\$ 3,000	\$ -
Wright County	6/29/1990	6:45 PM	Tornado	F1	0	0	\$ 3,000	\$ -
Wright County	5/17/1991	1:18 PM	Tornado	F2	0	0	\$ 25,000	\$ -
Wright County	5/17/1991	3:52 PM	Tornado	F0	0	0	\$ 3,000	\$ -

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Belmond	6/18/1994	5:10 PM	Tornado	F0	0	0	\$ 1,000	\$ -
Eagle Grove	5/15/1998	2:58 PM	Tornado	F1	0	0	\$ 50,000	\$ 1,000
Belmond	6/6/1999	3:19 PM	Tornado	F0	0	0	\$ -	\$ -
Clarion	6/6/1999	3:10 PM	Tornado	F0	0	0	\$ -	\$ -
Goldfield	6/8/1999	5:09 PM	Tornado	F0	0	0	\$ -	\$ -
Clarion	5/21/2004	6:30 PM	Tornado	F0	0	0	\$ -	\$ -
Dows	3/30/2005	1:15 PM	Tornado	F1	0	0	\$ 30,000	\$ -
TOTAL					21	187	\$ 279,818,200	\$ 6,101,936,000

Appendix M: Repetitive Loss Properties

According to Mathew Noble with Iowa Homeland Security and Emergency Management there are no repetitive loss properties in Wright County, Iowa.

Appendix N: Plan Updates

For all communities the 2004 plans were not FEMA approved plans but plans approved by the State of Iowa. All plans were reviewed in developing the Wright County Multi-Jurisdiction Plan however all sections of the plans had to be updated.

The Belmond and Eagle Grove Mitigation Plans were approved by FEMA in 2009. These plans were brought over to be part of the Wright County Multi-Jurisdiction Plan however only the Mitigation Actions were updated.

There have been no substantial residential, commercial or industrial expansion to Belmond or Eagle Grove that would cause their mitigation goals and priorities to change since the adoption of their previous plan in 2009.

Belmond and Eagle Groves goals remained the same from their 2009 plan. Every jurisdiction adopted their own goals and did not take theirs from the Belmond or Eagle Grove Plan.

Below is the of the mitigation actions that are ongoing or have been completed from previous plans.

Public Entity	Mitigation Action	Status
Belmond	Continue participating in the NFIP	Ongoing
	Further training on how to handle pipeline incidents	Ongoing
	Build communications between neighboring cities/counties	Ongoing
	Series of river gauges	Complete
	Investigate shelter locations	Ongoing
	Designate shelters	Ongoing
	Promote Code Red	Ongoing
	More public education and awareness	Ongoing
	Work with Alliant energy to mitigate energy disruption	Ongoing
	Manhole rehabilitation in all flood-prone areas	Complete
	Lightning protection	Complete
	Debris removal from river	Complete
	Smoke detectors & fire extinguisher program	Ongoing
	Upgrade outdoor warning system	Complete
	Upgrade of walkie-talkie system	Complete
	Analyze how to increase communication between City & emergency staff	Complete
	Further flood analysis and building of any recommended projects	Ongoing
	Building of tornado safe room	Ongoing
Clarion	Encourage use of and educate citizens on NOAA weather radio warning system	Complete
	Improve public awareness/hazard safety education of public via improved communication methods, including the internet	Complete
	Join the Iowa Mutual Aid Compact Agreement	Complete

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	Conduct an analysis of storm water and sewer system	Complete
	Continue to expand HAZMAT/Chemical Incident training for emergency responders	Complete
	Increase public awareness of HAZMAT sites, risks and dangers of chemicals found in “meth labs” and dumpsites	Complete
	Apply for grant monies to better prepare emergency responders of how to handle terrorist incidents	Had training did not apply for funds
	Increase spotter training with local authorities	Complete
Dows	Purchase and educate the public on the use of weather radios	Complete
	Establish emergency response “triage” centers at schools/churches	Complete
	Continue education and training for Hazardous materials emergency responders	Complete
Eagle Grove	Separating storm & sanitary sewer, eliminating connections	Ongoing
	Identify, pinpoint, and fix I/I sources	Ongoing
	Pursue ordinance to address inflow/outflow	Complete
	Continue all mitigation activities/ordinances	Ongoing
	Continue participating in the NFIP	Ongoing
	Replace and/or repair both generators at water and sanitary plants	Complete
	Improve or update warning sirens	Complete
	Additional tornado sirens	Complete
	Educational assistance to homeowners to prevent/mitigate flooded basements	Ongoing
	Continue monitoring current industrial discharges	Ongoing
	Promotion and disposing safely of hazardous chemicals and toxic waste	Ongoing
	Equipment purchases and training, to deal with hazardous materials for fire department	Ongoing
Galt	Continue education and training for Hazardous Materials emergency responders	No longer have a fire department contract out
	Establish recruitment efforts for fire departments	No longer have a fire department contract out
Goldfield	Encourage and educate the public on the use of weather radios	Ongoing
	Establish emergency response “triage” centers at schools/churches	Complete
	Continue education and training for hazardous materials emergency responders	Ongoing
	Continue efforts of the fire department to identify areas where dry hydrants are needed and pursue funding to construct	Ongoing
	Hold training drills for aircraft accident/crafts every 4-5 years	Ongoing
Rowan	Encourage the use of weather radios and educate the public on their use	Complete
Woolstock	Encourage the use of weather radios and educate the public on their use	Complete
	Identify locations suitable as “triage” centers in the event of a tornado	Ongoing
	Continue education and training for Hazardous Materials emergency responders	Ongoing
	County anti-terrorism committee education of the public	Complete

Appendix O: USACE National Levee Database List of Levees within 75 miles of Clarion in Wright County

FEMA	Region(s)	State(s)	County(ies)	System Name	Length (Miles)	Inspection Date	Inspection Rating	Authorization Category	Corps Program	Risk Assignment	Leveed Area Type	Leveed Area Acreage
	Region 7	Iowa	Black Hawk County	Cedar Falls, IA	1.09	16-May-12	MINIMALLY	USACE	Fe Yes	No	Urban	71.38
	Region 7	Iowa	Polk County	Des Moines, IA & SE DM - SW	10.19	-	-	USACE	Fe Yes	No	-	3,532.71
	Region 7	Iowa	Polk County	Des Moines, IA - DM II - RDB Des	3.14	27-Apr-10	MINIMALLY	USACE	Fe Yes	No	Urban	749.26
	Region 7	Iowa	Polk County	West Des Moines & Des Moines,	4.27	3-Apr-12	MINIMALLY	USACE	Fe Yes	No	Urban	857.53
	Region 7	Iowa	Marshall County	Marshalltown, IA - RDB Iowa	5.51	30-Apr-12	MINIMALLY	USACE	Fe Yes	No	Urban	1,014.12
	Region 7	Iowa	Marshall County	Marshalltown, IA - RDB Linn	2.32	3-May-12	MINIMALLY	USACE	Fe Yes	No	Urban	272.63
	Region 7	Iowa	Marshall County	Marshalltown, IA - RDB Linn	1.28	3-May-12	MINIMALLY	USACE	Fe Yes	No	Urban	74.55
	Region 7	Iowa	Tama County	Tama, IA	2.71	20-Mar-12	MINIMALLY	USACE	Fe Yes	No	Urban	498.89
	Region 7	Iowa	Black Hawk County	Waterloo, IA - RDB Cedar River /	4.61	15-May-12	UNACCEPT	USACE	Fe Yes	No	Urban	811.92
	Region 7	Iowa	Black Hawk County	Waterloo, IA - RDB Cedar River /	6.41	16-May-12	UNACCEPT	USACE	Fe Yes	No	Urban	899.3
	Region 7	Iowa	Black Hawk County	Waterloo & Evansdale, IA - LDB	11.39	5-May-10	UNACCEPT	USACE	Fe Yes	No	Urban	3,485.06
	Region 7	Iowa	Black Hawk County	Waterloo, IA - Waste Water	1.08	5-May-10	UNACCEPT	USACE	Fe Yes	No	Urban	53.28
	Region 7	Iowa	Black Hawk County	Waterloo, IA - Virden Creek Dry	0.58	-	-	USACE	Fe Yes	No	Urban	485.67

Source: US Army Corps of Engineers National Levee Database

Appendix P: County Resolution Adopting Final Plan

RESOLUTION NO. 2013-05

A RESOLUTION OF THE WRIGHT BOARD OF SUPERVISORS ADOPTING A MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN FOR WRIGHT COUNTY, IA.

WHEREAS, the Wright County Board of Supervisors has authorized the development of a Hazard Mitigation Plan for Wright County, Iowa; and,

WHEREAS, this plan will be the guidance regarding future mitigation actions; and,

WHEREAS, updates to the plan will be made after plan adoption, as required by IHSEM/FEMA.

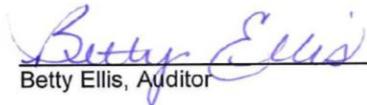
NOW THEREFORE BE IT RESOLVED, that the Wright County Board of Supervisors; hereby adopts the Wright County Multi-Jurisdictional Hazard Mitigation Plan contingent upon committee recommendation and City Council adoption by the Cities of Dows, Rowan, Galt, Belmond, Clarion, Goldfield, Eagle Grove, and Woolstock.

PASSED AND ADOPTED this 7th day of January, 2013.



Stan Watne, Chairman

Attest:



Betty Ellis, Auditor