



Pottawattamie County, Iowa

Countywide Multi-Jurisdictional Pre-Disaster Mitigation Plan



Prepared by:

Pottawattamie County Pre-Disaster
Mitigation Planning Committee

Incorporated Municipalities of
Pottawattamie County

Pottawattamie County
Emergency Management Agency

Omaha-Council Bluffs
Metropolitan Area Planning Agency



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**POTTAWATTAMIE COUNTYWIDE
MULTI-JURISDICTIONAL
PRE-DISASTER MITIGATION PLAN**

Pottawattamie County, Iowa

2013

Prepared by:

**Pottawattamie Countywide Hazard Mitigation Planning Committee
Incorporated Municipalities of Pottawattamie County
Pottawattamie County Emergency Management Agency
&
Omaha-Council Bluffs Metropolitan Area Planning Agency**

The Omaha-Council Bluffs Metropolitan Area Planning Agency, in coordination with the Pottawattamie County Emergency Management Agency, prepared the Countywide Multi-Jurisdictional Pre-Disaster Mitigation Plan for Pottawattamie County, Iowa, with direction and assistance from the Pottawattamie Countywide Hazard Mitigation Planning Committee. Participation and cooperation to complete this project was provided by the following groups and persons:

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TABLE OF CONTENTS

Section	Page
I. Executive Summary	1
II. Purpose and Process of the Countywide Pre-Disaster Mitigation Plan.....	2
III. Community Profile Information – Pottawattamie County	4
History	4
Government.....	4
Location.....	4
Climate	5
Legal Jurisdictions	5
Population	5
Housing	6
Financial Analysis	7
Public Works.....	8
Emergency Services.....	11
Utilities.....	12
Watersheds, Major Rivers and Streams.....	13
Floodplain and Flood Control Information	13
Relevant Community Plans, Ordinances, and Studies	14
Recreation	15
K-12 Education	15
Employment.....	15
Economic Conditions	18
Development Patterns	18
IV. Hazard Analysis and Risk Assessment	20
Overview	20
Flood Hazard Areas and Repetitive Loss Properties.....	20
Critical Facilities.....	22
Hazard Profiles	29
Potential Hazards	33
Dam Failure	34
Drought.....	36
Earthquake	37
Expansive Soils	39
Extreme Heat.....	41
Flash Flood.....	42
Grass or Wild Land Fire	44
Hailstorm	45
Landslide/Erosion/Slope Failure.....	47
Levee Failure	48
River/Stream Flood.....	50
Severe Winter Storm.....	52
Sink Holes.....	54
Thunderstorms and Lightning.....	55
Tornado	56
Windstorm.....	58
Air Transportation Incident	60
Communications Failure	61
Energy Disruption	62

Fixed Hazardous Materials Incident	63
Fixed Radiological Incident	64
Highway Transportation Incident.....	65
Pipeline Incident	66
Rail Transportation Incident	67
Transportation Hazardous Materials Incident.....	68
Transportation Radiological Incident	70
Waterway/Waterbody Incident	71
Enemy Attack.....	72
Public Disorder	73
Biological Terrorism (Includes Agricultural Terrorism)	74
Chemical Terrorism.....	75
Conventional Terrorism.....	76
Cyber Terrorism.....	77
Radiological Terrorism	78
Animal Disease	79
Human Disease	80
Plant/Crop Disease	81
Structural Failure.....	82
Structural Fire	83
Vulnerability by Incorporated City	84
Prioritizing Hazards.....	98
V. Current Countywide Pre-Disaster Mitigation Activities	101
VI. Hazard Mitigation Goals and Objectives.....	107
VII. Mitigation Plan Implementation and Evaluation.....	111
VIII. Summary of Mitigation Recommendations	117

LIST OF TABLES

Table	Page
1 Climatic Statistics, 1/1/1919 – 4/30/2012	5
2 Population Trends, 1950-2010	6
3 Percent of Population by Age, 2007-2011	6
4 Year Owner-Occupied Home Built.....	7
5 Median Value of Owner-Occupied Units	7
6 Community Financial Analysis	8
7 Municipal Water Providers and Capacity	9
8 Municipal Wastewater Providers and Capacity	9
9 Area Utility Providers	12
10 Area Top Employers by Jurisdiction	16
11 Employment and Occupation Counts	17
12 Retail Sales Tax by Jurisdiction	18
13 Number and Assessed Value of Parcels.....	19
14 Rural County Structures in Floodway	21
15 Hazard Identification.....	33
16 Hazard Scoring Summary.....	99
17 Hazard Priority Groupings	100
18 Selected Mitigation Action Items.....	112
19 Mitigation Action Rankings by Incorporated City.....	115
20 Mitigation Action Implementation	117

LIST OF APPENDICES

- Appendix A** – Pottawattamie County Road Map
- Appendix B** – Township Boundary Map
- Appendix C** – City Street Maps
- Appendix D** – Critical Facilities Maps
- Appendix E** – Topographic Maps
- Appendix F** – Floodplain Maps
- Appendix G** – Railroad and Pipeline Map
- Appendix H** – Land Use Maps
- Appendix J** – Jurisdiction Parcel Numbers and Assessed Values
- Appendix K** – Hazard Identification by Municipality
- Appendix L** – Municipal Hazard Scoring and Priority Grouping
- Appendix M** – Historical Occurrences
- Appendix N** – Countywide Dam Inventory
- Appendix P** – Area Media Providers
- Appendix Q** – Notice of Public Hearing
- Appendix R** – Local Mitigation Plan Review Tool
- Appendix S** – Meeting Sign-In Sheets

LIST OF ACRONYMS/ABBREVIATIONS

BFE – Base Flood Elevation
CPRI – Calculated Priority Risk Index
DI – Damage Indicators
DOD – Degrees of Damage
EMA – Emergency Management Agency
EPZ – Emergency Planning Zone
EHS – Extremely Hazardous Substances
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
Hazmat – Hazardous Materials
IDLH – Immediately Dangerous to Life and Health
IPZ – Ingestion Pathway Zone
LIDAR – Light Detection and Ranging
LEPC – Local Emergency Planning Committee
NFIP – National Flood Insurance Program
NIMS – National Incident Management System
NOAA – National Oceanic and Atmospheric Administration
OMMRS – Omaha Metropolitan Medical Response System
OPPD – Omaha Public Power District
PDI – Palmer Drought Index
PDM – Pre-Disaster Mitigation
VZR – Vulnerability Zone Radius
WMD – Weapons of Mass Destruction
WNV – West Nile Virus

I. EXECUTIVE SUMMARY

The Pottawattamie Countywide Multi-Jurisdictional Pre-Disaster Mitigation Plan was developed for and applicable to one county government, thirteen incorporated municipal governments, and six special purpose districts. These government/special purpose entities include Pottawattamie County; the Cities of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, and Walnut; and the A-H-S-T, Riverside, Treynor, Tri-Center, Underwood, and Walnut school districts. All previously adopted single-jurisdiction hazard mitigation plans were utilized and migrated into this plan at the greatest extent possible. Individual jurisdictional data was updated to reflect the most current information available and any content deemed irrelevant or outdated was excluded from this plan. Otherwise, all applicable content was transferred to the multi-jurisdictional document.

The Pottawattamie Countywide Hazard Mitigation Planning Committee met three times to discuss potential hazards with the county and 13 incorporated jurisdictions. 40 natural and manmade hazards were determined to possibly or likely occur in the county and are cited in Section IV of this plan. The Committee's prioritization of hazards is located in Page 98.

After studying potential hazards, the Committee identified current mitigation activities and assessed gaps in the mitigation/preparedness of hazards to the county and all municipalities. Further in the process, the Committee set goals, objectives and actions that cover all identified hazards and are covered in Section VI. Hazard mitigation can occur through the accomplishments of objectives that, when achieved, will reduce the impact of hazards on citizens and businesses countywide. Many of the objectives are inexpensive and simple while others are more costly and sophisticated in scope. However, all objectives are within the realm of possibility and can be carried out to fruition.

Adoption by all governing bodies within the jurisdictional boundaries of Pottawattamie County demonstrates commitment on a countywide basis to fulfill the mitigation goals and objectives outlined in the plan. Adoption legitimizes the plan and authorizes responsible entities to execute their responsibilities.

II. PURPOSE AND PROCESS OF THE COUNTY PRE-DISASTER MITIGATION PLAN

Purpose

There are three primary purposes for the development of the Pottawattamie Countywide Multi-Jurisdictional Pre-Disaster Mitigation (PDM) Plan:

First, the plan has been developed to protect the health, safety and economic interests of residents and businesses by reducing the impacts of natural and manmade disaster events through planning, awareness and implementation. Pre-disaster mitigation is any action taken to permanently eliminate or reduce the long-term risk to human life and property from natural and manmade hazards.

The second purpose of the plan is to comply with the requirements of Iowa Administrative Code 605-7.2(4)(d)(1)(2)-29C.9 and the Disaster Mitigation Act of 2000 as established by the Federal Emergency Management Agency (FEMA).

The third purpose of the plan is to identify short and long-term strategies to eliminate hazards or reduce the impact of hazards that cannot be eliminated.

Process

In 2009 the Pottawattamie County Board of Supervisors received funding to complete a Multi-Jurisdictional Hazard Mitigation Plan for all legal jurisdictions within Pottawattamie County, including unincorporated areas. Work on the plan began with assembling background information, using the State of Iowa Hazard Mitigation Plan and the previously approved single-jurisdiction PDM plans of the Cities of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, Walnut, and unincorporated Pottawattamie County. Sources of information provided in this plan include: U.S. Census Bureau (and American Community Survey), Agriculture Census, Council Bluffs Chamber of Commerce, Western Iowa Development Association, High Plains Regional Data Center, National Climatic Data Center, Iowa Department of Management, Iowa Department of Revenue, Iowa State University Extension and Outreach, Pottawattamie County Assessors' Office, and staff from local jurisdictions. Information from these plans and sources was used in the development of this current plan to identify background information, vulnerabilities, critical facilities, historic weather/hazard events, property values, and other pertinent details. The planning process was discussed at the Pottawattamie County Board of Supervisors and at the council meetings of each legal jurisdiction.

The planning process began in the fall of 2010 by engaging public officials, administrators, business owners, citizens, school district administrators, and other local stakeholders to comprise the Pottawattamie Countywide Hazard Mitigation Planning Committee. The Committee first convened in December 2010 and met formally additional times through fall 2012 to identify and prioritize hazards, review past and present mitigation activities, and formulate additional mitigation goals and strategies. Committee members also participated in the planning process by completing assigned tasks and information gathering between meetings. Meetings were held at the Pottawattamie County Courthouse in Council Bluffs and at the government buildings of the incorporated cities represented in this plan. All meetings were open to the public and held in accordance with Iowa's Open Meetings laws, found in Chapter 21 of the Code of Iowa.

The following is an outline of the planning process by meeting:

Meeting 1: Orientation of planning process and desired outcomes; Identify potential hazards; Begin Hazard Analysis/Risk Assessment

Meeting 2: Complete Hazard Analysis/Risk Assessment; Prioritize hazards; Identify critical facilities

Meeting 3: Review and update goals and objectives; Validate mitigation activities and projects; Discuss plan implementation and evaluation

Upon completion of a clean draft, the PDM plan was forwarded to the Pottawattamie County Board of Supervisors and chief elected officials of each legal jurisdiction in the county for additional review. Prior to adoption by the Board of Supervisors, a Notice of Public Hearing (see Appendix Q) was published in the Council Bluffs Daily Nonpareil, Avoca Journal Herald, Neola Gazette, Oakland Herald, and Walnut Bureau. The notice was posted at the Pottawattamie County Courthouse, allowing interested parties from the area adequate time to review the plan and provide comments. A copy of the plan and hearing notice was emailed to neighboring jurisdictions (Cass County, Harrison County, Mills County, Montgomery County, and Shelby County).

Political Body Approval: Pottawattamie County Board of Supervisors

Approval Date: _____

III. COUNTYWIDE PROFILE INFORMATION

This section of the plan describes and examines a variety of characteristics of Pottawattamie County. This section includes demographic, climatic, geographic and community specific information. Please note data is not always available for the unincorporated area of the county.

History

Pottawattamie County evolved out of the Pottawattamie Purchase of 1847. It was named for the Indian tribe that once possessed the Iowa Territory. The name is an Indian term meaning "Blowers of Fire," "Keepers of the Council Fires," or "Makers of Fire."



The county commissioners proposed Kaneshville and Pleasant Grove, about eight miles apart, for the county seat. Council Bluffs was previously known as Hart's Bluff and then Miller's Hollow before it became Kaneshville. The rapidly growing village had a population of about 7,000 at the time, mainly Mormons on their way from Illinois to Utah. It was also an important outfitting town for gold seekers and others on their way to California and the West. Hyde's New Hall at Kaneshville, which was renamed Council Bluffs on January 19, 1853, was used for several years as the courthouse.

A two-story courthouse, constructed of stone and brick, was finally built in 1868 at Council Bluffs at a cost of about \$50,000. As early as 1884, only 16 years after this courthouse was built, there was talk of it being unsafe and county offices having insufficient space. Space was leased in the Masonic Temple for county offices until the construction of a new courthouse was completed. The county accepted the white limestone building on February 15, 1888.

On August 22, 1973, Pottawattamie County voters approved a bond issue for the construction of a new county courthouse and jail. The preceding courthouse was torn down to make room for parking.

Government

Pottawattamie County's main unit of government, the Board of Supervisors, is comprised of five elected officials, including an administrative staff that serves numerous offices/departments. The term of office for Board members is four years. The Board meets each Tuesday at 10:00 a.m. (excluding holidays) with additional meetings called by the Chairperson when necessary. Each city in Pottawattamie County elects a mayor and five council members to two to four year terms.

Location

Pottawattamie County is located in the southwestern part of Iowa and is bordered by Harrison and Shelby Counties to the north, Cass County to the east, Mills County to the south, and the Missouri River to the west. The largest city and county seat is Council Bluffs. Pottawattamie County is comprised of 29 townships and 14 incorporated cities. Interstates 80 and 29 intersect the county.

Climate

The climate of the county and region is continental with relatively warm summers and cold, dry winters. The region is situated between the humid east and dry west, therefore it experiences climactic fluctuations. The fluctuations between the two zones produce weather conditions for periods that are characteristic of either zone, or a combination of both. Low pressure systems commonly affect the weather of the area by causing periodic and rapid changes, especially during the winter months.

Most precipitation falls during the evening as sharp showers or thunderstorms, which occur mostly during the growing season of April through September. About 75 percent of the total precipitation falls during that period. Although winters are relatively cold, precipitation is light, accounting for 10 percent of total annual precipitation. Table 1 documents climatic statistics of the area.

Table1: Climatic Statistics, 1/1/1919 – 4/30/2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High Temperature (F)	31.5	36.4	48.4	63.3	73.7	82.8	87.1	84.7	77.5	66.2	48.7	35.8
Average Low Temperature (F)	10.8	15.7	26.1	38.0	49.3	59.3	63.6	61.2	52.3	40.6	27.2	16.1
Average Participation (in.)	0.84	0.97	1.89	3.01	3.92	4.99	3.65	4.22	3.57	2.35	1.59	0.92
Average Total Snowfall (in.)	6.9	6.2	5.4	0.9	0.0	0.0	0.0	0.0	0.0	0.4	2.3	5.1

Source: High Plains Regional Data Center (Oakland, IA weather station)

Legal Jurisdictions

The following are the legal jurisdictions of Pottawattamie County with 2010 U.S. Census population figures:

- Pottawattamie County – 93,158
- City of Avoca – 1,506
- City of Carson – 812
- City of Carter Lake – 3,785
- City of Council Bluffs – 62,230
- City of Crescent – 617
- City of Hancock – 196
- City of Macedonia – 246
- City of McClelland – 151
- City of Minden – 599
- City of Neola – 842
- City of Oakland – 1,527
- City of Shelby (part) – 23
- City of Treynor – 919
- City of Underwood – 917
- City of Walnut – 785

The City of Shelby is in both Pottawattamie and Shelby Counties in Iowa; the population figure for Shelby only accounts for the residents who reside within the jurisdictional boundaries of Pottawattamie County.

Population

Pottawattamie County's total population is ranked 3rd out of 8 counties in the Omaha, NE-Council Bluffs, IA Metropolitan Statistical Area, and 8th out of 99 counties in the State of Iowa according to the 2010 census. Population data for Pottawattamie County and its municipalities is provided in Table 2 starting with the 1950 census.

Table 2: Population Trends, 1950-2010

Jurisdiction	1950	1960	1970	1980	1990	2000	2010
Pottawattamie County	69,682	83,102	86,991	86,561	82,628	87,803	93,158
Avoca	1,595	1,540	1,535	1,650	1,497	1,610	1,506
Carson	596	583	756	716	705	668	812
Carter Lake	1,183	2,287	3,268	3,438	3,200	3,248	3,785
Council Bluffs	45,429	55,641	60,348	56,449	54,315	58,268	62,230
Crescent	N/A	296	284	547	469	537	617
Hancock	264	252	228	254	201	207	196
Macedonia	208	290	330	279	262	325	246
McClelland	159	150	146	177	139	129	151
Minden	328	355	433	483	539	564	599
Neola	839	870	968	839	909	845	842
Oakland	1,296	1,340	1,603	1,552	1,496	1,487	1,527
Treynor	247	368	472	981	897	950	919
Underwood	278	337	424	448	515	688	917
Walnut	888	777	870	897	857	877	785
Unincorporated County	16,282	18,016	15,320	17,793	16,560	17,336	18,026

Source: U.S. Census Bureau

Table 3 shows percent of population by age for Pottawattamie County and its municipalities. The median age of Pottawattamie County residents is 38.5 based on the American Community Survey's five year population estimates.

Table 3: Percent of Population by Age, 2007-2011

Jurisdiction	Under 5	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-59	60-64	65-74	75-84	Over 85
Pottawattamie County	6.7	6.7	6.5	7.3	6.3	12.4	12.4	15.1	6.8	5.5	7.3	5.0	1.8
Avoca	5.8	6.0	5.8	4.7	4.1	9.3	12.5	18	6.1	7.2	8.5	8.5	3.2
Carson	4.9	8.4	6.7	9.0	4.7	9.9	16.1	10.7	7.8	8.3	6.1	6.0	1.5
Carter Lake	12.0	7.5	7.4	4.1	7.0	17.1	10.9	13	5.6	5.5	4.6	3.7	1.7
Council Bluffs	7.2	7.1	6.1	7.7	6.8	14.1	12.5	14.1	6.2	4.9	6.9	4.9	1.6
Crescent	7.7	4.0	5.4	7.2	6.5	9.6	17.2	13.8	10.2	6.3	8.6	2.8	0.5
Hancock	0.0	4.6	3.5	0.0	6.4	11.6	7.5	20.8	4.6	8.7	24.3	8.0	0.0
Macedonia	3.7	2.0	5.7	3.7	6.1	14.7	9.4	24.9	5.3	5.7	7.3	7.8	3.7
McClelland	0.0	8.5	7.1	13.5	2.8	2.8	23.4	22.7	2.8	5.0	7.8	2.1	1.4
Minden	10.9	9.8	7.2	5.8	2.6	14.9	13.5	10.0	7.9	2.5	9.3	4.9	0.7
Neola	10.1	7.2	6.7	4.9	6.8	12.3	13.5	13.6	6.6	5.0	6.4	5.3	1.3
Oakland	7.5	6.2	8.5	8.3	3.9	11.8	12.4	10.7	5.4	5.3	6.8	8.3	4.9
Treynor	5.5	4.9	9.8	8.3	5.0	9.8	14.9	13.7	7.0	7.1	5.7	6.8	1.5
Underwood	5.0	9.1	12.2	8.6	4.8	9.9	14.8	13.5	7.7	5.1	6.2	2.8	0.2
Walnut	8.8	7.8	5.9	6.0	3.4	11.0	6.2	15.5	9.2	5.7	10.2	6.5	3.9

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates

Housing

Table 4 illustrates when homes were built in Pottawattamie County and its municipalities. At least 40 percent homes were built prior to 1940 in seven communities: Avoca, Carson, Hancock, Macedonia, McClelland, Neola, and Walnut. More homes were built prior to 1940 than any other decade throughout much of the county, with exceptions in Carter Lake, Crescent, Treynor, and Underwood.

Table 4: Year Owner-Occupied Home Built

Jurisdiction	Before 1940	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2004	After 2005
Pottawattamie County	28.7	5.3	14.0	11.9	14.0	6.6	10.0	7.4	2.0
Avoca	55.2	6.7	7.2	8.6	5.7	5.5	5.8	5.1	0.2
Carson	41.2	3.3	8.7	10.7	16.7	10.4	5.4	3.6	0.0
Carter Lake	11.6	6.8	15.0	23.9	19.9	4.1	10.9	3.0	4.8
Council Bluffs	29.3	5.9	16.7	10.9	11.5	6.3	9.7	8.1	1.6
Crescent	10.7	0.0	3.6	15.2	44.2	11.2	11.2	0.0	4.1
Hancock	64.8	9.1	10.2	2.3	5.7	1.1	4.5	2.3	0.0
Macedonia	45.8	4.6	7.6	6.1	1.5	20.6	12.2	1.5	0.0
McClelland	53.9	1.5	6.0	7.5	13.4	0.0	9.0	9.0	0.0
Minden	26.4	8.3	4.9	10.2	14.7	14.0	17.4	0.0	4.2
Neola	48.8	2.1	5.5	15.8	13.0	9.1	3.9	0.8	1.0
Oakland	27.2	8.0	11.9	15.6	16.8	6.5	8.5	5.4	0.0
Treynor	15.7	0.8	9.0	19.1	33.2	5.2	15.5	1.5	0.0
Underwood	20.0	0.0	17.5	8.9	21.9	4.1	16.5	2.9	8.3
Walnut	64.5	3.2	7.8	10.5	9.1	2.7	1.3	0.8	0.0

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates

Pottawattamie County and its municipalities all experienced positive growth in median home value since 2000. Table 5 shows median value for cities in the county.

Table 5: Median Value of Owner-Occupied Dwellings

JURISDICTION	2000 MEDIAN VALUE	2007-2011 MEDIAN VALUE	% CHANGE
Pottawattamie County	\$84,900	\$125,100	47.3
Avoca	\$73,000	\$95,200	30.4
Carson	\$82,000	\$106,400	29.8
Carter Lake	\$70,400	\$96,900	37.6
Council Bluffs	\$78,200	\$112,200	43.5
Crescent	\$102,900	\$148,300	44.1
Hancock	\$46,500	\$68,300	46.9
Macedonia	\$62,900	\$72,300	14.9
McClelland	\$93,000	\$150,000	61.3
Minden	\$97,000	\$139,000	43.3
Neola	\$86,500	\$132,300	52.9
Oakland	\$76,800	\$104,500	36.1
Treynor	\$108,100	\$145,400	34.5
Underwood	\$95,900	\$156,300	63.0
Walnut	\$66,900	\$88,500	32.3

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates

Financial Analysis

Pottawattamie County receives its tax revenue from its rural residents based on a \$43.98830 tax levy per \$1,000 valuation for the 2012/2013 fiscal year; this rate varies by year and taxing district. The current assessed valuation for the county is \$4,166,552,339.00, of which \$1,461,881,170.00 is rural property. Table 6 provides financial analysis figures for each municipality.

Table 6: Community Financial Analysis

JURISDICTION	Source of Tax Revenue	Assessed Valuation
Avoca	\$14.56696 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$80,299,382
Carson	\$15.35793 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$35,609,420
Carter Lake	\$13.50474 tax levy per \$1,000 valuation on regular property No agriculture land levy	\$196,845,484
Crescent	\$6.50037 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$36,172,614
Hancock	\$10.06310 tax levy per \$1,000 valuation on regular property \$2.99744 tax levy on agricultural land	\$8,529,679
Macedonia	\$13.01420 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$8,742,427
McClelland	\$8.10000 tax levy per \$1,000 valuation on regular property No agriculture land levy	\$7,294,680
Minden	\$9.18525 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$26,618,090
Neola	\$8.90601 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$44,529,216
Oakland	\$8.10000 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$63,076,663
Treynor	\$9.73456 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$53,726,273
Underwood	\$13.97685 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$45,449,040
Walnut	\$14.81254 tax levy per \$1,000 valuation on regular property \$3.00375 tax levy on agricultural land	\$35,469,433

Source: Iowa Department of Management, FY 2012/2013

Public Works

Roads

The road system in Pottawattamie County consists of 191 miles of paved two lane roads and 1,231 miles of two lane unpaved roads with 346 bridges. The county also has approximately 77 miles of interstate highway, but the county is not responsible for maintenance.

The county secondary roads department employs 62 persons. The department has facilities in four incorporated cities and four townships, with road and bridge maintenance crews located in Underwood and Carson. The roads department is a large part of the overall county budget. The department owns over \$6 million of equipment ranging from hand shovels to road graders and includes 20 motor graders and 21 dump trucks.

The department is responsible for all construction, maintenance, repair, widening, resurfacing, and reconstruction of pavements, bridges and culverts on the county highway system. The department is also responsible for traffic control, safety, mowing, snow removal, and issuing permits for driveways and overweight/over dimensional vehicles.

Maintenance departments of incorporated cities are generally responsible for the maintenance of streets and sidewalks within their respective jurisdictional limits. Road maps for the county and municipalities are provided in Appendix C.

Water Supply and Distribution

The county does not provide residents with water service. Water is provided by private wells, rural water organizations or connection to an adjacent community. Table 7 provides water supply and distribution details for each municipality.

Table 7: Municipal Water Providers and Capacity

JURISDICTION	Provider/Operator	Average Daily Capacity*	Peak Capacity*
Avoca	Large well field; 280k gallon tower	215,300	348,200
Carson	4 wells; 150k gallon tower	90,000	100,000
Carter Lake	Provided by City of Omaha	97,000,000	200,000,000
Crescent	Provided by Council Bluffs; 50k gallon tower	10,445,000	16,610,000
Hancock	Provided by Oakland; 70k gallon tower	500,000	800,000
Macedonia	Well field & 3 pumps; 30k gal elevated tower	25,000	35,000
McClelland	Regional Water, Inc.	11,000,000	18,200,000
Minden	5 wells; 40k gallon tower	59,000	59,000
Neola	2 wells; 200k gallon tower	90,700	130,000
Oakland	7 wells; 2-300,000k gallon towers	550,000	800,000
Treynor	3 deep wells; 150k gallon tower	77,000	131,000
Underwood	Regional Water, Inc.; 250k gallon storage	215,300	348,200
Walnut	2 wells; 250k gallon storage	80,000	225,000

Source: Western Iowa Development Association

*Gallons per day

Wastewater Treatment

The county does not provide residents with wastewater treatment service. This service is provided by private septic systems, onsite lagoon systems or connection to a city treatment system. Table 8 provides wastewater treatment details for each municipality. Most cities in the county utilize a lagoon treatment system.

Table 8: Municipal Wastewater Providers and Capacity

JURISDICTION	Treatment System	Rated Capacity*
Avoca	3 cell lagoon	255,000
Carson	Automated Trickling Filter System	70,000
Carter Lake	City of Omaha	232,000,000
Crescent	Lagoon System	72,000
Hancock	2 Cell Lagoon	40,000
Macedonia	2 Cell Lagoon	291,000
McClelland	Individual Septic System	N/A
Minden	Lagoon System	90,000
Neola	Mechanical Treatment Facility	135,000
Oakland	2 Cell Lagoon	416,000
Treynor	4 Cell Lagoon	200,000
Underwood	3 Cell Lagoon	113,000
Walnut	2 Cell Lagoon	300,000

Source: Western Iowa Development Association

*Gallons per day

Stormwater Drainage

Water drainage from storms is usually handled through various ditch systems throughout the county. Council Bluffs' storm sewer system includes 120 miles of sewer line and 10 storm water pump stations located along the Missouri River, Indian Creek and Mosquito Creek. Approximately 20 to 25 percent of Carter Lake has in-ground collection of stormwater. Remaining communities in Pottawattamie County utilized open ditches or curb and gutter for stormwater drainage.

Public Buildings and Facilities

The county is responsible for numerous public buildings. Primary county buildings include:

- County Courthouse and Law Enforcement Center, 227 South 6th Street, Council Bluffs
- Human Services Department, 417 East Kaneshville Boulevard, Council Bluffs
- County Annex, 223 South 6th Street, Council Bluffs
- Avoca Courthouse, 209 North Elm Street, Avoca
- Care Facility, 600 9th Avenue
- SW Iowa Juvenile Detention Center, 629 6th Avenue, Council Bluffs
- Correctional Center, 1400 Big Lake Road, Council Bluffs
- Solid Waste Transfer Station, 42485 Mahogany Road, Hancock

Primary public buildings per community in Pottawattamie County include:

Avoca

- City Hall and Fire Department, 201 North Elm Street
- Post Office, 202 North Elm Street
- Public Library, 213 North Elm Street

Carson

- Carson City Hall and Fire Department, 127 Broadway Boulevard
- Post Office, 115 Broadway Blvd.
- Maintenance Sites at 121 Park Street and 306 South Commercial Street

Carter Lake

- Carter Lake City Hall and Police Department, 950 Locust Street
- Community Resource Center, 1105 Redick Boulevard
- Fire Department and Maintenance, 2929 North 9th Street
- Public Library, 1120 Willow Street
- Senior Center, 626 Locust Street

Crescent

- Crescent City Hall and Fire Department, 102 West Florence Street

Hancock

- Hancock City Hall and Fire Department, 207 N Main Street

Macedonia

- Macedonia City Hall, 322 Main Street
- Stempel Bird Museum, 311 Main Street

McClelland

- McClelland City Hall, 117 Main Street
- Fire Department, 81 Main Street

Minden

- Minden City Hall, 207 Main Street
- Fire Department, 205 Main Street

Neola

- Neola City Hall and Fire Department, 105 3rd Street
- Maintenance Building (no address listed)

Oakland

- Oakland City Hall, 101 North Main Street
- Post Office, 503 Pioneer Avenue
- Public Library, 213 North Elm Street
- Maintenance Building, 200 Maple Street

Treynor

- Treynor City Hall, 7 South Eyberg Street
- Fire Department and Community Center, 11 West Main Street (south of Hwy 92)

Underwood

- Underwood City Hall and Fire Department, 218 2nd Street

Walnut

- Walnut City Hall, 219 Antique City Drive
- Fire Department, 500 Pearl Street
- Public Library, 224 Antique City Drive
- Storage Building (no address listed)

Emergency Services

Fire and Rescue

Fire protection service is provided by a combination of township and community based paid and volunteer fire departments. There are 16 fire departments and 15 rescue units operating in Pottawattamie County. These rescue units maintain approximately 100 paid and 400 volunteer first responders. Emergency response capabilities by number of personnel and equipment in jurisdictions of Pottawattamie County are listed below.

Avoca

25 firefighters; 10 rescue unit personnel
5 rescue/response vehicles

Carson

18 firefighters; 9 rescue unit personnel
7 rescue/response vehicles

Carter Lake

22 firefighters; 12 rescue unit personnel
6 rescue/response vehicles

Crescent

19 firefighters; 14 rescue unit personnel
6 rescue/response vehicles

Hancock

24 firefighters
5 rescue/response unit vehicles

Macedonia

20 firefighters; 20 rescue unit personnel
5 rescue/response vehicles

McClelland

17 firefighters; 6 rescue unit personnel
4 rescue/response vehicles

Minden

21 firefighters; 21 rescue unit personnel
6 rescue/response vehicles

Neola

28 firefighters; 13 rescue unit personnel
6 rescue/response vehicles

Oakland

30 firefighters
9 rescue/response vehicles

Treynor

24 firefighters; 16 rescue unit personnel
7 rescue/response vehicles

Underwood

24 firefighters; 8 rescue unit personnel
6 rescue/response vehicles

Walnut

35 firefighters; 18 rescue unit personnel
7 rescue/response vehicles

For emergency assistance citizens should dial 911 or (800) 432-9227. To contact the Pottawattamie County Emergency Management Agency call (712) 328-5777. The office is located in the Pottawattamie County Courthouse at 227 South 6th Street, Council Bluffs.

Law Enforcement

The Pottawattamie County Sheriff's Department consists of approximately 150 employees, 45 law enforcement officers and 97 correctional officers/staff. The department is responsible for law enforcement duties in an effort to protect life and property by enforcing local, state and federal laws. The department patrols 963 square miles, 1,450 miles of secondary county roads, 225 miles of state primary highways, and 77 miles of interstate highway. The department also contracts with 11 of the 14 legal municipalities in Pottawattamie County to provide law enforcement services; Avoca and Carter Lake maintain their own police departments.

Warning Systems

The National Oceanic and Atmospheric (NOAA) Weather Radio Warning System serves the county. Pottawattamie County Emergency Management Agency controls outdoor warning sirens throughout the county and in all incorporated communities. Each city has at least one warning siren that provides citywide coverage. The county also participates in the CodeRed Emergency Alert System. Residents in the county may register to receive emergency notifications via telephone messages. Pottawattamie County residents can receive weather notifications via television and AM/FM radio outlets. A listing of major media providers in the area is located in Appendix P.

Medical Services and Facilities

Avoca, Minden, Neola, Oakland, and Treynor have an outpatient clinic or family practice. Much of the county relies on Jennie Edmundson or Alegent Health Mercy Hospital, both in Council Bluffs, for emergency and major medical services. Myrtle Memorial Hospital in Harlan, IA and Cass County Memorial Hospital in Atlantic, IA are available to residents in eastern Pottawattamie County. There are at least 59 medical facilities in the Omaha-Council Bluffs area that provides cancer treatment, mental health services, rehabilitation services, and a variety of other specialties.

Utilities

Table 9 lists utility providers in Pottawattamie County by incorporated city.

Table 9: Area Utility Providers

Jurisdiction	Electric	Natural Gas	Telephone	Cable	Internet	Water	Solid Waste
Avoca	Mid-American Energy	Mid-American Energy	Walnut Communications, Windstream	MediaCom, Walnut Communications	Walnut Communications, Windstream	Regional Rural Water, Inc.	R&S Waste Disposal
Carson	Mid-American Energy	Mid-American Energy	Frontier Communications	Interstate Cablevision	Frontier Communications	City of Carson	City of Carson
Carter Lake	Omaha Public Power District	Aquila	CenturyLink, Cox	Cox	CenturyLink, Cox	Metropolitan Utilities District	Papillion Sanitation
Crescent	Mid-American Energy	Peoples Natural Gas	CenturyLink	Cox, Telepartners	CenturyLink	City of Council Bluffs	Individual contracts
Hancock	Mid-American Energy	Mid-American Energy	Farmers Mutual Cooperative Telephone	Farmers Mutual Cooperative Telephone	Farmers Mutual Cooperative Telephone	City of Hancock via City of Oakland	City of Hancock
Macedonia	Mid-American Energy	Mid-American Energy	Western Iowa Networks	Interstate Cablevision	Western Iowa Networks	City of Macedonia	Iowa Waste Systems
McClelland	Mid-American Energy	Mid-American Energy	CenturyLink	CenturyLink	CenturyLink	Regional Rural Water, Inc.	Rural Sanitation Services
Minden	Mid-American Energy	Mid-American Energy	Walnut Communications, Windstream	Walnut Communications	Walnut Communications, Windstream	City of Minden	R&S Waste Disposal
Neola	Neola Light and Water	Mid-American Energy	CenturyLink	Walnut Communications	CenturyLink	City of Neola	R&S Waste Disposal

Oakland	Mid-American Energy	Mid-American Energy	Frontier Communications	Teleservices	CenturyLink	City of Oakland	City of Oakland
Treynor	Mid-American Energy	Mid-American Energy	Frontier Communications	Cox	Frontier Communications	City of Treynor	MTS, Inc.
Underwood	Mid-American Energy	Mid-American Energy	CenturyLink, Walnut Communications	Walnut Communications	CenturyLink, Walnut Communications	Regional Rural Water, Inc.	MK Mills
Walnut	Mid-American Energy	Mid-American Energy	Walnut Communications	Walnut Communications	Walnut Communications	City of Walnut	Walnut Sanitation

Source: Western Iowa Development Association; Incorporated Cities

Watersheds, Major Rivers and Streams

There are five watersheds in Pottawattamie County:

- West Nishnabotna (10240002) – The total number of watershed acres is 725.7 acres. The primary river within the watershed is the West Nishnabotna River, which is directly west of Avoca. The watershed also includes: 64 lakes, 16 rivers and streams, 2,223.6 total river miles and 819.5 perennial river miles.
- Big Papillion-Mosquito (10230006) – The total number of watershed acres is 5,412.2 acres. The primary river within the watershed is the Mosquito Creek. The watershed also includes: 112 lakes and 14 rivers and streams.
- Keg-Weeping Water (10240001) – The total number of watershed acres is 1,565.4 acres. The primary river within the watershed is Nishnabotna River. The watershed also includes: 67 lakes and 7 rivers and streams.
- East Nishnabotna (10240003) – The total number of watershed acres is 1,726.6 acres. The primary river within the watershed is the East Nishnabotna River. The watershed also includes: 117 lakes and 11 rivers and streams.
- Boyer (10230007) – The total number of watershed acres is 908.6 acres. The primary river within the watershed is the Boyer River. The watershed also includes: 108 lakes and 8 rivers and streams.

Floodplain and Flood Control Information

The following list is jurisdictions participating in the National Flood Insurance Program (NFIP). Macedonia and McClelland do not participate in the NFIP.

	Community Identification	Year Joined NFIP	Current Effective Floodplain Map
Pottawattamie County	190232#	08/03/1993	02/04/2005
Avoca	190233#	12/16/1980	02/04/2005
Carson	190234#	09/04/1985	02/04/2005(M)
Carter Lake	190492#	08/08/1978	02/04/2005
Crescent	190723#	11/01/1999	02/04/2005
Hancock	190236#	04/21/2006	02/04/2005
Minden	190781#	12/07/1988	(NSFHA)
Neola	190493#	12/17/1990	02/04/2005
Oakland	190237#	08/03/1981	02/04/2005
Treynor	190816#	03/26/1977	02/04/2005
Underwood	190494#	06/01/1982	02/04/2005
Walnut	190676#	12/31/2009	02/04/2005

(NSFHA) No Special Flood Hazard Area – All Zone C
(M) No Elevation Determined – All Zone A, C and X

Presently there are no jurisdictions in Pottawattamie County participating in FEMA's Community Rating System.

Below is a description of various past and current property protection projects within Pottawattamie County:

- Acquisition projects: Goosehaven area and various individual sites throughout the county.
- Elevation projects: None
- Structural Relocation projects: None
- Flood proofing projects: None
- Other property protection projects: None

The primary flood control structure in Pottawattamie County is the Missouri River levee system. This vital structure protects Council Bluffs and parts of Pottawattamie County from Missouri River flooding for over 30 miles.

Relevant Community Plans, Ordinances and Studies

The Pottawattamie County Comprehensive Plan 2003–2013, approved in 2004, is a guide for future development within the county. It is designed to provide policy guidance, which will enable citizens and elected officials to make informed judgments and decisions about the future of the county. This plan is intended to identify goals, policies and procedures leading to the attainment of quality of life in Pottawattamie County and provide a general guide for future decisions and development concepts.

Pottawattamie County adopted a zoning ordinance in 1961. Since its adoption the ordinance has undergone two major revisions, the first on October 1, 1981 and the second on February 13, 2004. This ordinance classifies land within one of the following land use districts: Agricultural and Conservation, Residential, Commercial, and Industrial. There are numerous zones within each of the above listed districts. There are a total of 15 zones in Pottawattamie County.

The county's subdivision ordinance, originally adopted in 1969, was revised to its current standards on February 9, 1996. The revised ordinance outlines the process and procedures necessary for the proper division and development of land that is under county jurisdiction.

The county has a Community Builder Plan, approved in 1995, which serves as a small scale strategic plan. This plan includes a community profile, financial analysis, capital improvement plan, and an inventory of city public works and services.

Pottawattamie County also maintains a wastewater treatment and disposal system ordinance (amended 1998), a private well ordinance (amended 1998), and a floodplain management ordinance (adopted 1993).

All cities in Pottawattamie County, excluding McClelland and Walnut, have developed and maintain floodplain ordinances. In addition, all Pottawattamie County cities except McClelland have adopted zoning ordinances. The Cities of Avoca, Carson, Carter Lake, Neola, Oakland, Treynor, and Underwood have developed comprehensive plans.

Pottawattamie County, including all legally incorporated jurisdictions, will regularly maintain the Multi-Jurisdictional PDM Plan once it has been formally approved by Iowa Homeland Security and Emergency Management Division and FEMA.

Recreation

The Pottawattamie County Conservation Board is responsible for the care and maintenance of eight parks and nature areas. The conservation staff consists of 12 fulltime employees and hires 12 seasonal employees during the summer months. The sites are:

- **Arrowhead Park** (near Neola, 29357 310th Street) – 147 acre park with modern camping, showers, cabins, playground, 17 acre lake with fishing and boat rentals, and covered shelters for larger gatherings.
- **Botna Bend Park** (north of Hancock) – 119 acre park with camping, showers, bison and elk herds, and canoe/kayak rentals on the West Nishnabotna River.
- **Hitchcock Nature Area** (north of Crescent) – 1,100 acre area of the Loess Hills with native prairie, over 10 miles of hiking trails for all difficulty levels, modern lodge for retreats, business meetings, and family gatherings, modern campground with RV sites, cabins and tent sites, and equal access boardwalk in the Loess Hills.
- **Narrows River Park** (north of Council Bluffs) – 36 acre park with boat ramp and dock on the Missouri River, archery range, covered picnic shelters with Missouri River overlook deck, and hiking trails.
- **Olde Town Park** (west of Macedonia) – 9 acre park with primitive camping, picnicking and access to the West Nishnabotna River.
- **Farm Creek Public Wildlife Area** (near Carson) – 320 acre wildlife area with public hunting and fishing and two ponds.
- **Pheasants Forever Habitat Area** (near the I-29/I-680 interchange) – 14 acre grassland
- **Blackbird Marsh** (Council Bluffs) – 14 acre educational area owned by the State of Iowa, but managed by the Conservation Board.

Each municipality in Pottawattamie County maintains at least one public park and/or recreational facility. Such sites can be found by incorporated city under Critical Facilities in Section IV, Hazard Analysis and Risk Assessment.

K-12 Education

There are eight school districts throughout Pottawattamie County. The Council Bluffs Community School District is the largest district in the county with 18 total schools and an enrollment of over 9,000 students. The following is a listing of county school districts and their enrollments for the 2011-2012 school year provided by the Iowa Department of Education:

- A-H-S-T (Avoca, Hancock, Shelby, and Tennant); enrollment of 602
- Council Bluffs; enrollment of 9,032
- Lewis Central (within Council Bluffs); enrollment of 2,580
- Riverside (Carson and Oakland); enrollment of 680
- Treynor; enrollment of 598
- Tri-Center (Neola); enrollment of 677
- Underwood; enrollment of 735
- Walnut; enrollment of 201

Employment

As Pottawattamie County's largest city, Council Bluffs has a significant concentration of major employers. The service and entertainment industry in Council Bluffs has become prevalent with the presence of three casinos and hotels. Health care and food processing are also notable job creating industries in Council Bluffs. Transportation, service, food processing, and agri-business are typically the largest job industries in the remainder of the county. Oakland Foods, a meat processor with approximately 500 employees, is the largest employer in the county outside of Council Bluffs. Table 10 lists major local employers by jurisdiction.

Table 10: Major Area Employers by Jurisdiction

Avoca	Industry	Employees
Wings America	Retail/Service	100
CI Direct	Telecommunications	80
AHST Community Schools	Education	70
Double S Truck Line	Trucking	50
Care Initiatives	Elderly Care	30
Avoca Implement	Retail/Supplier	30
CCX	Trucking	30
MidAmerican Energy Co.	Utility	20
Iowa Dept. of Transportation	Government	15
MidStates Bank	Banking	15
Carson		
Riverside Middle School	Education	40-45
Tin Cup	Food Service	10
City of Carson	Government	5-10
Cohron Ready Mix	Retail/Supplier	5-10
Carter Lake		
Owen Industries	Manufacturing	190
Goodkind and Goodkind Direct, Inc.	Manufacturing	140
Carter Lake Elementary School	Education	70
Shoreline Golf Course	Recreation	50
Wingate Inn	Lodging	30
City of Carter Lake	Government	25
Super 8	Lodging	20
McMullen Trucking	Distribution	10
Council Bluffs		
Tyson Foods	Food Processing	1,280
Ameristar Casino	Gaming/Hotel	1,250
Horseshoe Casino	Gaming/Hotel	1,140
Council Bluffs Community Schools	Education	1,110
Jennie Edmundson Hospital	Health Care	880
Harrah's Casino Hotel	Gaming/Hotel	880
Alegent Health Mercy Hospital	Health Care	860
Con Agra Frozen Foods	Food Processing	800
Iowa Western Community College	Education	620
Wal-Mart	Retail	610
City of Council Bluffs	Government	445
Griffin Pipe Products	Manufacturing	450
Pottawattamie County	Government	425
IBP, Inc.	Food Processing	240
Crescent		
Crescent Elementary School	Education	50
Pink Poodle Restaurant and Bar	Food Service	15
Henry's Diner	Food Service	1-5
People's National Bank	Banking	1-5
Phillips 66 Fill and Food	Retail/Service	1-5
Hancock		
Hancock Elevator, Inc.	Agriculture	10
Farmers Mutual Telephone	Utility	1-5
Gress Locker	Food Processing	1-5
Hancock Fertilizer Co.	Agriculture	1-5

Jacobson Oil	Retail/Service	1-5
McClelland		
WestWind Logistics	Trucking	75
Dew Drop Inn	Food Service	1-5
Elevator	Agriculture	1-5
Neola		
Tri Center Community Schools	Education	No data
Oakland		
Oakland Foods	Food Processing	500
Riverside Schools	Education	150
Oakland Manor	Elderly Care	85
Steve Emken Trucking	Transportation	40
Schueman Trucking	Transportation	30
Henry Well Co.	Service	20
Treynor		
Treynor Community Schools	Education	80
Treynor State Bank	Banking	20
Clausen Trucking	Transportation	1-5
Farm Service Co-Op	Agriculture	1-5
Treynor Ag Supply	Agriculture	1-5
Underwood		
Jack Link's Beef Jerky	Distribution/Warehouse	130
Underwood Community Schools	Education	No data
Walnut		
Walnut K-12 School	Education	30

Source: Council Bluffs Chamber of Commerce; Incorporated Cities

In Pottawattamie County, the total number of businesses located in the designated special flood hazard area is unknown. The county also has a sizable amount of land designated as the 500-year floodplain. It is unknown how many at risk businesses have flood insurance.

Table 11 shows select employment figures obtained from the American Community Survey.

Table 11: Employment and Occupation Counts

Employment	
In Labor Force	52,736
Civilian	52,688
Employed	47,854
Unemployed	4,834
Armed Forces	48
Industry	
Civilian employed population 16 years or older	47,854
Agriculture, forestry, fishing and hunting, and mining	777
Construction	3,961
Manufacturing	4,435
Wholesale trade	1,440
Retail trade	5,487
Transportation and warehousing, utilities	4,307
Information	1,346
Finance and insurance, real estate, rental and leasing	3,865
Professional and related services	3,428
Educational services, and health care and social assistance	10,829
Arts, entertainment, recreation, and accommodation and food services	4,523
Other services, except public administration	1,981
Public administration	1,475

Source: 2010 Census

Economic Conditions

The western side of Pottawattamie County is significantly more urbanized than the eastern half. Retail, service and entertainment industries are concentrated in the Council Bluffs area. In taxable retail sales for FY 2011, Council Bluffs accounted for 91 percent of the county's total taxable sales (see Table 12). Council Bluffs and its adjacent areas benefit from proximity to rail lines and two interstate corridors, thereby generating transportation, manufacturing and industrial development and employment. Though Pottawattamie County is more urbanized than its neighboring counties in Iowa, it is still heavily rural and agriculture is central to the economy. According to the 2007 USDA Census of Agriculture there are 1,158 farms in Pottawattamie County with an average size of 420 acres. The average net cash income per farm operation is \$93,343. The average market value of land and buildings per farm in Pottawattamie County is \$1,523,228.

Table 12: Retail Sales Tax by Jurisdiction

Jurisdiction	Taxable Sales	Computed Tax
Avoca	\$24,164,678	1,441,024
Carson	\$2,500,814	150,049
Carter Lake	\$14,903,474	834,803
Council Bluffs	\$905,082,718	53,984,502
Crescent	\$6,725,881	403,441
Hancock	\$1,705,903	102,354
McClelland	\$657,216	39,433
Minden	\$2,070,850	123,789
Neola	\$5,616,107	336,966
Oakland	\$8,791,300	527,446
Treynor	\$3,697,648	221,859
Underwood	\$6,063,798	363,828
Walnut	\$7,839,754	461,617
Other	\$7,405,547	443,737
County Total	\$997,225,688	59,434,848

Source: Iowa Department of Revenue, FY 2011

Development Patterns

Land use maps for the county and all incorporated cities can be found in Appendix H. Much of the unincorporated county is agriculture or forest/grass land. Industrial and commercial land uses are mainly concentrated in the county's larger cities and along portions of Interstates 29 and 80.

Agriculture and Open Land

After residential land, agriculture is the dominant land use in Pottawattamie County. Most land is cultivated for corn and soybeans but some areas are used for pasture. The areas comprising of the Loess Hills are largely undeveloped due to steep bluffs, slopes and upland ridges. Wetlands and forested areas are located along rivers and streams. Scenic views and unique geological characteristics can provide increased opportunities for tourism potential.

Commercial

Commercial use accounts for over 6 percent of the county's property parcels. Of the 3,450 commercial parcels identified by the Pottawattamie County Assessor, 66 percent are within Council Bluffs city limits. The greatest concentrations of commercial property are located in Council Bluffs along the I-29/I-80 corridors and Broadway/U.S. Highway 6. Avoca, Carter Lake, Oakland, and Walnut also have sizable pockets of commercial land; Oakland Foods is the single largest commercial site in the eastern half of the county. Commercial land in the incorporated cities is generally adjacent to major streets in downtown areas.

Industrial

Industrial land is the least dominant land use in Pottawattamie County and does not account for one percent of property parcels in any incorporated city or the county as a whole. Council Bluffs again has the largest concentration of industrial space, mainly near the I-29/I-80 corridors. There are various farming facilities and grain storage operations located throughout the county. Some of these facilities possess hazardous materials, such as fertilizer, fuel, etc. Industrial development is expected to expand in the next five to ten years, especially on land near the Missouri River and Interstate 29.

Residential

Approximately 61 percent of the county's land use is residential. Of the 32,623 residential parcels in Pottawattamie County, 65 percent are in Council Bluffs. Residential land accounts for no less than 71 percent of land use in all 14 incorporated cities. Residential development has slowed significantly in the last four years. Residential building permits have decreased every year since 2008 and it is uncertain when the trend will reverse.

Many natural hazards will be countywide in scope. New development, regardless of the use, will be similarly impacted and as vulnerable as existing buildings and infrastructure. Other natural hazards and most manmade incidents will be more localized. Future development is difficult to anticipate, however, it is expected that the current distribution of property classes will remain steady throughout the next five years.

Table 13 below shows the total assessed value of taxable parcels in Pottawattamie County during 2012 separated by agricultural, commercial, industrial, and residential uses. Assessed values by incorporated city are located in Appendix J.

Table 13: Number and Assessed Value of Parcels

Property Classification	Number	%	Total Value	%
Agricultural	17,112	32.1	\$1,171,006,097	18.5
Commercial	3,450	6.5	\$1,282,830,919	20.2
Industrial	90	0.2	\$121,284,392	1.9
Residential	32,623	61.2	\$3,766,496,053	59.4
TOTAL	53,275	100.0	\$6,341,617,461	100.0

Source: Pottawattamie County Assessor and GIS Department, 2012

Development Changes

Development in Pottawattamie County outside the Council Bluffs area has been generally slow in the last two to three years. Slow development trends can be mainly attributed to the national economic downturn, particularly in the housing market, that began in 2007/2008. No recent development has occurred in any known hazard areas.

The Interstate 29 corridor and I-29/I-80 junctions remain key industrial and commercial areas in the county. Land adjacent to south Highway 275 has been identified by local economic developers as having significant industrial development potential due to the availability of vacant land close to rail and interstate access. In addition, a report was completed in 2011 that determined the feasibility of a bi-state port authority. The port authority would be a 2,500 square acre area bordered by I-29 to the east, I-680 to the north, and the Missouri River to the west and south. These economic development proposals could potentially attract over \$1 billion worth of investment to the local economy. However, development in or near the Missouri River floodplain presents inherent risks that must be addressed.

IV. HAZARD ANALYSIS AND RISK ASSESSMENT

Overview

This section reviews a variety of potential hazards specifically impacting the Pottawattamie County area, including descriptions of past events for each particular hazard. Hazardous events have been a common occurrence throughout Pottawattamie County, affecting most of the unincorporated area as well as the majority of the county's incorporated cities. In fact, Pottawattamie County has been included in 19 Presidential Disaster Declarations since 1965. Thirteen of the disaster declarations have resulted from thunderstorms and/or flooding. Flooding, by natural or manmade means, continues to remain a high priority hazard throughout Pottawattamie County. Flooding hazards were vigorously analyzed in the development of this plan in response to the 2011 Missouri River flood. Flooding will continue to be thoroughly discussed in the hazard analysis and risk assessment section of future plans.

The disasters were as follows:

- | | |
|---|--------------|
| ▪ June 27, 2011: Flooding | FEMA DR-1998 |
| ▪ March 2, 2011: Severe Winter Storms | FEMA DR-1880 |
| ▪ February 25, 2010: Severe Winter Storms | FEMA DR-1877 |
| ▪ May 27, 2008: Summer Storms | FEMA DR-1763 |
| ▪ May 25, 2007: Severe Storms, Tornadoes, and Flooding | FEMA DR-1705 |
| ▪ March 30, 2007: Snow | FEMA DR-3275 |
| ▪ March 14, 2007: Severe Winter Storm | FEMA DR-1688 |
| ▪ May 25, 2004: Severe Storms, Tornadoes, and Flooding | FEMA DR-1518 |
| ▪ May 13, 2001: Summer Storm | FEMA DR-1367 |
| ▪ July 22, 1999: Severe Storms and Flooding | FEMA DR-1282 |
| ▪ May 21, 1999: Severe Storms, Flooding and Tornadoes | FEMA DR-1277 |
| ▪ June 2, 1998: Flood | FEMA DR-1230 |
| ▪ November 20, 1997: Winter Storm | FEMA DR-1191 |
| ▪ August 21, 1996: Flood | FEMA DR-1133 |
| ▪ July 9, 1993: Flood | FEMA DR-0996 |
| ▪ July 28, 1988: Tornado | FEMA DR-814 |
| ▪ June 27, 1984: Severe Storms, Tornadoes, Hail, Floods | FEMA DR-715 |
| ▪ September 26, 1972: Severe Storms, Flooding | FEMA DR-354 |
| ▪ April 22, 1965: Flooding | FEMA DR-193 |

Flood Hazard Areas and Repetitive Loss Properties

Presently, it is estimated that there are 136 structures in rural Pottawattamie County located in the 100-year floodplain. This figure includes all structures in the county, including outbuildings. The number of structures protected by flood insurance is not known. Rural Pottawattamie County does not have any properties currently listed on the Repetitive Loss List maintained by FEMA. Table 14 lists the type, number and assessed value of structures in the floodway of unincorporated Pottawattamie County.

Table 14: Rural County Structures in Floodway

	Number of Structures	Land Value	Building Value	Dwelling Value	Total Value
Residential	57	\$ 1,253,656	\$ 0.00	\$ 4,027,154	\$ 5,280,810
Civic	1	\$ 0.00	\$ 480,000	\$ 0.00	\$ 480,000
Commercial	39	\$ 19,636,220	\$ 107,731,080	\$ 0.00	\$ 127,367,300
Industrial	1	\$ 30,600	\$ 53,500	\$ 0.00	\$ 84,100
Agricultural	38	\$ 411,570	\$ 93,341	\$ 461,918	\$ 966,829
TOTAL	136	\$ 21,332,046	\$ 108,357,921	\$ 4,489,072	\$ 134,179,039

Source: Pottawattamie County Assessor and GIS Department

Note: Public property is assessed at \$0.00 by the Pottawattamie County Assessor.

The following are assessments of flood hazard areas by incorporated city:

Avoca: Branches of the West Nishnabotna River are on the eastern and western sides of Avoca. It is estimated there are approximately 60 structures in Avoca located in the 100-year floodplain. The number of these structures that are protected by flood insurance is not known.

Carson: The Nishnabotna River traverses south on the west side of Carson. It is estimated there are approximately eight structures located in the 100-year floodplain. The number of these structures that are protected by flood insurance is not known.

Carter Lake: Due to the presence of the Missouri River and Carter Lake, there is a threat for flooding in Carter Lake, however, only a relatively small amount of the city is within the 100-year floodplain.

Crescent: Pigeon Creek runs in a southwest direction on the west side of the Crescent. Crescent Creek runs through the south part of the city from east to west. There are approximately 46 buildings within the 100-year floodplain. The largest body of water is the Missouri River 10 miles to the west of Crescent, but it poses little threat to the city.

Hancock: The Nishnabotna River flows on the west side of Hancock. Presently, there are no structures in Hancock located in the 100-year floodplain. The number of structures that are protected by flood insurance is not known. The Hancock Elevator and the Hancock Fertilizer plant are among a few structures in the 500-year floodplain, which was breached in 1993 by record flooding.

Macedonia: As of the February 2005 revision of FEMA's floodplain maps, there are no identified special flood hazard areas within Macedonia. Accordingly, there are no structures in Macedonia located in the 100-year floodplain. However, there is some floodplain located north and west of Macedonia, including land where the city's well field is located.

McClelland: The City of McClelland is located high on a ridge between the Mosquito and Keg Creeks. The city is not located near the flood hazard areas of either creek.

Minden: Due to the presence of Keg Creek near the southern and eastern boundaries of Minden, some areas of the city are located in special flood hazard areas. Presently, there are about 16 structures (none residential) in Minden located in the 100-year floodplain. The number of these structures protected by flood insurance is not known.

Neola: Mosquito Creek and Neola Creek run to the east and west of Neola, respectively. Presently, there are about 11 structures in Neola located in the 100-year floodplain. The number of these structures that are protected by flood insurance is not known.

Oakland: The Nishnabotna River runs west of Oakland. It is estimated that there are eight structures in Oakland located in the 100-year floodplain. The number of these structures that are protected by flood insurance is not known. Oakland does not have any properties currently listed on the REP maintained by FEMA.

Treynor: Only a very small portion of Treynor, along Iowa Highway 92 west of the city, is located in the 100-year floodplain of the middle branch of Silver Creek. Presently, there are no structures in Treynor located in the 100-year floodplain.

Underwood: Mosquito Creek runs east of Underwood and a significant portion of the city lies in the special flood hazard area. However, due to the hydrology and topography of the basin, and to significant channel work performed in the past, the risk of flooding from Mosquito Creek is minimal. Presently, there are about 10 structures in Underwood located in the 100-year floodplain. The number of these structures that are protected by flood insurance is not known.

Walnut: Walnut Creek is located on the east side of Walnut and only a very small portion of the city is within the special flood hazard area. Walnut has developed away from the flood hazard area and the risk of flooding from Walnut Creek is extremely minimal. Presently, there are no structures or critical facilities in Walnut located in the 100-year floodplain.

None of the incorporated cities in Pottawattamie County have any properties on FEMA's Repetitive Loss List. Strategies to reduce flood risk are addressed in subsequent sections. Floodplain maps the county and each city are located in Appendix F.

Critical Facilities

Critical facilities are structures and infrastructure that a jurisdiction places a priority on protecting. Damage to these facilities can endanger life, put vulnerable populations at risk, and impact the delivery of vital services. The Pottawattamie Countywide Hazard Mitigation Planning Committee identified county and community specific critical facilities. Many critical facilities, typically transportation routes, hospitals/clinics, hazardous materials ("hazmat") sites, etc, have overlapping importance for a county and municipality. These are listed under "Countywide" critical facilities. Community specific critical facilities are listed under each incorporated city. Critical facilities maps can be found in Appendix D of this plan.

Countywide

Facilities essential to the welfare of the entire population, especially following a hazard event:

County Courthouse/Communication Ctr.	Alegent Health Mercy Hospital
County/Council Bluffs Law Enforcement Ctr.	Jennie Edmundson Hospital
County Jail/Sheriff's Department	Iowa Highway Patrol District Headquarters

Transportation Systems:

Interstate 80	East Nishnabotna River Bridge at I-80
Interstate 29	Missouri River Bridge at I-80
Interstate 680	Missouri River Bridge at I-480
U.S. Highway 6	Mormon Bridge- Missouri River at I-680
U.S. Highway 59	Union Pacific Missouri River Rail Bridge

Utility Systems/Hazmat Sites:

Agriland FS- Avoca branch
 Agriland FS- Underwood branch
 BP oil tanks
 Bunge North America
 Con Agra frozen foods facility
 Council Bluffs Waterworks
 Crop Production Services- Hancock
 Farm Service Company- Neola
 Farm Service Co-Op- Oakland
 Farm Service Co-Op- Shelby
 FedEx shipping center
 Google data center
 IBP, Inc.

IPTV transmission tower and NOAA radio tower
 Mid-American Energy power plant
 National Co-Op Refinery Assn. oil tanks
 Northern Natural Gas facility and pipeline
 Oakland Foods
 Oakland Pelgrow, Inc.
 Regional Water, Inc.
 Sire Energy
 Treynor Ag Supply
 Underwood Farm Supply
 Union Pacific rail yards
 Wings America Truck Stop

Other Vulnerable Population Centers:

Ameristar, Bluffs Run, Harrah's, Horseshoe Casinos
 Arrowhead Park
 Botna Bend Park
 Carstens 1880 Farmstead

Hitchcock Nature Center
 Mid-America Center
 Westfair Fairgrounds
 ^All 38 public schools in the county

*Located in 100-Year Floodplain
 **Located in 500-Year Floodplain
 ^See individual schools by city

Avoca

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department/police department
 American Legion Hall
 A-H-S-T Elementary
 A-H-S-T High School*
 Avoca Medical Clinic
 Post office

Regional Water, Inc.
 Avoca Motel/Capri Hotel/ Motel 6
 US Bank and MidStates Bank
 St. Mary's Catholic Church
 Trinity Lutheran Church
 United Church of Avoca

Transportation Systems:

Interstate 80
 US Highway 59
 Iowa Highway 83
 County Road G18

Utility Systems/Hazmat Sites:

Agriland FS
 Avoca Aquatic Center
 Avoca Building and Materials Center
 Avoca Implement
 Avoca Seed and Chemical
 B&B Oil
 Bryant Seeds

Casey's General Store
 Estes Express Lines (trucking company)
 Iowa Department of Transportation building
 Mid-American energy station
 Nelsen's Mini Mart
 Wings America Truck Stop
 Wastewater treatment facility

Other Vulnerable Population Centers:

Avoca Nursing and Rehabilitation	Edgington Park
Avoca Pre-School and Day Care Center	Public library
East Pottawattamie County Fairgrounds	CI Direct

Carson

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department	Community of Christ Church
Carson Community Center	Methodist Church
Post office	Presbyterian Church
Riverside Middle School	

Transportation Systems:

Iowa Highway 59
Iowa Highway 92

Utility Systems/Hazmat Sites:

Carson Country Store (gas station)	Water tower
Macedonia electronic substation	Water treatment facility
Wastewater treatment facility	

Other Vulnerable Population Centers:

Broadway Boulevard (central business district)
Dreamland Theatre
Mill Stone Park
Rodeo grounds

Carter Lake

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/police department	People's National Bank
Carter Lake Elementary School	Senior center
Fire department	Community churches (5)
Public library	

Transportation Systems:

Abbott Drive
Canadian National Rail
Eppley Airfield (adjacent to Carter Lake)
Locust Street

Utility Systems/Hazmat Sites:

Gas and natural gas stations	Sanitary sewer pumping stations
Permanent generators (5)	Sapp Brothers (truck stop)
Praxair (gas provider)	Warning sirens (2)

Other Vulnerable Population Centers:

Boys and Girls Club	Country Inn and Suites
Hamilton's Sports Complex	Holiday Inn Express
Lakeside Mobile Home District	La Quinta Inn

Lone Tree Apartments
Mabrey Park
Shoreline Golf Course

Super 8 Motel
Wingate Inn
Whitehorse Grill

Crescent

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department*
Crescent Elementary School
Post office
Storage garage

Transportation Systems:

Interstate 29/680	Burlington Northern rail line
Mormon Bridge Road	Union Pacific rail line
Old Lincoln Highway	

Utility Systems/Hazmat Sites:

Amoco petroleum pipeline	U-Stop gas station
Henningsen Construction, Inc. (paving plant)	Wastewater lagoons/lift stations
Metz Engineering	Water tower
Pump house*	

Note: Though Crescent's pump house is in the 100-year floodplain, it is elevated above the Base Flood Elevation (BFE) in accordance with FEMA guidelines.

Other Vulnerable Population Centers:

Crescent Early Childhood Center*
City park

Hancock

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department
Post office
United Methodist Church

Transportation Systems:

US Highway 59
County Road G30

Utility Systems/Hazmat Sites:

Crop Production Services	Waste transfer station
Hancock Elevator	Wastewater lagoons
Jacobsen Oil	Water tower/chlorination facility

Other Vulnerable Population Centers:

Botna Bend Park*

Note: Botna Bend Park is in the 100-year floodplain, though it remains preserved as park/recreation space by Pottawattamie County Conservation officials to minimize impact on the floodplain.

Macedonia

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall	Dewitt Community Center
Fire department	Macedonia Implement
Post office	

Transportation Systems:

State Highway 59
 County Road G66/Pioneer Trail
 County Road M16

Utility Systems/Hazmat Sites:

Mid-American substations	Water treatment plant and well field*
Sewage lagoons and lift stations	Western Iowa Networks phone switching building
Water tower	

Note: Walnut's well field is in the 100-year floodplain. However, the well heads have been elevated above BFE to minimize the threat of flooding to the city's raw water supply.

Other Vulnerable Population Centers:

Main Street (central business district)	Grist Mill Theater
City park and baseball diamond	Assembly of God Church
Grand Donia Apartments (senior housing)	United Methodist Church

McClelland

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall
 Fire department
 Feed mill

Transportation Systems:

County Highway L52
 Railroad tract

Utility Systems/Hazmat Sites:

Power substations and grid
 Propane tanks
 SCOLA antenna farm
 Water supply

Other Vulnerable Population Centers:

City park
 Daycare

Minden

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall	Post office
Fire department	Grocery store
Minden Community Center	United Church of Christ

Transportation Systems:

Interstate 80
County Road L66 and bridge over Keg Creek on CR L66
County Road G18 (Tamarack Road- formerly Iowa Highway 83)

Utility Systems/Hazmat Sites:

Mid-American energy grid	Wastewater treatment plant
Natural gas pipeline	Water tower
Sewer lift station/permanent generator	Water treatment plant and distribution systems

Other Vulnerable Population Centers:

Main Street (central business district)
Senior citizen apartments

Neola

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department	Tri-Center High School
Neola Community Center	Tri-Center Middle School
Post office	First Presbyterian Church
Tri-Center Elementary School	St. Patrick's Catholic Church

Transportation Systems:

Interstates 80 and 680
County Road G8L (Railroad Hwy/Iowa Hwy 191)
Burlington Northern Santa Fe rail line

Utility Systems/Hazmat Sites:

CenturyLink phone switching station	Warning sirens (2)
Don's Fuel	Wastewater treatment plant**
Gas station	Water tower
Farm Service Co.	Water treatment plant*
Neola power substations	

Note: Neola's water treatment plant is in the 100-year floodplain, though it is elevated above the BFE in accordance with FEMA guidelines. Additionally, the wastewater treatment facility is in the 500-year floodplain.

Other Vulnerable Population Centers:

City park
Front Street (central business district)
Neola senior housing
Phoenix Theater

Oakland

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall	Oakland Medical Clinic
Fire department	Oakland Pharmacy
Oakland Community Center	Oakland State Bank
Post office	Riverside Elementary School
Public library	Riverside High School

Transportation Systems:

US Highway 6
US Highway 59

Utility Systems/Hazmat Sites:

Farm Service Co-Op (2 sites)	Oakland Pelgrow, Inc.
Frontier Telecommunications	Wastewater treatment plant
Mid-American power grid	Water treatment plant
Oakland Foods	

Other Vulnerable Population Centers:

Chautauqua Park	Riverside athletic complex/swimming pool
Oakland Manor (nursing home)	Oakland Methodist Church (shelter site)
Oakland senior meal site	

Treynor

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall	Treynor Elementary and Jr./Sr. High Schools
Community center/fire department	St. Paul's Lutheran Church
Post office	Zion Congregational Church

Transportation Systems:

State Highway 92
County Road L55

Utility Systems/Hazmat Sites:

Casey's General Store	Wastewater lift station
Drinking water wells	Wastewater treatment plant
Natural gas border station	Water tower
Phone switching station	Water treatment plant
Treynor Agriculture Supply	

Other Vulnerable Population Centers:

City park
Treynor Recreational Area

Underwood

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall/fire department
Underwood Elementary, Intermediate and High Schools
Underwood Memorial Building

Transportation Systems:

Interstate 80
County Road G8L (Railroad Highway)
Burlington Northern Santa Fe rail line

Utility Systems/Hazmat Sites:

Agriland FS	Sewage lagoons and lift station*
CenturyLink phone switching station	Underwood Farm Supply

Farm Services Co-Op
Power substations

Underwood I-80 Truck Stop
Water tower

Note: Underwood's sewage lagoons and lift station are in the 100-year floodplain. The sewage lagoons are protected by levees and the lift station generator is on a raised platform to protect against floodwaters.

Other Vulnerable Population Centers:

City park
Eaglewood Court Apartment Complex
Jack Link's Beef Jerky facility

Community of Christ Church
Underwood Lutheran Church

Walnut

Facilities essential to the welfare of the entire population, especially following a hazard event:

City hall
Fire department
Public library
Walnut Elementary, Intermediate and High Schools

Transportation Systems:

Interstate 80
State Highway 83

Utility Systems/Hazmat Sites:

Communications building
Power substations
Sewage lagoons and lift stations

Water tower
Water treatment facility
Water wells

Other Vulnerable Population Centers:

Public library
Peace Haven Retirement Home
Veterans' Memorial Park
Churches (7)

Hazard Profiles

In addition to the disaster events listed above, the Pottawattamie Countywide Hazard Mitigation Planning Committee reviewed a list of 40 potential hazards (as listed in the State of Iowa Plan). For each of these hazards (listed in Table 15), the Committee discussed previous occurrences in the countywide area. They then reviewed factors present that could result in future occurrences. The Committee identified 40 of the 40 hazards as "Has Occurred" or "May Occur". Hazard identification by incorporated city is in Appendix K.

For all 40 hazards, the Committee completed a Hazard Profile Worksheet that analyzes six variables: Historical Occurrence, Probability, Vulnerability, Maximum Geographic Extent, Severity of Impact, and Speed of Onset. Each variable was then scored on a scale of one through four (scoring criteria is defined in the following tables). The resulting scores were then compiled into a formula that gave hazards a prioritizing value (see Page 98).

Historical Occurrence

How many times has this hazard occurred in the past? Each hazard may or may not have a comprehensive documented historical record. Because each hazard has a different period for

which historical occurrences have been collected, each hazard was prorated to a 25 year period. Local, state, and federal government agencies have increasingly improved record-keeping with respect to incidents, accidents, and disasters which affect people and property.

Historical Occurrence: The number of times that a hazard has occurred in the past 25 years.	
Score	Description
1	Less than 4 occurrences in the past 25 years
2	4 to 7 occurrences in the past 25 years
3	8 to 12 occurrences in the past 25 years
4	More than 12 occurrences in the past 25 years

Probability

The probability score reflects the estimated frequency of the hazard occurrence in the future. Many times the historical occurrence can be extrapolated into the future, but sometimes this is not accurate. If a hazard or its impacts have been mitigated, the future occurrence will most likely be less than the historical occurrence. The opposite can also be true. There may be new hazards that present themselves to the county. For example, a new industry that produces a hazardous material may have moved into the county where before, the hazard was not there.

Probability: Reflects the likelihood of the hazards occurring again in the future, sometimes without regard to the hazard's historical occurrence.		
Score	Description	
1	Unlikely	Less than 1% probability in the next 100 years
2	Possible	Between 1% and 10% probability in the next year, or at least one chance in the next 100 years
3	Likely	Between 10% and 100% probability in the next year, or at least one chance in the next 10 years
4	Highly Likely	Nearly 100% chance in the next year

Vulnerability

The vulnerability score represents adverse impacts to citizens, visitors, and emergency responders. Many hazards occur which do not significantly impact people.

Vulnerability: Measure of the percentage of people that will be adversely affected by the occurrence of the hazard.		
Score	Description	
1	Unlikely	<ul style="list-style-type: none"> ➤ Less than 10% of the total population of the jurisdiction ➤ No risk to response personnel, or no response needed
2	Possible	<ul style="list-style-type: none"> ➤ 10% to 25% of the total population of the jurisdiction ➤ Minimal risk to response personnel
3	Likely	<ul style="list-style-type: none"> ➤ 25% to 50% of the total population of the jurisdiction ➤ Moderate risk to response personnel
4	Highly Likely	<ul style="list-style-type: none"> ➤ More than 50% of the total population of the jurisdiction ➤ High risk to response personnel

Maximum Geographic Extent

The maximum geographic extent is the percentage of a jurisdiction impacted by a hazard. As an example, a snowstorm will likely impact the entire county, whereas a small hazardous materials incident may cover only a few city blocks.

Maximum Geographic Extent: The potential spatial extent of the impacted area.		
Score	Description	
1	Negligible	➤ Less than 10% of the jurisdiction
2	Limited	➤ 10% to 25% of the jurisdiction
3	Critical	➤ 25% to 50% of the jurisdiction
4	Catastrophic	➤ More than 50% of the jurisdiction

Severity of Impact

The severity of impacts is the most complex of the scoring guides. Many considerations must be accounted for including, at a minimum, the following:

- A. Health and safety of persons in the affected area at the time of the incident (injury and death);
- B. Health and safety of personnel responding to the incident;
- C. Continuity of operations;
- D. Property, facilities, and infrastructure;
- E. Delivery of services;
- F. The environment;
- G. Economic and financial condition;
- H. Regulatory and contractual obligations; and
- I. Reputation of the entity.

This scoring guide was provided to help the Hazard Mitigation Planning Committee provide an appropriate score for this complex section. It was found that impacts to certain areas call for a score in one category while impacts to another area call for a different score. Providing an appropriate score for that hazard characteristic in the overall scale of one (1) through (4) was the overriding factor. The scoring guides were provided as guides only, and served to provide a uniform frame of reference for all users of the assessment tool.

Severity of Impact: Assessment of severity in terms of injuries and fatalities, personal property, and infrastructure.		
Score	Description	
1	Negligible	<ul style="list-style-type: none"> ➤ Few if any injuries ➤ Minor quality of life lost with little or no property damage ➤ Brief interruption of essential facilities and services for less than 4 hours ➤ No environmental impact ➤ No impact to reputation of the jurisdiction
2	Limited	<ul style="list-style-type: none"> ➤ Minor injuries and illness ➤ Minor or short-term property damage which does not threaten structural stability ➤ Shutdown of essential facilities and services for 4-24 hours ➤ Minor short-term environmental impact ➤ Very limited impact to reputation of the jurisdiction
3	Critical	<ul style="list-style-type: none"> ➤ Serious injury and illness ➤ Major or long-term property damage which threatens structural stability ➤ Shutdown of essential facilities and services for 24-72 hours ➤ Minor long-term environmental impact ➤ Moderate impact to reputation of the jurisdiction
4	Catastrophic	<ul style="list-style-type: none"> ➤ Multiple deaths ➤ Property destroyed or damaged beyond repair ➤ Complete shutdown of essential facilities and services for 3 days or more ➤ Major long-term environmental impact ➤ Severe impacts to the reputation of the jurisdiction

Speed of Onset

The speed of onset is the amount of warning time available before the hazard occurs. This should be taken as an average warning time. For many of the atmospheric natural hazards there is a considerable amount of warning time as opposed to the human caused accidental hazards that occur instantaneously or without any significant warning time.

Speed of Onset: Rating of the potential amount of warning time that is available before the hazard occurs.	
Score	Description
1	More than 24 hours warning time
2	12-24 hours warning time
3	6-12 hours warning time
4	Minimal or no warning

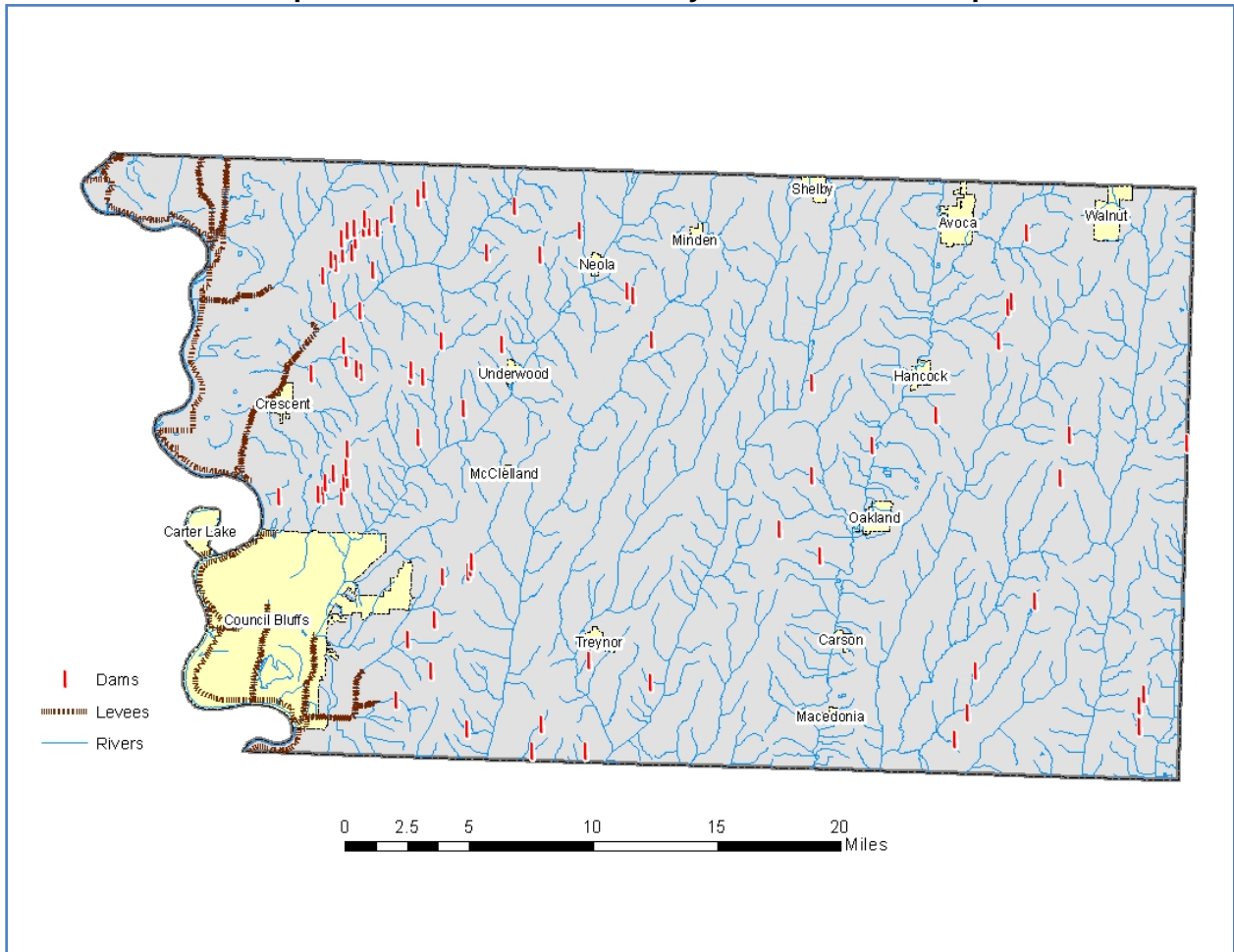
Table 15: Hazard Identification

Natural Hazards			
Has Occurred	May Occur	Absolutely Will Not Occur	Hazard
	X		Dam Failure
X			Drought
	X		Earthquake
X			Expansive Soils
X			Extreme Heat
X			Flash Flood
X			Grass or Wild Land Fire
X			Hailstorm
X			Landslide/Erosion/Slope Failure
X			Levee Failure
X			River/Stream Flood
X			Severe Winter Storm
	X		Sink Holes
X			Thunderstorm and Lightning
X			Tornado
X			Windstorm
Human Caused Accidental Hazards			
X			Air Transportation Incident
X			Communications Failure
X			Energy Disruption
X			Fixed Hazardous Materials Incident
	X		Fixed Radiological Incident
X			Highway Transportation Incident
X			Pipeline Incident
X			Rail Transportation Incident
X			Transportation Hazardous Materials Incident
	X		Transportation Radiological Incident
X			Waterway/Waterbody Incident
Human Caused Purposeful Hazards			
	X		Enemy Attack
X			Public Disorder
	X		Terrorism – Biological (Includes Agricultural Terrorism)
	X		Terrorism – Chemical
	X		Terrorism – Conventional
	X		Terrorism – Cyber
	X		Terrorism – Radiological
Other/Combination Hazards			
	X		Animal Disease Epidemic
X			Human Disease Epidemic
X			Plant/Crop Disease Epidemic
X			Structural Failure
X			Structural Fire

Dam Failure

Definition	A break in, or imposed threat from, any water retention fixture which may endanger population downstream of the containment area.	
Description	Dams are constructed for a variety of uses, including flood control, erosion control, water supply impoundment, hydroelectric power generation, and recreation. Flooding, operating error, poor construction, lack of maintenance, damage due to burrowing animals, vandalism, terrorism, and earthquakes can cause dam failure. Dams are classified into three categories based on the potential risk to people and property should a failure occur: <u>High Hazard</u> - If the dam was to fail, lives would be lost and extensive property damage could result; <u>Moderate Hazard</u> - Failure could result in loss of life and significant property damage; and <u>Low Hazard</u> - Failure results in minimal property damage only. The classification may change over time because of development downstream from the dam since its construction. Older dams may not have been built to the standards of its new classification. Dam hazard potential classifications have nothing to do with the material condition of a dam, only the potential for death or destruction due to the size of the dam, the size of the impoundment, and the characteristics of the area downstream of the dam. The Iowa Department of Natural Resources tracks all dams in the state of Iowa with a height of at least 25 feet or a total storage of at least 50 acre feet of water. The inventory excludes all dams less than 6 feet high regardless of storage capacity and dams less than 15 acre feet of storage regardless of height.	
Historical Occurrence	There are no documented dam failures that have affected the residents of Pottawattamie County in the last 25 years.	1
Probability	In the extremely remote event of failure of one or more of the Corps of Engineer Dams on the Missouri River in South Dakota, all 500-year floodplains and adjoining low laying areas near the river could be flooded within 24 hours. Many dams in Pottawattamie County are beginning to show signs of age and wear, increasing the risk of a failure with time. These dams are inspected on an annual basis to mitigate failure. Presently the probability of any dam failing in the next few years is relatively low. A list of dams within Pottawattamie County is found in Appendix N. Overall, there are 72 total dams of varying size in the county. Graphic 1 on the proceeding page shows dams (and levees) in Pottawattamie County.	1
Vulnerability	In the event of an upstream earthen dam failure, both unincorporated and incorporated areas will be at risk. Much of the unincorporated land is agricultural with some residential uses. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	In the event of a dam failure, flooding would affect areas in close proximity at a minimum.	2
Severity of Impact	<ul style="list-style-type: none"> A. Citizens most at risk from dam failure are those downstream of dam sites and those in the 100 or 500-year floodplains. Motorists are also at risk when driving on roads near creeks and streams. B. Rescuers are at some risk when attempting to work in rising and swiftly moving currents associated with dam failure. C. None directly, but operations could be affected by communication loss, critical facility damage/destruction, etc. D. Depends upon the downstream property, facilities, and infrastructure. Worst case scenario could involve whole subdivisions being swept away by the fast flowing water. E. If the water being held by the dam was used for source water, a secondary source of water may be needed until the water level could be restored. F. Much scouring would take place and erosion would be extensive. G. Most impacts are indirect due to disruption of business and damage to infrastructure on which industry and services rely on. H. No direct impact to contractual obligations. I. Victims sometime will blame development or monitoring practices. Inspection records must be kept up to date to demonstrate that proper maintenance was being done. 	3
Speed of Onset	Residents and businesses would have a few hours of lead time to prepare for rising waters and/or evacuate if needed.	4

Graphic 1: Pottawattamie County Dam and Levee Map



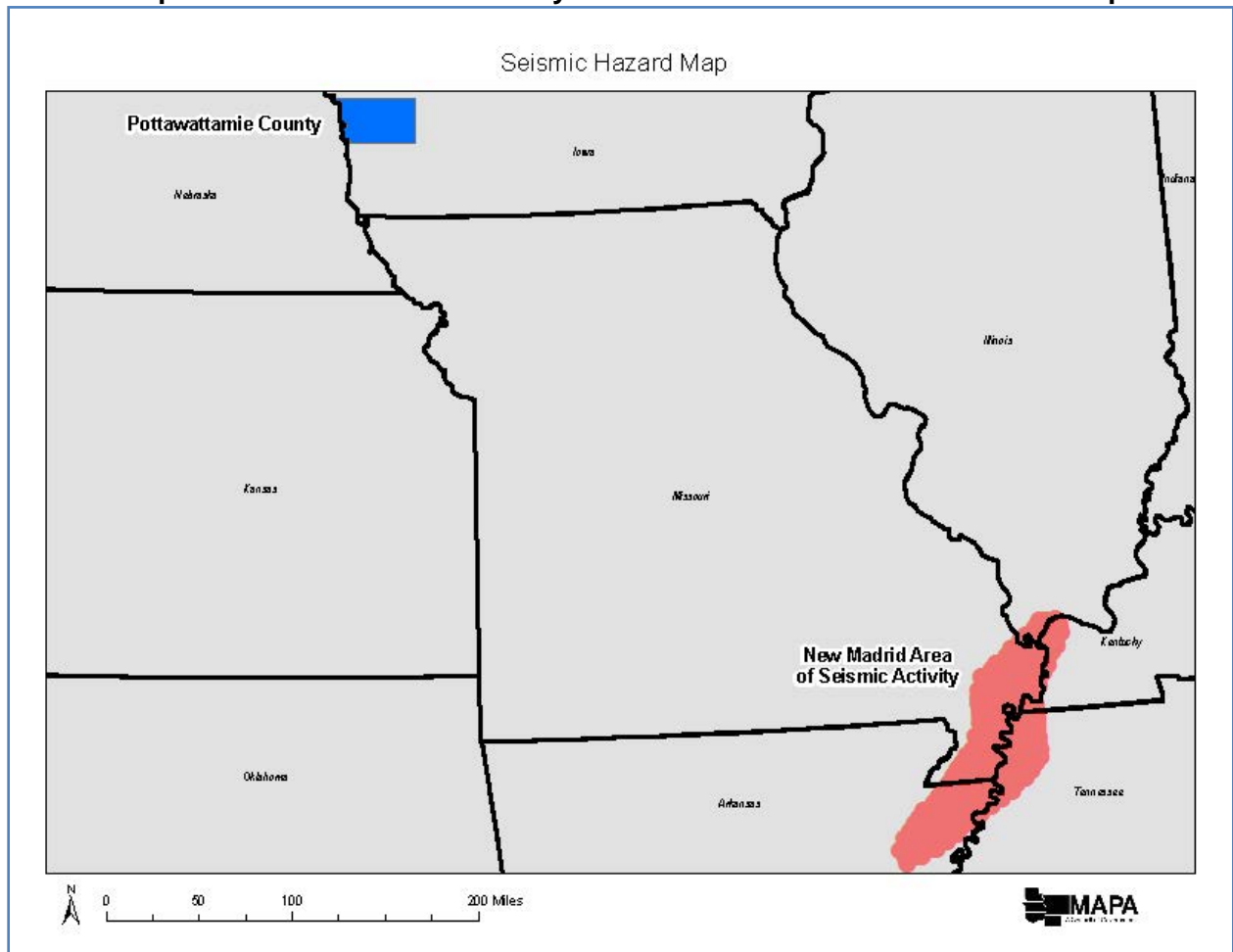
Drought

Definition	A period of prolonged lack of precipitation for weeks at a time producing severe dry conditions.	
Description	There are three types of drought conditions that are relevant to Iowa: <u>Meteorologic drought</u> , which refers to precipitation deficiency; <u>hydrological drought</u> , which refers to declining surface water and groundwater supplies; and <u>agricultural drought</u> , 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.	
Historical Occurrence	According to local records, drought or near drought conditions affected Pottawattamie County during periods in 1977, 1983, 1984, 1989, 2000-2003, 2005-2006, and 2012.	4
Probability	Lack of rainfall and long periods of extreme heat in the summer of 2012 have placed Pottawattamie in a moderate drought. Periods of drought are always possible in a given season, though the extent and duration are difficult to forecast.	3
Vulnerability	The municipal water systems in the county utilize groundwater and are somewhat protected from surface water fluctuations associated with drought. However, many of the county's residents are served by private water wells, which are relatively shallow and could run dry in the event of a severely prolonged drought. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	Drought conditions are generally uniform on a region-wide scale. There would be little variance in the scale of drought throughout the Pottawattamie County area. Droughts are monitored and classified by the Palmer Drought Index (PDI). The PDI is a measurement of dryness based on recent precipitation and temperature. Droughts are classified by the following conditions: <u>Extreme Drought</u> (-4.00 and below); <u>Severe Drought</u> (-3.99 to -3.00); <u>Moderate Drought</u> (-2.99 to -2.00); <u>Mid-Range</u> (-1.99 to 1.99); <u>Moderately Moist</u> (2.00 to 2.99); <u>Very Moist</u> (3.00 to 3.99); and <u>Extremely Moist</u> (4.00 and above). One of these conditions will affect 100% of Pottawattamie County at a given time.	4
Severity of Impact	<ul style="list-style-type: none"> A. There would be few if any health impacts to people in the affected area because of secondary sources of water. Health impacts would be more significant on livestock without auxiliary water supplies. B. Response personnel are at minimal risk. C. Continuity of operations would not be affected. D. Property losses would be limited to livestock and crops to the agricultural community. Facilities would not be impacted. Infrastructure could be affected in areas of expansive soils due to drying soils, lower water levels around dams, etc. E. Delivery of services would be limited to source water delivery and those services that consume large amounts of water. F. Drought is a naturally occurring hazard. The environmental impacts are usually short-term and the natural environment is used to drought cycles. Drought more directly affects agricultural crops, livestock, natural vegetation, wildlife, and stream flows (fish and aquatic vegetation). G. Drought can lead to significant impacts to the agricultural economy. Because of Pottawattamie County's strong reliance on the agricultural economy, the economic and financial impacts would certainly ripple out into other sectors. Rural areas can be especially affected by long-term drought. If restrictions are put on manufacturers that use large amounts of water, the local economy can be impacted that way as well. H. Regulations in the agricultural sector can be and are often adjusted to provide some lenience for adverse conditions for livestock and crop loss. I. Drought is a naturally occurring hazard and is "out of the hands" of local and state officials. Local jurisdictions can have their reputation damaged if they do not provide source water to residents or respond in a satisfactory manner to provide an alternative supply. 	3
Speed of Onset	Drought events occur slowly, over a period of weeks and months. Of all the hazards profiled in this plan, a drought is probably the slowest and most predictable hazard that can affect the county.	1

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: <u>tectonic</u> , <u>volcanic</u> , and <u>artificially produced</u> .	
Historical Occurrence	There have been no reported earthquake events in the Pottawattamie County area in the last 25 years.	1
Probability	The nearest threat of an earthquake in Pottawattamie County is the New Madrid Seismic Zone. Earthquakes that occur in the New Madrid Seismic Zone can potentially threaten parts of Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee. Graphic 2 on the proceeding page shows the proximity of Pottawattamie County to the New Madrid Zone.	1
Vulnerability	It is likely there would be little to no loss of life in the event of an earthquake in a seismic zone. The nearest zone, New Madrid, is over 500 miles from Pottawattamie County. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	Maximum geographic extent for an earthquake can be estimated by reviewing magnitude and scale of previous events in areas of similar geography and population density. The Richter Magnitude Scale is used to classify earthquake magnitude as follows: <u>Micro</u> (less than 2.0); <u>Minor</u> (2.0-3.9); <u>Light</u> (4.0-4.9); <u>Moderate</u> (5.0-5.9); <u>Strong</u> (6.0-6.9); <u>Major</u> (7.0-7.9); <u>Great</u> (8.0-9.9); and <u>Massive/Epic</u> (10.0 to more). The Mercalli Intensity Scale quantifies the effect of an earthquake on the Earth's surface, humans, objects of nature, and manmade structures on a scale of I (not felt) to XII (total destruction). Geographic extent will depend on the magnitude and intensity of the event.	1
Severity of Impact	<ul style="list-style-type: none"> A. Ground shaking should be very minor and minimally threaten public health and safety. B. First responders should take extra precautions if aftershocks are reported, but there should not be a significant threat to the health and safety of rescuers. C. Continuity of operations would be affected only indirectly if communications were to be disabled. D. There is the possibility of noticeable shaking or structural shifting of poorly constructed buildings. No significant property damage is expected to occur from an earthquake in Pottawattamie County. E. Delivery of services such as water, gas, electricity, etc. may suffer minor, short-term delays. F. There could be potential for some localized underground pipe leaks or ruptures if tremors were strong enough. G. No known impact to the Pottawattamie County economy. H. Impacts would be limited to debris removal if any were produced. I. No known impact to jurisdictional reputation. 	1
Speed of Onset	Due to the county's proximity to any known fault lines, some county residents may have a few minutes of lead time before any tremors reach the county. However, any earthquake that affects the county will do so with virtually no warning.	4

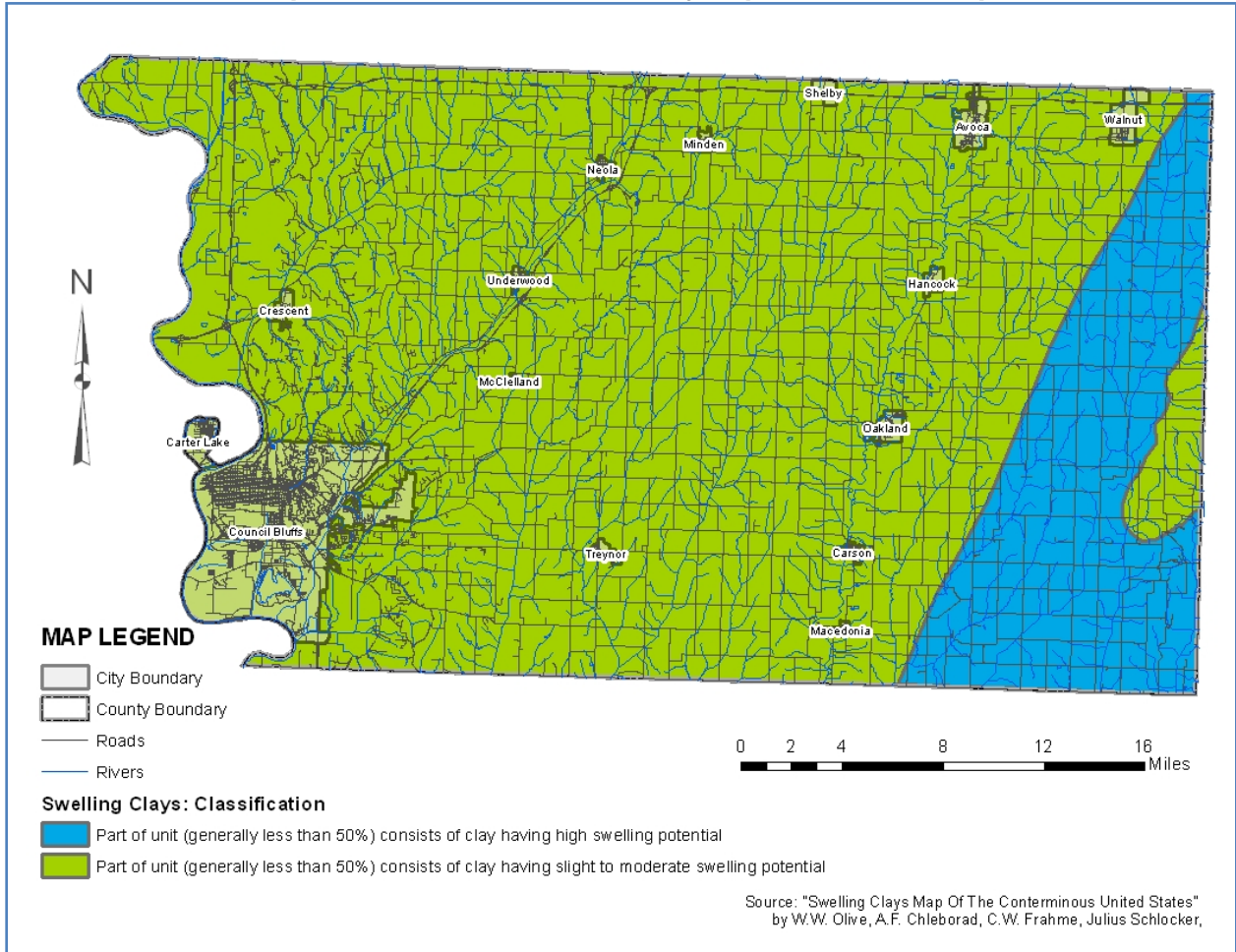
Graphic 2: Pottawattamie County-New Madrid Seismic Zone Location Map



Expansive Soils

Definition	Soils and soft rock that tend to shrink or swell 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.	
Historical Occurrence	There has been no notable occurrence of expansive soils in the last 25 years.	1
Probability	Probability and frequency analyses have not been prepared because of the nature of occurrence of this hazard. This is consistent with other geologic hazards that occur slowly over time.	1
Vulnerability	Little if any direct human impacts. Impacts commonly involve swelling clays beneath areas covered by buildings and slabs of concrete and asphalt, such as those used in construction of highways, walkways, and airport runways. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The maximum extent of expansive soils to Pottawattamie County is likely negligible. According to "Swelling Clay Maps of the Conterminous United States," much of the soil in Pottawattamie County consists of clay having "slight to moderate swelling potential" (see Graphic 3 on the proceeding page). There are no incorporated or unincorporated jurisdictions containing soil that consists of clay having "high swelling potential."	1
Severity of Impact	<ul style="list-style-type: none"> A. No known impact to public health and safety. B. No known impact to first responder health and safety. C. No known impact to continuity of operations. D. The most extensive damage from expansive soils occurs to highways and streets. Houses and one-story commercial buildings are more apt to be damaged by the expansion of swelling than are multi-story buildings, which usually are heavy enough to counter swelling pressures. The most obvious manifestations of damage to buildings are sticking doors, uneven floors, and cracked foundations, floors, walls, ceilings, and windows. E. Utilities could be affected because of constant pushing and pulling resulting in cracks, breaks, and severing of underground infrastructure. F. Environmental impacts would be limited to spills and leaks of containment facilities. G. Economic and financial impacts would be felt by individual owners of buildings and facilities. These would occur over time and would not be a onetime impact. H. Building code requirements may impose due burden on construction to ensure proper performance of buildings and utilities in areas with expansive soils. I. No known impact to jurisdictional reputation. 	1
Speed of Onset	This is a generally slow occurring hazard.	2

Graphic 3: Pottawattamie County Expansive Soils Map



Extreme Heat

Definition	Temperatures (including heat index) in excess of 100 degrees Fahrenheit or three successive days of 90 degrees Fahrenheit or higher. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.	
Description	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.	
Historical Occurrence	Pottawattamie County experiences at least one extreme heat event each summer. The duration and severity of that event varies from year to year, but the county generally experiences extreme heat on an annual basis. See Appendix M for historical occurrences.	4
Probability	Based on historical information, the county will almost certainly continue to experience an extreme heat event on an annual basis. Isolated days with extreme heat occur yearly, and the county has experienced heat waves from time to time and can expect similar conditions in future summers.	4
Vulnerability	The effects of extreme heat vary from event to event, but in almost all cases, the persons most at risk are the elderly, people who work outdoors, and households without air conditioning. Schools will dismiss early during extreme heat events, especially when conditions make it difficult for school officials to adequately cool buildings. Buildings and infrastructure would not be harmed. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	All extreme heat events in Pottawattamie County affect the entire area, and usually affect hundreds of square miles of area at once. Long periods of extreme heat will greatly affect those that do not have air conditioning. Crops and livestock will also struggle, and prolonged heat waves can threaten human and animal life.	4
Severity of Impact	<ul style="list-style-type: none"> A. Extreme heat conditions can lead to heat stroke, dehydration and even death. B. Response personnel could suffer heat stroke and dehydration working in extreme heat conditions. C. None directly, see E. D. Transportation impacts include the loss of lift for aircrafts, softening of asphalt roads, buckling of highways and railways, and stress on automobiles and trucks (increase in mechanical failures). E. Electric transmission systems are impacted when power lines sag in high temperatures. High demand for electricity also outstrips supply, causing electric companies to have rolling black outs. The demand for water also increases sharply during periods of extreme heat. This can contribute to fire suppression problems for the county's volunteer fire departments. F. Livestock and other animals are adversely impacted by extreme heat. High temperatures at the wrong time inhibit crop yields as well. G. There is potential for economic costs in transportation, agriculture, production, energy, and infrastructure. These direct costs could impact many other economic sectors indirectly. H. No known impact to contractual obligations. I. No impact if response is adequate and timely. 	2
Speed of Onset	As with other weather phenomena, periods of extreme heat are predictable within a few degrees within 3 days or so. Variations in local conditions can affect the actual temperature within a matter of hours or even minutes. The National Weather Service will initiate alert procedures when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.	1

Flash Flood

Definition	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.	
Description	Flash flooding results from intense rainfall over a brief period, 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 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.	
Historical Occurrence	<p>Pottawattamie County experienced numerous significant flash flood events over the past 25 years. NOAA has seven such events on record since 1993 (see Appendix M). Pottawattamie County has been included in seven Presidential Disaster Declarations:</p> <ul style="list-style-type: none"> ▪ May 27, 2008: FEMA DR-1763 ▪ May 25, 2007: FEMA DR-1705 ▪ May 25, 2004: FEMA DR-1518 ▪ August 6-7 1999: FEMA DR-1282 ▪ June 14-19, 1998: FEMA DR-1230 ▪ August 21, 1996: FEMA DR-1133 ▪ July 9, 1993: FEMA DR-0996 	3
Probability	As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. Larger portions of the county around Council Bluffs are being developed with impervious surfaces. As development continues, the amount of runoff produced also increases. Unless measures are taken to control the amount of runoff (or slow its movement), flash flooding will continue and possibly increase. Storm sewer systems are necessary to carry increased runoff in certain areas and are not generally constructed in rural developments. Flash floods in the West Nishnabotna, East Nishnabotna, Boyer, Keg-Weeping Water, and Big Papillion-Mosquito Watersheds are equally probable. It is highly likely that the county will be affected by flash flooding in the near future.	3
Vulnerability	Particularly at risk are those in low lying areas; close to dry creek beds or drainage ditches; near water; or downstream from a dam, levee, or storage basin. People and property in areas with insufficient storm sewers and other drainage infrastructure can also be put at risk because the drains cannot rid the area of runoff quickly enough. Nearly half of all flash flood fatalities are auto related. Motorists often try to traverse water covered roads and bridges and are swept away by the current. Six inches of swiftly moving water can knock persons off their feet and only two feet of water can float a full sized automobile. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	People and property located in low lying areas and in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be impacted in the event of a significant rainfall. Unlike areas affected by a river/stream flood, flash floods can impact areas far from the stream itself. Streets can become moving rivers and basements can fill with water in a matter of minutes.	2
Severity of Impact	<p>A. Flash floods take lives every year in the United States. Those especially vulnerable to flash flooding include people in low lying areas, people close to dry creek beds or drainage ditches, people downstream or near water, and travelers in automobiles. There are no known fatalities from flash flooding in Pottawattamie County.</p> <p>B. Rescuers are at significant risk when attempting to work in swift moving floodwaters associated with flash flooding.</p> <p>C. Continuity of operations can be compromised at least temporarily during flash flooding or severe weather that precedes flooding. Impacts may include flooded critical facilities, downed power and communication, and blocked roadways.</p> <p>D. Personal property can be extensively damaged and destroyed by swift moving water. Land surrounding buildings can be scoured and structural integrity compromised. Because flash floodwater passes through premises quickly, damages similar to standing water are not as prevalent. However, flash floods cause abrasive type damages such as erosion and undercutting.</p> <p>E. Drainage and wastewater services can be compromised during flash flooding. Roadways may also be cut off by water or debris disburged from floodwaters.</p>	4

	<p>F. Contaminated water is a primary environmental impact of flash flooding. Manmade objects can also be disbursed by floodwaters to natural settings where they can create problems.</p> <p>G. Most impacts are indirect due to disruption of business and damage to infrastructure on which industry and services rely on.</p> <p>H. No direct impacts to contractual obligations.</p> <p>I. Flash floods can be damaging to the reputation of a community if proper notification and warning are not given. Victims may blame development or other changes in their communities as the cause of flooding on their properties.</p>	
Speed of Onset	Flash floods are somewhat unpredictable, but there are factors that can point to the likelihood of a flood event in the county. Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Advance warnings for some of these events are not always possible.	4

Grass or Wild Land Fire

Definition	An uncontrolled fire that threatens life and property in either a rural or wooded area and is beyond normal day-to-day response capabilities.	
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.	
Historical Occurrence	There have been numerous grass and timber fires in Pottawattamie County over the last 25 years that required a response beyond the normal capabilities of any one fire department. Even the Council Bluffs Fire Department responds to an average of 21 grass or wild land fires per year. On March 6, 2005 a smoldering tree stump started a field of grass and crop residue on fire near the City of Carson, burning nearly 4,000 acres and resulting in damages of approximately \$5 million.	4
Probability	Prevailing dry conditions in the county favor grass or timber fires. It is likely a fire will occur in the next 5 to 10 years.	3
Vulnerability	The areas of Pottawattamie County that are most vulnerable to a grass or wild land fire are the levee areas along the Missouri River and the undeveloped areas and parklands along the bluffs, which extend throughout the northern and eastern portions of the county. As residential development continues throughout the county, the vulnerability of residences to grass fires will increase. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	Most grass fires are contained to highway right-of-way and rail right-of-way ditches and are less than a few acres in size. High winds can turn a small flame into a multi-acre grassfire within a matter of minutes. However, due to the land cover throughout the county, it is unlikely that a grass fire would spread to more than a few isolated properties.	2
Severity of Impact	<ul style="list-style-type: none"> A. Injuries and deaths from fighting the fire most often occur by natural causes such as heart attack or stroke. B. Volunteer fire fighters in Pottawattamie County are well equipped and protected from most risks associated with grass and wild land fires. C. Operations would unlikely be disrupted. D. Property damage is usually limited to grass, small trees, etc. Occasionally a house or outbuilding can be damaged or destroyed. E. No known impact to service delivery. F. Environmental impacts of grass and wild land fires do not deviate much from the burning of the grasses, crops, or other low land cover. G. The loss of crops could potentially lead to economic hardships within a jurisdiction. H. Jurisdictions throughout Pottawattamie County are engaged in mutual aid agreements for fire response, including grass and wild land fires. I. Grass fires occur frequently and have little impact on reputation. 	2
Speed of Onset	As mentioned above, most grass fires occur without warning and travel at a moderate rate. Fires that will impact the county will probably generate along right-of-ways or from burn piles, and will likely be blown toward crop areas and residential sites. In a situation where a grass fire threatens significant numbers of properties, most citizens will have adequate time to evacuate.	4

Hailstorm

Definition	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. Pets and livestock are particularly vulnerable to hail.																																					
Historical Occurrence	In August of 1999, a hail storm event produced 2.75 inch size hail in the City of Oakland. On April 10, 2001 and May 13, 2001 a severe hail storm swept across the City of Council Bluffs. Local records show this storm causing millions of dollars in damage. Hail measuring up to 2.5 inches in diameter caused \$340,000 in damage to the city's public safety vehicles. The county's fleet of public safety vehicles suffered another \$150,000 in damage. The hailstorms of April 10 and May 13, 2001, which damaged thousands of cars and over 3,000 commercial and residential structures, resulted in the inclusion of Pottawattamie County in Presidential Disaster Declaration FEMA DR-1367 . An August 18, 2011 a hail storm in western Pottawattamie County produced 2.75 inch size hail causing nearly a million dollars in damage to Iowa Western Community College and thousands of dollars in damage to vehicles and residential properties. According to NOAA records, there have been 164 hail events in Pottawattamie County since 1962 (see Appendix M).	4																																				
Probability	Given the frequency of hail producing thunderstorms in Southwest Iowa and the number of significant hail events that have occurred in Pottawattamie County and nearby counties in recent years, there is a good chance that the county will experience another significant hail event in the near future.	4																																				
Vulnerability	The primary risks associated with a hailstorm are the potential for damage to vehicles, buildings, and crops. Hailstorms can result in injuries from time to time but rarely can be directly attributed to fatalities. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2																																				
Maximum Geographic Extent	<p>Many hailstorms will cover a large portion of the county. Within a storm there may be isolated areas that receive larger hailstones or more hail than other areas, but hailstorms are rarely isolated to small areas within the county. Most of these storms will impact at least 10% of the county to some degree. In Pottawattamie County hail is measured by the TORRO Hailstorm Intensity Scale. The scale extends from HO to H10 with its increments on intensity or damage potential related to hail size, texture, number, fall speed, speed of storm translation, and strength of accompanying winds. The scale is described as follows:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Typical Hail Diameter (mm)</th> <th style="text-align: center;">Typical Damage Impacts</th> </tr> </thead> <tbody> <tr> <td>HO</td> <td>5 (pea)</td> <td>No damage</td> </tr> <tr> <td>H1</td> <td>5-15 (mothball)</td> <td>Slight general damage to plants, crops</td> </tr> <tr> <td>H2</td> <td>10-20 (marble)</td> <td>Significant damage to fruit, crops, vegetation</td> </tr> <tr> <td>H3</td> <td>20-30 (walnut)</td> <td>Severe damage to fruit and crops, damage to plastic structures, paint and wood scoured</td> </tr> <tr> <td>H4</td> <td>25-40 (squash ball)</td> <td>Widespread glass damage, vehicle bodywork damage</td> </tr> <tr> <td>H5</td> <td>30-50 (golf ball)</td> <td>Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries</td> </tr> <tr> <td>H6</td> <td>40-60 (hen's egg)</td> <td>Bodywork of grounded aircraft dented, brick walls pitted</td> </tr> <tr> <td>H7</td> <td>50-75 (tennis ball)</td> <td>Severe roof damage, risk of series injuries</td> </tr> <tr> <td>H8</td> <td>60-90 (soft ball)</td> <td>Severe damage to aircraft bodywork</td> </tr> <tr> <td>H9</td> <td>75-100 (grapefruit)</td> <td>Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open</td> </tr> <tr> <td>H10</td> <td>>100 (melon)</td> <td>Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open</td> </tr> </tbody> </table>		Typical Hail Diameter (mm)	Typical Damage Impacts	HO	5 (pea)	No damage	H1	5-15 (mothball)	Slight general damage to plants, crops	H2	10-20 (marble)	Significant damage to fruit, crops, vegetation	H3	20-30 (walnut)	Severe damage to fruit and crops, damage to plastic structures, paint and wood scoured	H4	25-40 (squash ball)	Widespread glass damage, vehicle bodywork damage	H5	30-50 (golf ball)	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries	H6	40-60 (hen's egg)	Bodywork of grounded aircraft dented, brick walls pitted	H7	50-75 (tennis ball)	Severe roof damage, risk of series injuries	H8	60-90 (soft ball)	Severe damage to aircraft bodywork	H9	75-100 (grapefruit)	Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open	H10	>100 (melon)	Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open	2
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H7	50-75 (tennis ball)	Severe roof damage, risk of series injuries																																				
H8	60-90 (soft ball)	Severe damage to aircraft bodywork																																				
H9	75-100 (grapefruit)	Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open																																				
H10	>100 (melon)	Extensive structural damage; Risk of severe or even fatal injuries to persons caught in the open																																				
Severity of Impact	<p>A. Exposure to hail larger than a nickel can be very dangerous and life threatening. B. Risk to response personnel is the same as the risk to others without shelter from hail. C. Operations should not be affected to any significant degree. D. Damage to property, facilities, and infrastructure is usually limited to broken windows and damaged roofs. E. Delivery of services should not be affected to any significant degree. There may be minor disruptions, but they would likely come from high winds and lightning (usually</p>	2																																				

	<p>associated with hailstorms).</p> <p>F. Hail can strip plants of their vegetation in very little time. If this occurs at a critical time in the life cycle of plants, it could have fatal consequences.</p> <p>G. The peak hail activity coincides with the Midwest's peak agricultural season. Significant hail events can cause hundreds of thousands of dollars in damage, but most damaged crops, vehicles, and buildings are covered with some degree of insurance. Financial impact can be severe. Due to repeated hail losses in this region, insurance premiums have doubled for casualty insurance covering hail loss.</p> <p>H. No known risk to contractual obligations.</p> <p>I. No known impact to jurisdictional reputation.</p>	
Speed of Onset	<p>Forecasting hailstorms, as with their parent thunderstorms, is becoming quite accurate due to the advancement in Doppler radar and other technologies operated by the National Weather Service and many televisions weather departments. Warnings in the 20 to 30 minute range are usually available prior to the occurrence of the storm.</p>	4

Landslide/Erosion/Slope Failure

Definition	A downward and outward movement of slope forming materials reacting under the force of gravity.	
Description	Landslides occur when masses of rock, earth, or debris move down a slope. Landslides may be very small or very large, and can move at slow to very high speeds. Many landslides have been occurring over the same terrain since prehistoric times. They are activated by storms and fires and by human modification of the land. New landslides occur as a result of rainstorms, earthquakes, and various human activities.	
Historical Occurrence	There have been no documented landslides in Pottawattamie County in the past 25 years.	1
Probability	Due to the hilly terrain of Pottawattamie County and the presence of some very steep Loess Hills bluffs in the western part of the county, it is highly likely that landslides will occur. Loess Hills soil is highly cohesive and tends to stand in cliffs or blocks when dry, however, saturation can cause the slopes to fail, resulting in landslides. Fortunately the nature of these events is such that damage to property is not widespread and the landslides are usually highly localized and relegated to gullies where little human activity occurs. The mining of Loess Hills soil as fill dirt contributes to the probability of landslides, thus the likelihood of slope failure near quarries is high. Construction practices in the Loess Hills also contribute to the probability of slope failure; sediment and erosion control practices will help to curb this risk.	1
Vulnerability	Any landslide that would occur in Pottawattamie County would be limited to residences located at the top or bottom of the county's steeper bluffs/hills. Landslides could impact roadways, hindering emergency response capabilities. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	A landslide event in Pottawattamie County would most likely be limited to an area less than a square mile at the most and would probably only affect a few residential properties and secondary roads.	1
Severity of Impact	<ul style="list-style-type: none"> A. Injuries and deaths are very unlikely except in the case of undetected slope failure warning signs in structures overlooking steep slopes. B. Limited if any. C. No known impact to continuity of operations. D. Property would be limited to a very small percentage of structures. Infrastructure damages would be more significant. Utilities such as pipelines, cables, power poles, etc. are often vulnerable to downward movements of the soil. E. Delivery of services would be limited to only those services whose infrastructure was impacted. For example, there may be minor power outages or water disruptions if a landslide shifts or destroys underground utilities. F. This is usually a naturally occurring event and would occur on a very localized scale. G. Landslides have damaged homes, disrupted electricity, water service, communications, and transportation routes. Economic impacts would be secondarily associated with landslides H. No known impact to contractual obligations. I. Occurrences would be very rare and would not have significant impact on the reputation of a jurisdiction. 	2
Speed of Onset	Since a landslide would be triggered by other hazards and slowly developing conditions, the lead time for such an event would be a number of days in which an area would become susceptible to slope failure.	4

Levee Failure

Definition	Loss of structural integrity of a wall, dike, berm, or elevated soil by erosion, piping, saturation, or under seepage causing water to inundate normally dry areas.	
Description	The only levees in the county are located in the southwest portion surrounding Council Bluffs. These are constructed primarily of sand with compacted clay caps on the top and sides. They are located along the Boyer River chute, along the Missouri River outside of Council Bluffs, and along portions of the Indian Creek. These protect both the City of Council Bluffs and western rural Pottawattamie County. Other similarly constructed levees during heavy rainfalls that follow the dry spells, water fills the cracks and fissures. In addition to increasing the hydrostatic forces, the water is slowly absorbed by the clay. The effect of the absorbed water is an increase in the unit weight of the clay as well as a decrease in its shear strength. This results in a simultaneous increase of the slide (driving) forces and a decrease of the resisting (shear strength) forces. Furthermore, the cyclic shrink/swell behavior of the cracked clay zone results in a progressive reduction of the shear strength of the clay, perhaps approaching its residual strength. It also results in deepening of the cracked clay zone, which may eventually reach a depth of 9 ft (2.74 m) or more, especially for clays with a plasticity index greater than 40. The end result may be a sloughing failure following a heavy rainfall. It is believed that fast removal of the runoff water from the interconnected network of cracks could alleviate this surface instability problem.	
Historical Occurrence	In 1952, the levees along the Missouri River were built to protect surrounding agricultural lands from a 100-year flood event. The massive floods of that year easily overtopped that levee and caused millions of dollars in damage to thousands of properties in southwest Iowa. Levees were later rebuilt to withstand a 500-year flood event. Controlled flooding of the Missouri River by the U.S. Army Corps of Engineers in the summer of 2011 created record flooding conditions over a period of over four months. From May through October, levees along the Missouri River were inundated with water. And though there were no levee failures, structural integrity of the levees was significantly compromised. Repair and reinforcement of levees and drainage systems along the Missouri River will continue into 2012 and likely beyond.	1
Probability	The likelihood of a levee failure in Pottawattamie County is low. However, almost all of the necessary factors for a levee failure are beyond of the county's control. Those factors include substantial rainfall over a prolonged period of time and the potential for an upstream dam failure along the Missouri River in South Dakota.	2
Vulnerability	In the unlikely event of a levee failure along the Missouri River, thousands of acres of agricultural ground would be flooded and many residences would be severely damaged or destroyed. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The levee system in place will prevent most floods from leaving the floodway, but if a flood is large enough to overtop a levee or collapse a wall, very few buildings in flood-prone areas could withstand the force and volume of the water.	3
Severity of Impact	<ul style="list-style-type: none"> A. Citizens in floodplains and near levees are usually given adequate notice to evacuate their homes or businesses before levees breach. Standing water can produce health risks such as hazmat exposure, infectious diseases, electrical exposure, etc. B. See river/stream flood and flash flood. C. There would be no significant impacts to continuity of operations unless critical facilities or services are impacted by the floodwaters. If so, areas of operation will have to be relocated for a period of time until the water recedes. D. Any property and infrastructure located in the 100 or 500-year floodplains face potential damage or all-out destruction, depending on how long water stands in those areas after the breach. E. Services in and near the floodplain may be impacted, but the levee break should still keep the waters within the original floodplain. F. The breach allows large volumes of water to enter formerly dry areas, forming temporary lakes. Such lakes do not go away immediately, because the lake is blocked from returning to the main channel by levee segments that were not destroyed. Consequently, the water level drops along the main river days before it drops behind breached levees. Pumps behind the levees are often needed to remove floodwaters that breach the levees. This alleviates some of the impacts associated with levee failure. G. Economic losses for homeowners and business owners can be catastrophic in the 	3

	<p>event of levee failure despite flood insurance and other precautions. Businesses that have been flooded out will be unable to operate for at least the short-term following the incident. The permanent loss of one business in several communities in Pottawattamie County may be devastating to their local economies. Flood recovery and levee repair efforts are also expensive to the jurisdictions that are responsible. Costs incurred for repairs may take years or decades to recoup.</p> <p>H. No known impact to contractual obligations.</p> <p>I. Residents behind levees often have a false sense of security. There may be damage to local reputation if a jurisdiction does not communicate to its residents the actual risks of levee failure.</p>	
Speed of Onset	Any levee failure in the county will not happen without days of prior warning signs. The factors that have to be in place for a levee to fail will develop over a prolonged period of time.	1

River/Stream Flood

Definition	A rising or overflowing of a tributary or body of water that covers adjacent land not usually covered by water when the volume of water in a stream exceeds the channel's capacity.	
Description	Floods are the most common and widespread of all natural disasters, except 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.	
Historical Occurrence	<p>Pottawattamie County has experienced river/stream floods that have resulted in seven Presidential Disaster Declarations:</p> <ul style="list-style-type: none"> ▪ June 27, 2011: FEMA DR-1998 ▪ May 27, 2008: FEMA DR-1763 ▪ May 25, 2007: FEMA DR-1705 ▪ May 25, 2004: FEMA DR-1518 ▪ August 6-7, 1999: FEMA DR-1282 ▪ June 15-July 23, 1996: FEMA DR-1133 ▪ July 8-9, 1993: FEMA DR-0996 <p>Historically, the largest floods in Pottawattamie County occurred in 1952, 1993 and 2011. These floods caused millions of dollars in damage and washed out homes, infrastructure and businesses. In May of 2011, the U.S. Army Corps of Engineers began releasing record amounts (up to 160,000 cubic feet per second) of water from Gavins Point Dam in South Dakota. The controlled flooding was in response to record precipitation and delayed snow melt in the upper Missouri River basin. From May through October, significant portions of western Pottawattamie County were inundated with water.</p>	2
Probability	Given the historical occurrence of this hazard, it is likely that there will be a minor flood event in the next three to four years and possibly a major flood in the next decade.	2
Vulnerability	The entire western boundary of Pottawattamie County is defined by the Missouri River. The Army Corps of Engineers has designed and constructed a levee system to protect much of this area from a direct flood of the Missouri River. Flood Insurance Rate Maps (FIRM) developed by FEMA and updated for the county show that significant portions of Pottawattamie County are located in either a 100 or 500-year floodplain from either the Missouri River or adjacent streams and watersheds. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	Nearly 15 percent of Pottawattamie County is affected by the 100 or 500-year floodplain based on FIRM information.	2
Severity of Impact	<p>A. Citizens near floodplains or tributaries are usually given adequate notice to evacuate their homes or businesses before water levels exceed channel capacity. River/stream flood does not have as high a risk as flash flooding because of the slower onset of the former.</p> <p>B. Responding to river flooding often includes sandbagging and working in floodwaters. Response personnel that do not have current tetanus and hepatitis shots face risk of infection.</p> <p>C. Operations can be disrupted from direct impacts if facilities are located in the floodplain and indirectly from loss of critical services to maintain operations.</p> <p>D. Any property and infrastructure located in the 100 or 500-year floodplains face potential damage or all-out destruction. The degree of damage is dependent on the pace of moving water and the duration that water sits in the flooded area.</p> <p>E. Damage and disruption of communications, transportation routes/vehicles, utilities, and other services are likely in serious cases. Water treatment and wastewater treatment facilities are located in or near floodplains in Pottawattamie County and are at high risk for flooding.</p> <p>F. Floodwaters may contain manmade materials, many of which are hazardous and dangerous to the environment. Clean water supplies may become contaminated.</p> <p>G. Economic losses for homeowners and business owners can be catastrophic in the</p>	3

	<p>event of flooding despite flood insurance and other precautions. Businesses that have been flooded out will be unable to operate for at least the short-term following the incident. The permanent loss of one business in several communities in Pottawattamie County may be devastating to their local economies. Flood recovery efforts are also expensive to the jurisdictions that are responsible, though there is government financial assistance available in many cases. Costs incurred for repairs may take years or decades to recoup.</p> <p>H. No known impact to contractual obligations.</p> <p>I. Participation in the National Flood Insurance Program and providing up to date Flood Insurance Rate Maps will assist jurisdictions head off allegations of poor service or support.</p>	
<p>Speed of Onset</p>	<p>River flooding usually develops over the course of several hours or even days depending on the basin characteristics and the position of forecasts for the Omaha-Council Bluffs area. Flood warnings are issued over radio, television and weather radios. People in the paths of river floods usually have time to take appropriate actions to limit harm to themselves and their property.</p>	<p>2</p>

Severe Winter Storm

Definition	Severe winter weather conditions that affect day-to-day activities. These can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold.	
Description	Winter storms are common during the winter months of October through April. The various types of extreme winter weather cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapsed buildings, and loss of livestock and wildlife. Blizzard conditions are winter storms which last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of one-quarter mile or less, and whiteout conditions. Heavy snows of more than 6 inches in a 12 hour period or freezing rain greater than 0.25 inches accumulation causing hazardous conditions can slow or stop the flow of vital supplies and 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. Ice storms result in fallen trees, broken tree limbs, downed power lines and utility poles, fallen communications towers, and impassable transportation routes. Severe ice storms have caused total power outages over large areas of Iowa and rendered assistance unavailable to those in need. 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 and wildlife, and pets are also at risk from extreme cold and severe winter weather.	
Historical Occurrence	Pottawattamie County will usually experience at least one heavy snowfall and/or freezing precipitation event annually. Pottawattamie County has been included in five Presidential Disaster Declarations for severe winter weather: <ul style="list-style-type: none"> ▪ March 2, 2011: FEMA DR-1880 ▪ February 25, 2012: FEMA DR-1877 ▪ March 30, 2007: FEMA DR-3275 ▪ March 14, 2007: FEMA DR-1688 ▪ November 20, 1997: FEMA DR-1191 	3
Probability	The probability of a major winter storm in the county depends on climatic conditions in the area, but in general, the county receives a major winter storm about once every four or five years. There are smaller events that occur on a more frequent basis that may merely be an inconvenience rather than a hazardous threat.	3
Vulnerability	Hazardous driving conditions and exposure to extreme wind chills and temperatures are the primary threats associated with winter storms. Elderly and the young are the most at risk, but all residents face danger if exposed for long durations. Power outages can be dangerous to vulnerable populations during extremely cold periods. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	Winter storms generally affect multiple counties and cover hundreds of miles. In addition to affecting the entire county, many winter storms often restrict access to communities for extended periods due to poor road conditions in adjoining rural areas. Almost 100 percent of the geographic area will be affected.	3
Severity of Impact	<p>A. Exposure to severe winter weather conditions can be dangerous and life threatening to individuals. Particularly at risk are the elderly, young children and people without adequate shelter or heat. People driving in severe winter weather are also at risk from accidents. There have been no casualties due to severe winter weather in the last 25 years.</p> <p>B. Response personnel are exposed to cold temperatures and traffic accidents when responding to the victim needs.</p> <p>C. Potential exists for power and communications failure during severe winter weather, which limits continuity of operations. Dangerous driving conditions or impassable roads can prevent critical staff from reaching their destination or place of work.</p> <p>D. Older and poorly constructed buildings can collapse under heavy snow or high winds. Buildings that are not adequately heated can experience damage from frozen piping. Downed trees, utility poles and towers also pose serious risk to property and structures. However, typical winter storms cause more of a nuisance than significant damage.</p> <p>E. Immobilized vehicles (including law enforcement and rescue), obstructed roadways, power outages, and communications failures are just some of the impacts severe winter weather has on service delivery. Fire is a serious risk since water supplies may freeze in sub-zero temperatures.</p> <p>F. Winter storms are a natural occurrence and have no impact on the environment. Ice</p>	2

	<p>jams on streams and rivers may pose flooding risks once temperatures rise.</p> <p>G. The cost of snow removal, debris cleanup, and utility repair can cost jurisdictions and businesses thousands of dollars for one event. Large storms can shut down businesses for days in some cases.</p> <p>H. Jurisdictions in and including Pottawattamie County should continue to maintain snow emergency ordinances. Removal of debris and reinstatement of energy are vital to public safety. Agreements with utility providers and snow removers should be regularly maintained.</p> <p>I. Effective and timely response to a winter storm is key to maintaining a positive reputation. Streets clear of snow and ice are important to the public.</p>	
Speed of Onset	<p>Major winter storms are often forecast at least a few days in advance. However, while citizens generally have advance warning that some kind of storm is coming, the exact magnitude of a winter storm cannot generally be predicted. In most cases people have time to prepare for a storm but cleanup and recovery may take time as well.</p>	2

Sink Holes

Definition	The loss of surface elevation due to the removal of subsurface support.	
Description	Sinkholes range from broad, regional lowering of the land surface to localized collapse. The primary causes of most subsidence are human activities: underground mining of coal, groundwater or petroleum withdraw, and drainage of organic soils. Sinkholes are due also to erosion of limestone of the subsurface.	
Historical Occurrence	There are no documented occurrences of sink holes in the last 25 years.	1
Probability	The probability of sink holes occurring in Pottawattamie County is unlikely.	1
Vulnerability	Pottawattamie County's vulnerability to sink holes is negligible. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	Damage consists primarily of direct structural damage and property loss and depreciation of land values.	1
Severity of Impact	<ul style="list-style-type: none"> A. Generally, land subsidence poses a greater risk to property than to life. B. No known impact to first responder health and safety. C. Depends on the area damaged and the facilities and infrastructure involved. D. Damage to property, facilities and infrastructure would only occur if the event undermined foundations. E. No known impact to service delivery. F. Sinkholes are a result of a dynamic environment and occurrences would generally be localized. G. Depends on the affected area. Land values could depreciate. H. No known impact to contractual obligations. I. No known impact to jurisdictional reputation. 	1
Speed of Onset	Regional lowering occurs gradually over time.	1

Thunderstorms and Lightning

Definition	Atmospheric imbalance and turbulence resulting in heavy rains, winds reaching or exceeding 58 mph, tornadoes, or surface hail at least 0.75 inches in diameter.	
Description	Thunderstorms are common in Iowa and can occur singly, in clusters, or in lines. They are formed from a combination of moisture, rapidly raising warm air, and a lifting mechanism such as clashing warm and cold air masses. 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. The National Weather Service considers a thunderstorm severe if it produces hail at least 0.75 inches in diameter, wind 58 mph or higher, or tornadoes. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes. Lightning is an electrical discharge that results from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt." This flash of light usually occurs within the clouds or between the clouds and the ground. A bolt of lightning reaches temperatures approaching 50,000 degrees Fahrenheit in a split second. This rapid heating, expansion, and cooling of air near the lightning bolt creates thunder.	
Historical Occurrence	Thunderstorms occur in Pottawattamie County on a yearly basis (see Appendix M) during the spring and summer months. Thunderstorms and lightning are often a triggering hazard event for many other hazards, including flash flooding, river flooding, hailstorms, and fires. Lightning and microburst winds associated with thunderstorms cause damage to commercial, residential and agricultural property throughout the county each year.	4
Probability	Pottawattamie County will continue to experience thunderstorms on an annual basis. As in the past, the primary products of these storms will be heavy rains, high winds, hail, lightning, and perhaps tornados.	4
Vulnerability	In addition to the rapid accumulation of rainfall associated with a thunderstorm, power failures can occur due to lightning strikes or high winds that may damage infrastructure. There are also many mature trees within the county that could be damaged or cause damage to buildings and vehicles during a storm. Virtually 100 percent of Pottawattamie County's population will be affected by a thunderstorm at some point in future years but any threat to human life is highly unlikely. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	While a thunderstorm can cover a number of miles, the most severe events are generally isolated. However, most thunderstorms that impact the county will affect county residents in one way or another. It is highly probably that a thunderstorm can impact one or more cities during a single event.	3
Severity of Impact	<ul style="list-style-type: none"> A. Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures. Thunderstorms can also bring large hail that can damage homes and businesses, break glass, destroy vehicles, and cause bodily injury to people, pets, and livestock. B. Response personnel are exposed to the same risk as the general public when caught in the storm without shelter. Work on ladders and other apparatus during lightning can expose responders to higher risk situations. C. Continuity of operations would be affected through indirect impacts such as loss of critical services. D. High winds can damage trees, homes (especially mobile homes), and businesses and can knock vehicles off of the road. Straight-line winds are responsible for most thunderstorm damage. E. Thunderstorms often disable power and communications services. F. High winds can damage trees, but this is a naturally occurring hazard and the environment proves to be resilient following these and other natural hazards. G. Windstorms and lightning occur rapidly and do not persist. The aftermath may cause moderate economic impacts, but most will be related to cascading hazards such as flooding. H. No known impact to contractual obligations. I. Timely and adequate response and cleanup will stave off any negative reputation that a jurisdiction could be exposed to. 	2
Speed of Onset	While weather forecasters can generally predict the chance of storms over a broad area two or three days in advance, it is quite difficult to predict exactly when and where a thunderstorm will occur.	3

Tornado

Definition	A violent, destructive, rotating column of air taking the shape of a funnel shaped cloud that progresses in a narrow, erratic path. Rotating wind speeds can exceed 200 mph and travel across the ground at average speeds of 25 to 30 mph.	
Description	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 Fujita Scale.	
Historical Occurrence	<p>There have been 35 documented tornados in Pottawattamie County since 1950 according to NOAA records (see Appendix M). Pottawattamie County experiences at least one National Weather Service tornado warning each year. The county has been included in five Presidential Disaster Declarations as a result of tornados:</p> <ul style="list-style-type: none"> ▪ May 25, 2007: FEMA DR-1705 ▪ May 25, 2004: FEMA DR-1518 ▪ May 21, 1999: FEMA DR-1277 ▪ July 28, 1988: FEMA DR-814 ▪ June 27, 1984: FEMA DR-715 	4
Probability	In the U.S. Iowa is ranked third in the number of strong to violent (F2-F5) tornadoes per 10,000 square miles. Historically, 30 to 40 tornadoes are confirmed in Iowa per year. Pottawattamie County is located on the northern edge of Tornado Alley, an area delineated by meteorologists and named for the high number of tornadoes that occur on an annual basis. While the occurrence of a tornado is impossible to predict, there is a likely chance that a tornado will strike at some point in Pottawattamie County in coming years.	3
Vulnerability	Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to tornados. The elderly, very young, and the physically and mentally handicapped are especially vulnerable because the lack of mobility to escape a tornado's path. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The area that can be directly affected by a tornado will vary from a couple hundred feet to over a mile in some cases. Tornadoic thunderstorms are also accompanied by large hail, lightning, heavy rain, and destructive straight-line winds. Extent of damage is largely dependent on the wind speed and duration of the tornado (see Enhanced Fujita Scale in severity of impact). Extent can be as little as a few city blocks to an entire community.	2
Severity of Impact	<p>A. Injury or death related to tornadoes most often occur from building failure and being caught outdoors.</p> <p>B. Response personnel are exposed to the same risk as the general public when caught without shelter.</p> <p>C. Tornadoes can destroy government facilities just as they could other property. Disruption of critical services can also affect operations. Employees may be affected and unable to attend work-related issues.</p> <p>D. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction and disintegration of structures, infrastructure, and trees. See Enhanced Fujita Scale in severity of impact.</p> <p>E. Tornadoes can impact many critical services, mainly electrical power. Buried services are not as vulnerable, but can be affected by their system components that are above ground.</p> <p>F. Tornadoes are naturally occurring phenomena. Damages to the environment could result from spills and other contaminants from the built environment.</p> <p>G. Whole towns have been known to be "wiped off the map." Economic impacts can result from direct damages to facilities or business disruption from the lack of critical services such as power, gas, or water.</p> <p>H. Debris removal is a vital service that is often too vast for most Pottawattamie County jurisdictions to do without contractual assistance.</p> <p>I. Adequate warning is key to the positive reputation of Pottawattamie County. Bringing critical services back on line quickly will assist residents in beginning their personal recovery process.</p> <ul style="list-style-type: none"> ▪ Currently the severity of tornadoes is measured by intensity based upon the 	2

	<p>Enhanced Fujita Scale. It is based on wind speed and extent of damage as follows: <u>EF0</u> (65-85 mph); <u>EF1</u> (86-110 mph); <u>EF2</u> (111-135 mph); <u>EF3</u> (136-165 mph); <u>EF4</u> (166-200 mph); and <u>EF5</u> (>200 mph). It also breaks down each event by Damage Indicators (DI) and Degrees of Damage (DOD). DIs are broken down into 28 categories of structures. Each individual type of structure is given an abbreviation code as well as a number code for easy reference. DODs are broken down into categories of possible damage that might occur. Each of these categories is also assigned a number. More information can be found on the Storm Prediction Center's website: http://www.spc.noaa.gov/faq/tornado/ef-scale.html.</p>	
<p>Speed of Onset</p>	<p>Tornadoes are often spawned from very powerful thunderstorms. Although in most instances a tornado watch can be issued hours in advance of a storm, an area that experiences a tornado may have virtually no warning. Since many tornadoes strike with little or no warning, persons often have very little time to take shelter. A countywide outdoor warning system has been in place since 2008.</p>	<p>4</p>

Windstorm

Definition	Extreme winds associated with severe winter storms, severe thunderstorms, downbursts, and very steep pressure gradients.	
Description	Extreme winds other than tornados are experienced in all regions of the United States. It is difficult to separate the various wind components that cause damage from other wind related natural events that often occur with or generate windstorms.	
Historical Occurrence	Windstorms and other high wind events have occurred quite frequently over the past 25 years throughout Pottawattamie County. Many of these events were associated with severe storms, but others have been simply high winds that have caused damage. On May 15, 1998 wind gusts between 90 and 97 mph literally blew 14 tractor-trailer trucks and one Greyhound Bus off of I-80 between mile markers 22 and 49 (although this event was not recorded by NOAA; see Appendix M for NOAA recorded events). On June 27, 2008 80 to 90 mph straight-line winds came through portions of the county. The storm brought down trees, damaged homes and buildings, and downed power lines. The power failure lasted into the following day in some areas.	3
Probability	Given the historical occurrence of high wind events in Pottawattamie County, there is a very good chance the county will experience more high wind events in coming years.	3
Vulnerability	People in high profile vehicles and persons caught outside during a windstorm are usually most at risk. Older trees and power lines are also susceptible to wind related damage. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide and several hundred miles long. A windstorm may extend throughout all of Pottawattamie County depending on the length/width of the storm and the direction the storm is traveling. The greater the force of wind (measured by the Beaufort Wind Scale) contributes to the extent of damage that can occur.	2
Severity of Impact	<ul style="list-style-type: none"> A. Injury or death related to windstorms most often occur from building failure and being caught outdoors. B. Response personnel are exposed to the same risk as the public when caught in windstorms without shelter. C. Windstorms can damage government facilities just as they could other property. Disruption of critical services can also affect operations. Employees may be affected and unable to attend work-related issues. D. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction of well constructed structures, infrastructure, and trees. See the classifications of wind and wind-related damage on the proceeding page. E. Windstorms can affect many critical services, especially electrical power. Buried Services are not as vulnerable, but can be affected by their system components that are above ground. F. Windstorms are naturally occurring phenomena. Damages to the environment could result from hazardous materials spills and other contaminants from the built environment. G. Economic impacts can result from direct damages to facilities or business disruption from the lack of critical services such as power. Crop damage is often associated with windstorms; laying down crops, breaking stalks, and twisting plants, reducing the yield and making it difficult to harvest. H. Debris removal is a vital service that is often too vast for most Pottawattamie County jurisdictions to do without contractual assistance. I. Adequate warning is key to the positive reputation of Pottawattamie County. Bringing critical services back on line quickly will assist residents in beginning their personal recovery process. 	3
Speed of Onset	Windstorms, whether they are isolated incidents or part of a larger storm event, generally occur with little to no warning. Weather forecasters can predict gusty conditions but usually cannot pinpoint the exact location where a severe wind event may take place.	4

Beaufort Wind Scale

Force	Wind (mph)	Description	Appearance of Wind Effects
			On Land
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	Leave and small twigs constantly moving, light flags extended
4	13-17	Moderate Breeze	Dust, leaves and loose paper lifted; small tree branches move
5	18-24	Fresh Breeze	Small trees in leaf begin to sway
6	25-30	Strong Breeze	Larger tree branches moving; whistling in wires
7	31-38	Near Gale	Whole trees moving; resistance felt walking against wind
8	39-46	Gale	Twigs breaking off trees; generally impedes progress
9	47-54	Strong Gale	Slight structural damage occurs; slate blows off roofs
10	55-63	Storm	Trees broken or uprooted; considerable structural damage
11	64-73	Violent Storm	Widespread damage to vegetation; many roofing surfaces are damaged; asphalt tiles that have curled up and/or fractured due to age may break away completely
12	≥74	Hurricane	Very widespread damage to vegetation; some windows may break; mobile homes and poorly constructed sheds and barns are damaged; debris and unsecured objects are hurled about

Air Transportation Incident

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.	
Historical Occurrence	Pottawattamie County has not experienced air transportation incidents during the last 50 years other than 3 light aircraft accidents and two commercial aircraft "near misses". In 1968, a 727 commercial passenger jet scheduled to land at Eppley Airfield in Omaha instead landed at the Council Bluffs Municipal Airport and was unable to take off again until it was unloaded due to the lack of runway space at that facility. In 1979, a Mexican Air Force DC 6 lost power on takeoff from Eppley Airfield and crashed into the levee at the north end of the airport.	1
Probability	The potential for widespread destruction of property and sudden death or injury to a large number of people from an aircraft accident in Pottawattamie County and the City of Council Bluffs is significant because all common approaches to Eppley Airfield in Omaha are over those areas. History indicates that aircraft accidents are more likely to occur near airports where aircrafts operate at lower altitudes. The Council Bluffs Municipal Airport is located west of the city. Numerous county businesses and residences are in or near the flight path of departures and arrivals to Eppley Airfield and the Council Bluffs airport. It is reasonable to suggest an air transportation incident in Pottawattamie County is possible at any given time.	2
Vulnerability	Other than those in the airplane involved, persons and structures most vulnerable to an air transportation incident would be those located closest to the two airports for which many flights travel over the county at low altitudes. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	An air transportation incident would most likely be restricted to a crash site, which would probably not be more than a few city blocks. However, the effects could be much greater if such an event were to occur near a hazardous materials facility or on an interstate highway.	1
Severity of Impact	<p>The level of severity would depend on the type of aircraft involved, the type of cargo being transported, and the area on the ground on which the accident occurred.</p> <ul style="list-style-type: none"> A. The lives and health of the pilot, crew, passengers, and the population on the ground would be at risk. B. Response personnel would likely be exposed to fire hazards and other hazards associated with crashes such as sharp objects, glass, and confined spaces. C. No known impact unless the crash affects a critical facility. D. Significant damage can also occur to property on the ground. Often buildings, fences, utility lines, and trees are damaged or destroyed in the event of a plane crash. The cargo aboard a plane that has crashed will likely be damaged or destroyed. E. No known impact unless the crash affects a critical facility. F. Hazardous materials may be on board or result from spilled fuel. Damage would be localized to the crash site. G. Economic impacts would likely be related to cleanup and repair to any damaged structures. H. No known impact to contractual obligations. I. Reputation is based on effective and timely response. 	4
Speed of Onset	There is practically no warning associated with this hazard.	4

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 which 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.	
Historical Occurrence	In 1988 a tornado struck near the Pottawattamie County Courthouse and temporarily disabled countywide radio communications located there. Otherwise, there have not been any documented instances of long-term radio communications failures. Isolated incidents of telephone communications failure in portions of the county occur nearly every year. As an example, after the winter storm of October 1997 some sections of the county were without telephone use for up to nine days.	1
Probability	The risk of a long-term (more than a few hours) communications failure in Pottawattamie County is relatively low. Restoration of communications capabilities during a prolonged blackout would be a priority, and during most hazard events the county will establish a command center and ensure that communications are reestablished as soon as possible.	2
Vulnerability	The impacts of a communication failure on citizens would be indirect and would create more of an inconvenience than a threat to health and safety. Essential communications equipment throughout the county is supported by backup systems, and incorporated cities, along with the Sheriff's Department, can provide limited alternate communications capabilities in the event of a prolonged failure. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	A communications failure can vary from a single property to an entire system, which would affect much of the county. However, since most households and government emergency services offices have more than one means of communication, the long-term effects of a failure would be minimal. In the event of an emergency services communications failure, officials would have greater difficulty with incident management at response sites, which could significantly impair emergency services and response times.	3
Severity of Impact	<ul style="list-style-type: none"> A. A communications failure would not directly result in injuries or fatalities. If 911 systems were to fail due to phone communication disruption, secondary impacts could occur by the inability of citizens to alert responders of their needs. B. No known impact to first responder health and safety. C. Inter-agency and intra-agency communications would be limited. Data transmission could also be affected. D. Not affected. E. If 911 systems were to fail due to phone communication disruption, secondary impacts could occur by the inability of citizens to alert responders of their needs. F. Failed communications could result in malfunctioning systems and potential does exist for facilities to discharge hazardous materials into the environment. G. Most economic impacts would be felt on those sectors dependent on communications systems. Financial losses could also be incurred due to direct damage to electronic equipment and communication system infrastructure. H. No known impact to contractual obligation. I. Widespread communication failures could moderately harm the reputation of the county. If 911 systems are affected, the reputation damage could be more serious. 	2
Speed of Onset	A communications failure will most likely occur with virtually no warning. Planned communications failures, such as those to address maintenance and/or efficiency issues, are usually announced to the public well in advance and alternative measures can be developed to address those outages.	4

Energy Failure/Disruption

Definition	An extended interruption of electric, petroleum or natural gas service, which could create a potential health problem for the population and possibly mass panic.	
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 disruptions are long lasting, 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.	
Historical Occurrence	During the past 25 years, there has been a minor power outage somewhere in the county at least once a year, many of which were direct results of other hazard events (i.e. storms). The most serious power outage to affect the county occurred in 1991 in conjunction with an ice storm. Many residents were without power for up to 72 hours.	4
Probability	The probability of another extended power outage is dependent on the size, scope and circumstances under which power might fail. Most of the county's electricity is provided by Mid-American Energy and the Nishnabotna Valley Rural Electric Cooperative, which have several power grids located in the county. The probability of a short-term outage somewhere in the county is possible each year, but prolonged outages are unlikely to occur frequently.	2
Vulnerability	A short-term energy disruption would cause more of an inconvenience than a threat to health and safety. An extended power failure or natural gas disruption would pose a threat, particularly in the winter, to vulnerable populations such as the elderly or sick. Most critical facilities in the county have access to a fixed or portable generator, though backup power is a luxury to many residents. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	Depending on the nature of the disruption, energy failure can impact the entire county at most, to just specific neighborhoods or sections at least.	2
Severity of Impact	<ul style="list-style-type: none"> A. Injuries and fatalities would not be directly caused by an energy shortage. Injuries and fatalities could occur if energy was not available for heating during extreme cold periods or for cooling during extreme heat. B. No known impact to first responder to first responder health and safety. C. Hospitals, shelters, emergency response vehicles and facilities, and other critical facilities would have priority during energy shortages. D. No known impact to property or infrastructure. E. Effects could range from minor heating and air conditioning disruptions to transportation limitations all the way to civil unrest due to the high demand, low supply, and subsequent cost increases. F. No known impact to the environment. G. Practically all businesses rely on an adequate energy supply to operate. The cost imposed on local businesses depends on the length of the disruption and the time of day it occurs. H. No known impact to contractual obligations. I. Reputation could be harmed if the reason for the shortage or failure could have been avoided by good planning. If caused by natural events, there would be no significant impact unless the response to the outage was poor. 	2
Speed of Onset	Some energy disruptions, such as those that may be caused by excess usage, can be detected well in advance and mitigated through measures such as issuing peak alerts and encouraging energy conservation. Disruptions caused by hazard events, however, will usually occur with almost no warning.	4

Fixed Hazardous Materials Incident

Definition	Accidental release of chemical substances or mixtures that presents danger to the public health or safety during production or handling at a fixed facility.	
Description	A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. 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." Each year, over 1,000 new synthetic chemicals are introduced. Hazardous substances are categorized as <u>toxic</u> , <u>corrosive</u> , <u>flammable</u> , <u>irritant</u> , or <u>explosive</u> . Hazardous materials incidents generally affect a localized area and the use of planning and zoning can minimize the area of impact.	
Historical Occurrence	Accidental release of hazardous materials at fixed site facilities in Pottawattamie County during the last 25 years occurred in many forms. A drugstore was evacuated after a worker spilled one gallon of caustic acid. At least five ammonia leaks required evacuation of the workplace or homes in local jurisdictions. Discovery of an illegal methamphetamine manufacturing operation also posed a safety problem for first responders. Gasoline, fuel oil, and pesticide or herbicide releases have occurred as well and are likely to occur again at some point.	4
Probability	Pottawattamie County holds 29 facilities in which the owners use, store or manufacture "extremely hazardous substances" (EHS) at or above reporting threshold levels identified in Section 302, of the Emergency Planning and Community Right to Know Act. The most prevalent EHS is anhydrous ammonia stored in bulk quantities at 20 of the 29 sites. Each of the sites is highly regulated and retains professional safety and environmental engineers to maintain contingency plans for public safety. The main threat of a hazardous material release is through either a catastrophic material failure or human error on the part of the operator. Some EHS sites could become potential targets for terrorist groups.	3
Vulnerability	The primary areas of vulnerability are the public and private properties immediately surrounding the EHS sites within a radius of 0.5 to 1 mile. The Vulnerability Zone Radius (VZR) is calculated for a worst case spill at each EHS site. (See Annex P-Hazardous Materials in the Pottawattamie County Emergency Operations Plan. The plan is on file with the Pottawattamie County Emergency Management Agency.) A VZR is an area where it may be anticipated that airborne concentrations of a released hazardous substance may reach one-tenth of the concentration considered Immediately Dangerous to Life and Health (IDLH). An IDLH atmosphere is one that will kill or incapacitate within a 30 minute period of time. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	Depending upon weather conditions and the amount and type of EHS in a container, a worst-case incident of any of the EHS sites in Pottawattamie County in which 100 percent of the EHS is released during a 10 minute period could result in a VZR of 0.1 to 5.4 miles at the extremes. Up to 30,000 residents could be affected by a worst-case release. Response time by technician level hazardous materials response team would normally be under 10 minutes, however, the incident commander's decision to evacuate or shelter citizens in place may have to be made within minutes of the release.	2
Severity of Impact	<ul style="list-style-type: none"> A. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful and damaging burns to skin if direct exposure occurs. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the toxic materials. C. None known impact unless the incident occurs on or near critical facilities or services. D. Damage is usually limited to the immediate property involved. Proper decontamination is needed before the facilities go back in service. E. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. F. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. G. Loss of livestock and crops may lead to economic hardships within a jurisdiction. Cleanup costs could also be significant to a jurisdiction. H. No known impact to contractual obligations. I. Safe and timely response will greatly limit any damage to a jurisdiction's reputation. 	3
Speed of Onset	Fixed facility EHS releases generally occur with no warning. In most cases, the quickness of the response to such an event will be the main determinant of the severity of the incident.	4

Fixed Radiological Incident

Definition	An incident resulting in a release of radiological material at a fixed facility to include power plants, hospitals, laboratories, and the like.	
Description	Although the term "nuclear accident" has no strict technical definition, it generally refers to events involving the release of significant levels of radiation. Most commercial nuclear facilities in the United States were developed in the mid-1960s and are designed to withstand aircraft attack. Therefore, they should withstand most natural hazards even though they may not have been specifically designed for those forces. Emergency classifications are divided into four categories. Each calls for a certain level of response from plant and government personnel. From least to most severe, the classifications are: <u>Unusual Event</u> , <u>Alert</u> , <u>Site Area Emergency</u> , and <u>General Emergency</u> .	
Historical Occurrence	Since 1990, the Cooper Nuclear power station in Brownville, NE has had 18 Unusual Events, 1 Alert, and no Site Area Emergencies or General Emergencies. Also, the Omaha Public Power District (OPPD) power station in Fort Calhoun, NE has had 18 Unusual Events, 2 Alerts, and no Site Area Emergencies or General Emergencies. These events did not affect any area of Pottawattamie County. Both facilities were at risk from flood waters during the 2011 Missouri River Flood. Rising waters did prompt an Unusual Event at the OPPD station.	1
Probability	Operators of facilities that use radioactive materials and transporters of radioactive waste are circumspect in the packaging, handling, and shipment of such materials. Since operators are closely regulated by a variety of federal and state agencies, the likelihood of an incident is remote.	1
Vulnerability	The extreme northwest corner of Pottawattamie County is within the 10 mile Emergency Planning Zone (EPZ) of the OPPD nuclear power station in Fort Calhoun, NE. The entire county is within the 50 mile Ingestion Pathway Zone (IPZ) for the Fort Calhoun station. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	In 30 years of nuclear power production in the U.S., no deaths or serious injuries from radiation have been recorded among the general public. Except in a nuclear detonation, exposure to large amounts of radiation is less likely to cause large-scale damage, death and injury than many of the conventional hazards this plan addresses. All nuclear facilities in the U.S. identify a 10 mile radius EPZ and a 50 mile radius IPZ. Approximately 25 to 50 percent of the geographic area of the county would be affected.	2
Severity of Impact	<ul style="list-style-type: none"> A. Depending on the level of exposure, radiation can cause loss of life and long and short- term health effects. Time, distance, and shielding minimize radiation exposure to the body. Nuclear radiation above normal levels could be a health and safety consideration because of its ability to damage living cells. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the radioactive materials. C. No known impact to continuity of operations. D. Property and infrastructure damage can result from radioactive contamination. E. Power plants may be taken off line for extended periods of time. Other impacts would be indirect and only if in the contaminated area. F. Damage to the environment can be very long-lasting depending on the half-life of the products involved. Land, water, and air would be affected. G. If the land and facilities cannot be used for weeks, months, or even years, the loss of production would be devastating. Economic impacts would be multi-sector and long-lasting, especially in and around the affected region. H. Indemnification would be a vital issue to address in the long-term following a radioactive release. I. Reputation of an entity can be very damaging because of the high profile nature of these events. The negative impact could be felt for decades following contamination. 	4
Speed of Onset	Ionizing radiation cannot be seen, smelled, heard, or detected with human senses. Detection instruments are needed to indicate the existence of dangerous radiation. Distance from the incident would dictate the amount of time needed to avoid exposure. Protective actions directed by state and county officials will depend upon weather conditions and developments at the release site. In an actual emergency, the public can turn to their local Emergency Alert System Station or NOAA weather radio.	4

Highway Transportation Incident

Definition	A single or multi-vehicle incident which requires responses exceeding normal day-to-day capabilities.	
Description	An extensive surface transportation network exists in Iowa. Local residents, travelers, business, and industry 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.	
Historical Occurrence	Thousands of traffic accidents occur in Pottawattamie County each year. Many of these accidents are limited to fender benders with damage only to property, but several accidents result in injuries and even deaths in some cases. According the Center for Transportation Research and Education, there were 739 crashes in Pottawattamie County during 2008. Of those, there were 305 injuries and 14 fatalities.	4
Probability	There are four interstates, three U.S. highways and five state highways that extend into Pottawattamie County. Given high traffic volumes, especially on interstates and major highways, the probability of at least one significant highway transportation incident occurring in the county is high.	4
Vulnerability	Those most susceptible to a highway transportation incident are vehicle drivers and passengers. The risk of an accident will be higher during large gatherings, morning and evening commutes, and in adverse weather conditions. In most cases, people are affected by traffic stops and detours resulting from an accident. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	Most accidents are isolated to the vehicles and persons directly involved. In the event of an accident involving a vehicle carrying hazardous materials, there are additional risks associated with spills, leaks, or fires. There may also be situations where a vehicle will leave the roadway and may cause damage to property or infrastructure, though the extent in those cases would be negligible. A highway incident would affect one to no more than five percent of a given jurisdiction.	1
Severity of Impact	<ul style="list-style-type: none"> A. Highway incidents threaten the health and lives of people in the vehicles, pedestrians, and citizens of a community if hazardous materials are involved. Mass casualty events can occur if mass transit vehicles are involved. B. Response personnel are certainly not immune to traffic accidents. Because of the number of hours that law enforcement are on the road, they have a higher risk than do other response personnel. C. No known impact to continuity of operations. D. Property damage primarily involves affected vehicles and cargo, though roads, bridges, and infrastructure such as light and power poles can be impacted. Third party property adjacent to the accident scenes such as buildings and yards can suffer damage as well. E. There may be short term localized impacts if utility poles are affected or if streets are blocked off. F. Fuel and other fluids can be spilled from the affected vehicles. If vehicles hauling hazardous materials are involved, the impact could be much greater. Thousands of gallons or pounds of product can be released to the environment if the container is damaged. G. No significant impact other than business disruption in the affected area. H. No known impact to contractual obligations. I. Highway incidents occur very frequently and do not have a significant impact on the reputation of any jurisdictions in and including Pottawattamie County. 	4
Speed of Onset	Highway transportation incidents occur with virtually no warning. Emergency response personnel will generally be more alert for the possibility of an incident during adverse weather conditions.	4

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.	
Historical Occurrence	There have been no major pipeline incidents in Pottawattamie County in the last 25 years.	1
Probability	The primary risk of a pipeline incident in the county would come from construction that would require significant trenching. Such construction would most likely involve infrastructure improvements, which are usually designed and certified by a professional engineer to avoid such an incident.	1
Vulnerability	Five pipeline companies – B.P., Kinder Morgan Energy Partners, National Cooperative Refinery Association, Northern Natural Gas, and Peoples Natural Gas – operate over 260 miles of pipeline in diameters ranging from 2 to 30 inches conveying petroleum and fuel gases. The primary risk of a pipeline incident would be to persons excavating near a pipeline and to structures and the environment around an incident. In the event of a release, persons and residences downhill and downwind would be most at risk. However, vulnerability to the public would be negligible. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	A pipeline incident could affect anywhere from an isolated, undeveloped portion of the county to a significant portion of a city. The effects of a pipeline incident will range from interruption of services to the potential for explosions or other catastrophes associated with a release involving hazardous materials.	2
Severity of Impact	<ul style="list-style-type: none"> A. All petroleum liquids pose dangers from fire or explosion and the fire may produce poisonous or irritating gasses. Toxic fumes and direct contact can cause health hazards. Vapor clouds can travel a distance and settle in low lying areas where the fumes may overcome people and animals. Released products should be treated as any other hazardous material. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. B. Specialized training is required to work around pipelines because of hazardous materials, potential high pressure liquids and gases, and trench rescue techniques. C. Services that depend on products moving through pipelines may be impacted if they do not have an auxiliary source. D. Pipeline leaks and eruptions can cause significant damage to land and structural property, though such damage would likely be localized to the impacted area. E. Many utilities in Pottawattamie County are transported via pipelines, such as gas and water. County jurisdictions and residents may experience a delay to any number of services in the event of a pipeline incident. F. Saturated soil and erosion are the primary environmental impacts of a pipeline incident. G. Business disruption can occur to those businesses that rely on regular pipeline service, whether for water, gas, etc. Mass evacuations can also disrupt local business and operations. H. Utility providers in the county would be responsible for any repair or replacement. I. A well informed public before, during, and after an incident will greatly reduce the impact to a jurisdiction's reputation. 	3
Speed of Onset	While an actual pipeline incident will occur with no warning, the effects of such an event can usually be detected and mitigated quickly. Fumes, vapors, and sounds will usually alert people to any danger relating to a pipeline incident.	4

Rail Transportation Incident

Definition	A derailment or a train accident which directly threatens life or property, or which adversely impacts jurisdictional capabilities to provide emergency services.	
Description	Rail transportation incidents may include derailments, collisions, and highway/rail crossing incidents. Train incidents can result from a variety of causes. Human error, mechanical failure, faulty signals, and problems with the track can all lead to rail incidents. Results of an incident can be range from minor “track hops” to catastrophic hazardous materials incidents and even passenger casualties. With the many miles of track in Iowa, there are numerous at-grade crossings at which vehicles must cross the railroad tracks.	
Historical Occurrence	According to records, there have been 40 documented rail incidents in Pottawattamie County since 1978. There were 47 injuries and 6 deaths related to those incidents. Nearly all of the incidents were at highway/rail intersections.	4
Probability	Three railroad companies – Burlington Northern, Iowa Interstate and Union Pacific – service and traverse Pottawattamie County from north to south and east to west. There are dozens of railroad crossings in Pottawattamie County, including at-grade crossings, viaducts, and rail bridges crossing over major roads. The miles of railroad track in the county, combined with the large number of street and highway crossings, makes the probability of a highway/rail collision or derailment relatively higher in Pottawattamie County than in some other counties. Most street/rail intersections are protected with signals and other traffic controls, which alert motorists and reduce the overall risk of an incident.	4
Vulnerability	People and property in close proximity to the rail lines, crossings, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	The Cities of Carter Lake, Council Bluffs, Crescent, Hancock, McClelland, Neola, and Underwood have rail lines that go through their city limits. Vehicle/train collisions are usually limited to areas in and near intersections. In rare cases, an incident will result in widespread effects. The direct area of impact is usually quite small, but depending on the products and materials involved, the area could become extensive. Accidents in the rural areas rarely happen. If hazardous materials are involved, the effects could reach areas up to 1.5 miles from the scene. Harmful products may contaminate streams, rivers, water distribution systems, and storm water systems. Large portions of any city where rail lines pass could be impacted. The Council Bluffs Fire Department maintains a hazardous materials response unit. Jurisdictions throughout Pottawattamie County maintain mutual aid agreements with the Council Bluffs Fire Department to respond to rail accidents and potential hazardous materials spills.	2
Severity of Impact	<ul style="list-style-type: none"> A. Deaths and injuries can range from those directly involved, to citizens in the radius of a hazmat release. Evacuations may occur depending on the materials involved. B. First responders face risk at rail incident sites from fire and hazmat releases. C. No known impact to continuity of operations. D. Damage may be limited to the train, railcars, and cargo involved, but it could also include rail infrastructure and adjacent properties. E. Rail transportation routes may be out of commission until the accident is cleaned up and the infrastructure repaired. Cargo delays will occur for hours or perhaps days. F. Gases, liquids, and solids can contaminate air, soil, and water in and near the incident scene. G. Economic impacts include loss of production, business disruption due to evacuations, and disruptions of those businesses served by the railroad. Disruptions could last several days until cleanup efforts are complete. H. None known impact to contractual obligations. I. Communities with rail routes in Pottawattamie County are familiar with the level of rail traffic, but not necessarily familiar with the cargo that may pass through day-to-day. Education, public information, and a timely and effective response will determine the impact to reputation. 	3
Speed of Onset	Rail transportation incidents occur with virtually no warning.	4

Transportation Hazardous Materials Incident

Definition	Accidental release of chemical substances or mixtures that presents danger to public health or safety during transportation.	
Description	A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. 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.” Each year, over 1,000 new synthetic chemicals are introduced and transported across the county via semi truck and train. Hazardous substances are categorized as <u>toxic</u> , <u>corrosive</u> , <u>flammable</u> , <u>irritant</u> , or <u>explosive</u> . Hazardous materials incidents generally affect a localized area, and the use of planning and zoning can minimize the area of impact.	
Historical Occurrence	<p>The Council Bluffs Fire Department’s Hazardous Material Response Team responds to several transportation related hazardous material releases throughout the county each year. Many have potential to be deadly. The following are three notable incidents:</p> <ul style="list-style-type: none"> ▪ June 29, 1997: Union Pacific workers discovered a hole in a railroad tanker car containing a 90 percent ethyl alcohol solution with a benzene base. This leak had allowed nearly all of a 30,000 gallon tanker to be released into the environment. Recovery and cleanup operations took several weeks. ▪ May 16, 2000: A tractor trailer carrying household chemicals on I-80 hit a bridge abutment and plummeted into the Nishnabotna River. The accident killed the driver and a passenger, started the vehicle on fire, and released the chemicals on board into the river. Westbound I-80, east of Avoca, was closed for 9 hours and traffic was disrupted for 30 hours. ▪ December 9, 2000: A semi-truck loaded with propane went over an embankment on the Interstate 80 eastbound interchange, closing Interstates 80 and 29 for over 13 hours. The potential impact of this incident was very dangerous considering the location of the incident and the material involved. 	4
Probability	<p>To summarize the probability, the “Pottawattamie County Local Emergency Planning Committee Hazardous Commodity Flow Analysis” examines hazardous material transportation throughout Pottawattamie County via highway, rail, pipeline, and water. The analysis shows that the City of Council Bluffs is a significant transportation corridor through which tremendous volumes of hazardous substances move on a daily basis.</p> <ul style="list-style-type: none"> ▪ <u>Highway transportation</u>: Both interstates 29 and 80 run through the city. Where these two roadways combine the interstate carries over 90,000 vehicles per day. These roads are major north/south and east/west transportation routes for freight movement all over the country. Hazardous substances, to include, but not limited to: corrosives, solvents, fuel, alcohol, asphalt, poison, flammable inks, hazardous waste, sulfuric acid, anhydrous ammonia, nitrogen, and non-flammable gas are all common on these routes. ▪ <u>Rail transportation</u>: Approximately 55 major trains move northbound through Council Bluffs daily. Three railroad companies – Burlington Northern, Iowa Interstate and Union Pacific – service or traverse Pottawattamie County from north to south and east to west. A substantial number of railcars carry hazardous liquids (up to 40,000 gallons per car), solids (up to 200,000 pounds) and gases. The hundreds of shipments per year include corrosive liquids, non-flammable gases, explosives, liquid and solid poisons, radioactive materials, flammable gases and solids, oxidizers, poison gases, combustible liquids, and various environmentally hazardous substances. ▪ <u>Pipeline</u>: Five pipeline companies – B.P., Kinder Morgan Energy Partners, National Cooperative Refinery Association, Northern Natural Gas, and Peoples Natural Gas – operate pipelines in diameters ranging from 2 to 30 inches conveying petroleum and fuel gases. ▪ <u>Water</u>: The Missouri River flows north to south along the county line for 39 miles. 	3

	Along that stretch of riverfront at least 39 facilities contain storage tanks, liquid handling and/or loading facilities, barge loading terminals, pipelines, drum storage areas, or liquid waste treatment structures, all of which could be the source of a spill or leakage into the river. Four major highway bridges and one rail line cross the river.	
Vulnerability	The primary areas of vulnerability are the public and private properties immediately surrounding the hazardous material transportation routes within a radius of 0.5 to 1 mile. The Vulnerability Zone Radius (VZR) can be calculated for a worst-case spill at any point along a transportation corridor. A VZR is an area where it may be anticipated that airborne concentrations of a released hazardous substance may reach one-tenth of the concentration considered Immediately Dangerous to Life and Health (IDLH). An IDLH atmosphere is one that will kill or incapacitate within a 30 minute period of time. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	The transportation of hazardous substances within Pottawattamie County poses a threat to communities that are located within five miles of major highways and/or railroad tracks. Such materials cannot be identified precisely in advance. In most cases, the effects of an accident are contained to the accident site and the persons directly involved. However, there may be some extreme instances where a leak, spill or explosion will carry hazardous materials away from the accident site to a larger area of the county. Such an event could cause serious injuries and/or fatalities.	2
Severity of Impact	<ul style="list-style-type: none"> A. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful and damaging burns to skin if direct exposure occurs. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the toxic materials. C. The occurrence of a transportation hazmat incident often shuts down transportation corridors for hours at a time while the scene is stabilized, the product is off-loaded, and reloaded on a replacement container. D. Damage may be limited to the cargo liner, and cargo involved, but it could also include highway, interstate, or street infrastructure, and adjacent properties. E. Transportation corridors can be shut down for hours at a time. Utilities should continue to function normally unless contamination has occurred. F. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. G. Loss of livestock and crops may lead to economic hardships to those adjacent to the accident site. H. Transportation of hazardous materials is regulated by the Iowa Department of Transportation. However, if a release of hazardous materials were to take place, then the Department of Natural Resources becomes the regulatory and managing agency. I. Although citizens are aware of the shipping industry, they may not be as aware of the dangers that some cargo may pose. Education, public information, and a timely and effective response will determine the impact to reputation. 	3
Speed of Onset	A transportation hazardous materials incident will almost always occur without warning. Even if reported immediately, people in the area of the release have very little time to be warned and evacuated. During some events, sheltering in-place is the best alternative to evacuation, since the material has already affected the area and there is no time to evacuate safely. A quick and efficient response to any such incident will be the key to minimizing the threat to public health and safety.	4

Transportation Radiological Incident

Definition	An incident resulting in a release of radioactive material during transportation.	
Description	Transportation of radioactive materials through Iowa over the interstate highway system is considered a radiological hazard. The transportation of radioactive material by all means of transport is licensed and regulated by the federal government. As a rule there are two categories of radioactive materials that are shipped over the interstate highways. <u>Low-level waste</u> consists primarily of materials that have been contaminated by low-level radioactive substances, but pose no serious threat except through long-term exposure. These materials are shipped in sealed drums within placarded trailers. The danger to the public is no more than a wide array of other hazardous materials. <u>High-level waste</u> , usually in the form of spent fuel from nuclear plants, is transported in specially constructed casks which are built to withstand a direct hit from a locomotive. When these materials are moved across Iowa highways, state officials are notified and appropriate escorts are provided.	
Historical Occurrence	There have been no documented transportation radiological incidents in Pottawattamie County in the past 25 years.	1
Probability	Transportation accidents are the most common type of incident involving radioactive materials because of the sheer number of radioactive shipments. Operators of facilities that use radioactive materials and transporters of radioactive waste are circumspect in the packaging, handling, and shipment of the radioactive materials. Since the transportation of radioactive materials is closely regulated by various state and federal agencies, the likelihood of an incident is remote.	1
Vulnerability	Transportation of radioactive materials is mostly low-level waste consisting primarily of materials that pose no serious threat except through long-term exposure. The danger to the public is no more than a wide array of other hazardous materials. Those working with or near sources of radiation are at a greater risk than the general citizens of the area. Those responding to a radiological incident should be trained in recognizing a radiological incident and minimizing exposure to radioactive materials. Less than one percent of the county's population would be affected in an incident. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	1
Maximum Geographic Extent	Other than a transportation incident involving large amounts of high-level radioactive materials, radiation exposure will be limited to localized areas. It is likely that one to less than five percent of a given jurisdiction would be affected.	1
Severity of Impact	<ul style="list-style-type: none"> A. Time, distance, and shielding minimize radiation exposure to the body. Nuclear radiation above normal levels could be a health and safety consideration because of its ability to damage living cells. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the radioactive materials. C. No known impact to continuity of operations. D. Property and infrastructure damage can result from radioactive contamination. E. Some services may need to be temporarily cancelled until it is determined the affected area is free of radioactive contaminants. F. Long lasting impacts on the environment from a radiological incident could include soil, air, and water contamination. These impacts could last decades. G. If contaminated land and facilities cannot be used for weeks, months, or even years, the loss of production would be devastating. Economic impacts would be multi-sector and long-lasting, especially in and around the affected region. H. Indemnification would be a vital issue to address in the long-term following a radioactive release. I. Reputation of an entity can be very damaging because of the high profile nature of these events. The negative impact could be felt for decades following contamination. 	3
Speed of Onset	A radiological incident in Pottawattamie County would result from an accident in handling or transporting radioactive materials. This accident would occur with little or no warning. Distance from the incident would dictate the amount of time needed to avoid exposure. The U.S. Department of Transportation requires the use of placards to indicate to the public and first responders the types of materials on board.	4

Waterway/Waterbody Incident

Definition	An accident involving any vessel that threatens life or which adversely impacts a jurisdiction's capability to provide emergency services.	
Description	Waterway incidents will primarily involve pleasure craft on area rivers and lakes. In the event of an incident involving a water vessel, the greatest threats would be drowning, fuel spillage, and property damage. Water rescue events would largely be handled by first responding agencies. Waterway incidents may also include events in which persons fell through the ice on partially frozen water bodies.	
Historical Occurrence	Waterway incidents that occur in Pottawattamie County receive emergency response from local jurisdictions that cooperate in mutual aid agreements. In the past 25 years there have been numerous instances (the exact number is not available) where the Council Bluffs, Lewis Township and Carter Lake Fire Departments have responded to water related incidents, primarily involving boaters and swimmers in small crafts. While there have been some injuries and drowning related deaths, there have not been any large-scale water related incidents involving commercial boats or barges, or either of the two riverboat casinos.	3
Probability	The probability of a water related incident is highly likely in Pottawattamie County with the presence of the Missouri River, Carter Lake and Lake Manawa, all of which are popular recreational attractions.	4
Vulnerability	Passengers of pleasure craft and riverboat casinos are vulnerable to water related incidents. Operators of barges are also vulnerable. The environment is vulnerable to potentially damaging materials aboard the numerous barges that normally operate year round on the Missouri River. The U.S. Coast Guard Auxiliary, 8 th Western Rivers District, Division 33 maintains and executes a disaster emergency plan for the portion of the Missouri River that borders Pottawattamie County. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The maximum extent of a waterway/waterbody incident would be limited. Impacts would not extend beyond the immediate incident scene. Exceptions would include a search and rescue operation and a hazardous materials release, but even those incidents would have a finite geographic extent.	2
Severity of Impact	<ul style="list-style-type: none"> A. Impacts would be limited to personal injuries and possibly death of the persons directly involved. B. First responders may face risk from fuel spills. C. Minor disruption to operations may occur due to the possibility of conflicting operations in the area. Site may be restricted until the rescue, salvage or possible cleanup/decontamination operations have been completed. For example salvage operations may not be able to get underway until a successful testing and decontaminating operation is completed. D. Property damage would be restricted to the watercraft involved. E. Refer to C. F. Environmental damage could impact aquatic flora and fauna. Water quality could be compromised if hazardous materials are released from boats or barges. G. Economic damages would largely rest on the watercraft owners involved. H. The Department of Natural Resources monitors watercraft regulations and serves as an aquatic police force (shore patrol) in the State of Iowa. I. Impact to reputation would mainly be connected to the watercraft owner(s)/operator(s) involved in an incident. 	3
Speed of Onset	Most incidents occur with little or no warning and can be attributed to inclement weather and/or operator error. Weather forecasts are usually available days in advance and would give ample time to prepare for inclement weather.	4

Enemy Attack

Definition	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	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.	
Historical Occurrence	There have been no enemy attacks on or in the State of Iowa in modern times.	1
Probability	Enemy attack is still a possibility due to international conflicts and the large number of weapons still in existence throughout the world. The City of Council Bluffs, while not a significantly large city in the United States, is part of the 59th largest metropolitan area, which is home to STRATCOM, the strategic headquarters of much of the military's planning and operations, and a very critical facility on the national level. The presence of that facility and its many employees throughout the Omaha-Council Bluffs metropolitan area slightly increases the risk of an enemy attack in the region.	1
Vulnerability	Any attack would likely target numerous critical facilities, including but not limited to information and communication systems; electrical power systems; gas and oil production, storage, and transportation systems; banking and finance organizations; transportation and distribution systems; water supply systems; emergency services; and government services. Nearly every citizen, business, and organization depends on these for normal operation as well safety and security. If not affected directly, the entire county would be vulnerable through indirect impacts. The number of human injuries and fatalities could range from very few to thousands.	4
Maximum Geographic Extent	Though actual damage and destruction could be isolated to one city or area, numerous indirect results could impact much of the county as a whole.	4
Severity of Impact	<p>A. Severity of impact would depend on the type of weapons deployed and the scale of attack. Nuclear, chemical, biological, or conventional weapons have various types of impacts. In a full-scale attack on the state/county, there could be mass casualties and fatalities. Lives not threatened by the primary attack would be in jeopardy from many various post-attack threats such as sickness, starvation, and exposure to the elements.</p> <p>B. See A.</p> <p>C. Continuity of operations would be disrupted at least initially during the primary attack.</p> <p>D. Catastrophic property and infrastructure damage could result from an enemy attack.</p> <p>E. Services would at least be temporarily cancelled during the duration of an attack.</p> <p>F. In a full-scale attack on the state/county, there could be radiological, chemical, or biological contamination of the air, soil, water, and food supply.</p> <p>G. A full-scale attack could result in millions of dollars of damages to the county. Business production of all kinds could be ceased, at least in the initial aftermath.</p> <p>H. No known impact to contractual obligations.</p> <p>I. There would be little to no adverse impact to Pottawattamie County's reputation. Response would be focused on the federal government.</p>	4
Speed of Onset	As mentioned above, the United States federal government monitors worldwide political and military activity. The citizens and states of the U.S. would be put on heightened alert during periods of intense political or military conflict. With Iowa's position in the interior of the U.S., there would likely be significant warning of an impending enemy attack.	2

Public Disorder

Definition	Mass demonstrations or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes.	
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 public. 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.	
Historical Occurrence	There have been no large-scale civil disturbances in Pottawattamie County in the last 25 years. Non-peaceful incidents have occurred in the past, but all were within the response capabilities of local law enforcement.	1
Probability	Although destructive civil disturbances are rare, the potential is always there for an incident to occur. In a time where television, radio, and the internet provide the ability to instantly broadcast information (factual or not) to millions of people, an already precarious situation can grow very quickly. This also allows outside parties, previously not involved, to participate in the disturbance for no other reason than to riot, loot, burn, and destruct. Alcohol is often involved in public disorder, especially as it relates to sporting events and concerts. Also, the presence of organizations perceived by some as controversial increases the risk of a demonstration that could lead to public disorder.	2
Vulnerability	Large-scale civil disturbances are often difficult for local communities to handle. Fortunately, most demonstrations and large public gatherings are held in a peaceful, responsible manner. However, there never seems to be a shortage of groups (often under the influence of drugs and alcohol) whose primary objective is to disrupt normal activities and perhaps even cause injury and property damage. People at risk are mainly the willing participants and law enforcement officials. In some cases, innocent bystanders and their property can be at risk as well.	2
Maximum Geographic Extent	Events usually affect a localized area. Often times only a couple of blocks or streets are affected. Less than one percent of the county's geographic area would be affected during a given incident.	1
Severity of Impact	<ul style="list-style-type: none"> A. Citizens at risk would be those involved in the disorder and likely some innocent bystanders. B. There are inherent risks for first responders in dealing with public disturbances such as violence from rioters. Fires can also result which create additional risks for rescuers. C. None likely unless a critical facility is a casualty of a riot. D. Property damage is often a result of public disturbances. The scope of damage is dependent on the number of rioters and the duration of the disturbance. E. Some businesses and services may be unable to function during the duration of a disturbance. Street access may also be blocked off. F. None expected. Public disturbances often take place in urbanized settings. G. Businesses that sustained damage from rioters could face potential short-term economic hardships. Total economic distress in a community would be unlikely. H. No known impact to contractual obligations. I. Any jurisdiction that suffers from a public disturbance will very likely see damage to their reputation, at least in the short-term. The degree of negative image depends largely on the duration of the disturbance, damage done, and response by law enforcement officials. 	2
Speed of Onset	Events that incite such activity can build up over hours, days, or years, and the violent disturbance is a culmination of a long-term situation. Civil disruptions can also escalate very rapidly following events where people are gathered, such as sporting events, concerts, or speeches.	2

Biological Terrorism (includes Agricultural Terrorism)

Definition	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.	
Description	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers. Biological agents may pose viable threats from hours to years depending upon the agent and the conditions in which it exits. 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. Agricultural terrorism is the direct, generally covert contamination of food supplies or introduction of pests or disease agents to crops and livestock.	
Historical Occurrence	There have not been any threats of agricultural/biological terrorism in Pottawattamie County in the past 25 years.	1
Probability	While the probability of an act of biological terrorism in Pottawattamie County is relatively low, the threat of such event to the U.S. and the Omaha-Council Bluffs metropolitan area has increased in the last 25 years, particularly since the terrorist attacks on September 11, 2001.	2
Vulnerability	Innocent people are often victims of terrorist activity targeted at specific organizations and activities. Based on the method of delivery, the general public is vulnerable to bio-terrorism. Most Americans are not vaccinated for many of the agents used as weapons by terrorists. In early 2003, a few hospitals in the State of Iowa issued smallpox vaccinations to volunteers and first responders. Pottawattamie County agencies are collaborating with Omaha Metropolitan Medical Response System agencies to increase the county's readiness for a bio-emergency.	4
Maximum Geographic Extent	Because of the characteristics of the bio-weapons terrorists can use, the area affected can range from a room to an entire community. Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind, water, humans, or animals. Because of the variables described above, the geographic extent of an incident could grow quite broad before the incident is recognized as a terrorist act. 100 percent of the county's geographic area could be affected.	4
Severity of Impact	<ul style="list-style-type: none"> A. The intent of terrorism is to cause fear based on illness, injury, and death. A bio-terrorism incident would likely result in illness at a minimum, with multiple deaths and long-term health problems as a worst-case. B. Responders may not initially be aware that they are responding to a biological incident and may not have the personal protective equipment necessary to protect them against the released agent. This could result in injuries, illness, and death among responders. C. Evacuations would shut down most operations until an alternative operations site could be set up outside the affected area. This may take days be a degraded operation because of assets that are unable to be duplicated. D. A highly persistent biological agent would not destroy property, facilities, or infrastructure, but would render the facility useless until the facility was decontaminated. E. Critical services could be affected such as health care. Capability of health care services to diagnose and treat a biological agent may be severely limited in rural areas. Most services would be impacted by being overwhelmed. F. Biological agents could contaminate soil, air, and water not only in the target area but in other pockets by agent migration. G. Economic impacts from an agro-terrorism incident would be far-reaching and severely damaging because of loss of production and long-term disruption of commodity flows. H. Widespread losses of crops would affect many contractual obligations related to commodity flows. I. Timely and adequate response will minimize damage to the jurisdiction's reputation. Given today's environment, even a small bio-terrorism incident will receive national media attention. 	4
Speed of Onset	While a lone terrorist or terrorist organization may threaten action in advance of an event, most attacks will occur without warning. Many times terrorists will use the threat of attack to spread fear, and all credible threats should be taken very seriously. A bio-terrorism event could be "stealthy" in that responders would not realize an attack had occurred until illnesses and casualties started being reported.	2

Chemical Terrorism

Definition	Use of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom.	
Description	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions. 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.	
Historical Occurrence	The Pottawattamie County 911 Center received one threat of chemical terrorism in 1999. The threat turned out to be a hoax.	1
Probability	While the probability of an act of biological terrorism in Pottawattamie County is relatively low, the threat of such event to the U.S. and the Omaha-Council Bluffs metropolitan area has increased in the last 25 years, particularly since the terrorist attacks on September 11, 2001.	2
Vulnerability	All types of terrorism are generally directed at specific groups, persons, public venues, or critical assets and public infrastructure. Per the State of Iowa Critical Asset Protection Plan, Pottawattamie County contains at least 26 critical assets that are vulnerable to various terrorist methods unless specific actions are taken to “harden” those assets. For these reasons, the entire county faces some vulnerability during an attack.	4
Maximum Geographic Extent	A terrorist induced release of chemicals could result in a Vulnerability Zone Radius of up to 9 miles, thereby placing a sizable portion of a given jurisdiction at risk. Persons, vehicles, water, and wind can carry contaminants out of the initial target area. The chemical type, method of dispersal, and prevailing wind conditions (if released outdoors) will determine the extent of a chemical outbreak in Pottawattamie County.	4
Severity of Impact	<ul style="list-style-type: none"> A. The intent of terrorism is to cause fear based on illness, injury, and death. A chemical terrorism incident would likely result in illness at a minimum, with multiple deaths and long-term health problems as a worst-case. B. Responders may not initially be aware that they are responding to a chemical incident and may not have the personal protective equipment necessary to protect them against the released compound. This could result in injuries, illness, and death among responders. C. Evacuations would shut down most operations until an alternative operations site could be set up outside the affected area. This may take days be a degraded operation because of assets that are unable to be duplicated. D. A highly persistent chemical would not destroy property, facilities, or infrastructure, but would render the facility useless until the facility was decontaminated. E. Critical services could be affected such as health care. Capability of health care services to diagnose and treat a chemical agent may be severely limited in rural areas. Most services would be impacted by being overwhelmed. F. Depending upon the chemicals used, soil, air, and water could be affected. Dilution, disbursement, and natural factors may lessen the impact over time depending upon the chemical’s persistence. G. Economic impacts would vary depending upon the persistence of the chemical used and the time required for decontamination. H. None known impact to contractual obligation. I. Timely and adequate response will minimize damage to the jurisdiction’s reputation. Given today’s environment, even a small chemical terrorism incident will receive national media attention. 	4
Speed of Onset	While a lone terrorist or terrorist organization may threaten action in advance of an event, most attacks will occur without warning. Many times terrorists will use the threat of attack to spread fear, and all credible threats should be taken very seriously.	3

Conventional Terrorism

Definition	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.	
Description	Conventional terrorism includes detonation of an explosive device on or near a target delivered via 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 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.	
Historical Occurrence	There have been no conventional terrorist attacks by an individual or organization in Pottawattamie County, though the 911 Communications Center does occasionally receive bomb threats. Past threats were found to be hoaxes.	3
Probability	While the probability of an act of biological terrorism in Pottawattamie County is relatively low, the threat of such event to the U.S. and the Omaha-Council Bluffs metropolitan area has increased in the last 25 years, particularly since the terrorist attacks on September 11, 2001.	3
Vulnerability	All types of terrorism are generally directed at specific groups, persons, public venues, or critical assets and public infrastructure. Per the State of Iowa Critical Asset Protection Plan, Pottawattamie County contains at least 26 critical assets that are vulnerable to various terrorist methods unless specific actions are taken to “harden” those assets. For these reasons, the entire county faces some vulnerability during an attack.	4
Maximum Geographic Extent	A conventional terrorist attack could affect anywhere from a couple of individuals to thousands of people depending on the scope of attack and number of people at the attack site. Since these kinds of attacks are usually target specific there will almost certainly be damage to property and infrastructure.	3
Severity of Impact	<ul style="list-style-type: none"> A. The intent of terrorism is to cause fear based on illness, injury, and death. A terrorism incident would likely result in numerous injuries and perhaps fatalities. B. Secondary devices have been used to intentionally harm the responders assisting victims of the initial attack. Injuries and deaths could also result from unstable structures, fire, etc. C. Operations will be minimally affected unless the target is a critical facility such as government buildings, emergency operations centers, communication hubs, etc. D. Damage to property, facilities and infrastructure is often a result of conventional terrorism, whether intended or unintended. E. Delivery of services will be moderately affected unless the target is a particular service. Other impacts could result from reallocation of resources to respond to the incident. F. Environmental impact would be minimal unless the target contained a hazardous material and that material was released. G. Threats and scares have psychological impacts and disrupt activities at a cost to productivity. Damaged facilities disrupt productivity. H. None known impact to contractual obligations. I. Timely and adequate response will minimize damage to the jurisdiction’s reputation. Given today’s environment, even a small terrorism incident will receive national media attention. 	4
Speed of Onset	While a lone terrorist or terrorist organization may threaten action in advance of an event, most attacks will occur without warning. Many times terrorists will use the threat of attack to spread fear, and all credible threats should be taken very seriously.	4

Cyber Terrorism

Definition	Electronic attack using one computer system against another in order to intimidate people or disrupt other systems.	
Description	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.	
Historical Occurrence	There have been no documented occurrences of cyber terrorism or cyber related attacks in Pottawattamie County.	1
Probability	With the growing number of computer hackers and the automation of all activities and records, there is a good chance that at least an attempt to disrupt or shut down electronic activities will occur in Pottawattamie County in the foreseeable future.	3
Vulnerability	All persons and businesses that maintain records electronically are at risk of a cyber terrorism attack. Improper security of sensitive information could lead to other terrorist activities if that information were provided to the wrong people. Such an event would have little impact on human life.	1
Maximum Geographic Extent	Due to the ease of connecting to computers and electronic systems worldwide, an attack can be generated from anywhere and can impact a single computer or an entire network.	3
Severity of Impact	<ul style="list-style-type: none"> A. No direct loss of life. Indirect injuries or deaths may result from secondary impacts to critical life sustaining sectors such as energy, water, etc. B. None known impact to first responder health and safety. C. Severe impacts to continuity of operations could result if a cyber attack reached critical operational systems. D. There would be no impacts on the built environment. E. Impacts can range from annoyance to complete shutdown of critical services. Secondary impacts could affect citizen welfare by denying service or providing false readings. F. Impacts would result only if systems were infiltrated and directed to malfunction by shutting down, overloading, etc. G. Many businesses and operations today rely heavily on electronic and digital technology. Disruptions to computer hardware and/or systems could incapacitate a single business or perhaps even a local economy. H. There is the potential for the elimination of electronic records and information. I. Any jurisdiction that failed to recognize cyber threats or prepare for an attack would face negative consequences to reputation by local residents and the media. 	3
Speed of Onset	Because of the networks (formal and informal) that exist to share intrusion attempts and impacts, warnings can be put out in advance to alert those in similar situations to take protective security recommendations such as updating virus detection software, making sure security patches are in place, etc. Warning time can range from minutes to days.	4

Radiological Terrorism

Definition	Use of radiological materials against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom.	
Description	Radioactive contaminants can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers. Detonation of a nuclear device may be underground, at the surface, in the air, or at high altitude.	
Historical Occurrence	There is no history of radiological terrorism in the State of Iowa.	1
Probability	Given the relatively low number of radiological weapons in existence and the realization by all parties involved that any radiological event would be catastrophic, the probability of such an event is extremely low.	1
Vulnerability	In the event of an attack, at least 50 percent of all living organisms and environmental assets would be vulnerable to radiation.	3
Maximum Geographic Extent	Any radiological attack could result in a fallout area hundreds of miles in diameter, meaning an attack would likely impact several states to some degree.	4
Severity of Impact	<p>A. Nuclear detonation by terrorists will endanger public health and safety. The potential for mass casualties is great if the event were to take place but the amount of people affected is dependent on several factors: 1) the amount and type of material used to make the device; 2) the construction of the device; 3) the site of detonation and number of people in the blast radius; and 4) the wind direction. Illness and death from radiological terrorism can result from the initial blast, radioactive fallout, fire, building collapse, flying debris, and other secondary conditions.</p> <p>B. First responders face the same risks as the general public and the danger to their health is dependent on the factors identified above. A radiological terrorism incident in Pottawattamie County would require response materials and expertise outside the normal day-to-day capabilities of local volunteer rescue units.</p> <p>C. Continuity of operations will be disrupted in any of the incorporated cities in Pottawattamie County if a radiological incident were to occur. The targeted area would depend on assistance from neighboring jurisdictions in the aftermath.</p> <p>D. The extent of destruction to property and infrastructure is dependent on the size and the location of the blast itself.</p> <p>E. Service delivery from within the blast area will be rendered incapable.</p> <p>F. The impacts to the environment would be devastating and long-term. Decades may pass before a fallout area is safe to inhabit.</p> <p>G. Any businesses in the area of impact would be disrupted. A single radiological incident could irreparably cripple a local economy and perhaps an entire region's economy.</p> <p>H. No known impact to contractual obligations.</p> <p>I. The reputation of a jurisdiction targeted by radiological terrorism would be significantly tarnished even if the jurisdiction was permanently evacuated because of contamination. The negative impacts would persist for decades after the event.</p>	4
Speed of Onset	While a terrorist organization may threaten action in advance of an event, an actual attack will occur without warning. Many times terrorists will use the threat of an attack to spread fear, and all credible threats should be taken very seriously.	4

Animal Disease Epidemic

Definition	A medical, health, or sanitation threat to the wildlife or domestic animals (such as contamination, epidemics, plagues, and insect infestation).	
Description	Infectious diseases introduced onto an operation can have a devastating effect on cash flow and equity. Major animal diseases include foot and mouth disease, rinderpest, African sine fever, classical swine fever, brucellosis, lumpy skin disease, and others. Adverse effects of infectious diseases can occur at the farm or industry level. Some diseases may severely limit or eliminate animal marketing options (for example: to slaughter only). In the future producers may be responsible for potential pathogen contamination of the food supply or environment. Negative effects may be short or long-term, depending on the nature of the pathogen and level of concern among producers and consumers. Presence of some pathogens can also affect market access for larger portions of the industry. With the stakes so high, bio-security should be a very high priority in day-to-day management decisions.	
Historical Occurrence	The current animal disease epidemic is the West Nile Virus (WNV). Carried by birds and mosquitoes, WNV causes severe neurological infections in humans, horses, and other mammal species. As of early 2004, the disease has been found in nearly all states east of the Rocky Mountains, including Iowa where many confirmed human cases, birds and horses have tested positive. Several citizens in Pottawattamie County tested positive for the WNV.	1
Probability	The presence of several grain and livestock processing facilities in throughout the county increases the possibility of a diseased animal coming into an area and potentially compromising the safety of the products generated in those facilities. Close monitoring of vaccinations, animal handling procedures, and cases identified by local veterinarians will help to mitigate the spread of any disease that may affect a large number of animals or the food supply.	2
Vulnerability	Those in Pottawattamie County most at risk of an animal disease epidemic would be those who work in livestock processing and food production facilities. Such facilities are rich environments for diseases to spread. Domestic animals would be much less at risk to epidemics, but the mobile nature of diseases such as WNV places those animals and their handlers at some risk. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The extent to which an animal disease outbreak would affect Pottawattamie County would depend on the nature of the outbreak and the types of animals affected. Any epidemic discovered in a processing facility would most likely be detected and isolated quickly with minimal threat to health and safety to the general public. More mobile epidemics, such as WNV, may spread more quickly, causing illness and perhaps death for animals and some humans. According to the 2007 Agriculture Census there is an inventory of 146,931 various livestock in Pottawattamie County. That number has more than likely increased in the last five years. There were 1,158 farms in the county that year but not all of those farms would have raised livestock.	4
Severity of Impact	<ul style="list-style-type: none"> A. No known impact to public health and safety. B. No known impact to first responder health and safety. C. No known impact to continuity of operations. D. No known impact to the built environment. E. A large enough animal disease outbreak could overwhelm animal care professionals throughout Pottawattamie County. F. Some disease outbreaks can threaten non-agricultural indigenous species in the region. G. Economic losses can be significant to livestock handlers and food processors. This would be especially detrimental in Pottawattamie County due to the strong presence of livestock and related industries. H. Animal handlers and food producers would face inquiry from state and federal agencies and potentially suffer penalties if mandated controls were not followed. I. The reputation of handlers and producers would likely be more impacted and scrutinized than any local government entity. 	3
Speed of Onset	Local veterinarians are the first line of defense and will undoubtedly be the first to witness the symptoms of an animal disease before it becomes an epidemic. The U.S. Department of Agriculture monitors reports submitted by veterinarians and labs to identify patterns. However, some diseases may spread far more quickly than professionals can adequately respond, especially where there are large concentrations of animals.	3

Human Disease Epidemic

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 as the cause of many serious diseases (e.g. cholera and tuberculosis). 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. In 2011, a total of 62 infectious diseases were designated as notifiable at the national level by the Centers for Disease Control. 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.	
Historical Occurrence	There have not been any major disease epidemics reported in Pottawattamie County in the last 25 years.	1
Probability	Local, state and regional public health officials work diligently to protect citizens from the risk of widespread disease by tracking infectious disease reports, educating citizens on preventative measures, and informing health care officials of signs of an outbreak. The probability of a widespread disease outbreak that would affect a significant portion of the county's population is possible but generally low.	2
Vulnerability	Public health agencies work to reduce the impact of communicable diseases and to eliminate the morbidity associated with those diseases. Prevention and care services target HIV/AIDS, STDs, tuberculosis, and other infectious diseases. While vaccines are available for many diseases, local citizens remain vulnerable to other diseases known and unknown. Depending on the type of disease and the ease with which it spreads, an epidemic could impact a significant portion (50 percent or more) of the county. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	4
Maximum Geographic Extent	Because of the high mobility in society today diseases can travel and infect people in a short period of time. People living in cities or in close proximity to each other are more likely to become infected, but residents in more rural areas are not any less immune. A major disease epidemic can very likely reach every corner of the county.	4
Severity of Impact	<ul style="list-style-type: none"> A. Many of the diseases on the national notification list result in serious illness if not death. Some diseases are treatable, but for others only the symptoms can be treated. B. Doctors, nurses, paramedics, and emergency medical technicians are vulnerable to contagious diseases. Universal precautions can greatly diminish the transfer rate and risk to responders and medical professionals. C. No known impact to continuity of operations. D. No known impact to the build environment. E. Health care services throughout the county may be at the limits of capacity. Some service providers may be under-staffed due to illness. F. No known impact to the environment. G. Large outbreaks may warrant travel advisories to the area. General commerce could suffer as a result. H. No known impact to contractual obligations. I. Adequate disease prevention programs and response to outbreaks can limit the damage to a jurisdiction's reputation. 	4
Speed of Onset	Local health care professionals will be the first to identify a notifiable disease or a significant number of cases of any other ailment. State and federal agencies monitor reports submitted by local professionals to identify patterns but some diseases can spread quickly and compromise the effectiveness of health care throughout the county.	3

Plant/Crop Disease Epidemic

Definition	The threat of transmittable disease or pest infestation to indigenous plant life and agricultural crops.	
Description	Plant/crop diseases and infestations can cause widespread loss and economic hardship on farmers, landowners and related businesses. Infections or infestations may become endemic, causing repeated losses in subsequent years.	
Historical Occurrence	There have been no plant/crop disease epidemics in Pottawattamie County in the last 25 years.	1
Probability	As Pottawattamie County is a largely rural county, there is the possibility of a plant or crop disease epidemic, though it is highly unlikely based on no historical occurrences.	1
Vulnerability	A plant/crop disease epidemic would have little impact on the health and safety of the public, though those who work in agriculture or horticulture could be affected on a monetary scale. Approximately 10 to 20 percent of Pottawattamie County's population could be affected in such a manner. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	According to the 2007 Agriculture Census there are 485,943 acres of cropland in Pottawattamie County, which accounts for approximately 79% of the county's total land area.	3
Severity of Impact	<ul style="list-style-type: none"> A. No known impact to public health and safety. B. No known impact to first responder health and safety. C. No known impact to continuity of operations. D. No Known impact to the built environment. E. No known impact to service delivery. F. The propagation of certain diseases and/or pests can threaten indigenous plant life, which could ultimately impact the regional ecosystem over time. G. Loss of crop yields due to infestation or disease can significantly impact economic gains of agriculture producers and related industries throughout Pottawattamie County. H. No known impact to contractual obligations. I. Plant/crop diseases usually occur naturally. An impacted jurisdiction would likely not suffer any damage to its reputation unless the spread of a disease or pest could have been prevented or reduced. 	3
Speed of Onset	Plant and crop diseases are monitored by state and federal agencies. Such agencies typically forecast and release information that can assist local residents and officials mitigate oncoming disease outbreaks.	1

Structural Failure

Definition	The collapse (part or all) of any 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. 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.	
Historical Occurrence	There have been at least four unplanned structural failures throughout Pottawattamie in the last 25 years.	2
Probability	Due to the inconsistent approach to infrastructure improvements and the enforcement of building codes across the county, structural failure due to age or condition is possible. Moreover, there is always a possibility of a structural failure occurring as a result of another hazard event.	2
Vulnerability	Older homes and commercial structures are most vulnerable to the risk of a structural failure. Infrastructure at risk for failure includes streets, bridges, and wells, but prevailing conditions would have to be extreme for these structures to fail. Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	2
Maximum Geographic Extent	The impacts of a structural failure would be limited to the structure itself and adjoining properties. In the extreme case of an infrastructure failure, such as a bridge failure, traffic delays could result.	1
Severity of Impact	<ul style="list-style-type: none"> A. Personal injury or death may occur from building collapse itself or by falling debris. B. Structural collapse rescue is a specialized form of rescue and can result in injury or death to responders. C. Continuity of operations would only be impacted if structural failure occurred at or near a critical facility. D. All structures including residential homes, businesses, government facilities, etc. can experience structural damage or total collapse. Adjacent buildings and infrastructure can be damaged as well. E. Bridge failures and debris in the streets and sidewalks would interrupt normal routes of travel. Utilities may be cut off to surrounding areas and communication transmissions may be lost for a period of time. F. There would be little to no impact to the environment unless a structural failure released a hazardous material. G. Cost to repair or replace structures would be significant to those impacted. The loss of a business’s physical location would naturally cease or hinder commerce and day-to-day operations. In smaller communities, the loss of a building could be socially and economically devastating. H. Failure during construction can be the liability of the contractor or owner. This would depend upon the contract for construction and at which time the property ownership is transferred. I. A jurisdiction’s reputation could suffer if a structural collapse could have been averted or limited by code enforcement. 	
Speed of Onset	While a failing structure may show signs of failure for weeks or months in advance, an unplanned structural failure will often occur with little or no warning.	4

Structural Fire

Definition	An uncontrolled fire in populated area that threatens life and property and is beyond normal day-to-day response capabilities.	
Description	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 material involved.	
Historical Occurrence	There are on average 91 structural fires each year in Pottawattamie County ranging from single-family dwellings to large commercial buildings. Most fires are small in nature but some exceed the response capabilities of a single jurisdiction's fire department; departments throughout the county participate in mutual aid agreements.	4
Probability	Based on the call volume received by local fire departments and historical information, there is a good chance the county will experience a structural fire at some point in the next 12 months.	4
Vulnerability	Older structures with obsolete wiring systems and buildings not constructed to current fire codes are most vulnerable to fires. Businesses that use heat, fire or combustible materials are also at an increased risk. Rural areas are not adequately served by fire hydrants so it is necessary to transport water via tankers. There is always a risk to life during fires, but people with limited mobility are perhaps most vulnerable (e.g. the elderly, sick, young children). Vulnerability by jurisdiction is further discussed beginning on Page 84 of this plan.	3
Maximum Geographic Extent	Most structural fires are isolated to a single building, and in many cases only a portion of the building is affected. However, a structural fire in a concentrated area can easily spread to multiple buildings quickly. Due to sufficient countywide fire protection coverage and quality response times, most structural fires will not spread beyond their source.	1
Severity of Impact	<ul style="list-style-type: none"> A. Injuries and fatalities are often a result of structural fires. B. First responders, especially fire fighters, are at high risk of injury or death when responding to structural fires. C. Only in rare cases would a structural fire affect continuity of operations. Fire may occur at a critical facility, data center, communications hub, etc. D. Each structural fire will cause damage or destruction to one or more buildings. E. Fires that occur at critical facilities or utility hubs may impact service delivery on rare occasion. F. Structural fires may spur grass or wild land fires in rural areas but overall environmental impact is limited. G. Structural fires will lead to repair or rebuilding costs but there is insurance that covers fire incidents. The loss of a business's physical location would naturally cease or hinder commerce and day-to-day operations. In smaller communities, the loss of a building could be socially and economically devastating. H. No known impact to contractual obligations. I. Structural fires are common occurrences and usually have little impact on jurisdictional reputation. 	2
Speed of Onset	Almost all structural fires occur with no warning but most buildings are equipped with detection and warning systems that alert occupants and responders.	4

Vulnerability by Incorporated City

Dam Failure

The only incorporated city in Pottawattamie County that is vulnerable to dam failure is Carter Lake. Dams located on the northern Missouri River are operated by the U.S. Army Corps of Engineers for conservation and recreational purposes. Any threat of dam failure on the Missouri River is out of Carter Lake's control.

Drought

Vulnerability among incorporated cities in Pottawattamie County is generally uniform. Depleted water levels over an extended period could compel jurisdictions to enact water use restrictions. Water pressure could also suffer. Oakland Foods is an industry that relies heavily on water use to operate, consuming nearly 600,000 gallons per day.

Earthquake

Avoca	Damage to the Mid-American Energy station could sever the power supply Avoca. A rupture in any of the Agriland FS chemical/anhydrous tanks could also pose a threat to the city. The elementary and high school facilities house the most vulnerable populations in Avoca. An additional pre-school and daycare facility are also of concern.
Carson	Carson does not have any significant critical facilities identified that would cause an external impact as the result of an earthquake.
Carter Lake	There is a large above-ground petroleum tank farm that extends into Carter Lake near Abbott Drive. A rupture of one or more tanks from an earthquake would be dangerous to the environment and emergency responders. Carter Lake also has a larger portion of vulnerable population facilities in multi-family apartments and mobile home parks.
Crescent	Nearly 87.3% of the housing stock within Crescent was constructed after 1960 which indicates a lower risk for structural damage as result of an earthquake incident.
Hancock	The risk of structural damage as a result of an earthquake is increased with 47.2% of Hancock's housing stock built before 1940.
Macedonia	The risk of structural damage as a result of an earthquake is increased with 53.2% of Macedonia's housing stock built before 1940.
McClelland	The risk of structural damage as a result of an earthquake is increased with 59.7% of McClelland's housing stock built before 1940.
Minden	Damage to the Mid-American Energy grid could sever the power supply to Minden. A rupture in any of the Northern Natural pipeline running north-south along the eastern portion of Minden also poses a potential threat.
Neola	The business district located on Front Street would be most at risk of an earthquake event due to the age and state of some of the commercial structures. Approximately 43% of the housing stock in Neola was built prior to 1940 and faces some increased vulnerability from structural failure as a result of an earthquake.
Oakland	The business district located on Main Street north of Oakland Avenue would be most at risk of an earthquake event due to the age and state of some of the commercial structures. The structural integrity of Oakland's housing stock is less of an issue with only 27.8% built prior to 1940.
Treynor	The fact that nearly two-thirds of Treynor's housing stock was built within the past 50 years greatly reduces the likelihood of structural damage as a result of an earthquake.
Underwood	Nearly 60% of Underwood's housing stock was built after 1970 which greatly reduces the likelihood of structural damage. In addition, Treynor does not have any significant critical facilities identified within the city limits that could cause an external impact as the result of an earthquake.
Walnut	With 63% of homes built prior to 1940, Walnut is at an increased risk for structural damage as a result of an earthquake. In addition, the entire school district resides within Walnut creating a concentrated vulnerable population.

Expansive Soils

All incorporated cities classify this hazard as "Will Not Occur." No incorporated cities in Pottawattamie County contain soil that consists of clay having "high swelling potential."

Extreme Heat	
<p>Vulnerability among incorporated cities in Pottawattamie County is generally uniform. Extreme heat can lead to illness and possibly death. The young and elderly are especially at risk, in addition to those who work or spend several hours a day outdoors. Extreme heat can even affect those indoors who do not have air conditioning or an effective means to keep cool. It is unknown how many homes in Pottawattamie County lack air conditioning. Population centers such as schools have enacted policies to release students from class when temperatures are dangerous and school officials are unable to keep facilities cool. Retirement home facilities have populations that could be at risk if heat conditions become dangerously high.</p>	
Flash Flood	
Avoca	The West Nishnabotna River splits off north of Avoca creating two rivers that run on both eastern and western boundaries of the city. The southern portion of Avoca is most at risk as it is at a lower elevation. The East Pottawattamie County Fairgrounds would be the most impacted critical facility in the event of a flash flood during the annual event.
Carson	The east end of Washington Street is the only area in Carson prone to flash flooding. This area experienced flash flooding in 1999 with no occurrences since.
Carter Lake	The actual Carter Lake that surrounds the northern hemisphere of the city has potential to flood during significant rain events. Particularly at risk are those structures adjacent to the lake.
Crescent	Particularly at risk are those structures adjacent to the Crescent and Pigeon Creek. Areas south of East Welch Street are prone to ditch build-up and flash flooding. Crescent Elementary School, public ball fields, and the city equipment storage facility are located along this street.
Hancock	The West Nishnabotna River runs along the west end of Hancock placing nearly half of the land mass in a floodplain. Fortunately most of this land is part of the Botna Bend County Park or farm land.
Macedonia	While the West Nishnabotna River is less than a half mile north and west of Macedonia limits, past flash flood events have not affected the city.
McClelland	McClelland sits at one of the highest points in the county and no part lies within a designated floodplain.
Minden	The fact that some areas of Minden do not have storm sewer facilities increases the vulnerability of a flash flood event. In addition, a majority of the city south of Main Street is within the 100-year floodplain.
Neola	About a quarter of Neola's property lies within the 100-year flood plain, and some of that runs through the middle of town. Residences in the southwest portion of the city and those areas nearest to Mosquito Creek on the eastern edge of town are the most at risk.
Oakland	Flooding is a concern for residents of Oakland as it sits along the Nishnabotna River. Residences and businesses in the southwest portion of the city probably face a greater risk from flash flooding than in other parts of town. On the other hand, Oakland's hilly terrain allows rain water to move quickly to the flood plain area and into the Nishnabotna River reducing the risk of a flash flood.
Treynor	Residences and businesses in the west side of Treynor are most vulnerable to flash flooding due to the proximity to Middle Silver Creek.
Underwood	The east side of Underwood would be the first to be affected because of its proximity to the Mosquito Creek. Less than 20% of Underwood is within the 100 year-flood plain, however, central and western portions of the city are within the 500-year flood plain.
Walnut	Very small portions of Walnut Creek lie within undeveloped parts of Walnut.
Grass or Wild Land Fire	
<p>Pottawattamie County is a predominately rural county and all incorporated cities are generally surrounded by rural crop land or grass lands. All incorporated cities share similar vulnerabilities related to grass fire due to surrounding land characteristics. Jurisdictions would be most vulnerable during periods of drought and extreme heat. Though local volunteer fire departments have the capabilities to contain most grass fires, inter-local agreements may need to be implemented if a fire becomes too extensive for one single</p>	

<p>department to control. In addition, all cities have at least some equipment and vehicles that are aged and not as reliable. Worn firefighting tools can endanger firefighters and the land/property threatened by fire.</p>	
<p>Hailstorm</p>	
<p>The vulnerability from hail among incorporated cities in Pottawattamie County is generally uniform. Storms can damage homes, vehicles and other property by the size and sheer force of hail. Persons caught outside during a hailstorm are at risk. Hail can wipe out entire fields of crop, though cropland is located in rural areas.</p>	
<p>Landslide/Erosion/Slope Failure</p>	
<p>The potential for a landslide is unlikely in most areas of Pottawattamie County. While there are several residential and commercial structures built on hills or slopes, there is no inventory of vulnerable buildings in any of the county's cities other than Crescent's recent residential development near the bluffs of the Loess Hills.</p>	
<p>Levee Failure</p>	
<p>Carter Lake and Crescent have the greatest vulnerability to levee failure due to the presence of the extensive levee systems along the Missouri River that encompasses much of the county's western border. Originally built in 1952 to withstand a 100-year flood, these levees were updated in 1986 to withstand a 500-year event.</p>	
<p>River/Stream Flood</p>	
Avoca	<p>Similar vulnerabilities as flash flood are associated with a river/stream flood incident. However, flooding over long periods of time such as the 2011 Missouri River event have additional issues such as flooded basements. As mentioned above, the southern portion of Avoca is most at risk as it is at a lower elevation. The fairgrounds would still be at risk in addition to the adjacent high school facility and sports complex.</p>
Carson	<p>Similar to the flash flooding, the western portion of Carson is susceptible to periodic flooding as it is adjacent to the West Nishnabotna River. The rodeo/park grounds located in that part of the city are vulnerable to flooding.</p>
Carter Lake	<p>Due to the high groundwater table, there is a possibility that Carter Lake will experience flooding in the future, but a river/stream flood from the Missouri River is unlikely due to the distance and location of the river from the city.</p>
Crescent	<p>The Crescent and Pigeon Creek pose a minor flood threat to the western and southern portions of Crescent. Risk factors are increased in areas of Crescent that lack storm sewer facilities.</p>
Hancock	<p>The West Nishnabotna River runs along the west end of Hancock placing nearly half of the land mass in a floodplain. Fortunately most of this land is part of the Botna Bend County Park or farm land. The residences near the fringe of either the 100 or 500-year floodplain may likely experience basement flooding.</p>
Macedonia	<p>No part of Macedonia lies within the 100-year floodplain of the West Nishnabotna River.</p>
McClelland	<p>McClelland sits at one of the highest points in the county and no part lies within a designated floodplain.</p>
Minden	<p>While much of Minden's land mass south of Main Street is within the 100-year floodplain, this area is agricultural land that adjoins commercial buildings minimizing potential harm to the residential areas of the city.</p>
Neola	<p>Residences in the southwest portion of Neola and some areas near Mosquito Creek on the eastern edge of city are the most vulnerable to flooding.</p>
Oakland	<p>Residences and businesses in the southwest portion of Oakland probably face a greater risk from flash flooding than in other parts of town. With federal assistance, several properties have been removed from the 100-year floodplain in Oakland during the past decade. Much of the acquired land has been preserved as green space or converted to recreational areas.</p>
Treynor	<p>Although a small portion of Treynor is within a 100-year floodplain, most of the danger and damage would be experienced by the people and property located near the floodways. There are no structures within the 100-year floodplain.</p>
Underwood	<p>The east side of Underwood would be the first to be affected because of its proximity to the Mosquito Creek. Less than 20% of the city's property lies within the 100-year</p>

	flood plain, with all of that territory lying east of Railroad Highway. However, central and western portions of the city are within the 500-year flood plain.
Walnut	Very small portions of Walnut Creek lie within undeveloped parts of Walnut.
Severe Winter Storm	
Avoca	Conventional home insulation was not widely installed in homes prior to 1940. With nearly 46.6% of housing built prior to 1940, residents of these homes are at an increased vulnerability to extreme cold. In addition, Avoca sits along Interstate 80 and boasts Wings America truck stop which includes restaurants and hotel accommodations. Local first responders may need to divert resources to assist with an emergency call on I-80 and/or the truck stop with its increased temporary population.
Carson	A severe winter storm could hinder or entirely shut down access in or out of Carson, particularly if U.S. Highway 59 and/or Iowa Highway 92 are impassable. Fire and rescue workers may not be able to respond to calls if road conditions are dangerous. All business and government operations may be shut down if power fails and roads cannot be cleared. It is unknown how many residents lack backup power or have a secondary means to heat their homes.
Carter Lake	A severe winter storm has the potential to create a secondary impact should Eppley Airfield in Omaha, NE postpone or cancel flights causing passengers to find hotels in Carter Lake.
Crescent	Crescent is less than a mile from Interstate 29. Accidents are likely to occur if a winter storm causes slick roads or whiteout conditions. Though I-29 does not run through Crescent city limits, local first responders may assist with an emergency call. It is unknown how many residents lack backup power or have a secondary means to heat their homes.
Hancock	A severe winter storm could hinder or entirely shut down access in or out of Hancock, particularly if U.S. Highway 59 is impassable. Fire and rescue workers may not be able to respond to calls if road conditions are dangerous. Additionally, many homes would not be able to stay heated in the event of a power outage during a storm event. Roads may be closed and water pipes could freeze.
Macedonia	A severe winter storm could hinder or entirely shut down access in or out of Macedonia, particularly if U.S. Highway 59 is impassable. Fire and rescue workers may not be able to respond to calls if road conditions are dangerous. Additionally, many homes would not be able to stay heated in the event of a power outage during a storm event. Roads may be closed and water pipes could freeze.
McClelland	Many homes would not be able to stay heated in the event of a power outage during a storm event. Roads may be closed and water pipes could freeze. In addition, local first responders may be called upon to assist with an emergency on Interstate 80, which is 3.5 miles from McClelland.
Minden	Conventional home insulation was not widely installed in homes prior to 1940. Being that only 22.3% of the homes in Minden were built prior to 1940, the lack of insulation is less of a concern in this city. In addition, local first responders may be called upon to assist with an emergency on Interstate 80, which is 2 miles from Minden.
Neola	Conventional home insulation was not widely installed in homes prior to 1940. With nearly 43% of housing built prior to 1940, residents of these homes are at an increased vulnerability to extreme cold. In addition, local first responders may be called upon to assist with an emergency on Interstate 80, which is less than one mile from Neola.
Oakland	A severe winter storm could hinder or entirely shut down access in or out of Oakland, particularly if U.S. Highway 6/59 is impassable. Fire and rescue workers may not be able to respond to calls if road conditions are dangerous. Additionally, many homes would not be able to stay heated in the event of a power outage during a storm event. Roads may be closed and water pipes could freeze. Road closures or disruption of water distribution due to winter weather would be particularly detrimental to Oakland Foods.

Treyvor	A severe winter storm could hinder or entirely shut down access in or out of Treyvor, particularly if U.S. Highway 92 is impassable. Fire and rescue workers may not be able to respond to calls if road conditions are dangerous. All business and government operations may be shut down if power fails and roads cannot be cleared. It is unknown how many residents lack backup power or have a secondary means to heat their homes.
Underwood	Conventional home insulation was not widely installed in homes prior to 1940. Being that only 20.7% of the homes in Underwood were built prior to 1940, the lack of insulation is less of a concern. In addition, local first responders may be called upon to assist with an emergency on Interstate 80, which is less than one mile from Underwood. Poor travel conditions caused by winter weather could have an effect on daily operations of the Jack Link's Beef Jerky distribution center.
Walnut	Conventional home insulation was not widely installed in homes prior to 1940. With nearly 60% of housing built prior to 1940, residents of these homes are at an increased vulnerability to extreme cold. In addition, Walnut is less than a mile from Interstate 80. Accidents are likely to occur if a winter storm causes slick roads or whiteout conditions. Local first responders may need to divert resources to assist with an emergency call on Interstate 80.
Sink Holes	
Though sink hole is classified by incorporated cities in Pottawattamie County as a "may occur" hazard, there are no known developed areas where a sink hole is likely to occur. Therefore, it is problematic to confidently state what a city's vulnerability to sink holes is without further data.	
Thunderstorm and Lightning	
<p>All incorporated cities in Pottawattamie County are vulnerable to thunderstorms and lightning. High winds can damage trees, residences, and businesses, and can knock vehicles off of the road. Straight-line winds are responsible for most thunderstorm damage. Older homes can likely expect greater damage from wind and hail. The following lists the percentages of housing units in incorporated cities built prior to 1990 and in 1939 or earlier*. (It is unknown how many units are in "good" condition or better.):</p> <ul style="list-style-type: none"> ▪ Avoca- 86.3% prior to 1990, 46.6% in 1939 or earlier ▪ Carson- 89.7% prior to 1990, 44.9% in 1939 or earlier ▪ Carter Lake- 77.9% prior to 1990, 12.3% in 1939 or earlier ▪ Crescent- 82.0% prior to 1990, 8.3% in 1939 or earlier ▪ Hancock- 91.1% prior to 1990, 47.2% in 1939 or earlier ▪ Macedonia- 79.1% prior to 1990, 53.2% in 1939 or earlier ▪ McClelland- 88.7% prior to 1990, 59.7% in 1939 or earlier ▪ Minden- 75.5% prior to 1990, 22.3% in 1939 or earlier ▪ Neola- 92.0% prior to 1990, 43.2% in 1939 or earlier ▪ Oakland- 83.6% prior to 1990, 27.8% in 1939 or earlier ▪ Treyvor- 84.7% prior to 1990, 14.1% in 1939 or earlier ▪ Underwood- 71.3% prior to 1990, 20.7% in 1939 or earlier ▪ Walnut- 96.3% prior to 1990, 63.0% in 1939 or earlier <p>Power and communications failures often result from thunderstorms. However, loss of systems is usually temporary and many critical functions have backup capabilities. Those most at risk are people caught outside when severe weather starts.</p> <p>*2010 ACS 5-year estimates</p>	
Tornado	
Avoca	Housing in Carson is 85% single-family and 14% multi-unit with less than 1% of housing made up of mobile homes, which are high-risk structures during high wind events and tornadoes. Of the total 704 housing units, it is unknown how many lack adequate shelter. The A-H-S-T Elementary School and High School are located in Avoca. As enrollment continues to grow, shelters in the schools may become inadequate.
Carson	Housing in Carson is 88.3% single-family and 11.1% multi-unit with less than 1% of

	housing made up of mobile homes, which are high-risk structures during high wind events and tornadoes. Of the total 341 housing units, it is unknown how many lack adequate shelter. The Oakland Riverside Middle School is located in Carson. Shelters in the schools may need to expand should the school district experience significant growth in the near future.
Carter Lake	There are 220 mobile homes in Carter Lake, 15.3% of the city's housing stock. Areas where there are concentrations of mobile homes should have a nearby facility available to provide a shelter during a high wind or tornado event. The Carter Lake Elementary School, part of the Council Bluffs Community School District, is located in the city. Shelters in the school may need to expand should the area experience significant growth in the near future.
Crescent	People living in mobile homes or other structures without permanent foundations are particularly vulnerable to tornados, however, there are no mobile homes, campgrounds, or recreational vehicle parks identified in Crescent city limits. The Crescent Elementary School, part of the Council Bluffs Community School District, is located in the city. Shelters in the school may need to expand should the area experience any growth in the near future.
Hancock	Of the 89 homes in Hancock, 80 are single-family units with only 5 mobile homes. The remaining four units are attributed to 2 and 3-4 unit housing.
Macedonia	Housing in Macedonia is 85.6% single-family and 10.7% multi-unit with less than 3.6% of housing made up of mobile homes. Of the total 139 housing units, it is unknown how many lack adequate shelter.
McClelland	Housing in McClelland is 94.6% single-family with only 5.4% of housing made up of mobile homes. Of the total 56 housing units, it is unknown how many lack adequate shelter.
Minden	Of the 233 housing units in Minden, single-family units and multi-unit facilities make up nearly all housing options with on three mobile homes listed. It is unknown how many residences lack adequate shelter.
Neola	Of the 347 housing units in Neola, the city only has two mobile homes. Aside from these residents in mobile home structures, it is unknown how many residences lack adequate shelter.
Oakland	Housing in Oakland is 85.2% single-family and 13.9% multi-unit with less than 1.0% of housing made up of mobile homes. Of the total 687 housing units, it is unknown how many lack adequate shelter. The Oakland Riverside Elementary School and High School building is located in Oakland. Shelters in the schools may need to expand should the school district experience significant growth in the near future.
Treynor	Treynor has no mobile homes which are considered high-risk structures during high wind events and tornadoes. Of the 398 housing units, it is unknown how many residences lack adequate shelter. The Treynor Elementary School and Junior/Senior High School buildings are located in Treynor. Shelters in the schools may need to expand should the school district experience significant growth in the near future.
Underwood	Underwood has no mobile homes which are considered high-risk structures during high wind events and tornadoes. Of the 328 housing units, it is unknown how many residences lack adequate shelter. The Underwood Elementary/Middle School and High School buildings are located in Underwood. Shelters in the schools may need to expand should the school district experience significant growth in the near future.
Walnut	There are 24 mobile homes in Walnut. While a majority of the remaining housing units are composed of single-family units (291 units or 75.8%) and multi-unit structures (69 units or 18%), this minority population will likely be the hardest hit and need the most assistance in the event of a tornado. The Walnut Elementary School and High School buildings are located in Walnut. Shelters in the schools may need to expand should the school district experience significant growth in the near future.
Windstorm	

Windstorm vulnerability for all incorporated cities in Pottawattamie County is generally similar to what is stated in tornado vulnerability. Older homes in cities not built to modern standards may face risk of some kind of structural failure. Roof and siding damage to homes and structures is likely regardless of age. Power and telephone lines may be knocked down. Falling trees or tree limbs can likely be expected. Trees and limbs can damage automobiles and sometimes break through homes and other structures. Flying debris can itself cause damage and injuries.

Air Transportation Incident

Carter Lake is most vulnerable to an air transportation incident due close proximity to Eppley Airfield in Omaha, NE. In 2011, over 100,000 aircrafts departed and landed at Eppley, accommodating 4.3 million passengers, 50 million pounds of mail, and 94 million pounds of cargo. Crescent is also within the path of takeoffs and landings at Eppley Airfield putting it at risk of a potential incident. Injured persons would have to be sent to hospitals in nearby Council Bluffs or Omaha if an incident occurred.

Communications Failure

Disruption of continuity of operations would be the primary vulnerability among incorporated cities in Pottawattamie County. There would likely be a void in emergency response and coordination until a secondary means to communicate could be established. The 911 and communications center for all of Pottawattamie County is located at the county courthouse in Council Bluffs.

Energy Disruption

Avoca	Mid-American Energy provides Avoca with electricity and many of the factors that will determine the scope and length of an energy disruption are beyond Avoca's control. While a few of the city's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems. Schools and nursing homes have the most vulnerable populations in the city. Approximately 93.6% of workers in Avoca 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Carson	Those most vulnerable to energy disruption in Carson are those without adequate means to stay warm or cool if a failure were to occur during a period of extreme temperatures. Approximately 95.9% of workers in Carson 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Carter Lake	Those most vulnerable to energy disruption in Carter Lake are those without adequate means to stay warm or cool if a failure were to occur during a period of extreme temperatures. As consumer of OPPD energy, the likelihood of prolonged energy disruption is decreased as this large energy producer has greater capacity and response capabilities. Approximately 95% of workers in Carter Lake 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Crescent	While a few of the city's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems. Approximately 91.7% of workers in Crescent 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Hancock	Although Hancock's power comes from a local Mid-American energy grid, many of the factors that will determine the scope and length of an energy disruption are beyond the city's control. A few of the city's critical facilities have permanent generators and others have access to portable generators. Approximately 97.7% of workers in Hancock 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Macedonia	While a few of Macedonia's critical facilities have permanent generators and others

	have access to portable generators, a long-term energy disruption could cause widespread problems. Approximately 93.9% of workers in Macedonia 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
McClelland	While two of McClelland's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems. Approximately 95% of workers in McClelland 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Minden	Minden is at a higher risk of vulnerability during an energy disruption since the city does not generate its own energy resources. While a few of Minden's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems. Approximately 94.2% of workers in Minden 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Neola	Those populations most at risk to energy disruption are the elderly, especially the concentrated population at the senior housing center. Also at risk is the 84.8% of workers in Neola 16 years of age and over that take a vehicle to work. There is no public transportation available in Neola and a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Oakland	Since Mid-American Energy provides Oakland with electricity and that utility is generated outside the city, there exists a relatively high degree of vulnerability to an energy disruption caused by external sources. While a few of Oakland's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems, especially for Oakland Foods, a major county employer and food processor. Both the elementary and high school facilities as well as Oakland Manor nursing home have the most vulnerable populations in the city. Approximately 91.0% of workers in Oakland 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Treynor	Mid-American Energy provides Treynor with electricity and many of the factors that will determine the scope and length of an energy disruption are beyond the city's control. While a few of Treynor's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems. 88.8% of workers in Treynor 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Underwood	Mid-American Energy provides Underwood with electricity and many of the factors that will determine the scope and length of an energy disruption are beyond the city's control. While a few of Underwood's critical facilities have permanent generators and others have access to portable generators, a long-term energy disruption could cause widespread problems, especially to the Jack Link's Beef Jerky distribution center, a major county employer. Both the elementary/middle and high school facilities have the most vulnerable populations in the city. Approximately 91.6% of workers in Underwood 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Walnut	Mid-American Energy provides Walnut with electricity and many of the factors that will determine the scope and length of an energy disruption are beyond the city's control. While a few of Walnut's critical facilities have permanent generators and others have

	access to portable generators, a long-term energy disruption could cause widespread problems. Approximately 93.9% of workers in Walnut 16 years of age and over take a vehicle to work and there is no public transportation available in the city; a shortage of gasoline and oil would limit means of travel for most residents, especially those who commute.
Fixed Hazardous Materials Incident	
Avoca	Avoca lies within the vulnerability zone radius from one fixed hazardous facility and several modes of transportation for various toxic substances. The presence of anhydrous ammonia at Agriland FS poses the most significant threat to Avoca. Wings America, a major truck stop in Pottawattamie County, poses a vulnerability to Avoca due to the high number of costumers and volume of fuel pumped daily.
Carson	Carson is within a vulnerability zone that will kill or incapacitate in a 30-minute time period if a release occurs.
Carter Lake	There are several hazardous materials sites throughout Carter Lake, especially in the southeast portion of the city.
Crescent	There are no fixed hazmat sites in Crescent that pose a significant threat.
Hancock	The presence of anhydrous ammonia at the Hancock Elevator poses the most significant threat to Hancock.
Macedonia	There are chemical storage locations in Macedonia that could pose a danger if spilled or sparked, though the effect would not likely be city-wide due to the relatively small amount of materials contained.
McClelland	McClelland lies within the vulnerable zone of one facility that handles fixed hazardous or toxic materials.
Minden	There are no fixed hazmat sites in Minden that pose a significant threat.
Neola	Farm Service Co. in Neola possesses hazardous materials and the city is within a vulnerability zone that will kill or incapacitate in a 30-minute time period if a release occurs.
Oakland	The Farm Service Cooperative and Pelgrow are two critical fixed hazardous material facilities in Oakland. The Farm Service Cooperative is located very close to the city's nursing home, which would probably have to be evacuated for even a moderate incident. A major explosion or leak at one of these agricultural chemical facilities could affect 100% of the city.
Treynor	Treynor has two sites that store anhydrous ammonia.
Underwood	Underwood is within three vulnerability zones that will kill or incapacitate in a 30-minute time period if a release occurs. In addition, Underwood has several ag-related businesses where hazardous materials are stored.
Walnut	There are no fixed hazmat sites in Walnut that pose a significant threat.
Fixed Radiological Incident	
All of the incorporated cities within Pottawattamie County are in the 50 mile Ingestion Pathway Zone for the Cooper Nuclear Station in Brownville, NE and the Fort Calhoun Nuclear Station in Fort Calhoun, NE. Depending on the severity of the incident and wind conditions, all citizens in each city could be endangered. In the event of a mass evacuation from Pottawattamie County, residents would need to travel east and possibly north or south, depending on which facility the incident occurred.	
Highway Transportation Incident	
Avoca	Interstate 80 runs east-west along northern Avoca. Thousands of vehicles pass by Avoca every day. Based on vehicle crash rates and the volume of traffic Avoca experiences daily, the city has a higher risk for significant transportation incidents than several other cities in Pottawattamie County.
Carson	Iowa Highway 92 and U.S. 59 intersect just east of Carson city limits. Both are heavily traveled roads. There are no critical facilities in close proximity to these highways.
Carter Lake	Carter Lake does not have a major highway within its city limits although Abbott Drive, which borders the city on the east, is a high traffic arterial receiving nearly 20,000 vehicles a day.
Crescent	Traffic that runs north and south on the Old Lincoln Highway provides the greatest risk

	for an incident even though I-29 is less than a mile west of Crescent.
Hancock	Even though U.S. 59 runs north-south through Hancock, the relatively low traffic decreases the likelihood of a highway transportation incident.
Macedonia	U.S. 59 running north-south is less than a mile east of Macedonia's city limits. There are no critical facilities in close proximity to this highway.
McClelland	McClelland is located on Highway L52. Traffic volume in McClelland is typically low and there are no major thoroughfares where high speed driving is allowed.
Minden	Interstate 80 can be accessed from Minden via Lincoln Street/335 th Street; I-80 is two miles north of the city. Main Street/Tamarack Avenue is the major city thoroughfare and is adjacent to Minden's commercial center. Other roadways are primarily residential.
Neola	The likelihood of significant transportation incidents and secondary impacts is increased due to Neola's position near Interstates 80 and 680. Railroad Highway is a high traffic volume roadway that runs through the center of the city.
Oakland	U.S. Highways 6 and 59 are two major highways that intersect within Oakland. Both routes accommodate well over 1,000 vehicles per day.
Treynor	Treynor is only accessed by one major state highway, Highway 92, and no federal roadways. Use of Highway 92 as a major transportation corridor is not great, and it primarily serves local and regional trips.
Underwood	Interstate 80 runs northeast adjacent to Underwood. Thousands of vehicles pass by Underwood every day. Railroad Highway is another high traffic volume roadway that runs through Underwood where accidents are more prone to occur.
Walnut	Interstate 80 runs east-west along northern Walnut. Thousands of vehicles pass by Walnut every day.
Pipeline Incident	
Avoca	A stem of the Northern Natural Gas pipeline terminates within Avoca city limits on the eastern boundary.
Carson	The Enron Gas Pipeline Group operates a 2.3-inch pipeline that transfers natural gas. The line enters Carson from the north, near the intersection of Mildred Street and North Street.
Carter Lake	The Williams Pipeline Group operates a petroleum products filled line that serves Carter Lake and Eppley Airfield. This six-inch pipe services the city from the south side of town and carries gasoline, fuel oils, aviation fuels, liquefied petroleum gasses, and crude oil. A breakage in this pipe could be potentially dangerous to the entire city.
Crescent	The Amoco Pipeline Company operates an oil pipeline that runs from northwest to southeast generally through the northeast quadrant of Crescent. This area is a combination of wooded and open space with numerous residential structures nearby.
Hancock	There are no major pipelines running through Hancock city limits.
Macedonia	There are no major pipelines running through Macedonia's city limits.
McClelland	There are no major pipelines running through McClelland's city limits.
Minden	The Northern Natural Gas pipeline traverses the eastern portion of Minden transecting another pipeline less than a mile north of the city limits.
Neola	A stem of the Northern Natural Gas pipeline traverses east-west through Neola city limits.
Oakland	A stem of the Northern Natural Gas pipeline connects to Oakland at the southeast corner of Oakland's city Limits.
Treynor	A stem of the Northern Natural Gas pipeline connects to the southwest outside of Treynor city limits.
Underwood	A stem of the Northern Natural Gas pipeline connects to the northeast portion Underwood.
Walnut	A stem of the Northern Natural Gas pipeline terminates within Walnut city limits on the southern boundary.
Rail Transportation Incident	
Avoca	There are no active rail tracks that run through Avoca.

Carson	There are no active rail tracks that run through Carson.
Carter Lake	A major rail line runs east-west in Carter Lake south of Avenue H, a generally industrial area of the city. There is a major above-ground cylindrical storage tank facility directly south of the line. The numerous tanks contain petroleum and any derailment or other rail incident near the facility could be exceptionally dangerous. Also, a local hotel is roughly 50 yards away from the line.
Crescent	Two rail lines run north to south within two miles of Crescent. The hundreds of shipments per year include explosives, liquid and solid poisons, radioactives, flammable solids, oxidizers, flammable and combustible liquids, and various environmentally hazardous substances.
Hancock	The Iowa Interstate Railroad runs along the southern boundary of Hancock, though the line does not pass into city limits or run in close proximity to any critical facilities.
Macedonia	There are no active rail tracks that run through Macedonia.
McClelland	Iowa Interstate Railroad runs northeast/southwest along Railroad Street in McClelland. This line typically transports agriculture commodities. There are some residential and commercial properties that adjoin the line, though the area is low density and there are no critical facilities in close proximity.
Minden	There are no active rail tracks that run through Minden.
Neola	There is a BNSF rail line in Neola that runs along Front Street. There are several critical facilities located in close proximity to the line. These sites include Neola wastewater treatment, Farm Service Co., Neola fire station, and a gas station. Neola's central business district is mainly located on Front Street, thus local businesses and commercial buildings would be at risk in the event of a rail incident.
Oakland	There are no active rail tracks that run through Oakland.
Treynor	There are no active rail tracks that run through Treynor.
Underwood	There is a BNSF rail line that runs along the southeast border of Underwood. BNSF regularly transports materials that are combustible and toxic. It is unknown how many hazardous materials travel through Underwood on a daily basis. Agriland FS and Underwood wastewater treatment are located within one mile of the rail line and could become compromised in the event of a rail incident.
Walnut	There are no active rail tracks that run through Walnut.
Transportation Hazardous Materials Incident	
Avoca	The presence of state and federal routes with heavy truck traffic in Avoca and companies that transport chemicals to other locations increases the risk of a transportation hazardous materials incident.
Carson	U.S. Highway 59 runs north-south just east of Carson. Any hazardous materials released near Carson could impact the entire city depending on wind conditions.
Carter Lake	Abbott Drive and East Locust Street are the major thoroughfares in Carter Lake. It is not uncommon for transportation vehicles to pass through the city en route to Eppley Airfield or one of the numerous industrial sites in northeast Omaha. However, vehicles passing through Carter Lake do not travel at high rates of speed.
Crescent	Two major rail lines and Interstate 29 are both less than two miles west of Crescent. Numerous hazardous materials are transported on these routes each day and a hazmat release could easily affect the entire city due to proximity with the interstate and the small area of Crescent.
Hancock	The presence of the Hancock Elevator and the volume of truck traffic the city experiences daily along U.S. Highway 59 create the opportunity for an incident.
Macedonia	U.S. Highway 59 runs north-south less than one mile east of Macedonia city limits. Any hazardous materials released near Macedonia could impact the entire city depending on wind conditions.
McClelland	The lack of state and federal routes with heavy truck traffic in McClelland makes such an incident a low probability. However, there is one agricultural site in McClelland where hazardous materials are transported in and out.
Minden	Minden's proximity to Interstate 80 and its heavy truck traffic increase the risk of a transportation hazardous materials incident.

Neola	An increased risk of a transportation hazardous materials incident is present in Neola due to heavy truck traffic that transports chemicals to other locations along I-80 and through Neola on Railroad Highway.
Oakland	The presence of the Farm Service Cooperative and Pelgrow as well as the volume of truck traffic the city experiences daily along U.S. Highways 6 and 59 create the opportunity for an incident. In a rare occurrence there may be a risk of an incident where a leak, spill or explosion will carry hazardous materials away from the accident site and into a larger area of the city.
Treynor	A transportation hazmat incident is most likely to occur on State Highway 92, which becomes Main Street through Treynor city limits. Main Street is Treynor's major thoroughfare. Treynor Elementary School and Junior/Senior High School are along Main Street in addition to numerous commercial and residential buildings.
Underwood	An increased risk of a transportation hazardous materials incident is present in Underwood due to heavy truck traffic that transports chemicals to other locations along I-80 and through Underwood on Railroad Highway.
Walnut	The presence of state and federal routes with heavy truck traffic in Walnut and companies that transport chemicals to other locations increases the risk of a transportation hazardous materials incident.

Transportation Radiological Incident

Radioactive waste that is transported is typically low level waste and would not pose any serious health threats unless exposure was long-term. However, any incident in the incorporated cities of Pottawattamie County would require assistance from outside resources. Being in close proximity to major roads and rail lines puts cities at risk. Interstate 80 spans the entire county from east to west and Interstate 29 runs north-south through the western portion of Pottawattamie County. These major transportation routes have potential to impact Crescent, Underwood, Neola, Avoca and Walnut. U.S. Highway 59, a north-south route, runs through or in close proximity to the following cities: Macedonia, Carson, Oakland, Hancock, and Avoca. In addition, rail lines traverse through Carter Lake, Crescent, Hancock, McClelland, Neola and Underwood.

Waterway/Water Body Incident

Carter Lake has an oxbow lake of the same name that surrounds much of the northern half of the city. The Missouri River also borders Carter Lake's southern boundary. Aside from this connection to the Missouri River which borders all of western Pottawattamie County, the West Nishnabotna River is the most significant river directly impacting the incorporated cities in the county. The river runs through Carson, Oakland, and parts of Hancock, and is just outside the city limits of Macedonia and Avoca. Drowning is the most likely incident to occur. There are no waterways/water bodies within the city limits of Crescent, Macedonia, McClelland, Minden, Neola, Treynor, Underwood, or Walnut.

Animal Disease Epidemic

There are no livestock processing operations in any of Pottawattamie County's incorporated cities but livestock production generated \$118 million in 2007 or 38% of the market value products sold in Pottawattamie County according to the 2007 Agriculture Census. There were 128,766 hogs and pigs and 94,879 cattle sold in Pottawattamie County in that same year. Many of the livestock operations can be attributed to animal feeding operations, which include 29 confinements (ranked 73rd in Iowa) and 63 open feedlots (ranked 6th in Iowa). An animal disease epidemic would hinder the economic vitality of the county as a whole.

Human Disease Epidemic

Council Bluffs is the only incorporated city with hospitals or major medical clinics in Pottawattamie County. The following list provides the nearest hospital and approximate distance for each incorporated city:

- Avoca- Cass County Memorial Hospital (Atlantic, IA), 22 miles
- Carson- Jennie Edmundson Hospital (Council Bluffs, IA), 25 miles
- Carter Lake- University of Nebraska Medical Center (Omaha, NE), 5.5 miles
- Crescent- Jennie Edmundson Hospital, 7 miles
- Hancock- Cass County Memorial Hospital, 22 miles
- Macedonia- Montgomery County Memorial Hospital (Red Oak, IA), 23 miles
- McClelland- Jennie Edmundson Hospital, 13 miles

- Minden- Jennie Edmundson Hospital, 26 miles
- Neola- Jennie Edmundson Hospital, 19 miles
- Oakland- Jennie Edmundson Hospital, 25 miles
- Treynor- Jennie Edmundson Hospital, 15 miles
- Underwood- Jennie Edmundson Hospital, 14 miles
- Walnut- Cass County Memorial Hospital, 16 miles

Plant/Crop Disease Epidemic

According to the Iowa State Extension and Outreach Office, Pottawattamie County farmers own and manage 485,943 acres of land, 79% of all the land in the county. This includes cropland, pastures and trees. The main crops produced in Pottawattamie County are corn and soybeans. Based on data from the Agriculture Census, Pottawattamie County farmers harvested 33.1 million bushels of corn and 9.1 million bushels of beans in 2007. Production of all crops in the county contributed to nearly \$219.90 million or 3.5% of the county's economic output. Each incorporated city in Pottawattamie County has a facility or employer related to the crop agriculture sector, though the extent a crop disease epidemic would have on local economies is not quantifiable at this time.

Structural Failure

Much of the housing stock in Pottawattamie County and incorporated cities is older and potentially more vulnerable to structural failure than homes built to modern standards. The following lists the percentages of housing units in incorporated cities built prior to 1990 and in 1939 or earlier (It is unknown how many units are in "good" condition or better.):

- Avoca- 86.3% prior to 1990, 46.6% in 1939 or earlier
- Carson- 89.7% prior to 1990, 44.9% in 1939 or earlier
- Carter Lake- 77.9% prior to 1990, 12.3% in 1939 or earlier
- Crescent- 82.0% prior to 1990, 8.3% in 1939 or earlier
- Hancock- 91.1% prior to 1990, 47.2% in 1939 or earlier
- Macedonia- 79.1% prior to 1990, 53.2% in 1939 or earlier
- McClelland- 88.7% prior to 1990, 59.7% in 1939 or earlier
- Minden- 75.5% prior to 1990, 22.3% in 1939 or earlier
- Neola- 92.0% prior to 1990, 43.2% in 1939 or earlier
- Oakland- 83.6% prior to 1990, 27.8% in 1939 or earlier
- Treynor- 84.7% prior to 1990, 14.1% in 1939 or earlier
- Underwood- 71.3% prior to 1990, 20.7% in 1939 or earlier
- Walnut- 96.3% prior to 1990, 63.0% in 1939 or earlier

Structural Fire

Avoca	The downtown commercial district on North Elm between West Wool Street to West Lyon has a concentration of critical facilities. Fire at one building could easily spread to connecting structures. The elementary and high school facilities also have vulnerable populations to consider.
Carson	The downtown commercial district on Broadway between Commercial and Central Streets has a concentration of older structures including the Dreamland Theater. Fire at one building could easily spread to connecting structures.
Carter Lake	Carter Lake's elementary school and community resource center are located in the same building. This facility and its services are important to the city and all efforts should be made to ensure its safety from fire. Carter Lake has building codes which better guarantee that structures are designed to hold up under normal conditions. Routine inspection of older structures may alert inspectors of potential hazards and help lower the rate of incidents. A fire at Owen Industries, a steel processing and fabrication facility, could not only displace approximately 200 workers, but it also could significantly impact the manufacturing economy of Pottawattamie County.
Crescent	The Crescent Elementary School building is identified as the primary vulnerable population site in the city. Safely evacuating children in the event of a fire is critical and evacuation procedures should be adopted and practiced.
Hancock	A structural fire at the Hancock Elevator poses a potential threat with the presence of flammable chemicals and other hazardous materials. Furthermore, nearly half of the residences were constructed prior to 1940 and are at higher risk for electrical fires

	due to age.
Macedonia	The downtown business district on Main Street/Pioneer Trail between Clayton Avenue and Potter Street has a concentration of older structures. Fire at one building could easily spread to connecting structures.
McClelland	Nearly 60% of residences were constructed prior to 1940 placing a majority of McClelland's housing stock at higher risk for electrical fires as a result of damaged or older wiring system. WestWind Logistics, an Iowa pallet and transportation company, is a major employer for the McClelland area. A serious fire at their facility would not only handicap the local economy, it would hinder business operations statewide.
Minden	The downtown business district along Main Street has a concentration of older commercial structures. Fire at one building could easily spread to connecting structures.
Neola	The downtown business district along Front Street has a concentration of older commercial structures. Fire at one building could easily spread to connecting structures. Special consideration should be taken for a fire at the Neola senior center.
Oakland	The downtown business district along Main Street has a concentration of older commercial structures. Fire at one building could easily spread to connecting structures. Special consideration should be taken for a fire at either one of the school facilities and the Oakland Manor nursing home. Oakland Foods is one of the county's largest employers and a major asset to the local economy. Fire at this facility could cease production and displace as many as 500 workers.
Treynor	The commercial corridor along State Highway 92/Main Street has a concentration of older commercial structures. Fire at one building could easily spread to connecting structures. Special consideration should be taken for a fire at either of the elementary or high school facilities.
Underwood	The downtown business district along Third Street east of Railroad Highway has a concentration of older commercial structures. Fire at one building could easily spread to connecting structures. Special consideration should be taken for a fire at the elementary/middle and high school buildings. The Jack Link's Beef Jerky distribution facility is one of eastern Pottawattamie County's largest employers and a significant economic asset. A major fire at this facility could displace approximately 130 employees.
Walnut	Walnut's elementary, middle, and high school are located in the same building. Safely evacuating students in the event of a fire is critical and evacuation procedures should be adopted and practiced. The downtown commercial district on County Highway M47 between Highland and Pearl Streets has a concentration of older structures. Fire at one building could easily spread to connecting structures.

Prioritizing Hazards

Using the rankings described in the above tables, each hazard was assigned a Calculated Priority Risk Index (CPRI). The CPRI formula, including the weighting factors, was developed in consultation with the Iowa Homeland Security and Emergency Management Division mitigation planning staff.

CPRI Formula:

$$(\text{Historical} \times 0.20) + (\text{Probability} \times 0.20) + (\text{Vulnerability} \times 0.30) + (\text{Maximum Threat} \times 0.20) + (\text{Severity of Impact} \times 0.30) + (\text{Speed of Onset} \times 0.15) = \text{CPRI}$$

Based on their CPRI, hazards were separated into three categories of planning significance:

- Low (1.35 - 2.65)
- Moderate (2.70 - 4.05)
- High (4.10 - 5.40)

The CPRI formula provides a supplement to overall planning significance. Table 16 summarizes the CPRI rankings and identifies planning significance solely on the calculations. The PDM Planning Committee took CPRI calculations into account when prioritizing hazards, though adjustments were made in the organization of hazards based on level of priority (see Table 17). For instance, some hazards with low CPRI scores are organized as Priority 2 or 3 and other hazards with high scores are organized as Priority 2. This is due to the agreement among planning participants that some hazards are difficult to mitigate because of unpredictability (e.g. highway transportation incident) or because hazards will occur regardless of mitigation actions and are a part of life in Pottawattamie County.

CPRI calculations and priority groupings/rankings for each incorporated city can be found in Appendix K. Human-caused hazards are excluded from city analyses due to no recorded historical occurrences and low probability. Because dam failure and waterway/water body incidents will not occur at the municipal level (due to geographic and engineering considerations), those hazards are also excluded. Furthermore, hazard prioritization and rankings for incorporated cities is determined similarly to the composite countywide list, though planning partners consider local circumstances, thereby creating variation in what is presented in Table 17. For example, Hancock classifies river/stream flood as a Priority 1 hazard, whereas McClelland does not classify the hazard at all since no rivers or streams flow through McClelland's city limits. Dissimilarities such as these are common.

Table 16: Hazard Scoring Summary

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Dam Failure	1	1	2	2	3	4	2.90	Moderate
Drought	4	3	3	4	3	1	4.15	High
Earthquake	1	1	1	1	1	4	1.80	Low
Expansive Soils	1	1	2	1	1	2	1.80	Low
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	3	3	2	2	4	4	4.00	Moderate
Grass or Wild Land Fire	4	3	2	2	2	4	3.60	Moderate
Hailstorm	4	4	2	2	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	2	4	2.10	Low
Levee Failure	1	2	2	3	3	1	2.85	Moderate
River Flood	2	2	2	2	3	2	3.00	Moderate
Severe Winter Storm	3	3	3	3	2	2	3.60	Moderate
Sink Holes	1	1	1	1	1	1	1.35	Low
Thunderstorm and Lightning	4	4	3	3	2	3	4.15	High
Tornado	4	3	2	2	2	4	3.60	Moderate
Windstorm	3	3	2	2	3	4	3.70	Moderate
Air Transportation Incident	1	2	1	1	4	4	2.90	Moderate
Communications Failure	1	2	1	3	2	4	2.70	Moderate
Energy Disruption	4	2	2	2	2	4	3.40	Moderate
Fixed Hazardous Material Incident	4	3	3	2	3	4	4.20	High
Fixed Radiological Incident	1	1	2	2	4	4	3.20	Moderate
Highway Transportation Incident	4	4	2	1	4	4	4.20	High
Pipeline Incident	1	1	2	2	3	4	2.90	Moderate
Rail Transportation Incident	4	4	3	2	3	4	4.40	High
Transportation Hazardous Materials Incident	4	3	3	2	3	4	4.20	High
Transportation Radiological Incident	1	1	1	1	3	4	2.40	Low
Waterway/Waterbody Incident	3	4	2	2	3	4	3.90	Moderate
Enemy Attack	1	1	4	4	4	2	3.90	Moderate
Public Disorder	1	2	2	1	2	2	2.30	Low
Terrorism – Agricultural/Biological	1	2	4	4	4	2	4.10	High
Terrorism – Chemical	1	2	4	4	4	3	4.25	High
Terrorism – Conventional	3	3	4	3	4	4	4.80	High
Terrorism – Cyber	1	3	1	3	3	4	3.20	Moderate
Terrorism – Radiological	1	1	3	4	4	4	3.90	Moderate
Animal Disease Epidemic	1	2	2	4	3	3	3.35	Moderate
Human Disease Epidemic	1	2	4	4	4	3	4.25	High
Plant/Crop Disease Epidemic	1	1	2	3	3	1	2.65	Low
Structural Failure	2	2	2	1	2	4	2.80	Moderate
Structural Fire	4	4	3	1	2	4	3.90	Moderate

Table 17: Hazard Priority Groupings

High Risk Hazards (10)	Moderate Risk Hazardous (22)	Low Risk Hazards (7)
Drought Thunderstorm and Lightning Fixed Hazmat Incident Highway Transportation Incident Rail Transportation Incident Transportation Hazmat Incident Terrorism – Agricultural/Biological Terrorism – Chemical Terrorism – Conventional Human Disease Epidemic	Dam Failure Earthquake Energy Disruption Extreme Heat Flash Flood Grass or Wild Land Fire Hailstorm Levee Failure River Flood Severe Winter Storm Tornado Windstorm Air Transportation Incident Communications Failure Fixed Radiological Incident Pipeline Incident Waterway/Waterbody Incident Enemy Attack Terrorism – Cyber Terrorism – Radiological Structural Failure Structural Fire	Animal Disease Epidemic Expansive Soils Landslide/Erosion/Slope Failure Sink Holes Transportation Radiological Incident Public Disorder Plant/Crop Disease Epidemic

V. CURRENT PRE-DISASTER MITIGATION ACTIVITIES

The following is a synopsis of the significant pre-disaster mitigation accomplishments and ongoing activities in Pottawattamie County.

A. Pottawattamie County

1. Secondary Roads has three active hazard mitigation projects, including:
 - a. A stream stabilization project to prevent further erosion and protect an existing bridge valued at \$250,000;
 - a. Construction of a dam to stop erosion, which is approaching County Road L52 at two locations;
 - b. Collaboration with Golden Hills RC&D and Northern Natural Gas Company to repair or replace two existing stream stabilization structures on Walnut Creek. Pottawattamie County has agreed to assume all future maintenance on the structures.
2. Pottawattamie County and Council Bluffs are collaborating on a joint land use study for the Council Bluffs two mile extraterritorial jurisdiction.
3. The Pottawattamie County Emergency Management Agency contracted with Emergency Communications Network, Inc. in July, 2009 for the CodeRed Community Notification System services. The CodeRed system is a high speed telephone communication service available for countywide emergency and non-emergency community notifications. CodeRed employs a unique Internet mapping capability for geographic targeting of calls, complete with a high speed telephone calling system capable of delivering customized pre-recorded emergency messages directly to homes and businesses at the rate of thousands of calls per hour. The contract also includes purchase of the CodeRed Weather Warning Service, an early telephone, to include cell phone, warning system designed to automatically deliver targeted weather notifications for the immediate threats of severe weather being issued by the National Weather Service. The system automatically sends severe weather warnings to residents' phones in the projected path of severe weather. Thus, the county now has a state-of-the-art warning system by which to mitigate the effects of multiple hazards.
4. The Pottawattamie County Local Emergency Planning Committee (LEPC) developed an eight page public information flyer entitled "How to Protect Yourself During a Hazardous Materials Incident Near Your Home or Workplace." The LEPC members use this public training document about sheltering in place to mitigate the effects airborne hazardous materials incidents.
5. As part of a severe summer weather hazard mitigation project, the County Emergency Management Agency, in coordination with the Director of Communications and the 14 incorporated cities in the county, is considering an integrated outdoor warning system. The 911 Communications Center would be able to remotely activate the outdoor sirens in each of the cities, when necessary.
6. The county along with the City of Council Bluffs, Natural Resources Soil Conservation and the Soil and Water Conservation District are negotiating the development of a Regional Urban Conservation Office that would educate and provide informational and technical assistance on erosion and sedimentation control issues to developers and individual homeowners in the county.
7. In April, 2008, the National Weather Service awarded Pottawattamie County a "Storm Ready" designation for the period 2008 through 2011. This award recognizes the ongoing efforts of the emergency management agency and certain stakeholders to provide a systemic, proactive approach for increased severe weather preparedness and communications in the county.

8. The Emergency Management Agency and certain stakeholders collaborated to develop a specialized disaster response team, the Iowa Region 4 Disaster Assistance Saw Strike Team. This Pottawattamie County Team is comprised of over 20 personnel from fire departments in Oakland, Neola, Minden, Walnut, Hancock, Lewis Township, Carson, and Macedonia. The team members received specialty training in technical tree felling for the purpose of removing dangerous tree debris as a result of natural disaster and to allow emergency access, infrastructure restoration, and disaster recovery operations. Funding for the team was provided by corporate sponsors, Region 4 Homeland Security Board, and the Pottawattamie County Board of Supervisors. The Team was utilized in the 2008 Parkersburg, Little Sioux, and Mills County severe weather events. The team includes team members from Shelby County with identical make-up and assets to form the Iowa Region 4 Disaster Assistance Saw Strike Team. The two teams together create the specialty strike team that is sponsored by the City of Oakland and has now been designated as an Iowa Homeland Security Emergency Response Team.

B. Avoca

1. Avoca has adopted and enforces ordinances pertaining to snow emergencies, water restrictions, floodplain management, and open burning. Avoca also has a sandbagging plan to address flood-prone areas during river flooding events.
2. Avoca maintains and enforces a Floodplain Ordinance and participates in the NFIP, allowing residents and businesses to purchase flood insurance in the community.
3. Avoca maintains and enforces zoning and building regulations that minimize the potential for building failures caused by hazard events to present threats to citizens and neighboring properties and infrastructure.
4. Avoca maintains a list of designated emergency shelter locations.
5. Permanent generators are installed at several key community facilities, including the water and wastewater facilities, and the nursing home, ensuring the continuity of service and operations at these facilities in the event of a prolonged power disruption.
6. Officials with the police and fire departments speak to local schools and service organizations about hazard awareness and safety procedures on a regular basis.

C. Carson

1. Carson maintains and enforces a Floodplain Ordinance and participates in the NFIP, allowing residents and businesses to purchase flood insurance in the community.
2. Carson maintains and enforces ordinances pertaining to water restrictions, open burning, snow emergencies, building codes, and zoning regulations.
3. Carson's Subdivision Ordinance requires underground wiring for all new construction, and city leaders have expressed interest in replacing overhead power lines in other parts of the community with underground wiring.
4. The Carson Fire Department is staffed by one full-time fireman and maintains adequate staffing levels of volunteers at all times. Fire department staff members receive updated equipment and training on a regular basis.
5. Carson's rescue department recently upgraded equipment and training of volunteers to provide basic EMT transport services for area residents.
6. Carson recently completed construction of a new water tower and is in the process of upgrading many of the city mains, improving water distribution and fire protection in the community.
7. The Carson Fire Department holds open houses and conducts public education on smoke detectors and general fire safety and prevention.

8. The Carson Fire Department has a portable generator for use at the fire station, and city staff maintains a list of available generators to support critical facilities and operations in the event of prolonged power disruption.

D. Carter Lake

1. Carter Lake conducts several training exercises for its first responders, including hazardous materials response, weather spotting, and CPR.
2. Carter Lake has updated building codes to mitigate hazards such as fire and flooding.
3. Carter Lake is currently monitoring the toxic algae levels in the lake to ensure water safety. The more detailed reports are handled through Iowa's Department of Natural Resources and Department of Environmental Quality, and they alert the city when levels become dangerous.
4. Carter Lake is currently conducting a storm water study to determine areas of storm water infiltration and determine what repairs are needed.
5. Carter Lake has eight backup generators. The city also has a sandbagging operations plan and materials in reserve.
6. The Omaha Police Department provides mutual aid assistance to the Carter Lake Police Department as needed.
7. Carter Lake is educating the public about the dangers of chemical runoff via the Internet and newspapers.
8. Carter Lake has a voluntary water enforcement policy in place to mitigate drought and extreme heat and their potential dangers. Carter Lake follows Omaha's lead in enforcing the policy.

E. Crescent

1. Crescent follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.
2. Crescent has a portable generator for use at critical facilities in the event of a prolonged power disruption.
3. Crescent follows Pottawattamie County policies regarding water use restrictions during droughts.

F. Hancock

1. The Hancock Fire Department continues to train and equip their emergency responders. The fire department also provides smoke detectors, public awareness on fire protection and safety, and awareness of other hazards.
2. Hancock enforces the restrictions on burning and water usage as needed.
3. The Hancock Fire Department has a portable generator for use at critical sites. The department also has access to additional generators if needed.

G. Macedonia

1. Macedonia has adopted and enforces ordinances pertaining to water restrictions, zoning, building permits, and dangerous buildings.
2. Macedonia follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.
3. The Macedonia Fire Department maintains adequate staffing levels of volunteers at all times. Fire department staff members receive updated equipment and ongoing training, including hazardous materials response, weather spotting, and CPR.
4. All relevant city officials and first responders have completed National Incident Management System (NIMS) training.

5. Macedonia is in the process of upgrading its warning siren to provide improved coverage and to allow for the siren to be activated remotely from the Pottawattamie County Emergency Operations Center.
6. The Macedonia Fire Department has a portable generator for use at the fire station, and the city has a portable generator for use in the well fields during prolonged power outages.
7. Macedonia has identified the need for increased water storage capacity and water system distribution improvements in its recently updated strategic plan.
8. The well heads in the city's well field have been elevated above the base flood elevation.

H. McClelland

1. McClelland has adopted and enforces ordinances pertaining to snow emergencies and open burning.
2. McClelland follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.
3. McClelland provides training and equipment for its first responders on an ongoing basis.
4. McClelland has completed NIMS training. Through this process, the city and fire department have identified an asset list and protocol, which would be implemented in the event of a disaster.
5. McClelland has an outdoor warning siren that has battery backup capability.
6. The McClelland Fire Department has instituted training programs that have resulted in nearly 90 percent of members being trained to the operations level of hazardous material response capability and incident command training.
7. McClelland has three portable generators available for use in the event of power failure.

I. Minden

1. Minden has adopted and enforces ordinances pertaining to water restrictions, floodplain management and open burning.
2. Minden maintains and enforces a floodplain ordinance and participates in the NFIP.
3. Minden intends to purchase two additional outdoor warning sirens, which will be installed to provide coverage throughout the community and be capable of remote activation.
4. Minden recently completed installation of a permanent generator to provide emergency backup power for a sewer lift station.
5. Minden follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.
6. Minden provides training and equipment for its first responders on an ongoing basis.
7. Minden's employees and first responders are completing the necessary training to achieve NIMS compliance.
8. The Minden Volunteer Fire Department speaks to local schools and organizations about fire prevention and safety.

J. Neola

1. Neola has adopted and enforces ordinances pertaining to snow emergencies, water restrictions, floodplain management, and open burning.
2. Neola maintains and enforces a floodplain ordinance and participates in the NFIP.
3. Neola recently completed installation of a permanent generator to provide backup power for the water plant, water pump house and a sewer lift station.
4. Neola refurbished a donated commercial facility into a modern fire station. The fire department recently purchased a new rescue unit and a new fire truck.
5. Neola follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.

6. Neola provides training and equipment for its first responders on an ongoing basis.
7. The Neola Fire Department is installing a permanent generator at the fire station that will allow the building to be used as an emergency shelter and/or an emergency operations center.
8. The basement of Neola City Hall is available as a public storm shelter.

K. Oakland

1. Oakland has adopted and enforces ordinances pertaining to snow emergencies, water restrictions, floodplain management, and open burning.
2. Permanent generators have been installed at several key community facilities, including the water and wastewater treatment facilities, the telephone company, and the nursing home.
3. Oakland has access to portable backup generators and the city's designated shelter locations are wired to access to generator power.
4. Oakland's first responders receive regular training for storm spotting and reporting techniques.
5. Pelgrow and Farm Service Cooperative, two of Oakland's largest hazardous materials handlers, maintain risk management plans and educate the public on procedures in the event of an accidental release.

L. Treynor

1. The fire department recently purchased a new rescue unit and a new fire truck.
2. Treynor recently installed a new well head to be used only in the event of an emergency, such as extreme drought.
3. Treynor is conducting study to determine if improvements to the storm water collection system are necessary and feasible to reduce the impact of flash floods on the city.
4. Treynor recently completed discharge point stabilization to ensure adequate storm water drainage away from the city.
5. Treynor is in the process of developing a zoning ordinance which will ensure that new developments are constructed in a manner that minimizes the impact of storm water and facilitates the safe and efficient movement of people and vehicles.
6. The Treynor Fire Department visits local schools, 4-H groups and others on a biannual basis to educate citizens about the importance of fire safety, among other topics.
7. Treynor has adopted a capital improvements program and has made progress towards constructing additional hydrants, isolation valves, and looping dead end mains to ensure adequate water pressure for fire protection.
8. Treynor has a portable tank and pump available that it lends to the fire department to fight brush fires.
9. Local businesses have installed some locks on anhydrous ammonia tanks and have increased security by installing lights at locations where anhydrous ammonia is stored.
10. Treynor recently developed and adopted a NIMS-compliant Multi-Hazard Emergency Operations Plan.

M. Underwood

1. Underwood has adopted and enforces ordinances pertaining to snow emergencies, floodplain management and open burning.
2. Underwood maintains and enforces a floodplain ordinance and participates in the NFIP.
3. Underwood recently completed installation of a permanent generator for a new sewer lift station.
4. Underwood follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.

5. Underwood provides training and equipment for its first responders on an ongoing basis.
6. Underwood is in the process of completing NIMS training.
7. Underwood recently purchased a new outdoor warning siren that has battery backup capability.
8. The Underwood Fire Department has instituted training programs which have resulted in nearly 80 percent of members being trained to the operations level of hazardous material response capability and incident command training.
9. Underwood has two portable generators available for use in the event of power failure.

N. Walnut

1. Walnut has adopted and enforces ordinances pertaining to snow emergencies, floodplain management and open burning.
2. Walnut follows Pottawattamie County policies regarding open burning and any necessary burning restrictions.
3. Walnut provides training and equipment for its first responders on an ongoing basis.
4. Walnut is in the process of completing NIMS training.
5. The Walnut Fire Department has instituted training programs which have resulted in all of members being trained to the operations level of hazardous material response capability and incident command training.
6. Walnut has two portable generators available for use in the event of power failure.

VI. HAZARD MITIGATION GOALS AND OBJECTIVES

In spite of previous and ongoing efforts throughout Pottawattamie County to minimize the threat of hazard events and their potential impact on residents and facilities, the county and its legal jurisdictions realize that much more can be done to improve preparedness, response and recovery efforts through the development of mitigation goals and objectives. These goals and objectives are a list of activities and processes that will ultimately make all of Pottawattamie County a safer place. As many of the hazards previously discussed have similar mitigation solutions, mitigation goals and objectives are categorized into goals listed below. Goals and objectives for hazards not specifically mentioned in this section are included with the General Mitigation Activities category, as mitigation of these hazards can be completed most effectively through general measures.

As part of the development of this multi-jurisdictional plan, it was necessary to review the goals and objectives of previous single-jurisdiction plans from the unincorporated county and cities within Pottawattamie County. The Hazard Mitigation Planning Committee then reviewed previous goals and objectives to determine present validity and usefulness. New goals and objectives were added to the section that represents current mitigation needs. After reviewing and developing goals and objectives in response to identified hazards, the Committee continued discussion of potential action items to address each hazard category. Many of the actions listed are ongoing activities or continuation of existing policies and procedures and therefore can be completed with little or no additional cost to the county or the county's legal jurisdictions. Other actions, however, may require substantial technical and/or financial resources to complete and will likely only be implemented with outside assistance.

Goal 1: Continue development of plans, policies and procedures to minimize the effects of any hazard event that may occur in Pottawattamie County.	
Hazards Addressed: All identified natural or human caused hazards	
Objective 1.1	Maintain comprehensive emergency management and hazard mitigation planning documents.
Objective 1.2	Improve comprehensive emergency management and maintain a high level of service and response.
Objective 1.3	Implement programs, procedures and ordinances that further mitigation.
Objective 1.4	Ensure inter-local cooperation among jurisdictions in Pottawattamie County to develop and maintain plans that further mitigation.
Objective 1.5	Train and equip first responders to respond to potential natural and manmade hazard and the effects those hazards may have on public health and safety.
Objective 1.6	Enhance capabilities to monitor and assess hazard sites.
Objective 1.7	Enhance capabilities of hospitals and health agencies to respond to disaster and emergency scenarios.

Goal 2: Minimize the potential damage from and impact of flooding events.	
Hazards Addressed: Dam Failure, Flash Flood, Levee Failure, River/Stream Flood	
Objective 2.1	Provide for the safe and efficient flow of rivers and streams throughout the county.
Objective 2.2	Provide for the safe and efficient flow of stormwater throughout the county.
Objective 2.3	Monitor stage and streamflow at points along lakes and rivers/streams in the county to determine safety conditions.
Objective 2.4	Maintain and improve dam and levee structures as necessary.

Objective 2.5	Maintain the county's Emergency Action Plan for potential failure of the dam located on Indian Creek; its hazard classification was upgraded from "medium" to "high".
Objective 2.6	Maintain, enforce and update zoning ordinances and floodplain management ordinances as needed.
Objective 2.7	Continue participation in the National Flood Insurance Program (NFIP).
Objective 2.8	Protect life and property from flooding.
Objective 2.9	Educate and provide technical information to residents and businesses regarding flood prevention.

Goal 3: Minimize the potential impact of erosion along the banks of creeks, streams, recreational lakes or ponds, and areas with steep grades.

Hazards Addressed: Erosion, Flash Flood, River/Stream Flood

Objective 3.1	Implement stabilization projects on stream and river banks where necessary.
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Goal 4: Minimize the potential damage from and impact of soil and land hazards.

Hazards Addressed: Earthquake, Expansive Soils, Sink Holes, Structural Failure

Objective 4.1	Provide for safe development practices related to soil and land.
Objective 4.2	Maintain local building codes and land use regulations.
Objective 4.3	Promote soil conservation practices and policies.

Goal 5: Minimize the potential damage from and impact of severe weather events.

Hazards Addressed: Hail, Severe Winter Storm, Thunderstorm and Lightning, Tornado, Windstorm

Objective 5.1	Maintain and modernize weather emergency notification equipment.
Objective 5.2	Educate residents on severe weather safety and how to stay alert to severe weather events.
Objective 5.3	Ensure residents can access shelters during severe weather events by designating public shelters in areas of public use and high density.
Objective 5.4	Encourage interested parties, including school districts, to construct safe rooms, especially in structures or outdoor venues where no shelter is available.
Objective 5.5	Continue to enforce local building codes to ensure the structural integrity of all buildings throughout the county.
Objective 5.6	Implement procedures to collect and dispose of debris following an extreme weather incident.
Objective 5.7	Continue to enforce snow emergency ordinances throughout the county.

Goal 6: Minimize the potential impact of communication and energy failures.

Hazards Addressed: Communications Failure, Energy Disruption

Objective 6.1	Ensure shelters and critical facilities have adequate backup power capabilities.
Objective 6.2	Maintain and upgrade communications equipment, infrastructure, and facilities to maximize emergency response capabilities.
Objective 6.3	Monitor tree trimming of limbs near power lines that may pose a threat to

	power service during windstorms and other hazards.
Objective 6.4	Encourage residents to acquire and maintain disaster kits.
Objective 6.5	Educate residents on the proper and safe use of generators.
Objective 6.6	Identify areas that would benefit from underground utilities and consider adopting requirements for underground installation where appropriate.

Goal 7: Minimize the potential damage from and impact of transportation incidents.	
Hazards Addressed: Air, Highway, Rail, and Waterway/Waterbody Incidents	
Objective 7.1	Continue to train and pursue funding for emergency responders to conduct traffic and response activities along interstates, at highway and rail intersections, and near bridges.
Objective 7.2	Ensure road conditions are conducive to driver safety by implementing capital improvement programs to upgrade roads and safety devices.
Objective 7.3	Review and update procedure manuals.

Goal 8: Minimize the potential damage from and impact of hazardous substance releases.	
Hazards Addressed: Fixed Hazmat Incident, Fixed Radiological Incident, Pipeline Incident, Transportation Hazmat Incident, Transportation Radiological Incident	
Objective 8.1	Ensure all firefighters and first responders are trained to the operations level of hazardous material response capability.
Objective 8.2	Continue to operate and support the Council Bluffs Fire Department's Hazardous Material Response Team.
Objective 8.3	Assist the Pottawattamie County Local Emergency Planning Committee in the creation of a shelter-in-place public education program.
Objective 8.4	Form a highway incident management team to preplan and coordinate response to lengthy incidents, such as hazardous materials releases, which can interrupt or close transportation routes. The Southwest Iowa Freeway Team is such a team.
Objective 8.5	Maintain, enforce and update hazardous substance ordinances as needed; reassess ordinances after any incident.
Objective 8.6	Consider offering household hazardous waste initiatives.
Objective 8.7	Maximize safety and security of hazardous materials locations throughout the county.

Goal 9: Minimize the potential human, physical and financial threats caused by purposeful hazards.	
Hazards Addressed: Enemy Attack, Public Disorder, Terrorism	
Objective 9.1	Educate residents on how to identify and report suspicious activity.
Objective 9.2	Collaborated with health care professionals to recognize potential chemical and biological releases.
Objective 9.3	Train county and city staff, first responders, and elected officials to utilize the processes, protocols, and procedures established through the National Incident Command System (NIMS).
Objective 9.4	Collaborate with state, regional and federal agencies to mitigate manmade purposeful threats.
Objective 9.5	Develop and maintain plans that mitigate manmade purposeful threats.

Goal 10: Minimize the potential impact of public health incidents.	
Hazards Addressed: Animal, Human and Plant/Crop Disease Epidemics	
Objective 10.1	Foster improved monitoring and reporting procedures for potential health hazards.
Objective 10.2	Collaborate on a health surveillance and reporting system for entomologists and veterinarians to monitor changes in populations and characteristics of potential vectors (e.g. fleas, ticks, rodents, etc.).
Objective 10.3	Inform residents of any health or agriculture related threats and proper procedures for handling threats.

Goal 11: Minimize the potential damage from and impact of fires.	
Hazards Addressed: Grass or Wild Land Fire, Structural Fire	
Objective 11.1	Maintain and upgrade firefighting equipment and facilities to maximize firefighting capabilities.
Objective 11.2	Continue public awareness on fire prevention and fire related ordinances.
Objective 11.3	Continue to enforce open burning bans and post notification procedures for controlled burns.

Goal 12: Minimize the potential impact of prolonged drought and extreme heat conditions.	
Hazards Addressed: Drought, Extreme Heat	
Objective 12.1	Monitor water levels during periods of prolonged drought and enact water restrictions if necessary.
Objective 12.2	Ensure relief is available to those most vulnerable during extreme heat conditions by designating and publicizing relief locations.

VII. MITIGATION PLAN IMPLEMENTATION AND EVALUATION

Prioritization and Implementation

The process of implementing the Pottawattamie Countywide Pre-Disaster Mitigation Plan requires prioritizing and phasing the objectives so as to recognize the financial limitations of the county and all inclusive jurisdictions. The actions listed in Table 18 have been selected by the PDM Planning Committee based on the immediate need, scope, and cost of implementation. These factors indicate project feasibility for implementation, which is classified as “good,” “fair,” or “poor.” Action items are arranged according to the jurisdiction responsible for implementation: A) exclusively Pottawattamie County; or B) one or more jurisdictions that may include Pottawattamie County. Though jurisdictions do not have the same priorities with respect to mitigation actions, Pottawattamie County and incorporated cities attempted to retain similar criteria for implementation of actions. Table 19 on Page 115 ranks mitigation actions by incorporated city.

Five mitigation actions stated in previous single-jurisdictional plans were omitted from this current document:

- “Continue participation in organizations that address hazard mitigation activities.”
- “Continue public awareness of hazards and mitigation activities, and enforcement of local codes that further mitigation.”
- “Establish a list of elderly and special needs persons that would require assistance during hazards.”
- “Enact emergency curfews during critical periods.”
- “Encourage regular tree trimming near power lines.”

No mitigation actions were once considered but then rescinded in this current plan.

It was ultimately decided by the Planning Committee to exclude these mitigation actions from the final plan because they are generally minimal-to-no-cost actions or they can be completed under the regular auspices of the applicable jurisdiction. All remaining actions have been migrated to the multi-jurisdictional plan due to continued relevance. New action items will be considered priority in subsequent plans unless actions in the most current plan remain relevant.

County and municipal governing bodies and special purpose districts (e.g. school districts), as a part of their normal budget processes, shall consider investment into these needed hazard mitigation projects as pertinent to their jurisdictional requirements. For projects that require local funding, governing bodies should begin to allocate funds as their budget processes allow. The county and all legal jurisdictions should also consider these mitigation projects and policies when developing updates to any existing plans and ordinances. Many of the actions are relatively low cost, but can have tremendous benefit when implemented. In order to select the most beneficial actions, or those with the biggest benefits versus cost, the PDM Planning Committee considered social, technical, administrative, political, legal, economic, and environmental (STAPLEE process) elements.

Table 18: Selected Mitigation Action Items

Pottawattamie County as the Responsible Jurisdiction			
Selected Action Item	Corresponding Goal and Objective	Coordinating Department/Staff	Project Feasibility
			Good/Fair/Poor (comments)
Construct a new 911/EOC.	Goal 6, Objective 2	<ul style="list-style-type: none"> Pottawattamie Co. Board of Supervisors 	Fair- Construction of a new facility will require a significant financial contribution from the county, likely in the millions of dollars. However, local leaders are aware of the current site's limitations.
Participate in floodplain buyout programs.	Goal 2, Objective 8	<ul style="list-style-type: none"> Pottawattamie Co. Board of Supervisors 	Poor- Acquisition projects are costly and often times politically unpopular for various reasons. This action also demands significant staff time and the county may have to contract services out for management.
Equip first responders and public health agencies to respond to a WMD incident.	Goal 1, Objective 5 Goal 9, Objective 3	<ul style="list-style-type: none"> Pottawattamie Co. EMA 	Good- Training and equipment upgrades are conducted on an annual basis as time and funding allows. Funding is typically set aside.
Create a debris management plan.	Goal 5, Objective 6	<ul style="list-style-type: none"> Pottawattamie Co. EMA 	Fair- Development of a plan should not be financially restrictive but it will take considerable staff time and coordination from multiple parties.
Integrate all outdoor warning systems throughout the county.	Goal 5, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Communications/911; EMA 	Good- This action is currently underway but troubleshooting and system maintenance will continue.
Enhance hospital command centers to facilitate a level of command and control required for jurisdiction-wide emergencies and disasters.	Goal 1, Objective 2	<ul style="list-style-type: none"> Pottawattamie Co. EMA Council Bluffs Public Health Alegent Health Mercy Hospital Jennie Edmundson Hospital 	Good- This action will require regular collaboration between emergency management personnel and hospital administrators.
Create a stormwater management ordinance.	Goal 2, Objective 2	<ul style="list-style-type: none"> Pottawattamie Co. Conservation 	Good- It will take staff time and coordination to develop an ordinance but there should be no significant financial obligation.
Implement an emergency responder credentialing and accountability system with the capability to account for critical resources, volunteers and victims.	Goal 1, Objective 5	<ul style="list-style-type: none"> Pottawattamie Co. EMA Council Bluffs Public Health Volunteer Fire Department of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Fair- This action will require significant collaboration among emergency management personnel, local first responders and health care professionals. Roles and responsibilities have yet to be determined and it is likely some technical assistance will be required from a contracting agency.
Create a Loess Hills Stormwater Best Management Practices Guidance Manual.	Goal 2, Objective 2	<ul style="list-style-type: none"> Pottawattamie Co. Conservation 	Fair- Devoting staff time and resources to develop a guidance manual is a hindrance. Technical assistance by a contracting agency may be required in some areas.
Maintain and update the Pottawattamie County Comprehensive Operations Plan (parts A, B, & C).	Goal 1, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. EMA 	Good- This action is completed regularly by Pottawattamie Co. EMA. Technical assistance by a contracting agency may be required at times when county staff support is insufficient.
Complete Critical Asset Protection plans as part of the county's Emergency Operations Plan.	Goal 1, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. EMA 	Good- This action is completed regularly by Pottawattamie Co. EMA. Technical assistance by a contracting agency may be required at times when county staff support is insufficient.
Implement the Iowa Biological/Chemical Threat Agent Protocol Model.	Goal 1, Objective 3	<ul style="list-style-type: none"> Pottawattamie Co. EMA 	Good- This action is conducted under the auspices of Pottawattamie Co. EMA. Coordination among emergency planning stakeholders is key.
Maintain the Pottawattamie Countywide PDM Plan.	Goal 1, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Board of Supervisors; EMA 	Good- Funds are available through FEMA and Iowa HSEMD. The county has previously contributed in-kind match to meet the local funding obligation.
Adopt and implement procedures to effectively conduct hospital evacuations and search/rescue activities.	Goal 1, Objective 7	<ul style="list-style-type: none"> Pottawattamie Co. EMA Council Bluffs Fire Department Council Bluffs Public Health Alegent Health Mercy Hospital Jennie Edmundson Hospital 	Fair- This action will require coordination among emergency management and health care stakeholders. There will be some costs and staff time required for training and troubleshooting.
Complete shoreline stabilization project at Arrowhead Park.	Goal 3, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Engineer 	Fair- This project is cost restrictive but would be extremely helpful in protecting sensitive lands.
Complete river bend stabilization project at Botna Bend Park.	Goal 3, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Engineer 	Fair- This project is cost restrictive but would be extremely helpful in protecting sensitive lands.
Install USGS stage discharge monitoring devices.	Goal 2, Objective 3	<ul style="list-style-type: none"> Pottawattamie Co. Conservation; Engineer 	Fair- Such devices would be useful to accurately monitor streamflows but

			installation is currently not a high priority action.
Utilize LIDAR to monitor post-disaster landscapes.	Goal 1, Objective 6	<ul style="list-style-type: none"> Pottawattamie Co. GIS Department; EMA 	Good- This action is cost restrictive but LIDAR is necessary in many instances.
Utilize oblique photography to document post-disaster areas.	Goal 1, Objective 6	<ul style="list-style-type: none"> Pottawattamie Co. GIS Department; EMA 	Good- This action is cost restrictive but the benefits are ample enough to seriously consider.
Establish a regional conservation office.	Goal 4, Objective 3	<ul style="list-style-type: none"> Pottawattamie Co. Engineer 	Poor- This action will take considerable coordination and financing among stakeholders to implement. It is currently not a high priority action.

One or More Responsible Jurisdictions

Selected Action Item	Corresponding Goal and Objective	Coordinating Department/Staff	Project Feasibility
			Good/Fair/Poor (comments)
Establish and enhance EOCs with 24 hour operational capability to provide for increased and real-time situational awareness.	Goal 1, Objective 2	<ul style="list-style-type: none"> Pottawattamie County EMA City Councils & Fire Departments of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Fair- Startup costs can be significant, especially to municipal jurisdictions and it may be necessary to purchase new or updated equipment. Benefit may not outweigh immediate need.
Improve areas of poor stormwater drainage by upgrading or installing storm sewers.	Goal 2, Objective 2	<ul style="list-style-type: none"> Pottawattamie Co. Conservation; Engineer City Councils & Public Works Staff of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Poor- Capital improvement projects are costly and there are currently no areas in the county where benefit is greater than potential costs.
Improve security at hazmat locations.	Goal 8, Objective 7	<ul style="list-style-type: none"> Pottawattamie Co. Sheriff Maintenance staff of all incorporated cities 	Good- Law enforcement departments and local councils throughout the county should work with hazmat site operators to ensure they have adequate security measures in place. All efforts should be made to improve security when budgets and funding allow.
Purchase portable generator(s) to support continuity of operations and emergency response.	Goal 6, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Board of Supervisors; EMA City Councils of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Fair- There are enough portable generators for use throughout the county, however, many of the current units are aged and could use backups.
Maintain and upgrade warning sirens when necessary.	Goal 5, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. EMA City Councils of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Good- Funding resources for warning sirens are limited, though the county and municipalities monitor application opportunities
Develop emergency operations/continuity of operations plans.	Goal 1, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. EMA Fire Chiefs of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut Alegent Health Mercy Hospital Jennie Edmundson Hospital 	Fair- Development of EOPs and COPs at the county and municipal levels will require technical assistance.
Purchase fixed generator(s) for use at critical facilities.	Goal 6, Objective 1	<ul style="list-style-type: none"> Pottawattamie Co. Board of Supervisors; EMA City Councils of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Poor- Though funding assistance for this activity is available, incorporated jurisdictions have budget limitations that make necessary match obligations problematic.
Flood proof or relocate critical facilities that are located in flood hazard areas.	Goal 2, Objective 8	<ul style="list-style-type: none"> Pottawattamie Co. Planning & Development; EMA City Councils of Avoca, Crescent, Hancock, Minden, & Oakland. A-H-S-T Community School District 	Poor- This action is costly and will likely require funding assistance. This action may also require third party administrative assistance. Improvements to A-H-S-T High School could face opposition from district patrons.
Regularly clean and maintain storm sewers and drainage areas.	Goal 2, Objective 2	<ul style="list-style-type: none"> Maintenance/Public Works Departments of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Good- This activity is currently accomplished by jurisdictional maintenance/public works staff. Large debris following a disaster may require more time and resources to clear.

Update multi-hazard response plans for every jurisdiction in and including Pottawattamie County.	Goal 1, Objective 1	<ul style="list-style-type: none"> ▪ Pottawattamie Co. EMA ▪ Fire Chiefs of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Fair- Many jurisdictions in the county do not have the staff capacity necessary to devote significant time to response planning. Updating plans in an efficient and timely manner may require technical assistance.
Purchase NOAA weather radios for critical facilities.	Goal 5, Objective 1	<ul style="list-style-type: none"> ▪ Pottawattamie Co. Board of Supervisors; EMA ▪ City Councils of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Good- Most weather radios cost \$20-\$80 and only one unit would be required per facility.
Construct new fire stations in jurisdictions where facilities are inadequate.	Goal 11, Objective 1	<ul style="list-style-type: none"> ▪ City Councils & Volunteer Fire Departments of Avoca, Crescent, Hancock, & Minden 	Fair- New construction projects can be financially restrictive to communities with limited tax revenue. Grant funding is available for fire facility upgrades/construction but programs are typically competitive and providing local match can be a hindrance. Loans or bonds may be more viable options.
Acquire and demolish structures that are unsafe for occupation and have high risk for structural failure.	Goal 4, Objective 2	<ul style="list-style-type: none"> ▪ Planning Boards & City Councils of Avoca, Carson, Carter Lake, Crescent, Hancock, Macedonia, McClelland, Minden, Neola, Oakland, Treynor, Underwood, & Walnut 	Poor- Demolition of private properties requires consent of property owners, many of whom live outside the local area. The process to acquire and demolish unfit structures is often cumbersome and costly to small local governments.
Construct safe rooms at schools that require or will require additional shelter space.	Goal 5, Objective 4	<ul style="list-style-type: none"> ▪ Pottawattamie Co. Planning & Development; EMA ▪ A-H-S-T, Riverside, Treynor, Tri-Center, Underwood, & Walnut Community School Districts 	Poor- Safe room projects are costly and the application process can be time consuming and difficult to complete. School districts may likely require technical assistance to prepare an application.
Construct safe rooms in public facilities or near open areas that lack shelter space or have inadequate shelter.	Goal 5, Objective 4	<ul style="list-style-type: none"> ▪ Pottawattamie Co. Planning & Development; EMA 	Poor- Safe room projects are costly and the application process can be time consuming and difficult to complete. Smaller jurisdictions may likely require technical assistance to prepare an application.

Table 19: Mitigation Action Rankings by Incorporated City

	Avoca	Carson	Carter Lake	Crescent	Hancock	Macedonia	McClelland	Minden	Neola	Oakland	Treynor	Underwood	Walnut
Establish and enhance EOCs with 24 hour operational capability to provide for increased and real-time situational awareness.	1	5	4	5	7	1	1	1	1	4	1	1	4
Improve areas of poor stormwater drainage by upgrading or installing storm sewers.	2	3	5	3	4	5	2	3	2	5	5	2	1
Improve security at hazmat locations.	5	6	6	4	5	4	3	5	4	3	3	4	2
Purchase portable generator(s) to support continuity of operations and emergency response.	6	7	1	6	3	6	4	6	3	6	4	3	5
Maintain and upgrade warning sirens when necessary.	4	8	7	7	2	2	5	7	6	2	2	6	3
Develop emergency operations/continuity of operations plans.	7	1	2	2	8	7	9	8	7	7	6	7	6
Purchase fixed generator(s) for use at critical facilities.	8	2	8	1	9	8	8	9	5	8	7	5	7
Flood proof or relocate critical facilities that are located in flood hazard areas.*	3	4	9	8	6	N/A	N/A	10	8	9	8	8	N/A
Regularly clean and maintain storm sewers and drainage areas.	9	9	10	9	10	9	7	4	9	10	9	9	8
Update multi-hazard response plans for every jurisdiction in and including Pottawattamie County.	10	10	11	10	11	10	10	11	10	1	10	10	9
Purchase NOAA weather radios for critical facilities.	11	11	3	11	12	11	6	12	11	11	11	11	10
Construct new fire stations in jurisdictions where facilities are inadequate.	12	12	12	12	1	12	11	2	12	12	12	12	11
Acquire and demolish structures that are unsafe for occupation and have high risk for structural failure.	13	13	13	13	13	3	12	13	13	13	13	13	12
Construct safe rooms at schools that require or will require additional shelter space.**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Construct safe rooms in public facilities or near open areas that lack shelter space or have inadequate shelter.	14	14	14	14	14	13	13	14	14	14	14	14	13

*Macedonia, McClelland and Walnut have no critical facilities located in flood hazard areas.

**School districts in Pottawattamie County will be responsible for safe room development projects within their respective jurisdictional boundaries.

Evaluation and Continued Public Participation

Pottawattamie County Emergency Management Agency is responsible for monitoring and implementing the multi-jurisdictional PDM plan as it relates to the county; elected and administrative officials of the 14 incorporated municipalities will assume responsibility for local implementation of mitigation activities. It is suggested that at a minimum, the plan be reviewed annually by the Pottawattamie County Emergency Management Commission, Emergency Management Agency staff, local city representatives, and other stakeholders. This annual monitoring and evaluation will determine progress made in addressing the mitigation goals and objectives outlined in the plan. As part of that evaluation, certain goals may need adjustment to ensure that they continue to meet the needs of all jurisdictions. The functionality of the plan should also be assessed following a significant hazard event within the county. Near the end of five years, the plan will go through the process of full re-evaluation in order to remain eligible for state and federal funding assistance. Future reviews and updates will follow the procedure of:

Procedure and Techniques

Task A: Evaluate the effectiveness of the planning process

1. Reconvene the Hazard Mitigation Planning Committee
2. Review Planning Process (Items to discuss)
 - a. Building the planning team
 - b. Engaging the public
 - c. Data gathering and analysis
 - d. Coordinating with other agencies

Task B: Evaluate the effectiveness of actions

1. What were the results of the implemented 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 get started or were not implemented.

Task C: Determine why the actions worked or did not work

1. Lack of available resources/funds
2. Political and/or popular support
3. Distribution of assigned tasks among responsible parties
4. Actual time necessary to implement actions

While the Pottawattamie County Emergency Management Commission provides the best source of continuity in local leadership, as well as the necessary authority to ensure active implementation of planning initiatives and activities, significant input shall be obtained from Hazard Mitigation Planning Committee representatives, interested citizens, and neighboring jurisdictions. In conducting periodic evaluations of the plan, the Committee will first consider any material changes to data in the adopted document, such as the release of new demographic information or the addition of new critical facilities. Once those tasks are completed, the Committee will evaluate its list of recommended mitigation goals, objectives, and projects, making revisions to account for completed projects and outcomes achieved. For projects that either have not been completed or have been bypassed on the list, the Committee will explore the reasons for delays to those projects and re-evaluate their priority, not only within the context of the multi-jurisdictional plan, but in the overall scheme of the county's/local city's short-term strategic planning priorities.

VIII. SUMMARY OF MITIGATION RECOMMENDATIONS

In discussing which mitigation action items to implement in Pottawattamie County and legal jurisdictions, a number of factors were considered, including availability of financial and technical resources, legal and social impacts of activities, and overall importance of each project or policy as it relates to the area's overall goals. Prior to implementation of all projects, especially those requiring outside financial resources to compete, jurisdictions will need to complete a detailed cost-benefit review showing the quantifiable benefits of a project in relation to project expenses. However, until the process of implementing a selected project begins, it may be difficult to accurately determine the physical costs and benefits of certain mitigation activities. Below is a summary table of the Hazard Mitigation Planning Committee's recommendations for implementation of selected action items prioritized in Section VII. Table 20 identifies the timeframe, priority, funding sources, estimated cost, and funding distribution for each mitigation action.

Table 20: Mitigation Action Implementation

Pottawattamie County Mitigation Actions						
Immediate/Short-term (within 2 years)	Priority	Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Create a debris management plan.	Low	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA 	\$1,500	\$0	\$0	\$1,500
Integrate all outdoor warning systems throughout the county.	High	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA ▪ Iowa Homeland Security ▪ FEMA 	\$15,000	\$11,250	\$1,500	\$2,250
Create a stormwater management ordinance.	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County Conservation 	\$4,000	\$0	\$0	\$4,000
Implement an emergency responder credentialing and accountability system with the capability to account for critical resources, volunteers and victims.	High	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA ▪ Iowa Homeland Security 	\$5,000	\$0	\$1,000	\$4,000
Create a Loess Hills Stormwater Best Management Practices Guidance Manual.	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County Conservation 	\$4,000	\$0	\$0	\$4,000
Adopt and implement procedures to effectively conduct hospital evacuations and search/rescue activities.	High	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA ▪ Iowa Homeland Security 	\$7,500	\$0	\$1,000	\$6,500
Ongoing	Priority	Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Equip first responders and public health agencies to respond to a WMD incident.	High	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA ▪ Iowa Homeland Security 	\$400K	\$300K	\$0	\$100K
Enhance hospital command centers to facilitate a level of command and control required for jurisdiction-wide emergencies and disasters.	High	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA ▪ Iowa Homeland Security 	\$2,500	\$0	\$0	\$2,500
Maintain and update the Pottawattamie County Comprehensive Operations Plan (parts A, B, & C).	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA 	\$20K	\$15K	\$0	\$5,000
Complete Critical Asset Protection plans as part of the county's Emergency Operations Plan.	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA 	\$7,500	\$5,625	\$0	\$1,875
Implement the Iowa Biological/Chemical Threat Agent Protocol Model.	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County EMA 	\$2,000	\$0	\$0	\$2,000
Maintain the Pottawattamie Countywide PDM Plan.	Medium	<ul style="list-style-type: none"> ▪ Pottawattamie County ▪ Iowa Homeland Security ▪ FEMA PDM Grant 	\$40K/plan	\$30,000	\$4,000	\$6,000

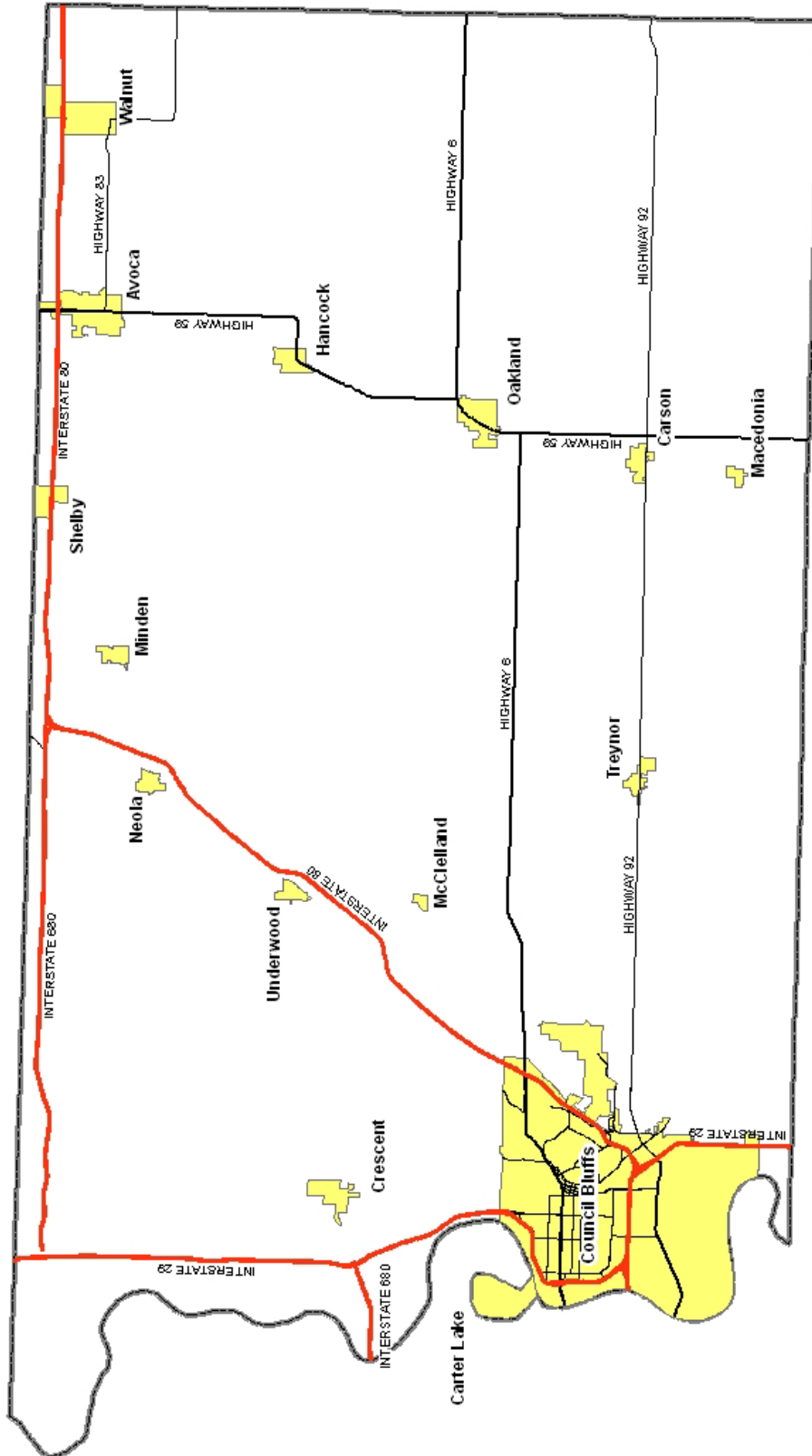
Long-term (beyond 2 years)	Priority	Program Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Construct a new 911/EOC.	Medium	<ul style="list-style-type: none"> Pottawattamie County EMA, Communications/911 	\$10M	\$2.5M	\$10M	\$7.5M
Participate in floodplain buyout programs.	High	<ul style="list-style-type: none"> FEMA- Flood Mitigation Assistance Program Iowa Homeland Security Iowa Department of Economic Development- CDBG Program Economic Development Administration 	\$3M +	\$2.25M	\$300K	\$450,000
Complete shoreline stabilization project at Arrowhead Park.	Medium	<ul style="list-style-type: none"> Pottawattamie County Conservation Iowa Department of Natural Resources 	\$30K	\$22.5K	\$0	\$7,500
Complete river bend stabilization project at Botna Bend Park.	Medium	<ul style="list-style-type: none"> Pottawattamie County Conservation Iowa Department of Natural Resources 	\$1M	\$500K	\$350K	\$150K
Install USGS stage discharge monitoring devices.	Low	<ul style="list-style-type: none"> Pottawattamie County Conservation Iowa Department of Natural Resources 	\$27.5K/ unit	\$5,000	\$5,000	\$17,500
Utilize LIDAR to monitor post-disaster landscapes.	Low	<ul style="list-style-type: none"> Pottawattamie County EMA, GIS 	\$200/sq mi	\$0	\$0	Varies on area covered
Utilize oblique photography to document post-disaster areas.	Low	<ul style="list-style-type: none"> Pottawattamie County EMA, GIS 	\$400/sq mi	\$0	\$0	Varies on area covered
Establish Regional Conservation Office.	Low	<ul style="list-style-type: none"> Pottawattamie County Conservation Iowa Department of Natural Resources 	\$250K	\$187.5K	\$0	\$62.5K
Jurisdiction-Wide Mitigation Actions						
Immediate/Short-term (within 2 years)	Priority	Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Establish and enhance EOCs with 24 hour operational capability to provide for increased and real-time situational awareness.	Low	<ul style="list-style-type: none"> Pottawattamie County EMA, Communications/911 	\$5,000-\$10K	\$0	\$0	\$5,000-\$10K
Improve security at hazmat locations.	High	<ul style="list-style-type: none"> Pottawattamie County EMA, Sheriff 	\$500-\$1,000	\$0	\$0	\$500-\$1,000
Develop emergency operations/continuity of operations plans.	High	<ul style="list-style-type: none"> Pottawattamie County EMA Iowa Homeland Security 	\$5,000/ plan	\$0	\$0	\$5,000
Update multi-hazard response plans for every jurisdiction in and including Pottawattamie County.	Medium	<ul style="list-style-type: none"> Iowa Homeland Security 	\$2,500-\$5,000/ plan	\$1,875-\$3,750	\$0	\$625-\$1,250
Purchase NOAA weather radios for critical facilities.	Medium	<ul style="list-style-type: none"> Pottawattamie County EMA 	\$20-\$80/unit	\$0	\$0	\$20-\$80
Ongoing	Priority	Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Improve areas of poor stormwater drainage by upgrading or installing storm sewers.	Medium	<ul style="list-style-type: none"> FEMA- Hazard Mitigation Grant Program Iowa Homeland Security Iowa Department of Economic Development- CDBG 	\$100K-\$500K	\$7,500-\$37.5K	\$10K-\$50K	\$15K-\$75K

		Program				
Maintain and upgrade warning sirens when necessary.	Medium	▪ Pottawattamie County EMA	\$10K-\$50K	\$75K-\$37.5K	\$1,000-\$5,000	\$1,500-\$7,500
Regularly clean and maintain storm sewers and drainage areas.	Medium	▪ Pottawattamie County Conservation	\$5,000-\$20K/year	\$0	\$0	\$5,000-\$20K
Long-term (beyond 2 years)	Priority	Funding Source(s)	Estimated Cost	Funding Distribution		
				Federal	State	Local
Purchase portable generator(s) to support continuity of operations and emergency response.	Medium	▪ FEMA- Hazard Mitigation Grant Program ▪ Iowa Homeland Security	\$3,000-\$7,000/unit	\$2,250-\$5,250	\$300-\$700	\$450-\$1,050
Purchase fixed generator(s) for use at critical facilities.	High	▪ FEMA- Hazard Mitigation Grant Program ▪ Iowa Homeland Security	\$15,000-\$120K/unit	\$11,250-\$90K	\$1,500-\$12K	\$2,250-\$18K
Flood proof or relocate critical facilities that are located in flood hazard areas.	High	▪ FEMA- Flood Mitigation Assistance Program ▪ Iowa Homeland Security	\$50K-\$2M	\$37.5K-\$1.5M	\$5,000-\$200K	\$7,500-\$300K
Construct new fire stations in jurisdictions where facilities are inadequate.	Low	▪ FEMA- Assistance to Firefighters Grant Program ▪ Iowa Department of Economic Development- CDBG Program	\$850K-\$1.5M	\$637.5K-\$1.13M	\$85K-\$150K	\$127.5K-\$225K
Acquire and demolish structures that are unsafe for occupation and have high risk for structural failure.	Low	▪ FEMA- Hazard Mitigation Grant Program ▪ Iowa Homeland Security	\$10K-\$15K/unit	\$7,500-\$11,250	\$1,000-\$1,500	\$1,500-\$2,250
Construct safe rooms at schools that require or will require additional shelter space.	Low	▪ FEMA ▪ Iowa Homeland Security	\$150K	\$113K	\$15K	\$22K
Construct safe rooms in public facilities or near open areas that lack shelter space or have inadequate shelter.	Low	▪ FEMA ▪ Iowa Homeland Security	\$150K	\$113K	\$15K	\$22K

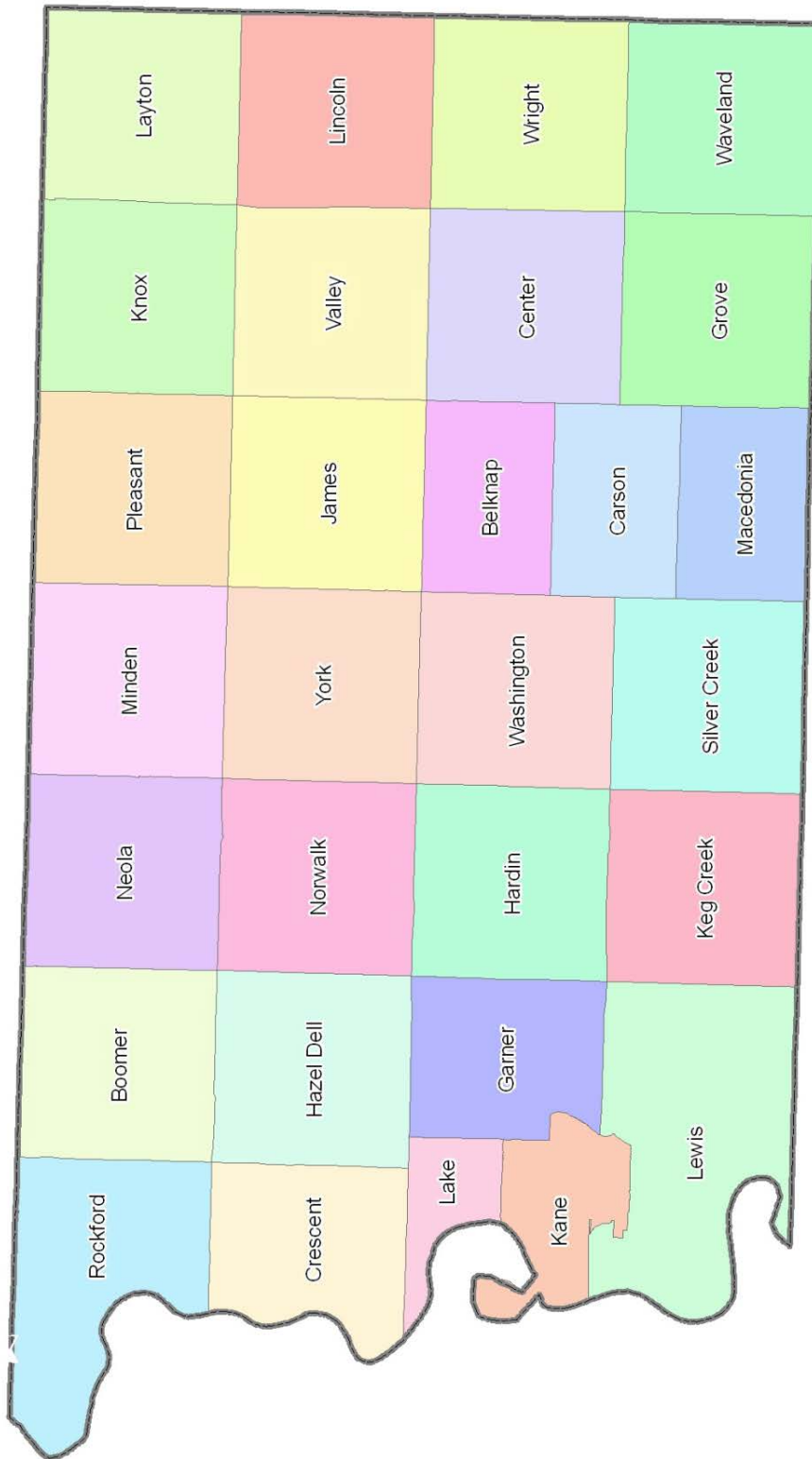
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APPENDICES

APPENDIX A
Pottawattamie County Road Map



APPENDIX B
Township Boundary Map



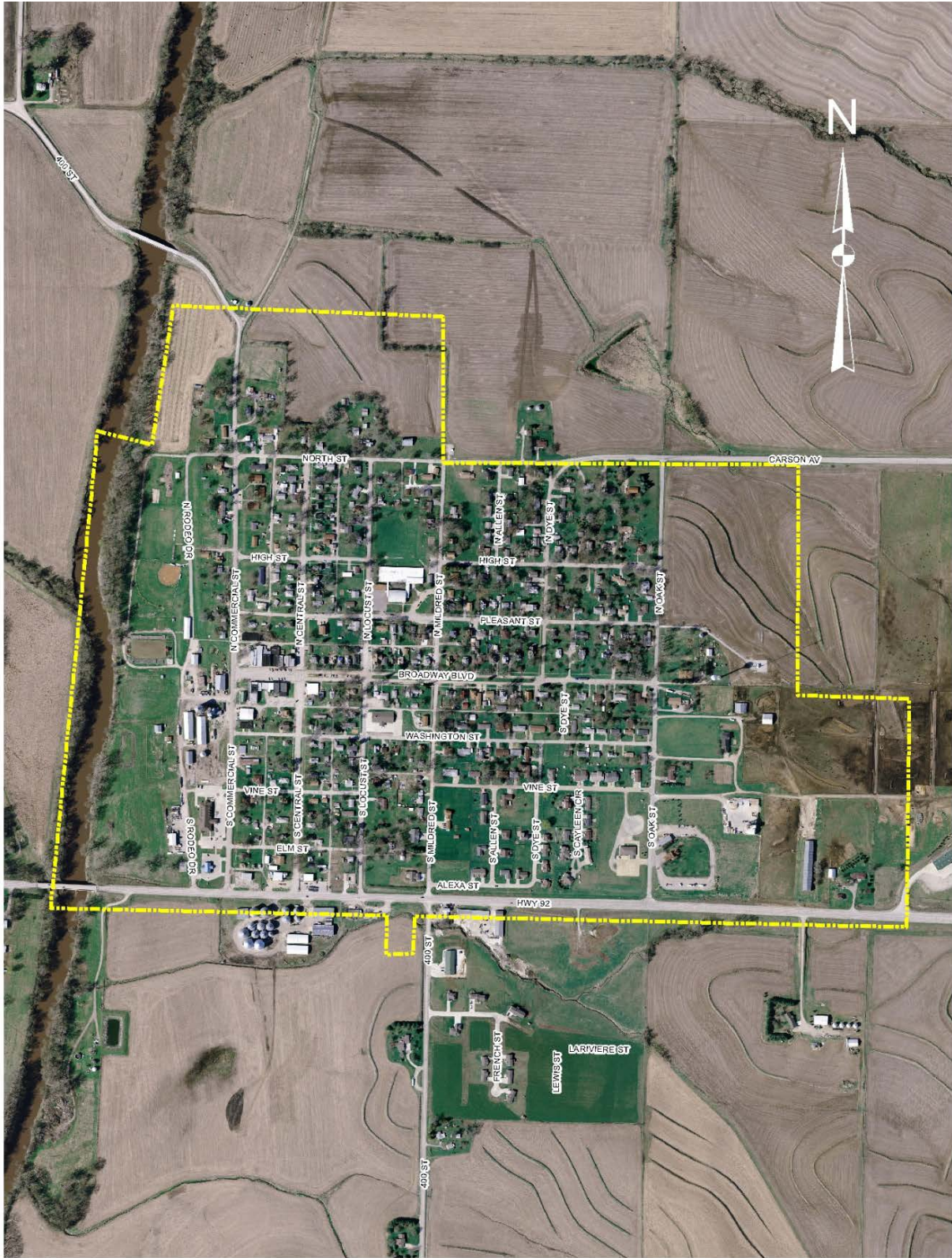
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgis/libx/>)

APPENDIX C
City Street Maps



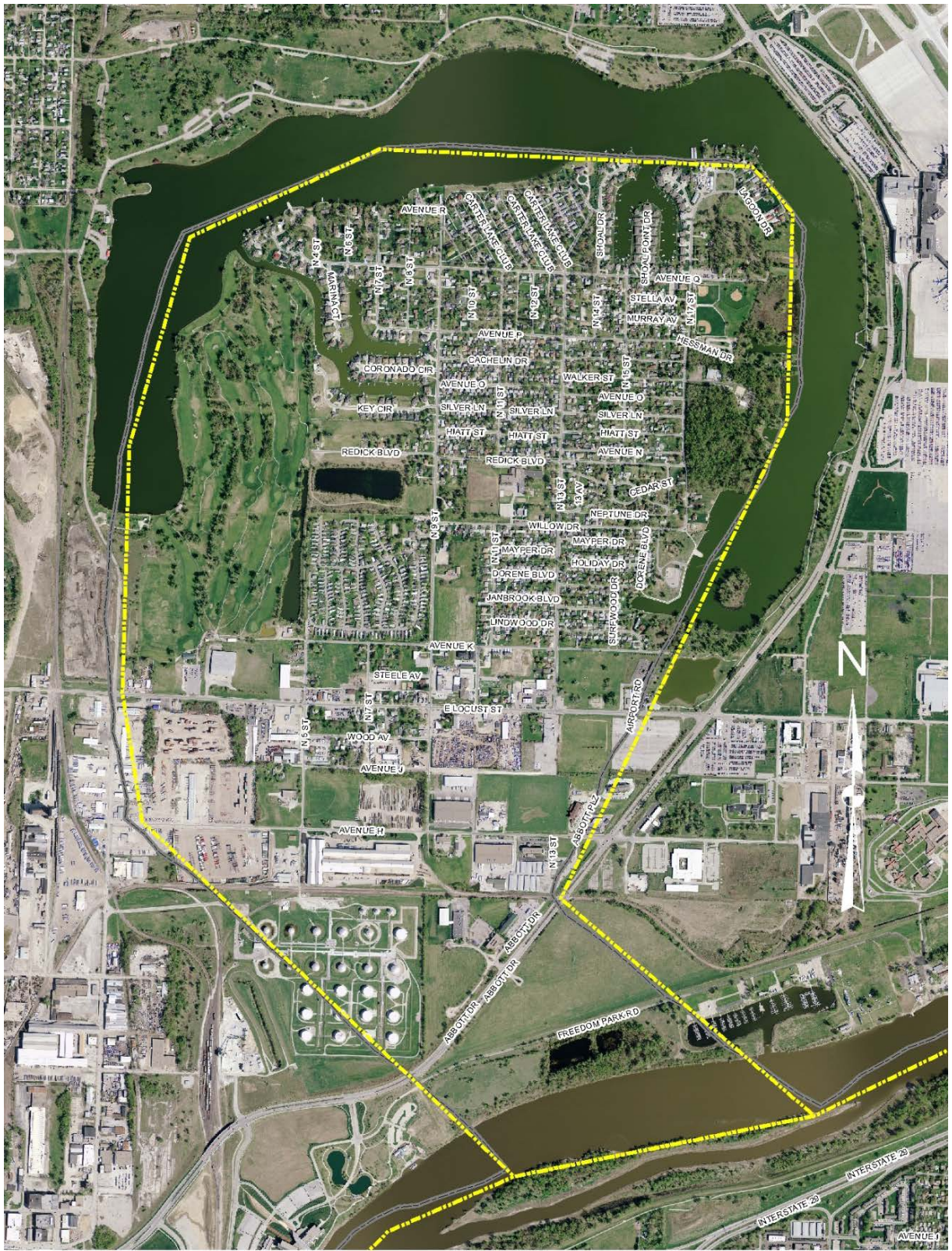
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.1: City of Avoca



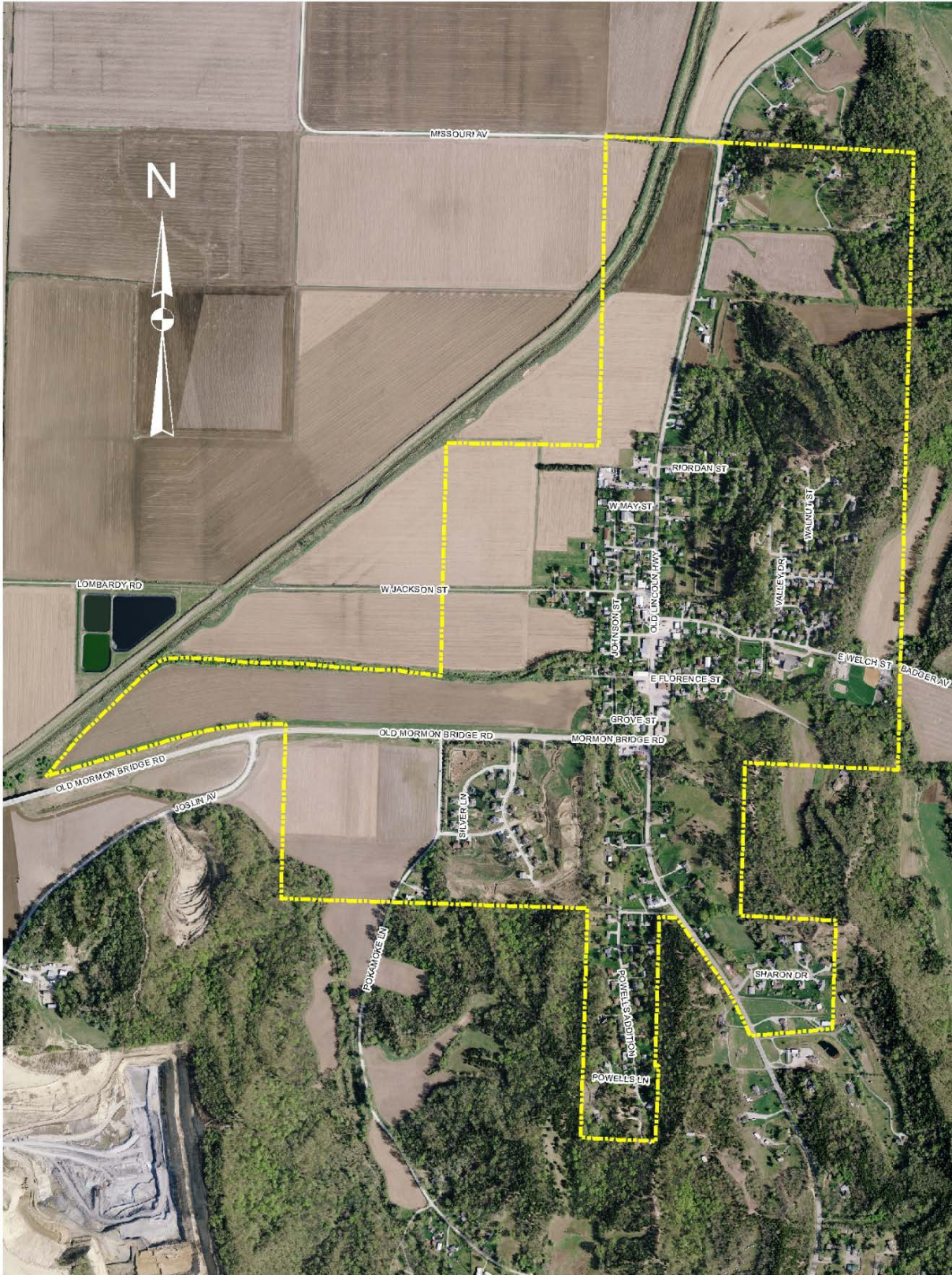
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.2: City of Carson



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.3: City of Carter Lake



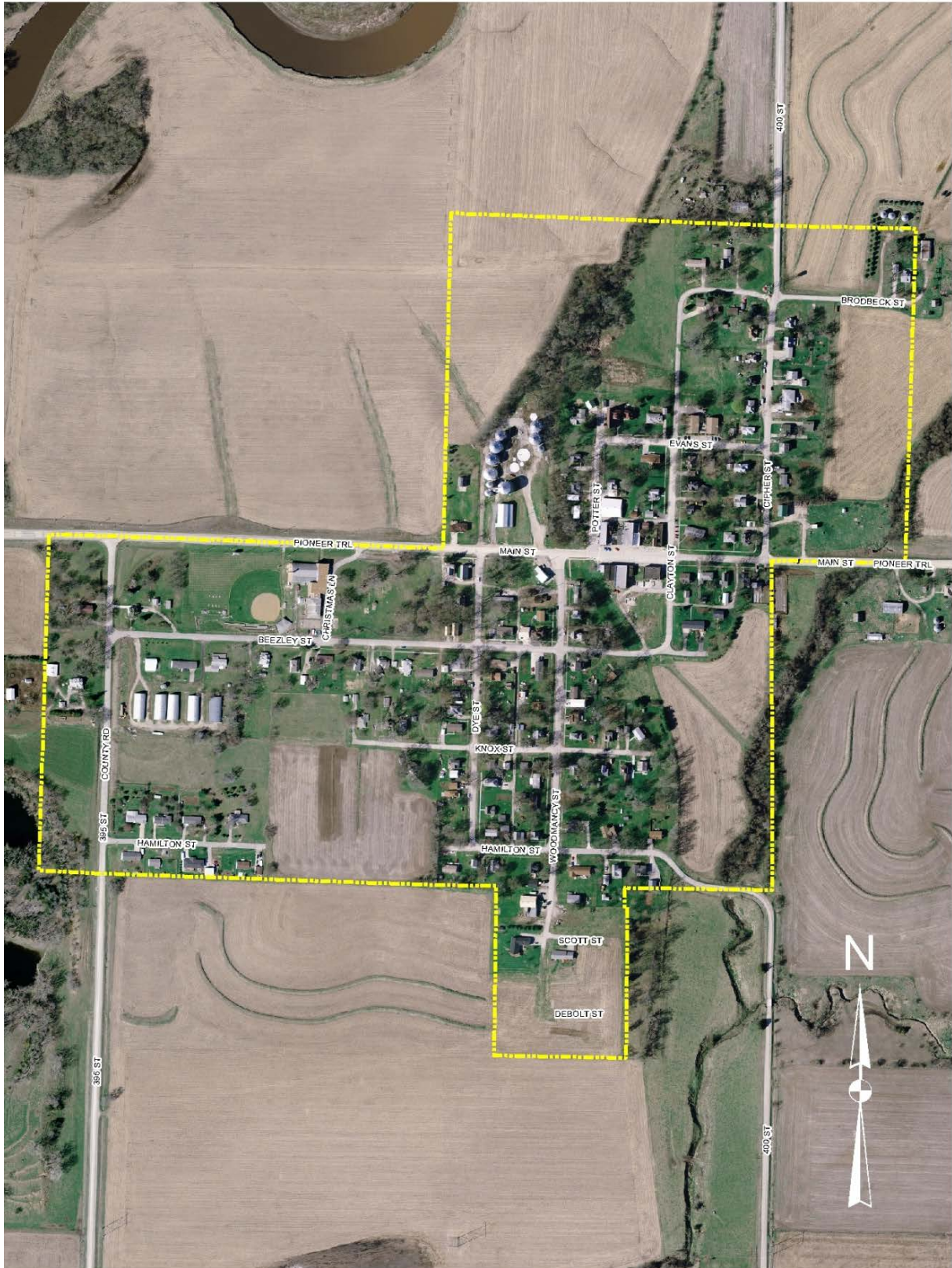
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.4: City of Crescent



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure C.5: City of Hancock



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.6: City of Macedonia



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure C.7: City of McClelland



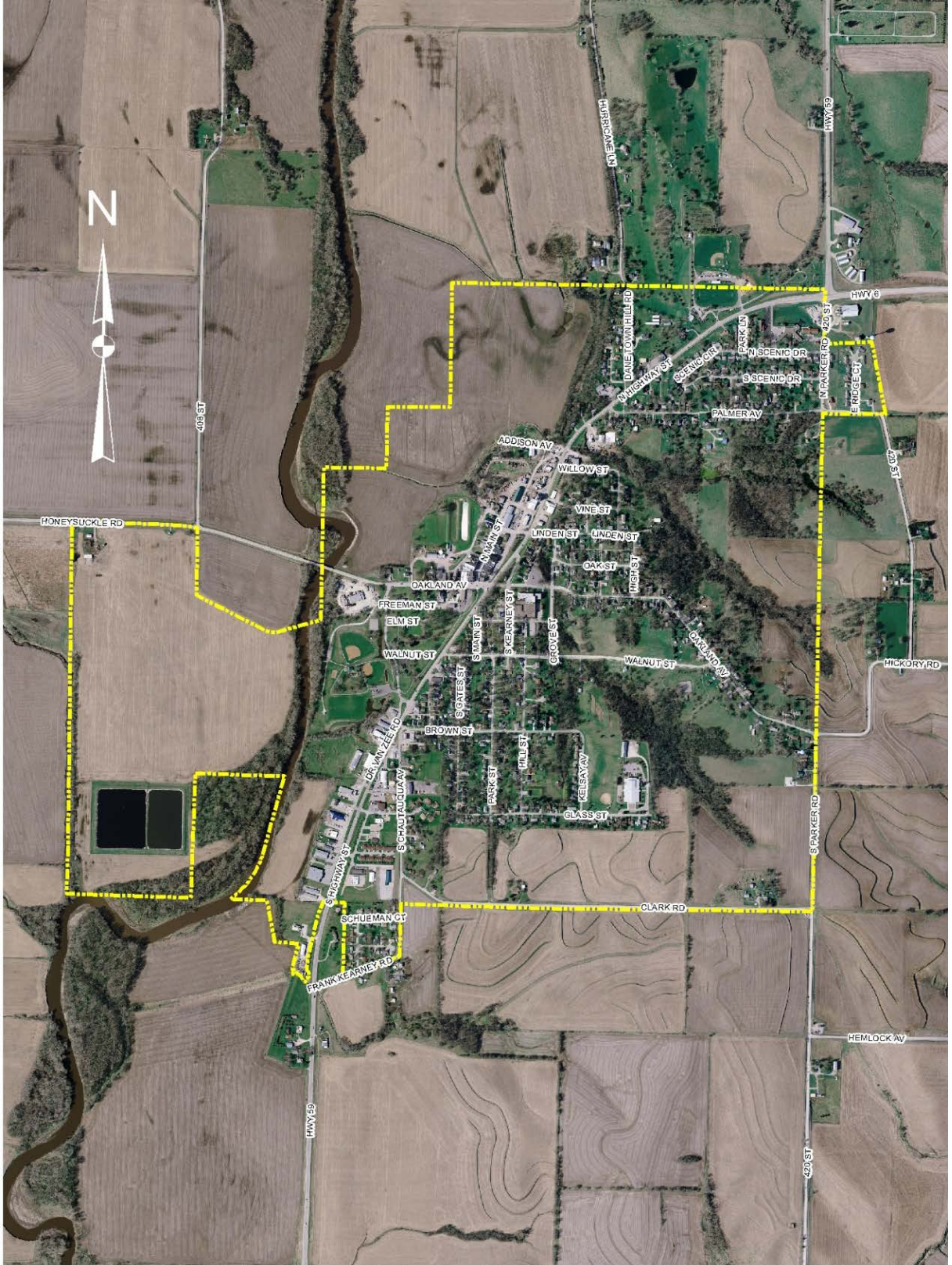
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure C.8: City of Minden



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure C.9: City of Neola



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislib/>)

Figure C.10: City of Oakland

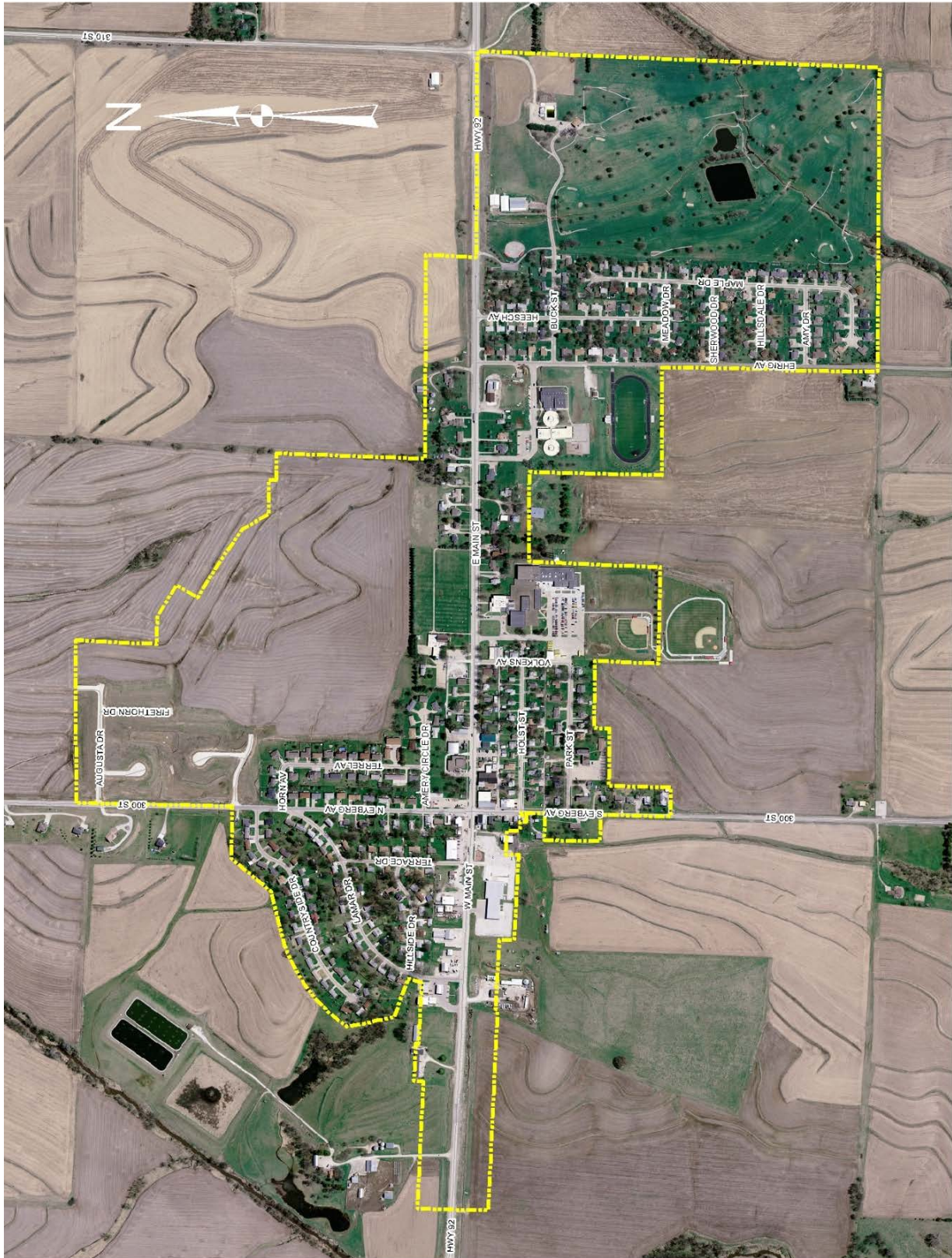
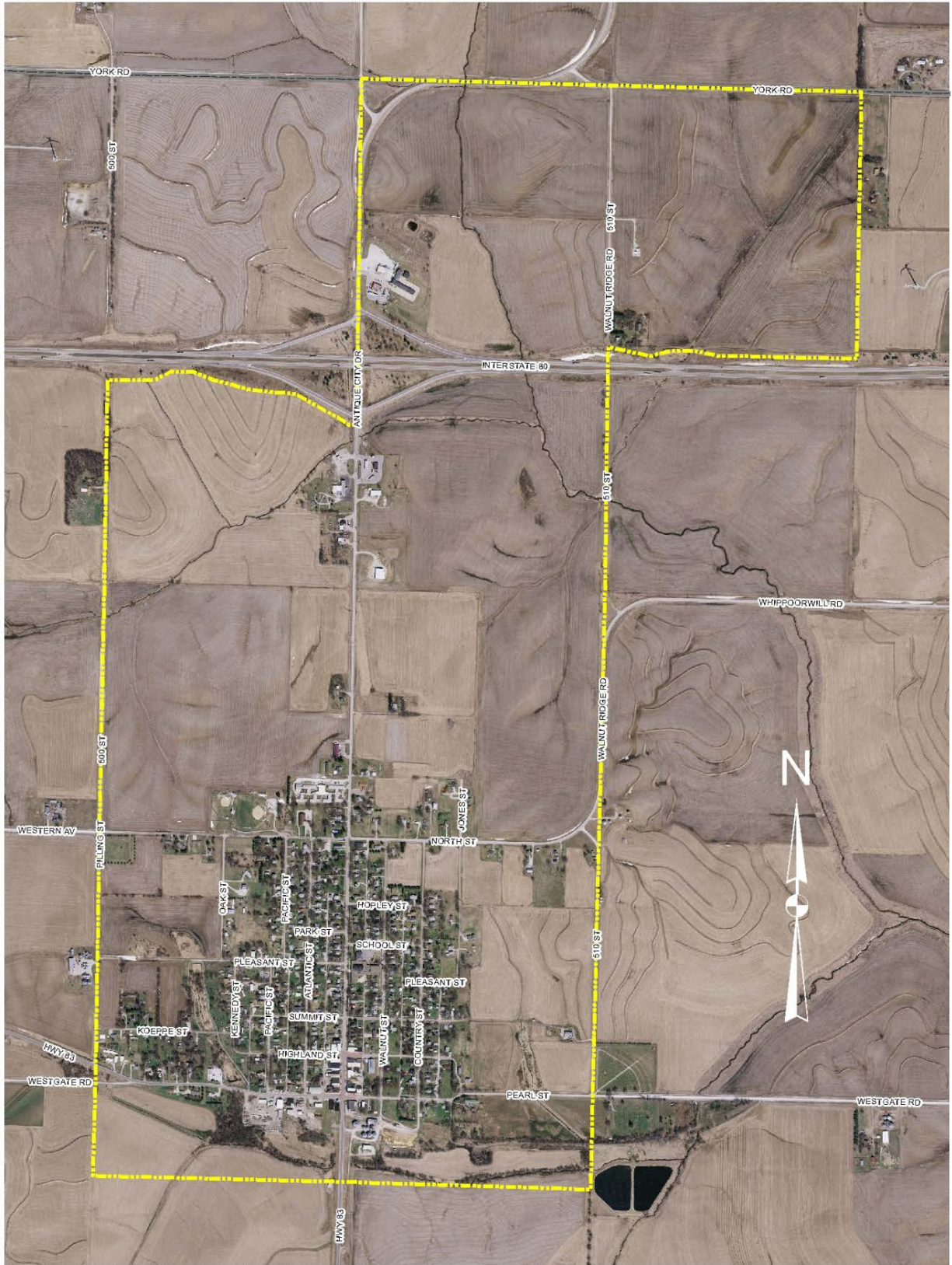


Figure C.11: City of Treynor



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure C.12: City of Underwood



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure C.13: City of Walnut

APPENDIX D
Critical Facilities Maps

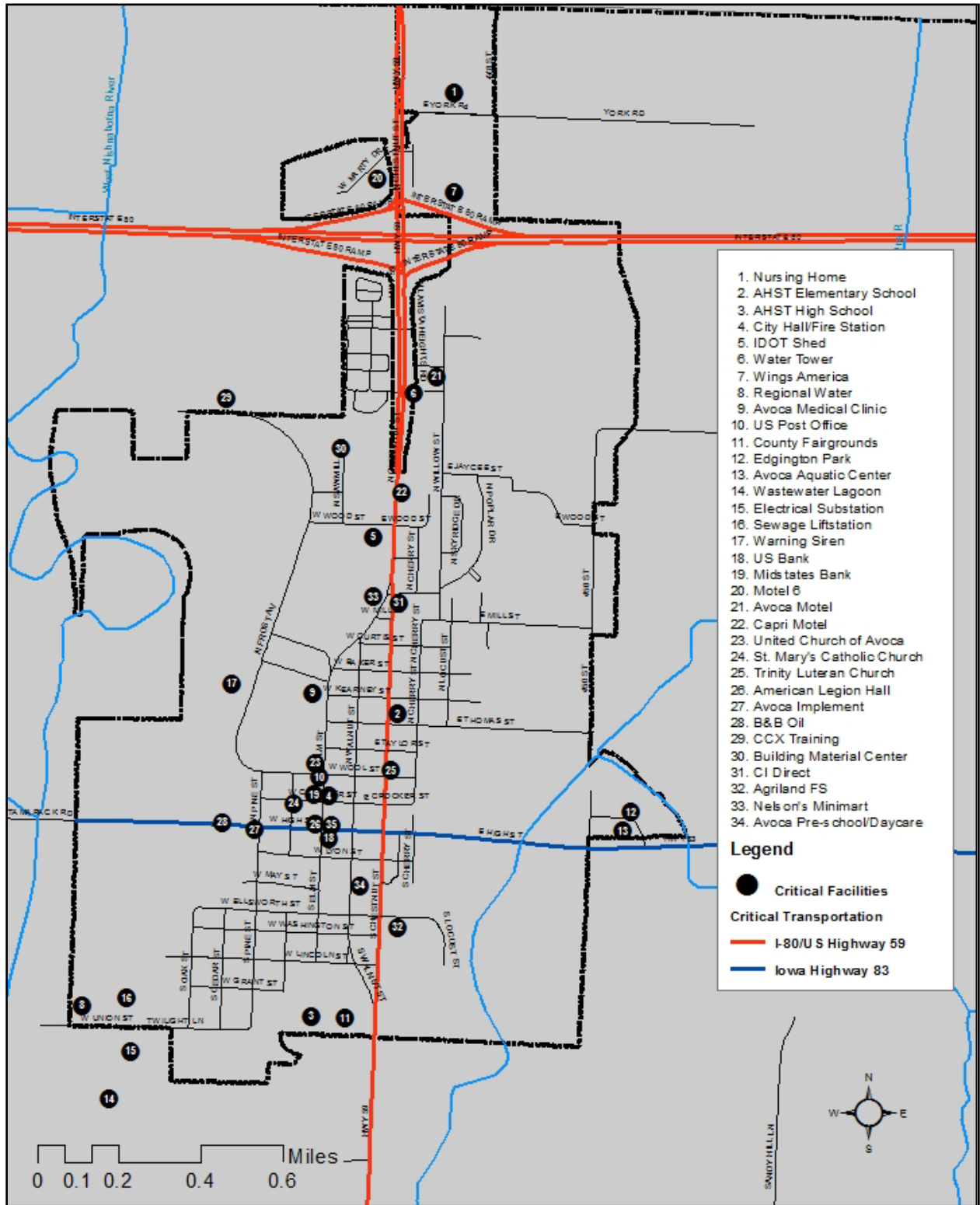


Figure D.1: City of Avoca

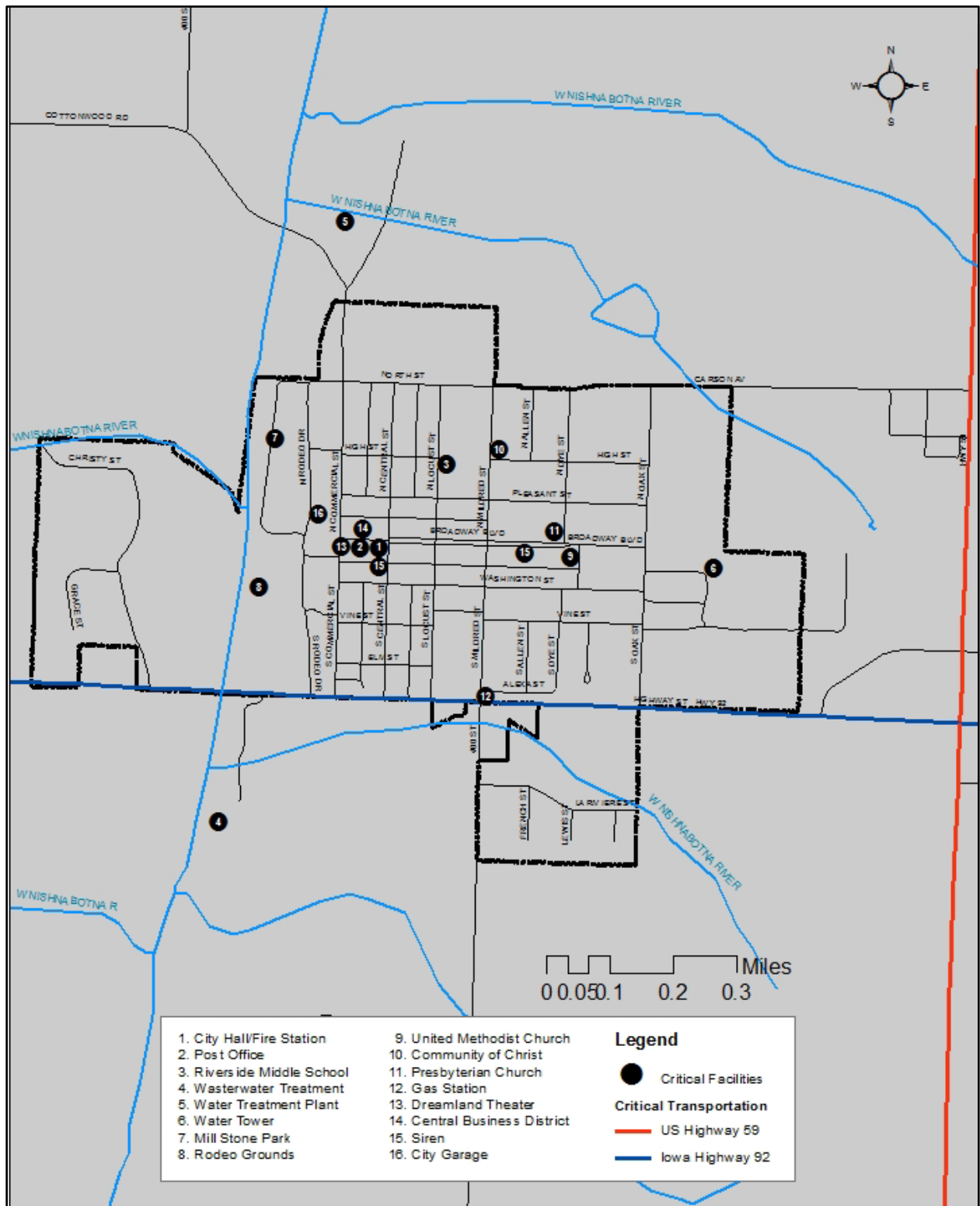


Figure D.2: City of Carson

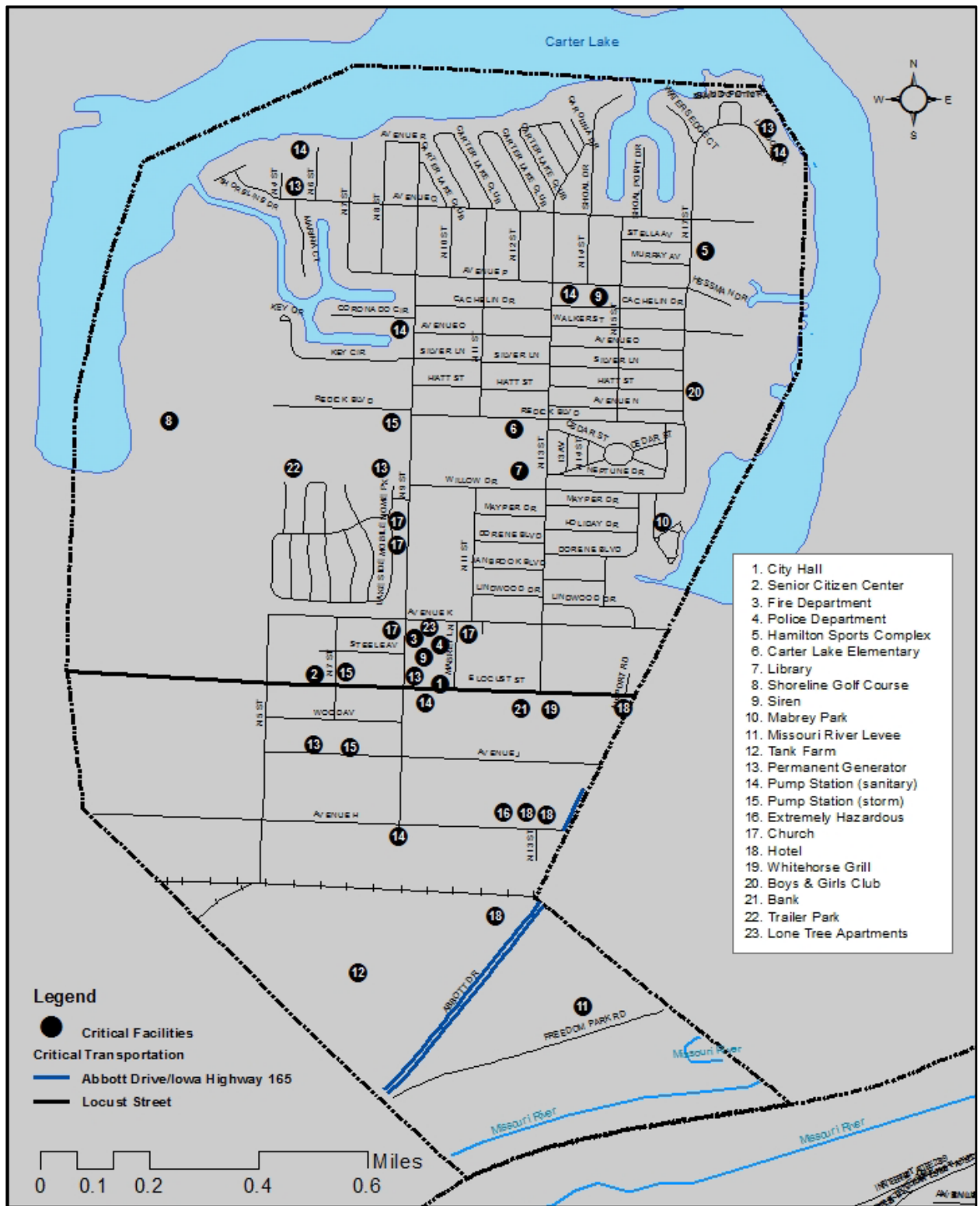


Figure D.3: City of Carter Lake

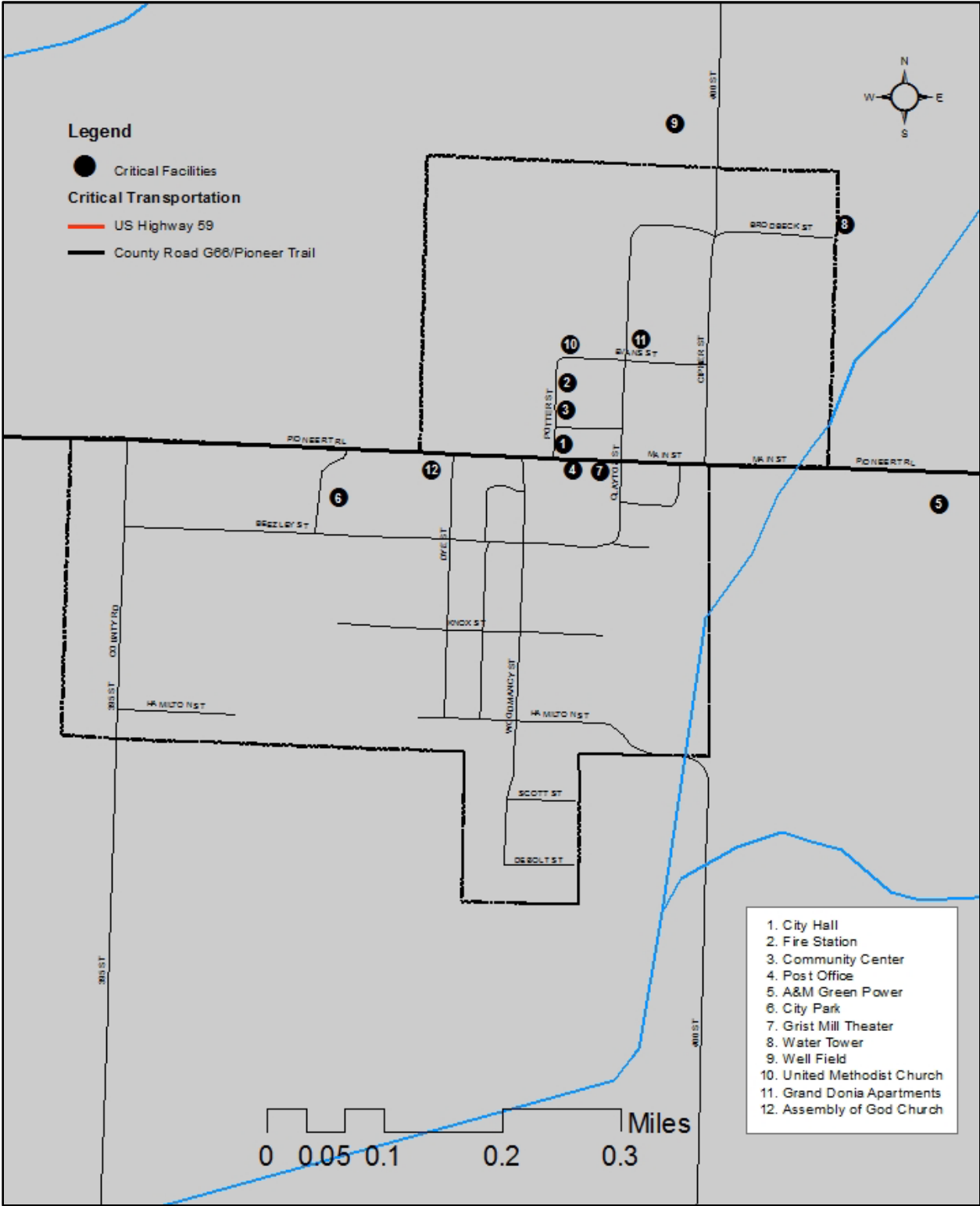


Figure D.6: City of Macedonia

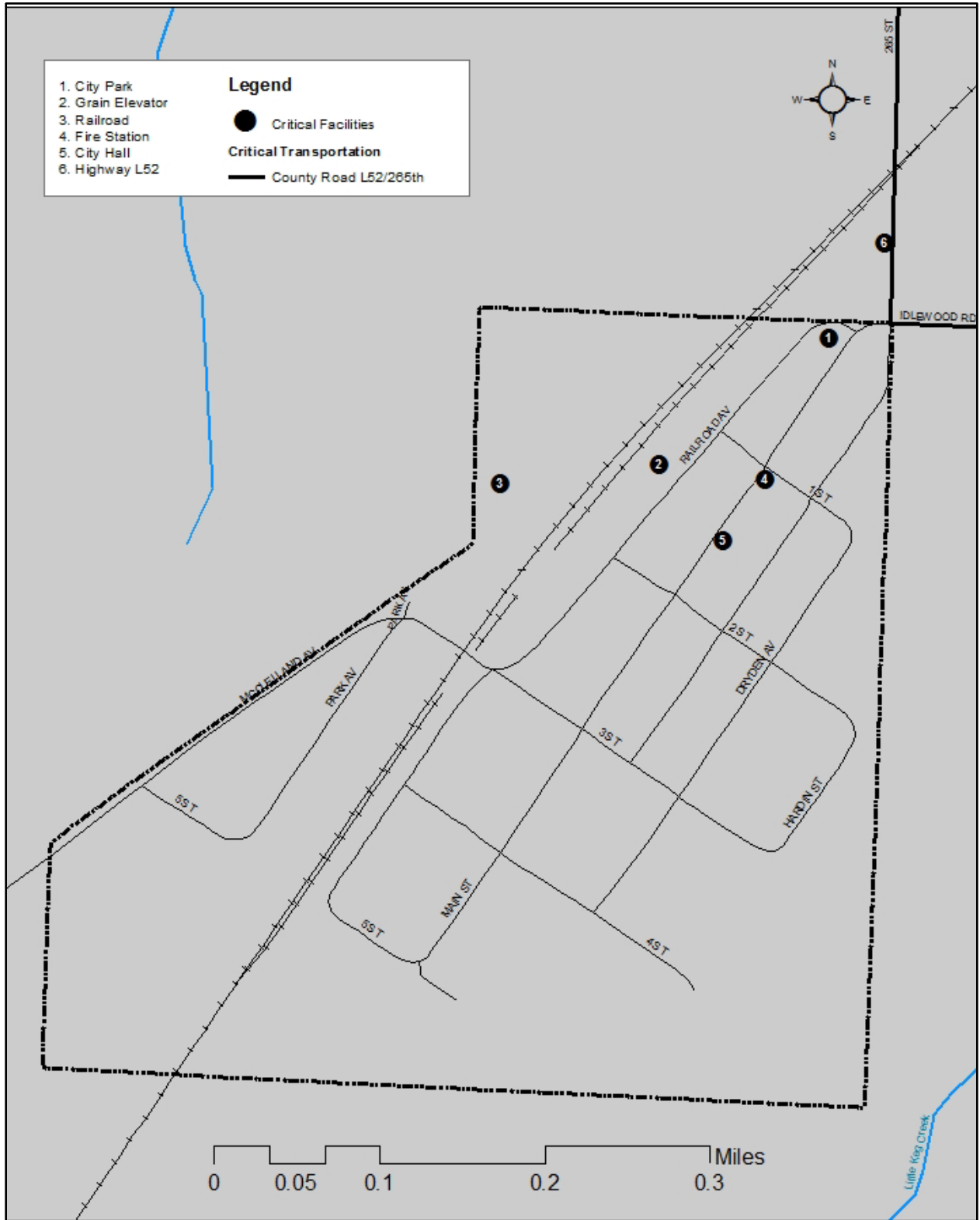


Figure D.7: McClelland

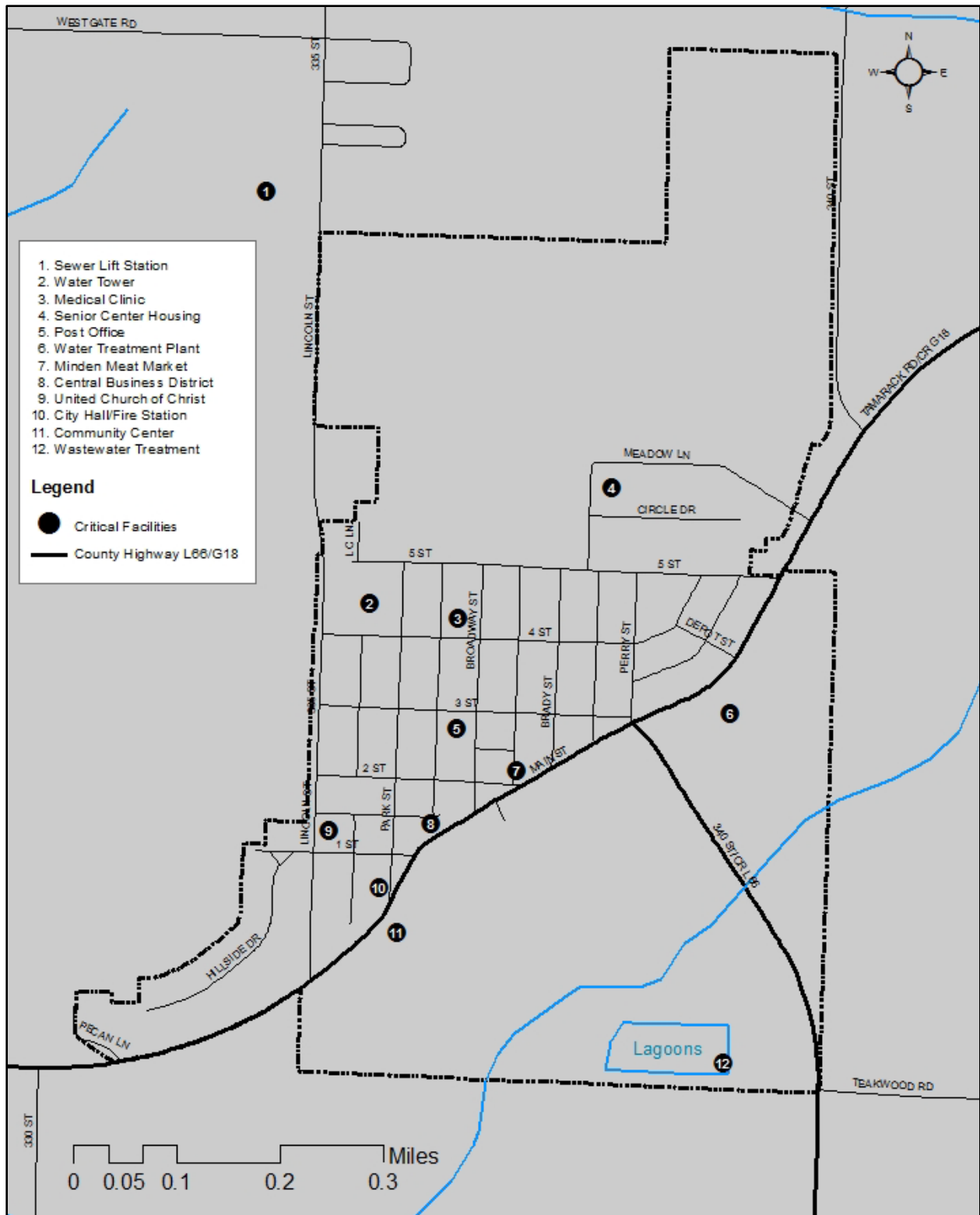


Figure D.8: City of Minden

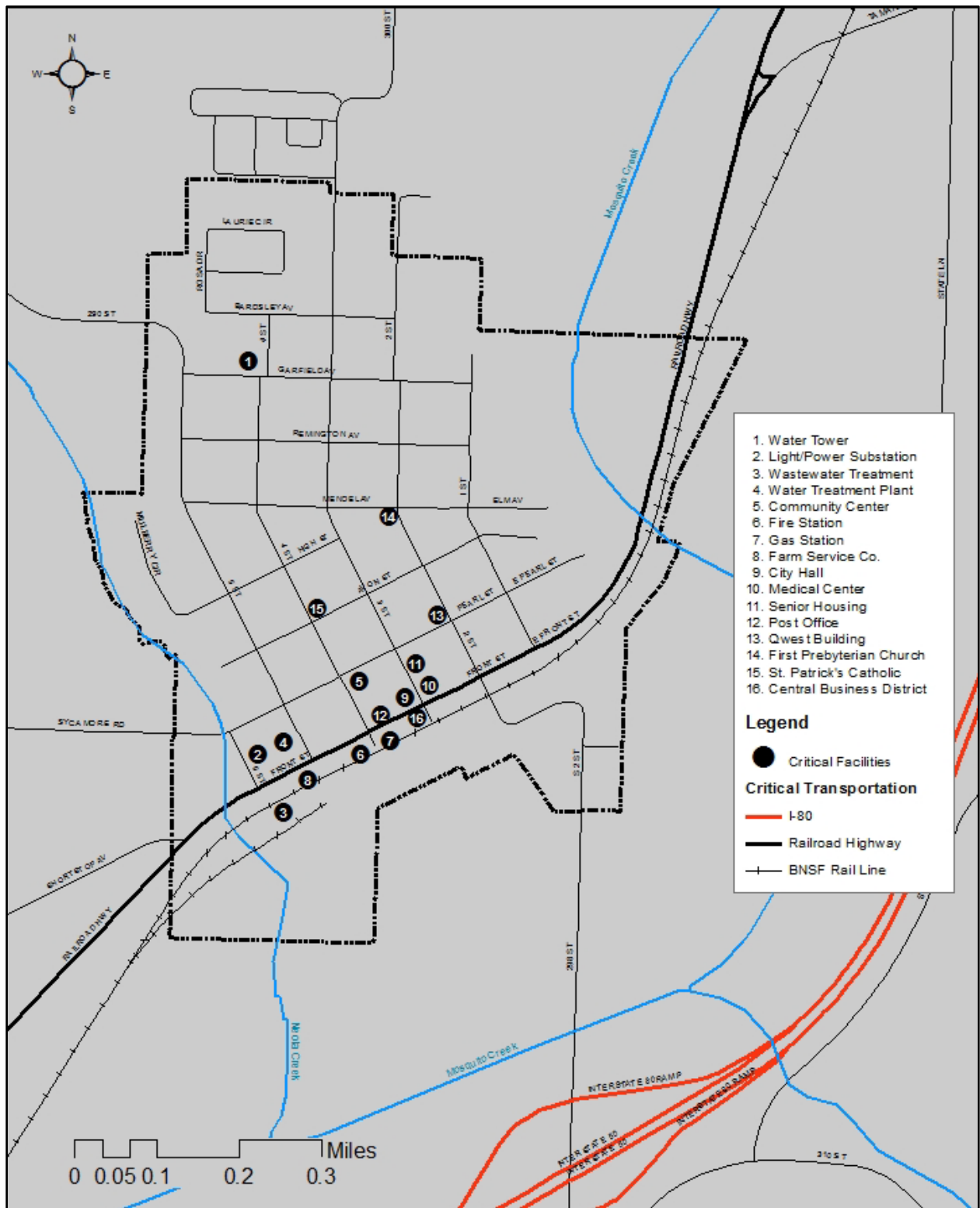


Figure D.9: City of Neola

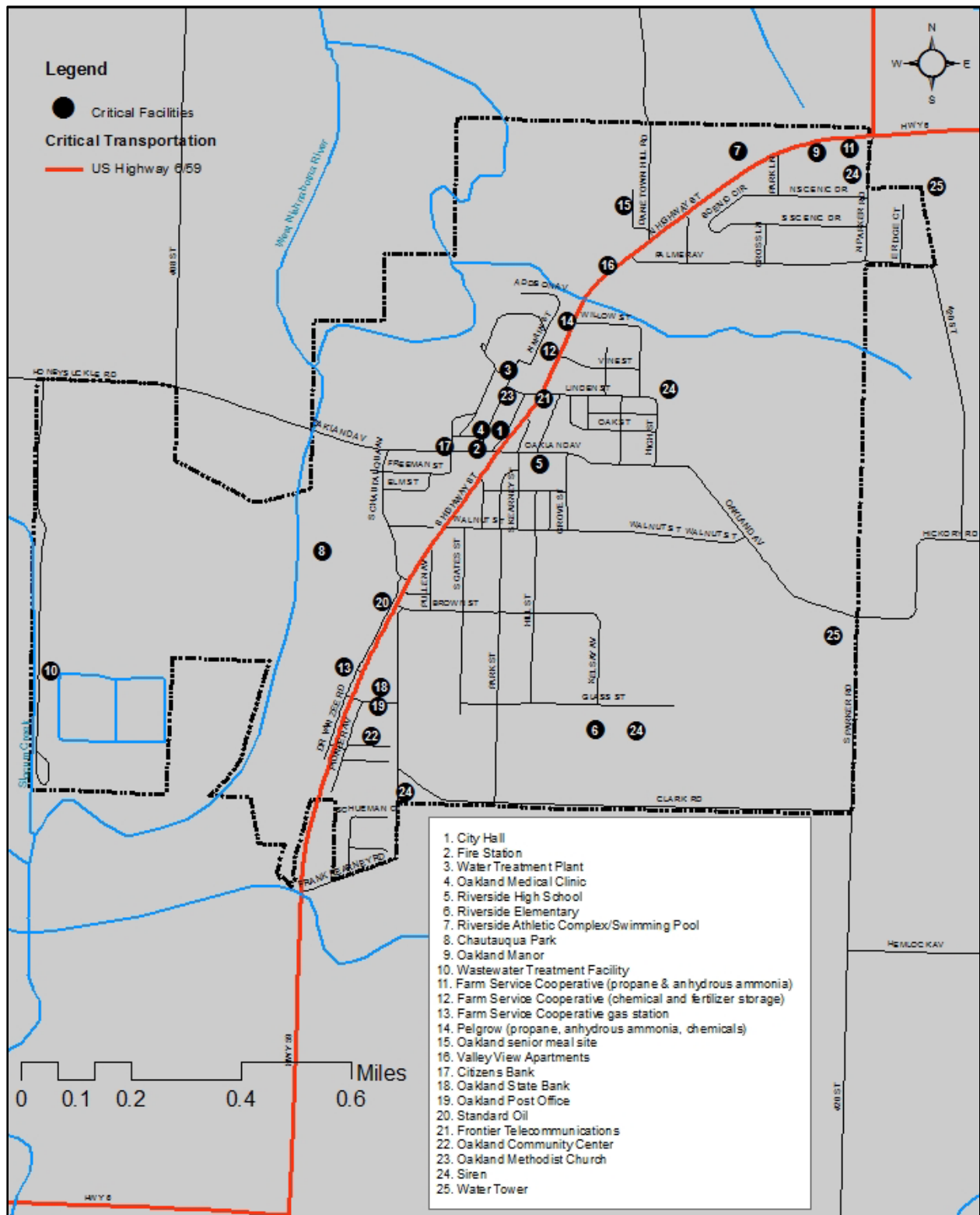


Figure D.10: City of Oakland

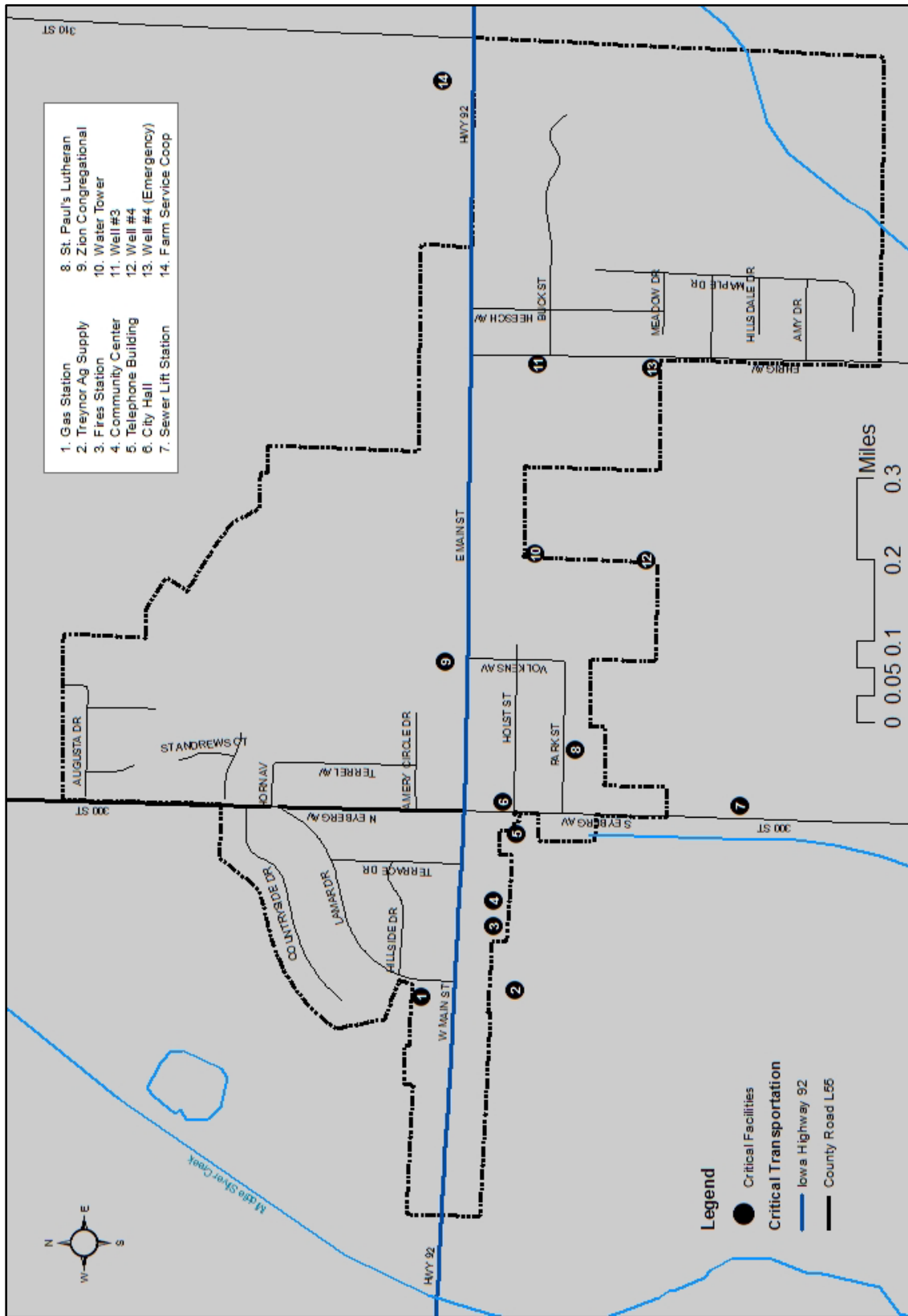


Figure D.11: City of Treynor

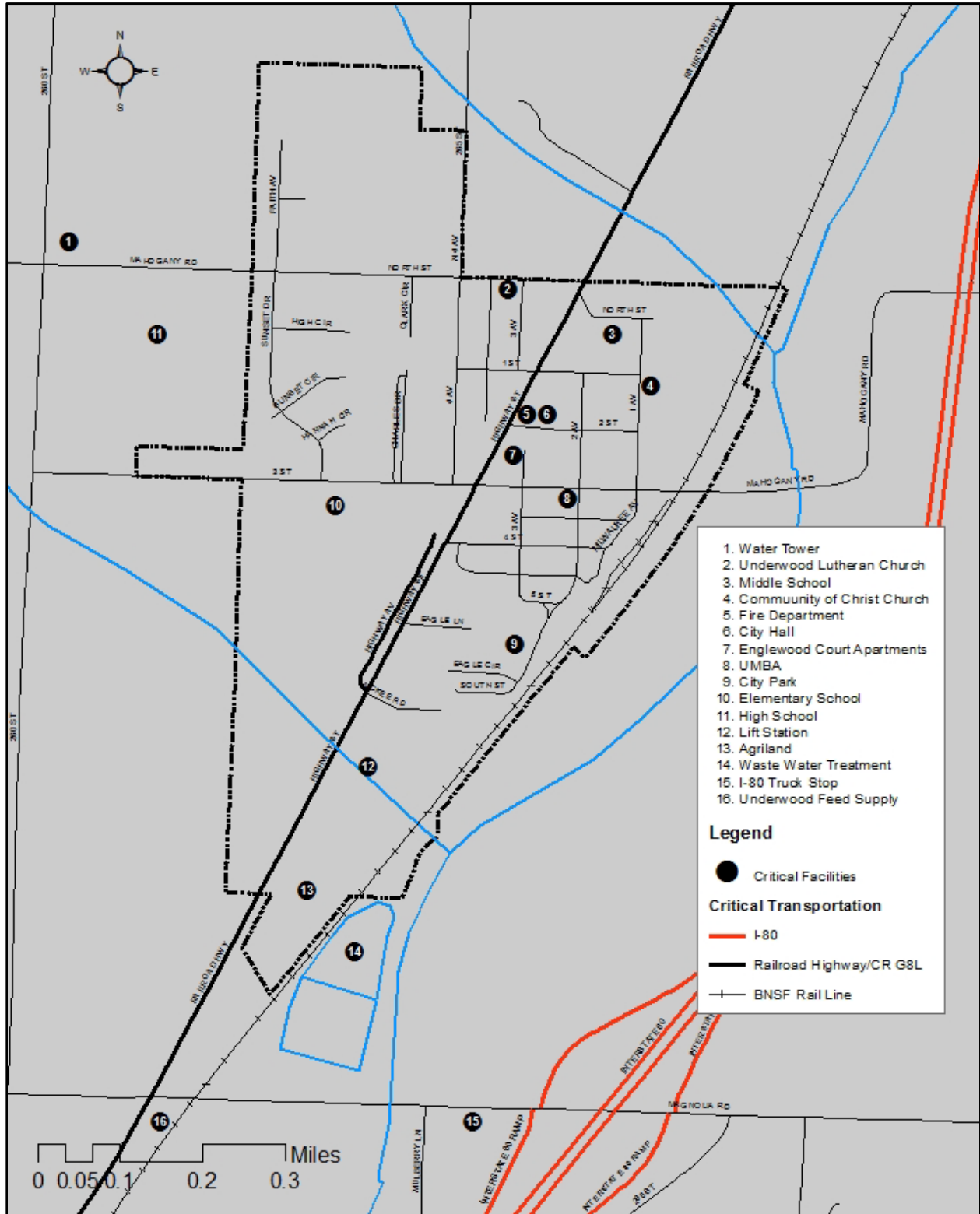


Figure D.12: City of Underwood

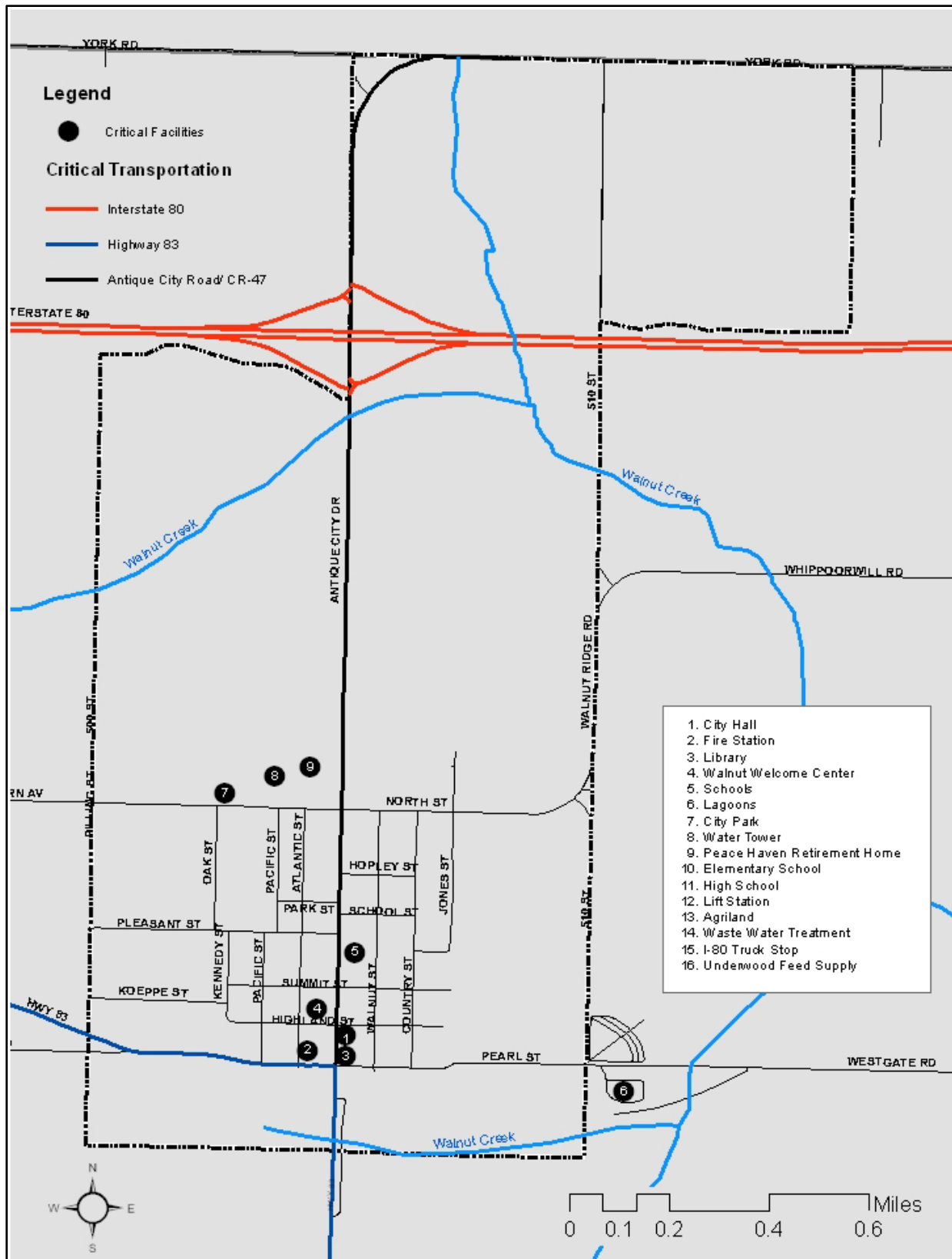


Figure D.13: City of Walnut

APPENDIX E
Topographic Maps

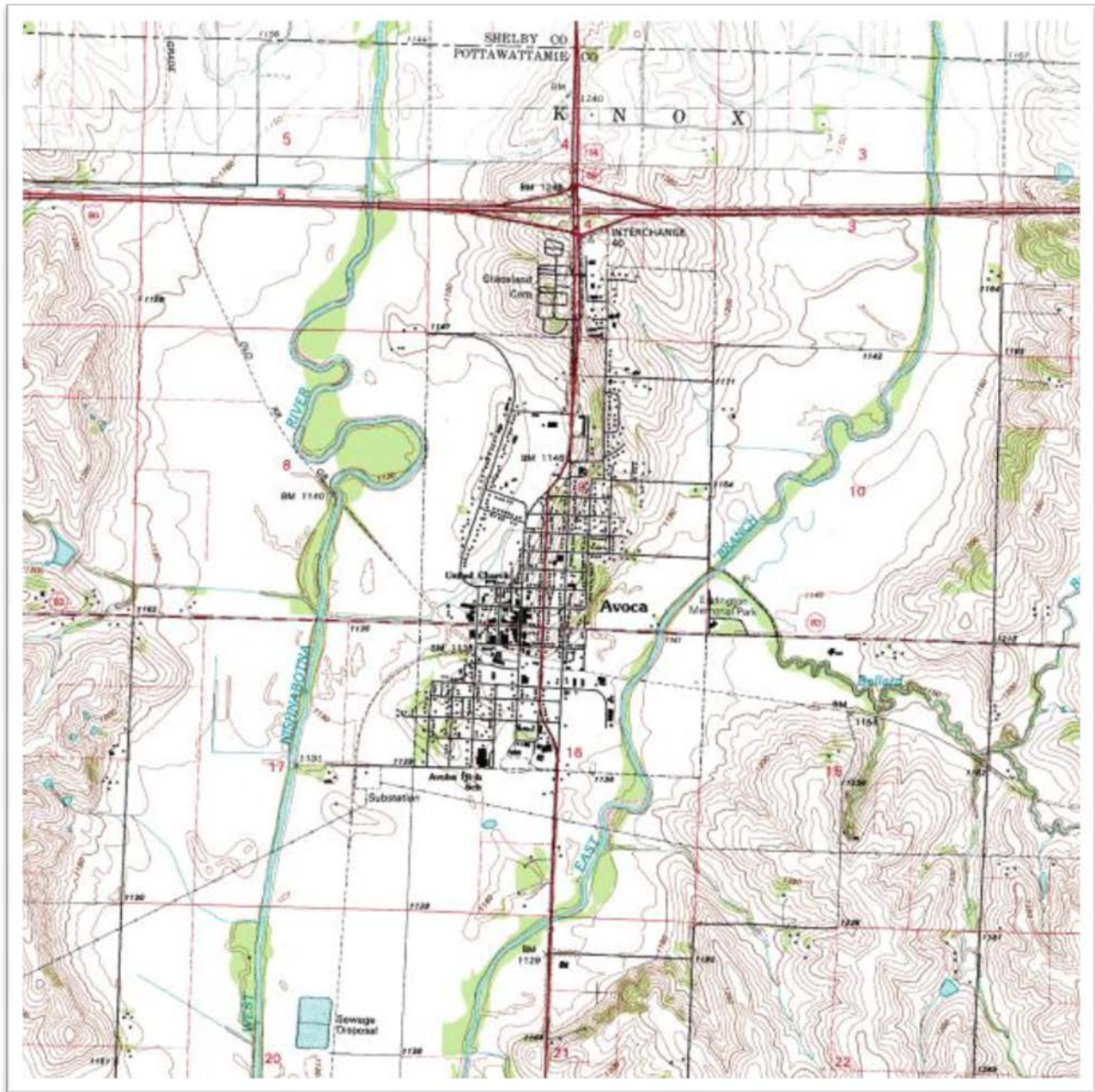


Figure E.1: City of Avoca



Figure E.2: City of Carson

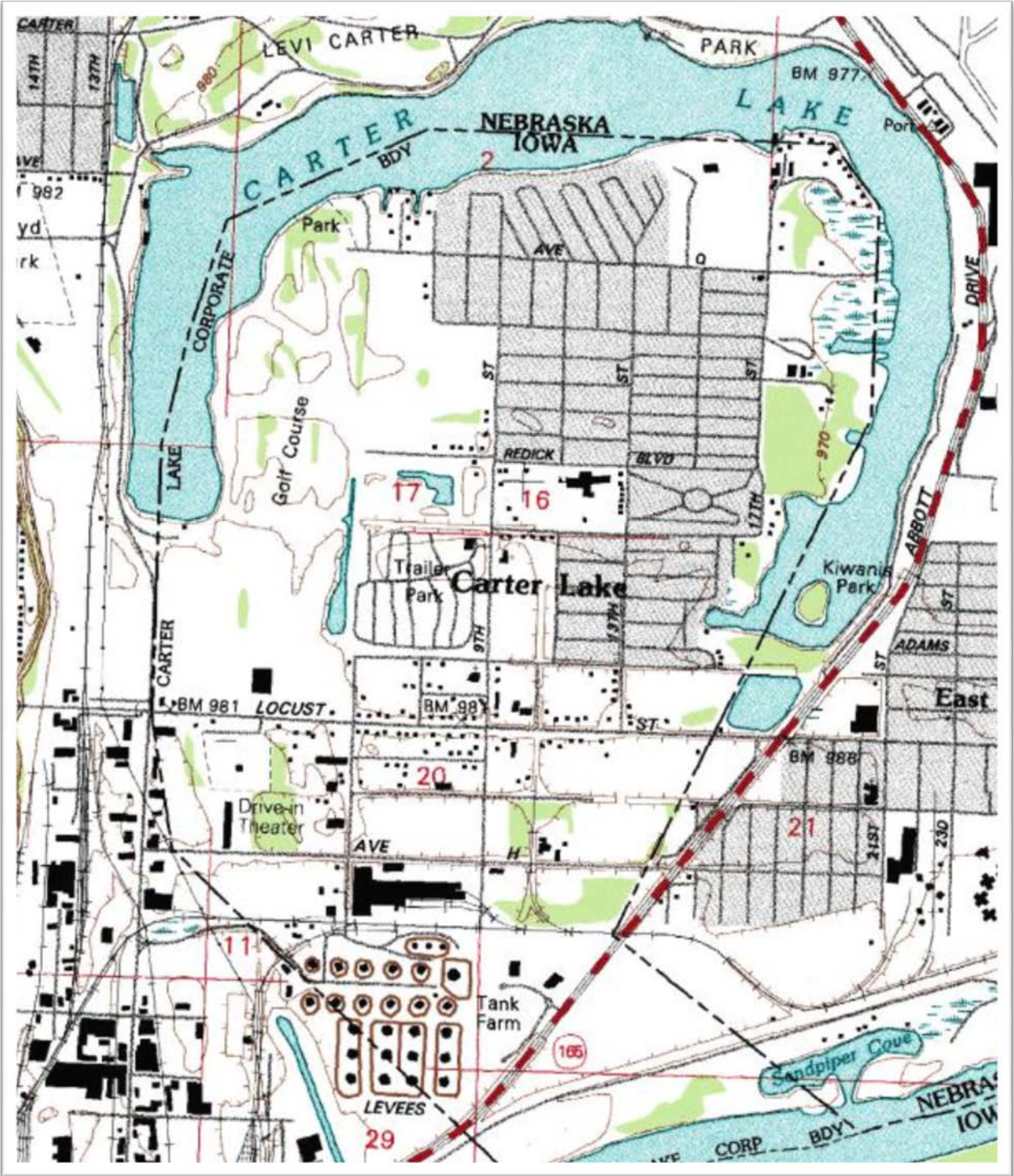


Figure E.3: City of Carter Lake

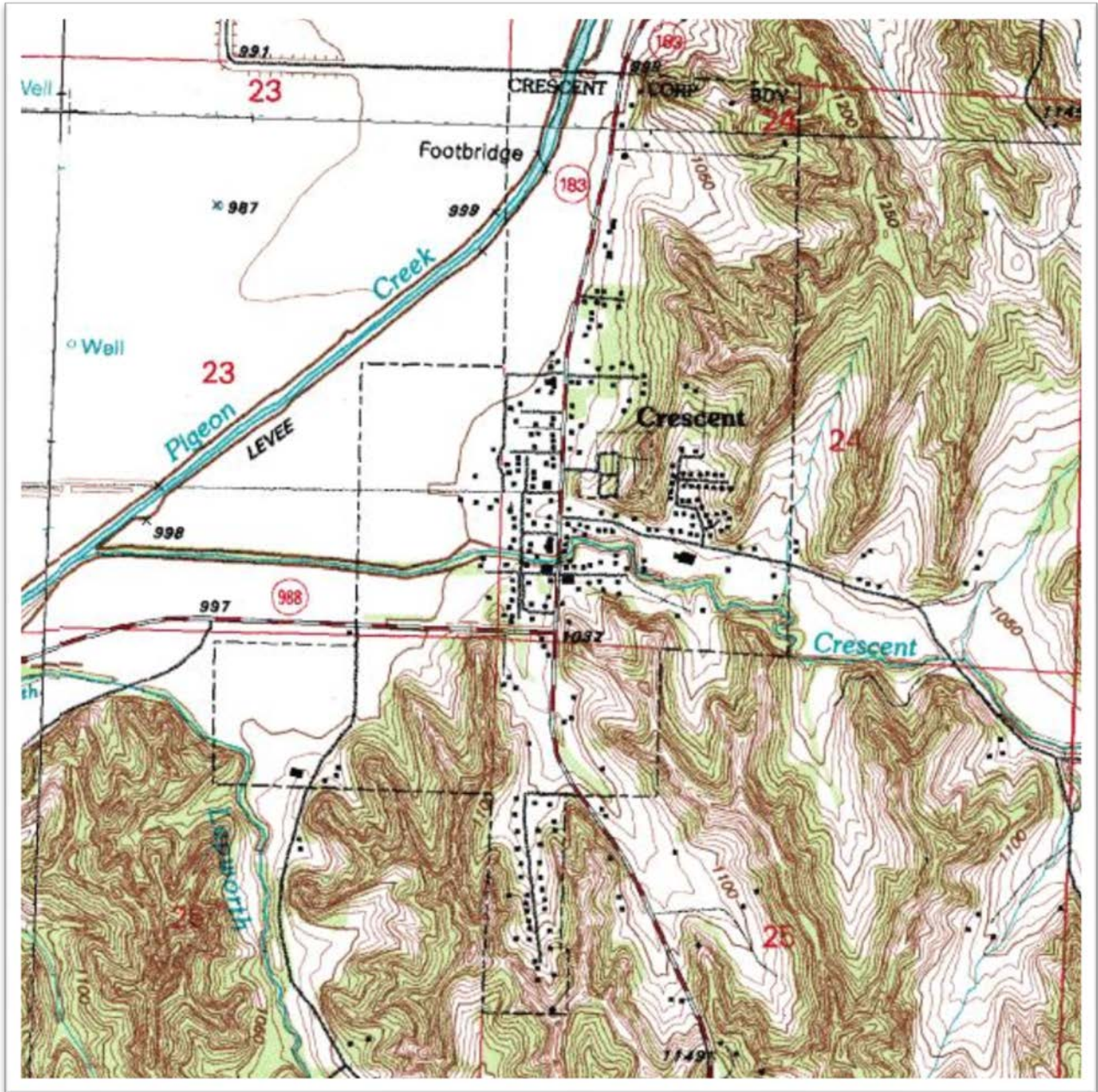


Figure E.4: City of Crescent

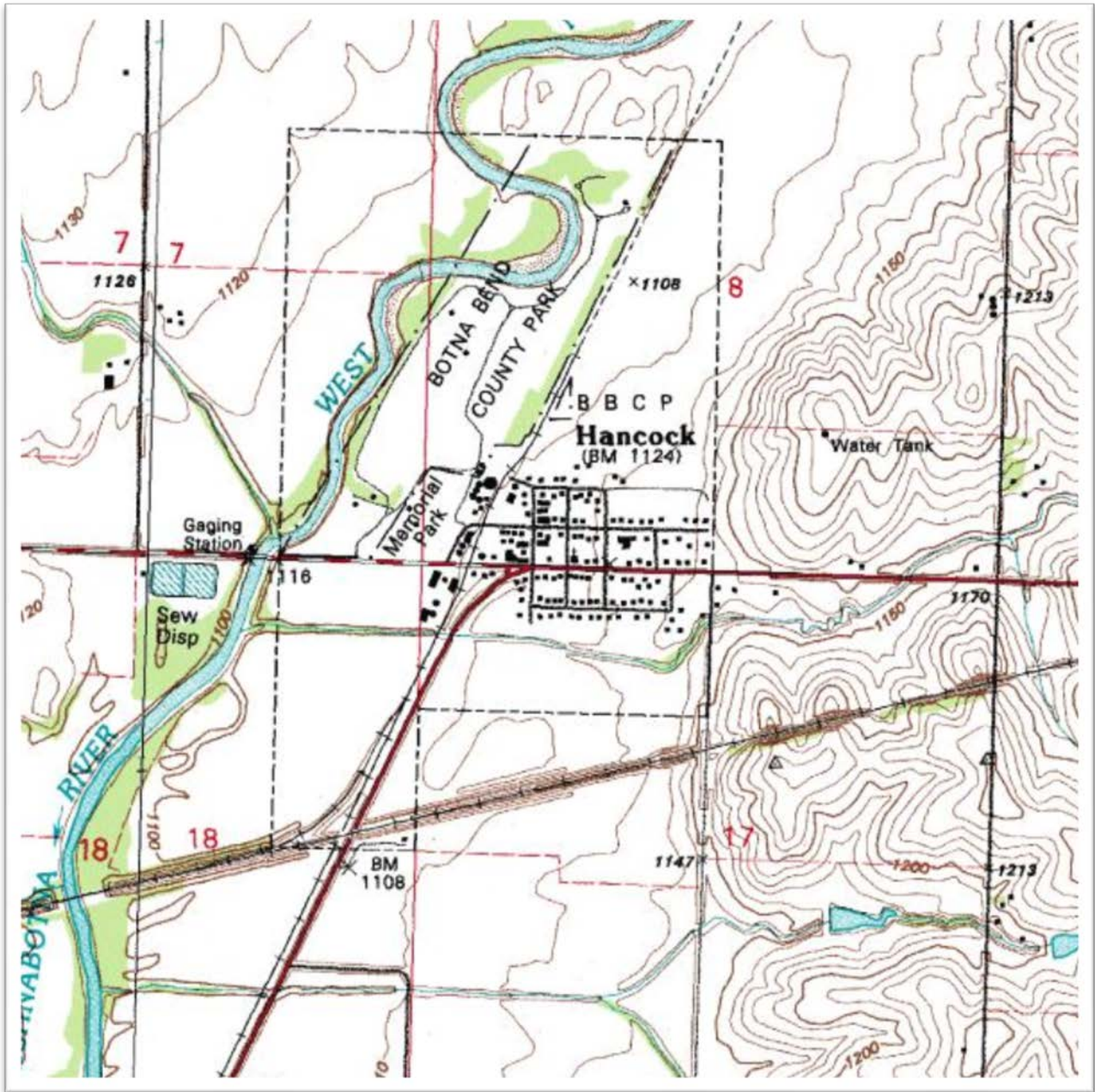


Figure E.5: City of Hancock

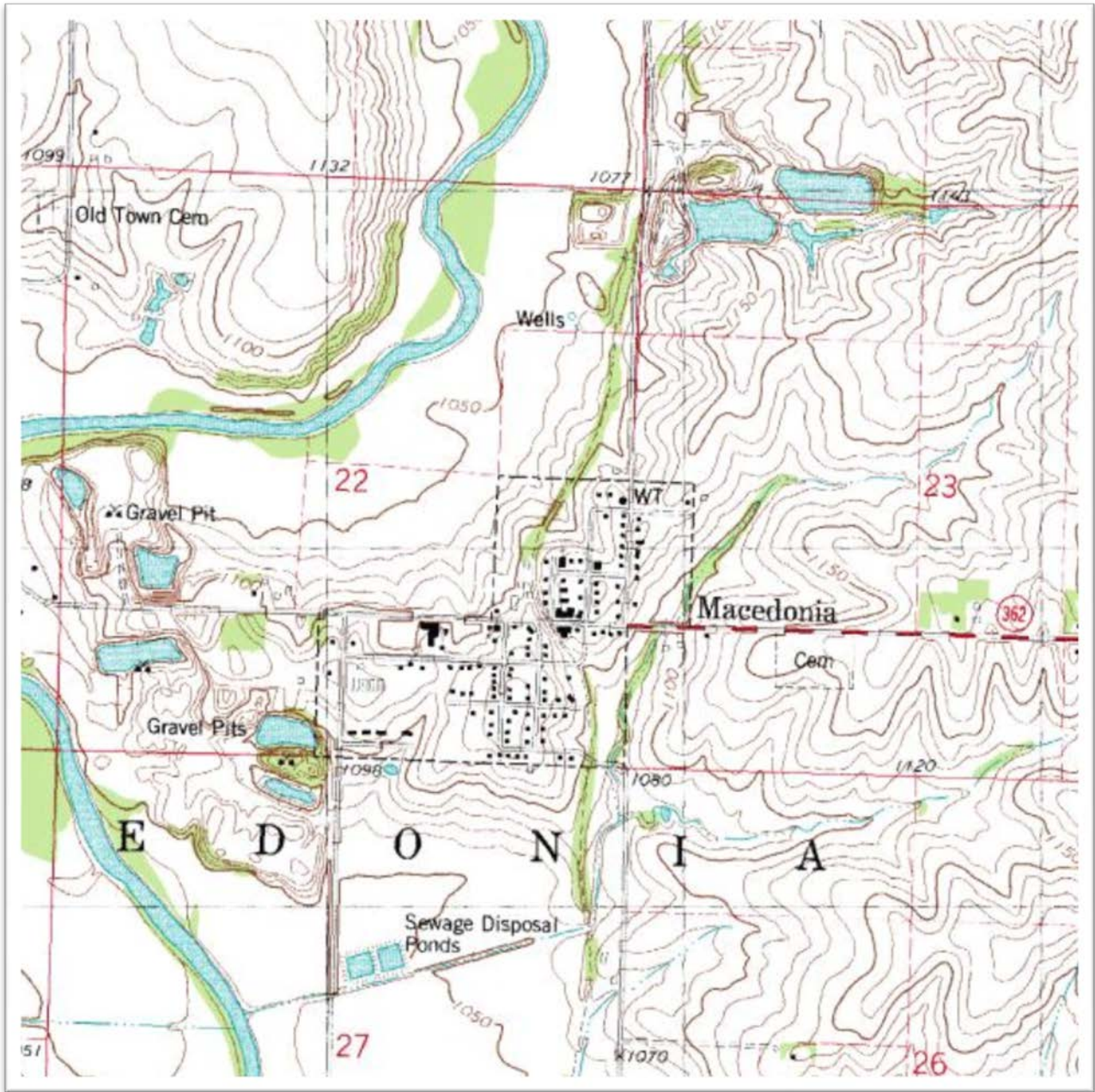


Figure E.6: City of Macedonia



Figure E.7: City of McClelland



Figure E.8: City of Minden

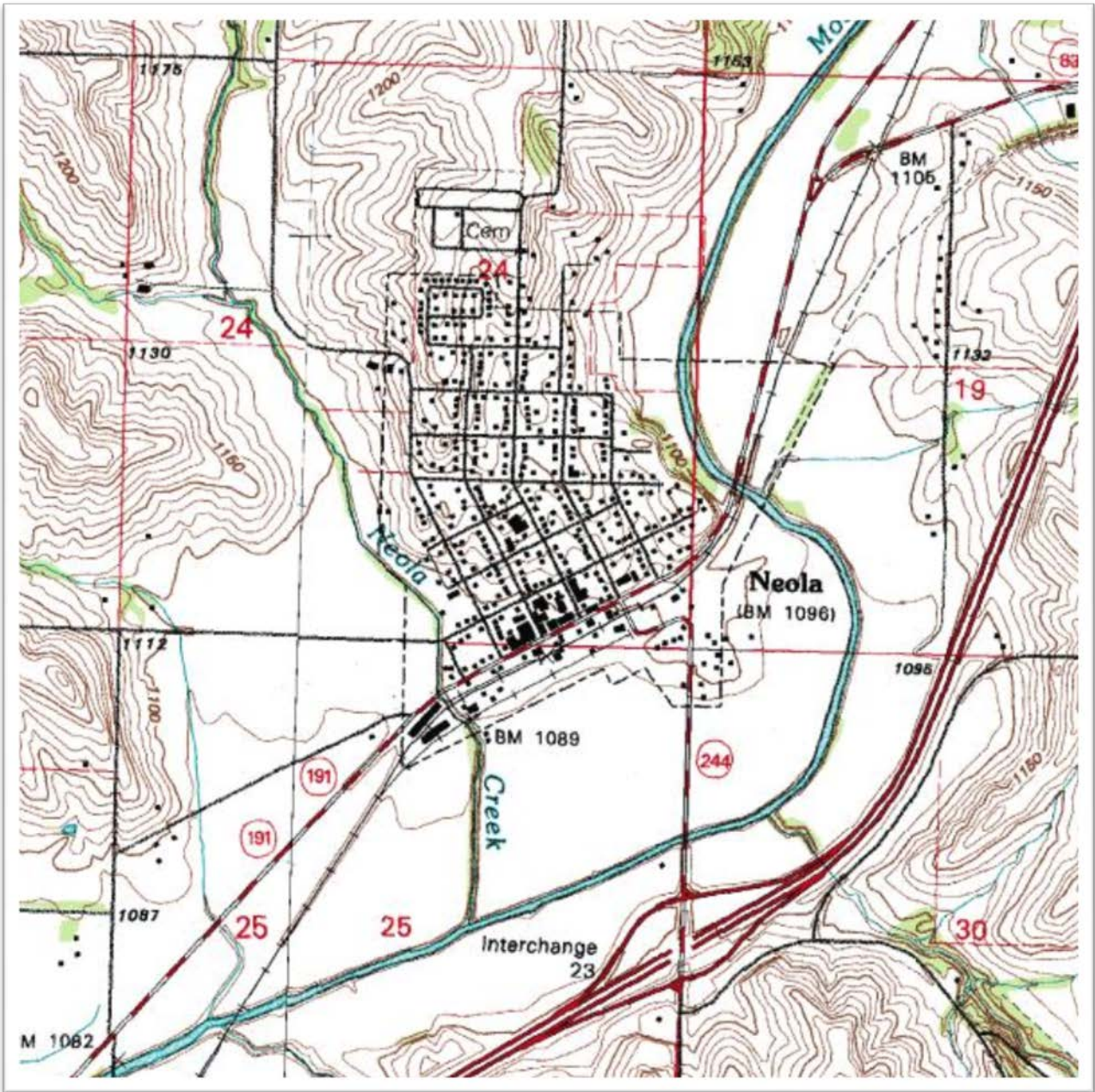


Figure E.9: City of Neola

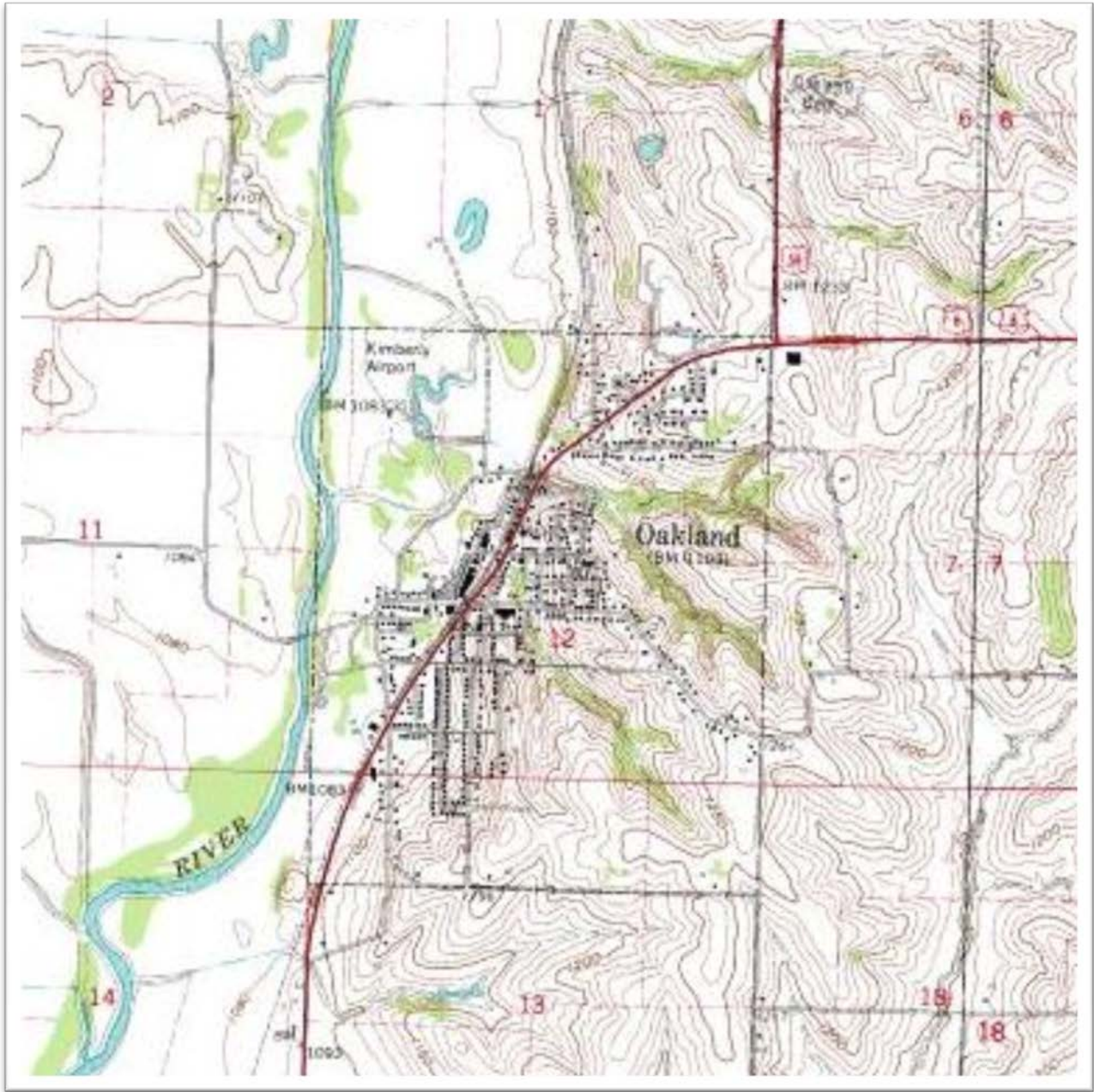


Figure E.10: City of Oakland

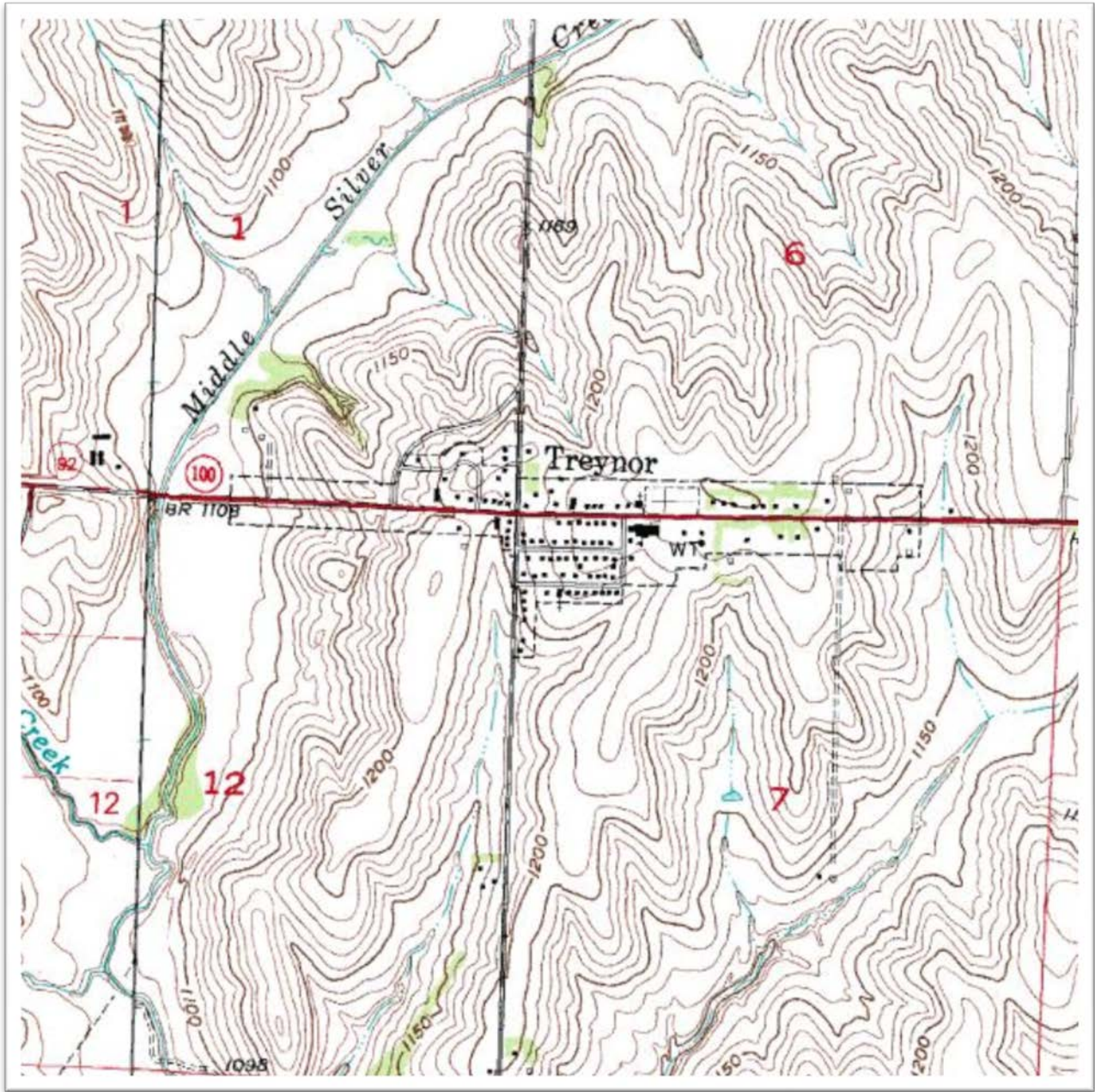


Figure E.11: City of Treynor

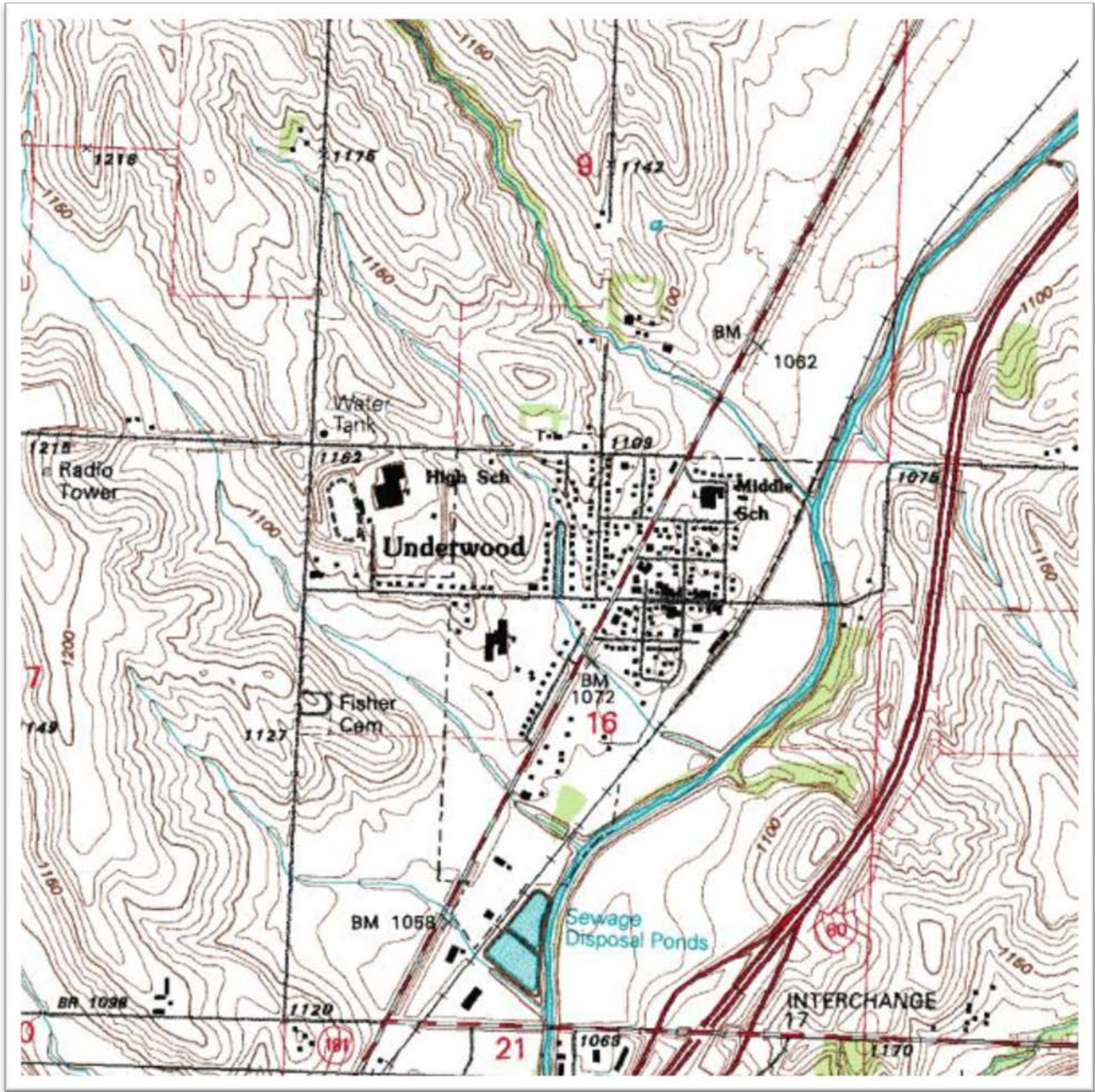


Figure E.12: City of Underwood

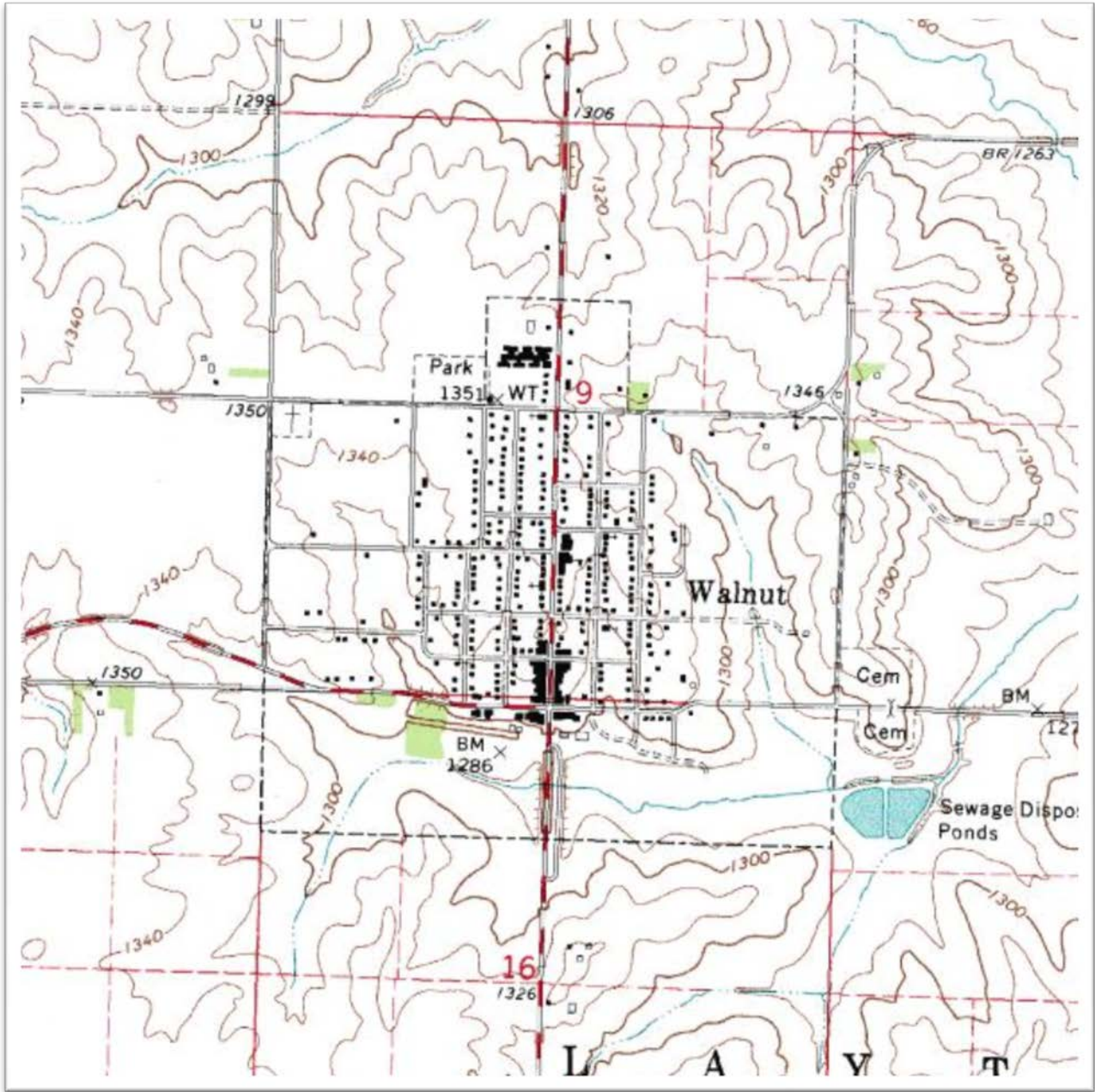
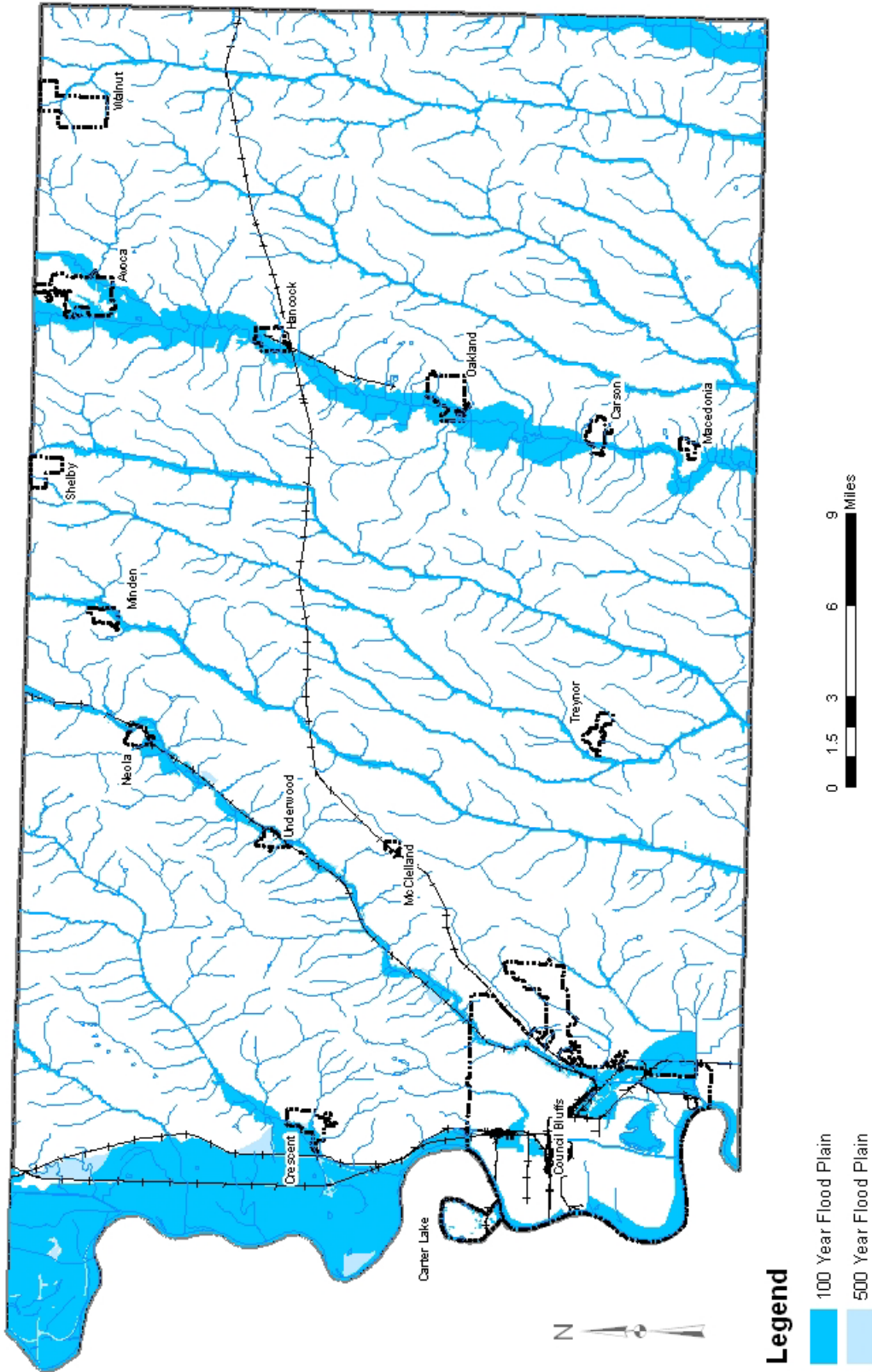
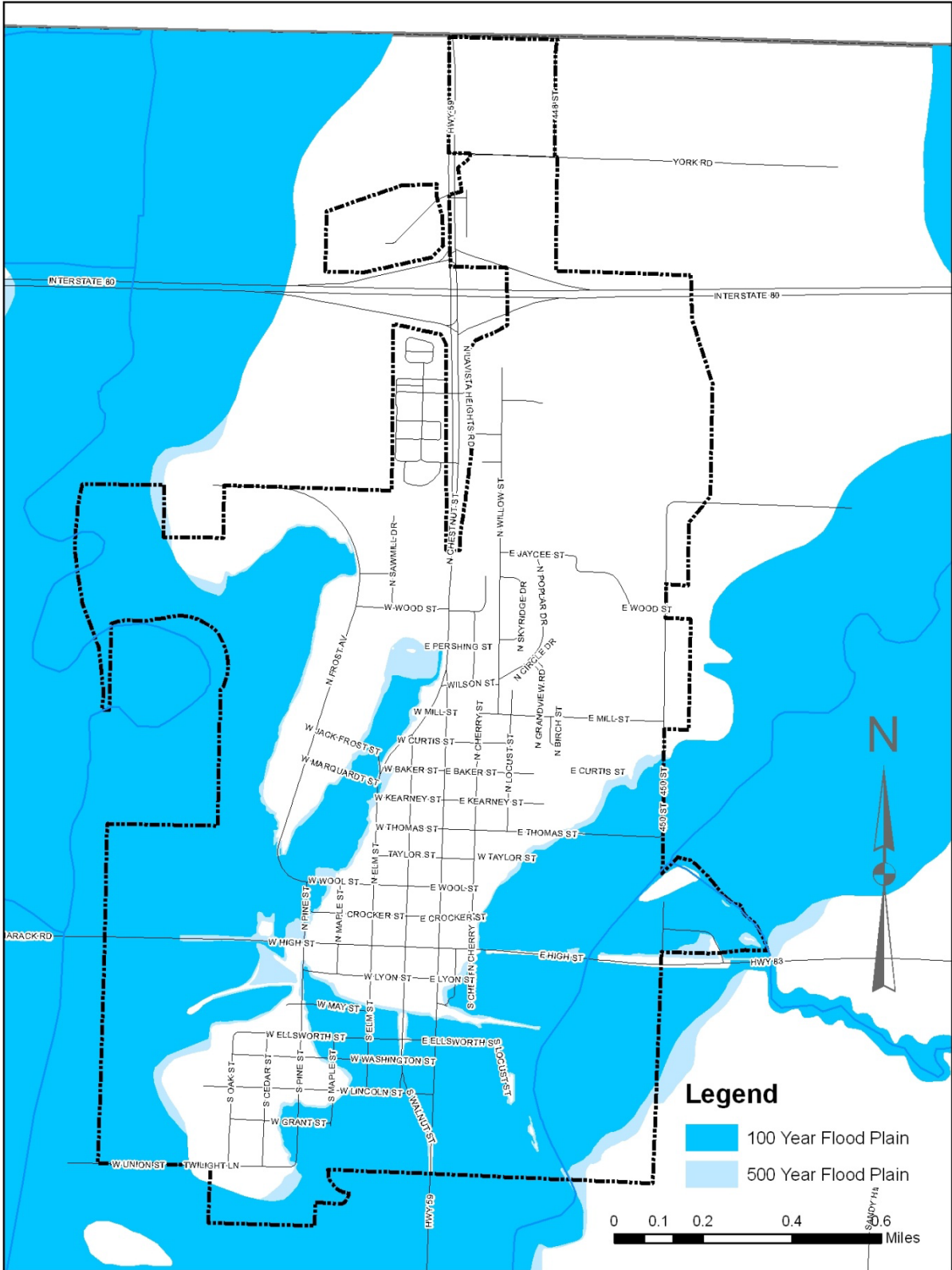


Figure E.13: City of Walnut

APPENDIX F
Pottawattamie County Floodplain Map

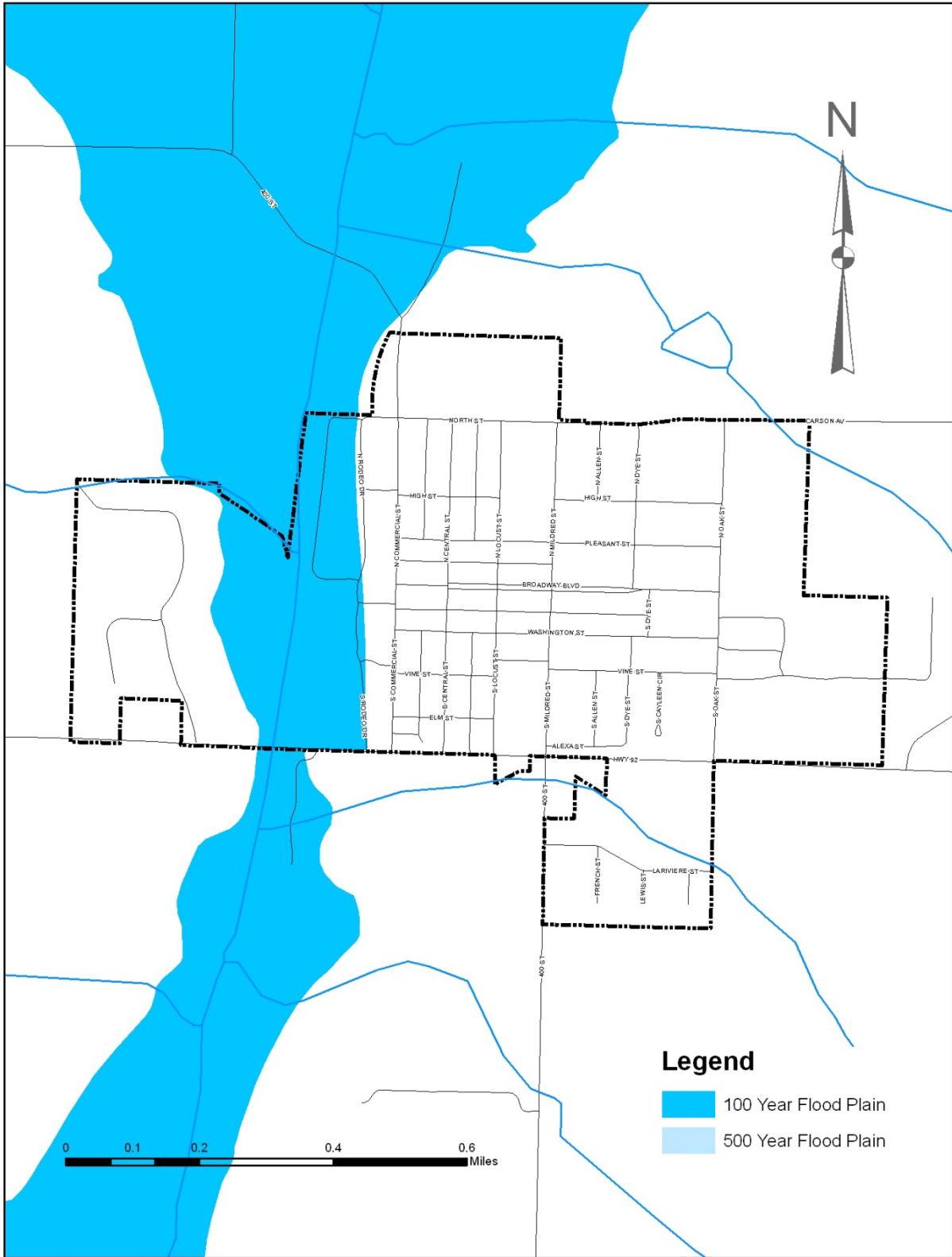


Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)



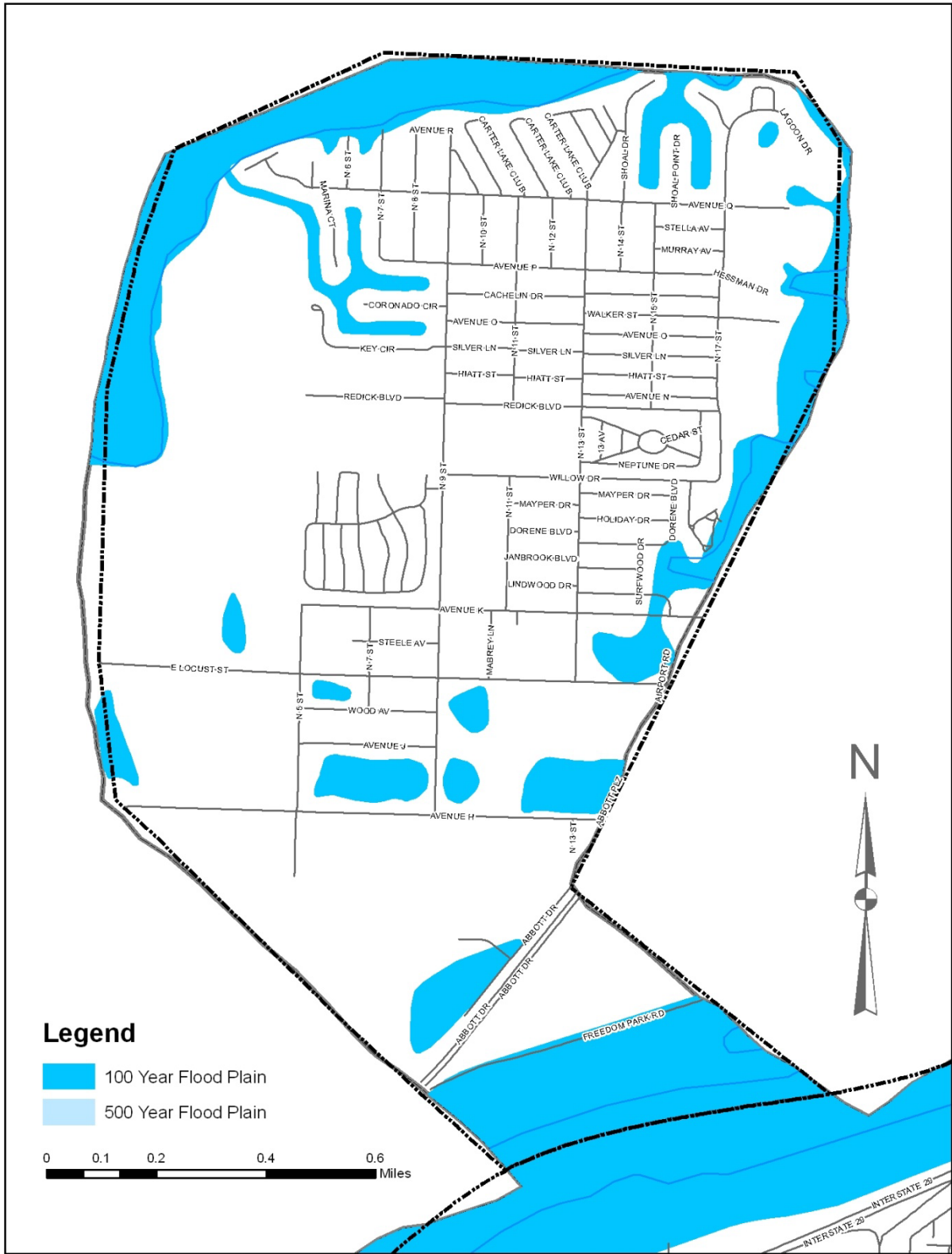
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.1: City of Avoca



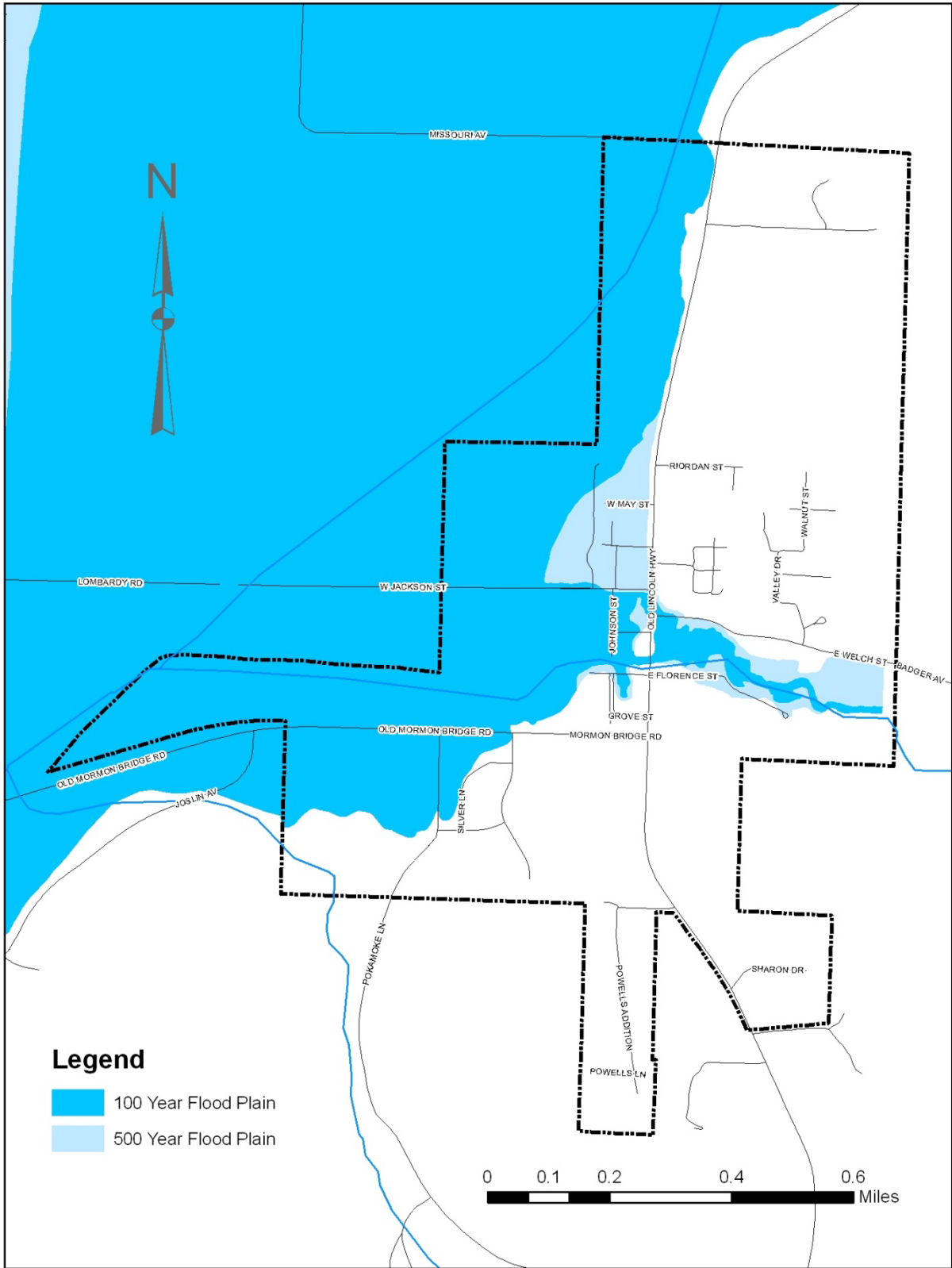
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure F.2: City of Carson



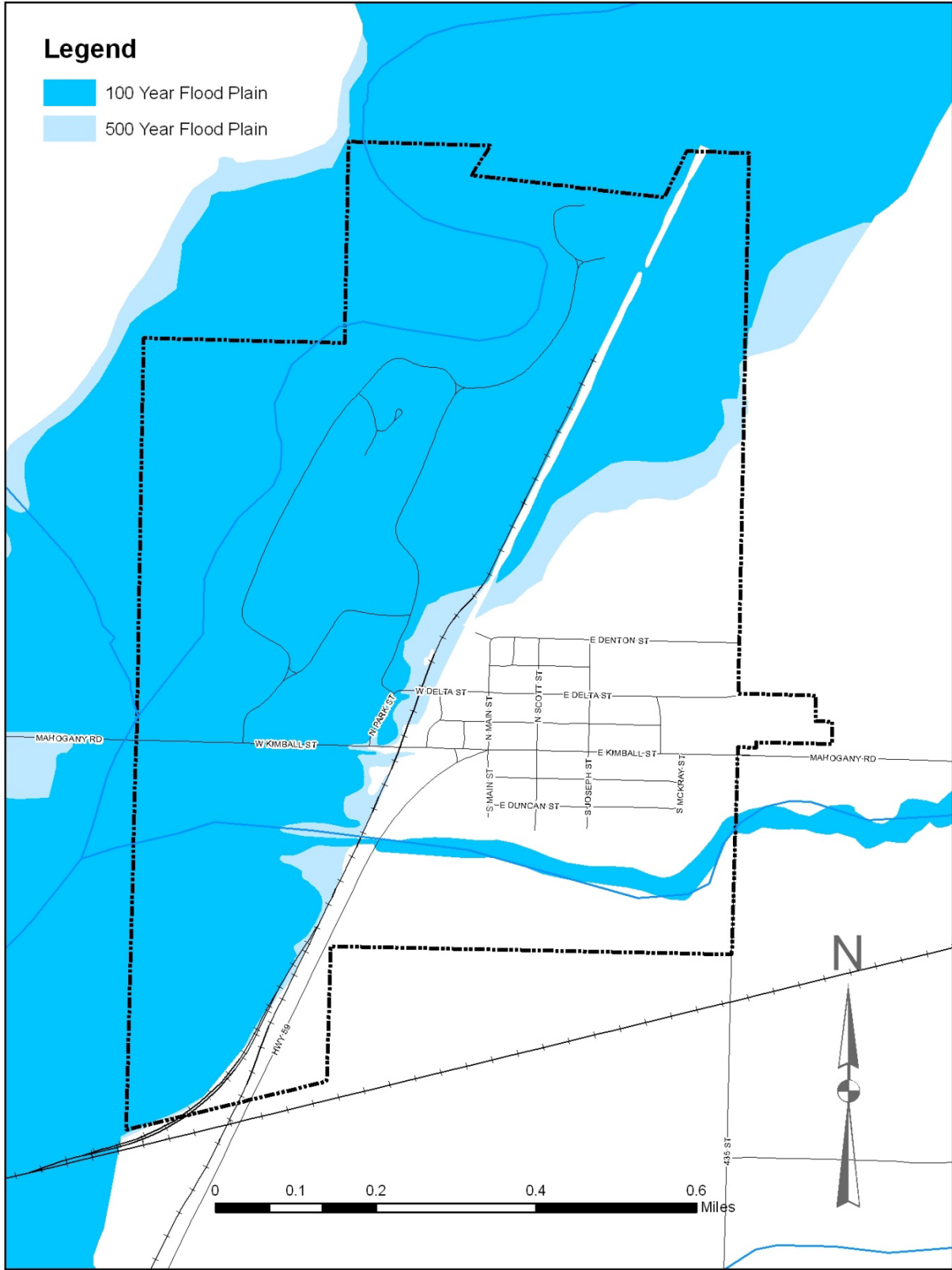
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.3: City of Carter Lake



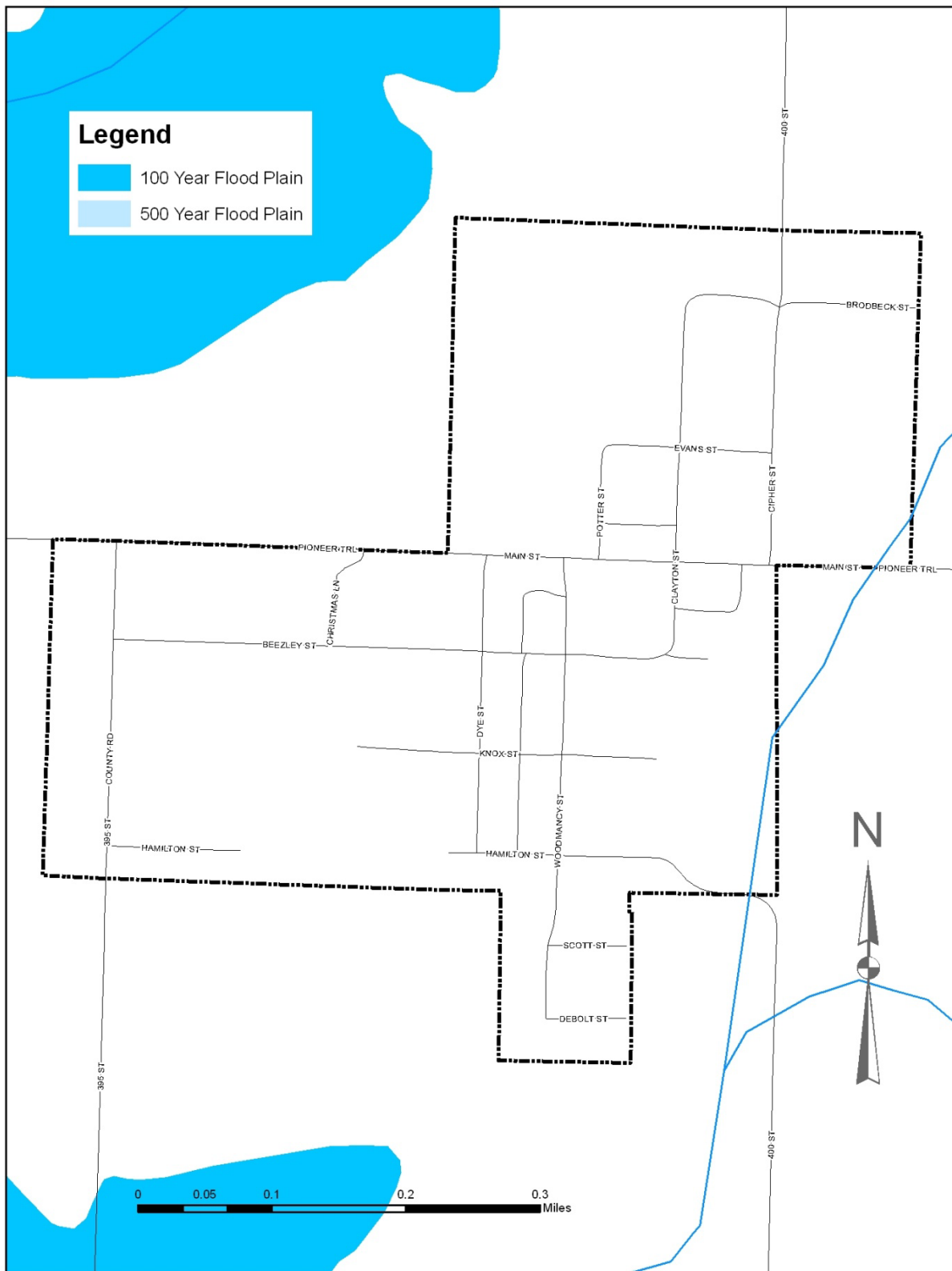
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure F.4: City of Crescent



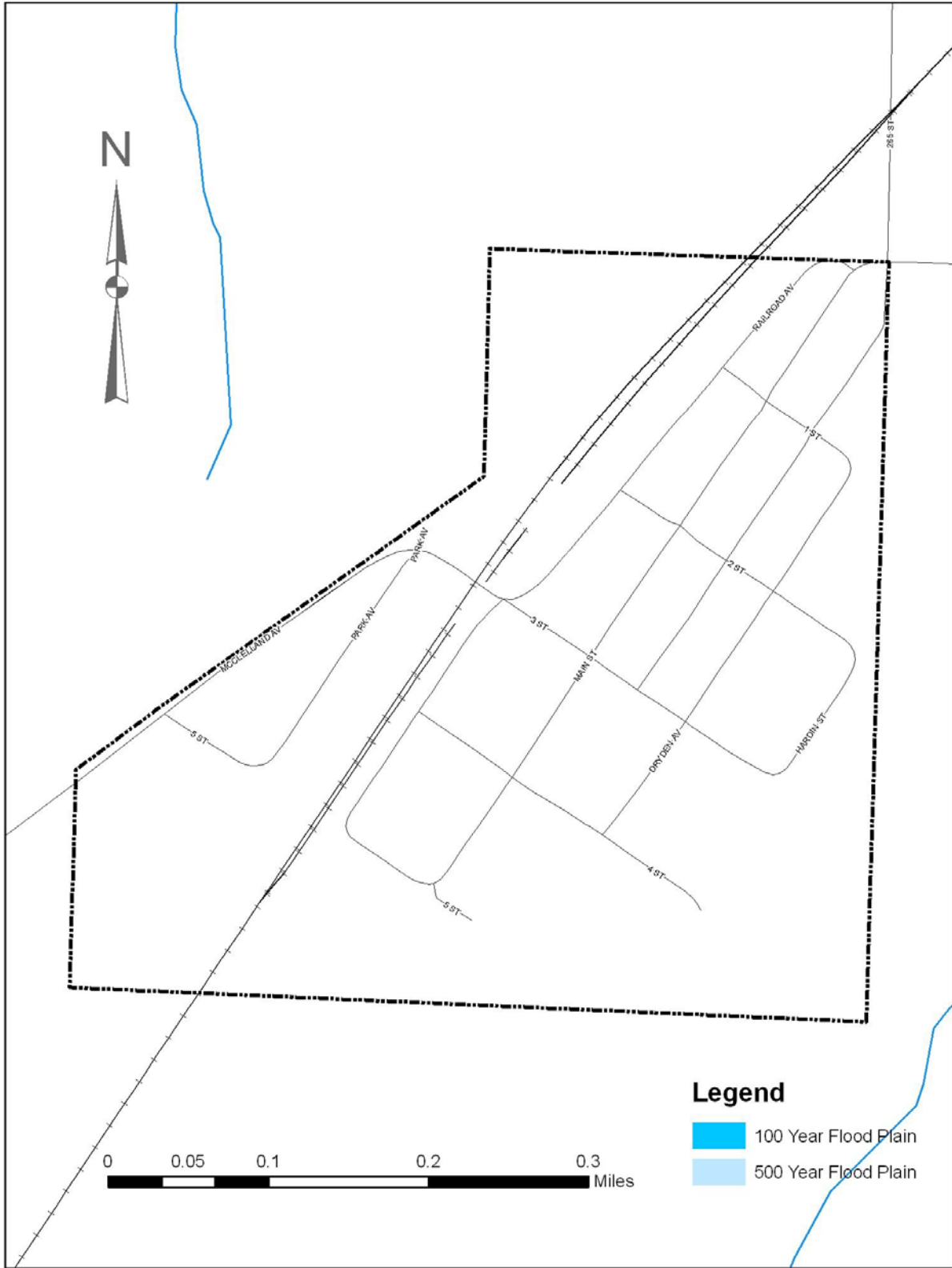
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.5: City of Hancock



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.6: City of Macedonia



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.7: City of McClelland

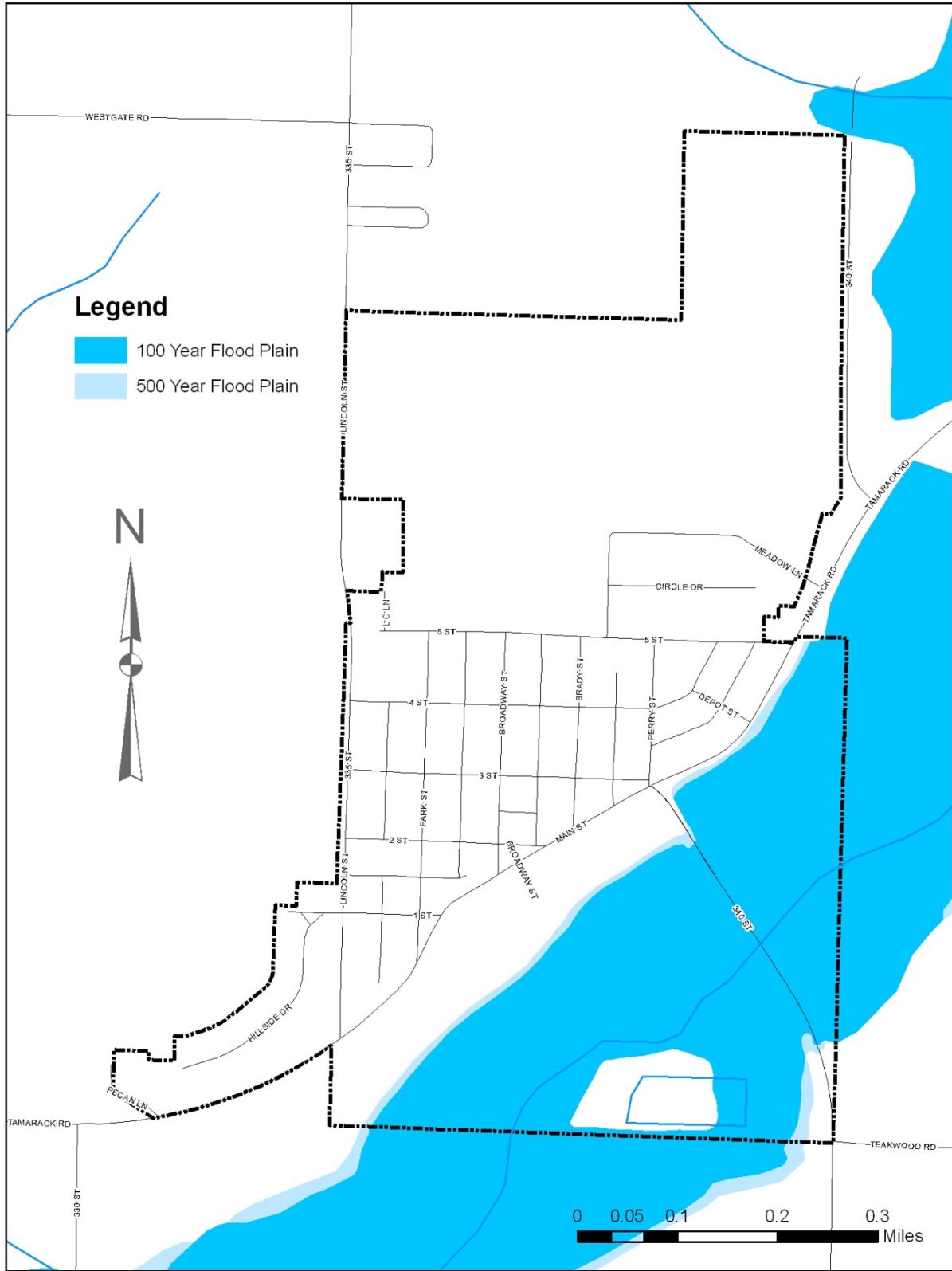
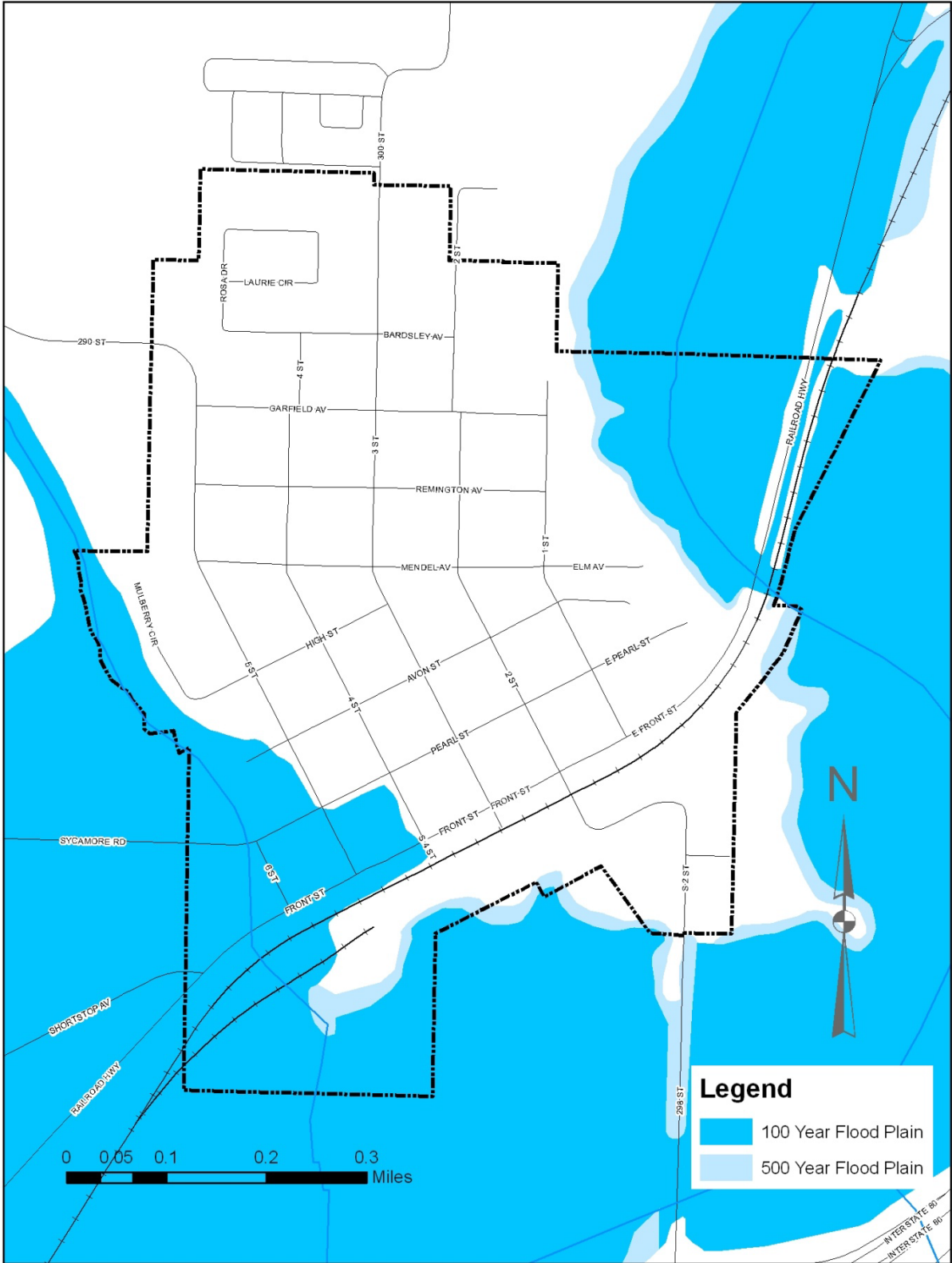


Figure F.8: City of Minden



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure F.9: City of Neola

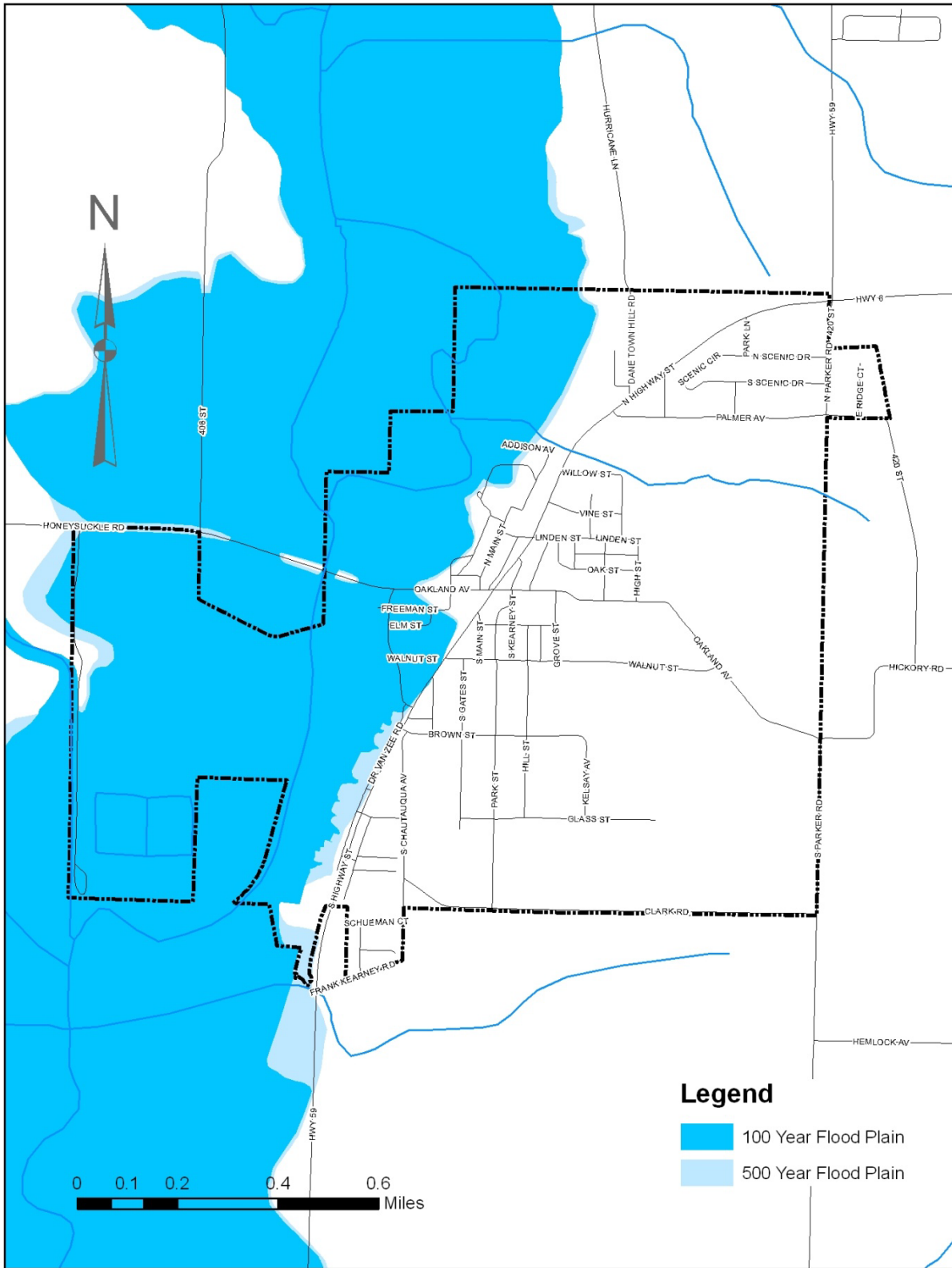
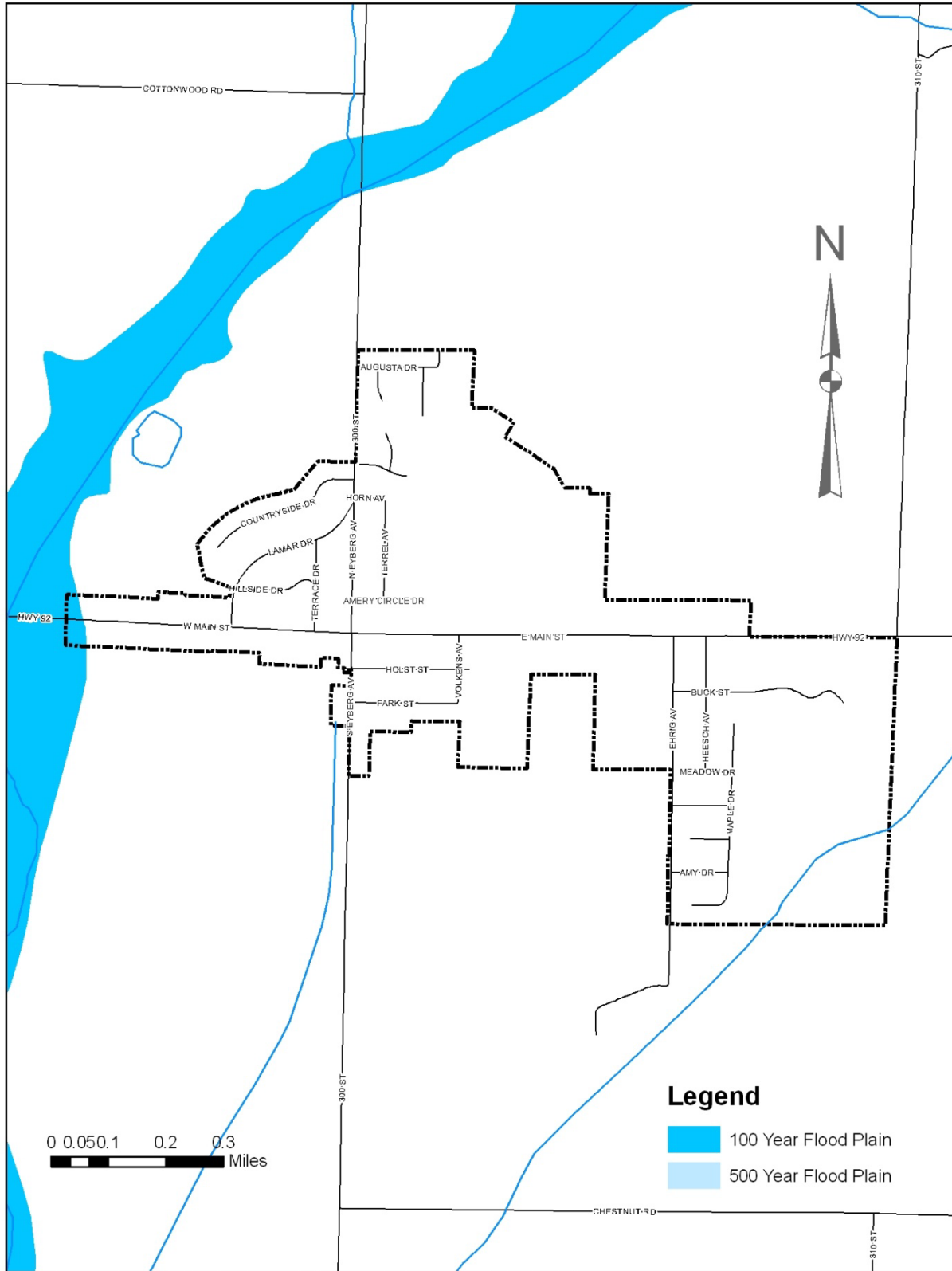


Figure F.10: City of Oakland



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure F.11: City of Treynor

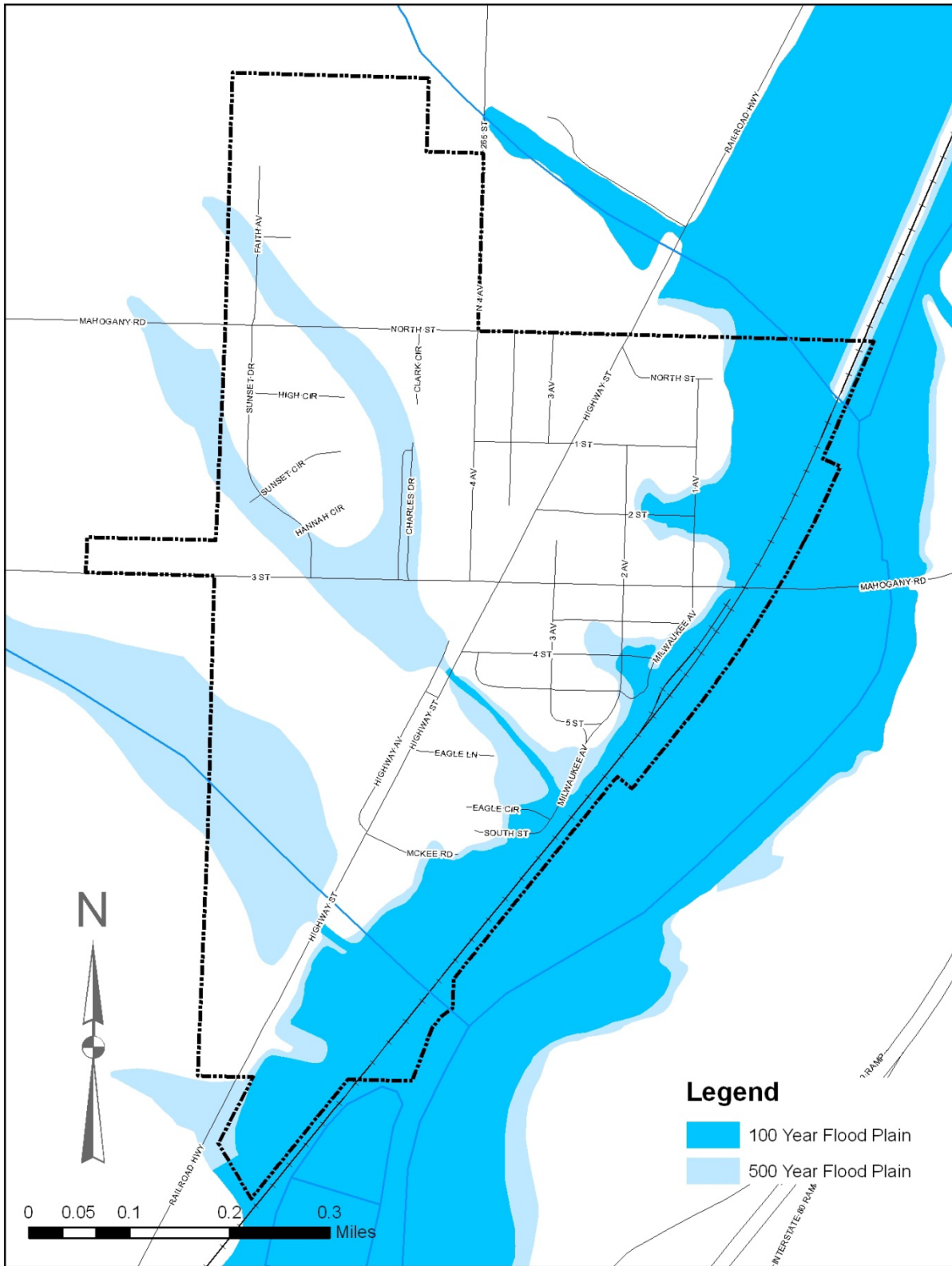
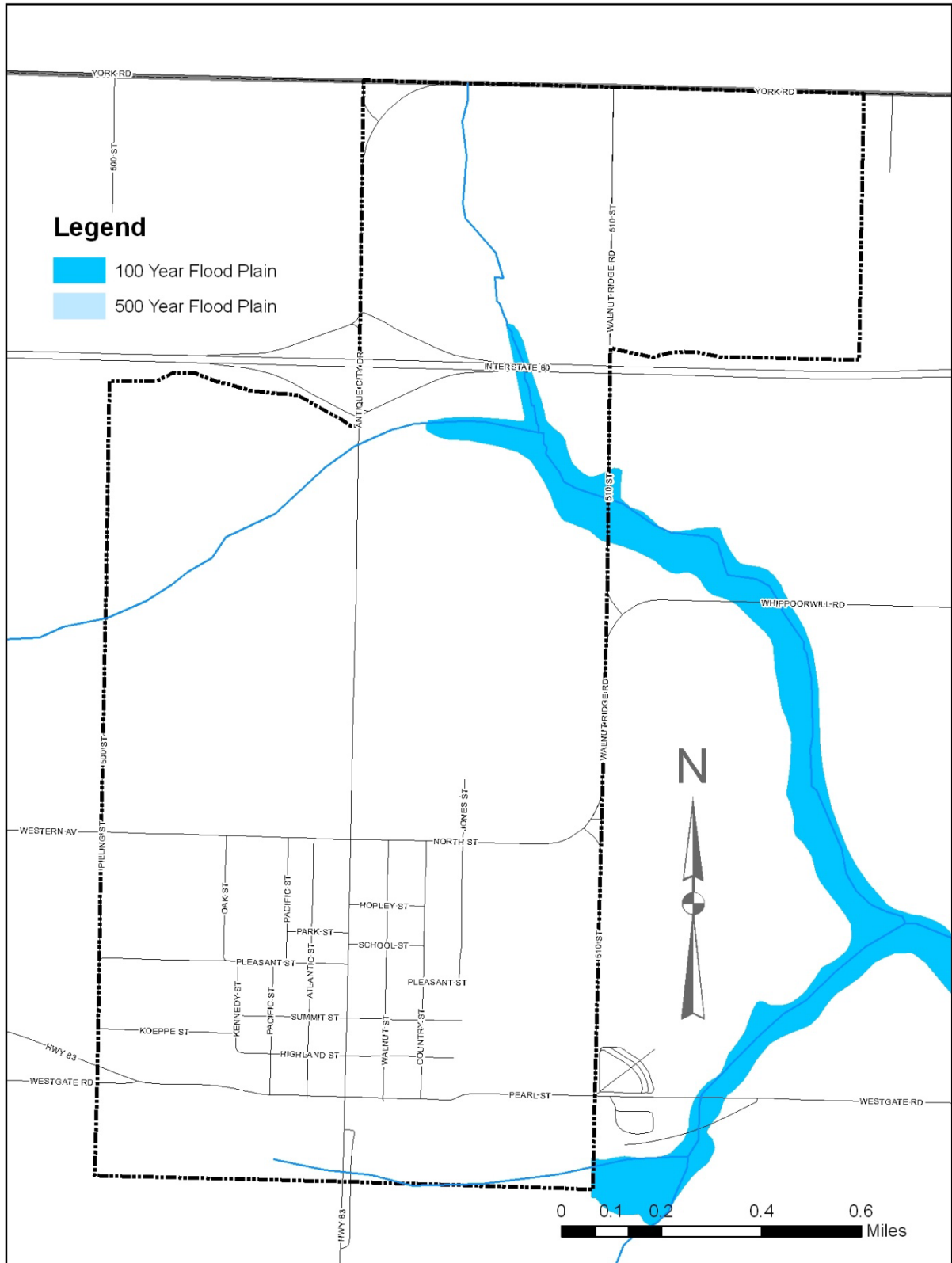


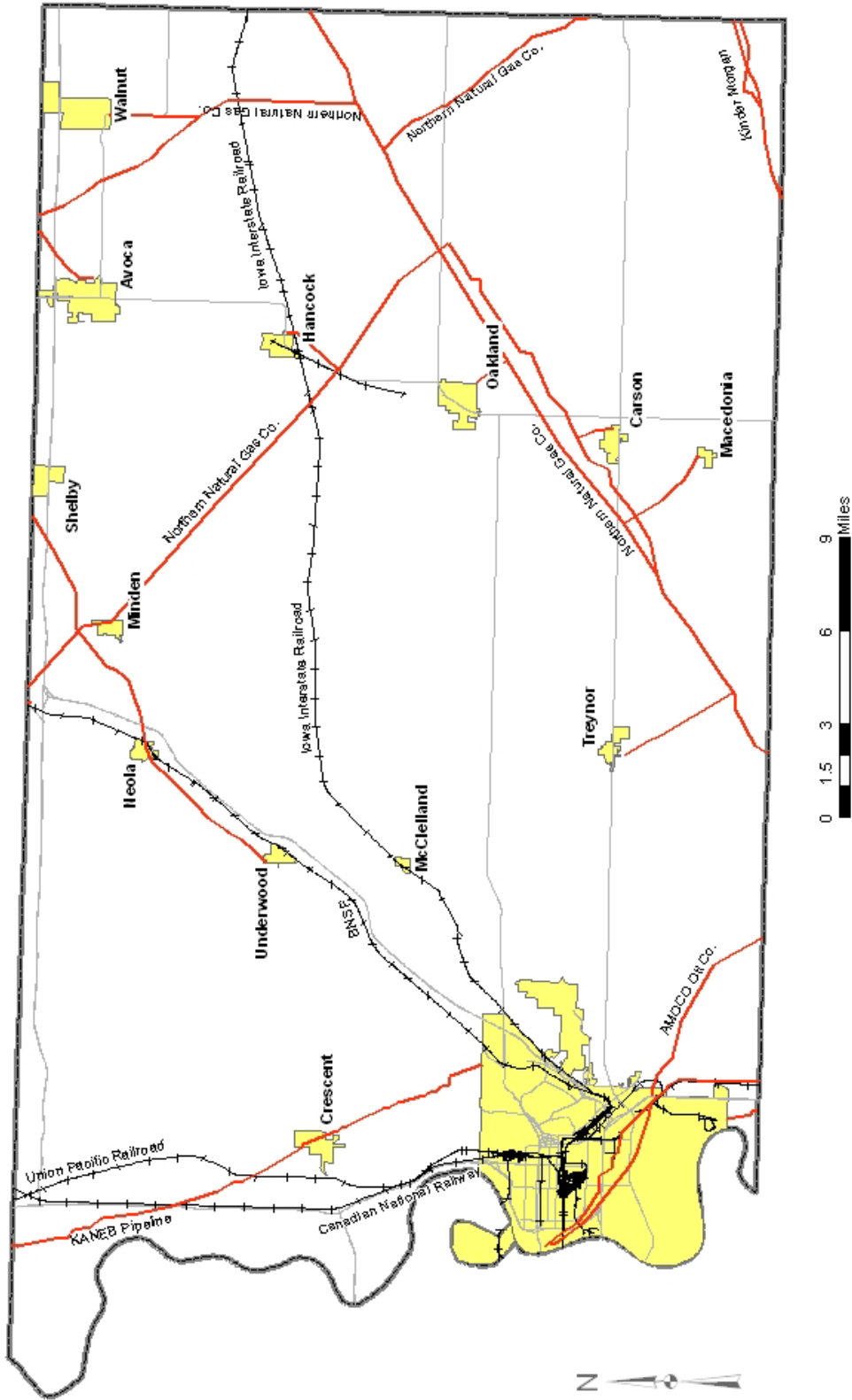
Figure F.12: City of Underwood



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

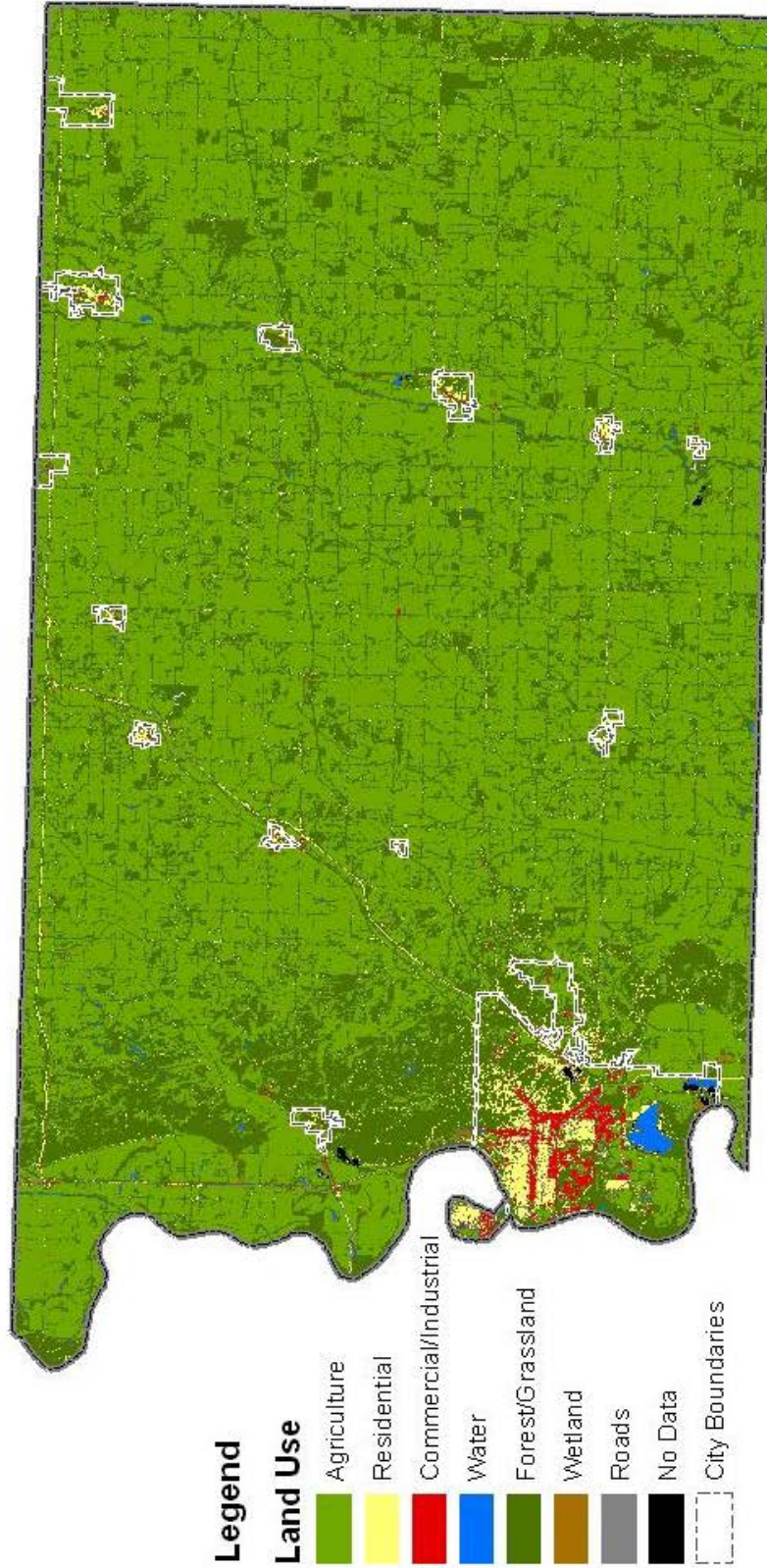
Figure F.13: City of Walnut

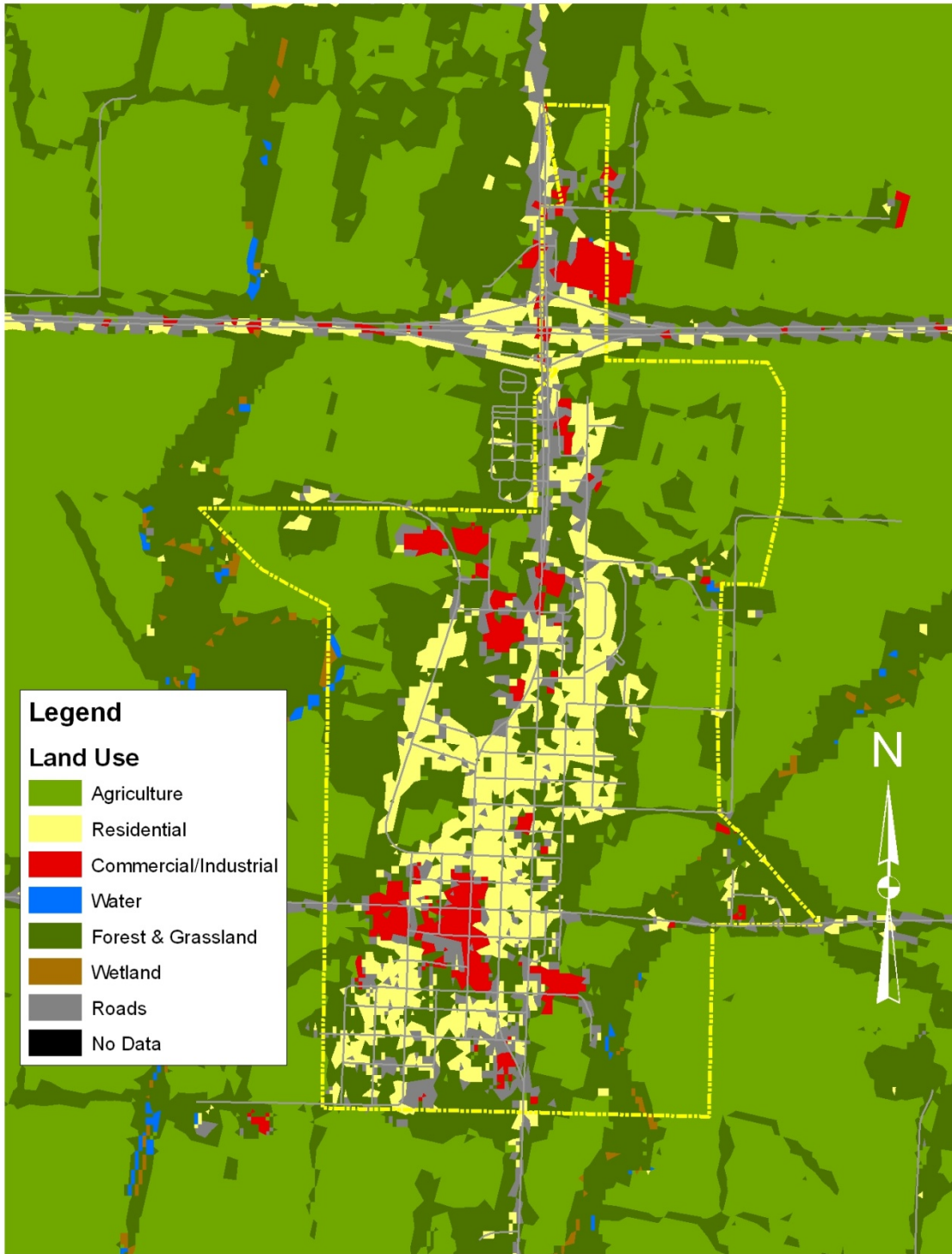
APPENDIX G
Railroad and Pipeline Map



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/mrgislib/>)

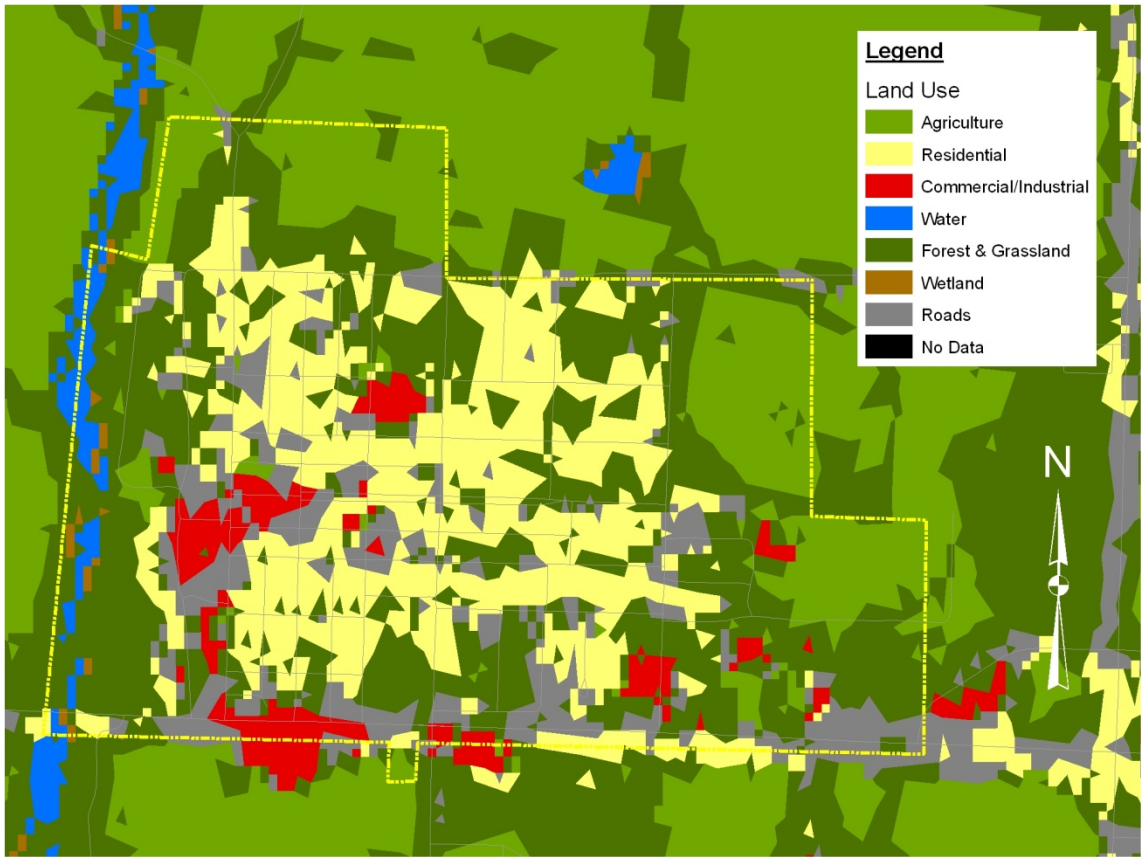
APPENDIX H
Countywide Land Use Map





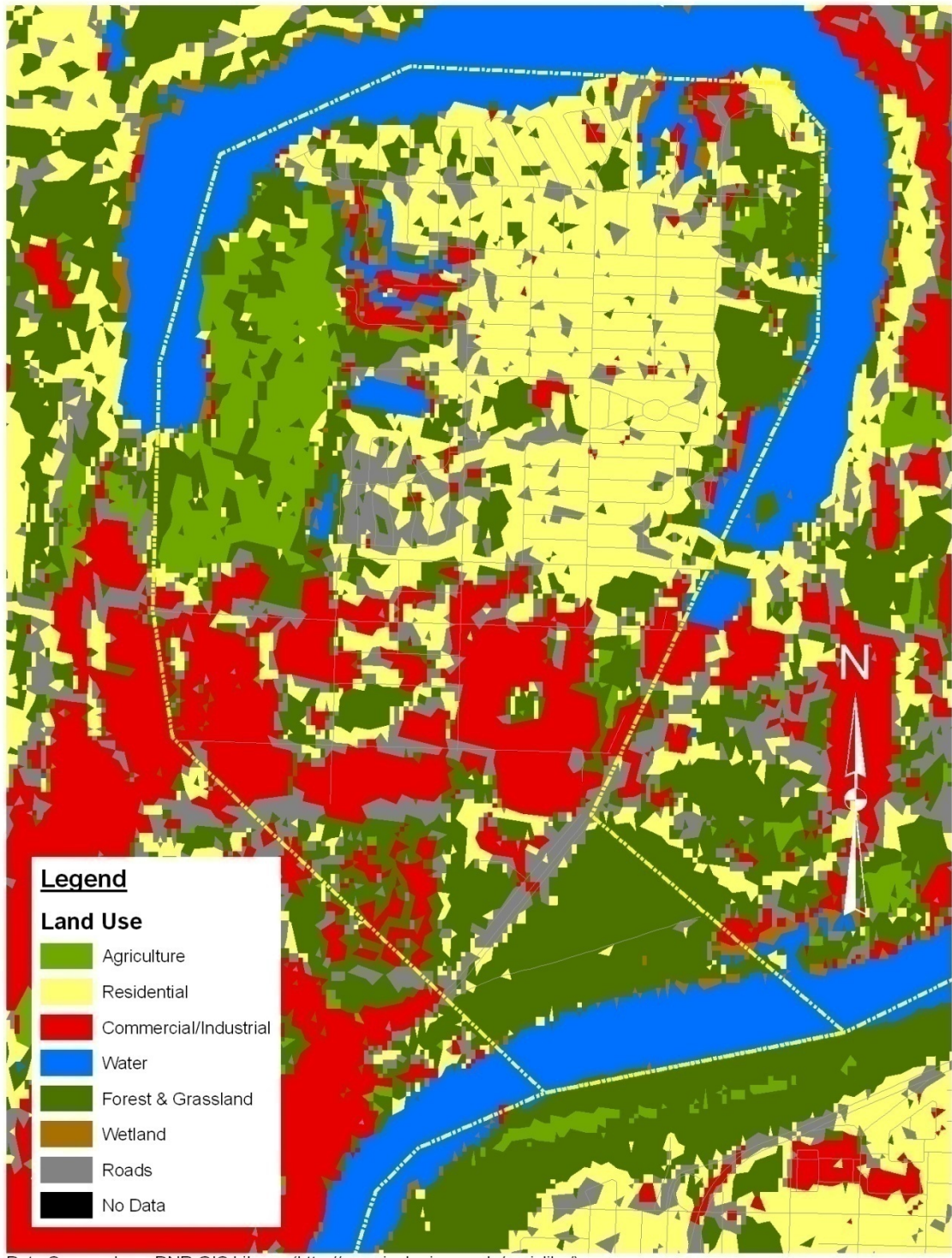
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Figure H.1: City of Avoca



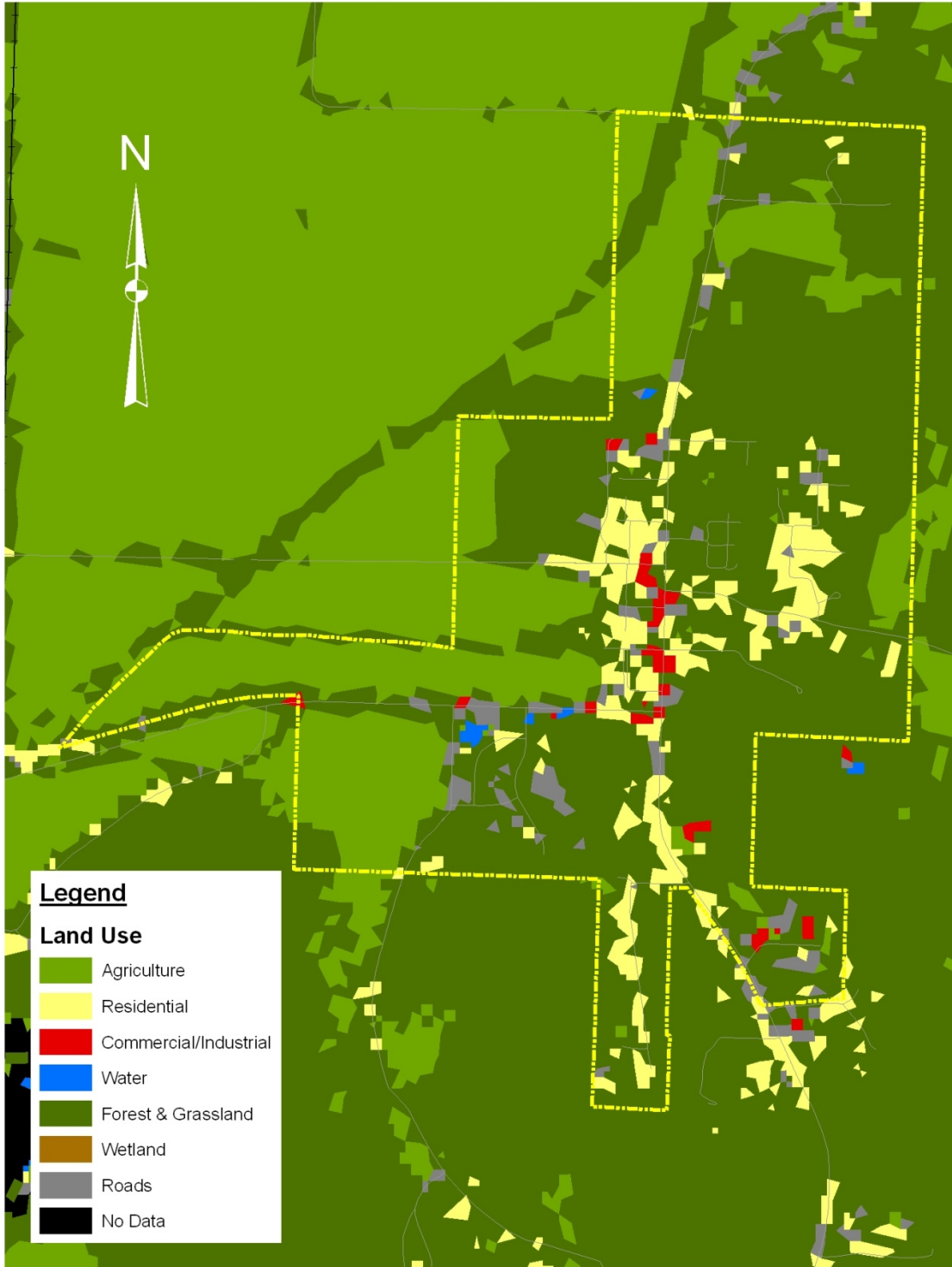
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislib/>)

Figure H.2: City of Carson



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/nrgislibx/>)

Figure H.3: City of Carter Lake



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.4: City of Crescent

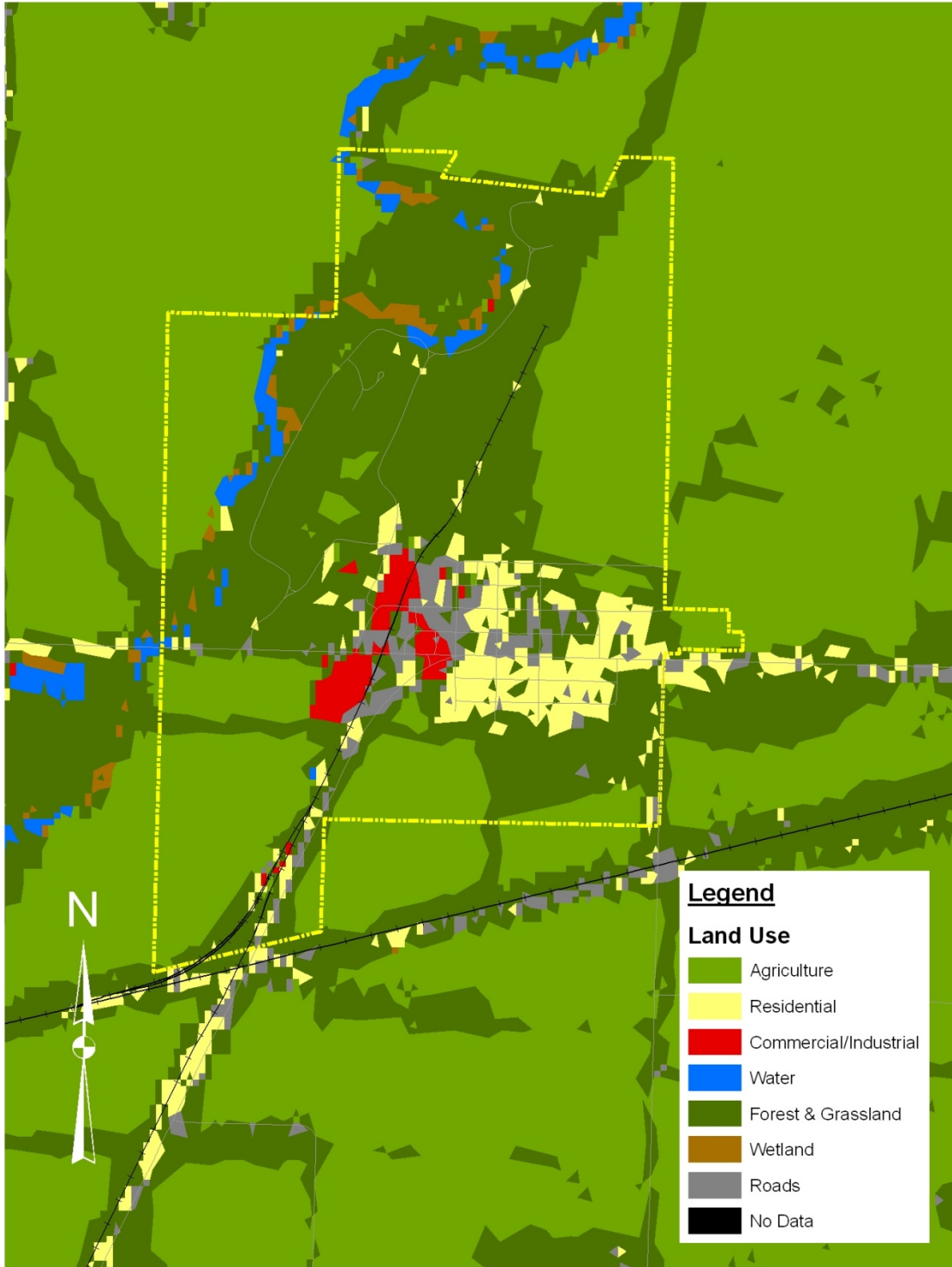
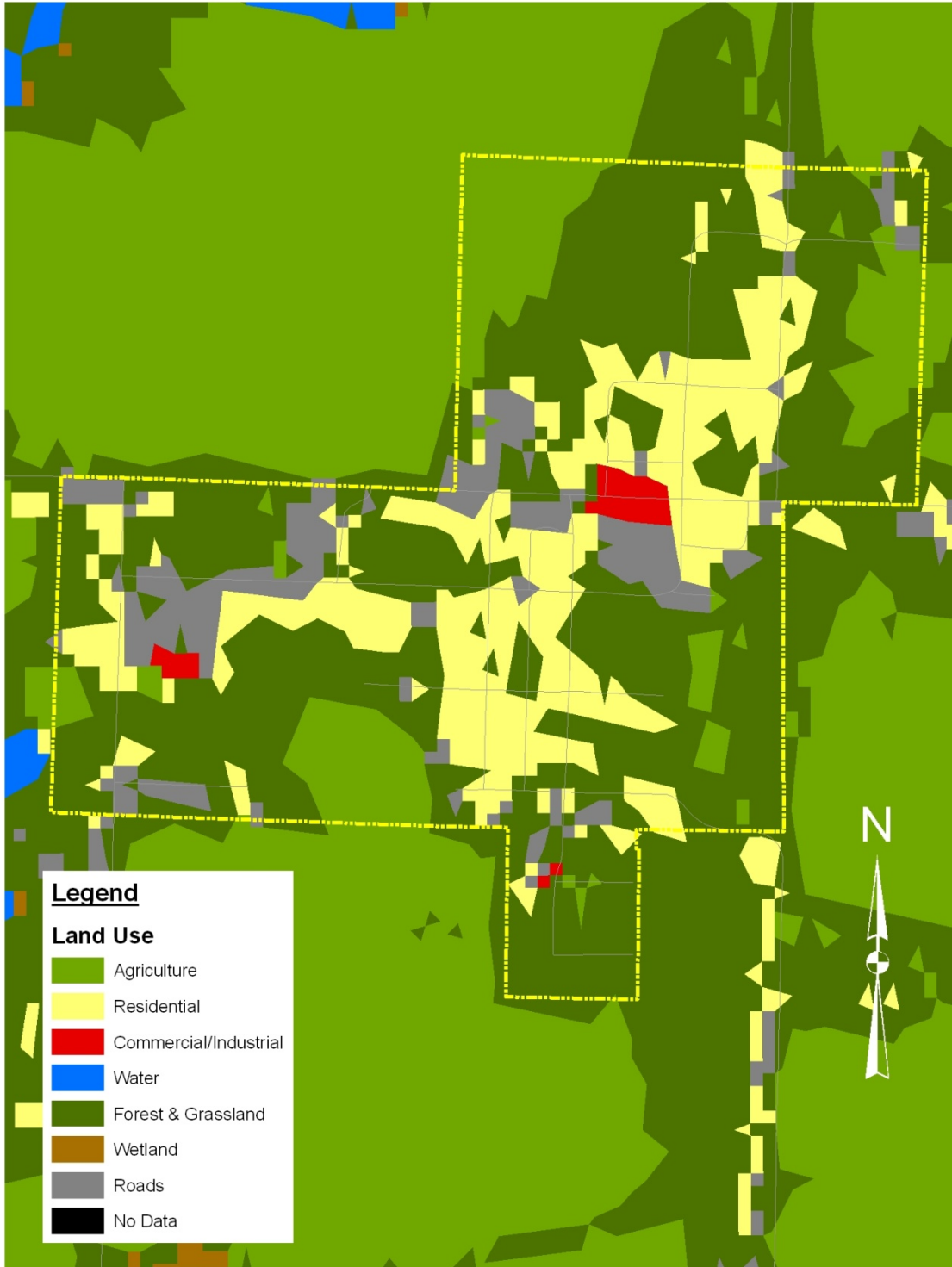
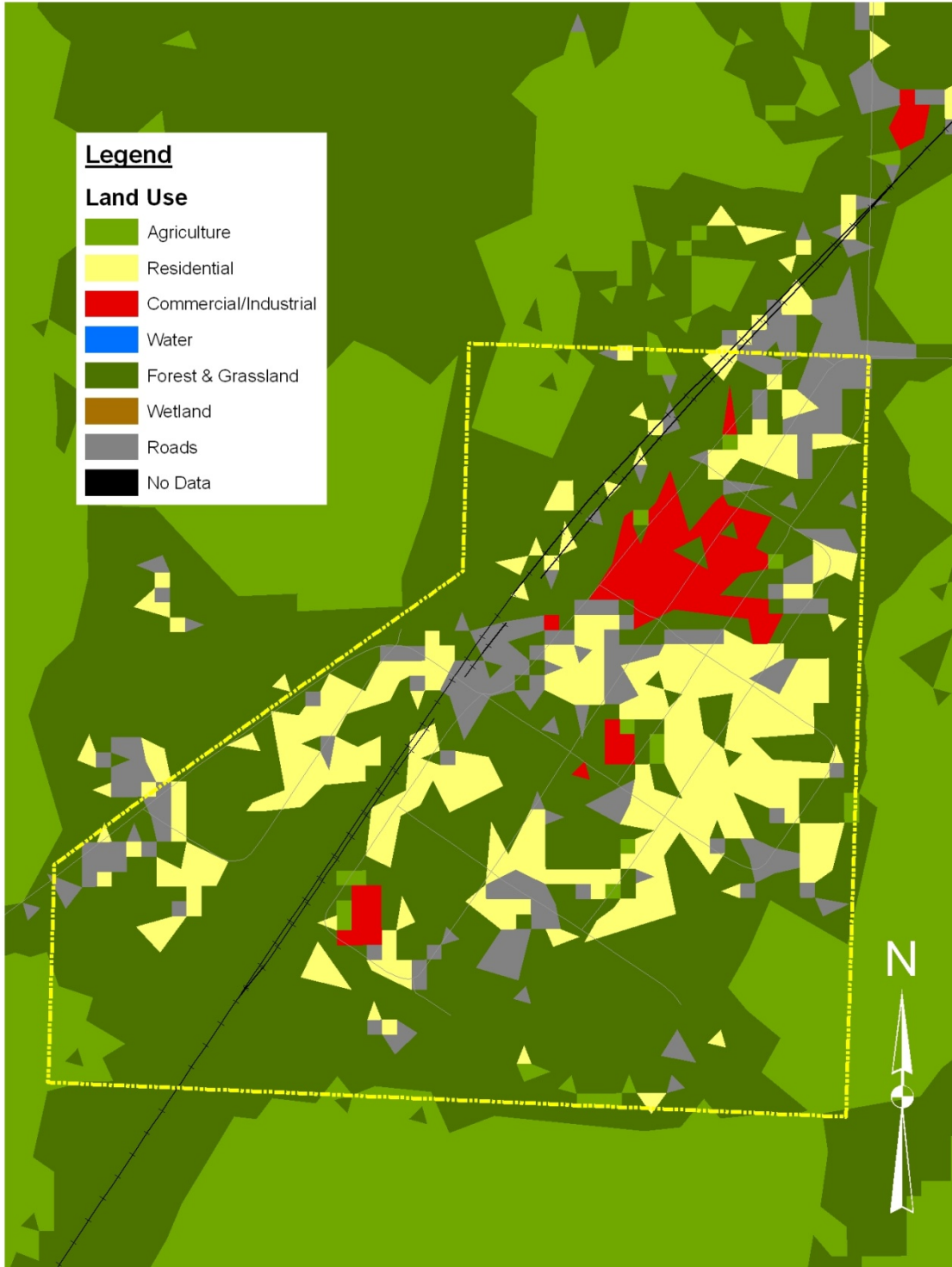


Figure H.5: City of Hancock



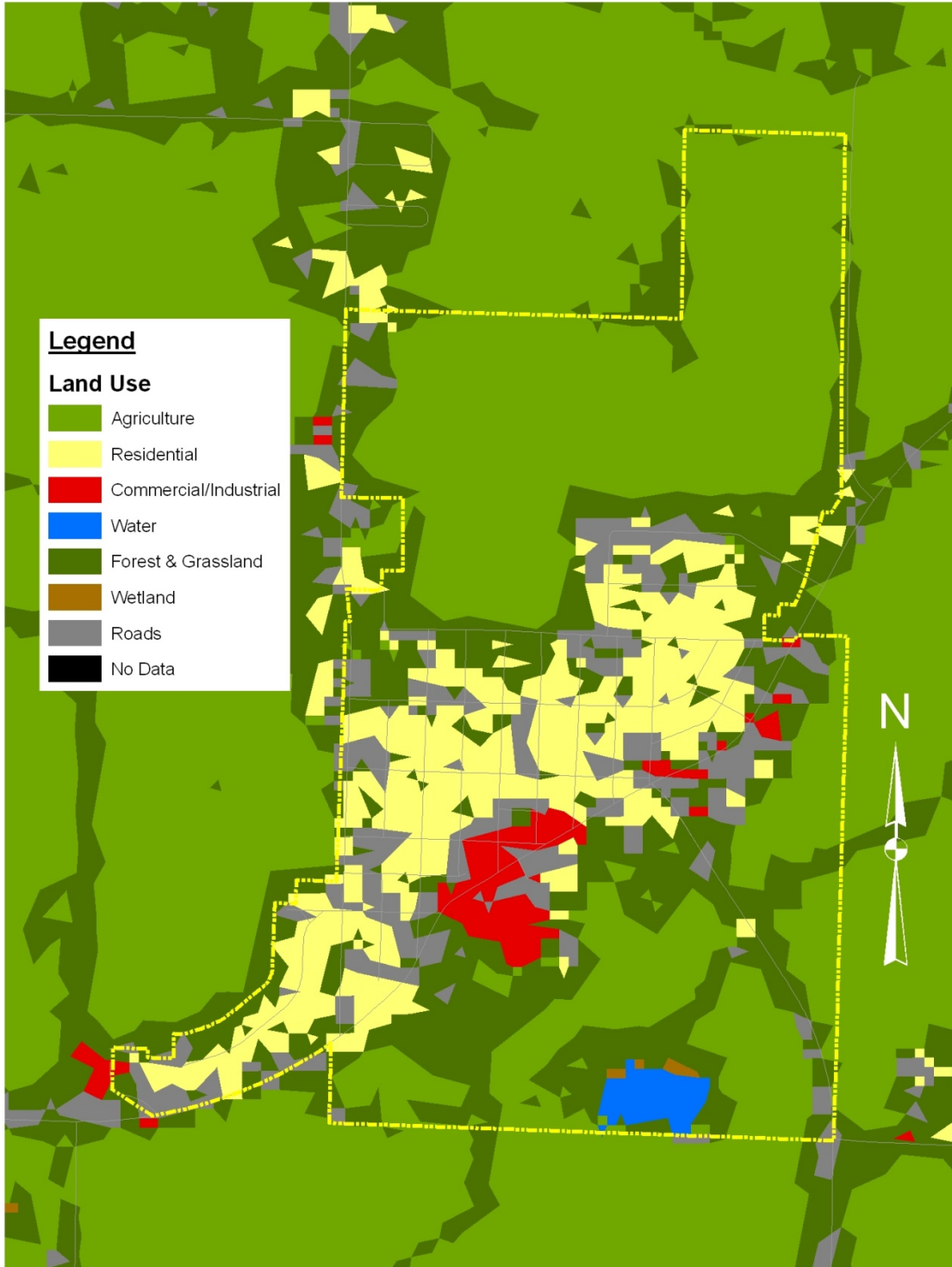
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.6: City of Macedonia



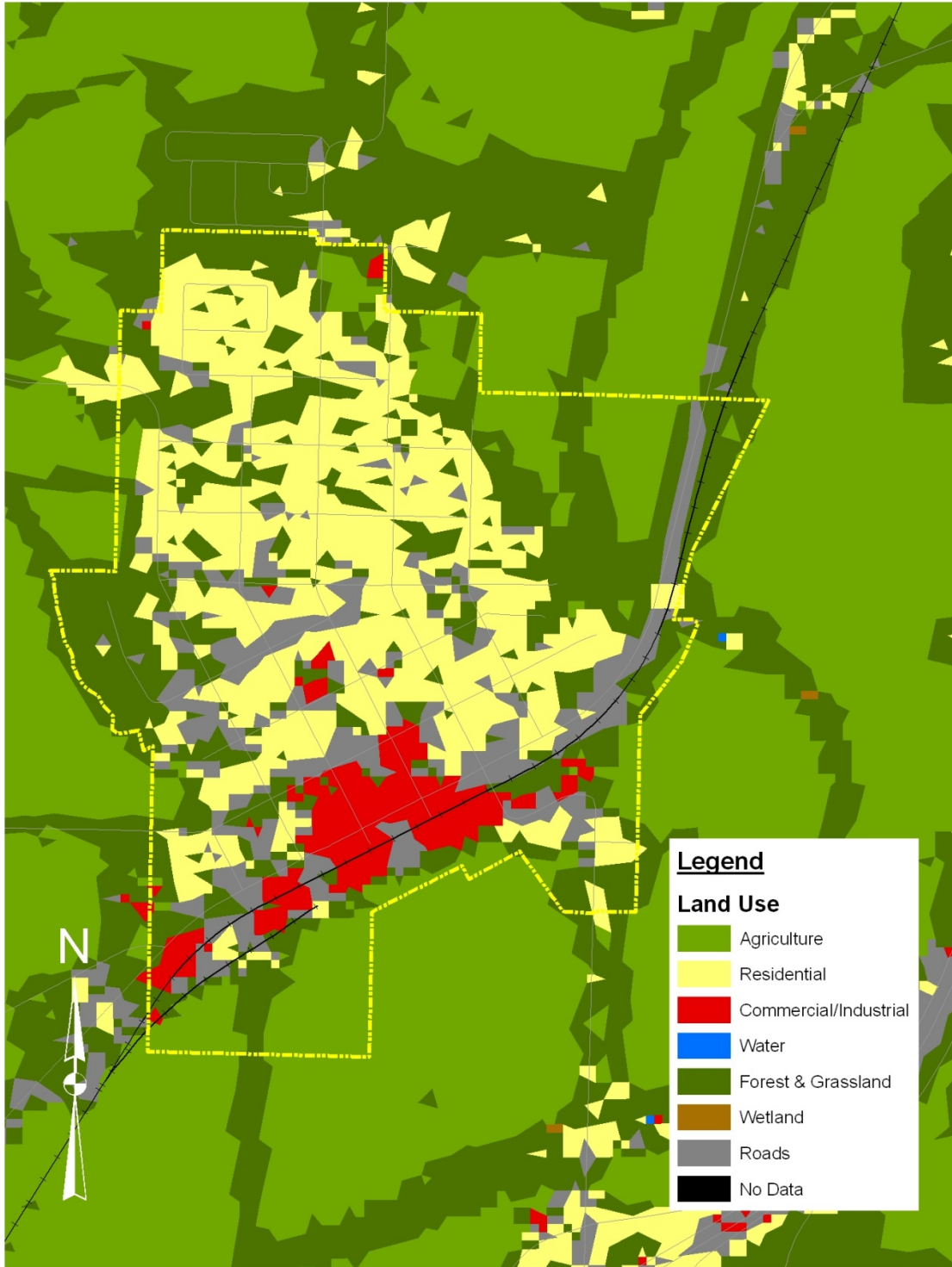
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.7: City of McClelland



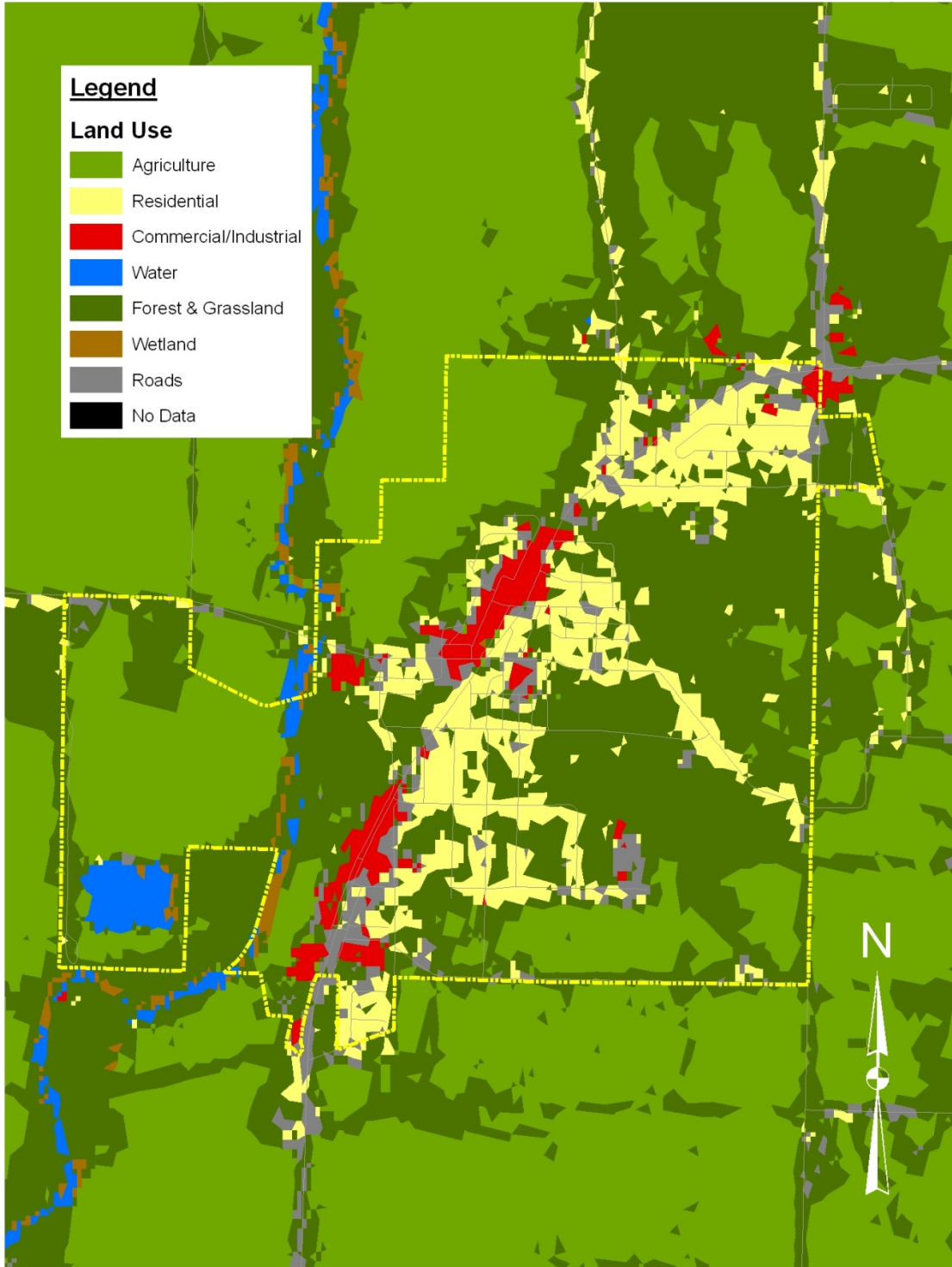
Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.8: City of Minden



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.9: City of Neola



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.10: City of Oakland

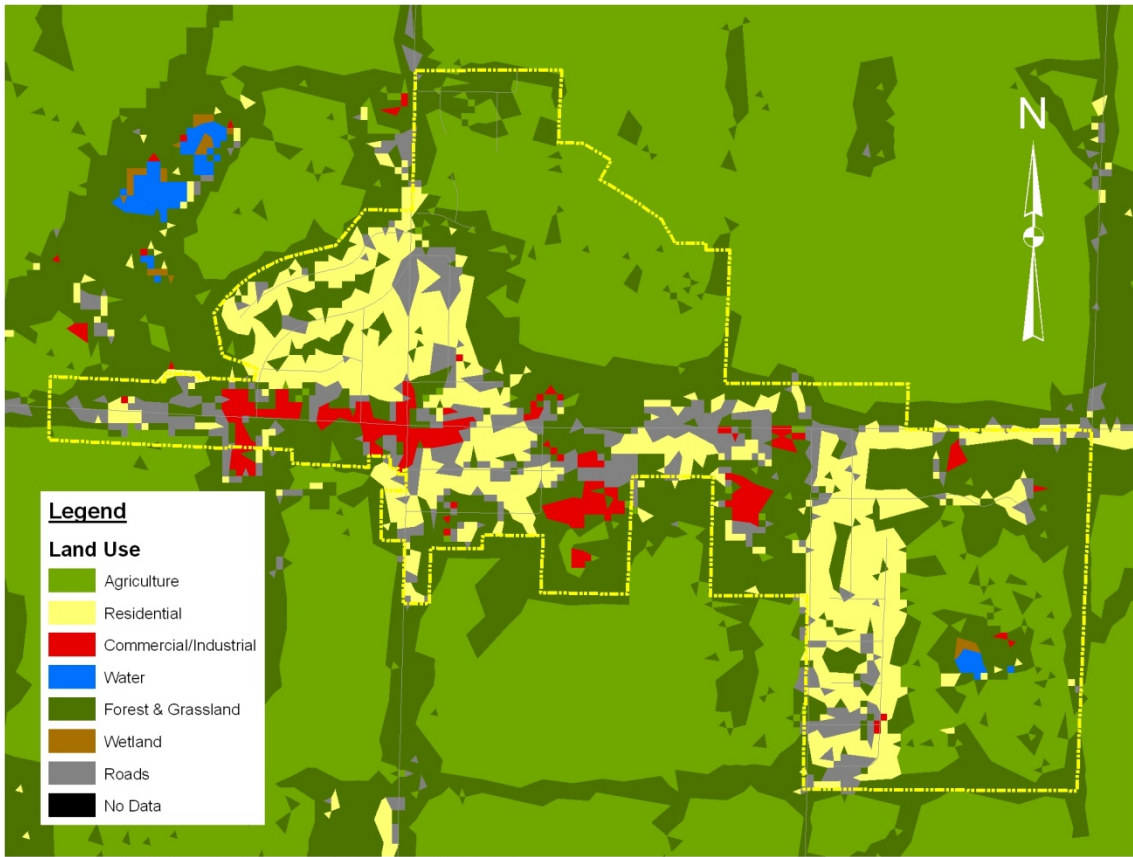


Figure H.11: City of Treynor

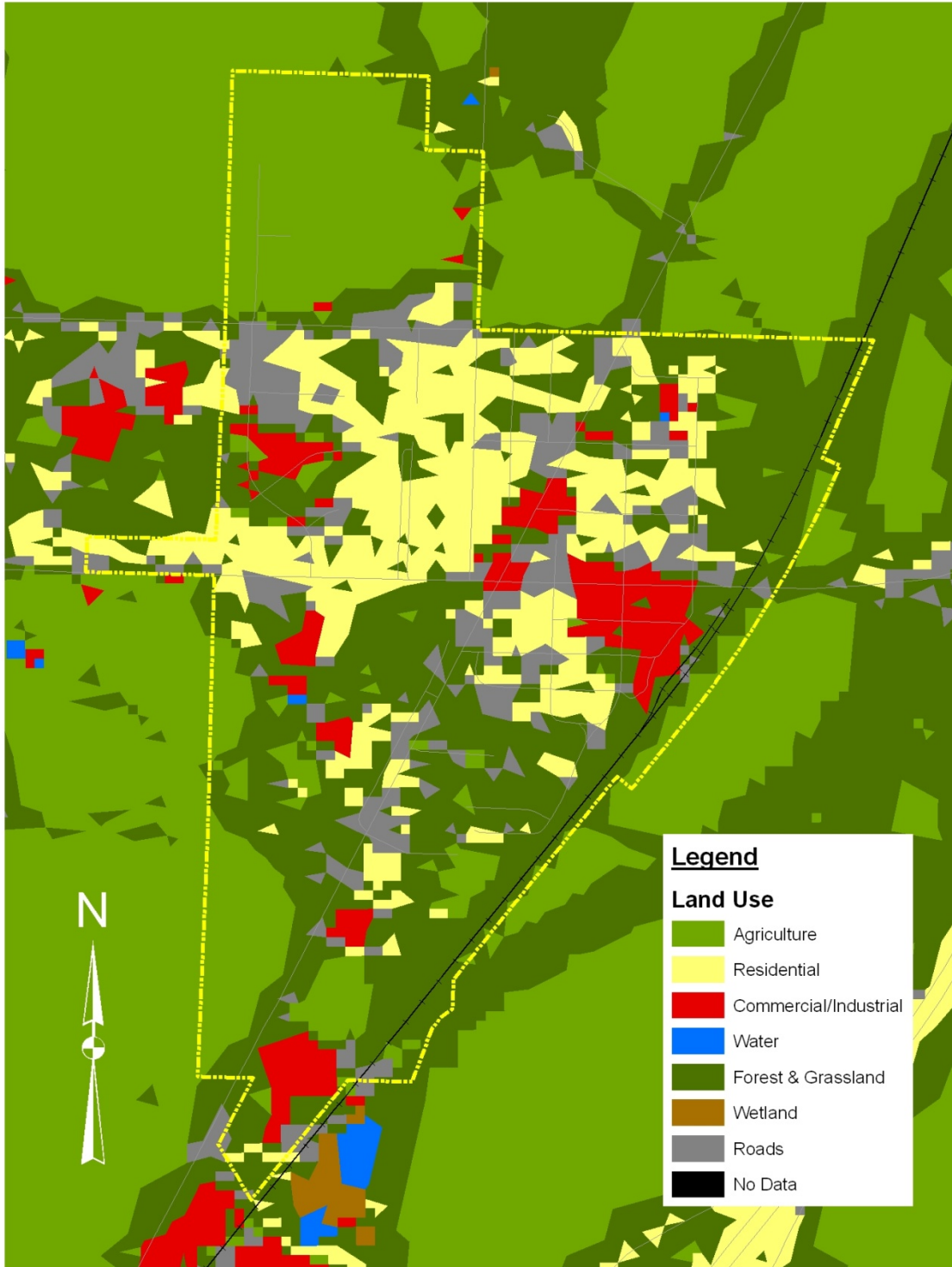
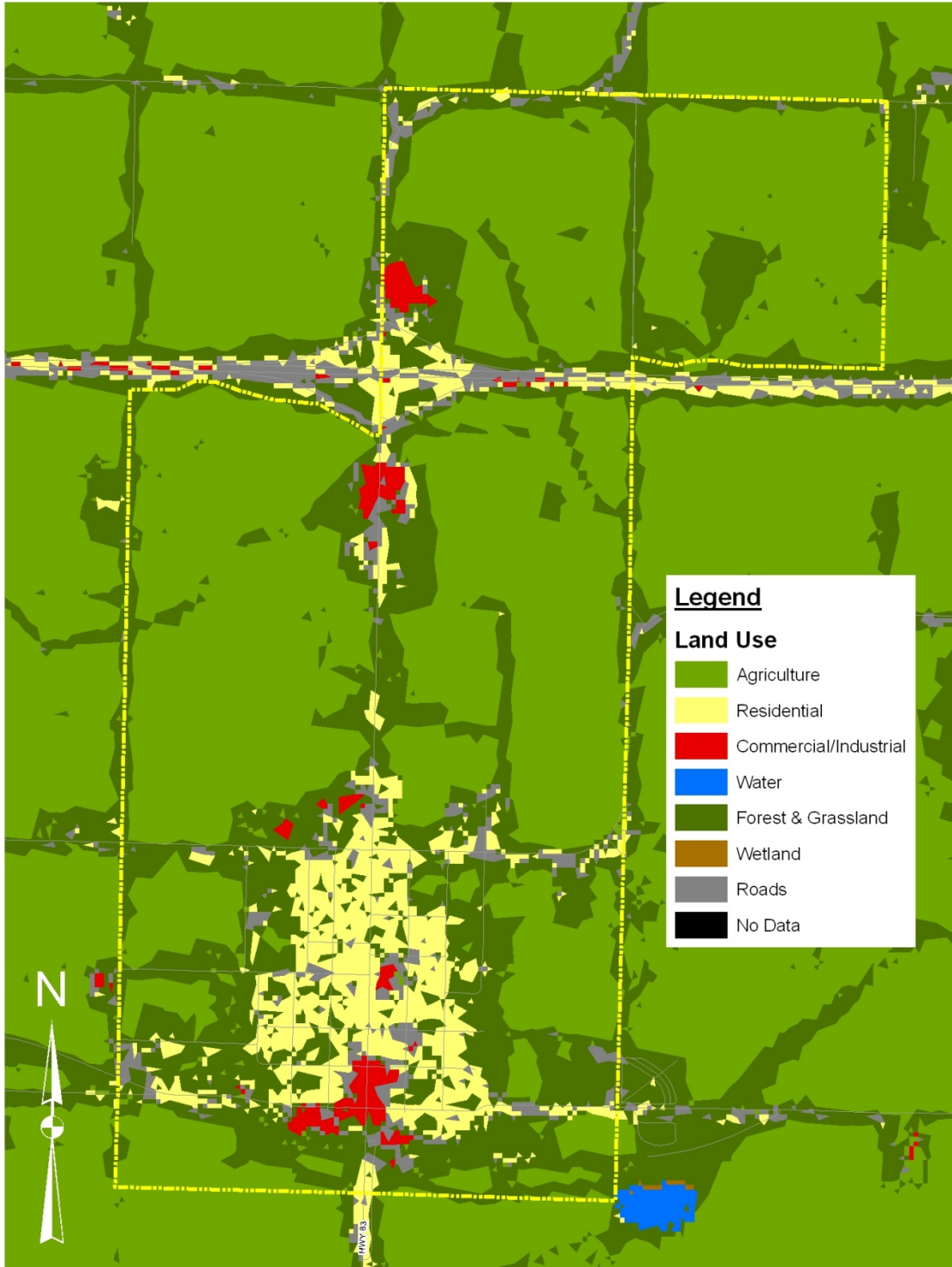


Figure H.12: City of Underwood



Date Source: Iowa DNR GIS Library (<http://www.igsb.uiowa.edu/hrgislibx/>)

Figure H.13: City of Walnut

APPENDIX J

Jurisdiction Parcel Numbers and Assessed Values

Avoca				
Class	Number	%	Total Value	%
Agriculture	44	4.50%	\$1,086,086	1.35%
Commercial	156	15.97%	\$22,117,904	27.54%
Industrial	3	0.31%	\$231,600	0.29%
Residential	774	79.22%	\$56,863,792	70.81%
TOTAL	977		\$80,299,382	

Carson				
Class	Number	%	Total Value	%
Agriculture	0	0.00%	-	0.00%
Commercial	61	13.06%	\$2,425,509	6.81%
Industrial	1	0.21%	\$155,000	0.44%
Residential	405	86.72%	\$33,028,911	92.75%
TOTAL	467		\$35,609,420	

Carter Lake				
Class	Number	%	Total Value	%
Agriculture	-	0.00%	-	0.00%
Commercial	117	7.61%	\$48,525,554	24.65%
Industrial	7	0.46%	\$4,104,519	2.09%
Residential	1,414	91.94%	\$144,215,411	73.26%
TOTAL	1,538		\$196,845,484	

Crescent				
Class	Number	%	Total Value	%
Agriculture	19	5.25%	-	0.00%
Commercial	21	5.80%	\$1,697,060	4.69%
Industrial	1	0.28%	\$155,000	0.43%
Residential	321	88.67%	\$34,320,554	94.88%
TOTAL	362		\$36,172,614	

Hancock				
Class	Number	%	Total Value	%
Agriculture	15	8.88%	\$337,687	3.96%
Commercial	20	11.83%	\$1,894,745	22.21%
Industrial	1	0.59%	\$406,233	4.76%
Residential	133	78.70%	\$5,891,014	69.06%
TOTAL	169		\$8,529,679	

Macedonia				
Class	Number	%	Total Value	%
Agriculture	7	3.52%	-	0.00%
Commercial	23	11.56%	\$529,236	6.05%
Industrial	0	0.00%	-	0.00%
Residential	169	84.92%	\$8,213,191	93.95%
TOTAL	199		\$8,742,427	

McClelland				
Class	Number	%	Total Value	%
Agriculture	1	1.06%	\$8,786	0.12%
Commercial	15	15.96%	\$675,915	9.27%
Industrial	0	0.00%	-	0.00%
Residential	78	82.98%	\$6,609,979	90.61%
TOTAL	94		\$7,294,680	

Minden				
Class	Number	%	Total Value	%
Agriculture	12	3.96%	\$315,147	1.18%
Commercial	45	14.85%	\$1,368,112	5.14%
Industrial	1	0.33%	\$95,000	0.36%
Residential	245	80.86%	\$24,839,831	93.32%
TOTAL	303		\$26,618,090	

Neola				
Class	Number	%	Total Value	%
Agriculture	8	1.74%	\$56,313	0.13%
Commercial	73	15.87%	\$2,891,342	6.49%
Industrial	3	0.65%	\$2,458,739	5.52%
Residential	376	81.74%	\$39,122,822	87.86%
TOTAL	460		\$44,529,216	

Oakland				
Class	Number	%	Total Value	%
Agriculture	28	3.13%	\$338,961	0.54%
Commercial	141	15.74%	\$10,391,407	16.47%
Industrial	2	0.22%	\$70,700	0.11%
Residential	725	80.92%	\$52,275,595	82.88%
TOTAL	896		\$63,076,663	

Treynor				
Class	Number	%	Total Value	%
Agriculture	0	0.00%	-	0.00%
Commercial	58	12.50%	\$4,980,075	9.27%
Industrial	0	0.00%	-	0.00%
Residential	406	87.50%	\$48,746,198	90.73%
TOTAL	464		\$53,726,273	

Underwood				
Class	Number	%	Total Value	%
Agriculture	3	0.82%	\$52,009	0.11%
Commercial	44	11.96%	\$3,693,339	8.13%
Industrial	0	0.00%	-	0.00%
Residential	321	87.23%	\$41,703,692	91.76%
TOTAL	368		\$45,449,040	

Walnut				
Class	Number	%	Total Value	%
Agriculture	47	8.44%	-	0.00%
Commercial	107	19.21%	\$8,072,909	22.76%
Industrial	3	0.54%	\$205,811	0.58%
Residential	400	71.81%	\$27,190,713	76.66%
TOTAL	557		\$35,469,433	

Unincorporated				
Class	Number	%	Total Value	%
Agriculture	16,447	73.49%	\$1,144,920,803	50.17%
Commercial	286	1.28%	\$31,099,911	1.36%
Industrial	19	0.08%	\$38,688,585	1.70%
Residential	5,628	25.15%	\$1,067,150,155	46.77%
TOTAL	22,380		\$2,281,859,454	

APPENDIX K

Hazard Identification by Municipality

Y = Has Occurred
 O = May Occur
 X = Will Not Occur

	Avoca	Carson	Carter Lake	Crescent	Hancock	Macedonia	McClelland	Minden	Neola	Oakland	Treynor	Underwood	Walnut
Natural Hazards													
Dam Failure	X	X	O	X	X	X	X	X	X	X	X	X	X
Drought	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Earthquake	O	O	O	O	O	O	O	O	O	O	O	O	O
Expansive Soils	X	X	X	X	X	X	X	X	X	X	X	X	X
Extreme Heat	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Flash Flood	Y	Y	Y	Y	Y	O	O	Y	Y	Y	Y	Y	O
Grass or Wild Land Fire	O	O	O	Y	O	Y	Y	Y	O	O	O	O	Y
Hailstorm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Landslide/Erosion/Slope Failure	O	X	X	Y	Y	X	X	X	O	O	Y	O	X
Levee Failure	O	X	Y	O	X	X	X	X	O	X	X	X	X
River/Stream Flood	Y	Y	Y	Y	Y	O	X	Y	O	Y	X	Y	O
Severe Winter Storm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sink Holes	X	X	X	X	X	X	X	X	X	X	X	X	X
Thunderstorm and Lightning	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tornado	Y	O	Y	O	Y	O	Y	Y	Y	Y	Y	O	Y
Windstorm	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Human-Caused Hazards													
Air Transportation Incident	O	O	O	O	O	O	O	O	O	O	O	O	O
Communications Failure	Y	Y	Y	O	Y	Y	Y	Y	Y	O	Y	Y	Y
Energy Disruption	O	O	Y	Y	Y	Y	Y	Y	O	Y	Y	Y	Y
Fixed Hazardous Materials Incident	O	O	O	Y	O	O	O	O	O	Y	O	O	Y
Fixed Radiological Incident	X	X	O	O	O	O	O	O	O	X	O	O	X
Highway Transportation Incident	Y	Y	O	Y	O	Y	O	O	Y	Y	Y	O	Y
Pipeline Incident	O	O	O	Y	X	O	X	O	O	O	O	O	O
Rail Transportation Incident	X	X	O	Y	O	X	O	X	O	X	X	O	X
Transportation Hazardous Materials Incident	Y	O	O	O	O	O	O	Y	Y	Y	O	Y	Y
Transportation Radiological Incident	O	X	O	O	X	O	O	O	O	X	X	O	O
Waterway/Water Body Incident	X	O	Y	X	O	O	X	X	X	X	X	X	X
Human-Caused Purposeful Hazards													
Enemy Attack	O	O	O	O	O	O	O	O	O	O	O	O	O
Public Disorder	O	O	Y	O	O	O	O	O	O	O	O	O	O
Terrorism – Biological/Agricultural	O	O	O	O	O	O	O	O	O	O	O	O	O
Terrorism – Chemical	O	O	O	O	O	O	O	O	O	O	O	O	O
Terrorism – Conventional	O	O	O	O	O	O	O	O	O	O	O	O	O
Terrorism – Cyber	O	O	O	O	O	O	O	O	O	O	O	O	O
Other/Combination Hazards													
Terrorism – Radiological	O	O	O	O	O	O	O	O	O	O	O	O	O
Animal Disease Epidemic	O	O	O	O	O	O	O	O	O	O	O	O	O
Human Disease Epidemic	Y	Y	O	O	O	O	O	O	O	O	O	O	Y
Plant/Crop Disease Epidemic	O	O	O	O	O	O	O	O	O	O	O	O	O
Structural Failure	Y	O	O	O	O	O	O	Y	O	O	O	O	Y
Structural Fire	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

APPENDIX L

Municipal Hazard Scoring and Priority Grouping

Avoca

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	1	4	1	1	2.75	Moderate
Earthquake	1	1	1	3	1	4	2.20	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	2	3	3	2	4	3.50	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	1	1.35	Low
Levee Failure	1	1	1	2	2	1	1.85	Low
River Flood	3	2	3	2	2	1	3.05	Moderate
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	3	4	2	3	2	4	3.80	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	2	3	2	2	2	4	3.20	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highway Transportation Incident	1	2	1	1	3	4	2.60	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	3	1	1	1	1	1.75	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Carson

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	2	3	1	4	2	1	2.85	Moderate
Earthquake	1	1	1	3	1	4	2.20	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	3	4	2	4	2	1	3.55	Moderate
Flash Flood	2	2	3	3	2	4	3.50	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	3	3	3	3	2	4	3.90	Moderate
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	2	2	2	2	2	1	2.55	Low
Severe Winter Storm	2	2	4	4	3	2	4.00	Moderate
Sink Holes							N/A	N/A
Thunderstorm and Lightning	4	4	3	4	3	4	4.80	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	4	4	2	3	2	4	4.00	Moderate
Air Transportation Incident	1	1	1	3	3	4	2.80	Moderate
Communications Failure	1	2	2	2	2	4	2.80	Moderate
Energy Disruption	2	3	3	4	2	4	3.90	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highway Transportation Incident	1	2	1	1	3	4	2.60	Low
Pipeline Incident	1	1	3	2	2	4	2.90	Moderate
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waterway/Water Body Incident	1	1	1	1	1	4	1.80	Low
Animal Disease Epidemic	1	3	1	1	1	1	1.75	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Carter Lake

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	1	4	1	1	2.75	Moderate
Earthquake	1	1	1	3	1	4	2.20	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	3	3	3	3	2	4	3.90	Moderate
Grass or Wild Land Fire	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hailstorm	3	3	3	3	2	4	3.90	Moderate
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	1	1	1	1	3	1	1.95	Low
River Flood	2	1	1	4	2	1	2.45	Low
Severe Winter Storm	3	2	4	4	3	2	4.20	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	4	4	2	3	2	4	4.00	Moderate
Air Transportation Incident	1	3	1	3	3	4	3.20	Moderate
Communications Failure	2	3	2	2	2	4	3.20	Moderate
Energy Disruption	2	3	2	4	2	4	3.60	Moderate
Fixed Hazardous Material Incident	1	2	2	3	3	4	3.30	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	2	1	1	3	4	2.60	Low
Pipeline Incident	1	1	4	2	2	4	3.20	Moderate
Rail Transportation Incident	1	2	3	2	3	4	3.40	Moderate
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	2	4	1	1	2	4	2.90	Moderate
Animal Disease Epidemic	1	3	1	1	1	1	1.75	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	1	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Crescent

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	2	3	1	4	2	1	2.85	Moderate
Earthquake	1	1	1	3	1	4	2.20	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	3	4	2	4	2	1	3.55	Moderate
Flash Flood	2	3	3	3	2	4	3.70	Moderate
Grass or Wild Land Fire	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hailstorm	3	3	3	3	2	4	3.90	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	1	1.35	Low
Levee Failure	1	1	2	2	3	1	2.45	Low
River Flood	1	1	2	2	2	1	2.15	Low
Severe Winter Storm	3	2	4	4	3	2	4.20	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	3	4	3	3	3	4	4.40	High
Tornado	2	2	3	4	4	4	4.30	High
Windstorm	2	4	2	3	2	4	3.60	Moderate
Air Transportation Incident	1	2	1	3	3	4	3.00	Moderate
Communications Failure	2	2	2	2	2	4	3.00	Moderate
Energy Disruption	2	2	3	4	2	4	3.70	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	2	4	2.10	Low
Pipeline Incident	1	1	3	2	2	4	2.90	Moderate
Rail Transportation Incident	1	2	3	2	3	4	3.40	Moderate
Transportation Hazardous Materials Incident	1	2	4	2	2	4	3.40	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	1	1	1	1	1	1.35	Low
Human Disease Epidemic	1	1	1	1	1	1	1.35	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	1	1	2	4	2.10	Low

Hancock

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	1	4	1	1	2.75	Moderate
Earthquake	1	1	1	3	1	4	2.20	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	3	3	3	2	4	3.70	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	1	1.35	Low
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	2	2	3	3	2	1	3.05	Moderate
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	3	4	2	3	2	4	3.80	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	2	3	2	2	2	4	3.20	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	3	4	2.40	Low
Pipeline Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rail Transportation Incident	1	1	2	2	3	4	2.90	Moderate
Transportation Hazardous Materials Incident	1	1	2	2	2	9	3.35	Moderate
Transportation Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waterway/Water Body Incident	1	1	1	1	2	3	1.95	Low
Animal Disease Epidemic	1	3	1	1	1	1	1.75	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	2	1.50	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Macedonia

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	2	4	1	1	3.05	Moderate
Earthquake	1	1	1	2	1	4	2.00	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	2	3	2	2	4	3.30	Moderate
Grass or Wild Land Fire	2	2	2	1	1	3	2.35	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	1	1	2	1	2	1	1.95	Low
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	4	4	2	3	2	4	4.00	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	3	3	2	2	2	4	3.40	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	2	3	3	4	3.10	Moderate
Highway Transportation Incident	1	1	1	1	2	4	2.10	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	1	1	1	1	1	4	1.80	Low
Animal Disease Epidemic	1	3	1	1	2	1	2.05	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

McClelland

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	1	1	3	4	2	1	2.85	Moderate
Earthquake	1	1	1	3	3	4	2.80	Moderate
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	1	2	3.60	Moderate
Flash Flood	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grass or Wild Land Fire	4	4	2	1	1	4	3.30	Moderate
Hailstorm	3	3	4	4	1	4	4.10	High
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Severe Winter Storm	3	2	4	4	1	3	3.75	Moderate
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	4	4	1	3	4.35	High
Tornado	1	1	3	1	3	4	3.00	Moderate
Windstorm	4	3	3	3	1	4	3.80	Moderate
Air Transportation Incident	1	1	1	1	2	4	2.10	Low
Communications Failure	4	4	4	4	1	4	4.50	High
Energy Disruption	4	4	4	4	2	4	4.80	High
Fixed Hazardous Material Incident	1	2	3	2	3	4	3.40	Moderate
Fixed Radiological Incident	1	1	1	1	3	4	2.40	Low
Highway Transportation Incident	1	2	1	1	1	4	2.00	Low
Pipeline Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Rail Transportation Incident	1	1	1	1	2	4	2.10	Low
Transportation Hazardous Materials Incident	1	1	1	1	2	4	2.10	Low
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	1	1	1	1	2	1.50	Low
Human Disease Epidemic	1	1	3	3	3	1	3.10	Moderate
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Minden

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	2	4	1	1	3.05	Moderate
Earthquake	1	1	1	2	1	4	2.00	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	2	3	3	2	4	3.50	Moderate
Grass or Wild Land Fire	1	2	2	1	1	3	2.15	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	1	2	2	1	2	1	2.15	Low
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	4	4	2	3	2	4	4.00	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	3	3	2	2	2	4	3.40	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	3	4	2.40	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	3	1	1	2	1	2.05	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Neola

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	2	4	1	1	3.05	Moderate
Earthquake	1	1	1	2	1	4	2.00	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	2	3	3	2	4	3.50	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	1	1.35	Low
Levee Failure	1	1	1	1	1	1	1.35	Low
River Flood	1	1	2	2	2	1	2.15	Low
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	3	4	2	3	2	4	3.80	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	1	3	2	2	2	4	3.00	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	2	4	2.10	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	1	2	2	2	3	4	3.10	Moderate
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	3	1	1	2	1	2.05	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Oakland

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	2	3	3	4	2	1	3.45	Moderate
Earthquake	1	1	4	4	4	4	4.20	High
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	3	4	2	1	4.05	Moderate
Flash Flood	2	2	3	3	2	4	3.50	Moderate
Grass or Wild Land Fire	3	3	3	2	1	4	3.40	Moderate
Hailstorm	2	2	2	1	2	4	2.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	4	1.80	Low
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	4	4	2	2	1	3	3.35	Moderate
Severe Winter Storm	4	4	4	4	3	1	4.65	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	2	4	4.30	High
Tornado	1	2	2	2	3	4	3.10	Moderate
Windstorm	4	4	3	3	3	4	4.60	High
Air Transportation Incident	1	1	1	1	1	4	1.80	Low
Communications Failure	3	3	3	3	3	4	4.20	High
Energy Disruption	2	2	4	4	3	4	4.30	High
Fixed Hazardous Material Incident	4	4	4	3	4	4	5.20	High
Fixed Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highway Transportation Incident	4	4	2	1	1	4	3.30	Moderate
Pipeline Incident	1	1	1	1	1	4	1.80	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	1	1	4	4	2.90	Moderate
Transportation Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	1	1	1	1	2	1.50	Low
Human Disease Epidemic	1	1	1	1	3	1	1.95	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	2	1	1	2	2	2.00	Low
Structural Fire	4	4	3	1	2	4	3.90	Moderate

Treyvor

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	2	4	2	1	3.35	Moderate
Earthquake	1	1	1	2	1	4	2.00	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	3	3	3	3	2	4	3.90	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	4	4	3	4	2	4	4.50	High
Landslide/Erosion/Slope Failure	1	1	1	1	2	3	1.95	Low
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	1	2	2	2	2	1	2.35	Low
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	3	4	2	3	2	4	3.80	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	1	3	2	2	2	4	3.00	Moderate
Energy Disruption	2	3	3	4	2	4	3.90	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	2	4	2.10	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	3	1	1	2	1	2.05	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Underwood

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	3	3	2	4	1	1	3.05	Moderate
Earthquake	1	1	1	2	1	4	2.00	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	4	2	1	3.75	Moderate
Flash Flood	2	3	3	3	2	4	3.70	Moderate
Grass or Wild Land Fire	1	1	2	1	1	3	1.95	Low
Hailstorm	4	3	2	3	2	4	3.80	Moderate
Landslide/Erosion/Slope Failure	1	1	1	1	1	1	1.35	Low
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	1	2	2	2	2	1	2.35	Low
Severe Winter Storm	3	3	4	4	3	2	4.40	High
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	3	3	3	4	4.60	High
Tornado	1	2	3	4	4	4	4.10	High
Windstorm	3	4	2	3	1	4	3.50	Moderate
Air Transportation Incident	1	1	1	1	3	4	2.40	Low
Communications Failure	1	3	2	2	2	4	3.00	Moderate
Energy Disruption	1	2	3	4	2	4	3.50	Moderate
Fixed Hazardous Material Incident	1	1	2	3	3	4	3.10	Moderate
Fixed Radiological Incident	1	1	3	3	4	4	3.70	Moderate
Highway Transportation Incident	1	1	1	1	2	4	2.10	Low
Pipeline Incident	1	1	1	2	2	4	2.30	Low
Rail Transportation Incident	1	2	2	2	3	4	3.10	Moderate
Transportation Hazardous Materials Incident	1	2	2	2	2	4	2.80	Moderate
Transportation Radiological Incident	1	1	1	1	2	4	2.10	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	3	1	1	2	1	2.05	Low
Human Disease Epidemic	1	1	1	1	1	2	1.50	Low
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	1	4	1.80	Low
Structural Fire	1	1	2	1	2	4	2.40	Low

Walnut

Hazard Type	Historical	Probability	Vulnerability	Maximum Threat	Severity	Speed of Onset	CPRI	Planning Significance
Drought	2	2	2	1	1	1	2.05	Low
Earthquake	1	1	2	1	2	4	2.40	Low
Expansive Soils	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Extreme Heat	4	4	2	2	1	1	3.05	Moderate
Flash Flood	1	1	1	1	1	4	1.80	Low
Grass or Wild Land Fire	3	3	3	2	4	2	4.00	Moderate
Hailstorm	4	4	4	4	3	4	5.10	High
Landslide/Erosion/Slope Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Levee Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
River Flood	1	1	1	1	1	2	1.50	Low
Severe Winter Storm	2	2	2	2	2	2	2.70	Moderate
Sink Holes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Thunderstorm and Lightning	4	4	4	2	2	4	4.40	High
Tornado	2	2	2	4	4	4	4.00	High
Windstorm	4	4	3	3	3	4	4.60	High
Air Transportation Incident	1	1	1	1	1	1	1.35	Low
Communications Failure	4	4	1	1	2	4	3.30	Moderate
Energy Disruption	4	4	3	4	1	4	4.20	High
Fixed Hazardous Material Incident	1	1	1	1	1	1	1.35	Low
Fixed Radiological Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highway Transportation Incident	4	4	2	1	1	4	3.30	Moderate
Pipeline Incident	1	1	1	1	1	1	1.35	Low
Rail Transportation Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Transportation Hazardous Materials Incident	2	2	1	1	3	4	2.80	Moderate
Transportation Radiological Incident	1	2	1	1	3	4	2.60	Low
Waterway/Water Body Incident	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Animal Disease Epidemic	1	1	1	1	1	1	1.35	Low
Human Disease Epidemic	1	1	3	3	3	1	2.95	Moderate
Plant/Crop Disease Epidemic	1	1	1	1	1	1	1.35	Low
Structural Failure	1	1	1	1	2	4	2.10	Low
Structural Fire	2	3	1	1	2	4	2.40	Low

Avoca

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Flash Flood River/Stream Flood Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Transportation Hazmat Incident Fixed Hazmat Incident Highway Transportation Incident Communications Failure Energy Disruption	Drought Hailstorm Air Transportation Incident Grass or Wild Land Fire Human Disease Epidemic Structural Failure Structural Fire	Earthquake Levee Failure Pipeline Incident Enemy Attack Fixed Radiological Incident Animal Disease Epidemic Transportation Radiological Incident Landslide/Erosion/Slope Failure Plant/Crop Disease Epidemic

Carson

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Energy Disruption Thunderstorm and Lightning Flash Flood River/Stream Flood Communications Failure Severe Winter Storm Structural Fire Grass or Wild Land Fire Waterway/Water Body Incident Windstorm Tornado Highway Transportation Incident	Transportation Hazmat Incident Structural Failure Fixed Hazmat Incident Fixed Radiological Incident Air Transportation Incident Extreme Heat Hailstorm	Pipeline Incident Drought Earthquake Animal Disease Epidemic Human Disease Epidemic Plant/Crop Disease Epidemic

Carter Lake

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Flash Flood Hailstorm Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Transportation Hazmat Incident Communications Failure Energy Disruption Fixed Hazmat Incident Air Transportation Incident	Drought River/Stream Flood Pipeline Incident Rail Transportation Incident Human Disease Epidemic Structural Fire Waterway/Water Body Incident	Earthquake Fixed Radiological Incident Levee Failure Highway Transportation Incident Animal Disease Epidemic Structural Failure Transportation Radiological Incident Plant/Crop Disease Epidemic

Crescent

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Highway Transportation Incident Thunderstorm and Lightning Energy Disruption Grass or Wild Land Fire Transportation Hazmat Incident Tornado Communications Failure Severe Winter Storm Hailstorm Structural Failure Extreme Heat Structural Fire	Flash Flood Windstorm River/Stream Flood Air Transportation Incident Pipeline Incident Fixed Radiological Incident Fixed Hazmat Incident Levee Failure	Drought Animal Disease Epidemic Human Disease Epidemic Landslide/Erosion/Slope Failure Earthquake Plant/Crop Disease Epidemic

Hancock

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Flash Flood Hailstorm River/Stream Flood Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Communications Failure Energy Disruption	Drought Landslide/Erosion/Slope Failure Fixed Hazmat Incident Rail Transportation Incident Human Disease Epidemic Structural Fire Grass or Wild Land Fire Transportation Hazmat Incident Highway Transportation Incident	Earthquake Air Transportation Incident Fixed Radiological Incident Waterway/Water Body Incident Animal Disease Epidemic Structural Failure Plant/Crop Disease Epidemic

Macedonia

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Communications Failure Energy Disruption Transportation Hazmat Incident	Drought Flash Flood Hailstorm River/Stream Flood Air Transportation Incident Fixed Hazmat Incident Highway Transportation Incident Pipeline Incident Waterway/Water Body Incident Animal Disease Epidemic Grass or Wild Land Fire Human Disease Epidemic Structural Failure Structural Fire	Earthquake Fixed Radiological Incident Transportation Radiological Incident Plant/Crop Disease Epidemic

McClelland

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Energy Disruption Communications Failure Thunderstorm and Lightning Human Disease Epidemic Fixed Hazmat Incident	Windstorm Grass or Wild Land Fire Extreme Heat Structural Fire Highway Transportation Incident Rail Transportation Incident Hailstorm Severe Winter Storm Air Transportation Incident Tornado	Flash Flood Animal Disease Epidemic Structural Failure Earthquake Drought Transportation Radiological Incident Transportation Hazmat Incident Fixed Radiological Incident Plant/Crop Disease Epidemic

Minden

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Flash Flood Hailstorm Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Transportation Hazmat Incident Fixed Hazmat Incident Communications Failure	Drought Earthquake River/Stream Flood Highway Transportation Incident Energy Disruption Grass or Wild Land Fire Structural Fire	Pipeline Incident Transportation Radiological Incident Animal Disease Epidemic Air Transportation Incident Structural Failure Fixed Radiological Incident Human Disease Epidemic Plant/Crop Disease Epidemic

Neola

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Flash Flood Hailstorm Severe Winter Storm Thunderstorm and Lightning Tornado Windstorm Transportation Hazmat Incident Fixed Hazmat Incident Communications Failure	Drought Earthquake River/Stream Flood Rail Transportation Incident Structural Fire Energy Disruption Grass or Wild Land Fire Highway Transportation Incident	Landslide/Erosion/Slope Failure Levee Failure Pipeline Incident Animal Disease Epidemic Transportation Radiological Incident Air Transportation Incident Structural Failure Fixed Radiological Incident Human Disease Epidemic Plant/Crop Disease Epidemic

Oakland

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Extreme Heat Structural Fire Fixed Hazmat Incident Energy Disruption Windstorm Highway Transportation Incident Severe Winter Storm Communications Failure Structural Failure Thunderstorm and Lightning	Grass or Wild Land Fire Tornado River/Stream Flood Drought	Earthquake Hailstorm Flash Flood Transportation Hazmat Incident Pipeline Incident Human Disease Epidemic Air Transportation Incident Fixed Radiological Incident Animal Disease Epidemic Landslide/Erosion/Slope Failure Plant/Crop Disease Epidemic

Treynor

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Thunderstorm and Lightning Energy Disruption Communications Failure Tornado Windstorm Structural Fire Severe Winter Storm Flash Flood Highway Transportation Incident Fixed Hazmat Incident	Transportation Hazmat Incident Extreme Heat Hailstorm Structural Failure Grass or Wild Land Fire Drought Animal Disease Epidemic Pipeline Incident Human Disease Epidemic Landslide/Erosion/Slope Failure	Fixed Radiological Incident Air Transportation Incident Earthquake Plant/Crop Disease Epidemic

Underwood

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Thunderstorm and Lightning Energy Disruption Communications Failure Tornado Transportation Hazmat Incident Highway Transportation Incident Flash Flood Severe Winter Storm Extreme Heat Fixed Hazmat Incident Transportation Radiological Incident	Rail Transportation Incident Windstorm Structural Failure Structural Fire Hailstorm River/Stream Flood Air Transportation Incident Drought Animal Disease Epidemic Human Disease Epidemic	Fixed Radiological Incident Grass or Wild Land Fire Earthquake Pipeline Incident Landslide/Erosion/Slope Failure Plant/Crop Disease Epidemic

Walnut

Priority 1 (High) Hazards	Priority 2 (Moderate) Hazards	Priority 3 (Low) Hazards
Energy Disruption Windstorm Hailstorm Tornado Thunderstorm and Lightning Communications Failure Highway Transportation Incident Grass or Wild Land Fire Structural Fire Extreme Heat Structural Failure	Transportation Hazmat Incident Earthquake Human Disease Epidemic Severe Winter Storm Transportation Radiological Incident Air Transportation Incident Drought	Flash Flood Fixed Hazmat Incident River/Stream Flood Pipeline Incident Animal Disease Epidemic Fixed Radiological Incident Plant/Crop Disease Epidemic

APPENDIX M

Historical Occurrences

(Source: National Climatic Data Center, <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwEvent~Storms>)

Flooding Between the dates of 04/30/1950 and 07/31/2011 Number of events: 29

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Pottawattamie	9/21/1993	11:00 PM	Flash Flood	N/A	0	0	500K	50K
Southwest Iowa	10/15/1993	3:00 AM	Flooding	N/A	0	0	5K	5K
Much Of Iowa	3/3/1994	12:00 PM	Flooding	N/A	0	0	500K	0
Regional	6/11/1994	10:00 PM	Flooding	N/A	0	0	5K	5K
Pottawattamie	6/22/1994	7:30 AM	Urban Flooding	N/A	0	0	500K	1K
Statewide	6/22/1994	11:30 PM	Flooding	N/A	0	0	500K	500K
Regional	2/18/1997	6:00 PM	Flood	N/A	0	0	0	0
Regional	4/2/1997	12:00 PM	Flood	N/A	0	0	0	0
Western Pottawattamie	5/1/1997	12:00 AM	Flood	N/A	0	0	0	0
Pottawattamie	9/2/1997	2:00 AM	Flash Flood	N/A	0	0	0	0
Regional	6/9/1998	7:46 AM	Flood	N/A	0	0	0	35.0M
Council Bluffs	8/7/1999	1:30 AM	Flash Flood	N/A	0	0	4.0M	0
Regional	5/24/2004	9:15 PM	Flood	N/A	0	0	0	0
Avoca	5/6/2007	5:00 AM	Flood	N/A	0	0	1.6M	0K
Avoca	6/8/2008	1:30 PM	Flood	N/A	0	0	0K	0K
Loveland	6/11/2008	12:30 AM	Flood	N/A	0	0	0K	0K
Lake Manawa	6/11/2008	9:52 PM	Flash Flood	N/A	0	0	0K	0K
Hancock	6/11/2008	11:15 PM	Flood	N/A	0	0	0K	0K
Oakland	6/12/2008	12:30 AM	Flash Flood	N/A	0	0	0K	0K
Pottawattamie	3/16/2010	4:00 PM	Flood	N/A	0	0	10K	0K

Pottawattamie	6/1/2010	5:45 PM	Flash Flood	N/A	0	0	20K	OK
Pottawattamie	6/15/2010	6:00 PM	Flood	N/A	0	0	5K	OK
Pottawattamie	6/27/2010	1:00 PM	Flood	N/A	0	0	1K	OK
Pottawattamie	7/1/2010	1:00 AM	Flood	N/A	0	0	10K	OK
Pottawattamie	8/1/2010	12:00 AM	Flood	N/A	0	0	1K	OK
Island Park	5/27/2011	8:00 PM	Flood	N/A	0	0	10K	OK
Grable	6/1/2011	12:00 AM	Flood	N/A	0	0	200K	OK
Lake Manawa	6/25/2011	5:48 AM	Flash Flood	N/A	0	0	1K	OK
Grable	7/1/2011	12:00 AM	Flood	N/A	0	0	3.0M	OK

Funnel Cloud Between the dates of 04/30/1950 and 07/31/2011 Number of events: 4

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Council Bluffs	8/7/1998	4:30 PM	Funnel Cloud	N/A	0	0	0	0
Walnut	6/13/2000	2:55 PM	Funnel Cloud	N/A	0	0	0	0
Council Bluffs	8/20/2007	6:25 PM	Funnel Cloud	N/A	0	0	OK	OK
Pottawattamie	7/7/2010	1:15 PM	Funnel Cloud	N/A	0	0	OK	OK

Hail Between the dates of 04/30/1950 and 07/31/2011 Number of events: 164

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Pottawattamie	7/21/1962	9:30 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	7/3/1964	8:00 PM	Hail	2.50 in.	0	0	0	0
Pottawattamie	8/29/1964	5:30 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	6/27/1967	3:07 PM	Hail	2.00 in.	0	0	0	0
Pottawattamie	7/9/1967	9:00 PM	Hail	1.50 in.	0	0	0	0
Pottawattamie	6/13/1968	11:45 PM	Hail	0.75 in.	0	0	0	0

Pottawattamie	4/2/1969	7:00 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	5/2/1969	7:37 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	5/11/1970	7:21 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	6/7/1972	5:50 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	7/6/1972	6:00 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	5/17/1974	4:23 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	8/8/1974	9:45 PM	Hail	0.75 in.	0	0	0	0
Pottawattamie	8/13/1974	10:00 AM	Hail	1.75 in.	0	0	0	0
Pottawattamie	5/6/1975	3:45 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	8/24/1975	7:30 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	6/27/1976	9:00 PM	Hail	2.00 in.	0	0	0	0
Pottawattamie	9/6/1979	1:10 AM	Hail	1.00 in.	0	0	0	0
Pottawattamie	6/18/1980	2:45 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	7/4/1980	10:25 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	4/3/1981	6:10 PM	Hail	1.50 in.	0	0	0	0
Pottawattamie	5/24/1983	4:27 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	4/26/1984	3:55 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	6/26/1984	5:55 PM	Hail	0.75 in.	0	0	0	0
Pottawattamie	4/20/1985	6:36 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	4/20/1985	6:36 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	4/20/1985	6:52 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	4/20/1985	7:15 PM	Hail	1.00 in.	0	0	0	0
Pottawattamie	5/23/1985	6:38 PM	Hail	1.50 in.	0	0	0	0
Pottawattamie	6/16/1985	5:20 PM	Hail	1.75 in.	0	0	0	0

Pottawattamie	6/23/1985	3:50 PM	Hail	4.00 in.	0	0	0	0
Pottawattamie	6/23/1985	5:10 PM	Hail	2.75 in.	0	0	0	0
Pottawattamie	5/9/1986	10:30 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	5/10/1986	12:45 AM	Hail	1.50 in.	0	0	0	0
Pottawattamie	5/12/1986	4:30 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	7/13/1986	7:15 PM	Hail	1.50 in.	0	0	0	0
Pottawattamie	7/30/1986	9:50 PM	Hail	1.50 in.	0	0	0	0
Pottawattamie	6/24/1987	6:25 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	8/7/1987	7:55 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	6/13/1990	10:30 PM	Hail	2.75 in.	0	0	0	0
Pottawattamie	6/13/1990	8:35 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	6/18/1990	6:30 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	4/29/1991	12:35 PM	Hail	1.75 in.	0	0	0	0
Pottawattamie	7/15/1992	4:53 PM	Hail	2.50 in.	0	0	0	0
Pottawattamie	7/18/1992	10:30 PM	Hail	1.75 in.	0	0	0	0
Oakland	4/14/1994	7:45 PM	Hail	1.75 in.	0	0	50K	0K
Neola	9/21/1994	2:15 PM	Hail	0.75 in.	0	0	5K	5K
Council Bluffs	4/7/1995	2:14 PM	Hail	1.75 in.	0	0	0	0
Treynor	4/7/1995	3:00 PM	Hail	1.00 in.	0	0	0	0
Carson	4/7/1995	3:12 PM	Hail	1.25 in.	0	0	0	0
Red Oak	4/7/1995	3:15 PM	Hail	0.88 in.	0	0	0	0
Treynor	4/7/1995	3:15 PM	Hail	1.00 in.	0	0	0	0
Bentley	5/13/1995	3:55 PM	Hail	2.00 in.	0	0	0	0
Neola	7/22/1995	1:00 AM	Hail	0.75 in.	0	0	0	0

Carter Lake	7/24/1995	3:50 PM	Hail	1.25 in.	0	0	0	0
Treynor	6/23/1996	4:11 PM	Hail	2.75 in.	0	0	10K	0
Crescent	9/10/1996	4:45 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	5/7/1997	3:24 PM	Hail	0.75 in.	0	0	0	0
Crescent	5/24/1998	6:32 PM	Hail	1.00 in.	0	0	0	0
Crescent	5/24/1998	6:34 PM	Hail	0.75 in.	0	0	0	0
Crescent	5/24/1998	7:38 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	5/24/1998	7:56 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	5/29/1998	12:25 AM	Hail	0.75 in.	0	0	0	0
Avoca	7/21/1998	8:40 PM	Hail	1.75 in.	0	0	0	0
Council Bluffs	5/16/1999	3:10 PM	Hail	0.75 in.	0	0	0	0
Oakland	5/16/1999	4:16 PM	Hail	1.50 in.	0	0	0	0
Treynor	5/16/1999	4:33 PM	Hail	1.75 in.	0	0	0	0
Oakland	5/16/1999	4:43 PM	Hail	1.50 in.	0	0	0	0
Oakland	5/16/1999	4:55 PM	Hail	2.00 in.	0	0	0	0
Treynor	9/7/1999	4:20 PM	Hail	0.75 in.	0	0	0	0
Oakland	9/7/1999	6:05 PM	Hail	0.75 in.	0	0	0	0
Oakland	9/7/1999	7:35 PM	Hail	0.75 in.	0	0	0	0
Oakland	5/12/2000	12:20 AM	Hail	0.75 in.	0	0	0	0
Walnut	7/26/2000	4:55 PM	Hail	2.75 in.	0	0	0	0
Oakland	7/26/2000	5:32 PM	Hail	2.75 in.	0	0	0	0
Carson	7/26/2000	6:10 PM	Hail	0.75 in.	0	0	0	0
Walnut	8/5/2000	7:45 PM	Hail	1.00 in.	0	0	0	0
Oakland	4/10/2001	3:15 PM	Hail	1.00 in.	0	0	0	0

Oakland	4/10/2001	3:15 PM	Hail	1.75 in.	0	0	0	0
Council Bluffs	4/10/2001	11:00 AM	Hail	2.75 in.	0	0	0	0
Council Bluffs	5/13/2001	5:08 AM	Hail	2.75 in.	0	0	0	0
Avoca	5/13/2001	7:00 AM	Hail	1.75 in.	0	0	0	0
Walnut	5/13/2001	7:20 AM	Hail	1.75 in.	0	0	0	0
Carson	6/1/2001	1:45 PM	Hail	0.75 in.	0	0	0	0
Carson	6/1/2001	1:45 PM	Hail	0.75 in.	0	0	0	0
Crescent	6/18/2001	7:52 PM	Hail	0.75 in.	0	0	0	0
Crescent	6/18/2001	8:00 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	6/18/2001	8:20 PM	Hail	1.25 in.	0	0	0	0
Oakland	6/18/2001	8:49 PM	Hail	0.75 in.	0	0	0	0
Minden	8/17/2001	8:38 PM	Hail	0.75 in.	0	0	0	0
Oakland	8/17/2001	8:55 PM	Hail	0.75 in.	0	0	0	0
Treynor	9/20/2001	9:40 AM	Hail	1.75 in.	0	0	0	0
Carson	9/20/2001	10:00 AM	Hail	1.50 in.	0	0	0	0
Carson	9/20/2001	10:30 AM	Hail	1.50 in.	0	0	0	0
Council Bluffs	10/22/2001	11:30 AM	Hail	1.75 in.	0	0	0	0
Treynor	10/22/2001	12:00 PM	Hail	0.88 in.	0	0	0	0
Council Bluffs	5/5/2002	5:02 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	5/5/2002	6:17 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	7/25/2002	3:45 AM	Hail	1.75 in.	0	0	0	0
Treynor	7/25/2002	5:00 AM	Hail	1.00 in.	0	0	0	0
Honey Creek	9/25/2002	12:00 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	5/14/2003	12:34 PM	Hail	0.75 in.	0	0	0	0

Council Bluffs	5/14/2003	12:55 PM	Hail	1.75 in.	0	0	0	0
Carson	5/29/2003	6:13 PM	Hail	0.75 in.	0	0	0	0
Minden	6/18/2003	3:00 PM	Hail	0.75 in.	0	0	0	0
Treynor	6/24/2003	5:20 PM	Hail	1.00 in.	0	0	0	0
Avoca	7/6/2003	3:20 AM	Hail	1.00 in.	0	0	0	0
Avoca	7/9/2003	2:10 PM	Hail	1.00 in.	0	0	0	0
Walnut	8/10/2003	6:15 PM	Hail	0.75 in.	0	0	0	0
Crescent	4/20/2004	8:35 PM	Hail	1.00 in.	0	0	0	0
Avoca	5/8/2004	8:00 PM	Hail	1.00 in.	0	0	0	0
Crescent	5/17/2004	4:30 PM	Hail	0.75 in.	0	0	0	0
Neola	5/22/2004	7:45 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	5/24/2004	3:10 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	5/29/2004	11:37 PM	Hail	1.00 in.	0	0	0	0
Carson	8/26/2004	5:29 PM	Hail	0.88 in.	0	0	0	0
Oakland	8/26/2004	5:30 PM	Hail	0.75 in.	0	0	0	0
Crescent	3/30/2005	6:00 AM	Hail	0.75 in.	0	0	0	0
Crescent	5/8/2005	2:35 PM	Hail	0.75 in.	0	0	0	0
Crescent	5/8/2005	3:40 PM	Hail	1.50 in.	0	0	0	0
Avoca	5/10/2005	9:10 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	6/4/2005	5:33 PM	Hail	1.00 in.	0	0	0	0
Council Bluffs	6/8/2005	5:55 AM	Hail	0.75 in.	0	0	0	0
Avoca	6/8/2005	6:30 AM	Hail	0.75 in.	0	0	0	0
Hancock	6/27/2005	2:55 PM	Hail	0.75 in.	0	0	0	0
Council Bluffs	6/29/2005	5:10 PM	Hail	1.75 in.	0	0	0	0

Minden	6/29/2005	6:16 PM	Hail	1.00 in.	0	0	0	0
Neola	7/25/2005	5:18 PM	Hail	0.75 in.	0	0	0	0
Honey Creek	8/20/2005	3:45 PM	Hail	1.25 in.	0	0	0	0
Crescent	8/21/2005	6:32 PM	Hail	0.75 in.	0	0	0	0
Crescent	9/18/2005	9:35 PM	Hail	0.88 in.	0	0	0	0
Walnut	3/7/2006	10:50 AM	Hail	0.88 in.	0	0	0	0
Treynor	4/11/2006	6:07 PM	Hail	0.75 in.	0	0	0	0
Underwood	4/15/2006	5:50 PM	Hail	0.75 in.	0	0	0	0
Carson	6/19/2006	1:00 AM	Hail	0.88 in.	0	0	0	0
Macedonia	6/19/2006	2:20 AM	Hail	1.00 in.	0	0	0	0
Macedonia	6/19/2006	12:40 AM	Hail	2.50 in.	0	0	0	0
Oakland	3/21/2007	5:12 AM	Hail	0.88 in.	0	0	OK	OK
Oakland	3/31/2007	13:49 PM	Hail	0.75 in.	0	0	OK	OK
Oakland	4/3/2007	12:35 AM	Hail	0.75 in.	0	0	OK	OK
Oakland	5/5/2007	20:09 PM	Hail	0.75 in.	0	0	OK	OK
Council Bluffs	5/5/2007	21:22 PM	Hail	0.75 in.	0	0	OK	OK
Avoca	6/22/2007	16:01 PM	Hail	0.75 in.	0	0	OK	OK
Hancock	6/22/2007	17:02 PM	Hail	1.00 in.	0	0	OK	OK
Council Bluffs	10/14/2007	2:01 AM	Hail	1.00 in.	0	0	OK	OK
Council Bluffs	10/14/2007	2:45 AM	Hail	1.25 in.	0	0	OK	OK
Walnut	6/3/2008	3:10 AM	Hail	1.00 in.	0	0	OK	OK
Oakland	6/19/2008	12:40 PM	Hail	0.75 in.	0	0	OK	OK
Lake Manawa	6/27/2008	16:05 PM	Hail	1.75 in.	0	0	OK	OK
Treynor	7/7/2008	16:30 PM	Hail	0.75 in.	0	0	OK	OK

Macedonia	7/11/2008	23:25 PM	Hail	0.75 in.	0	0	OK	OK
Carson	2/26/2009	10:45 AM	Hail	1.00 in.	0	0	OK	OK
Treynor	4/26/2009	8:25 AM	Hail	1.00 in.	0	0	OK	OK
Minden	5/6/2009	14:58 PM	Hail	1.25 in.	0	0	OK	OK
Carson	5/6/2009	15:30 PM	Hail	1.00 in.	0	0	OK	OK
Macedonia	5/6/2009	15:45 PM	Hail	2.75 in.	0	0	OK	OK
Pottawattamie	4/5/2010	23:05 PM	Hail	1.50 in.	0	0	OK	OK
Pottawattamie	5/12/2010	20:11 PM	Hail	0.88 in.	0	0	OK	OK
Pottawattamie	8/3/2010	20:41 PM	Hail	1.75 in.	0	0	OK	OK
Pottawattamie	9/18/2010	23:55 PM	Hail	0.88 in.	0	0	OK	OK
Pottawattamie	9/19/2010	12:30 AM	Hail	2.00 in.	0	0	OK	OK
Lake Manawa	5/21/2011	19:40 PM	Hail	1.25 in.	0	0	OK	OK
Chautauqua	6/1/2011	21:40 PM	Hail	0.88 in.	0	0	OK	OK
McClelland	6/1/2011	21:45 PM	Hail	0.88 in.	0	0	OK	OK

High wind Between the dates of 04/30/1950 and 07/31/2011 Number of events: 18

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Southern Iowa	12/5/1993	3:00 PM	High Winds	0 kts.	0	0	500K	0
Statewide	4/14/1994	10:00 PM	High Winds	0 kts.	0	0	500K	0
Regional	4/25/1994	6:30 PM	High Winds	0 kts.	0	0	500K	0
Statewide	4/26/1994	9:00 AM	High Winds	0 kts.	0	3	5.0M	0
Regional	11/17/1994	5:00 AM	High Winds	0 kts.	0	0	150K	0
Statewide	2/10/1995	12:00 AM	High Winds	0 kts.	0	0	100K	0
Regional	2/10/1996	6:00 AM	High Wind	56 kts.	0	0	0	0
Regional	2/15/1996	8:00 AM	High Wind	48 kts.	0	0	0	0

Regional	4/25/1996	3:00 AM	High Wind	43 kts.	0	0	0	0
Regional	10/26/1996	3:00 PM	High Wind	59 kts.	0	0	0	0
Regional	10/29/1996	2:00 PM	High Wind	55 kts.	0	0	0	0
Regional	4/6/1997	8:00 AM	High Wind	52 kts.	0	0	0	0
Regional	10/13/1997	3:20 PM	High Wind	52 kts.	0	0	0	0
Regional	11/10/1998	1:00 AM	High Wind	51 kts.	0	0	0	0
Regional	2/11/1999	10:00 AM	High Wind	50 kts.	0	0	0	0
Regional	3/30/1999	11:00 AM	High Wind	55 kts.	0	0	0	0
Regional	4/6/2001	11:00 PM	High Wind	50 kts.	0	0	0	0
Regional	6/23/2003	12:00 AM	High Wind	35 kts.	0	0	0	0

Lightning

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 2

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Lake Manawa	5/3/1996	3:30 PM	Lightning	N/A	1	1	0	0
Council Bluffs	8/3/2004	8:00 PM	Lightning	N/A	0	1	0	0

Snow & Ice

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 58

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Western Iowa	11/24/1993	9:00 AM	Freezing Rain	N/A	0	0	5K	0
Western Iowa	12/1/1993	5:00 AM	Freezing Rain	N/A	0	0	5K	0
Southern Iowa	1/26/1994	1:00 PM	Freezing Rain	N/A	0	0	500K	0
Northwest Two-thirds	2/22/1994	10:00 AM	Heavy Snow	N/A	0	0	500K	0
Southern Iowa	12/6/1994	12:00 AM	Ice Storm	N/A	0	0	15.0M	0
Statewide	12/7/1994	6:00 AM	Heavy Snow	N/A	0	0	500K	0
Southern Iowa	1/5/1995	6:00 PM	Heavy Snow	N/A	0	0	40K	0
Statewide	1/26/1995	11:00 PM	Freezing Rain	N/A	0	0	100K	0
Much Of The North	3/6/1995	9:00 AM	Heavy Snow	N/A	0	0	25K	0

Regional	12/6/1995	6:00 AM	Heavy Snow	N/A	0	0	0	0
Regional	11/14/1996	2:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/26/1997	3:00 PM	Winter Storm	N/A	0	0	0	0
Regional	4/9/1997	5:00 PM	Winter Storm	N/A	0	0	0	0
Regional	4/11/1997	6:00 AM	Winter Storm	N/A	0	0	0	0
Regional	10/25/1997	8:00 PM	Heavy Snow	N/A	0	0	7.9M	900K
Regional	1/20/1998	5:00 PM	Winter Storm	N/A	0	0	0	0
Regional	3/7/1998	4:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/18/1999	10:00 AM	Winter Storm	N/A	0	0	0	0
Regional	2/22/1999	5:00 AM	Winter Storm	N/A	0	0	0	0
Regional	3/8/1999	12:00 AM	Winter Storm	N/A	0	0	0	0
Regional	12/10/2000	7:00 PM	Winter Storm	N/A	0	0	0	0
Regional	12/16/2000	2:00 AM	Winter Storm	N/A	0	0	0	0
Regional	12/17/2000	10:00 PM	Winter Storm	N/A	0	0	0	0
Regional	1/28/2001	10:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/8/2001	2:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/23/2001	1:00 PM	Winter Storm	N/A	0	0	0	0
Regional	3/11/2001	2:00 PM	Winter Storm	N/A	0	0	0	0
Regional	1/30/2002	12:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/9/2002	4:00 PM	Winter Storm	N/A	0	0	0	0
Regional	1/15/2003	4:00 PM	Winter Storm	N/A	0	0	0	0
Regional	2/14/2003	5:30 PM	Winter Storm	N/A	0	0	0	0
Regional	12/9/2003	10:00 AM	Winter Storm	N/A	0	0	0	0
Regional	1/3/2004	11:00 PM	Winter Storm	N/A	0	0	0	0

Regional	1/25/2004	5:00 AM	Winter Storm	N/A	0	0	0	0
Regional	2/1/2004	12:00 AM	Winter Storm	N/A	0	0	0	0
Regional	2/5/2004	12:00 AM	Winter Storm	N/A	0	0	0	0
Regional	3/15/2004	3:00 AM	Winter Storm	N/A	0	0	0	0
Regional	1/4/2005	2:00 PM	Winter Storm	N/A	0	0	0	0
Regional	3/21/2006	12:00 AM	Winter Storm	N/A	0	0	0	0
Regional	1/20/2007	5:00 PM	Heavy Snow	N/A	0	0	OK	OK
Regional	2/24/2007	7:00 PM	Winter Storm	N/A	0	0	OK	OK
Regional	12/1/2007	4:00 AM	Ice Storm	N/A	0	0	OK	OK
Pottawattamie	12/10/2007	9:30 PM	Ice Storm	N/A	0	0	OK	OK
Regional	12/18/2008	6:00 PM	Ice Storm	N/A	0	0	OK	OK
Regional	12/18/2008	6:00 PM	Winter Storm	N/A	0	0	OK	OK
Regional	1/12/2009	1:30 PM	Winter Weather	N/A	0	0	OK	OK
Pottawattamie	2/13/2009	9:00 AM	Heavy Snow	N/A	0	0	OK	OK
Pottawattamie	10/10/2009	3:00 AM	Winter Weather	N/A	0	0	OK	OK
Regional	12/7/2009	11:00 PM	Winter Storm	N/A	0	0	OK	OK
Regional	12/23/2009	9:00 AM	Ice Storm	N/A	0	0	OK	OK
Regional	12/24/2009	3:00 AM	Winter Storm	N/A	0	0	OK	OK
Pottawattamie	1/6/2010	6:00 AM	Winter Storm	N/A	0	0	OK	OK
Regional	1/6/2010	9:00 PM	Winter Weather	N/A	0	0	OK	OK
Regional	1/19/2010	11:30 PM	Ice Storm	N/A	0	0	OK	OK
Regional	1/24/2010	5:00 PM	Winter Weather	N/A	0	0	OK	OK
Regional	2/14/2010	10:00 AM	Winter Weather	N/A	0	0	OK	OK
Regional	1/9/2011	6:00 AM	Winter Weather	N/A	0	0	OK	OK
Regional	1/31/2011	8:00 AM	Winter Storm	N/A	0	0	OK	OK

**Temperature
Extremes**

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 44

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Statewide	1/14/1994	3:00 AM	Extreme Cold	N/A	1	0	500K	0
Statewide	1/17/1994	6:00 AM	Extreme Cold	N/A	0	0	500K	0
Statewide	2/10/1995	10:00 PM	Extreme Windchill	N/A	0	0	50K	0
Regional	7/10/1995	10:00 AM	Heat Wave	N/A	0	0	2.4M	0
Regional	1/17/1996	7:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	2/1/1996	10:00 PM	Extreme Cold	N/A	0	0	0	0
Regional	12/18/1996	4:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	12/23/1996	7:00 AM	Extreme Windchill	N/A	0	0	0	0
Regional	1/9/1997	10:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	1/12/1997	1:00 AM	Extreme Windchill	N/A	0	0	0	0
Regional	1/16/1997	1:00 AM	Extreme Windchill	N/A	0	0	0	0
Regional	1/24/1997	10:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	1/27/1997	8:00 AM	Extreme Windchill	N/A	0	0	0	0
Regional	5/13/1997	1:00 AM	Extreme Cold	N/A	0	0	0	0
Regional	1/2/1999	6:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	7/19/1999	12:01 AM	Excessive Heat	N/A	0	0	0	0
Regional	12/16/2000	6:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	12/18/2000	10:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	7/28/2001	6:00 PM	Excessive Heat	N/A	0	0	0	0
Regional	8/1/2001	12:00 AM	Excessive Heat	N/A	0	0	0	0
Regional	1/22/2003	6:00 PM	Extreme Windchill	N/A	0	0	0	0
Regional	1/5/2004	7:00 PM	Extreme Cold/Windchill	N/A	0	0	0	0
Regional	1/27/2004	12:00 AM	Extreme Cold/Windchill	N/A	0	0	0	0

Regional	1/28/2004	12:00 AM	Extreme Cold/Windchill	N/A	0	0	0	0
Regional	7/22/2005	11:00 AM	Excessive Heat	N/A	0	0	0	0
Pottawattamie	1/15/2007	8:00 AM	Cold/Windchill	N/A	0	0	OK	OK
Pottawattamie	2/3/2007	6:00 AM	Cold/Windchill	N/A	0	0	OK	OK
Regional	2/14/2007	2:00 AM	Cold/Windchill	N/A	0	0	OK	OK
Pottawattamie	2/20/2008	3:00 AM	Cold/Windchill	N/A	0	0	OK	OK
Regional	12/14/2008	6:00 PM	Cold/Windchill	N/A	0	0	OK	OK
Regional	12/20/2008	8:00 PM	Cold/Windchill	N/A	0	0	OK	OK
Pottawattamie	12/20/2008	10:00 PM	Cold/Windchill	N/A	0	0	OK	OK
Regional	1/14/2009	9:00 PM	Cold/Windchill	N/A	0	0	OK	OK
Regional	6/22/2009	1:00 PM	Excessive Heat	N/A	0	0	OK	OK
Regional	1/7/2010	7:00 PM	Cold/Windchill	N/A	0	0	OK	OK
Regional	1/7/2010	7:00 PM	Extreme Cold/Windchill	N/A	0	0	OK	OK
Regional	6/26/2010	2:00 PM	Heat	N/A	0	0	OK	OK
Regional	7/14/2010	11:00 AM	Heat	N/A	0	0	OK	OK
Regional	7/17/2010	12:00 PM	Heat	N/A	0	0	OK	OK
Regional	8/8/2010	12:00 PM	Excessive Heat	N/A	0	0	OK	OK
Regional	6/30/2011	2:00 PM	Heat	N/A	0	0	OK	OK
Regional	7/10/2011	1:00 PM	Heat	N/A	0	0	OK	OK
Pottawattamie	7/15/2011	11:00 AM	Excessive Heat	N/A	0	0	OK	OK
Regional	7/27/2011	4:00 PM	Heat	N/A	0	0	OK	OK

Thunderstorms

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 120

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Pottawattamie	5/25/1965	9:30 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	5/15/1968	3:55 PM	T-storm Wind	55 kts.	0	0	0	0
Pottawattamie	6/29/1968	1:30 AM	T-storm Wind	0 kts.	0	0	0	0

Pottawattamie	6/29/1968	1:35 AM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	6/29/1968	1:40 AM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	6/29/1968	1:45 AM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/18/1968	5:00 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	6/6/1971	7:45 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	9/10/1972	6:00 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	9/26/1973	12:30 AM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	4/27/1974	8:00 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/24/1975	7:30 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/24/1975	8:00 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	12/14/1975	12:00 AM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	6/13/1976	5:15 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/20/1977	8:00 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	5/29/1980	10:00 PM	T-storm Wind	61 kts.	0	0	0	0
Pottawattamie	6/12/1980	3:40 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	7/4/1980	8:45 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	7/4/1980	10:25 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/5/1980	7:05 PM	T-storm Wind	52 kts.	0	0	0	0
Pottawattamie	11/3/1983	6:30 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	4/19/1985	7:20 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	7/5/1986	5:45 PM	T-storm Wind	55 kts.	0	0	0	0
Pottawattamie	11/7/1986	9:55 PM	T-storm Wind	0 kts.	0	0	0	0
Pottawattamie	8/3/1987	5:32 AM	T-storm Wind	51 kts.	0	0	0	0
Pottawattamie	8/7/1987	7:55 PM	T-storm Wind	50 kts.	0	0	0	0

Pottawattamie	5/19/1988	5:13 PM	T-storm Wind	63 kts.	0	0	0	0
Pottawattamie	5/20/1988	5:30 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	7/15/1988	4:00 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	8/22/1988	11:55 AM	T-storm Wind	55 kts.	0	0	0	0
Pottawattamie	9/2/1988	6:39 PM	T-storm Wind	52 kts.	0	0	0	0
Pottawattamie	7/17/1989	9:55 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	8/5/1989	6:28 AM	T-storm Wind	54 kts.	0	0	0	0
Pottawattamie	8/5/1989	7:00 AM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	6/5/1990	6:00 AM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	6/5/1990	6:10 AM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	6/7/1990	9:13 AM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	6/7/1990	9:15 AM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	6/16/1990	9:45 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	3/26/1991	11:25 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	5/16/1991	7:26 PM	T-storm Wind	64 kts.	0	0	0	0
Pottawattamie	6/14/1991	7:34 PM	T-storm Wind	60 kts.	0	0	0	0
Pottawattamie	6/14/1991	8:21 PM	T-storm Wind	50 kts.	0	0	0	0
Pottawattamie	5/10/1992	5:40 PM	T-storm Wind	75 kts.	0	0	0	0
Macedonia	8/22/1993	11:15 PM	T-storm Wind	50 kts.	0	0	50K	5K
Ankeny	8/22/1993	11:35 PM	T-storm Wind	61 kts.	0	0	50K	5K
Macedonia	8/22/1993	11:45 PM	T-storm Wind	50 kts.	0	0	5K	1K
Council Bluffs	4/25/1994	6:59 PM	T-storm Wind	57 kts.	0	0	50K	0
Oakland	4/25/1994	7:00 PM	T-storm Wind	50 kts.	0	0	50K	0
Avoca	7/1/1994	4:55 PM	T-storm Wind	50 kts.	0	0	50K	1K

Council Bluffs	8/8/1994	1:15 AM	T-storm Wind	50 kts.	0	0	5K	1K
Oakland	6/21/1997	12:30 AM	T-storm Wind	0 kts.	0	0	1K	0
Underwood	9/2/1997	12:22 AM	T-storm Wind	55 kts.	0	0	0	0
Minden	5/15/1998	2:09 PM	T-storm Wind	62 kts.	0	0	0	0
Council Bluffs	5/15/1998	8:38 AM	T-storm Wind	52 kts.	0	0	0	0
Hancock	5/15/1998	8:40 AM	T-storm Wind	70 kts.	0	0	0	0
Honey Creek	5/15/1998	8:41 AM	T-storm Wind	61 kts.	0	0	0	0
Loveland	5/15/1998	8:55 AM	T-storm Wind	70 kts.	0	0	0	0
Crescent	5/24/1998	6:34 PM	T-storm Wind	52 kts.	0	0	0	0
Walnut	6/6/1999	1:50 PM	T-storm Wind	60 kts.	0	0	0	0
Carter Lake	5/29/2000	11:20 PM	T-storm Wind	55 kts.	0	0	0	0
Oakland	6/13/2000	3:15 PM	T-storm Wind	57 kts.	0	0	0	0
Treynor	6/13/2000	5:20 PM	T-storm Wind	55 kts.	0	0	0	0
Oakland	7/26/2000	5:32 PM	T-storm Wind	60 kts.	0	0	10K	0
Walnut	8/5/2000	7:45 PM	T-storm Wind	52 kts.	0	0	0	0
Council Bluffs	4/10/2001	11:00 AM	T-storm Wind	50 kts.	1	1	20K	0
Carter Lake	7/17/2001	10:35 PM	T-storm Wind	60 kts.	0	0	0	0
Council Bluffs	5/5/2002	7:20 PM	T-storm Wind	50 kts.	0	0	0	0
Minden	7/21/2002	5:30 PM	T-storm Wind	60 kts.	0	0	0	0
Council Bluffs	5/4/2003	3:40 PM	T-storm Wind	50 kts.	0	0	0	0
Council Bluffs	6/24/2003	4:50 PM	T-storm Wind	50 kts.	0	0	0	0
Walnut	5/8/2004	8:00 PM	T-storm Wind	60 kts.	0	0	0	0
Walnut	5/8/2004	8:07 PM	T-storm Wind	55 kts.	0	0	0	0
Treynor	5/29/2004	7:34 PM	T-storm Wind	50 kts.	0	0	0	0

Avoca	6/12/2004	5:30 PM	T-storm Wind	50 kts.	0	0	0	0
Council Bluffs	6/12/2004	12:10 PM	T-storm Wind	55 kts.	0	0	0	0
Council Bluffs	7/12/2004	8:50 PM	T-storm Wind	60 kts.	0	0	0	0
Minden	7/22/2004	5:00 AM	T-storm Wind	65 kts.	0	0	0	0
Council Bluffs	8/3/2004	8:28 PM	T-storm Wind	50 kts.	0	0	0	0
Oakland	6/27/2005	3:05 PM	T-storm Wind	50 kts.	0	0	0	0
Council Bluffs	6/29/2005	3:00 AM	T-storm Wind	50 kts.	0	0	0	0
Walnut	6/29/2005	7:10 PM	T-storm Wind	50 kts.	0	0	0	0
Underwood	7/25/2005	5:30 PM	T-storm Wind	50 kts.	0	0	0	0
Treynor	7/25/2005	6:50 PM	T-storm Wind	60 kts.	0	0	0	0
Carson	7/25/2005	7:05 PM	T-storm Wind	60 kts.	0	0	0	0
Council Bluffs	3/30/2006	4:10 PM	T-storm Wind	55 kts.	0	0	0	0
Neola	3/30/2006	4:40 PM	T-storm Wind	50 kts.	0	0	0	0
Council Bluffs	7/13/2006	3:12 PM	T-storm Wind	50 kts.	0	0	0	0
Underwood	9/16/2006	9:30 PM	T-storm Wind	50 kts.	0	0	0	0
Oakland	4/3/2007	12:35 AM	T-storm Wind	52 kts.	0	0	OK	OK
Avoca	6/22/2007	4:05 PM	T-storm Wind	60 kts.	0	0	OK	OK
Hancock	6/22/2007	4:50 PM	T-storm Wind	52 kts.	0	0	OK	OK
Oakland	7/18/2007	11:52 PM	T-storm Wind	52 kts.	0	0	OK	OK
Honey Creek	8/6/2007	5:50 PM	T-storm Wind	52 kts.	0	0	OK	OK
Bentley	8/6/2007	6:19 PM	T-storm Wind	52 kts.	0	0	OK	OK
Avoca	8/12/2007	4:35 PM	T-storm Wind	52 kts.	0	0	OK	OK
Council Bluffs	8/20/2007	6:46 PM	T-storm Wind	64 kts.	0	0	OK	OK
Underwood	8/20/2007	6:50 PM	T-storm Wind	52 kts.	0	0	OK	OK

Oakland	8/20/2007	7:30 PM	T-storm Wind	52 kts.	0	0	OK	OK
Hancock	5/25/2008	7:45 PM	T-storm Wind	50 kts.	0	0	OK	OK
Lake Manawa	6/27/2008	4:05 PM	T-storm Wind	80 kts.	2	1	OK	OK
Avoca	7/7/2008	3:54 PM	T-storm Wind	52 kts.	0	0	OK	OK
Oakland	7/7/2008	5:06 PM	T-storm Wind	55 kts.	0	0	OK	OK
Macedonia	4/26/2009	1:15 PM	T-storm Wind	52 kts.	0	0	OK	OK
Treynor	4/26/2009	2:18 PM	T-storm Wind	52 kts.	0	0	OK	OK
Pottawattamie	6/1/2010	4:38 PM	T-storm Wind	55 kts.	0	0	OK	OK
Pottawattamie	6/1/2010	5:15 PM	T-storm Wind	55 kts.	0	0	OK	OK
Pottawattamie	6/18/2010	7:05 AM	T-storm Wind	55 kts.	0	0	OK	OK
Pottawattamie	6/18/2010	7:30 AM	T-storm Wind	55 kts.	0	0	OK	OK
Pottawattamie	6/22/2010	10:20 PM	T-storm Wind	52 kts.	0	0	OK	OK
Pottawattamie	7/14/2010	6:50 PM	T-storm Wind	52 kts.	0	0	OK	OK
Pottawattamie	8/10/2010	22:05 PM	T-storm Wind	52 kts.	0	0	OK	OK
Pottawattamie	8/10/2010	10:10 PM	T-storm Wind	52 kts.	0	0	OK	OK
Carson	6/9/2011	10:15 PM	T-storm Wind	50 kts.	0	0	OK	OK
Carson	6/9/2011	10:15 PM	T-storm Wind	52 kts.	0	0	OK	OK
Council Bluffs	6/20/2011	7:25 PM	T-storm Wind	55 kts.	0	0	OK	OK
Oakland	6/26/2011	7:54 PM	T-storm Wind	52 kts.	0	0	OK	OK
Walnut	7/16/2011	12:20 AM	T-storm Wind	55 kts.	0	0	OK	OK
Underwood	7/28/2011	3:40 AM	T-storm Wind	50 kts.	0	0	OK	OK

Tornadoes

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 35

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Pottawattamie	5/12/1970	7:30 PM	Tornado	F2	0	0	250K	0
Pottawattamie	5/6/1975	4:00 PM	Tornado	F2	0	0	25K	0

Pottawattamie	5/6/1975	4:20 PM	Tornado	F2	0	0	25K	0
Pottawattamie	6/26/1976	5:15 PM	Tornado	F4	0	6	2.5M	0
Pottawattamie	5/15/1982	4:00 PM	Tornado	F0	0	0	0K	0
Pottawattamie	6/26/1984	6:00 PM	Tornado	F0	0	0	0K	0
Pottawattamie	5/26/1987	3:10 PM	Tornado	F1	0	0	2.5M	0
Pottawattamie	5/26/1987	3:25 PM	Tornado	F1	0	0	25K	0
Pottawattamie	5/26/1987	4:30 PM	Tornado	F1	0	0	25K	0
Pottawattamie	5/31/1987	4:38 PM	Tornado	F1	0	0	3K	0
Pottawattamie	5/7/1988	10:10 PM	Tornado	F2	0	0	2.5M	0
Pottawattamie	7/15/1988	3:14 PM	Tornado	F2	0	42	25.0M	0
Pottawattamie	7/15/1988	3:16 PM	Tornado	F3	0	34	25.0M	0
Pottawattamie	7/15/1988	3:19 PM	Tornado	F1	0	12	25.0M	0
Pottawattamie	4/27/1989	6:35 PM	Tornado	F0	0	2	250K	0
Pottawattamie	3/13/1990	5:10 PM	Tornado	F1	0	0	250K	0
Pottawattamie	6/16/1990	10:30 PM	Tornado	F0	0	0	25K	0
Pottawattamie	4/29/1991	12:20 PM	Tornado	F1	0	0	250K	0
Pottawattamie	4/29/1991	1:21 PM	Tornado	F0	0	0	3K	0
Pottawattamie	6/16/1992	11:00 PM	Tornado	F2	0	0	250K	0
Macedonia	8/22/1993	11:15 PM	Tornado	F0	0	0	50K	1K
Shelby	7/24/1996	2:21 PM	Tornado	F1	0	0	100K	0
Honey Creek	4/8/1999	1:18 PM	Tornado	F0	0	0	0	0
Treynor	5/16/1999	4:07 PM	Tornado	F0	0	0	10K	0
Treynor	5/16/1999	4:14 PM	Tornado	F2	0	0	690K	0
Neola	6/13/2000	2:10 PM	Tornado	F0	0	0	0	0
Walnut	7/26/2000	5:00 PM	Tornado	F0	0	0	0	0
Carson	4/11/2001	11:55 AM	Tornado	F1	0	0	110K	0
Treynor	4/11/2001	11:55 AM	Tornado	F0	0	0	0	0
Crescent	4/11/2001	12:00 PM	Tornado	F0	0	0	0	0
Council Bluffs	6/24/2003	4:53 PM	Tornado	F0	0	0	0	0
Walnut	5/8/2004	7:57 PM	Tornado	F1	0	0	0	0
Macedonia	5/5/2007	7:46 PM	Tornado	F2	0	0	0K	0K
Oakland	5/5/2007	8:00 PM	Tornado	F1	0	0	0K	0K
Macedonia	6/20/2008	3:40 PM	Tornado	F0	0	0	0K	0K

Wildfire

Between the dates of 04/30/1950 and 07/31/2011

Number of events: 1

Location or County	Date	Time	Type	Magnitudes	Deaths	Injuries	Property Damage	Crop Damage
Pottawattamie	3/6/2005	1:00 PM	Wildfire	N/A	0	2	1.0M	0

APPENDIX N
Countywide Dam Inventory

Dam Name	STATEID	NIDID	Section	River	Owner Name
INDIAN CREEK WATERSHED SITE 2	1664	IA01664	SE,SE,S06,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 4-1	925	IA00925	SW,S30,T077N,R43W	PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 7-1	926	IA00926	SE,S19,T077N,R43W	PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE M-4	927	IA00927	SW,S10,T077N,R43W	PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
ANDERSON DAM	928	IA00928	NE,S01,T074N,R43W	PONY CREEK	VIRGIL ANDERSON
IOWA NONAME39	929	IA00929	S20,T075N,R42W	LITTLE KEG CREEK	POTTAWATTAMIE CO BOARD OF SUPERVISORS
IOWA NONAME40	930	IA00930	S29,T075N,R42W	LITTLE KEG CREEK	POTTAWATTAMIE CO BOARD OF SUPERVISORS
MORAN DAM	931	IA00931	S18,T076N,R43W	PIGEON CREEK	JOE MORAN
IOWA NONAME41	932	IA00932	NW,S32,T077N,R41W	MOSQUITO CREEK	POTTAWATTAMIE CO CONSERVATION BOARD
POTTAWATTAMIE CO ROADGRADE DAM 8-76-42	933	IA00933	NE,S08,T076N,R42W	MOSQUITO CREEK	POTTAWATTAMIE CO BOARD OF SUPERVISORS
SPENCER DAM	934	IA00934	NE,S28,T077N,R43W	PIGEON CREEK	RUSSELL M SPENCER
INDIAN CREEK WATERSHED SITE 13	935	IA00935	SE,SE,S05,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 5	936	IA00936	SE,NE,S05,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 4	937	IA00937	E,S32,T076N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
BEE JAY WATERSHED SITE 12	938	IA00938	NE,S04,T075N,R40W	WEST NISHNABOTA RIVER	EAST POTTAWATTAMIE CO SWCD
RYAN HENSCHAL WATERSHED SITE F-3	939	IA00939	SE,S14,T076N,R43W	MOSQUITO CREEK	WEST POTTAWATTAMIE CO SWCD
RYAN HENSCHAL WATERSHED SITE F-2	940	IA00940	SW,S14,T076N,R43W	MOSQUITO CREEK	WEST POTTAWATTAMIE CO SWCD
RYAN HENSCHAL WATERSHED SITE F-1	941	IA00941	NW,S14,T076N,R43W	MOSQUITO CREEK	WEST POTTAWATTAMIE CO SWCD
RYAN HENSCHAL WATERSHED SITE E-2	942	IA00942	S,S19,T076N,R42W	MOSQUITO CREEK	WEST POTTAWATTAMIE CO SWCD
TIMBERMAN DAM	943	IA00943	SW,S22,T074N,R39W	FARM CREEK	EARL TIMBERMAN
PETERS/FISCHER DAM	944	IA00944	S13,T074N,R43W	PONY CREEK	D PETERS & MRS J FISCHER

NILAN DAM	945	IA00945	NW,S22,T075N,R40W	WEST NISHNABOTA RIVER	WILBERT NILAN
ROHWER DAM	946	IA00946	NW,S29,T076N,R38W	WALNUT CREEK	HERBERT ROHWER
RYAN HENSCHAL WATERSHED SITE H-1	947	IA00947	NE,S12,T076N,R43W	MOSQUITO CREEK	WEST POTTAWATTAMIE CO SWCD
WOHLERS DAM	948	IA00948	S11,T077N,R43W	POTATO CREEK	O NEILL WOHLERS & POTTAWATTAMIE CO
ARTERBURN/KENEALY DAM	949	IA00949	N,S11,T077N,R43W	POTATO CREEK	J ARTERBURN & J KENEALY
BINGHAM DAM	950	IA00950	SE,S20,T076N,R39W	WEST NISHNABOTA RIVER	RAYMOND BINGHAM
SCHULTZ/BLUMER DAM	951	IA00951	SE,S36,T074N,R42W	SILVER CREEK	E SCHULTZ & M BLUMER
GOOS/BRANDT DAM	952	IA00952	SW,S29,T074N,R42W	KEG CREEK	ALFRED GOOS & C H BRANDT
CARLSON/WALSH DAM	953	IA00953	NW,S22,T077N,R42W	MOSQUITO CREEK	R&R CARLSON & A WALSH
IOWA NONAME43	954	IA00954	NE,S30,T075N,R42W	KEG CREEK	GRAALFS HILDEBRAND WILLI
ARROWHEAD LAKE DAM	955	IA00955	SW,S29,T077N,R41W	MOSQUITO CREEK	POTTAWATTAMIE CO CONSERVATION BOARD
JOHNSON DAM	956	IA00956	SE,S26,T077N,R39W	WEST NISHNABOTA RIVER	RONALD C JOHNSON
LARSEN DAM	957	IA00957	NE,S14,T077N,R42W	MOSQUITO CREEK	HAROLD LARSEN
RODENBURG/PORTER DAM	958	IA00958	NW,S20,T077N,R42W	PIGEON CREEK	G RODENBURG & P PORTER
SCHOOR DAM	959	IA00959	W,S26,T074N,R42W	SNAKE CREEK	BERNARD SCHOOR
MC KENZIE/CHILD DAM	960	IA00960	S16,T074N,R41W	SILVER CREEK	MRS MC KENZIE & MRS CHILD
IOWA NONAME79	1662	IA01662	SE,S25,T075N,R39W	FARM CREEK	MIDWESTERN PORK CO
INDIAN CREEK WATERSHED SITE 12	1666	IA01666	S05,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 26	1668	IA01668	S07,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 39	1670	IA01670	S08,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD
SIMON RUN WATERSHED SITE 4-2	1678	IA01678	S08,T076N,R43W	SIMONS CREEK	WEST POTTAWATTAMIE CO SWCD
SIMON RUN WATERSHED SITE 5-2	1680	IA01680	SE,S08,T076N,R43W	SIMONS CREEK	WEST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 25	1866	IA01866	S07,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE CO SWCD

RYAN HENSCHAL WATERSHED SITE A-2	1867	IA01867	S26,T076N,R43W	LITTLE HENSCHAL CREEK	WEST POTTAWATTAMIE CO SWCD
BEE JAY WATERSHED SITE 16	1868	IA01868	N,S17,T075N,R40W	MINIMUM CREEK	EAST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 16	2004	IA02004	SW,S16,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 9	2005	IA02005	SW,S20,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 11-1	2006	IA02006	NW,S20,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 12-1	2007	IA02007	SE,S17,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 13	2008	IA02008	NE,S20,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 15	2009	IA02009	SE,S17,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
NORTH PIGEON CR WATERSHED SITE 16-1	2010	IA02010	NW,S16,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
BEEDLE DAM	2049	IA02049	S02,T076N,R39W	JIM CREEK	THEODORE BEEDLE
THOMPSON DAM	2166	IA02166	SW,NE,S08,T076N,R43W	PIGEON CREEK	J. THOMPSON
WAVELAND BIGHOLE 3	2315	IA02315	NW,S23,T074N,R38W	EAST NISHNABOTNA R.	D. RUSH
NORTH PIGEON CR WATERSHED SITE M-3	2383	IA02383	NW,SE,S16,T077N,R43W	N. PIGEON CR.	WEST POTTAWATTAMIE CO SWCD
SIMON RUN WATERSHED SITE 9-3E	2384	IA02384	NE,SW,S16,T076N,R43W	SIMON RUN	WEST POTTAWATTAMIE CO SWCD
SIMON RUN WATERSHED SITE 9-3W	2385	IA02385	SW,NW,S16,T076N,R43W	SIMON RUN	WEST POTTAWATTAMIE CO SWCD
HENRY DAM	2622	IA02622	SW,S21,T074N,R39W	FARM CREEK	JAMES W. HENRY
NORTH PIGEON CR WATERSHED SITE 10-1	2661	IA02661	SE,S20,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD
TWIN PONIES WATERSHED SITE 8	2663	IA02663	SW,S23,T074N,R43W	PONY CREEK	WEST POTTAWATTAMIE CO SWCD
BEE JAY WATERSHED SITE 4	2691	IA02691	NW,SE,S26,T076N,R40W	WEST NISHNABOTA RIVER	EAST POTTAWATTAMIE CO SWCD
INDIAN CREEK WATERSHED SITE 6	2747	IA02747	SW,SE,S05,T075N,R43W	INDIAN CREEK	WEST POTTAWATTAMIE COUNTY SWCD
NORTH PIGEON CR WATERSHED SITE 17	2898	IA02898	NE,SW,S16,T077N,R43W	PIGEON CREEK	WEST POTTAWATTAMIE COUNTY SWCD
WILLIAMS DAM	2939	IA02939	SW,NE,S16,T076N,R40W	SILVER CREEK	BRYAN K. WILLIAMS
NORTH PIGEON CR WATERSHED SITE M	3041	IA03041	SW,SW,S32,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE COUNTY SWCD
DE SOTO DAM	3163	IA03163	NE,NE,S09,T077N,R45W	MISSOURI RIVER	U.S. FISH AND WILDLIFE SERVICE

TWIN PONIES WATERSHED SITE 17A	3232	IA03232	SW,NE,S11,T074N,R43W	PONY CREEK	WEST POTTAWATTAMIE COUNTY SWCD
PERDUE DAM	3274	IA03274	NW,SE,S14,T074N,R38W	EAST NISHNABOTNA RIVER	MIKE PERDUE
SERAN DAM	3351	IA03351	NE,SE,S34,T074N,R42W	KEG CREEK	GENE SERAN
NORTH PIGEON CR WATERSHED SITE M-1	2662	IA02662	NW,NW,S29,T077N,R43W	NORTH PIGEON CREEK	WEST POTTAWATTAMIE CO SWCD

APPENDIX P

Area Media Providers

AM Radio

- KSXP 590 AM, Omaha
- KCRO 660 AM, Omaha
- KMMQ 1020 AM, Plattsmouth/Omaha
- KFAB 1110 AM, Omaha
- KOIL 1180 AM, Bellevue/Omaha
- KKAR 1290 AM, Omaha
- KOTK 1420 AM, Omaha
- KOMJ 1490 AM, Omaha
- KLNG 1560 AM, Council Bluffs
- KOZN 1620 AM, Bellevue/Omaha

FM Radio

- KMLV 88.1 FM, Ralston/Omaha
- KYFG 88.9 FM, Omaha
- KIWR 89.7 FM, Council Bluffs
- KVNO 90.7 FM, Omaha
- KIOS 91.5 FM, Omaha
- KEZO 92.3 FM, Omaha
- KFFF 93.3 FM, Bennington/Omaha
- KBUL 93.7 FM, Omaha
- KQCH 94.1 FM, Omaha
- KQBW 96.1 FM, Omaha
- KQKQ 98.5 FM, Omaha
- KGOR 99.9 FM, Omaha
- KGBI 100.7 FM, Omaha
- KVSS 102.7 FM, Omaha
- KXKT 103.7 FM, Glenwood/Omaha
- KSRZ 104.5 FM, Omaha
- KKCD 105.9 FM, Omaha
- KOPW 106.9 FM, Plattsmouth/Omaha

Television

- KMTV 3, CBS affiliate
- WOWT 6, NBC affiliate
- KETV 7, ABC affiliate
- KXVO 15, CW affiliate
- KYNE 26, PBS member station, part of NET Television
- KBIN 32, PBS member station, part of Iowa Public Television (licensed to Council Bluffs)
- KHIN 36, PBS member station, part of Iowa Public Television (licensed to Red Oak)
- KPTM 42, Fox affiliate

Print

- Omaha-World Herald, daily
- Council Bluffs Daily Nonpareil, daily
- The Gazette, weekly
- Avoca Journal- Herald, weekly
- Walnut Bureau, weekly
- Botna Valley Reporter, weekly

APPENDIX Q
Notice of Public Hearing

**NOTICE OF PUBLIC HEARING
POTTAWATTAMIE COUNTY – ADOPTION OF MULTI-JURISDICTIONAL
MITIGATION PLAN**

The Pottawattamie County Board of Supervisors will hold a public hearing for the purpose of receiving input and suggestions from the general public concerning the adoption of the Pottawattamie Countywide Multi-Jurisdictional Pre-Disaster Mitigation Plan. The public hearing will be at the Pottawattamie County Courthouse, 227 South 6th Street, Council Bluffs, IA at 10:00 a.m. on ~~May 8~~, 2012.

Citizen participation is strongly encouraged.

A copy of the plan is available at the Pottawattamie County Auditor's Office for public review.

Written comments will be received at the Auditor's office until 10:00 a.m. on ~~May 8~~, 2012.

APPENDIX R
Local Mitigation Plan Review Tool

(Insert)

APPENDIX S
Meeting Sign-In Sheets

(Insert)