



Source: BPS

CRAWFORD COUNTY HAZARD MITIGATION PLAN

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1 | Introduction

1.1 Overview

With the Crawford County 2014 Natural Hazard Mitigation Plan set to expire in November of 2019, Crawford County and its constituents are aiming to adopt a new, updated hazard mitigation plan. As outlined in the Disaster Mitigation Act of 2000, any local jurisdiction seeking funding from the Federal Emergency Management Agency (FEMA) must maintain an up-to-date disaster mitigation plan. This Plan meets the criteria as set forth by FEMA in the Disaster Mitigation Act of 2000 and provides the County and its participating jurisdictions with a comprehensive guide for future mitigation efforts to combat the hazards that affect their communities.

Natural, geological, and manmade hazards pose a variety of risks to the lives, businesses, and properties within Crawford County. As such, a Core Planning Committee within Crawford County has been established with the goal of developing and implementing the Crawford County Hazard Mitigation Plan. Through cooperative efforts between local, county, state, and federal government agencies, this Plan is designed to minimize the adverse effects of hazardous events on the lives and properties of residents of Crawford County.

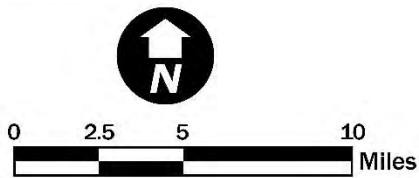
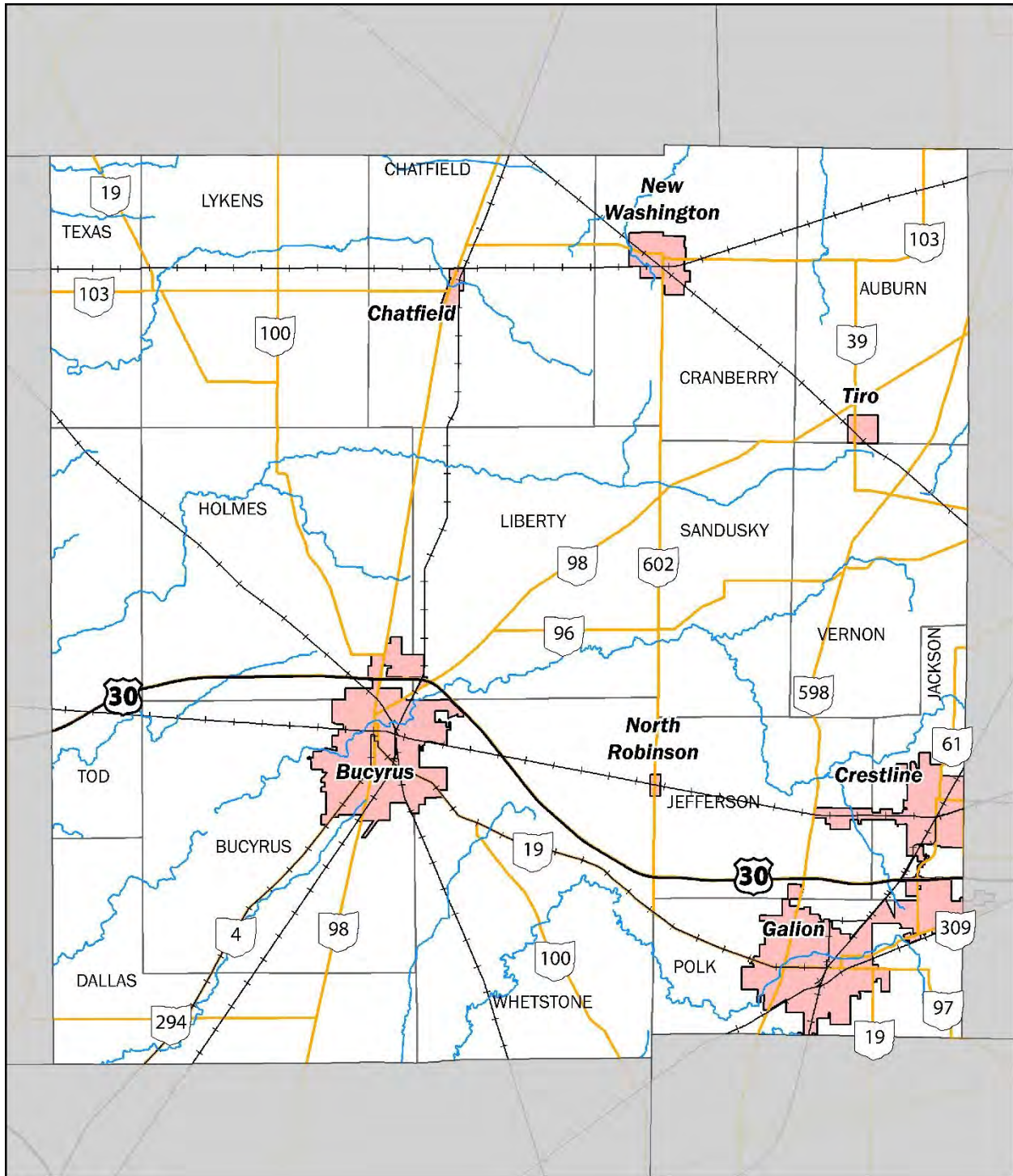
The Crawford County Hazard Mitigation Plan is a multi-jurisdictional plan which considers the impacts of hazards on incorporated areas (cities and villages) and unincorporated areas (townships). Crawford County's incorporated and unincorporated areas are listed below in **Table 1.1**. These jurisdictions are also displayed in **Figure 1.1** on the following page. The Plan is designed for a five-year implementation period and describes the methods and procedures utilized in its development, provides the results of community involvement activities such as survey collection, identifies the mitigation activities determined to be the most important to the County, and establishes a timeline for the implementation of the actions.

Table 1.1: Crawford County Townships and Jurisdictions

Townships		Jurisdictions
Auburn Township	Liberty Township	City of Bucyrus
Bucyrus Township	Lykens Township	City of Galion
Chatfield Township	Polk Township	Village of Chatfield
Cranberry Township	Sandusky Township	Village of Crestline
Dallas Township	Texas Township	Village of New Washington
Holmes Township	Tod Township	Village of North Robinson
Jackson Township	Vernon Township	Village of Tiro
Jefferson Township	Whetstone Township	

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Figure 1.1: Crawford County Jurisdictions Map



1 | INTRODUCTION

This Plan is comprised of six sections, which detail the methods, analyses, and discussion surrounding the various hazards that threaten Crawford County and its jurisdictions. These sections are as follows:

1. This **Introduction** (Section 1) provides a discussion about the general purpose and goals that Crawford County wishes to achieve throughout the development and implementation of this Plan. This section also includes a summary of the Plan's contents.
2. Section 2, **History and Demographics**, includes a brief description of Crawford County and each of the jurisdictions participating in this Plan, including their history, population, and other general information.
3. The process for the development of this Plan is detailed in Section 3, **Planning Process**. This section includes details about the formation of this Plan, including a description of who participated, how the community was involved, which hazards were included in the Plan and why, as well as how, the Plan was developed through public meetings, reviews, and evaluations.
4. Section 4 contains the **Hazard Identification and Risk Assessment (HIRA)**. This section provides detailed descriptions and a corresponding analysis for each hazard that could potentially affect Crawford County. Excluded hazards are also documented, along with the rationale for exclusion from the Plan. The nature, location, extent, historical impact, vulnerability, and likelihood of occurrence for each hazard are provided for each hazard.
5. The goals, strategies, and actions for the County are then outlined in Section 5, **Hazard Mitigation**. The proposed actions are presented in tables, categorized by the associated hazard and community, and then ranked from highest to lowest priority based on feedback received from County officials and participating jurisdictions and stakeholders.
6. The final section of this Plan, **Schedule and Maintenance**, provides a summary of the proposed Plan adoption, integration, and maintenance schedule.

The resulting Crawford County Hazard Mitigation Plan will be submitted to the Ohio Emergency Management Agency (Ohio Emergency Management Agency) and subsequently FEMA for their review. Following the agency review, the jurisdictions will then review the Plan for adoption. This hazard mitigation plan serves as a helpful tool for citizens, policymakers, local businesses, and other local stakeholders who all share a public interest in keeping Crawford County as safe and resilient as possible. As such, this Plan aims to:

- Minimize property damage, economic loss, injury, and loss of human life – to achieve the Plan's main goal of reducing the impact of natural and manmade hazards on the County's economy and the well-being of its citizens.
- Enhance public awareness and education – to widen the public's understanding of natural and manmade hazards and how they might affect public health and safety, the environment, the local economy, and basic day-to-day operations.
- Coordinate inter-jurisdictional preparedness measures – to encourage and ensure multi-jurisdictional cooperation in County-wide mitigation actions and programs so that they may be implemented efficiently and effectively.
- Provide decision-making tools for interested stakeholders – to formulate a comprehensive, updated analysis of Crawford County's vulnerability to hazards so that decision-makers can better prepare for natural and manmade disasters.
- Achieve regulatory compliance – to ensure that the County and its political subdivisions meet state and federal mitigation planning requirements so that they may be eligible to participate in and receive funding from grant programs, policies, and regulations.

1.2 Setting

Crawford County is located in North Central Ohio, with a total area of approximately 403 square miles. Crawford County contains two cities, five villages, and 16 townships (**Table 1.1**). The City of Bucyrus serves as the County seat. Crawford County is bounded by Wyandot County to the west, Seneca and Huron counties to the north, Richland County to the east, and Morrow and Marion counties to the south.

There are eight land uses in Crawford County, including agriculture, industrial, commercial, residential, government owned, public/quasi-public, parks, and transportation (**Figure 1.2**). The most common land use in the County is active agriculture. Land cover in Crawford County is shown in **Figure 1.3**.

1.3 County Features

1.3.1 Transportation

Major roadways – US Routes (US) and State Routes (SR) – in Crawford County include US-30, SR-4, SR-19, SR-39, SR-61, SR-96, SR-97, SR-98, SR-100, SR-103, SR-294, SR-309, SR-598, and SR-602. In 2005, US-30, which is the major arterial route in the County, became a limited access highway across the entire County.

Crawford County contains 88.8 lane-miles of priority roadways and 325.9 lane-miles of general roadways. Additionally, there are 34.8 urban lane-miles. In total, Crawford County has 449.5 lane-miles of roadways.

According to the airport facilities data collected by the Federal Aviation Administration, three airport facilities and three heliport facilities are located in Crawford County. The only public airport is the Port Bucyrus-Crawford County Airport, which is owned by the City of Bucyrus. There is one privately-owned airport in Galion and one privately-owned landing strip in Chatfield. The heliports are privately-owned by a private hospital company, including Bucyrus (Avita) Hospital and Galion (Avita) Hospital. Additionally, Galion Municipal Airport is located in Richland County to the east.

Freight rail service in Crawford County includes railroad owned by Chicago, Ft. Wayne, and Eastern Railroad, which is utilized by Norfolk Southern and CSX Transportation. Additionally, Wheeling and Lake Erie Railway have an east-west rail in the northern portion of the County, traversing the Villages of Chatfield and New Washington.

1.3.2 Natural Features

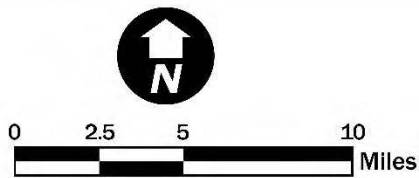
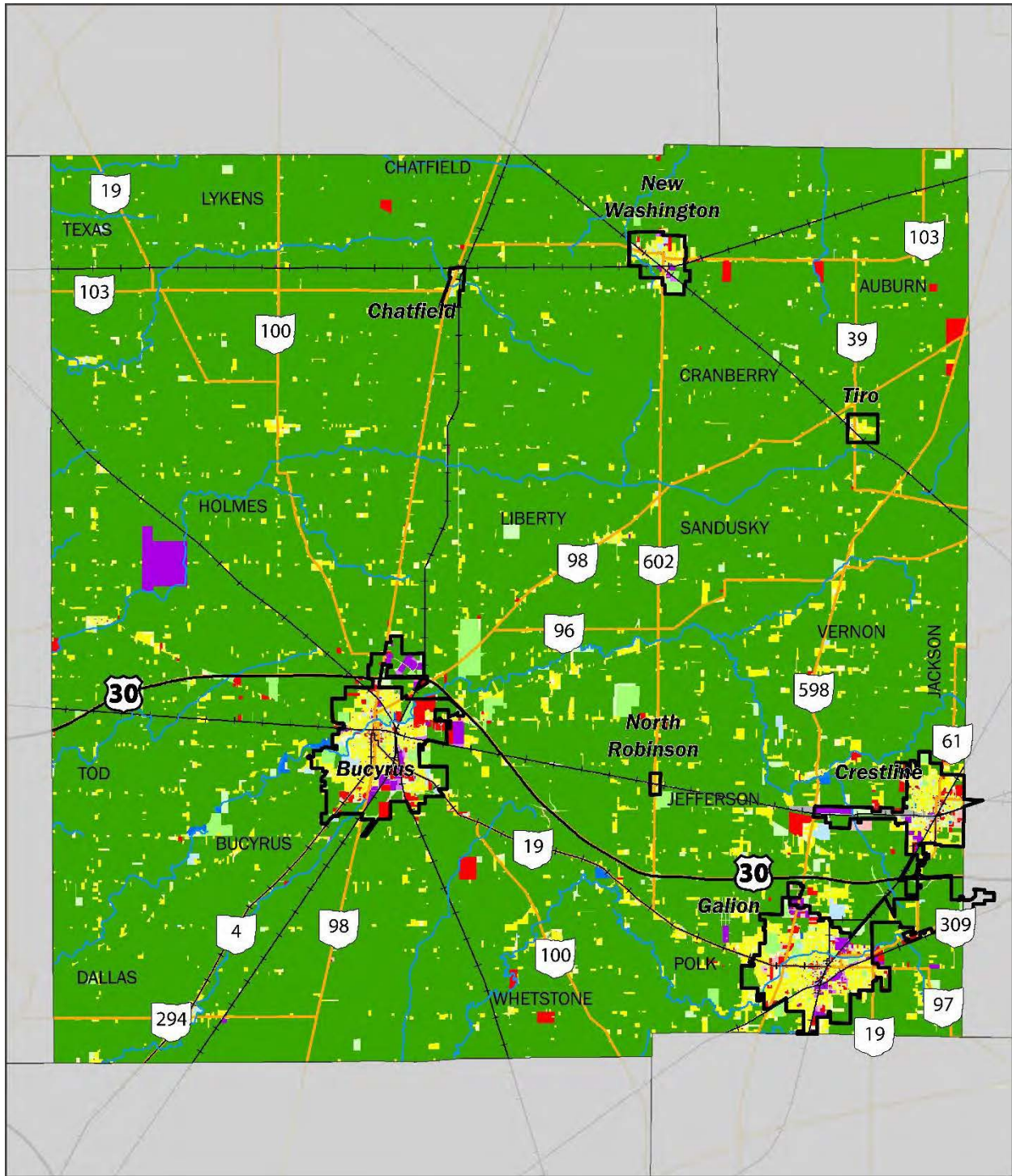
In Crawford County, the Sandusky River begins approximately 2.6 miles west of the Village of Crestline at the confluence of Paramour Creek and Allen Run. This river travels northwest from Crestline toward Bucyrus before turning southwest and exiting into Wyandot County. Accordingly, the majority of the County is located in the Sandusky River Watershed, which then empties into Lake Erie.

The Olentangy River also begins in Crawford County, approximately 2 miles northeast of Galion. This River flows through Galion and then travels south through Marion, Delaware, and Franklin counties before joining the Scioto River in Columbus, Ohio. Additionally, a branch of the Scioto River, the Little Scioto, flows through southwestern Crawford County.

Crawford County is also home to several parks, nature preserves, and wildlife areas, which are listed in **Table 1.2**.

1 | INTRODUCTION

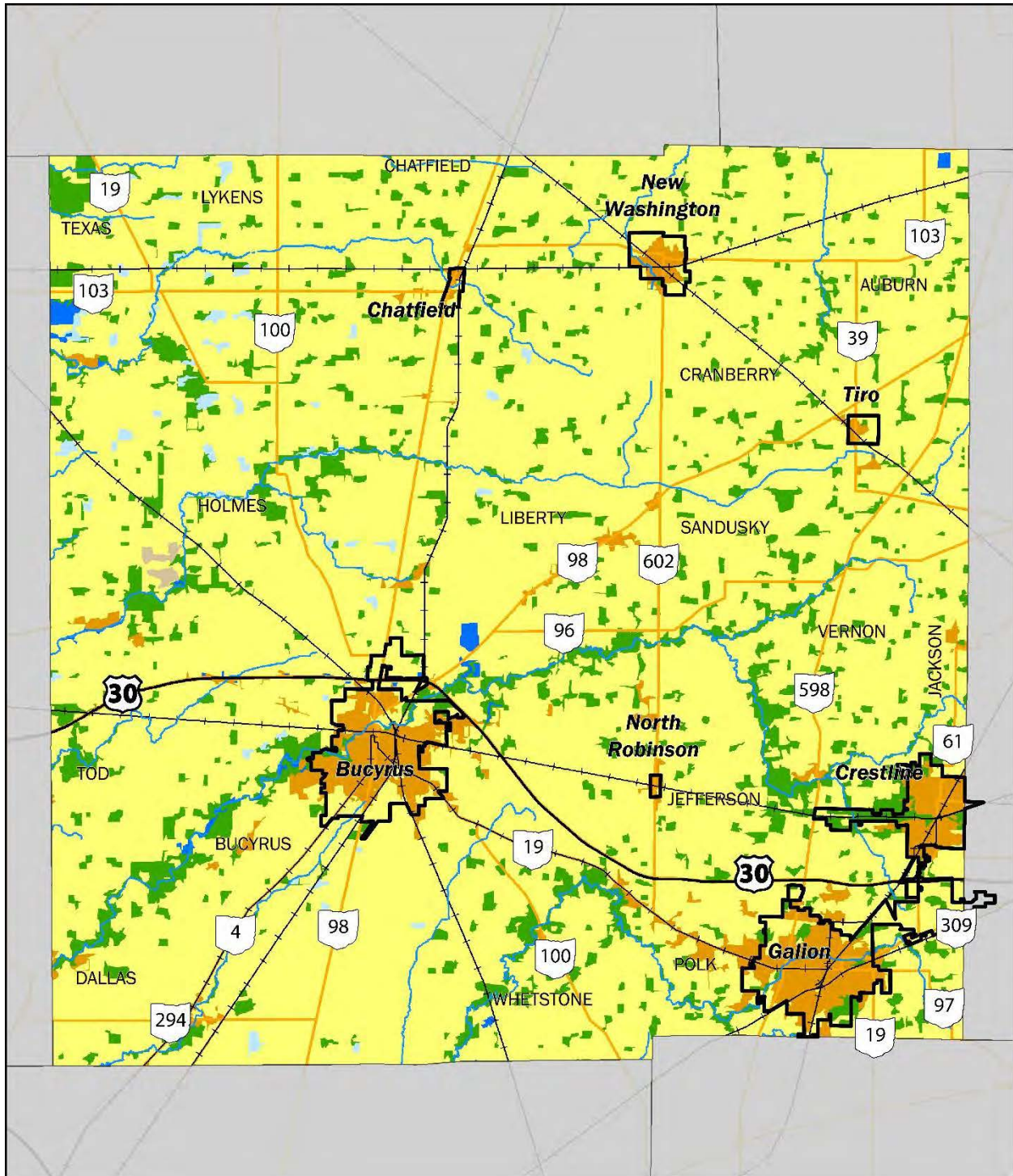
Figure 1.2: Crawford County Land Use Map



- | | | |
|--|--|---|
| Vacant Agriculture | Vacant Commercial | Government Owned |
| Active Agriculture | Active Commercial | Public/Quasi-Public |
| Vacant Industrial | Vacant Residential | Parks |
| Active Industrial | Active Residential | Transportation |

1 | INTRODUCTION

Figure 1.3: Crawford County Land Cover Map



1 | INTRODUCTION

Table 1.2: Crawford County Parks and Nature Areas

Park Name	Address
Lowe-Volk Park	2401 SR-598 Crestline, OH, 44827
Unger Park	1303 Bucyrus-Nevada Rd, Bucyrus, OH 44820
Sears Woods State Nature Preserve	1486 Mt Zion Rd, Bucyrus, OH 44820
Daughmer Prairie Savannah State Nature Preserve	786 Marion-Melmore Rd, Bucyrus, OH 44820
Heckert Nature Preserve	1601 SR 19, Bucyrus, OH 44820
Sandusky Wildlife Area	2035 River Rd, Bucyrus, OH 44820

2 | History and Demographics

2.1 History

Crawford County was established in February of 1820. The County is named after William Crawford, a soldier in the Revolutionary War. After the County was founded, many of its early settlers came from New England, New York, and Pennsylvania. In the decade following the founding, a large number of German immigrants settled in the County. Crawford County's borders changed several times in the first few decades after the County was founded. These changes can largely be attributed to the transfer of Native American land that was home to the Wyandot.

Crawford County has 27 properties registered in the National Register of Historic Places. There are a variety of information sources about the cultural resources and historical properties that provide more details about the unique history of Crawford County, including several historical societies and museums:

- Bucyrus Historical Society, Scrogg's House (**Figure 2.1**)
- Bucyrus Public Library
- Galion Public Library
- Crestline Public Library
- The Central Hotel (**Figure 2.2**)
- The Galion Train Depot (**Figure 2.3**)
- Bucyrus Commercial Historic District
- Crestline Shunk Museum
- The Howard Mansion
- Leesville Town Hall
- Brownella Cottage

Figure 2.1 Scrogg's House



Figures 2.2-2.3: The Central Hotel (left) and the Galion Train Depot (right)



2.2 Communication Outlets

Crawford County is served by several newspapers and periodicals, including:

- Crawford County Now
- Bucyrus Telegraph Forum
- Galion Inquirer
- The Crestline Advocate

2 | HISTORY AND DEMOGRAPHICS

Additional County communication outlets including websites, television, radio, and social media are listed in **Table 2.1**:

Table 2.1: Communication Outlets

Communication Type	Source
Website	http://www.crawford-co.org/
Twitter	https://twitter.com/crawfordemaohio
Facebook	https://www.facebook.com/CrawfordEMAOhio
Radio	WQEL- 92.7 FM - Local News Radio
	WOSU - 89.7 FM - National Public Radio

2.3 Demographics Overview

The 2017 American Community Survey, provided by the U.S. Census, offers population estimates for all townships and jurisdictions within Crawford County. **Table 2.2** displays the population estimates of Crawford County's townships for the 2010 Census compared to the estimates provided by the 2017 American Community Survey, as well as the expected percent change in population. These estimates show the population of Crawford County shrinking by 3.5 percent between 2010 and 2017. Furthermore, nine of the 16 townships are expected to shrink in population.

A more detailed description of population, housing, and income demographics for Crawford County and each jurisdiction are discussed on the following pages.

Table 2.2: County/Township population growth estimates between 2010 Census and 2017 American Community Survey

County/Township	Total Population 2010 Census	Total Population 2017 American Community Survey	2010-2017	
			Population Change	Percent Change
Crawford County	43,784	42,231	-1,553	-3.5%
Auburn Township	795	536	-259	-32.6%
Bucyrus Township	835	868	33	4.0%
Chatfield Township	724	671	-53	-7.3%
Cranberry Township	1,579	1,555	-24	-1.5%
Dallas Township	485	518	33	6.8%
Holmes Township	1,339	1,227	-112	-8.4%
Jackson Township	381	335	-46	-12.1%
Jefferson Township	1,576	1,580	4	0.3%
Liberty Township	1,369	1,322	-47	-3.4%
Lykens Township	660	424	-236	-35.8%
Polk Township	2,132	1,919	-213	-10.0%
Sandusky Township	459	615	156	34.0%
Texas Township	384	440	56	14.6%
Tod Township	677	671	-6	-0.9%
Vernon Township	832	882	50	6.0%
Whetstone Township	2,080	2,088	8	0.4%

2.4 Crawford County

Tables 2.3 to 2.5 summarize Crawford County’s population, housing statistics, and income statistics. The tables show that the County’s population declined by 1,553 people (3.5 percent) from 2010 to 2017. For housing units in the County, the majority of housing units in the County were occupied with a vacancy rate of 11.2 percent. Related to income, the largest percentage of Crawford County families (19.7 percent) made within \$50,000 to \$74,999 annually; 14.3 percent of families in Crawford County made less than \$15,000 annually.

Table 2.3: Crawford County Population Totals 2010-2017

Year & Source	Population Total
2010 Census	43,784
2011 American Community Survey Estimate	43,998
2012 American Community Survey Estimate	43,623
2013 American Community Survey Estimate	43,348
2014 American Community Survey Estimate	43,036
2015 American Community Survey Estimate	42,725
2016 American Community Survey Estimate	42,485
2017 American Community Survey Estimate	42,231

Table 2.4: Crawford County Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	20,084
Occupied Housing Units (Owned & Rented)	17,833
Vacant Housing Units (Owned & Rented)	2,251
Vacancy Rate of Owned Housing	10.9%
Vacancy Rate of Rental Housing	18.4%

Table 2.5: Crawford County Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	7.2%
\$10,000 to \$14,999	7.1%
\$15,000 to \$24,999	13.0%
\$25,000 to \$34,999	13.6%
\$35,000 to \$49,999	16.9%
\$50,000 to \$74,999	19.7%
\$75,000 to \$99,999	10.3%
\$100,000 to \$149,999	8.6%
\$150,000 to \$199,999	1.9%
\$200,000 or more	1.7%
Median Family Income	\$41,726
Mean Family Income	\$57,309

2.5 City of Bucyrus

Tables 2.6 to 2.8 summarize City of Bucyrus’s population, housing statistics, and income statistics. The tables show that the City’s population declined by 412 people (3.3 percent) from 2010 to 2017. For housing units, the City had higher homeowner and rental vacancy rates than the County (13.4 percent). Related to income, like the County, the largest percentage of families (19.6 percent) had an income between \$50,000 and \$74,999; 15.8 percent of families had an annual income of less than \$15,000.

Table 2.6: City of Bucyrus Population Totals 2010-2017

Year & Source	Population Total
2010 Census	12,362
2011 American Community Survey Estimate	12,413
2012 American Community Survey Estimate	12,306
2013 American Community Survey Estimate	12,235
2014 American Community Survey Estimate	12,140
2015 American Community Survey Estimate	12,045
2016 American Community Survey Estimate	12,011
2017 American Community Survey Estimate	11,950

Table 2.7: City of Bucyrus Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	6,148
Occupied Housing Units (Owned & Rented)	5,324
Vacant Housing Units (Owned & Rented)	824
Vacancy Rate of Owned Housing	1.5%
Vacancy Rate of Rental Housing	9.0%

Table 2.8: City of Bucyrus Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	7.2%
\$10,000 to \$14,999	8.6%
\$15,000 to \$24,999	15.3%
\$25,000 to \$34,999	15.3%
\$35,000 to \$49,999	17.3%
\$50,000 to \$74,999	19.6%
\$75,000 to \$99,999	8.3%
\$100,000 to \$149,999	6.2%
\$150,000 to \$199,999	1.2%
\$200,000 or more	1.2%
Median Family Income	\$38,272
Mean Family Income	\$51,518

2.6 City of Galion

Tables 2.9 to 2.11 summarize City of Galion’s population, housing statistics, and income statistics. The tables show that the City’s population declined by 343 people (3.3 percent) from 2010 to 2017. For housing units, the City had higher homeowner and rental vacancy rates than the County (13.2 percent). Related to income, the largest percentage of families (18.7 percent) had an income between \$25,000 and \$34,999; 17.4 percent of families had an annual income of less than \$15,000.

Table 2.9: City of Galion Population Totals 2010-2017

Year & Source	Population Total
2010 Census	10,512
2011 American Community Survey Estimate	10,604
2012 American Community Survey Estimate	10,471
2013 American Community Survey Estimate	10,404
2014 American Community Survey Estimate	10,314
2015 American Community Survey Estimate	10,227
2016 American Community Survey Estimate	10,245
2017 American Community Survey Estimate	10,169

Table 2.10: City of Galion Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	5,058
Occupied Housing Units (Owned & Rented)	4,388
Vacant Housing Units (Owned & Rented)	670
Vacancy Rate of Owned Housing	1.7%
Vacancy Rate of Rental Housing	3.6%

Table 2.11: City of Galion Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	8.0%
\$10,000 to \$14,999	9.4%
\$15,000 to \$24,999	15.5%
\$25,000 to \$34,999	18.7%
\$35,000 to \$49,999	15.7%
\$50,000 to \$74,999	16.6%
\$75,000 to \$99,999	6.8%
\$100,000 to \$149,999	7.8%
\$150,000 to \$199,999	1.0%
\$200,000 or more	0.5%
Median Family Income	\$33,566
Mean Family Income	\$50,739

2.7 Village of Chatfield

Tables 2.12 to 2.14 summarize Village of Chatfield’s population, housing statistics, and income statistics. The tables show that the Village’s population increased by 96 people (50.8 percent) from 2010 to 2017. For housing units, the Village had lower homeowner and rental vacancy rates than the County (7.6 percent). Related to income, the largest percentage of families (26.4 percent) had an income between \$35,000 and \$49,999; 11.8 percent of families had an annual income of less than \$15,000.

Table 2.12: Village of Chatfield Population Totals 2010-2017

Year & Source	Population Total
2010 Census	189
2011 American Community Survey Estimate	209
2012 American Community Survey Estimate	145
2013 American Community Survey Estimate	165
2014 American Community Survey Estimate	184
2015 American Community Survey Estimate	260
2016 American Community Survey Estimate	255
2017 American Community Survey Estimate	285

Table 2.13: Village of Chatfield Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	119
Occupied Housing Units (Owned & Rented)	110
Vacant Housing Units (Owned & Rented)	9
Vacancy Rate of Owned Housing	0.1%
Vacancy Rate of Rental Housing	0.1%

Table 2.14: Village of Chatfield Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	11.8%
\$10,000 to \$14,999	0.0%
\$15,000 to \$24,999	2.7%
\$25,000 to \$34,999	16.4%
\$35,000 to \$49,999	26.4%
\$50,000 to \$74,999	21.8%
\$75,000 to \$99,999	16.4%
\$100,000 to \$149,999	4.5%
\$150,000 to \$199,999	0.0%
\$200,000 or more	0.0%
Median Family Income	\$48,750
Mean Family Income	\$50,528

2.8 Village of Crestline

Tables 2.15 to 2.17 summarize Village of Crestline’s population, housing statistics, and income statistics. The tables show that the Village’s population declined by 168 people (3.6 percent) from 2010 to 2017. For housing units, the Village had lower homeowner and rental vacancy rates than the County (10.2 percent). Related to income, the largest percentage of families (18.1 percent) had an income between \$35,000 and \$49,999; 24.4 percent of families had an annual income of less than \$15,000.

Table 2.15: Village of Crestline Population Totals 2010-2017

Year & Source	Population Total
2010 Census	4,630
2011 American Community Survey Estimate	4,637
2012 American Community Survey Estimate	4,603
2013 American Community Survey Estimate	4,545
2014 American Community Survey Estimate	4,516
2015 American Community Survey Estimate	4,472
2016 American Community Survey Estimate	4,463
2017 American Community Survey Estimate	4,462

Table 2.16: Village of Crestline Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	2,131
Occupied Housing Units (Owned & Rented)	1,914
Vacant Housing Units (Owned & Rented)	217
Vacancy Rate of Owned Housing	2.4%
Vacancy Rate of Rental Housing	4.8%

Table 2.17: Village of Crestline Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	12.1%
\$10,000 to \$14,999	12.3%
\$15,000 to \$24,999	11.4%
\$25,000 to \$34,999	7.5%
\$35,000 to \$49,999	18.1%
\$50,000 to \$74,999	15.2%
\$75,000 to \$99,999	12.1%
\$100,000 to \$149,999	7.7%
\$150,000 to \$199,999	0.5%
\$200,000 or more	3.1%
Median Family Income	\$40,280
Mean Family Income	\$54,291

2.9 Village of New Washington

Tables 2.18 to 2.20 summarize Village of New Washington’s population, housing statistics, and income statistics. The tables show that the Village’s population increased by 85 people (8.8 percent) from 2010 to 2017. For housing units, the Village had lower homeowner and rental vacancy rates than the County (8.0 percent). Related to income, the largest percentage of families (27.6 percent) had an income between \$50,000 and \$74,999; 7.5 percent of families had an annual income of less than \$15,000.

Table 2.18: Village of New Washington Population Totals 2010-2017

Year & Source	Population Total
2010 Census	967
2011 American Community Survey Estimate	968
2012 American Community Survey Estimate	1,078
2013 American Community Survey Estimate	1,140
2014 American Community Survey Estimate	1,029
2015 American Community Survey Estimate	991
2016 American Community Survey Estimate	940
2017 American Community Survey Estimate	1,052

Table 2.19: Village of New Washington Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	452
Occupied Housing Units (Owned & Rented)	413
Vacant Housing Units (Owned & Rented)	39
Vacancy Rate of Owned Housing	0.1%
Vacancy Rate of Rental Housing	6.4%

Table 2.20: Village of New Washington Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	2.9%
\$10,000 to \$14,999	4.6%
\$15,000 to \$24,999	16.0%
\$25,000 to \$34,999	10.4%
\$35,000 to \$49,999	16.2%
\$50,000 to \$74,999	27.6%
\$75,000 to \$99,999	7.5%
\$100,000 to \$149,999	9.4%
\$150,000 to \$199,999	2.9%
\$200,000 or more	2.4%
Median Family Income	\$49,875
Mean Family Income	\$59,487

2.10 Village of North Robinson

Tables 2.21 to 2.23 summarize Village of North Robinson’s population, housing statistics, and income statistics. The tables show that the Village’s population increased by 69 people (33.7 percent) from 2010 to 2017. For housing units, the Village had lower homeowner and rental vacancy rates than the County (5.9 percent). Related to income, the largest percentage of families (32.8 percent) had an income between \$50,000 and \$74,999; 7.1 percent of families had an annual income of less than \$15,000.

Table 2.21: Village of North Robinson Population Totals 2010-2017

Year & Source	Population Total
2010 Census	205
2011 American Community Survey Estimate	198
2012 American Community Survey Estimate	169
2013 American Community Survey Estimate	134
2014 American Community Survey Estimate	188
2015 American Community Survey Estimate	241
2016 American Community Survey Estimate	243
2017 American Community Survey Estimate	274

Table 2.22: Village of North Robinson Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	136
Occupied Housing Units (Owned & Rented)	128
Vacant Housing Units (Owned & Rented)	8
Vacancy Rate of Owned Housing	0.1%
Vacancy Rate of Rental Housing	0.1%

Table 2.23: Village of North Robinson Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	5.5%
\$10,000 to \$14,999	1.6%
\$15,000 to \$24,999	14.1%
\$25,000 to \$34,999	14.8%
\$35,000 to \$49,999	29.7%
\$50,000 to \$74,999	32.8%
\$75,000 to \$99,999	0.0%
\$100,000 to \$149,999	1.6%
\$150,000 to \$199,999	0.0%
\$200,000 or more	0.0%
Median Family Income	\$47,727
Mean Family Income	\$43,209

2.11 Village of Tiro

Tables 2.24 to 2.26 summarize Village of Tiro’s population, housing statistics, and income statistics. The tables show that the Village’s population decreased by 96 people (2.1 percent) from 2010 to 2017. For housing units, the Village had higher homeowner and rental vacancy rates than the County (37.0 percent). Related to income, the largest percentage of families (19.0 percent) had an income between \$50,000 and \$74,999; 32.7 percent of families had an annual income of less than \$15,000.

Table 2.24: Village of Tiro Population Totals 2010-2017

Year & Source	Population Total
2010 Census	280
2011 American Community Survey Estimate	286
2012 American Community Survey Estimate	287
2013 American Community Survey Estimate	202
2014 American Community Survey Estimate	195
2015 American Community Survey Estimate	203
2016 American Community Survey Estimate	197
2017 American Community Survey Estimate	176

Table 2.25: Village of Tiro Housing Statistics 2017 Estimate

Housing Statistics	Number
Total Housing Units	92
Occupied Housing Units (Owned & Rented)	58
Vacant Housing Units (Owned & Rented)	34
Vacancy Rate of Owned Housing	22.9%
Vacancy Rate of Rental Housing	0.1%

Table 2.26: Village of Tiro Income Statistics 2017 Estimate

Family Income Statistics	Percentage of Households
Less than \$10,000	10.3%
\$10,000 to \$14,999	22.4%
\$15,000 to \$24,999	10.3%
\$25,000 to \$34,999	13.8%
\$35,000 to \$49,999	15.5%
\$50,000 to \$74,999	19.0%
\$75,000 to \$99,999	3.4%
\$100,000 to \$149,999	0.0%
\$150,000 to \$199,999	3.4%
\$200,000 or more	1.7%
Median Family Income	\$32,500
Mean Family Income	\$72,124

3 | Planning Process

3.1 Methodology

The Planning Process chapter describes the steps involved in the development of the Crawford County Hazard Mitigation Plan, including details about who participated, how community involvement was organized and promoted throughout the community, what hazards were included in the Plan and why, as well as how stakeholder involvement played a critical role in the planning process. This chapter will also explain how the Core Planning Committee was formed and how member feedback contributed to the updating of the County’s Hazard Mitigation Plan.

3.2 Existing Plans and Regulations

Crawford County maintains several plans that were pertinent to reference in the development of the 2019 Hazard Mitigation Plan, including:

- Crawford County Emergency Operations Plan (2011)
- Crawford County Natural Hazard Mitigation Plan (2015)
- Crawford County Hazard & Vulnerability Assessment (2016)
- Crawford County Floodplain Regulations
- Crawford County Land Use Plan
- Ohio Enhanced Mitigation Plan (2014)
- Draft State of Ohio Hazard Mitigation Plan (2019)

3.3 Crawford County Authority to Adopt Plan

Table 3.1 lists the existing authorities and regulations in place in Crawford County and its municipalities.

Table 3.1: Existing Authorities and Regulations in Crawford County’s Municipalities
(Source: 2015 Crawford County Local Hazard Mitigation Plan)

Community	Planning Commission	Comprehensive Plan	Floodplain Regulation	Building Codes	Zoning Ordinances	Capital Budget	Public Works Budget
Crawford County	County Shared	County Shared	Yes	Yes	No	None	None
City of Bucyrus	County Shared	County Shared	Yes	Yes	Yes	None	None
City of Galion	County Shared	County Shared	Yes	Yes	Yes	None	None
Village of Chatfield	County Shared	County Shared	No	Yes	No	None	None
Village of Crestline	County Shared	County Shared	Yes	Yes	Yes	None	None
Village of New Washington	County Shared	County Shared	No	Yes	Yes	None	None
Village of North Robinson	County Shared	County Shared	No	Yes	No	None	None
Village of Tiro	County Shared	County Shared	No	Yes	No	None	None

3.4 Local Jurisdiction Participation & Notification Process

Core Planning Committee members were invited to participate at the beginning of the planning process through a Kickoff Meeting announcement. Prior to each additional meeting, members of the Core Planning Committee were invited to participate via an email notification. Additionally, press releases were issued via *Crawford County Now*. Representatives from the following entities were invited to participate in the planning process. Additionally, **Table 3.2** lists the participating jurisdictions and representatives and how they participated.

Crawford County

- Crawford County Commissioners
- Crawford County Park District
- Crawford County Auditor
- Crawford County Geographic Information System (GIS)
- Crawford County Engineers
- Crawford County Public Health
- Crawford County Sheriff's Office
- Crawford County Soil and Water Conservation District
- Crawford Partnership
- Local Emergency Planning Committee (LEPC)

City and Village Members

- City of Bucyrus
- City of Galion
- Village of Chatfield
- Village of Crestline
- Village of New Washington
- Village of North Robinson
- Village of Tiro

Township Members

- Auburn Township
- Bucyrus Township
- Chatfield Township
- Cranberry Township
- Dallas Township
- Holmes Township
- Jackson Township
- Jefferson Township
- Liberty Township
- Lykens Township
- Polk Township
- Sandusky Township
- Texas Township
- Tod Township
- Vernon Township
- Whetstone Township

Local Schools and Universities

- Buckeye Central Local Schools
- Bucyrus City Schools
- Colonel Crawford Local Schools
- Crestline Exempted Village Schools
- Crestline St. Joseph Catholic School
- Galion City Schools
- St. Bernard School
- Wayside Christian School
- Wynford Local Schools
- Crawford County OSU Extension

Private Organizations

- Avita Health
- Bucyrus Telegraph Forum
- Central Ohio Trauma System (COTS)
- First Energy

Other County and State Agencies

- Ohio Department of Transportation (ODOT)
- Marion County Emergency Management Agency
- Seneca County Emergency Management Agency

3 | PLANNING PROCESS

Table 3.2: Participating Jurisdictions

Community/Organization	Representative(s)	Meetings Attended
<i>County</i>		
Crawford County Auditor's Office	Kyle Hartman, GIS Director	1 & 2
Crawford County Commissioners	Tim Ley, Commissioner Mo Ressallat, Commissioner Doug Weisenauer, Commissioner	1 & 2
Crawford County Emergency Management Agency	Kirk Williamson, Director Jette Cander, Deputy Director	1 & 2
Crawford County Engineer's Office	Mark Baker, County Engineer	1
Crawford County Public Health	Blythe Buurma, Emergency Preparedness Coordinator/Sanitarian Kate Siefert, Health Commissioner	1 & 2
Crawford County Soil & Water Conservation District	Mike Hall, Program Administrator	1 & 2
Crawford Partnership	Gary Frankenhouse, Executive and Economic Development Director Sarah Herrle, Marketing and Project Coordinator	1 & 2
Local Emergency Planning Committee (LEPC)	Michael Jacobs Richard Rockwell Jane Phenicie	1 & 2
<i>Cities and Villages</i>		
City of Bucyrus	Jeff Reser, Mayor Jeff Wagner, SSD David Koepke, Chief of Police Chad Schwemley, Fire Captain	2
City of Galion	Brian Saterfield, Police Chief Audrea Barnes, Director of EH, Galion City Health Department Lauren Fricke, Intern, Galion City Health Department	1 & 2
Village of Chatfield	Scott Bishop, Mayor	2
Village of Crestline	John Rostash, Village Administrator Matt Henderson, Superintendent, Crestline EVSD	1 & 2 & *
Village of New Washington	Jeremy Schick, Police Chief Mark Heefner, Chief of VFD	1 & 2
Village of North Robinson	Larry T. Rayborn, Mayor	*
Village of Tiro	Ronald Brown, Mayor	*

*These representatives were unable to attend the Core Planning Committee meetings in person, so they participated via the online surveys and through direct conversations with the County Emergency Management Agency Director, Kirk Williamson, as documented in **Appendix F**.

In addition to these County and jurisdiction representatives, Sarah McNamee and John Spahr, the Emergency Management Agency Directors from both Marion and Seneca counties, respectively, attended the first planning meeting. Sarah McNamee also attended the second planning meeting.

3.5 Meetings

The following section details the meetings that took place during the planning process. Documentation of each meeting, including newspaper postings, email announcements and attachments, meeting materials, and completed surveys can be found in **Appendix F**.

3.5.1 Core Planning Committee Kickoff

A Kickoff Announcement was emailed to stakeholders on June 19, 2019, inviting them to participate in the 2019 Crawford County Hazard Mitigation Plan update process as part of the Core Planning Committee. The Announcement outlined the following details regarding the planning process:

- Goals of the Hazard Mitigation Plan.
- A summary of who is involved in the planning process.
- Federal requirements of the hazard mitigation planning process.
- An overview of the hazard mitigation planning process.
- The proposed schedule for the Crawford County Plan update.
- The role of the Core Planning Committee in the update process.
- Contact information for both Crawford County Emergency Management Agency and Burton Planning Services.
- Dates and times of the Core Planning Meetings on July 23, 2019 at 3:30PM and August 20, 2019 at 3:30 PM.

3.5.2 Core Planning Committee Meeting 1

The first Core Planning Committee meeting took place on Tuesday, July 23, 2019 at 3:30 PM in the Lower Level Conference Room at the Crawford County Courthouse (112 E. Mansfield Street, Bucyrus, Ohio 44820). This meeting was announced to the Core Planning Committee via email and a press release was issued to *Crawford County Now* on July 15, 2019. The public was also notified via social media (see **Appendix F** for all meeting notices documentation).

A total of 28 people attended this meeting, including two representatives from the Crawford County Emergency Management Agency and two representatives from Burton Planning Services. One member of the media (*Bucyrus Telegraph Forum*) was also present.

The meeting began with a brief introduction from Crawford County Emergency Management Agency Director, Kirk Williamson, who introduced Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then guided the attendees through a presentation which detailed the hazard mitigation planning process, including requirements of the planning process, potential hazards that could be addressed, benefits of hazard mitigation planning, and potential types of projects that could be federally funded as a result of the hazard mitigation plan. Ms. van der Zwaag also described the role that the Core Planning Committee would serve in the development of the 2019 Crawford County Hazard Mitigation Plan.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through the following surveys:

1. Goals Survey

The purpose of this survey was to reflect on the goals included in the 2014 Natural Hazard Mitigation Plan to determine if they were still relevant to the 2019 Plan. Each attendee reviewed the previous goals and determined if they were still applicable, provided comments or edits to the goals that needed changed, and generated new goals to potentially be included in the Plan.

Following the completion of the survey, Ms. van der Zwaag guided a discussion on which goals were not relevant. Attendees discussed the need to make the goals specific, measurable, attainable, relevant, and timely (SMART), and noted that if the 2019 Hazard Mitigation Plan will include man-made hazards in addition to natural hazards, the goals will need to be updated to reflect that change.

2. Hazard Priority Survey

The purpose of this survey was to review all hazards that could be included in the 2019 Hazard Mitigation Plan and prioritize them. As such, attendees were asked to rate each hazard on a scale of zero to five, with five meaning the hazard poses the greatest possible threat to the County or their community and zero meaning the hazard should not be included in the 2019 Plan. Attendees rated hazards that were included in the 2014 Natural Hazard Mitigation Plan, as well as other potential hazards that could be included in the 2019 Plan.

Following the completion of this survey, Ms. van der Zwaag guided a discussion on which hazards were deemed most important and which hazards attendees did not think needed to be included. Several attendees indicated there is no need to discuss mine subsidence or hurricanes, as there are neither old mines in the County nor hurricanes or tropical storms. Others suggested the remnants of the hurricanes and tropical storms that the County experiences as severe weather can be incorporated into the severe storms hazard assessment.

3. Previous Mitigation Actions Status and Scoring Matrix

The purpose of the Previous Mitigation Actions survey was to have attendees review the mitigation actions that were included in the 2014 Natural Hazard Mitigation Plan, reflect on the status of each action, and determine if that action should be included in the 2019 Hazard Mitigation Plan. If attendees indicated that the mitigation action should be carried forward into the new plan, attendees were asked to score the mitigation action in five areas: cost effective, technically feasible, environmentally sound, immediate need, and total risk reduction. These scores were used to determine the priority of all mitigation actions that are included in this 2019 Hazard Mitigation Plan.

Following the completion of the meeting, an article was included in the *Bucyrus Telegraph Forum* describing the events of the meeting and encouraging the public to attend the next public meeting on August 20, 2019 (see article in **Appendix F**).

3.5.3 Public Meeting 1

The first Public Meeting took place on Tuesday, July 23, 2019 at 5:30 PM in the Lower Level Conference Room at the Crawford County Courthouse (112 E. Mansfield Street, Bucyrus, Ohio 44820). This meeting was advertised to the public through a press release via *Crawford County Now* on July 15, 2019, as well as through social media (**Appendix F**).

A total of 12 people attended, including two representatives from the Crawford County Emergency Management Agency and two representatives from Burton Planning Services.

The meeting began with a brief introduction from Crawford County Emergency Management Agency Director, Kirk Williamson, who introduced Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then guided the attendees through a presentation which detailed the hazard mitigation planning process, including requirements of the planning process, potential hazards that could be addressed, benefits of hazard mitigation planning, and potential types of projects that could be federally funded as a result of the Hazard Mitigation Plan.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through the Goals Survey, the Hazard Priority Survey, and the Previous Mitigation Action Status and Scoring Matrix, which are described above.

Several attendees at the Public Meeting were members of the Core Planning Committee who were unable to attend the 3:30 PM meeting on the same day. These members included representatives of townships and jurisdictions within Crawford County.

3.5.4 Core Planning Committee Meeting 2

The second Core Planning Committee meeting took place on Tuesday, August 20, 2019 at 3:30 PM in the Lower Level Conference Room at the Crawford County Courthouse (112 E. Mansfield Street, Bucyrus, Ohio 44820). A total of 24 people attended, including two representatives from the Crawford County Emergency Management Agency and two representatives from Burton Planning Services.

The meeting began with a brief introduction from Crawford County Emergency Management Agency Director, Kirk Williamson, who introduced Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then provided an update on the hazard mitigation planning process, including requirements of the planning process and results from the Hazard Priority survey distributed at the previous meeting.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through a New Mitigation Actions Scoring Matrix to determine which mitigation actions attendees would like to see in their community to mitigate the impacts of hazards. Attendees were provided a list of proposed mitigation actions, including blank rows for adding other actions, and were asked if the action was relevant to their community. If attendees indicated that the mitigation action was relevant, attendees were asked to score the mitigation action in five areas: cost effective, technically feasible, environmentally sound, immediate need, and total risk reduction. These scores were used to determine the priority of mitigation actions included in this 2019 Hazard Mitigation Plan.

3.5.5 Public Meeting 2

The second Public Meeting took place on Tuesday, August 20, 2019 at 5:30 PM in the Lower Level Conference Room at the Crawford County Courthouse (112 E. Mansfield Street, Bucyrus, Ohio 44820). A total of eight people attended, including two representatives from the Crawford County Emergency Management Agency and two representatives from Burton Planning Services.

The meeting began with a brief introduction from Crawford County Emergency Management Agency Director, Kirk Williamson, who introduced Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then provided an update on the hazard mitigation planning process, including requirements of the planning process and results from the Hazard Priority survey distributed at the previous meeting.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through a New Mitigation Actions Scoring Matrix to determine which mitigation actions attendees would like to see in their community to mitigate the impacts of hazards. Attendees were provided a list of proposed mitigation actions, including blank rows for adding other actions, and were asked if the action was relevant to their community. If attendees indicated that the mitigation action was relevant, attendees were asked to score the mitigation action in five areas: cost effective, technically feasible, environmentally sound, immediate need, and total risk reduction. These scores were used to determine the priority of mitigation actions included in this 2019 Hazard Mitigation Plan.

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Several attendees at the Public Meeting were members of the Core Planning Committee who were unable to attend the 3:30 PM meeting on the same day. These members included representatives of townships and jurisdictions within Crawford County.

3.6 Public Comment Period

The 2019 Crawford County Hazard Mitigation Plan was presented for 15 days of public feedback online at <https://burtonplanning.com/crawford-co-hmp> from September 9, 2019 through September 24, 2019. This link was also made available to the public via Facebook and Twitter. Both the public and stakeholders were invited to review the Final Draft Plan through this link and provide comments via SurveyMonkey online. There was also a printed copy of the Plan available at the Crawford County Emergency Management Agency Office, along with a paper copy of the survey. In total, 12 responses were recorded through SurveyMonkey. These can be reviewed in Appendix F.

3.7 Planning Process

Stakeholder and public input were essential for determining the hazard prioritization, as well as which hazards were included or excluded from the Plan. Based on feedback from the Core Planning Committee, it was determined that landslides and mine subsidence were not hazards of concern to Crawford County and its communities. As such, these hazards were not included in the plan. Other hazards, such as coastal erosion and coastal flooding are not applicable to Crawford County and have not been included in previous hazard mitigation plans. More details about how survey feedback assisted in the determination of which hazards to exclude can be found in **Chapter 5, Hazard Mitigation**.

Chapter 4, Hazard Identification and Risk Assessment, follows this chapter. Please note that **Chapter 4** is organized alphabetically and not in order of risk. The ranking of hazard priorities can be found in **Chapter 5, Hazard Mitigation**.

4 | Hazard Identification and Risk Assessment

4.1 Dam Failure

4.1.1 Description

FEMA defines a dam as “any artificial barrier of at least a minimum size, including appurtenant works that impounds or diverts water or liquid-borne solids on a temporary or long-term basis.” Dam failure occurs when that impounded water is suddenly released in an uncontrollable manner. A dam/levee failure can result in the uncontrolled release of floodwaters downstream of a facility. Water released from the dam during failure will always flow downhill, and the resulting flood wave can cause significant damage to buildings and infrastructure downstream. The unexpected nature of the flood wave also increases the likelihood of loss of life in the impacted area due to reduced warning times.

Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam.
- Structural failure of materials used in dam construction.
- Movement and/or failure of the foundation supporting the dam.
- Settle and cracking of concrete or embankment dams.
- Inadequate maintenance and upkeep.
- Deliberate acts of sabotage.

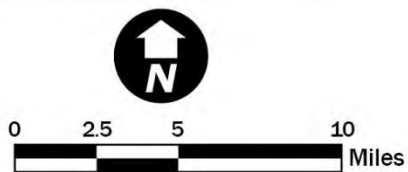
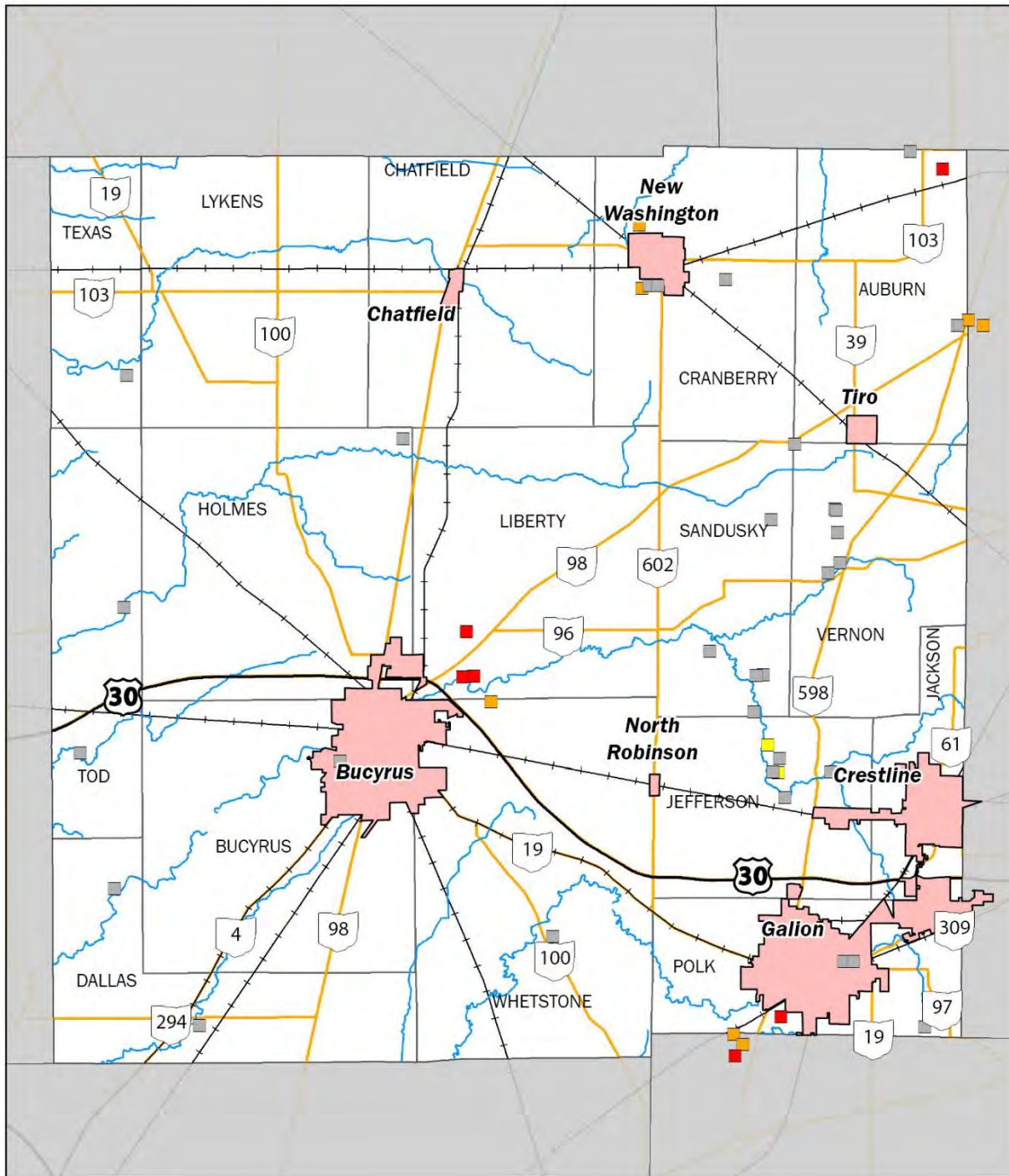
According to Ohio Administrative Code Rule 1501:21-13-01 (2010), dams are classified as either Class I - IV based on the following criteria:

- **Class I:** Dams having a total storage volume greater than 5,000 acre-feet or a height of greater than 60 feet.
- **Class II:** Dams having a total storage volume greater than 500 acre-feet or a height of greater than 40 feet.
- **Class III:** Dams having a total storage volume greater than 50 acre-feet or a height of greater than 25 feet.
- **Class IV:** Dams having a total storage volume of 50 acre-feet or less and a height of 25 feet or less.

4.1.2 Location

Dam locations can be seen in **Figure 4.1.1**. Dam locations and properties are also listed in **Table 4.1.1**.

Figure 4.1.1: Dam Locations in Crawford County, Ohio



4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Table 4.1.1: Dams in Crawford County, Ohio

Class	Name	Owner	Impoundment	Length	Height	Pool Area (Acres)	Volume (acres/feet)	EAP (as of 9/26/19)
I	Celeryville Upground Reservoir	Celeryville Conservancy District	Upground	6928	22	75	1488	No
I	Bucyrus Upground Reservoir	City of Bucyrus	Upground	10060	29	150	4626	No
I	Bucyrus Reservoir No. 3 Dam	City of Bucyrus	Upground	5131	31.5	30.1	695	No
I	Bucyrus Reservoir No. 1 Dam	City of Bucyrus	Dam and Spillway	1070	17.6	35	878	No
I	Powers Upground Reservoir	City of Galion	Upground	4344	28	27.5	612	No
I	Amicks Upground Reservoir	City of Galion	Upground	4500	40	55.9	1035	No
II	New Washington WWT Lagoon	Village of New Washington	Upground	4800	13	14.3	150	Approved 11/16/18
II	Obringer Upground Reservoir	Village of New Washington	Upground	1490	13	2.7	34.3	Approved 11/16/18
II	Cooke Pond No. 2 Dam	Walnut Grain Farms, LLC	Dam and Spillway	850	13	17.5	171	No
II	Cooke Pond No. 1 Dam	Ronald Cooke, Sr.	Dam and Spillway	975	16.5	7.3	63.7	No
II	Bucyrus Reservoir No. 2 Dam	City of Bucyrus	Dam and Spillway	500	23	40	420	No
II	Amann Reservoir Dam	City of Galion	Dam and Spillway	550	32	17.4	262	No
II	Amann Reservoir Upper Dam	City of Galion	Dam and Spillway	300	22.4	11.6	220	No
III	Big Pine Lake Dam	Dennis W. Williams	Dam and Spillway	315	28.29	3.5	54.9	No
III	Lockhart Lake Dam No. 2	Lanny Brown & Jane Brown	Dam and Spillway	205	21.8	3.6	37.2	No
III-EXE	Lake Galion Dam	Lake Galion Club, Inc.	Dam and Spillway	337	14.5	9.7	63.8	No (exempt from inspections but still required to have EAP)
Other	Unknown	Null	Dam and Spillway	Null	10	2	Null	Not required

4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Class	Name	Owner	Impoundment	Length	Height	Pool Area (Acres)	Volume (acres/feet)	EAP (as of 9/26/19)
Other	Unknown	Null	Dam and Spillway	Null	10	2	Null	Not required
Other	Sunset Springs Lake Dam	Gerlo Corporation	Dam and Spillway	225	15	1.4	Null	Not required
Other	Gray Lake Dam	Richard Gray	Dam and Spillway	440	12.5	1	5.4	Not required
Other	Burris Lake Dam	James Burris	Dam and Spillway	600	10	1	4	Not required
Other	Unknown	Null	Dam and Spillway	Null	10	3	Null	Not required
Other	Barnett Lake Dam	Tom Barnett	Dam and Spillway	Null	13	Null	3.8	Not required
Other	Long Lake Dam	Donald Long	Dam and Spillway	420	15	2.9	31.6	Not required
Other	Sugar Grove Lake Dam	Sugar Grove Lake Corporation	Dam and Spillway	350	14	13	109	Not required
Other	Unknown	Null	Dam and Spillway	Null	25	4	Null	Not required
Other	New Washington Upground Reservoir No. 2 (West)	Cliff Alt	Upground	1840	9.8	4.4	38.4	Not required
Other	New Washington Upground Reservoir No. 1 (East)	Cliff Alt	Upground	1520	11.5	2.9	39	Not required
Other	Heydinger Lake Dam	Glen Heydinger	Dam and Spillway	600	8.5	2.3	13.2	Not required
Other	Unknown	Null	Dam and Spillway	Null	15	4	Null	Not required
Other	Unknown	Null	Dam and Spillway	Null	10	1	Null	Not required
Other	Dean Lake Dam	Ralph Dean	Dam and Spillway	550	10.5	1.1	5.9	Not required
Other	Shealy Lake Dam	Alton Shealy	Dam and Spillway	575	11.4	1.7	15.5	Not required
Other	Niese Lake I Dam	Jerry Niese	Dam and Spillway	530	13	3.1	20	Not required
Other	Niese Lake II Dam	Jerry Niese	Dam and Spillway	160	13.4	1	7.9	Not required
Other	Unknown	Null	Dam and Spillway	Null	10	2.5	Null	Not required
Other	Kime Pond Dam	Lawrence A. Kime	Dam and Spillway	Null	18	3	Null	Not required
Other	Warrington Lake Dam	Robert Warrington	Dam and Spillway	500	12.5	2	20.4	Not required

4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Class	Name	Owner	Impoundment	Length	Height	Pool Area (Acres)	Volume (acres/feet)	EAP (as of 9/26/19)
Other	Michael Lake Dam	Walter Michael	Dam and Spillway	Null	10	2	Null	Not required
Other	Sawyer Lake II Dam	Dr. T.G. Sawyer	Dam and Spillway	Null	12	4	Null	Not required
Other	Sawyer Lake I Dam	Dr. T.G. Sawyer	Dam and Spillway	Null	10	2	Null	Not required
Other	Coon Hunters Lake Dam	Crawford County Coon Hunters, Inc.	Dam and Spillway	900	22	4	40.9	Not required
Other	Studer Lake Dam	William Studer	Dam and Spillway	200	23.2	2	17.9	Not required
Other	Lockhart Lake No. 1 Dam	Edgar Trent	Dam and Spillway	340	21	5	48.2	Not required
Other	Pabst Lake Dam	Egon Loschinkohl	Null	Null	4	Null	Null	Not required
Other	Unnamed Lake Dam	Null	Dam and Spillway	Null	10	5	Null	Not required
Other	Unknown	Null	Dam and Spillway	Null	10	4	Null	Not required
Other	Dolland Lake Dam	Joe Dolland	Dam and Spillway	1130	10.5	3	16.8	Not required

4.1.3 Extent

Sudden failures of Class I dams would increase the probability that one of the following conditions would result:

- Loss of human life
- Structural collapse of at least one residence or one commercial or industrial business

Sudden failures of Class II dams would result in at least one of the following conditions:

- Disruption of a public water supply or wastewater treatment facility, release of health hazardous industrial or commercial waste, or other health hazards.
- Flooding of residential, commercial, industrial, or publicly owned structures.
- Flooding of high-value property.
- Damage or disruption to major roads including but not limited to interstate and state highways, and the only access to residential or other critical areas such as hospitals, nursing homes, or correction facilities as determined by the chief.
- Damage or disruption to railroads or public utilities.
- Damage to downstream Class I, II, or III dams or levees, or other dams or levees of high value. Damage to dams or levees can include, but not be limited to, overtopping of the structure.

Sudden failures of Class III dams would result in at least one of the following conditions:

- Property losses including but not limited to rural buildings not otherwise described in the Ohio Administrative Code Rule 1501:21-12-01 (2010), and Class IV dams and levees not otherwise listed as high-value properties in this rule.

- Damage or disruption to local roads including but not limited to roads not otherwise listed as major roads.

Sudden failures of Class IV dams would result in property losses restricted mainly to the dam and rural lands; the loss of human life is not probable.

4.1.4 History

There were no reported dam failures in Crawford County.

4.1.5 Probability

As there are no reported dam failures in Crawford County; future dam failures are unlikely but not impossible. Additionally, since there are no historic dam failure events have occurred in the County, the annualized damages associated with this hazard average to \$0 per year.

4.1.6 Vulnerability Assessment

Infrastructure Impact

There are six Class I dams in Crawford County; Class I dam failure can cause structural collapse. There are seven Class II dams in Crawford County; Class II dam failure could flood roadways, including local roads. Utility infrastructure may also be negatively impacted by Class II dam failures, including wastewater treatment plants and the local water supply.

Population Impact

The local population could be impacted by loss of utilities, including the local water supply. Health hazards may also be released into the flood waters during a dam failure which may cause indirect harm to the local population.

Property Damage

Class I and II dam failure has the potential to damage high value properties. Residential, commercial, and industrial properties may be damaged, as well as publicly owned properties. (Properties that are owned by the dam owner may be exempt from the property damage calculation.)

Loss of Life

Loss of life is possible in a Class I dam failure. Loss of life is unlikely but not impossible in the dam failure of the other classes.

Economic Losses

Economic losses can include damages from flooding crops, damaged goods, and the flooding of vital roadways.

Emergency Action Plans (EAPs) have been completed for some of the dams in Crawford County; however, the data is subject to agreements where it cannot be published publicly. The Ohio Department of Natural Resources holds record of these EAPs.

4.1.7 Land Use and Development Trends

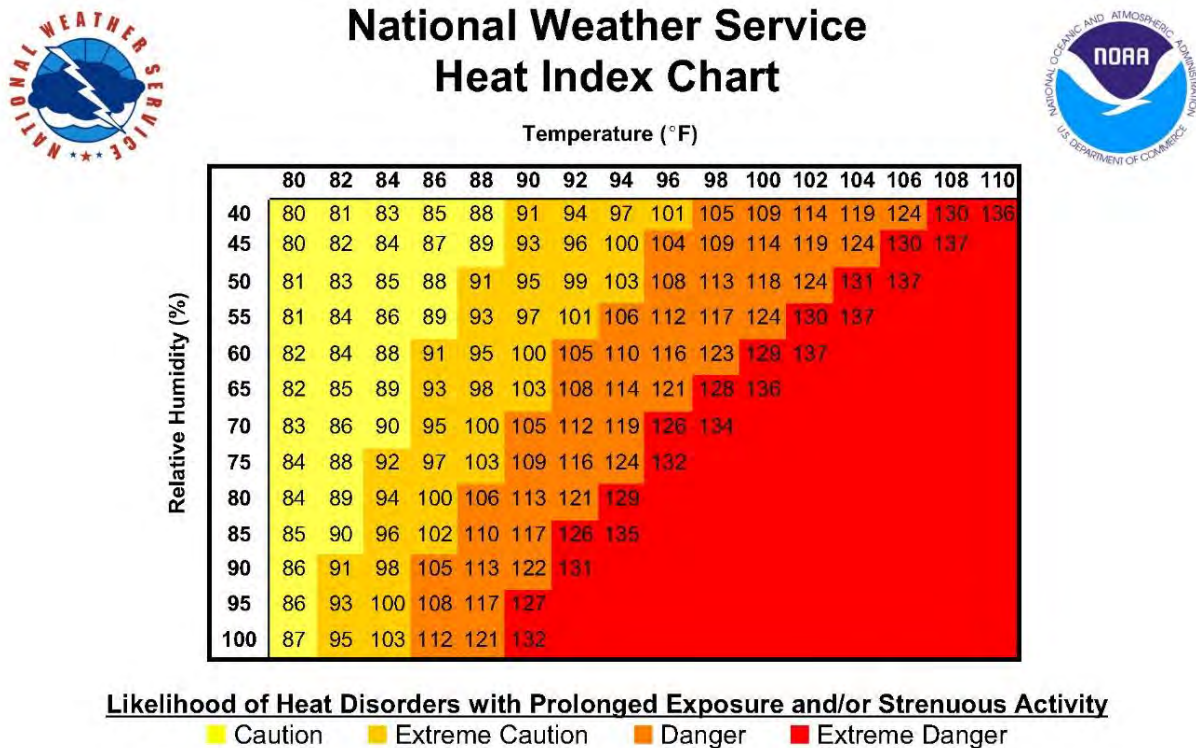
Development that has occurred in areas that will flood after a dam failure should be prepared for rapid flooding. Land use plans can limit development in these areas.

4.2 Drought and Extreme Heat

4.2.1 Description

According to the states of New York, Washington, and California, temperatures that hover over ten degrees or more above the average high temperature for the region and last for several days are considered Extreme Heat. Humid conditions, which add to the discomfort of high temperatures, occur when a high-pressure weather system traps hazy, moist air near the ground. Extreme heat may also contribute to the formation of a drought if moisture and precipitation are lacking. The National Weather Service’s Heat Index Chart is provided in Figure 4.2.1.

Figure 4.2.1: Heat Index Chart (Source: National Weather Service)



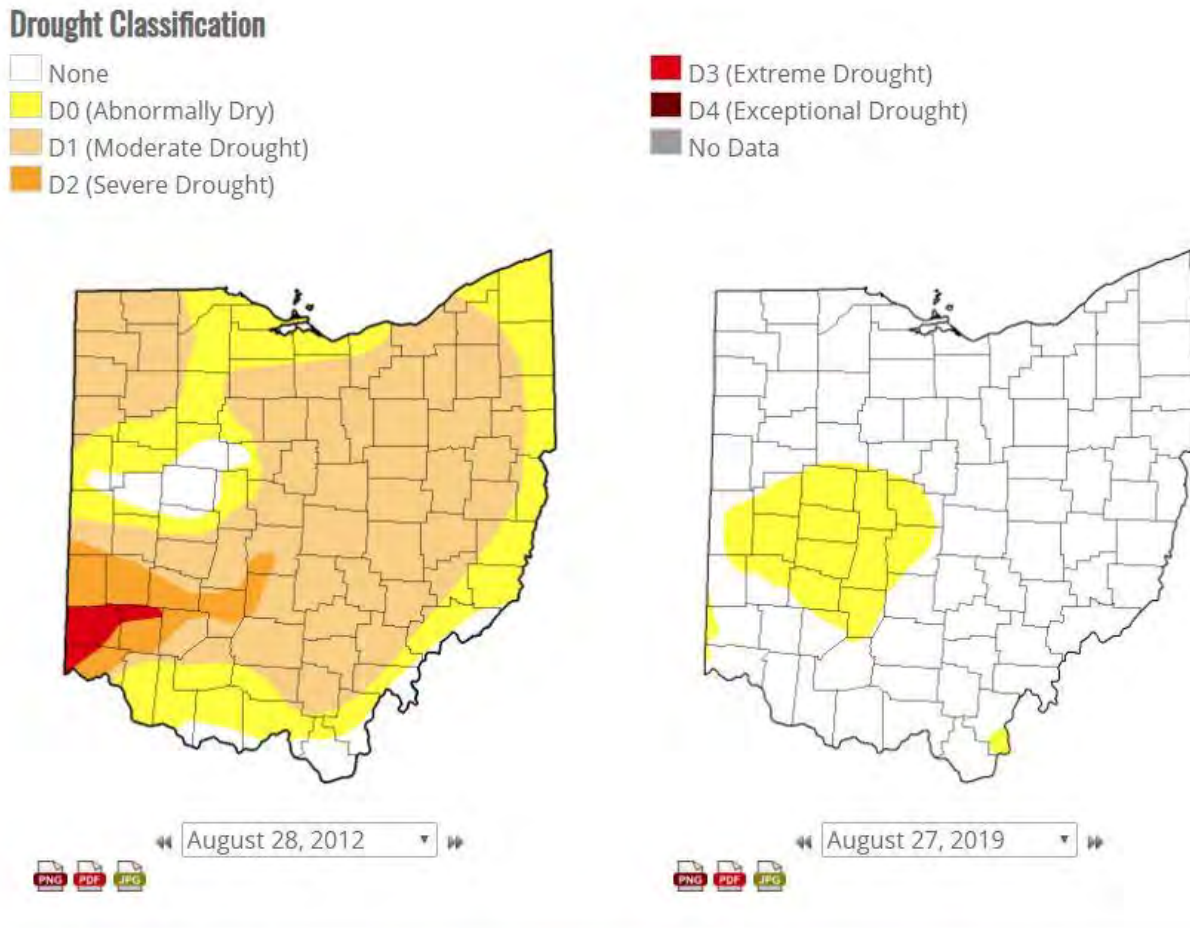
A drought is a shortage in atmospheric moisture or precipitation over an extended period of time. Droughts are common throughout all climatic zones and can range in length from a couple weeks to multiple years or decades in some areas. According to the National Oceanic and Atmospheric Administration (NOAA), there are three common types of drought: Meteorological, Agricultural, and Hydrological.

Meteorological drought severity is calculated by the amount of the rainfall deficit (compared to annual averages) and the length of the dry period. Agricultural drought is based on the effects to agriculture by factors such as rainfall and soil water deficits or diminished groundwater/reservoir levels needed for irrigation. Hydrological drought is based on the effects of rainfall shortages on the water supply, such as stream flow, reservoir and lake levels, and groundwater table decline.

4.2.2 Location

Drought (and extreme heat) is a countywide hazard that can affect all locations and jurisdictions in Crawford County. More specifically, this hazard typically occurs at a regional scale. Droughts most commonly occur in Ohio from spring through autumn; however, they may occur at any time throughout the year. **Figure 4.2.2** depicts the Drought Monitor for the State of Ohio for August 28, 2012 compared with the Drought Monitor for August 27, 2019, as well as the associated statistics comparison for the percent area of the State of Ohio that were experience the associated drought conditions. The drought in the summer of 2012 was one of the worst on record for Crawford County and is described in more detail below.

Figure 4.2.2: Drought Monitor for the State of Ohio, 2012 and 2019



Statistics Comparison

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
2012-08-28	6.61	93.39	65.23	7.57	1.64	0.00	168
2019-08-27	86.74	13.26	0.00	0.00	0.00	0.00	13
Change	80.13	-80.13	-65.23	-7.57	-1.64	0.00	-155

*The Statistics Comparison above is calculated as a percent area in those drought conditions.

4.2.3 Extent

Due to the widespread nature of extreme heat events, all structures, croplands, and infrastructure may experience impacts. All residents of the County may also be impacted, especially at-risk populations that are more susceptible. The elderly and infants are the most vulnerable populations for extreme heat.

The most common symptoms caused by extreme heat, according to the Centers for Disease Control (CDC), include:

- **Heat Cramps** are muscle spasms, often in the abdomen, arms, or calves, caused by a large loss of salt and water in the body. Heat cramps can occur from prolonged exposure to extreme heat combined with dehydration, and they commonly happen while participating in strenuous outdoor activities such as physical labor or sports.
- **Heat Exhaustion** is a severe illness requiring emergency medical treatment. It can occur from exposure to extreme heat over an extended period of time (usually several days), especially when combined with dehydration.
- **Heat Stroke** is the most serious medical condition caused by extreme heat, requiring emergency treatment. Heat stroke (or hyperthermia) occurs when the body can no longer regulate its temperature and its temperature rises rapidly—up to 106°F or higher. It usually occurs as a progression from other heat-related illnesses, such as heat cramps or heat exhaustion; however, it can also strike suddenly without prior symptoms, and it can result in death without immediate medical attention.

Extreme heat is especially dangerous because people might not recognize their symptoms as signs of a more serious condition. For example, symptoms like sweating or fatigue may just appear to be normal reactions to a hot day. People may be in more danger if they experience symptoms that alter their decision-making, limit their ability to care for themselves, or make them more prone to accidents. If untreated, heat-related illnesses can worsen and eventually lead to death. Heat can also contribute to premature death from health impacts other than those listed above. This is because extreme heat can worsen chronic conditions such as cardiovascular disease, respiratory disease, and diabetes.

Due to the regional nature of droughts, effects may be noticed throughout the County in the urbanized and rural areas. All jurisdictions with the County may be affected in a single drought event. In Crawford County, droughts are often linked to prolonged periods of above average temperatures and little to no precipitation.

Initial effects of drought can be noticed within a short period, as soils may dry out and plants may wither and die. When drought conditions persist over several weeks, months, or years, effects may be more pronounced with reductions in water levels of wells, lakes, reservoirs, streams, and rivers. Water supply issues for agriculture, commercial/industrial activities, and private consumption may arise if drought conditions persist over a long term.

The extent of the drought is determined by the Palmer Drought Severity Index (PDSI). In this way, the Index can be utilized as a tool to help define disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential for forest fires. The Palmer Drought Severity Index depicts prolonged (in months or years) abnormal dryness or wetness and is slow to respond, changing little from week to week. It also reflects long-term moisture runoff, recharge, and deep percolation, as well as evapotranspiration.

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The Palmer Drought Severity Index is a standardized index with values typically falling between -4.00 and +4.00, although extreme conditions can be greater in value (**Table 4.2.1**). Negative values indicate drought conditions while positive values represent wet conditions. Values around zero represent near normal conditions.

Table 4.2.1: Palmer Drought Severity Index Classifications

Palmer Classifications	
4.0 or greater	Extremely Wet
3.0 to 3.99	Very Wet
2.0 to 2.99	Moderately Wet
1.0 to 1.99	Slightly Wet
0.5 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.5 to -0.99	Incipient Dry Spell
-1.0 to -1.99	Mild Drought
-2 to -2.99	Moderate Drought
-3.0 to -3.99	Severe Drought
-4.0 or less	Extreme Drought

4.2.4 History

The National Climatic Data Center has record of five drought events in Crawford County from August 1996 to September 1999 resulting in \$16 million in crop damages and no property damage. An additional two drought events were recorded by local news sources and the National Weather Service. While there were no disaster declarations made for drought events in the County, all drought events on record are described below due to the potential economic losses due to reduction in crop yield.

Drought, Summer 2016

In September of 2016, the *Bucyrus Telegraph Forum* reported that a moderate drought prevented some crops from full growth. They stated that while farmers went three to four weeks with no measurable precipitation, several rain events late in August of 2016 seemed “to have saved the harvest from complete disaster.”

Drought, Summer 2012

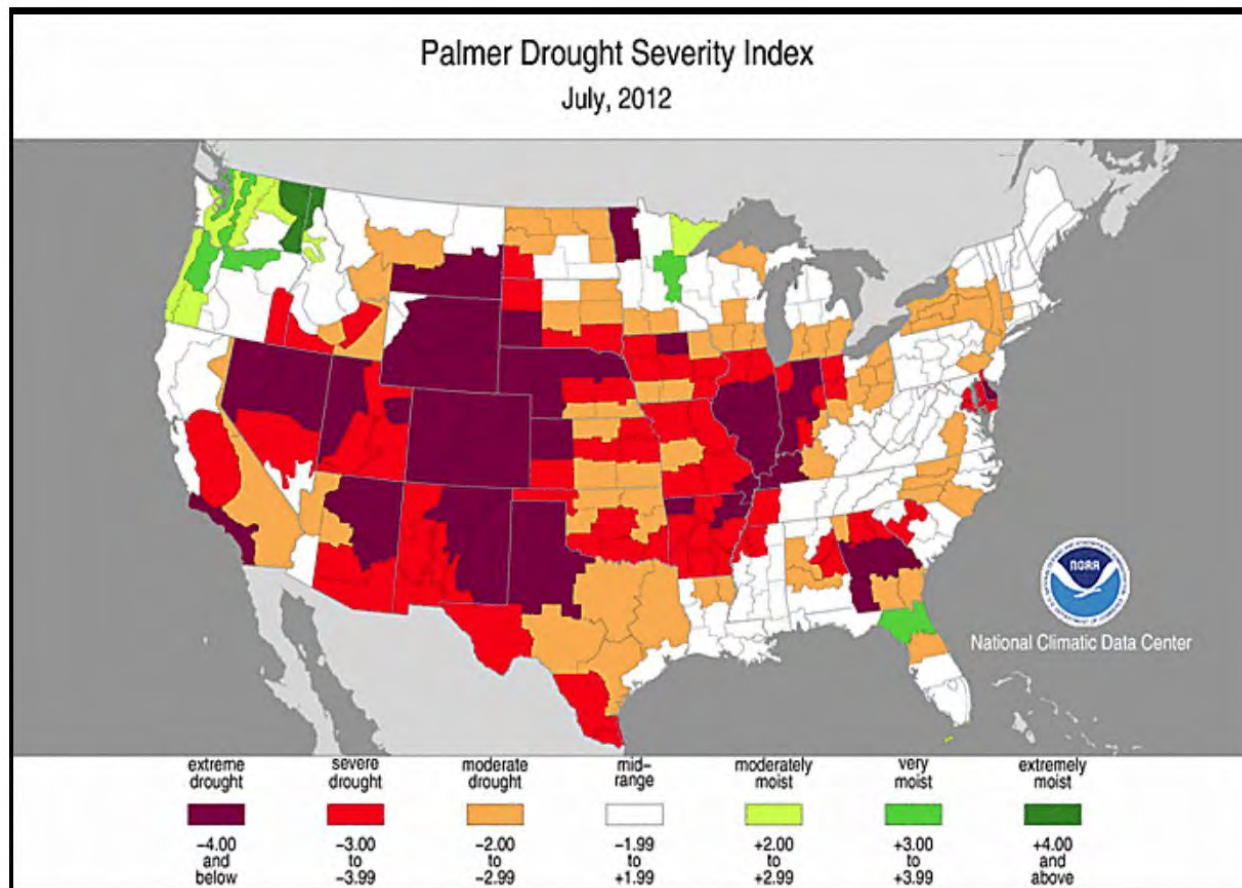
The National Weather Service recorded the drought of Summer 2012 with the following description:

“The warm and dry spring of 2012 became the hot and dry summer of 2012. Temperatures in June and July were well above normal, with monthly temperatures in July averaging 4 to 5 degrees above normal. High temperatures reached 90 or above on dozens of days. The mercury topped 90 degrees 28 times at Cleveland and 32 times at Toledo. At Toledo, the temperature soared above 100 degrees 4 times! Other locations in northern Ohio and northwest Pennsylvania got close to 100 or exceeded 100 at least once or twice. There was little relief at night, with many nights seeing low temperatures barely dropping into the 70s, especially in July. The lack of rain compounded the summer stress. Rainfall was below normal in most areas from April through July. The combination of

heat and drought left many farmers with parched soil. The drought in parts of northern Ohio was the worst since 1988, especially across parts of northwest Ohio. Rainfall in September and October was much above normal but was too little too late for many of the farmers.”

Figure 4.2.3 displays the PDI of July 2012 for the continental United States.

Figure 4.2.3: Palmer Drought Severity Index for the United States in July of 2012



Extreme Heat, June-July 1999

Temperatures across northern Ohio were much above normal. High temperatures were above 90 degrees Fahrenheit for several days and five daily record high temperatures were established nearby in Mansfield and Youngstown. An unofficial 100-degree Fahrenheit temperature was measured in Sandusky County on July 5, 1999 and the temperatures reached 100 degrees in Lake County near Painesville on July 31, 1999. All major reporting stations in northern Ohio finished with average monthly temperatures among the ten warmest on record for July.

Drought, June-September 1999

June: Little rain occurred from late May through much of June, making it the fifth driest June on record. Scattered rains late in June brought hope for farmers but crop yields were likely reduced even with adequate rain the remainder of the season. Exact losses due to the drought were unknown. Several communities instituted water use restrictions.

July: Drought conditions across northern Ohio eased as thunderstorm rain became more widespread. Nonetheless, very dry soil conditions persisted in a few areas that missed the brunt of the

thunderstorm activity. Some communities instituted water use restrictions and crop yields were likely reduced because of the lack of adequate rainfall.

August: Drought conditions persisted across northern Ohio as rainfall totals for the month were below normal at most locations. Water use restrictions were instituted in many areas. The drought also greatly impacted agricultural interests. Crop yields in northern Ohio were reduced by an average of 30 percent during this growing season.

September: Drought conditions continued across most of northern Ohio during September. Widespread heavy rain occurred on the August 29, 1999 but did little to help crop conditions. Losses from reduced crop yields were estimated at \$200 million for northern Ohio alone.

Drought, August 1996

Dry weather persisted throughout the month across northern Ohio. Rainfall averaged from a few tenths of an inch in north central and northwest Ohio to one to two inches in extreme northeast Ohio. August rainfall normally averages between three and four inches. Crops that normally mature during August were affected by the dry weather and crop losses were predicted at ten to 30 percent.

4.2.5 Probability

Crawford County has experienced droughts and excessive heat in the past, and the potential exists for the County to experience droughts in the future. Seasons of drought and extreme heat have the potential to occur during any particular year when necessary conditions are met. More specifically, the County has record of seven drought events from August 1996 to September 2016, which amounts to a 35 percent chance of a drought occurring any given year. On average, droughts are responsible for approximately \$800,000 in crop damages annually and no property damage. A more detailed commodity loss analysis is provided in the Vulnerability Assessment, below.

4.2.6 Vulnerability Assessment

Based on current climate reports:

- Drought projections suggest that some regions of the U.S. will become drier and that most will have more extreme variations in precipitation.
- Even if current drought patterns remained unchanged, warmer temperatures will amplify drought effects.
- Drought and warmer temperatures may increase risks of large-scale insect outbreaks and wildfires.
- Drought and warmer temperature may accelerate tree and shrub death, changing habitats and ecosystems in favor of drought-tolerant species.
- Forest-based products and values, such as timber, water, habitat and recreation opportunities, may be negatively impacted.
- Forest and rangeland managers can mitigate some of these impacts and build resiliency in forests through appropriate management actions.

Drought does not have a significant impact on infrastructure or structures. The greatest impacts of drought are on agricultural interests, as crops may fail, and livestock may not have sufficient water resources. Economic losses are the greatest threat from droughts to Crawford County. According to the 2012 Census of Agriculture developed by the United States Department of Agriculture (USDA),

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top crop items based on acreage for Crawford County include soybeans for beans, corn for grain, and winter wheat. Commodity Loss Statistics for these crops are included in **Table 4.2.2** and compare a non-drought year (2011) with the production and harvest of crops in a drought year (2012).

Based on data from the United States Department of Agriculture, Crawford County's soybean and winter wheat yields decreased by 0.76 percent and 3.34 percent, respectively, while the County's corn yield increased by 0.65 percent. Additionally, the total number of bushels per acre harvested decreased for soybeans and corn but increased for winter wheat.

Table 4.2.2: Commodity Loss Statistics between 2011 and 2012 (Source: USDA)

Commodity	Units	Non-Drought Year 2011 (acres)	Drought Year 2012 (acres)	Change	Change Amount
Soybeans-planted	Acres	94,900	92,600	Down	-2,300
Soybeans-harvested	Acres	94,700	91,700	Down	-3,000
Yield	%	99.79	99.03	Down	-0.76
Soybeans-production	Bushels	5,195,000	3,928,000	Down	-1,267,000
Yield	Bushels/acre harvested	54.86	42.84	Down	-12.02
Corn, planted	acres	74,500	83,600	Up	9,100
Corn, grain - harvested	acres	71,700	81,000	Up	9,300
Yield	%	96.24	96.89	Up	0.65
Corn, grain-production	Bushels	13,050,000	10,667,000	Up	-2,383,000
Yield	Bushels/acre harvested	182.01	131.69	Down	-50.32
Winter Wheat, planted	acres	20,500	13,900	Down	-6,600
Winter Wheat, harvested	acres	20,300	13,300	Down	-7,000
Yield	%	99.02	95.68	Down	-3.34
Winter Wheat - production	Bushels	1,366,000	967,000	Down	-399,000
Yield	Bushels/acre harvested	67.29	72.71	Up	5.42

4.2.7 Land Use and Development Trends

Drought is most likely to impact agriculture land uses and land uses that house or serve vulnerable populations, such as schools, daycares, hospitals, and nursing homes.

4.3 Earthquakes

4.3.1 Description

Earthquakes are a result of a sudden movement of the Earth's crust and are caused by the abrupt rupture and rebound of accumulated stress along geologic faults. These movements vary in length and may last from a few seconds to several minutes.

The seismicity, or seismic activity, of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Earthquakes are measured using observations from seismometers. The Moment Magnitude Scale (MMS), which was developed in the 1970s, is the most common scale on which earthquakes larger than approximately 5.0 in magnitude are reported for the entire world. Earthquakes smaller than magnitude 5.0, which are more numerous, are reported by national seismological observatories and measured most commonly on the local magnitude scale – also referred to as the Richter Scale. These two scales are numerically similar over their range of validity. Earthquakes of magnitude 3.0 or lower are often almost imperceptible or weak, while earthquakes of magnitude 7.0 or greater can potential cause serious damage over larger areas.

Damage from an earthquake also depends on the earthquake's depth in the earth's crust. The shallower an earthquake's epicenter, the more damage to structures it will cause. Alternatively, an earthquake can also be measured by its intensity. The Modified Mercalli Intensity Scale (MMI) ranges in value I to XII, in roman numerals (**Table 4.3.1**).

Major earthquakes are low probability, high consequence events. Most major earthquakes in the U.S. have occurred in California and other western states. There have been recorded earthquakes throughout the U.S., and the Ohio River Valley has experienced earthquakes exceeding the 3.0 magnitude within the last 25 years.

4.3.2 Location

Earthquakes are countywide hazards and can affect all areas and jurisdictions within Crawford County. According to the Ohio Department of Natural Resources, Ohio is located on the periphery of the New Madrid Seismic Zone, an area in and around Missouri that was the site of the largest earthquake sequence to occur in the country. Additionally, Crawford County is located east of the Anna Seismic Zone, the location of the largest earthquake in Ohio, as well as numerous smaller earthquakes since.

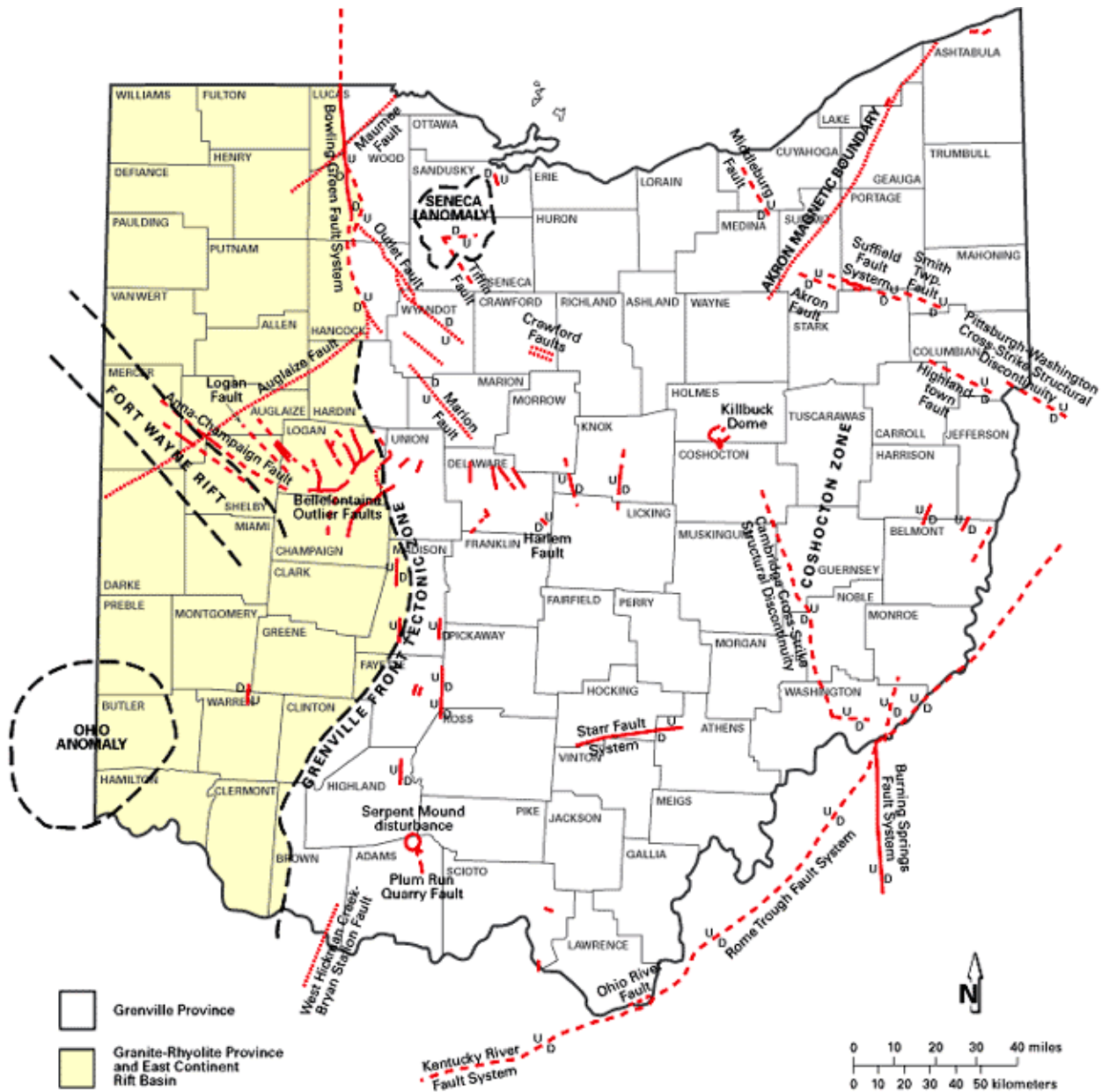
Furthermore, the Ohio Seismic Network's map of Deep Structures in Ohio (**Figure 4.3.1**) indicates that Crawford County contains the Crawford Faults in the southeastern portion of the County.

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Table 4.3.1: Modified Mercalli Intensity Scale (Source: Ohio Department of Natural Resources)

Modified Mercalli Intensity Scale		Magnitude
I	Detected only by sensitive instruments.	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing.	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibrations like passing truck.	2.5
IV	Felt indoors by many, outdoors by few, at night some awaken; dishes, windows, doors disturbed; standing autos rock noticeably.	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects.	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small.	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos.	4.5
VIII	Panel walls thrown out of frames; walls, monuments, chimneys fall; sand and mud ejected; drivers of autos disturbed.	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken.	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides.	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent.	6.5
XII		7
		7.5
		8

Figure 4.3.1 Map of Deep Structures in Ohio (Source: Ohio Department of Natural Resources)



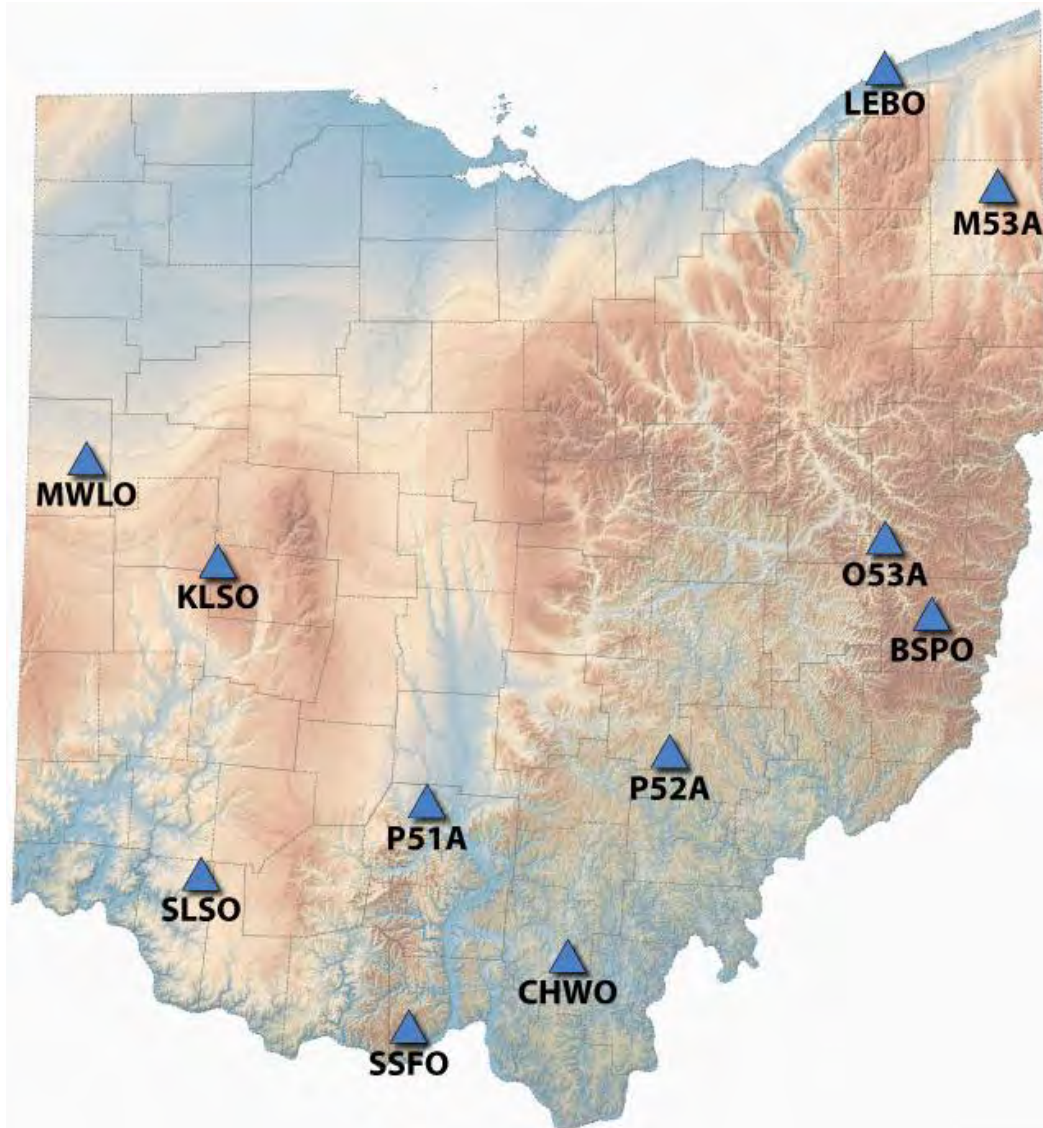
4.3.3 Extent

Earthquakes pose a risk to life and property, depending on the severity. To monitor earthquakes, the State of Ohio has deployed several seismometers to record them (Figure 4.3.2). The Kiser Lake State Park Ohio (KLSO) and Mercer Wildlife Area Ohio (MWLO) seismometers are located in the closest proximity to Crawford County. Both seismometers are situated in close proximity to the Anna Seismic Zone and were developed to provide the Ohio Seismic Network with the capability to detect and locate any earthquakes in the region. They also provide a better understanding of the tectonic network of the area's underlying rocks.

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Earthquakes can yield a variety of different outcomes. With the ground shaking associated with earthquake events, buildings have the potential to be impacted. If soil liquefaction, or the mixing of sand and soil with groundwater, occurs, buildings can sink into the ground. Earthquakes also have the potential to rupture dams or levees along a river, resulting in flooding (see Dam Failure section). Furthermore, earthquakes that break gas and power lines, can produce a fire.

Figure 4.3.2: Location of Seismometers in Ohio (Source: Ohio Department of Natural Resources)



4.3.4 History

The State of Ohio has experienced more than 120 earthquakes between 1776 and 2019. Fourteen of these earthquakes have caused minor to moderate damage. The largest historic earthquake in Ohio was centered in Shelby County in 1937. This event, estimated to have had a magnitude of 5.4 on the Richter scale, caused considerable damage in Anna and several other western Ohio communities, where at least 40 earthquakes have been felt since 1875.

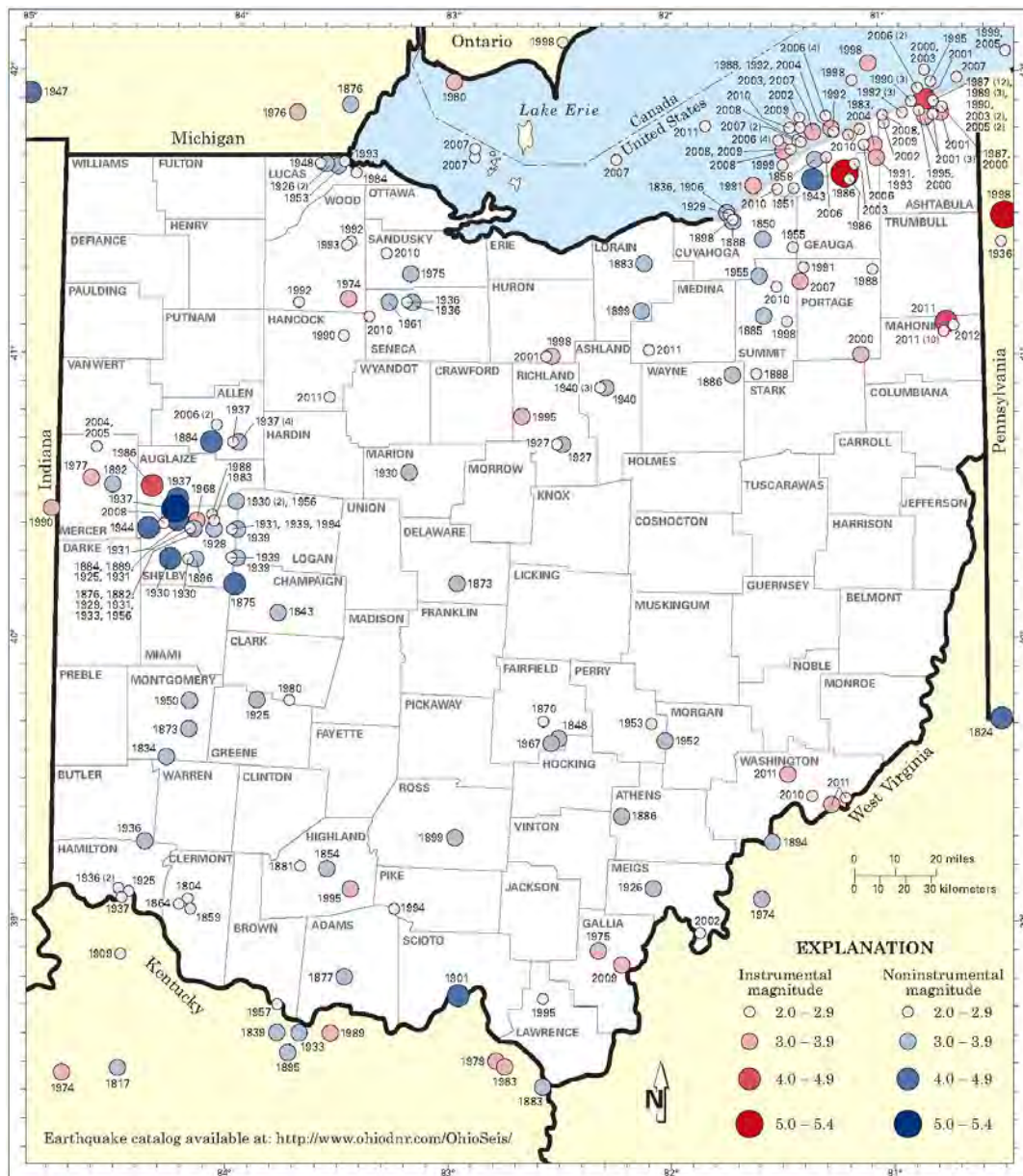
4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Crawford County has history of one earthquake event with an epicenter within the County from January 1995 to September 2019, which is described below. The value of damages to property and crops is unknown.

January 12, 1995

At 9:25 PM on January 12, 1995, a 3.3 magnitude earthquake with an unspecified depth occurred with an epicenter approximately 5 miles east of the Village of Crestline in adjacent Richland County. This earthquake was detected by United States Geological Survey instruments in the area. This is the only known event to be recorded in the vicinity of Crawford County. **Figure 4.3.3** displays epicenters of all historical earthquakes in the State of Ohio.

Figure 4.3.3: Earthquake Epicenters in Ohio (Source: Ohio Department of Natural Resources)



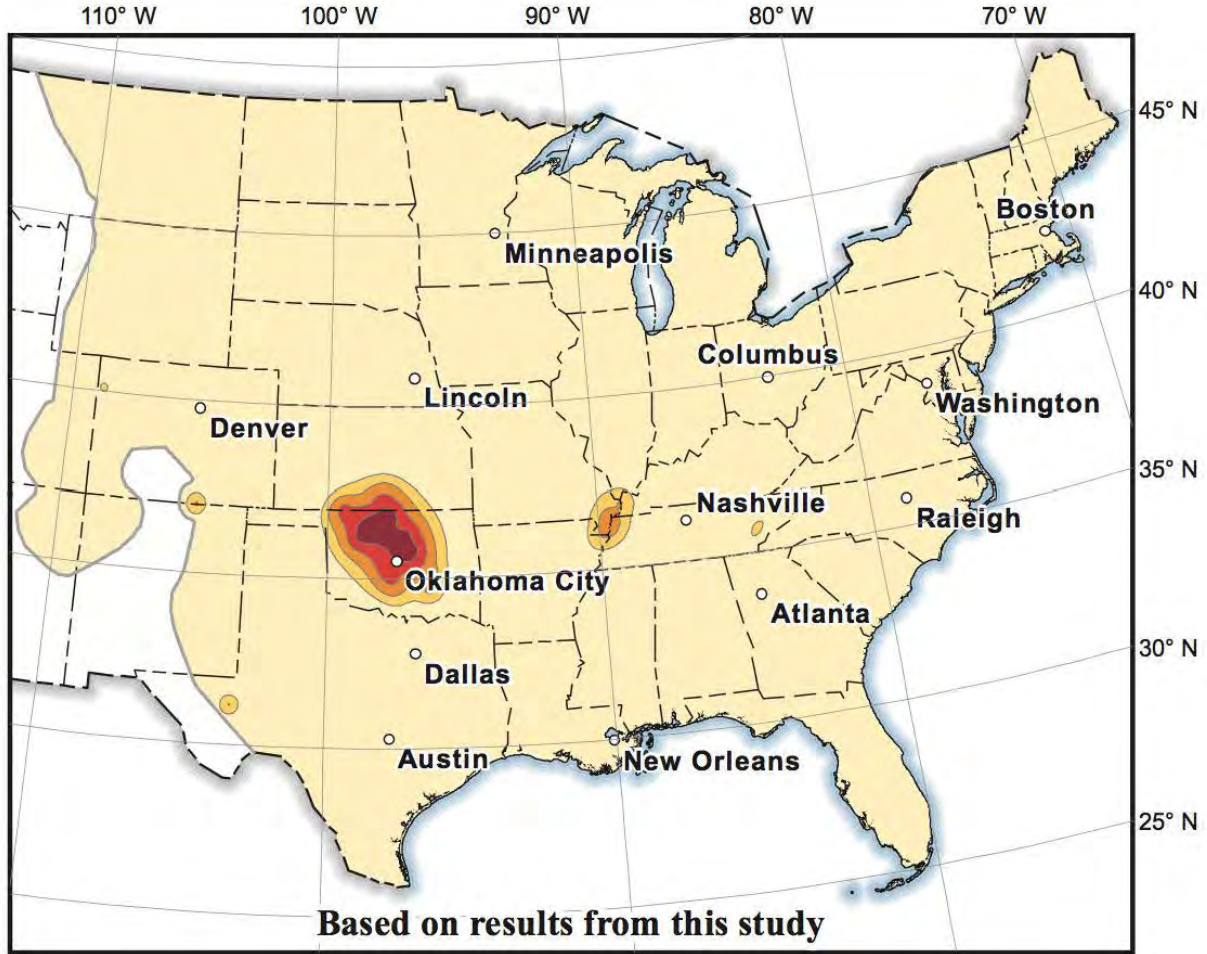
Recommended citation: Ohio Division of Geological Survey, 2012. Earthquake epicenters in Ohio and adjacent areas—color version; Ohio Department of Natural Resources, Division of Geological Survey Map EG-2, generalized page-size version, 1 p., scale 1:2,000,000.



4.3.5 Probability

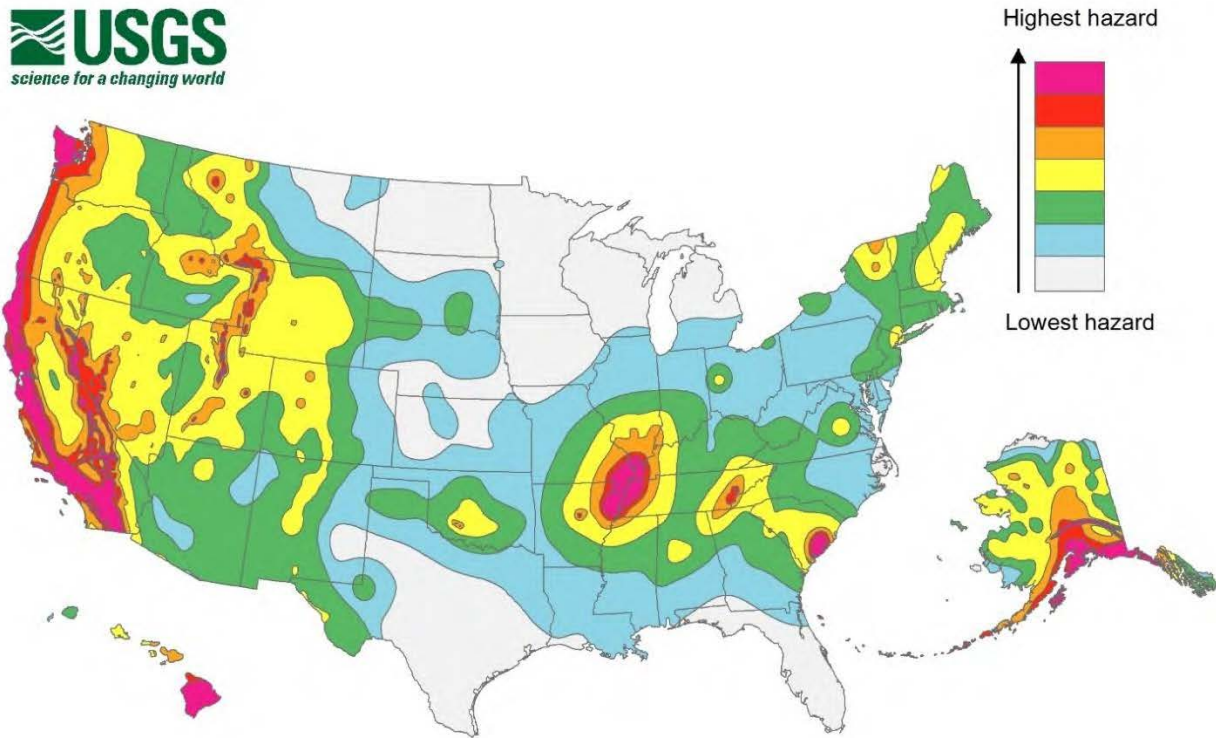
The United States Geological Survey has both long-term and short-term probabilistic seismic hazard forecasts. In the 2018 one-year probabilistic seismic hazard forecast, the United States Geological Survey estimates that there is a less than one percent chance of potentially minor-damage ground shaking in 2018 for Crawford County (Figure 4.3.4).

Figure 4.3.4: Chance of Potentially Minor-Damage Ground Shaking in 2018
(Source: United States Geological Survey)



The United States Geological Survey also determined the long-term hazard of earthquakes for the United States (Figure 4.3.5). The measurement used in this estimation is based on the chance of ground shaking – peak ground acceleration – as a percentage of the natural force of gravity over time. This map identifies that most of Crawford County and surrounding areas in Ohio have the second to lowest hazard ranking for the nation. There are some communities west of Crawford County that would have an increased probability of earthquakes, most likely due to their proximity to the Anna Seismic Zone.

Figure 4.3.5: Probability of Earthquakes in the United States
(Source: United States Geological Survey)



4.3.6 Vulnerability Assessment

Infrastructure Impact

While there was one known earthquake recorded in Crawford County's history, the associated damages to infrastructure are unknown. Buildings, roadways, and gas and power lines can be affected. Since the probability of an earthquake occurring in Crawford County is less than one percent, there is a low risk of impact to infrastructure as a result.

Population Impact

There is low risk of earthquakes occurring in Crawford County. Accordingly, there is low risk of impact to the population. If an earthquake would occur within the County, the population could be impacted by loss of homes, as well as potential loss of utilities.

Property Damage

While there was one recorded earthquake event in Crawford County's history, the property damage incurred as a result is unknown. With any earthquake event, there is potential for property damage to occur, as ground shaking can lead to damaged buildings.

Due to the non-site-specific nature of this hazard, **Table 4.3.2** lists all structures within Crawford County as having potential impacts from earthquakes. It also provides values for two worst-case scenarios valued at one percent damage and five percent damage.

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Loss of Life

Crawford County has no recorded earthquake events that have resulted in loss of life; however, in the event that an earthquake occurs, there is potential for loss of life. Loss of life can be mitigated by educating the public on proper protection in the event of an earthquake. For example, the Ready Campaign (Ready.gov) is a national public service campaign designed to educate and empower the American people to prepare for, respond to, and mitigate disasters. The Ready Campaign provides materials for how to educate the public on earthquake preparedness.

Economic Losses

While there was one recorded earthquake event in Crawford County's history, the economic losses experienced as a result are unknown. Earthquakes have the potential to damage infrastructure, resulting in economic burden of clean up and repairs. Potential economic losses and damages associated with Crawford County structures and potential worst-case scenarios are recorded in **Table 4.3.2**, below. Compared with other hazards, earthquakes are relatively unlikely to occur, meaning there is low risk of economic loss as a result of an earthquake.

Table 4.3.2: Structure Vulnerability from Earthquakes

Structure Type	Number of Properties Exposed	Total Value of Structures	Damage for 1% Scenario	Damage for 5% Scenario
Residential	22,289	\$982,816,730.00	\$9,828,167.30	\$49,140,836.50
Non-Residential	11,254	\$580,946,200.00	\$5,809,462.00	\$29,047,310.00
Critical Facilities	1,565	\$216,478,720.00	\$2,164,787.20	\$10,823,936.00
Total	35,108	\$1,780,241,650.00	\$17,802,416.50	\$89,012,082.50

4.3.7 Land Use and Development Trends

As there are no current at-risk communities for earthquakes, there are no likely impacts on development and land use.

4.4 Epidemic

4.4.1 Description

The Centers for Disease Control and Prevention (CDC) defines an epidemic as “an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area.”

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from any of the following:

- A recent increase in amount or virulence of the agent,
- The recent introduction of the agent into a setting where it has not been before,
- An enhanced mode of transmission so that more susceptible persons are exposed,
- A change in the susceptibility of the host response to the agent, and/or
- Factors that increase host exposure or involve introduction through new portals of entry.

While epidemics usually refer to infectious agents, the Centers for Disease Control and Prevention notes that non-infectious diseases such as diabetes and obesity exist in epidemic proportion in the United States. For the purposes of this report, only epidemics referring to infectious agents will be discussed.

Epidemic was identified as a hazard in Crawford County in the previous plan, and representatives from local communities indicated they would like to consider this hazard again for the 2019 Hazard Mitigation Plan.

4.4.2 Location

Epidemics can develop with little or no warning and quickly erode the capacity of local medical care providers. A fast-developing epidemic can last several days and extend into weeks or even months, in extreme cases. Epidemics can occur at any time of the year, but the warm summer months, when bacteria and microorganism growth are at their highest, present the greatest risk for epidemics to occur. An epidemic has the potential to affect the entire County but is more probable to occur in densely populated areas, especially at facilities with large numbers of occupants.

4.4.3 Extent

The most likely epidemics that could affect Crawford County include flu (bird flu, H1N1 virus) and West Nile Virus. Such an event has the potential to cause serious injury or death to large numbers of people but would cause no damage to private property or structural damage to public facilities. The impact on individuals could also be economic due to the inability of an infected person to go to work. In a worst-case scenario, cascading effects could lead to civil unrest, food and fuel shortages, or utility failure due to large numbers of people unable to provide services.

4.4.4 History

There were no known documented epidemics in Crawford County. As such, there are no historic property or crop damages associated with epidemics in the County.

4.4.5 Probability

As there are no known documented epidemics in Crawford County, there is a less than one percent chance in any given year of an epidemic occurring in the County.

4.4.6 Vulnerability Assessment

Given the lack of historic epidemic events in the County, it is difficult to estimate potential damages; however, the following assessment was developed to provide a general vulnerability assessment for epidemics in Crawford County.

Infrastructure Impact

There is likely to be little to no impact to infrastructure in the event of an epidemic.

Population Impact

The population of Crawford County is likely to be significantly impacted, should an epidemic occur; however, there is less than a one percent chance that an epidemic will occur in the County. This means there is a relatively low threat to the population from an epidemic hazard event.

Property Damage

Property damage is not likely to occur as a direct result of an epidemic event.

Loss of Life

Loss of life is a potential outcome from any epidemic event; however, there is a less than one percent chance of an epidemic event occurring in any given year, meaning there is low risk for loss of life due to an epidemic.

Economic Losses

Economic losses would likely be observed through the inability for individuals to work. Large-scale epidemics then can disrupt the flow of the economy. Because the threat of epidemics is low, there is little risk that economic losses will occur in the County due to an epidemic.

4.4.7 Land Use and Development Trends

Land use and development are not likely to be impacted by epidemics. Adequate health care facilities should be maintained in the event of an epidemic.

4.5 Flooding

4.5.1 Description

FEMA describes a flood as “a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters [and] the unusual and rapid accumulation or runoff of surface waters from any source.” Floods are typically riverine, coastal, or shallow. Flash floods are floods that occur quickly, even occurring without visible signs of precipitation.

Urban flooding is a type of flood that can occur in areas of development that have a high level of impervious surfaces, such as concrete. The level of development and the level of stormwater management practices impact the severity of urban flooding.

Common flood-related terms include:

- **100-Year Flood:** A flood that has a one percent chance to occur each year. The 100-year floodplain can be seen in **Figure 4.5.1: Flood Hazard Map**. The elevation of the water from the 100-year flood is called the Base Flood. Mitigation strategies should be based on the base flood elevation.
- **Floodplain:** An area that has the potential to flood from any source.
- **Floodway:** Sometimes referred to as a regulatory floodway. FEMA defines a floodway as “the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the Base Flood without cumulatively increasing the water surface elevation more than a designated height.”
- **Flash flood:** Flash floods are typically caused by heavy rainfall over a short period of time. These floods are particularly dangerous because they can occur in minutes and can sometimes occur even without rainfall, such as when an ice jam breaks or dissolves. Areas impacted by wildfires are particularly susceptible to flash floods.

4.5.2 Location

Flooding can occur throughout Crawford County, as the entire County falls within a 500-year floodplain. **Figure 4.5.1** shows the location of the 100-year floodplain.

4.5.3 Extent

Crawford County currently has 25 flood insurance maps. These were most recently updated in January 2011.

Crawford County and three communities within the County participate in the National Flood Insurance Program (NFIP). These communities include the City of Bucyrus, City of Galion, and the Village of Crestline. The Village of Chatfield does not participate, although there are portions of the Village within a floodplain. The Villages of New Washington, North Robinson, and Tiro do not participate in the NFIP as they are completely outside of any floodplain.

Table 4.5.1 shows the repetitive loss properties in Crawford County, Ohio. FEMA defines a repetitive loss property as an insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. FEMA defines a severe repetitive loss property as a single family property that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding \$5,000 and with cumulative amount of such claims payments exceeding \$20,000; or for

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which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

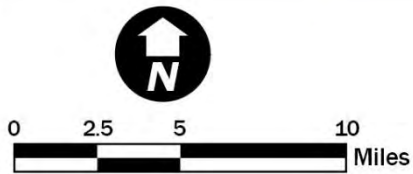
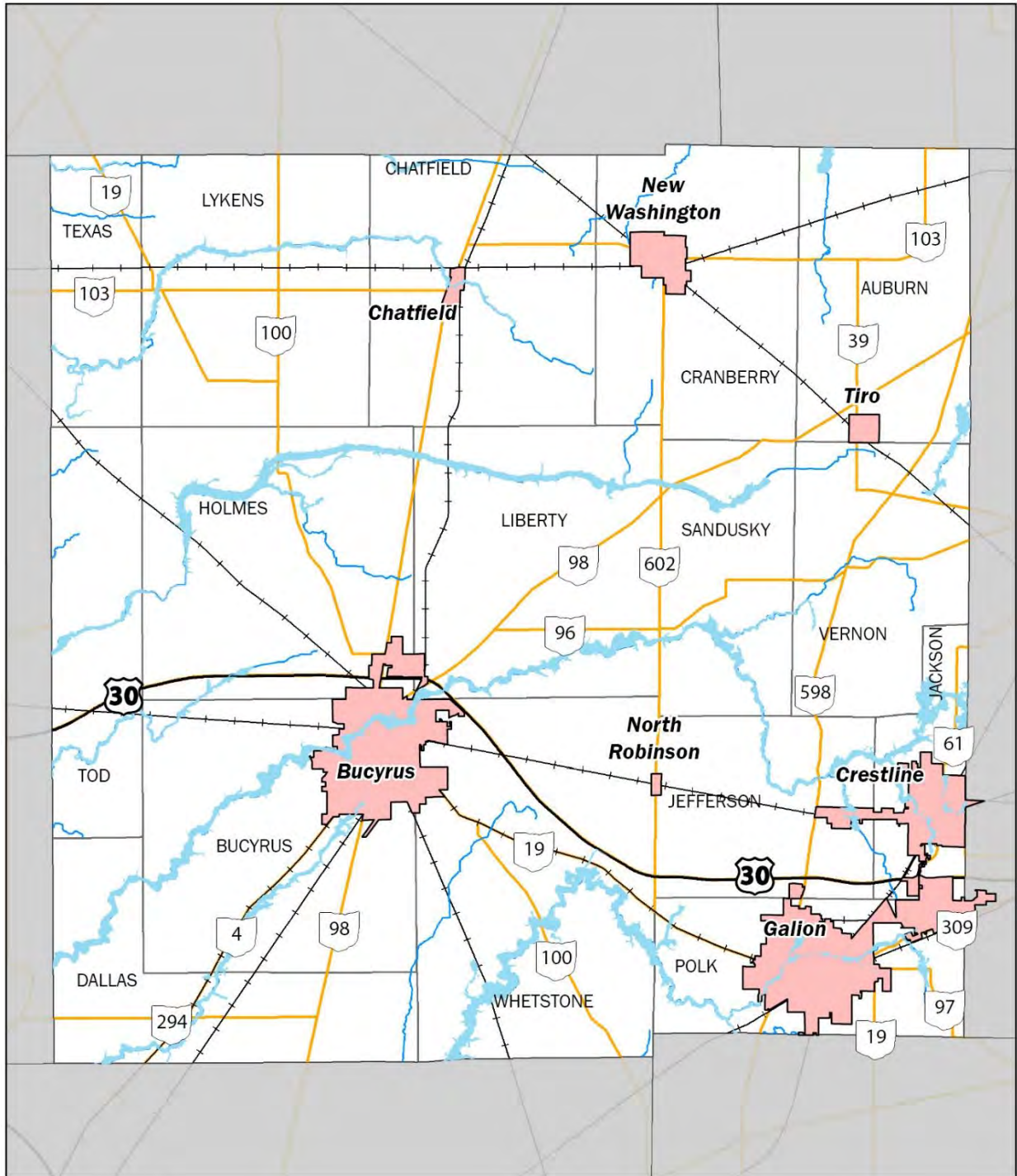
Table 4.5.1: Repetitive Loss Properties

Community Name	Occupancy	Zone*	Total Building Payment	Total Contents Payment	Losses	Total Paid	Average Pay
Severe Repetitive Loss Properties							
City of Galion	Other - nonres.	A05	\$177,954.22	\$50,000	4	\$227,954.22	\$56,988.56
Repetitive Loss Properties							
Crawford County	Single Family	A	\$23,395.86	\$0	2	\$23,395.86	\$11,697.93
Crawford County	Single Family	C	\$103,172.61	\$40,110.17	2	\$143,282.78	\$71,641.39
City of Bucyrus	Single Family	AE	\$42,378.55	\$0	2	\$42,378.55	\$21,189.28
City of Bucyrus	Other - nonres.	A	\$23,169.76	\$16,884.67	3	\$40,054.43	\$13,351.48
City of Bucyrus	Single Family	AE	\$102,429.91	\$4,000	4	\$106,429.91	\$26,607.48
City of Bucyrus	Single Family	AE	\$48,450.48	\$1,174	3	\$49,624.48	\$16,541.49
City of Bucyrus	Single Family	AE	\$74,533.57	\$0	2	\$74,533.57	\$37,266.79
City of Bucyrus	Single Family	AE	\$37,584.15	\$0	4	\$37,584.15	\$9,396.04
City of Bucyrus	Single Family	AE	\$31,600.00	\$0	2	\$31,600	\$15,800
Village of Crestline	Single Family	AE	\$62,123.84	\$5,433.55	3	\$67,557.39	\$22,519.13
Village of Crestline	Other - nonres.	A	\$34,049.57	\$0	2	\$34,049.57	\$17,024.79
City of Galion	Single Family	X	\$21,797.94	\$4,663.71	2	\$26,461.65	\$13,230.83
City of Galion	Single Family	A	\$14,862.73	\$0	2	\$14,862.73	\$7,431.37
City of Galion	Single Family	X	\$20,792.41	\$6,875.14	4	\$27,667.55	\$6,916.89
City of Galion	Other Residential	A05	\$29,281.30	\$0	3	\$29,281.3	\$9,760.43
City of Galion	Single Family	AE	\$57,544.25	\$2,682.08	3	\$60,226.33	\$20,075.44
City of Galion	Single Family	A	\$66,475.53	\$14,069.13	2	\$80,544.66	\$40,272.33

*Zone Types:

- 100-Year Floods: A=special flood hazard area (SFHA), no base flood elevation provided; A05=SFHA, base flood elevation provided; AE=SFHA, base flood elevation provided (newer designation)
- 500-Year Floods: C=area of minimal flood hazard, X=area of minimal flood hazard (newer designation)
- EMG=Emergency Program (initial phase of participation in NFIP without flood hazard information)

Figure 4.5.1: Flood Hazard Map



4.5.4 History

The National Climatic Data Center has record of 24 flash floods and 11 floods in Crawford County from March 1996 to January 2017. Altogether, these events produced \$67.7 million in property damage and \$4.27 million in crop damage. None of these events resulted in injuries or loss of life.

Of the 35 flash flood and flood events recorded in the County, only the flood events associated with disaster declarations are listed below. The flood events no associated with declarations are described in **Appendix A**.

Major Disaster Declaration, August 27, 2007 (DR-1720)

A major disaster declaration was made on August 27, 2007 for the incident period of August 20, 2007 through August 28, 2007. Designated counties for Individual Assistance included Allen, Crawford, Hancock, Hardin, Putnam, Richland, Seneca, and Wyandot counties.

Flash Flooding in the City of Bucyrus on August 21, 2007

Heavy rain producing thunderstorms affected Crawford County during the late evening hours of August 20, 2007 and early morning hours of August 21, 2007. Rainfall rates with the strongest storms exceeded three inches per hour. Trained spotters in the City of Bucyrus measured storm totals of 8.68 inches and 8.5 inches respectively. About five inches of this total fell between 12:00 AM and 4:00 AM. Runoff from this rain combined with ground already saturated from earlier rains led to catastrophic flooding across portions of Crawford County. A total of 68 homes were destroyed with another 240 homes suffering major structural damage. Another 600 homes sustained minor damage with over 1,200 additional homes affected (less than three feet of water in the basement). Many businesses also sustained significant damage. Some of the worst flooding occurred in the City of Bucyrus where many people had to be rescued from flooded cars. Hundreds of people had to be evacuated, including at least 30 that had to be rescued by boat. The Village of Crestline was also hard hit with water in some parts of the town over waist deep. Significant damage was reported along Bucyrus Street and Thrush Avenue. At least one business in the Village of Crestline was destroyed. Dozens of roads and streets had to be closed because of flooding. Damage to roads, bridges and culverts was extensive. Cleanup and overtime costs incurred by local government agencies were substantial. Finally, standing water and erosion from the runoff caused damage to agricultural interests in the County.

Flooding in the City of Bucyrus on August 21, 2007

Floodwaters continued to impact the area long after flash flooding during the morning hours of August 21, 2007. As the day progressed, additional reports of evacuations of business and homes continued. By afternoon, shelters opened for people displaced from their homes by flooding. Roads, businesses and homes were still flooded through the overnight hours and into the morning of August 22, 2007. By the afternoon of August 22, 2007, floodwaters began to significantly recede with roads beginning to open. By the evening hours of August 22, 2007, much of the water receded across the County so that by the morning of August 23, 2007 most roads were reopened. People displaced by flooding were able to get back to their homes and businesses.

Major Disaster Declaration, June 3, 2004 (DR-1519)

A major disaster declaration was made on June 3, 2004 for the incident period of May 18, 2004 through June 21, 2004.

Countywide flash flooding on June 13, 2004

Thunderstorms dumped over three inches of rain on portions of Crawford County during the evening hours of June 13, 2004. Spotters in the City of Bucyrus measured one inch of rain in a 20-minute period ending around 9:00 PM. Significant flooding occurred in some portions of the County. The City

of Galion area was especially hard hit. Several homes along Park Road sustained major damage from flood waters up to three feet deep. A cooperative observer in the area measured a total of 1.88 inches of rainfall on June 13, 2004. In the City of Bucyrus, 32 homes had to be evacuated because of flooding. Nearly 20 homes were damaged in the Village of Crestline by flooding. A total of over 50 homes were damaged in the County with around a dozen sustaining major damage. Many roads had to be closed because of flooding. Numerous vehicles were also damaged.

Countywide flash flooding on May 21, 2004

Thunderstorms dumped between two and three inches of rain on Crawford County during the early morning hours of May 21, 2004. Spotters measured 1.1 inches of rain in 30 minutes during the peak of the storm. This rainfall combined with ground already saturated from heavy rains the previous few days led to widespread flooding. Dozens of homes in the County sustained flood damage and several roads were either washed out or flooded.

Major Disaster Declaration, July 14, 2003 (DR-1478)

A major disaster declaration was made on Monday, July 14, 2003 for the incident period of July 4, 2003 through July 11, 2003.

Flash flooding in the City of Bucyrus on July 8, 2003

Thunderstorms dumped two to four inches of rain on the City of Bucyrus during the late afternoon and early evening hours causing many streams and creeks to leave their banks. Two inches of rain was measured in 25 minutes during the peak of the storm. Widespread street and lowland flooding occurred, mainly on the east side of the City of Bucyrus. Several streets had to be closed due to flooding. Flood waters up to three feet deep were reported and at least a couple vehicles became stranded in the high water.

4.5.5 Probability

There have been 35 flooding events, including flash floods, from March 1996 to January 2017. These flood events average to nearly three flooding events per year. There are some years in this time period that have no floods or less than three floods, as well as some years that have more than three floods.

4.5.6 Vulnerability Assessment

Infrastructure Impact

Floods can impact roadways, including interstates and state routes by blocking them due to high water or by filling them with debris. Wastewater and potable water systems at risk in the entire County total \$420,105,000.

Population Impact

Floods and flash floods have caused damages to occupied homes in the past. During flood events, shelter may need to be provided to those impacted by flooding. A 100-year flood could displace as many as 750 people from 250 households.

Property Damage

Property damage is likely during floods, to both residential and non-residential properties. **Table 4.5.2** lists the value of all the properties that are exposed to 100-Year floods. Additionally, the historic flood events have caused \$3.2 million in property damage and \$203,300 in crop damage annually.

Table 4.5.2: Structure Vulnerability from Flooding

Structure Type	Number of Properties Exposed	Value of Land Impacted	Value of Buildings Impacted
Residential	564	\$6,785,040	\$26,370,920
Non-Residential	1,060	\$52,411,330	\$41,352,370
Critical Facilities	68	\$1,410,570	\$10,523,160
Total	1,692	\$60,606,940	\$78,246,450

Furthermore, the historic flood events produced \$67.7 million in property damage and \$4.27 million in crop damage from March 1996 to January 2017, which amounts to approximately \$3.2 million annually in property damage and \$203,300 annually in damage to crops.

Loss of Life

There are no reported deaths from any past floods; however, future severe flood events have the potential to lead to injuries or loss of life.

Economic Losses

Floods can halt economic activity, block roadways, and destroy agricultural crops. Contents in manufacturing, agriculture, high technology institutes, and medical institutes can also be destroyed. Crop losses are expected from a 100-year flood.

4.5.7 Land Use and Development Trends

Flashfloods can occur anywhere and are especially likely in highly developed areas. Any development that has occurred since the previous plan and any new development has a chance to be impacted by flash flooding.

Floods are typically limited to floodplains and flood prone areas. Development in floodplains should be regulated or limited.

4.6 Hazardous Materials

4.6.1 Description

According to the Ohio Environmental Protection Agency, hazardous materials can be defined in different ways depending on the law or regulation administered by the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC).

- The Institute for Hazardous Materials Management defines hazardous materials as “any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.”
- OSHA’s definition includes any substance or chemical which is a health hazard or a physical hazard, including carcinogens, toxic agents, irritants, corrosives, and sensitizers, as well as agents that interact to be harmful to the human body, explosive, or flammable.
- The Environmental Protection Agency’s definition includes the Occupational Safety and Health Administration definition. It also adds any item or chemical which can cause harm to people, plants, or animals when released into the environment.
- The Department of Transportation defines hazardous materials as any item or chemical which, when being transported or moved in commerce, is a risk to public safety or the environment.

The Ohio Environmental Protection Agency indicates that there are five categories in which materials can be hazardous, including acute, chronic, fire, reactive, or sudden release of pressure.

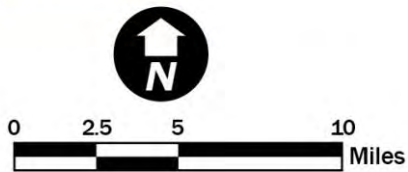
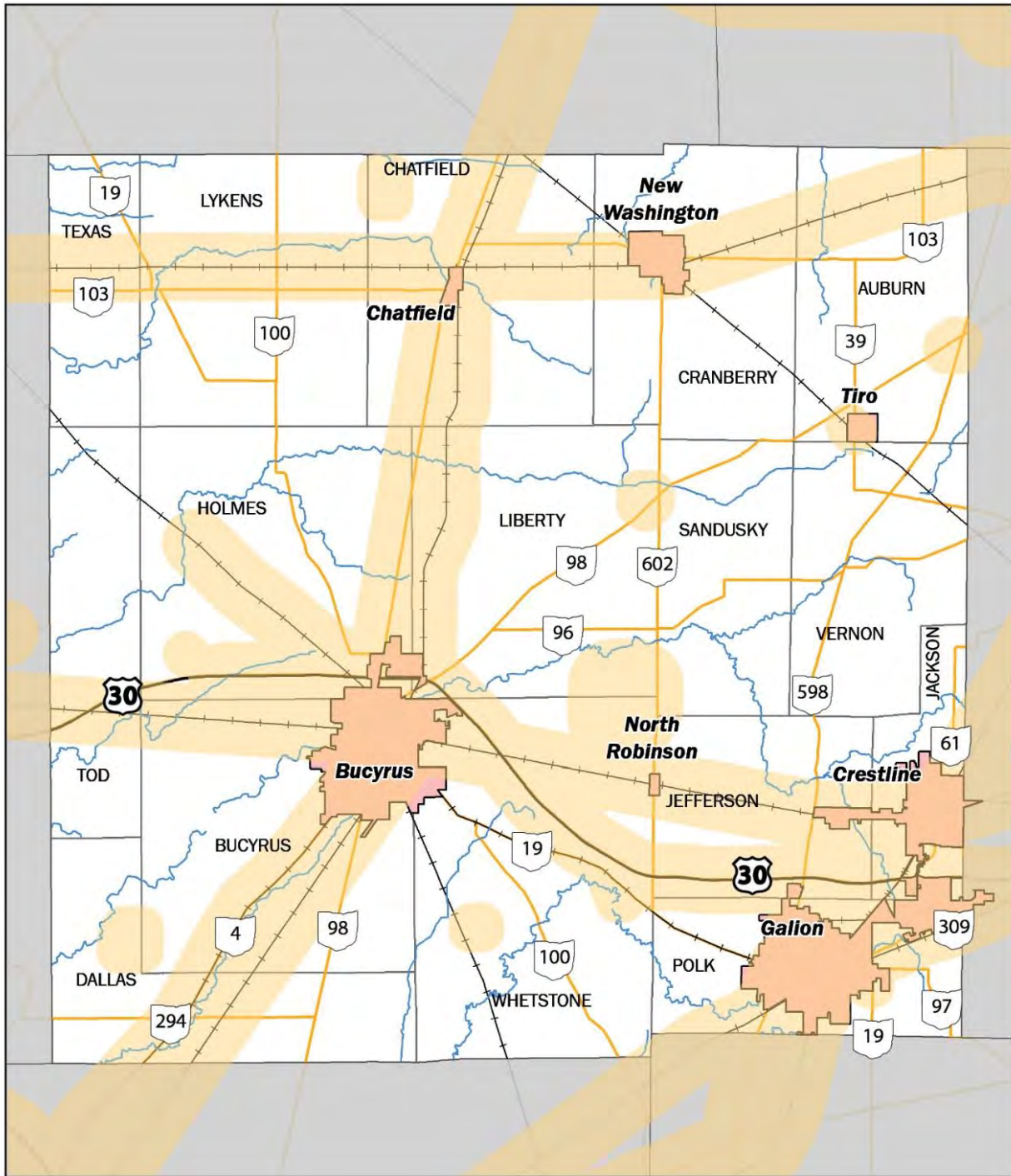
The U.S. Nuclear Regulatory Committee regulates materials that produce ionizing radiation, which includes by-product material and radioactive substances.


The Emergency Planning and Right to Know Act, or EPCRA, was passed as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires a facility that processes, uses, or stores extremely hazardous substances or hazardous substances as classified by the Occupational Safety and Health Administration hazard communication standard. This is also codified in the Ohio Revised Code (ORC) Chapter 3750 and the Ohio Administrative Code Chapter 3750.

4.6.2 Location

There are 51 hazardous materials facilities within Crawford County as of October 2018. Hazardous material spills can occur wherever hazardous materials are stored and during shipment to these facilities. **Figure 4.6.1** shows the areas which are at the highest risk of being impacted by hazardous materials spills. These areas were calculated by identifying normal shipping routes and active rail lines and places a one-mile buffer around these routes, as well as placing a half-mile buffer around landfills.

Figure 4.6.1: Hazardous Materials Risk Areas



 Hazardous Materials Risk Area

4.6.3 Extent

The Environmental Protection Agency keeps records for Extremely Hazardous Substance facilities because these facilities have a higher probability of spills due to the higher amounts of hazardous materials at their sites. Each potential hazardous material has varying levels of toxicity. The concentration of these materials should be measured in parts-per-million to determine whether they present a threat. Many chemicals are safe at low amounts and low concentrations but can become dangerous and even toxic at high amounts and concentrations. Additionally, some chemicals can be flammable and can become more volatile when exposed to oxygen. In ground spills, untreated chemical and waste spills can contaminate the soil and drinking water, creating toxic environmental conditions. Corrosive, flammable, or explosive chemicals can create infrastructure damage depending on the location, amount spilled, and the circumstances of the incident. In worst case scenarios, large spills can trigger evacuations of residents and close transportation routes used for hazardous materials transportation, which can also affect local residents.

4.6.4 History

There have been 18 recorded hazardous material spills and releases in Crawford County from June 2017 through July 2019. Estimated damage to property and crops have not been recorded.

Table 4.6.1 lists the hazardous materials spills and releases in Crawford County on record with the Ohio EPA from June 2017 through July 2019 (Source: Ohio Environmental Protection Agency).

Table 4.6.1: Hazardous Material Spills and Releases

Date	Spill Type	Location	Spill Size
6/12/2017	Unknown Amount	Unknown	Crawford County
7/12/2017	Small: 500 Gal/4000 Lbs.	Unknown	Whetstone Twp
9/5/2017	No Spill	No Spill	Liberty Twp
5/1/2018	Unknown Amount	Other	Village of Crestline
5/9/2018	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Chatfield Twp
5/30/2018	Small: 500 Gal/4000 Lbs.	CHEMICAL PRIOR TO USE IN THE USE	Eden Twp
6/14/2018	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Liberty Twp
7/13/2018	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	City of Bucyrus
9/16/2018	Small: 500 Gal/4000 Lbs.	Other	City of Bucyrus
9/21/2018	Unknown Amount	Unknown	City of Bucyrus
10/1/2018	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Holmes Twp
1/15/2019	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Holmes Twp
2/7/2019	Unknown Amount	Other	City of Bucyrus
2/12/2019	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Village of Crestline

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Date	Spill Type	Location	Spill Size
5/2/2019	Unknown Amount	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	City of Bucyrus
5/16/2019	Small: 500 Gal/4000 Lbs.	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	Jefferson Twp
5/21/2019	Unknown Amount	Hydrocarbon Including Oil, Crude Oil, and Natural Gas	City of Bucyrus
6/10/2019	Small: 500 Gal/4000 Lbs.	Other	Chatfield Twp

4.6.5 Probability

Due to the random and unpredictable nature of hazardous materials accidents, specific probabilities of occurrence are not reported for this hazard. Due to their unpredictable nature, hazardous materials spills should be considered to have a somewhat likely chance of occurring. With that being said, 18 spills have occurred in the last two years, averaging to nine hazardous material spills annually.

4.6.6 Vulnerability Assessment

Infrastructure Impact

Roadways, waterways, and groundwater may be impacted by hazardous materials spills. Road closures may occur as a direct or indirect result of hazardous materials spills.

Population Impact

The local population may be directly exposed to hazardous materials. If a large spill occurs, some residents may need to be evacuated and given shelter elsewhere.

Property Damage

Depending on the chemical, property damage is likely. Properties near Extremely Hazardous Substance facilities are likely to be damaged. **Table 4.6.2**, below, summarizes the vulnerability of property in Crawford County.

Loss of Life

While some hazardous materials can be toxic, loss of life from hazardous materials spills is unlikely. It is possible, however, and extreme precaution should be taken in the event of a spill.

Economic Losses

Economic losses can occur from the loss of hazardous materials that may be needed in manufacturing or for other processes. Road closures may lead to slowed commerce, and businesses impacted by hazardous materials spills may suffer property damage, damage to goods, or be required to close. **Table 4.6.2** details the value of residential, non-residential, and critical facilities within the hazardous materials risk area identified in **Figure 4.6.1 Hazardous Materials Risk Area**.

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Table 4.6.2: Vulnerability of Land and Structures Within Hazardous Materials Risk Area

Structure Type	Number of Properties Exposed	Value of Land Impacted	Value of Buildings Impacted
Residential	18,020	\$149,138,720	\$755,743,280
Non-Residential	7,438	\$221,516,160	\$472,656,880
Critical Facilities	1,401	\$21,407,500	\$204,224,470
Total	26,859	\$392,062,380	\$1,432,624,630

4.6.7 Land Use and Development Trends

Development that has occurred since the previous plan and any future development near hazardous materials storage facilities may be impacted by hazardous materials spills.

4.7 Invasive Species

4.7.1 Description

Invasive Species are species that have potential negative impacts on the environment and economy of Crawford County. Harmful species are both native and invasive. The National Oceanic and Atmospheric Administration (NOAA) defines an invasive species as “an organism that causes ecological or economic harm in a new environment and is not native.” Harmful species are species that are native to a region, but that also cause significant ecological, public health, or economic harm. Their growth is often encouraged through human activity.

4.7.2 Location

Invasive species have the potential to impact any location within the County. Individual species are limited by habitat.

4.7.3 Extent

A list of invasive species nearby or within Crawford County can be found in **Table 4.7.1**.

Table 4.7.1: Invasive Species in Ohio

Type	Name
Terrestrial Plant	Japanese Honeysuckle
Terrestrial Plant	Japanese Knotweed
Terrestrial Plant	Autumn-Olive
Terrestrial Plant	Buckthorns
Terrestrial Plant	Purple Loosestrife
Terrestrial Plant	Common Reed or Phragmites
Terrestrial Plant	Reed Canary Grass
Terrestrial Plant	Garlic Mustard
Terrestrial Plant	Multiflora Rose
Terrestrial Plant	Bush Honeysuckles
Terrestrial Plant	Wild Parsnip
Terrestrial Animal	Feral Swine
Insect	Asian Longhorned Beetle
Insect	Emerald Ash Borer
Insect	Gypsy Moth
Insect	Hemlock Woolly Adelgid
Aquatic Plant	Curlyleaf Pondweed

There are at least three invasive insect species that have the potential to impact Crawford County:

- The **Emerald Ash Borer** targets ash trees. This insect was first found in Ohio in 2003 and has been found in every county. Since the Emerald Ash Borer has been found in every county, there are no quarantines in effect within Ohio's borders; however, the State of Ohio is still listed in the Federal quarantine boundary.
- The **Hemlock Woolly Adelgid** was first discovered in Meigs County, but it has been observed in the eastern region of Ohio. As its name suggests, the Hemlock Woolly Adelgid impacts hemlock trees by stealing nutrients as the base of the tree's needles. Early infestations can be spotted when white, woolly sacs appear near the base of the needles. At a forest level, a thinning hemlock canopy could be caused by the Adelgid. All Hemlock Woolly Adelgids are female and reproduce asexually. Every year, one generation is born in the spring and one in the winter. Feeding and egg laying typically occur during the Autumn season, and hibernation or dormancy occurs during the growing season.
- The **Gypsy Moth** has been migrating into Ohio from Pennsylvania and Michigan. In the caterpillar stage the Gypsy Moth targets over 300 different trees and shrubs. A healthy tree will typically die within two years of a Gypsy Moth infestation. Gypsy Moth eggs are laid during July and overwinter until late April to mid-May. An egg mass can contain up to 600 eggs. Before feeding, the larvae are dispersed by the wind to other trees or areas. The Gypsy Moth can lead to heavy defoliation and can make trees more susceptible to other invasive or harmful species. Preferred host plants include alder, aspen, gray birch, white birch, hawthorn, larch, linden, mountain ash, oaks, Lombardy poplar, willows, and witch-hazel. Trees that are susceptible to older larvae only include beech, red cedar, chestnut, hemlock, plum, pine, and Colorado blue spruce.

4.7.4 History

There has been at least one recorded event of wild parsnip growing in Crawford County. Additionally, the Emerald Ash Borer was discovered in Ohio in 2003 and quickly spread to all 88 counties soon thereafter. It is also possible that any of the species listed above have at one point been in Crawford County.

4.7.5 Probability

While the exact probability of experiencing invasive species is difficult to quantify, it is very probable that Crawford County will see one or more of the invasive species listed above.

4.7.6 Vulnerability Assessment

Infrastructure Impact

There are no likely impacts to public roadways or utilities. Public trees may be destroyed or impacted by various invasive species.

Population Impact

There are no direct impacts to the population of Crawford County from the invasive species discussed above; however, it is possible that as invasive species migrate, some will pose a greater risk to population health.

Property Damage

Due to the likelihood that one or more of these invasive species will impact Crawford County, it is also likely that property damage, in the form of reduced values from impacts on landscaping, will occur.

Loss of Life

Loss of life due to the effects of invasive species is unlikely.

Economic Losses

Economic impacts can vary greatly depending on the target and of the invasive species and their impacts on those targets. If a large number of trees are severely damaged or killed by various invasive species, there may be indirect economic losses. Examples include increased heating and cooling costs, reduced property value, and reduction in viable lumber for construction.

4.7.7 Land Use and Development Trends

There are no likely impacts on development and land use due to invasive species.

4.8 Severe Storms

4.8.1 Description

Severe storm events may include severe thunderstorms, high wind, hail, and lightning. Tornadoes and flooding may also be categorized as severe storm-related events, and due to the potential threat of these events, they are each discussed in separate risk assessments. While tropical storms and hurricanes are also forms of severe storms, Crawford County does not have any record of such events affecting the County; therefore, the County has not deemed tropical storms and hurricanes to be a threat and these specific types of weather will not be addressed further.

According to the National Weather Service (NWS), a Severe Thunderstorm is a thunderstorm that produces a tornado, winds of at least 58 MPH, and/or hail at least one inch in diameter. A Severe Thunderstorm Watch is issued by the National Weather Service if conditions are favorable for the development of severe thunderstorms. A Watch is usually in place for four to eight hours, during which time people should be prepared to move to safe place if threatening weather approaches.

A Severe Thunderstorm Warning is issued if either the WSR-88D radar indicates a severe thunderstorm or if a spotter reports a storm producing hail or winds meeting the criteria outlined in the definition of a severe thunderstorm. The WSR-88D radar is an advanced Weather Surveillance Doppler Radar utilized by the National Weather Service to generate a radar image. The National Weather Service recommends that people in the affected area seek safe shelter immediately, as severe thunderstorms have the potential to produce tornadoes with little to no advance warning. Lightning frequency is not a criterion for issuing a severe thunderstorm warning. The warnings are usually issued for one hour and can be issued without a Severe Thunderstorm Watch already in effect. The National Weather Service Forecast Office in Cleveland, Ohio is responsible for issuing Severe Thunderstorm Watches and Warnings for Crawford County.

Lightning is caused by a rapid discharge of electrical energy that has built up in the atmosphere between clouds, the air, or the ground. Lightning strikes can be either direct or indirect. A direct strike is when lightning strikes a building or a specific zone, which can result in fusion points melting holes of varying sizes at the point of impact of materials with high resistivity. An indirect lightning strike is when lightning causes power surges that disrupt electrical equipment.

Severe storms can also create strong winds – often called “straight-line” winds to differentiate thunderstorm winds from tornadic winds. These winds, which have the potential to cause damage, are caused by an outflow generated by a thunderstorm downdraft.

Hail is a type of frozen precipitation that occurs when thunderstorm updrafts carry raindrops upward into extremely cold atmospheric zones where they freeze before falling to the ground. The resulting hailstones can fall at speeds greater than 100 MPH and range in size from smaller than 0.50 inches (the size of a pea) to 4.5 inches (the size of a softball) (Source: National Weather Service).

4.8.2 Location

Severe storms are a countywide hazard and all of Crawford County is susceptible to severe weather.

4.8.3 Extent

Severe storm events have the potential to create large-scale damage in Crawford County. Specifically, lightning is responsible for approximately 50 deaths annually across the United States, as well as hundreds of injuries (Source: National Oceanic and Atmospheric Administration). Winds

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have the potential to cause damage by bringing down tree limbs and generating widespread power outages. Both strong winds and hail can result in property damage. People living in mobile homes are especially at risk for injury and death due to strong winds. Even anchored mobile homes can be seriously damaged if winds gust over 80 MPH.

4.8.4 History

According to the National Oceanic and Atmospheric Administration, there have been 182 days with thunderstorm wind events, 29 days with high wind events, three days with strong wind events, two lightning events, and 72 hail events recorded in Crawford County from June 1971 to April 2019. These events resulted in \$11.238 million and \$10.238 million in property and crop damage, respectively. These events were also responsible for four injuries but no deaths. These events are summarized in **Table 4.8.1**, below. A complete list of severe storm events can be found in **Appendix A**.

Table 4.8.1: Severe Storm Events in Crawford County since 1971

Severe Storm Event Type	Number of Events	Injuries	Deaths	Property Damages	Crop Damages
Thunderstorm Wind	182	4	0	\$5,591,000	\$5,035,000
High Wind	29	0	0	\$4,719,000	\$850,000
Strong Wind	3	0	0	\$40,000	\$0
Lightning	2	0	0	\$50,000	\$0
Hail	72	0	0	\$838,000	\$5,020,000
Total	288	4	0	\$11,238,000	\$10,905,000

While 288 severe storm events have occurred in Crawford County between June 1971 and April 2019, only four of these events were associated with disaster declarations. These four declarations are listed below, while all other severe storm events are listed in **Appendix A**.

Major Disaster Declaration: August 26, 2007 (DR-1720-OH)

This Major Disaster Declaration was made on Sunday, August 26, 2007 for the incident period of August 20, 2007 through August 28, 2007. A total of four counties were affected by the storms and received funding as part of this disaster. The Ohio Emergency Management Agency indicates that \$64,763,025 were made available for all counties impacted by the severe weather. Flooding and tornadoes were also involved in this disaster event. Crawford County received both individual assistance and public assistance for this disaster.

Major Disaster Declaration: June 2, 2004 (DR-1519-OH)

This Major Disaster Declaration was made on Wednesday, June 2, 2004 for the incident period of May 18, 2004 through June 21, 2004. Severe weather impacted Crawford County throughout May and June in 2004. A series of severe thunderstorms moved across Crawford County, downing trees and causing power outages. Some of the worst damage in the County occurred near Galion where spotters estimated winds at 70 MPH. Several homes were damaged by fallen trees in that area. A few vehicles were also damaged in Crawford County.

A total of 20 counties were affected by the storms and received funding as part of this disaster. The Ohio Emergency Management Agency indicates that \$47,353,657 were made available for all counties impacted by the severe weather. Flooding was also involved in this disaster event.

Major Disaster Declaration: July 14, 2003 (DR-1478-OH)

This Major Disaster Declaration was declared on Monday, July 14, 2003 for the incident period of July 4, 2003 through July 11, 2003. Between July 4, 2003 and July 11, 2003, a series of severe thunderstorms moved across Crawford County. According to the National Climatic Data Center, numerous trees were downed resulting in scattered power outages and blocked roads, including SR-19.

A total of 11 counties were affected by the storms and received funding as part of this disaster. The Ohio Emergency Management Agency indicates that \$9,588,225 were made available for all counties impacted by the severe weather. Flooding was also involved in this disaster event.

Major Disaster Declaration: July 17, 1987 (DR-796-OH)

This Major Disaster Declaration was made on Thursday, July 17, 1987 for the incident period of July 1, 1987 through July 10, 1987. A total of four counties were affected by the storms and received funding as part of this disaster. The Ohio Emergency Management Agency indicates that \$1,332,822 were made available for all counties impacted by the severe weather. Flooding was also involved in this disaster event.

4.8.5 Probability

According to the National Climatic Data Center, there have been 288 severe storm events reported in Crawford County from June 1971 to April 2019, with total losses reaching more than \$22.1 million. This amounts to approximately six severe storm events annually with average annual damages of \$460,000.

4.8.6 Vulnerability Assessment

Infrastructure Impact

Above-ground infrastructure is at risk for storm damage by wind and falling debris. For infrastructure, high winds and hail are the most damaging part of a severe storm. High winds can strip bark from trees and detach limbs. If large branches fall, they can damage buildings and supporting above-ground infrastructure. In the most severe storms with high winds, large trees can be uprooted and have the potential to fall on buildings, including houses, which can cause harm or death.

Utilities are at risk for damage by severe storms, as well. Electrical lines are spread throughout the County connecting homes, businesses, and other facilities. Severe storms are likely to down tree limbs and generate other debris that can affect above-ground electrical lines, causing power outages. Downed power lines that are still live are extremely hazardous and can cause death by electrocution.

Population Impact

According to the American Community Survey's 2017 population estimates, the population of Crawford County is approximately 42,231. Summer storms are random in nature and affect the entire area of the County. Everyone within the County should be prepared during a storm event. Populations residing in mobile home parks are particularly vulnerable and should seek out shelters.

Property Damage

As described above, these events have caused approximately \$460,000 in property and crop damages annually. Due to the non-site-specific nature of this hazard, **Table 4.8.2** lists all structures within Crawford County as having potential impacts from severe storms.

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Loss of Life

While loss of life is rare due to severe weather, it is possible. According to National Climatic Data Center, severe storms, including Thunderstorm Wind, High Wind, Strong Wind, Lightning, and Hail, were responsible for four injuries due to events that passed through Crawford County since 1957.

Economic Losses

Severe storms usually cause minor damage to structures, such as blowing shingles off roofs and downed branches breaking windows or falling onto buildings and above-ground infrastructure. More severe damage may also result. Of the 288 severe storm events since 1957, 45 of the 182 Thunderstorm Wind events, 15 of the 29 High Wind events, one of the three Strong Wind events, one of the two lightning events, and three of the 72 hail events resulted in property damage of \$20,000 or more. The costliest storm in the County's history was a high wind event on September 14, 2008 which caused \$3.0 million in property damage and \$750,000 in crop damage.

Table 4.8.2: Structure Vulnerability from Severe Storms

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	22,289	\$193,610,000	\$982,816,730	\$1,176,426,730
Non-Residential	11,254	\$425,401,190	\$580,946,200	\$1,006,347,390
Critical Facilities	1,565	\$23,712,300	\$216,478,720	\$240,191,020
Total	35,108	\$642,723,490	\$1,780,241,650	\$2,422,965,140

4.8.7 Land Use and Development Trends

Severe storms can occur anywhere. Any development that has occurred since the previous plan and any future development has the potential to be impacted by severe storms.

4.9 Severe Winter Storms

4.9.1 Description

Winter storms are events that have snow, sleet, or freezing rain as their primary type of precipitation. While the precipitation itself is typically not dangerous, frozen roads and exposure to cold can cause death and injury.

A winter storm forms under the right combination of three causes:

- Below freezing temperatures in the clouds and near the ground, which are necessary to make snow or ice.
- Lift, which raises the moist air from the clouds and causes precipitation. Warm air colliding with cold air and being forced to rise over the cold is an example of lift.
- Moisture is needed to form clouds and precipitation. Air blowing across a body of water is a common source of moisture.

Winter storms are categorized by their type: blizzards, ice storms, lake effect storms, and snow squalls.

1. **Blizzards** are winter storms that are a combination of blowing snow and wind which lead to very low visibility. Heavy snowfalls and severe cold often accompany blizzards, but this is not required. Ground blizzards occur when strong winds pick up snow that has already fallen.
2. **Ice Storms** occur when at least a quarter inch of ice accumulates on exposed surfaces. Roads and sidewalks can become dangerously slick, and trees and powerlines can easily break under the weight of accumulated ice.
3. **Lake Effect Storms** are cold, dry air masses that move over the Great Lakes regions and drop the moisture as snow in areas near the Great Lakes.
4. **Snow Squalls** are brief, intense snow showers accompanied by strong winds. Accumulation may be significant.

4.9.2 Location

Winter storms are typically large events that will impact the entire County and have the potential to impact multiple counties.

Additionally, according to the *State of Ohio Enhanced Hazard Mitigation Plan*, western Crawford County received an annual average snowfall of between two to three feet between 2013 and 2017, while eastern Crawford County received three to four feet of snowfall annually, on average, between these same years.

4.9.3 Extent

According to the *State of Ohio Enhanced Hazard Mitigation Plan*, Ohio residents and governments are accustomed to handling winter storm events; however, events that are extreme can create dangerous conditions that are disruptive and difficult to manage. Small accumulations of ice can create slippery roads and walkways that have the potential to lead to vehicular and pedestrian accidents. Additionally, heavy ice and snow can weigh down tree limbs, resulting in downed limbs that can cause collapsed roofs or utility/power failure. Telecommunications and electric power can be disrupted for days as a result of severe winter weather.

4.9.4 History

The National Climatic Data Center has record of 23 winter storm events, two ice storm events, and four heavy snow events in Crawford County from January 1996 to January 2019, resulting in a total of \$16.539 million in property damage and \$0 in crop damage. Additionally, Crawford County has received four disaster declarations as a result of severe winter weather since 1977. Only the events associated with disaster declarations are described below, with event descriptions made available by the National Climatic Data Center. All other hazard events not associated with these disaster declarations are located in Appendix A for reference.

Emergency Declaration, April 24, 2008 (EM-3286)

An emergency declaration was made on April 24, 2008 for the incident period of March 7, 2008 through March 9, 2008.

Friday, March 7, 2008

Snow began during the late morning hours of March 7, 2008 and continued through the day. By evening, around four inches of snow fell across the area. The snow continued overnight and intensified by the morning hours of March 8, 2008. Throughout the day on March 8, 2008, snowfall was moderate to heavy at times and wind gusts around 25 MPH caused considerable blowing and drifting of snow. By the end of the event, snowfall amounts varied considerably across the area. Snow totals include 13.5 inches in Galion, 18.9 inches in the Village of New Washington, and 20.5 inches in the City of Bucyrus. Many accidents were reported during this storm.

Approximately \$650,000 in property damage was recorded as a result of this event.

Emergency Declaration, January 11, 2005 (EM-3198)

An emergency declaration was made on January 11, 2005 for the incident period of December 22, 2004 through December 24, 2004.

Wednesday, December 22, 2004

A record setting winter storm affected northern Ohio on December 22-23, 2004. The impact and damage caused by this storm has been compared to the Blizzard of January 1978.

Low pressure developed over eastern Texas early on December 22, 2004 and then moved quickly northeast. The low eventually tracked across eastern Ohio during the morning hours of December 23, 2004 after dumping nearly two feet of snow on portions of Ohio. The snow began around daybreak on December 22, 2004 and then intensified around midday. Heavy snow with visibilities of a quarter mile or less then persisted into the early morning hours of December 23, 2004. Snowfall rates much of this time ranged from one to two inches per hour. Winds increased significantly during the evening hours of December 22, 2004, as northerly winds developed on the backside of the low. Gusts to 30 MPH caused significant blowing and drifting. Drifts several feet deep were reported. Temperatures warmed slightly during the early morning hours of December 23, 2004 as the low moved into southeast Ohio. This caused the snow to first mix with, and then change completely to freezing rain.

Officially, 23.0 inches of snow was measured at Mansfield Lahm Airport (Richland County) establishing a new all-time record snowfall. In addition, 0.57 inches of freezing rain was measured at that location. The freezing rain significantly compacted the snow and official measurements made by cooperative observers around daybreak likely underestimated the actual snowfall. Had measurements been taken around midnight, reported accumulations would have likely been several inches higher at most locations. The wet and very heavy snow made travel nearly impossible across northern Ohio.

Hundreds of accidents were reported and holiday travel for many was not possible. Numerous power outages as a result of the freezing rain were also reported. The outages were most widespread in southern portions of Ashland and Richland Counties where some areas were without power for several days. The weight of the heavy snow damaged the roofs of dozens of homes and buildings, several of which had complete roof failures. It took several days for road crews to completely clean up after this event. Damage and clean-up costs for this storm were historic with only the Blizzard of 1978 having more financial impact.

Approximately \$4,800,000 in property damage was recorded as a result of this event, making this event the worst in terms of property damage recorded for the County.

Emergency Declaration, January 26, 1978 (EM-3055)

An emergency declaration was made on January 26, 1978 for the incident event on January 26, 1978.

Emergency Declaration, January 26, 1977 (EM-3029)

An emergency declaration was made on February 2, 1977 for the incident event on February 2, 1977.

4.9.5 Probability

Crawford County has experienced 29 severe winter weather events between January 1996 and January 2019. These events average to between one to two severe winter storm events annually. Combined, these events resulted in \$16,539,000 in property damage and \$0 in crop damage, which amounts to \$719,087 in property damage annually.

4.9.6 Vulnerability Assessment

Infrastructure Impact

Winter storms can cause damage to overhead utilities. Wires in particular can collapse under the weight of accumulated snow and ice. Debris can block roadways or damage property as tree limbs can also collapse under the weight of accumulated snow and ice. Water pipes can be frozen under extreme low temperatures that may accompany severe winter storms.

Roads and sidewalks can be blocked by the accumulation of snow, and they also have the potential to ice-over following freezing rain events.

Population Impact

All residents of Crawford County are expected to be impacted by severe winter storms. Particularly, there is high potential for damage to utility lines, which might result in loss of power and subsequent loss of heat. Additionally, driving conditions can become treacherous with blowing conditions which has the potential to lead to vehicular accidents.

Property Damage

Property can be damaged by accumulated snow and ice, debris, and falling wires. Extreme low temperatures can also freeze the water in pipes which could cause them to explode. All buildings are in the County are exposed and vulnerable to winter storms.

As a result of the severe winter storms listed above, \$16,539,000 in property damages were recorded, which averages to \$719,087 annually. Because severe winter storms can impact all parts

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of the County, **Table 4.9.1** lists all structures within Crawford County as having potential impacts from severe winter storms.

Loss of Life

There are no reported deaths from the severe winter storms listed above; however, there may be indirect deaths that occur from winter storms. Likely causes of death are from iced over and dangerous roads which lead to vehicular accidents, hypothermia from prolonged exposure to cold, and heart attacks from heavy snow shoveling.

Economic Losses

Economic losses can occur from businesses shutting down for potentially long periods of time. Economic activity can be completely halted during winter storms, including transportation of goods. Electricity outages may lead to spoiled goods. Since winter storms occur during the winter season, damages to crops are unlikely.

Table 4.9.1: Structure Vulnerability from Severe Winter Storms

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	22,289	\$193,610,000	\$982,816,730	\$1,176,426,730
Non-Residential	11,254	\$425,401,190	\$580,946,200	\$1,006,347,390
Critical Facilities	1,565	\$23,712,300	\$216,478,720	\$240,191,020
Total	35,108	\$642,723,490	\$1,780,241,650	\$2,422,965,140

4.9.7 Land Use and Development Trends

Winter storms can occur anywhere. Any development that has occurred since the previous plan and any future development has the potential to be impacted by winter storms.

4.10 Terrorism

4.10.1 Description

Terrorism is defined as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives” (28 CFR, Section 0.85). Tools used to conduct acts of terrorism include Weapons of Mass Destruction (WMD); biological, chemical, nuclear, and radiological weapons; arson; incendiary, explosives; armed attacks; industrial sabotage; intentional hazardous materials release; and cyberterrorism.

The Federal Bureau of Investigations (FBI) produces an annual terrorism report, which contains profiles and chronologies of terrorism incidents in the United States. Terrorism can be both International and Domestic, where International Terrorism is defined as acts “perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored)” (Source: FBI). The second is Domestic Terrorism, defined as acts “perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature” (Source: FBI).

Types of terrorism include Cyberterrorism, Agroterrorism, Terrorism (Biological), and Terrorism (Chemical). Stakeholders have also requested discussion on Active Aggressors as a hazard, and so an assessment of Active Aggressors has also been included in this section, as they have the potential to incite terror. These types of terrorism are defined below:

- **Cyberterrorism:** Cyberterrorism is an electronic attack using one computer system against another, and attacks can be directed towards computers, networks, or entire systems. A cyber-attack may last minutes to days. Homeland Security, the FBI, and the Federal Communications Commission Department of Justice are often involved in developing countermeasures that focus on reducing the threat, vulnerability, and likelihood of attack.
- **Agroterrorism:** Agroterrorism is a direct, generally covert contamination of food supplies or the introduction of pests and/or disease agents to crops and livestock. An agricultural-based terror attack can last days to months.
- **Biological Terrorism:** Biological terrorism includes use of bacteria, viruses, or toxins to incite terror. This mode of terrorism can last minutes to months.
- **Chemical Terrorism:** Chemical terrorism includes use of nerve agents, choking agents, blood agents, or blister agents, to attack normal bodily functions of the nervous, respiratory, circulatory, and skin, respectively. Usually, an act of chemical-based terror lasts only minutes.
- **Active Aggressor:** An Active Aggressor is an armed individual or group of individuals that is intending to cause harm or inflict terror on a civilian population. An Active Aggressor (or group) may be armed with guns, knives, bombs, or any other weapon/implement that may be used to inflict harm.

4.10.2 Location

Terrorism events have generally been localized within a single jurisdiction. Coordinated events have occurred historically, greatly expanding the number of affected jurisdictions. Based on the nature of the event, several jurisdictions may respond to an incident.

4.10.3 Extent

The extent of each of these modes of terrorism includes:

- **Cyberterrorism:** Typically, the built environment is unaffected by a cyber-attack. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.
- **Agroterrorism:** The extent of the effects varies by type of incident. Inadequate security can facilitate the adulteration of food and introduction of pests and disease agents to crops and livestock.
- **Biological Terrorism:** A biological attack could cause illness and even kill hundreds of thousands of people, overwhelm public health capabilities, and create significant economic, societal and political consequences. Public health infrastructure must be prepared to prevent illness and injury that would result from biological terrorism.
- **Chemical Terrorism:** Most chemical agents are capable of causing serious injuries or death, and their often rapid course of action, means there is very little time to act when an act of chemical terrorism occurs. Public health infrastructure must be prepared to prevent illness and injury that would result from chemical terrorism.
- **Active Aggressor:** Active Aggressor incidents often occur in areas where a number of people gather regularly. This may be a place of employment, a neighborhood gathering area (church, recreational center, school, etc.), or other location.

Terrorist threats may also occur among school districts within the County. Threats can last several hours or event days and cause multiple problems such as disturbing a school's order, causing traffic jams, and inducing civil panic. Individuals, groups, and institutions should be aware of, and understand how to react to, such potential threats immediately and appropriately.

4.10.4 History

There have been no reported terrorism events in Crawford County. Terrorist plots have been thwarted in Columbus, Dayton, Cincinnati, and Cleveland, among other locations. Mass shootings, such as a school shooting, is an example of an Active Aggressor situation. While there are no recorded school shooting or terrorism incidents in Crawford County, local officials have determined that the risk of such an incident occurring in Crawford County exists.

4.10.5 Probability

Because there have been no recorded terrorism events in Crawford County, there is a less than one percent chance of occurrence.

4.10.6 Vulnerability Assessment

Infrastructure Impact

Above ground structures such as government buildings, churches, libraries, and schools, as well as below-ground infrastructure such as natural gas pipelines, are at risk for terrorism damage. Acts of cyberterrorism have the potential to target systems that may influence or control infrastructure.

Population Impact

The population of Crawford County is likely to be impacted should an act of terror occur. It is important that public health organizations are prepared to prevent illness and injury that may result from acts of terror.

Property Damage

Since terrorism acts can occur anywhere within the County, property damage is a possible outcome of such an event. Agroterrorism may result in damage to crops, and an active aggressor situation may result in minimal property damage.

Loss of Life

Acts of terror are likely to result in loss of life. It is important that public health and healthcare organizations are prepared to act quickly should an act of terror occur.

Economic Losses

Since the probability of terrorism happening in Crawford County is very low, and there is less than a one percent chance of this type of hazard occurring in any given year, local terrorism-related economic losses are estimated at zero. However, terror attacks occurring in other locations have the potential to have economic impacts in Crawford County. Transportation networks, such as air transportation, can be shut down as a result of terrorism, impeding profits and resulting in economic losses to organizations within the County. Any act of terror, nationwide, that results in a temporary freeze of goods or services has the potential to limit or suspend economic activity in Crawford County as well.

4.10.7 Land Use and Development Trends

Terrorism can occur anywhere. Non-residential land uses are more likely to be targeted for terror events or active shooters. New schools and government buildings should have active shooter plans in place.

4.11 Tornadoes

4.11.1 Description

FEMA defines a tornado as “a violently rotating column of air extending from a thunderstorm to the ground.” Tornadoes can generate wind speeds of greater than 250 MPH. Tornado paths can be as large as one mile wide and 50 miles long. Nationally, there is an average of 800 tornadoes reported annually across all 50 states.

In general, the midsection of the United States experiences a higher rate of tornadoes than other parts of the country because of the recurrent collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains. Supercells, which form from rotating thunderstorms, are the most destructive variety of tornado.

Tornado Warnings are issued by the National Weather Service office in Wilmington, Ohio when a tornado is indicated by the WSR-88D radar or sighted in person by spotters. The WSR-88D radar is an advanced Weather Surveillance Doppler Radar utilized by the National Weather Service to generate a radar image. Once a warning has been issued, people in the warning area should seek shelter immediately. Warnings will include the location of the tornado, as well as what communities will be in its path. A tornado warning can be issued without a tornado watch, and they are typically issued for 30 minutes at a time. If the thunderstorm responsible for the formation of the tornado is also producing large volumes of rain, the tornado warning may be combined with a Flash Flood Warning. The National Weather Service Office in Wilmington will follow up any Tornado Warnings with Severe Weather Statements to provide up to date information on the tornado and inform the public when the warning is no longer in effect. (Source: National Weather Service).

4.11.2 Location

Tornadoes are a county-wide hazard, potentially affecting all areas and jurisdictions.

4.11.3 Extent

Tornadoes are measured by damage scale for their winds, with greater damage equating greater wind speed. The original Fujita Tornado Damage Scale (F-scale) was developed in 1971, without much consideration to a structure’s integrity or condition as it relates to the wind speed required to damage it. The Enhanced Fujita-scale (EF-Scale) took effect on February 1, 2007. This scale starts with the original F-scale’s F0-F5 ratings and also classifies tornado damage across 28 different types of damage indicators. These indicators mostly involve building/structure type and are assessed at eight damage levels from 1-8. Therefore, construction types and their relative strengths and weaknesses are incorporated into the EF classification given to a particular tornado. The most intense damage within the tornado path will generally determine the EF scale given the tornado. **Table 4.11.1** lists the classifications under the EF- and F-scale. It should be noted that the wind speeds listed in this table are estimates based on damage rather than measurements.

There are no plans by National Oceanic Atmospheric Administration or the National Weather Service to re-evaluate the historical tornado data using the enhanced scale. Therefore, this Plan and subsequent plans will reference both scales until a complete switchover is deemed necessary.

Table 4.11.1 Fujita and Enhanced Fujita Scale Classifications
(Source: State of Ohio Enhanced Hazard Mitigation Plan)

Fujita Scale 3-Second Wind Gust (MPH)		Damage Levels	Enhanced Fujita Scale 3-Second Wind Gust (MPH)	
F0	45-78	Light Damage: Tree branches down.	EF-0	65-85
F1	79-117	Moderate damage: Roof damage.	EF-1	86-110
F2	118-161	Considerable damage: Houses damaged.	EF-2	111-135
F3	162-209	Severe damage: Buildings damaged.	EF-3	136-165
F4	210-261	Devastating damage: Structures leveled.	EF-4	166-200
F5	262-317	Incredible damage: Whole towns destroyed.	EF-5	Over 200

4.11.4 History

The National Climatic Data Center has record of 13 tornado events in Crawford County from June 1961 to November 2017. Additionally, local news sources have reported one tornado event in Crawford County in 2019. Altogether, these events resulted in \$3.78 million in property damage with no crop damages reported. The two most recent events, which took place on September 4, 2018 and November 5, 2017 were the two worst tornadoes on record, based on total property damage. These events are described in detail below, along with the event from June 5, 2019, which was recorded by the local news, *Crawford County Now*. A complete list of all 13 tornado events is located in **Appendix A**.

June 5, 2019

Crawford County Now reported that the National Weather Service in Cleveland confirmed an EF-0 tornado touchdown in the City of Galion in Crawford County at 4:57 PM on Wednesday, June 5, 2019. Estimated peak winds were 75 MPH. The path length of the tornado was approximately 1.18 miles, with a maximum width of 10 yards. The tornado was reported to have touched down near the intersection of North Columbus and Grant Streets and traveled southeast until it dissipated over Second Avenue. The City of Galion utility crews were able to repair downed power lines within several hours.

November 5, 2017

The National Weather Service Storm Survey reported that an EF1 tornado touched down in the City of Galion near the intersection of Orange and Grand Streets. Many trees in the area were snapped or

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uprooted. The tornado continued east northeast across the city and damaged three homes as it crossed Union Street. Two of the homes lost some facia, siding and roofing but the third had a fallen tree damage a wall. A warehouse on Market Street lost a section of roofing. A second warehouse along Columbus Street also lost some roofing material. A few blocks to the east two homes were damaged on South Washington Street. One of the homes had its roof detached and the second lost some roofing and siding material. The tornado then intensified to EF2 as it crossed the southern end of Pierce Street. At least four properties on Pierce Street were damaged. Three of the homes were classified as having major damage and had their roofs torn off in addition to having broken windows and lost siding. Two of the properties also had detached garages destroyed. The fourth house had a porch damaged. Significant damage also occurred a block to the east along Riblet Street. An auto repair shop lost its roof and had three masonry walls collapse. Bricks from the building were found on the roofs of houses nearby. Three other commercial buildings on Riblet Street lost large sections of roofing. One of the three also sustained damage to an exterior wall. Four homes were damaged on the southern end of East Street. One of the homes sustained major damage in the form of a detached roof. The other three houses sustained lesser amounts of roof and siding damage. The tornado continued east for another block and finally lifted as it reached Walnut Street.

Many trees, limbs and utility poles were downed along the damage path which was just over a mile in length and up to 200 yards in width. A total of 21 structures were damaged in the City of Galion with one destroyed and five sustaining major damage. There were no injuries.

Approximately \$750,000 in property damage was recorded as a result of this tornado.

September 4, 2017

The National Weather Service Storm Survey reported that an EFO tornado touched down in rural Crawford County about three quarters of a mile west of North Robinson. The initial touchdown was in a cornfield west of Olentangy Road about halfway between Lower Leesville Road and Crestline Road. The tornado then continued east and moved across the northern half of North Robinson causing extensive damage. The tornado briefly reached EF2 intensity as it moved through the town.

Several garages were destroyed, and one home was heavily damaged after losing a large section of roof. Other homes along the path sustained lesser amounts of damage, mainly in the form of lost siding or shingles. One home did have a brick chimney toppled. Tree damage in the town was extensive. The tornado continued east over open farmland and eventually crossed the Sandusky River. The tornado then intensified to EF2 as it crossed State Route 598 north of Leesville. A home along State Route 598 was blown off its foundation and destroyed. A second home nearby lost large sections of roofing. The tornado then continued east northeast snapping dozens of hardwood trees and leveling three farm buildings near where the Lincoln Highway and Krichbaum Road intersect. The tornado then followed a track nearly parallel and just north of Krichbaum Road for a couple of miles. Several more farm buildings were damaged or destroyed and a home lost a portion of its roof before the tornado crossed into Richland County north of the intersection of Krichbaum Road and Crawford Richland Line Road.

The tornado was on the ground for just over 8 miles in Crawford County and had a damage path of up to 400 yards in width. Hundreds of trees and many power poles were downed along the damage path.

Approximately \$1,250,000 in property damage was recorded as a result of this tornado.

4.11.5 Probability

There have been 14 reported tornadoes from June 1961 to June 2019, which amounts to approximately one tornado every four to five years – or a 25 percent chance that a tornado will occur annually. Additionally, these 14 tornadoes have been responsible for \$3,780,250 in property damage and \$0 in crop damage, which amounts to \$65,176 in property damage annually.

4.11.6 Vulnerability Assessment

Infrastructure Impact

Above-ground infrastructure can be damaged by high tornado winds. Debris caught in the high winds can also cause damage to buildings and infrastructure, including road closure. Above-ground utility infrastructure can be damaged or destroyed, which can cause service outages.

Population Impact

Tornadoes are random in nature and have the potential to occur anywhere in the County. Everyone within the County should be prepared for a tornado. Residents in mobile home parks are particularly vulnerable and should have a plan in place.

Property Damage

There was \$3,780,250 in property damage reported from the 14 tornado events recorded. The minimum value of property damage recorded was \$250 on May 25, 1973, while the maximum value of property damage recorded was \$1,250,000 on September 4, 2017. Annually, tornado events cause approximately \$65,176 in property damage and no crop damage.

Loss of Life

While there were no deaths reported in the 13 tornadoes in the National Climatic Data Center database, there is still a potential for loss of life during or after a tornado. Loss of life can be both directly attributed to the tornado or indirectly. In extreme weather events, loss of utilities following a tornado event can create dangerous living conditions.

Economic Losses

Tornadoes can cause major damage to structures and roads. More severity tornadoes have the potential to completely destroy structures. Debris also has the potential to cause damage to structures by breaking windows, damaging walls, or falling directly onto buildings and above-ground infrastructure.

Damages to utilities and roadways may also cause economic damage due to business closures, destruction of goods that require electricity, and halting economic activity.

Figure 4.11.1 below simulates an extremely destructive, worst case scenario EF5 tornado and its impacts on Crawford County assets and infrastructure. The worst-case scenario is simulated by running the EF5 tornado on a straight path through the most populated areas of the County. This theoretical scenario is performed to determine maximum potential damage within the County. **Table 4.11.2** categorizes the damages that would result from such a tornado.

4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Table 4.11.2: Damages Associated with Worst-Case Scenario Tornado

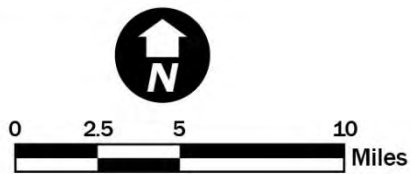
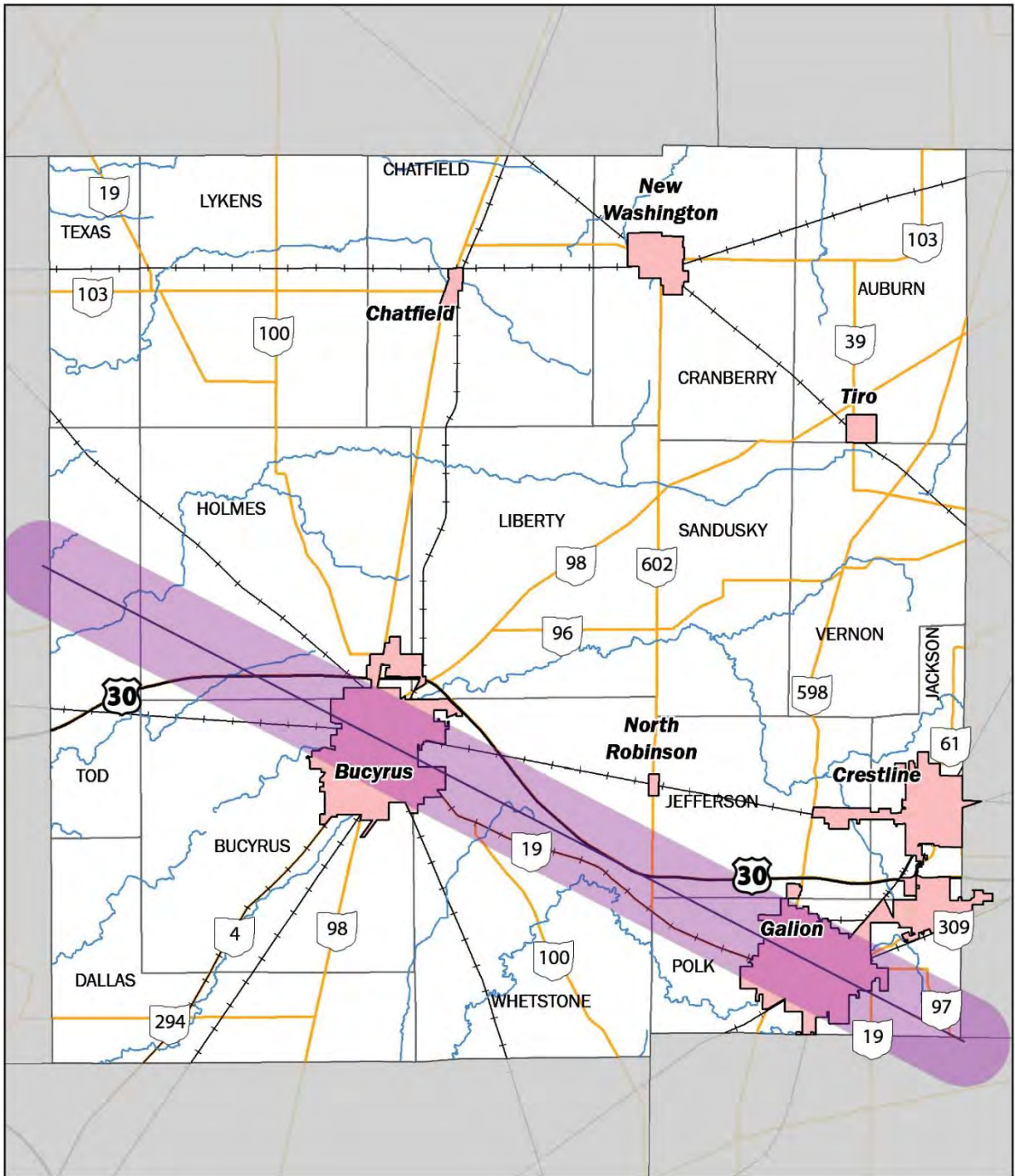
Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	11,784	\$95,346,110	\$480,866,000	\$576,212,110
Non-Residential	3,489	\$82,091,420	\$288,247,930	\$370,339,350
Critical Facilities	830	\$13,110,660	\$137,361,940	\$150,472,600
Total	16,103	\$190,548,190	\$906,475,870	\$1,097,024,060

4.11.7 Land Use and Development Trends

Tornadoes can occur anywhere. Any development that has occurred since the previous plan and any future development has the potential to be impacted by tornadoes.

4 | HAZARD IDENTIFICATION AND RISK ASSESSMENT

Figure 4.11.1: Worst-Case Scenario Tornado in Crawford County



— Tornado Path
■ Tornado Impact Zone

4.12 Utility Failure

4.12.1 Description

Utility failure refers to the loss of electric power (blackouts), water, sewage, natural gas or other utilities. These are primarily caused by system overload or lack of updated infrastructure. Power failures are generally caused by natural events, such as severe storms, ice storms, tornadoes, and high winds. These power failures are common and cannot easily be predicted due to the random nature of storms; however, updates to infrastructure can reduce the amount and frequency of these power outages.

There are five electric providers in the County: American Electric Power, First Energy, North Central Electric Co-Op, Mid-Ohio Energy Cooperative, and the City of Galion Line Department. Natural gas is only provided by Columbia Gas of Ohio. Landline telecommunication providers include CenturyLink, Frontier, and Sycamore Telephone Company.

The City of Bucyrus, City of Galion, and the Village of Crestline provide municipal water services, while Crawford County provides rural water service to the Village of North Robinson area. Private water providers include Northern Ohio Rural water. Some residents in the County also utilize water haulers to provide drinking water.

4.12.2 Location

Depending on the cause, blackouts can be isolated or countywide. Utility failures can occur in any area where the utility is provided.

4.12.3 Extent

Utility failures due to damaged infrastructure have the potential to impact large areas of the County through the loss of utilities that provide necessary services for the population. Loss of electric or gas can affect household temperatures, which can lead to severe dehydration or possibility of loss of life if outdoor temperatures are extreme. Additionally, utility failure affecting the water service has the potential to lead to contamination of the water supply.

4.12.4 History

While numerous utility failures have occurred within Crawford County in the form of power outages due to severe storms, severe winter weather, or other natural hazards; widespread utility failure has not been recorded in the County. Events resulting in power outages can be referenced in the Risk Assessment sections of the appropriate hazard.

4.12.5 Probability

As there are no previous indications that a widespread utility failure has occurred in Crawford County, there is less than one percent chance of a widespread utility failure within the County. However, it is likely that utility failures in the form of power outages will occur throughout any given year due to severe storms, ice storms, and other natural hazards. Probability of these natural hazards can be found in their respective sections.

4.12.6 Vulnerability Assessment

Infrastructure Impact

In the event of a utility failure caused by downed power lines, roads may be closed. Utility infrastructure may also suffer long-term damage as a result of such an event.

Population Impact

Extensive utility failures can threaten the health and safety of the public. During extreme temperature events, the impacts on residents are heightened. Loss of utilities that provide air conditioning or heat can create a safety hazard, especially for children and older populations. The County and/or communities should have a plan in place for how to notify and assist residents in case of utility failure.

Property Damage

Direct damage to property may result directly from downed power lines. Fires may also occur because of downed power lines.

Loss of Life

Loss of life from the loss of electricity can occur. Those who depend on electricity for necessary medical treatment are at risk. Critical facilities such as hospitals and nursing homes should be prepared in the event of a utility failure, as they manage sensitive populations that may be reliant on utilities. Downed power lines can also lead unsafe environments with live electric lines that have the potential to lead to loss of life.

Economic Losses

Blackouts are often caused by systems that are aging and deteriorating, and updates to these systems may require additional funds. Economic loss can occur because of reduced commercial activity. Goods that need electricity or other utilities for preservation may also be lost. If widespread blackouts occur, people may not be able to work, and wages or income may be lost as a result.

4.12.7 Land Use and Development Trends

Utility failure can impact any development. All development that has occurred since the previous plan and all development in the future can be impacted by utility failure.

4.13 Wildfires

4.13.1 Description

A wildfire is a fire in an area of combustible vegetation that occurs in the countryside or rural area. The Ohio Department of Natural Resources identifies Ohio's wildfire seasons as occurring primarily in the spring (March, April, and May) before vegetation has "greened-up" and in the fall (October and November) when leaf drop occurs. During these times and especially when weather conditions are warm, windy and with low humidity, cured vegetation is particularly susceptible to burning. Fuel (vegetation, woody debris), weather (wind, temperature, humidity) and topography (hills and valleys) can combine to present an extreme danger to unwary civilians and firefighters in the path of a wildfire. Each year an average of 1,000 wildfires burn 4,000 to 6,000 acres of forest and grassland within Ohio's forest fire protection district, which corresponds mostly to the state's unglaciated hill country.

4.13.2 Location

According to the *State of Ohio Enhanced Hazard Mitigation Plan*, Crawford County has not been identified as a county within the Ohio Department of Natural Resources Division of Forestry's Wildfire Protection Area. Additionally, no communities within Crawford County have been classified as a community at risk of wildfire, according to the Ohio Department of Natural Resources Division of Forestry. Based on the State of Ohio Wildfire Hazard Assessment, all townships and jurisdictions within Crawford County are at a low risk of Wildfire (**Figure 4.13.1**).

4.13.3 Extent

Several factors can contribute to the escalation of risk of wildfires, including the prevalence of forests and agricultural lands and their close proximity to homes, residences, and structures, as well as the distance between fire and emergency management services. In these cases, presence of fire near structures causes fire departments to shift focus away from fire suppression and towards structure protection.

According to the *State of Ohio Enhanced Hazard Mitigation Plan*, 99.9 percent of wildfires in Ohio are caused by human action or accident. As such, many wildfires in the State burn into close proximity of homes and structures. From 1997 to 2007, the main causes of wildfire in Ohio included debris burning, incendiary (arson), equipment, smoking, campfires, children (playing with matches), lightning, and railroad.

4.13.4 History

According to the *State of Ohio Enhanced Hazard Mitigation Plan*, Crawford County experienced 34 total fire events from January 1, 2007 to December 31, 2017, which averaged to approximately three fire events annually. These events burned a total of 219 acres, averaging 6.44 acres per event.

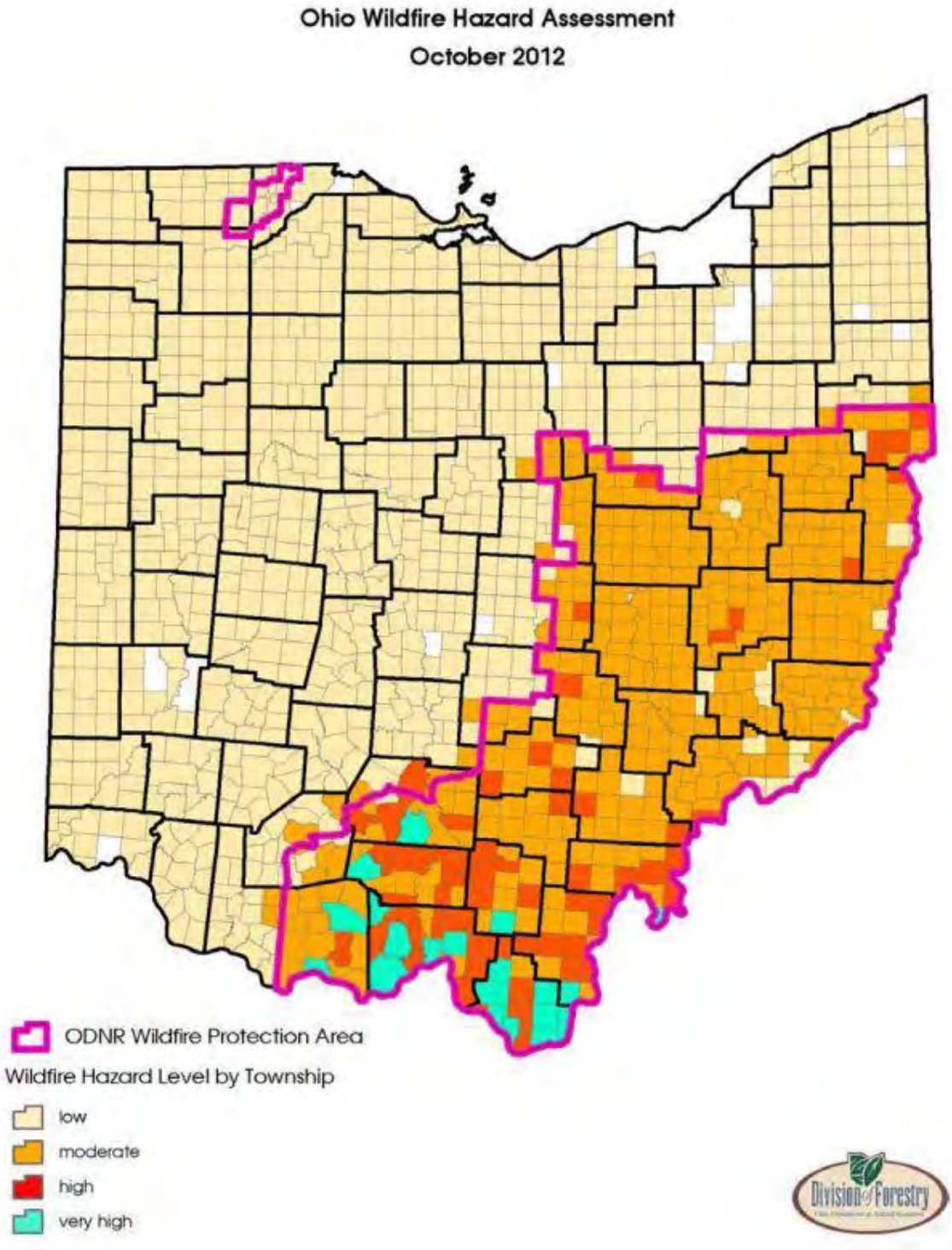
Estimating the monetary losses associated with wildfires is difficult due the fact that most of these events occur in open land or fields, with monetary losses often not being recorded. This lack of data may result in inconsistencies if an analysis was done based on reported monetary loss. As such, acres burned per fire event is a more consistent method of analysis for this hazard.

Of the 34 events, 25 fires (73.53 percent of events) burned less than 10 acres, while nine events (26.47 percent of events) burned between 10-99.9 acres. No events burned more than 100 acres.

4.13.5 Probability

According to the *State of Ohio Enhanced Hazard Mitigation Plan*, there is a 100 percent probability that a wildfire will occur within any county in any given year. Since 34 total fire events occurred in Crawford County between 1/1/2007 to 12/31/2017, an average of three fire events annually in the County.

Figure 4.13.1: Ohio Department of Natural Resources Division of Forestry Wildfire Hazard Level



4.13.6 Vulnerability Assessment

Infrastructure Impact

There is low risk that wildfire in Crawford County will impact infrastructure. Wildfire will most likely impact the County through property and crop damage.

Population Impact

There is low risk of wildfire in Crawford County. Accordingly, there is low risk of impact to the population. If wildfire would occur within the County, the population could be impacted by loss of homes and crops.

Property Damage

As there were no recorded wildfire events in Crawford County’s history, it is currently estimated that the County has not had any damage to infrastructure as a result of wildfires. Occasionally, in the event of wildfire event, fire engines belonging to local fire departments are damaged while suppressing wildfires. Wildfire suppression has resulted in a great amount of personal property being saved by fire departments.

Due to the non-site-specific nature of this hazard, **Table 4.13.1** lists all structures within Crawford County as having potential impacts from Wildfires. It also provides values for two worst-case scenarios valued at one percent damage and five percent damage.

Additionally, there are currently 14 State-owned and State-leased critical facilities located within the low wildfire hazard level, as determined by the Ohio Department of Natural Resources. These 14 facilities have a value of \$10,388,299.

Loss of Life

Crawford County has no recorded wildfire events resulting in loss of life. Because no wildfire events have occurred in the County, it is unlikely that loss of life will result from wildfire; however, with any wildfire event, there is potential for loss of life. Advanced evacuation warnings can reduce the likelihood of death as a result of wildfire.

Economic Losses

As there were no recorded events in Crawford County’s history, it is currently estimated that the County has not had any damage to infrastructure as a result of wildfires. However, wildfire has the potential to damage agricultural crops and tree plantations, which can result in economic losses. Potential economic losses and damages associated with Crawford County structures and potential worst-case scenarios are recorded in **Table 4.13.1**, below.

Table 4.13.1: Structure Vulnerability from Wildfires

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	22,289	\$193,610,000	\$982,816,730	\$1,176,426,730
Non-Residential	11,254	\$425,401,190	\$580,946,200	\$1,006,347,390
Critical Facilities	1,565	\$23,712,300	\$216,478,720	\$240,191,020
Total	35,108	\$642,723,490	\$1,780,241,650	\$2,422,965,140

4.13.7 Land Use and Development Trends

As there are no current at-risk communities for wildfire, there are no likely impacts on development and land use.

5 | Hazard Mitigation

5.1 Hazard Mitigation Strategy

Each potential hazard, including natural, geological, and man-made hazards, were rated by members of the Core Planning Committee, which included representatives from each jurisdiction in Crawford County. Each potential hazard was rated on a scale of zero to five, with zero indicating the hazard should not be studied and five indicating the most significant threat to the representative’s community. **Table 5.1** displays the average of the representatives’ ratings as a Priority Score for each hazard. The hazard that scored the highest (Flooding, 4.325), was given a Hazard Rank of one. The mitigation goals follow the ranking of hazards as established by the representatives of the participating jurisdictions.

Table 5.1: Hazard Priorities

Hazard	Priority Score	Hazard Rank
Flooding	4.325	1
Severe Storms	4.275	2
Tornadoes	4.250	3
Severe Winter Storms	4.125	4
Utility Failure	3.850	5
Hazardous Materials	3.825	6
Terrorism	3.263	7
Epidemic	3.038	8
Drought and Extreme Heat	2.875	9
Invasive Species	2.275	10
Dam Failure	2.100	11
Wildfire	1.700	12
Earthquakes	1.400	13
Hurricanes/Tropical Storms	0.654	Included with Severe Storms
Landslides	0.575	Not Assessed
Mine Subsidence	0.375	Not Assessed

Since Mine Subsidence and Landslides had a Priority Score less than one, those hazards were not assessed – this decision was approved by the County Emergency Management Agency Director. Five new hazards were added to the Crawford County Hazard Mitigation Plan since the 2014 Plan. These include Utility Failure, Hazardous Materials, Terrorism, Invasive Species, and Wildfire. Severe Storms also considered any risk posed by hurricanes or tropical storms.

Mitigation projects will only be implemented if the benefits outweigh the associated cost of the proposed project. The Core Planning Committee, in coordination with the Crawford County Emergency Management Agency, performed a general assessment of each action that would require FEMA funding as part of the planning process. A detailed cost-benefit analysis of each mitigation action will be required during the project

planning phase in order to determine the economic feasibility of each action. Projects will also be evaluated for social and environmental impact-related feasibility, as well as technical feasibility and any other criteria that evaluate project effectiveness. This evaluation of each project will be performed during the pre-application phase of a grant request. Project implementation will be subject to the availability of FEMA grants and other funding sources, as well as local resources.

Projects that are determined to be infeasible during this review process will be re-evaluated by members of the Core Planning Committee for re-scheduling or deletion.

5.2 Hazard Mitigation Goals

Developing achievable goals forms the foundation for all mitigation actions and activities that will aid Crawford County in attaining the overall mission of the Core Planning Committee. As such, the Core Planning Committee assessed the goals of the 2014 Crawford County Natural Hazard Mitigation Plan and had the opportunity to develop new goals for the 2019 update. Goals were reviewed and established based upon their relationship to the potential adverse impact upon the community.

The goals of the 2019 Crawford County Hazard Mitigation Plan are as follows:

5.2.1 Preventative

- To reduce risk and loss of life by implementing activities to give Crawford County citizens as much advance warning as possible of impending natural and man-made hazards.
- Coordinate existing plans and strategies already in place to put them to more effective use.
- Strengthen communication between various communities and agencies throughout the County to make them aware of good, sound mitigation activities and practices.
- Continue to coordinate policies and plans for the protection of critical facilities, services, and infrastructure – including dams.

5.2.2 Property Protection

- To develop practices and implement activities to protect lives and reduce damages to homes, businesses, industries, and agricultural areas of Crawford County.

5.2.3 Emergency Services

- Continue to support and coordinate emergency services efforts throughout the County and continue to strengthen emergency operation plans at the various Crawford County communities.

5.2.4 Structural Projects

- Continued maintenance of existing river, stream, and retention dikes and levees.

5.2.5 Natural Resource Protection

- Continue to rehabilitate, protect, and enhance the natural systems already in place in order to preserve the rich, historical, and agricultural environment found in Crawford County.

5.2.6 Public Information

- Continue to promote public awareness of the risks associated with natural hazard events.

All respondent surveys are available for review in **Appendix F: Meeting Documentation**.

5.3 Hazard Mitigation Action Priority

The goals listed above, as well as the hazards assessed for this Plan, informed the development of actions that the County and participating jurisdictions can take to mitigate the impacts of each of the hazards. Members of the Core Planning Committee completed a Previous Mitigation Action Status survey, which indicated the status of mitigation actions included in the 2014 Natural Hazard Mitigation Plan. This survey asked representatives to indicate whether the mitigation action from the previous plan was completed, deleted, deferred, unchanged, or ongoing. It also asked the representative if the action should be included in the Updated Plan.

Once all mitigation actions from the previous plan were reviewed and their status indicated, all mitigation actions for the 2019 Crawford County Hazard Mitigation Plan were reviewed and rated on a scale of one to five by members of the Core Planning Committee based on the several criteria, including whether the action was cost-effective, technically feasible, environmentally sound, needed immediately, and the action's total risk reduction.

All of the surveys collected were tabulated to develop a single raw score for each individual mitigation action. These scores are indicated on the Hazard Mitigation Action Priority Table on the following pages. Overall, the score was determined by two factors:

1. The rankings of the hazard, as determined by the Hazard Priority Survey (Table 5.1, above).
2. The ratings received from the Core Planning Committee and the public on each of the mitigation actions.

The raw scores were then ranked, and each mitigation action was assigned a number (1-95) to indicate the priority of that specific action, according to the survey responses.

Hazard Mitigation Action priorities are organized by hazard in **Table 5.2**. The information used to develop the priorities can be found in the Matrix Score Spreadsheet, which is located in **Appendix B**.

Appendix B also includes the status of all mitigation actions developed and included in the 2014 Natural Hazard Mitigation Plan. This table includes comments from the jurisdictions responsible for each action. The completed surveys that were used to make this table can be found in **Appendix F**.

5 | HAZARD MITIGATION

Table 5.2: Mitigation Actions Priority Table, by Hazard

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
All Hazards								
1	Increase communication, coordination and collaboration among community leaders, property owners, local building regulations, and zoning authorities to address risk and provide uniformity and consistency in implementing sound mitigation practices.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	1	5	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 75% complete
2	Develop a large gathering shelter plan for festivals and other events.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	1	11	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Unchanged, Included in ongoing sheltering plan
3	Implement recommendations of feasibility study for upgrading countywide safety service communications.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	1	10	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 80% complete
4	Identify and pursue funding options and opportunities to develop and implement local and county natural hazard mitigation activities.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	1	7	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing 50% complete
5	Encourage underground utility placement and tree maintenance programs in public rights of way.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	1	13	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, determined by utility companies and administration of city

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
6	Develop/update back-up power generation capabilities at critical government facilities (e.g. temporary storm safe locations, community EOCs).	Crawford County, City of Bucyrus, City of Galion, Village of New Washington, Dallas Twp, Whetstone Twp	1	12	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
7	Develop/update Continuity of Operations Plans.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp, Whetstone Twp	1	3	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
8	Provide public education and outreach on disaster preparedness including websites, newsletters, social media, Preparedness Month events, etc.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Village of North Robinson, Dallas Twp, Whetstone Twp	1	2	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield, New Washington, and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New
9	Develop or update Emergency Operation Plans.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Village of North Robinson, Bucyrus Twp, Dallas Twp, Whetstone Twp	1	1	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield, New Washington, and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New
10	Maintain an all-hazard outdoor warning siren system, including repairing, replacing, and upgrading.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Village of North Robinson, Dallas Twp, Whetstone Twp	1	4	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield, New Washington, and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
11	Conduct fire code, building code, zoning, and floodplain management enforcement activities.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Holmes Twp, Whetstone Twp	1	8	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
12	Prepare public buildings to act as shelters in case of any hazard.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp, Holmes Twp, Whetstone Twp	1	9	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
13	Develop a partnership to have places of worship serve as additional shelters.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp, Holmes Twp, Whetstone Twp	1	6	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
Flooding								
14	Identify surface water/county tile drainage obstructions for unincorporated areas.	Crawford County, Bucyrus Twp, Dallas Twp, Holmes Twp, Vernon Twp	2	32	Crawford County EMA	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 35% complete
15	Encourage development of strategies to preserve scenic waterways and open space in and around floodplains.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline	2	29	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 30% complete

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
16	Pursue mitigation activities and funding for designated flood prone areas.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	2	24	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 40% complete
17	Investigate and record repetitive loss areas in cities and villages.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	2	20	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 90% complete
18	Analyze and establish mitigation measures to protect wastewater treatment plants.	City of Bucyrus, City of Galion	2	35	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing
19	Pursue funding for mitigation actions of floodplain properties and residences along waterways through Bucyrus and Galion.	City of Bucyrus, City of Galion	2	27	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	Deferred
20	Complete Environmental Protection Agency storm/drainage separation system.	City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	2	31	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing
21	Assess and map problem drainage areas.	City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	2	17	Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 45% complete

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
22	Evaluate township roads for frequent flood areas in each township.	Bucyrus Twp, Dallas Twp, Holmes Twp, Vernon Twp	2	34	Crawford County EMA	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 50% complete
23	Improve the stormwater management system.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp	2	21	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
24	Identify and study poor draining areas to control flooding.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of North Robinson, Bucyrus Twp, Dallas Twp, Holmes Twp, Whetstone Twp	2	22	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New
25	Repair or replace ditches, culverts, and bridges to control flooding.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Bucyrus Twp, Dallas Twp, Holmes Twp, Whetstone Twp	2	25	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
26	Identify and study riverbank stabilization opportunities.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Dallas Twp, Whetstone Twp	2	30	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
27	Provide mitigation option guidance to property owners of Repetitive Loss and Severe Repetitive Loss Structures, such as acquisition, relocation, elevation, non-residential dry flood proofing, and non-residential wet flood proofing.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Whetstone Twp	2	33	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
28	Encourage residents in flood prone areas to purchase flood insurance.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp, Whetstone Twp	2	23	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
29	Modify building codes to encourage water proofing structures.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington	2	28	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
30	Adopt policies to reduce stormwater runoff.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington	2	19	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
31	Participate in the Community Rating System (awards communities who exceed National Flood Insurance Program requirements).	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington	2	26	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
32	Flood control activities at Aumiller Park.	City of Bucyrus	2	14	Crawford County EMA, Mayor/ Administrator of the City of Bucyrus	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
33	Flood control activities at Harmon Park.	City of Bucyrus	2	15	Crawford County EMA, Mayor/Administrator of the City of Bucyrus	To be identified through existing budget or grants	11/1/19-12/31/24	New
34	Clear log jams downstream to prevent flooding on Caldwell Road in Bucyrus Twp.	Bucyrus Twp	2	16	Crawford County EMA	To be identified through existing budget or grants	11/1/19-12/31/24	New
35	Remove log jams on Brokensword Creek from SR-4 to CR-31.	Holmes Twp	2	18	Crawford County EMA	To be identified through existing budget or grants	11/1/19-12/31/24	New
Severe Storms								
36	Inform residents of the various ways to receive weather alerts.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Village of North Robinson, Dallas Twp, Holmes Twp, Whetstone Twp	3	36	Crawford County EMA, Mayors/Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield, New Washington, and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New
37	Create a Standard Operating Guideline for the timely clearing of roads from debris caused by severe storms.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of North Robinson, Bucyrus Twp, Dallas Twp, Holmes Twp, Whetstone Twp	3	37	Crawford County EMA, Mayors/Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
38	Install a lightning warning system.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Whetstone Twp	3	38	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
39	Install lightning rods on public buildings.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Whetstone Twp	3	39	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
Tornadoes								
40	Install warning sirens.	Village of New Washington, Village of North Robinson	4	40	Crawford County EMA, Mayors/ Administrators for the Villages of New Washington and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	Unchanged; money was not there at that time to install warning sirens.
41	Convert old fire sirens into tornado sirens.	Crawford County, City of Bucyrus, Village of Crestline, Village of New Washington	4	44	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing/Completed in Galion in 2018.
42	Continue yearly tornado drills at all schools.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	4	41	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 100% complete (completed annually)
43	Provide weather radios to homes that are in sparsely populated areas.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline	4	48	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	Unchanged

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
44	Participate in and promote the Ohio Safe Room Rebate Program for safe room installation by homeowners.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	4	49	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Unchanged
45	Establish NOAA Weather Radio program for festivals, fairgrounds, campgrounds, parks, and recreation.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline	4	42	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 55% complete
46	Promote commercial safe rooms for high occupancy uses, such as bars and restaurants.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington,	4	47	Crawford County EMA, Mayors/ Administrators for the City of Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
47	Identify tornado safe locations for residents to seek shelter during tornadoes/high wind events.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Village of North Robinson, Dallas Twp, Holmes Twp, Whetstone Twp	4	43	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield, New Washington, and North Robinson	To be identified through existing budget or grants	11/1/19-12/31/24	New
48	Promote wind and tornado resistant construction practices.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington	4	46	Crawford County EMA, Mayors/ Administrators for the City of Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
49	Encourage mobile home parks and other vulnerable communities to have a tornado preparedness plan.	Crawford County, City of Bucyrus, City of Galion, Village of New Washington, Whetstone Twp	4	45	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Village of New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
Severe Winter Storms								
50	Increase public awareness of severe winter storms.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	5	50	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	Ongoing, 75% complete
51	Begin a public emergency plow telephone hotline for at-risk residents.	Crawford County, City of Bucyrus, City of Galion, Bucyrus Twp, Dallas Twp, Whetstone Twp	5	52	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
52	Promote community shoveling programs to reduce the risk of heart attacks from excessive labor.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Dallas Twp, Whetstone Twp	5	51	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
Utility Failure								
53	Tree trimming in rights of way along utility lines.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp	6	54	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
54	Begin a revolving loan program to help residents purchase backup generators.	Crawford County, City of Galion, Village of Chatfield	6	56	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
55	Consider burying utility lines outside of 100-Year flood plains in all new sub-divisions.	Crawford County, City of Galion	6	55	Crawford County EMA, Mayor/Administrator for the City of Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
56	Promote partnerships between utility companies to reduce the cost of higher-grade wires and burying lines.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington	6	53	Crawford County EMA, Mayors/Administrators of the City of Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
Hazardous Materials								
57	Develop a Wellhead Protection Plan.	Crawford County, City of Galion, Village of Chatfield	7	60	Crawford County EMA, Mayors/Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
58	Organize an annual drill to prepare for a disaster involving hazardous materials for emergency service personnel.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp, Whetstone Twp	7	57	Crawford County EMA, Mayors/Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
59	Report what hazardous materials are being handled on-site and amounts according to regulation.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Whetstone Twp	7	59	Crawford County EMA, Mayors/Administrators of the City of Bucyrus and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
60	Complete a commodity flow study to identify types and volume of hazardous materials transported via river, pipeline, truck, rail, and plane.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Bucyrus Twp, Dallas Twp, Whetstone Twp	7	58	Crawford County EMA, Mayors/Administrators of the Cities of Bucyrus and Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
Terrorism								
61	Encourage critical infrastructure to implement protective measures at their facilities.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp	8	64	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
62	Coordinate with emergency services to ensure the safety of large public gathering events.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp	8	63	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
63	Provide guidance to schools, churches, government agencies, health care facilities, and other critical facilities on improving protection, preparedness, response, and recovery activities to an active aggressor threat.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp, Whetstone Twp	8	61	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
64	Provide free active shooter training or promote free and low cost third-party active shooter training.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp, Whetstone Twp	8	62	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
65	Seal water wells.	Crawford County, City of Galion, Village of Chatfield	8	66	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
66	Install temporary bollards or fences during high-occupancy outdoor events.	Crawford County, City of Bucyrus, City of Galion, Village of New Washington	8	65	Crawford County EMA, Mayors/Administrators of the Cities of Bucyrus and Galion and the Village of New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
Epidemic								
67	Create public education programs to prevent the spread of contagious diseases.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp, Whetstone Twp	9	69	Crawford County Public Health	To be identified through existing budget or grants	11/1/19-12/31/24	New
68	Create a detailed public health plan to prepare for an epidemic.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp, Whetstone Twp	9	70	Crawford County Public Health	To be identified through existing budget or grants	11/1/19-12/31/24	New
69	Create a public education program for vaccinations.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp	9	68	Crawford County Public Health	To be identified through existing budget or grants	11/1/19-12/31/24	New
70	Encourage private agencies to become private Point of Dispensing (POD)	Crawford County	9	67	Crawford County Public Health, COTS	To be identified through existing budget or grants	11/1/19-12/31/24	New
Drought & Extreme Heat								
71	Ensure municipalities have enough water supplies.	City of Bucyrus, City of Galion, Village of Crestline	10	77	Crawford County EMA, Mayors/Administrators of the City of Galion and the Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
72	Provide education opportunities to farmers to reduce adverse effects of drought.	Crawford County, City of Galion, Village of Crestline	10	72	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	New
73	Cities and villages to adopt water conservation measures and standards.	Crawford County, City of Bucyrus, City of Galion, Village of Crestline, Village of New Washington	10	76	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and the Villages of Crestline and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
74	Provide guidance and resources for vulnerable populations during extreme temperature events, such as transportation to cooling shelters.	Crawford County, City of Bucyrus, City of Galion, Village of New Washington, Dallas Twp, Whetstone Twp	10	78	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Village of New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
75	Provide guidance and resources on utility assistance programs.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Dallas Twp	10	75	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion and the Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
76	Encourage farmers to deepen wells where possible.	Crawford County, City of Galion	10	80	Crawford County EMA, Mayor/ Administrator of the City of Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
77	Encourage farmers to connect watering systems to deep wells.	Crawford County, City of Galion	10	81	Crawford County EMA, Mayor /Administrator of the City of Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
78	Develop a plan to limit water usage during extreme and prolonged droughts.	Crawford County, City of Galion, Village of Chatfield	10	71	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
79	Install water saving equipment in public buildings.	Crawford County, City of Bucyrus, City of Galion	10	74	Crawford County EMA, Mayors/ Administrators of the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
80	Retrofit water supply and storage systems.	Crawford County, City of Galion, Village of Chatfield	10	73	Crawford County EMA, Mayors/ Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
81	Utilize xeriscaping (installation of drought-resistant plants arranged to save water) on public property to reduce water consumption.	Crawford County, City of Galion	10	79	Crawford County EMA, Mayor/ Administrator of the City of Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
Invasive Species								
82	Implement an invasive species education program that covers associated hazards, identification, behavior, and quarantine procedures.	Crawford County, City of Galion, Village of Chatfield, Dallas Twp	11	83	Crawford County EMA, Mayors/Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New
83	Share information with the public that explains the importance of not importing or exporting firewood.	Crawford County, City of Galion, Village of Chatfield, Dallas Twp, Whetstone Twp	11	82	Crawford County EMA, Mayors/Administrators of the City of Galion and the Village of Chatfield	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
Dam Failure								
84	Coordinate with Ohio Department of Natural Resources to implement Dam Safety Program.	Crawford County, City of Bucyrus, City of Galion	12	86	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
85	Work with dam owners to develop/update their dam safety plan.	Crawford County, City of Bucyrus, City of Galion	12	89	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
86	Work with dam owners to ensure they are prepared to respond should their dam fail.	Crawford County, City of Bucyrus, City of Galion	12	90	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
87	Model dam failure to identify at-risk areas.	Crawford County, City of Bucyrus, City of Galion	12	88	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
88	Work with local communities to create a dam failure response plan.	Crawford County, City of Bucyrus, City of Galion	12	87	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New
89	Reservoir Dam - Spillway at Pines Reservoir	City of Bucyrus	12	84	Crawford County EMA, Mayor/ Administrator for the City of Bucyrus	To be identified through existing budget or grants	11/1/19-12/31/24	New
90	Dam replacement or reinforcement for weakened dams.	City of Galion	12	85	Crawford County EMA, Mayor/ Administrator for the City of Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New

5 | HAZARD MITIGATION

Hazard Mitigation Actions - Priorities Table, by Hazard								
#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/End	Status
Wildfires								
91	Promote public education on smoking hazards and recreational fire risks.	Crawford County, City of Bucyrus, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp, Whetstone Twp	13	91	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
92	Provide public education on extreme fire danger and red flag warnings, including what it means and what actions to take when it is issued.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp	13	93	Crawford County EMA, Mayors/ Administrators for the City of Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
93	Develop a wildfire response plan with all fire departments.	Crawford County, City of Galion, Village of Chatfield, Village of New Washington, Bucyrus Twp, Dallas Twp	13	92	Crawford County EMA, Mayors/ Administrators for the City of Galion and Villages of Chatfield and New Washington	To be identified through existing budget or grants	11/1/19-12/31/24	New
Earthquakes								
94	Provide public awareness and safety procedures during and following an earthquake event.	Crawford County, City of Bucyrus, Village of Crestline	14	95	Crawford County EMA, Mayors/ Administrators for the City of Bucyrus and the Village of Crestline	To be identified through existing budget or grants	11/1/19-12/31/24	Unchanged
95	Use community outreach activities to foster an awareness of earthquake mitigation activities in homes, schools, and businesses.	Crawford County, City of Bucyrus, City of Galion, Bucyrus Twp, Dallas Twp, Whetstone Twp	14	94	Crawford County EMA, Mayors/ Administrators for the Cities of Bucyrus and Galion	To be identified through existing budget or grants	11/1/19-12/31/24	New

6 | Schedule and Maintenance

6.1 Participation Overview

The Crawford County Hazard Mitigation Plan will be adopted by all jurisdictions in Crawford County, including the County, all townships, the Cities of Bucyrus and Galion, and all villages. After the jurisdictions have adopted the plan, their signed resolutions or ordinances will be added to the plan as an Appendix.

6.2 Continued Public Involvement

The public will continue to be able to provide feedback on the Plan, as the Plan will be available through the Crawford County Emergency Management Agency and Ohio Emergency Management Agency websites. The Crawford County Emergency Management Agency will provide access to the plan to all County, municipality, and township offices, and will make the Plan available in hardcopy and electronic format to the public as appropriate. The Crawford County Emergency Management Agency Director or Deputy Director will post notices of any meetings for updating and evaluating the Plan, using the usual methods for posting meeting announcements in the County to invite the public to participate. All meetings will be open to the general public. The Crawford County Emergency Management Agency will publicly announce the mitigation action items that are slated for development in the current year, as well as any updates to the Plan as part of the annual review process.

6.3 Plan Integration and Annual Review

Local government plays a major role in the execution and implementation of mitigation strategies. This happens in large part during the daily operations that guide the development of various communities in the County. As such, each community will be responsible for understanding which items they are accountable for implementing. The Core Planning Committee will meet annually in order to monitor and evaluate the Crawford County Hazard Mitigation Plan. During the annual meeting, a status update will be provided for each mitigation action by the responsible agency.

All participating jurisdictions will be encouraged to attend this yearly plan update meeting. The meeting will be held so that it coincides with the budget process so that future funding sources can be determined and set aside for actions slated for that particular year. This meeting will also be available to the public.

Additionally, each jurisdiction and the County will review the Hazard Mitigation Plan during other planning processes, such as development of comprehensive plans or capital improvement plans, and incorporate appropriate goals and mitigation actions into such documents.

6.4 Updating the Plan

The Plan must be updated within five years and re-adopted by the County and all participating jurisdictions in order to maintain compliance with federal regulations and ensure eligibility for certain federal mitigation grant funds. The Crawford County Emergency Management Agency will identify any necessary modifications to the Plan, including changes in mitigation goals and actions that should be incorporated into the next update. The Crawford County Emergency Management Agency Director and the County Commissioners will initiate the process of updating the plan in accordance with federal guidelines in sufficient time to meet state and federal deadlines.