HAZARD MITIGATION PLAN

BARRY COUNTY, MICHIGAN

April 7, 2023

etc
environmental testing & consulting

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1.0 INTRODUCTION

Barry County has updated its 2005 Hazard Mitigation Plan (HMP) in accordance with the most recent decisions and policy changes at the federal, state, and local levels. The purpose of the HMP is reducing the impact of disasters or hazards and recovery from them; many types of hazards are manmade or natural. The frequencies of hazardous events, variations, and locations of these hazards can be anticipated or predicted, and it is the responsibility of local governments and jurisdictions to take reasonable steps for mitigation of hazards and protect the population.

Federal: FEMA has updated the Hazard Mitigation Plan (HMP) Review Guides Policy (Title 44 CFR Part 201). More specifically, the State Mitigation Plan Review Guide Policy (i.e., Parts 201.4 and 201.5) was updated in March 2015, and the Local Mitigation Plan Review Guide (i.e., Part 201.6) was updated in October 2011.

State: Michigan State Police (MSP), Emergency Management and Homeland Security updated the Michigan HMP in April 2019 and provides a profile of Michigan's diversified economy and land use patterns of the 83 Counties in Michigan; agriculture, manufacturing, tourism (Gilmore Car Museum, Yankee Springs Recreation Area, and Gun Lake fishing), services, and professional trades.

Barry County: Managing hazards involves a comprehensive effort to recover from, and mitigate man-made and natural crisis. Barry County (576 mi^2) has planned for pre-disaster mitigation, which includes identifying land use, demographic, environmental, and other constituents that need protection from hazards to help reduce or eliminate vulnerability. The County received a pre-disaster mitigation grant from the MSP Emergency Management Division to assist; FEMA Grant **HMGP4381**.

Mitigation planning is a collaborative process, which identifies hazards, assesses susceptibility, and develops methods to eliminate or offset the effects of hazards. The HMP is an appendix of Barry County's Master Plan, adopted on October 11, 2005, and provides an account of suspected and known hazardous circumstances. Specific mitigation actions are incorporated in the Action Strategies section of this update Plan, and will become a part of the updated Master Plan.

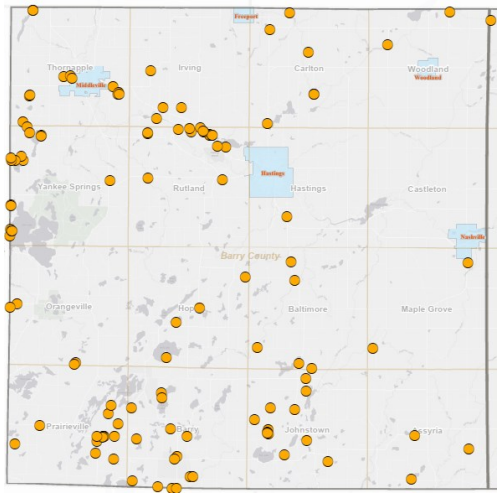
As a part of the development of the Community Profile for the Barry County HMP and Master Plan, community officials from all jurisdictions were interviewed, in part, to assess hazards in individual jurisdictions. The County conducted additional research on hazards to gauge potential harms. In addition, several community input processes were used to gain more knowledge about the circumstances facing the County. The following paragraphs discuss possible hazards that may affect Barry County communities. The assessment is arranged by natural, technological, and manmade-related hazards. Changes to the HMP update with reasoning are provided below and further discussed in the specific sections of this HMP update.

1.1 Changes from 2005 HMP:

Three (3) hazards have been added;

1. **Pandemic** is a significant hazard due to COVID-19 (10% probability). The County has a COVID-19 policy in place since 2020 via the Barry County Health Department.

2. **Nitrogen** in drinking water wells (30% probability) is a very low hazard. The Barry-Eaton District Health Department monitors potable water wells and provided the data for Nitrates. Barry Conservation District has a 10-year funding to reduce potable water well pollutants with a cost of $17M, from 2016 to 2026:



2007-2017 Nitrate Well Failures

Nitrates detected with 5 mg/L

[Source: Barry-Eaton District Health Department]

3. Proximity to the Palisades Nuclear Power Plant (downwind 50 miles per FEMA 2013 emergency planning zones) is a high hazard.

Three (3) hazards have been upgraded;

1. **Tornadoes** have been upgraded from significant to a high hazard.

Barry County Tornadoes 1950-2001 [Source: Michigan Tornado online]

ID	Date	Event Num	Time	Dead	Inj	F-Scale	Beg Coor	End Coor	County
508	AUG 6, 1955	10	15:35	0	1	2	42.65 -085.28	00.00 0	15
154	APR 11, 1965	5	18:40	0	5	3	42.65 -085.30	42.77 -085.07	15
264	JUN 9, 1966	6	8:00	0	0	2	42.52 -085.38	00.00 0	15
190	APR 21, 1967	7	18:00	0	1	2	42.72 -085.45	42.80 -085.18	15
656	SEP 17, 1972	17	19:55	0	0	1	42.67 -085.48	00.00 0	15
477	MAY 27, 1973	4	19:10	0	0	0	42.60 -085.50	00.00 0	15
275	MAY 17, 1977	9	15:40	0	0	1	42.43 -085.30	42.38 -085.25	15
629	JLY 5, 1980	13	4:30	0	0	1	42.57 -085.05	00.00 0	15
809	JLY 14, 1982	17	14:30	0	0	1	42.52 -085.42	42.55 -085.38	15
772	AUG 21, 1983	19	15:15	0	0	0	43.62 -085.53	00.00 0	15
539	JLY 15, 1986	8	18:38	0	0	2	42.55 -085.52	42.25 -084.75	15,25
642	AUG 26, 1986	16	14:40	0	0	2	42.58 -085.40	00.00 0	15
458	JLY 20, 1987	18	16:45	0	0	0	42.60 -085.52	00.00 0	15
823	JLY 18, 1993	9	14:38	0	0	0	42.75 -085.52	42.73 -085.45	15
891	MAY 21, 2001	9	12:50	0	0	0	42.62 -085.45	42.62 -085.45	15

2. **Hail** has been upgraded from very low to a significant hazard.

Hail Signatures in Last 5 years [Source: NCEI database]

Year	2017	2018	2019	2020	2021
# Hail Events	110	77	80	110	107

3. **Civil disturbances** have a higher probability (1%) with no change to ranking.

These additions and updates to the previous approved HMP will be introduced to, and integrated into the policy's, of the local jurisdictions by the adoption of this HMP update. No existing High Hazard Ranks were changed from the approved 2005 HMP.

2.0 PLANNING PROCESS

This HMP Update represents the culmination of work by many residents and local officials. It reflects a deep concern for the effective protection of quality of life, property, and the environment in Barry County. The plan outlines the preferred future and a set of comprehensive strategies to better preserve life and property in the community.

The fundamental purpose of the HMP update is to enable the County's emergency management and planning staff to establish a future direction for the County's protection of its resources. Once officially adopted and maintained, this plan will serve as a guide for the physical protection of population and property and implementing the FEMA grant.

Because of constant change in our social and economic structure, recent terror events, and timeless weather-related threats, this plan attempts to convey contemporary trends while maintaining long range protection goals. This plan will be effective to the degree that it:

- Reflects the needs of the citizens of Barry County;
- Interprets and reflects past and present hazard events; and
- Inspires consensus and cooperation among the various public agencies and the citizens of the County toward achieving common goals.

2.1 Plan Methodology

The HMP planning process involved four inter-related phases:

Hazard Analysis. The County, to the best of its ability based on information available, sought data on hazard events to support the HMP. The purpose of this effort was to develop a comprehensive impression of the patterns of occurrences and the challenges that have impacted the County in the past.

Vulnerability Assessment. The County provided expressive citizen input, and involved the public and various emergency and hazard mitigation agencies to evaluate the County's vulnerability to specific hazards, including seasonal conditions, and local hazard and loss estimations.

Goals and Objectives. The objective of the third phase was to establish a policy basis for the County's planning and emergency activities related to hazard mitigation. These policy statements will serve as a foundation for grant funds. Certain programs have been updated; the Building Resilient Infrastructure and Communities (**BRIC**) grant developed in 2018 for mitigation funding to improve egress from flooded roads (HUD and FEMA cost share, CDBG – Disaster Recovery (DR) funds). The National Mitigation Investment Strategy was developed in August 2019, and the Rehabilitation of High Hazard Potential Dams in 2019.

Action Strategies. The final phase of the HMP process involved the development of specific action strategies, and provide a plan to prioritize and implement the action strategies to carry out the HMP. The implemented strategies can tap into Federal HUD and FEMA updated programs and State programs to assist using cost share, where property owners share a small part of the cost. Non-Point Source (NPS) programs are available from the State for reducing Nitrogen and Phosphorous from groundwater (with Barry Conservation District's approved Thornapple River Watershed Management Plan**,** dated June 2016). With approval of the HMP update, Barry County will be eligible for federal and state funding to increase recovery from all hazards.

2.2 Community Input

Representatives of Barry County's jurisdictions had participated in the process of the approved HMP in 2005, and current incumbents were offered communications to provide input in 2021 during the planning process of the update HMP 2022 via virtual meetings, emails, questionnaire forms, and phone communications instead of in-person contact and meetings due to the COVID-19 Pandemic. On June 30, 2021, Barry County rescinded the Emergency status to comply with the State's Open Meetings Act, to allow more public availability to County meetings and input and had their first in-person meeting on July 16, 2021. The emergency status was to be extended to December 31, 2021, but was voted to be rescinded.

A pandemic is added to this HMP update because 10% of the population of Barry County was directly impacted by COVID-19, and more were corollary-impacted (secondary causes) from the pandemic. Barry County is updating the County Master Plan from 2005 with a potential shopping district in downtown City of Hastings, and modifications to zoning near Bay Pointe Inn on Gun Lake and Orangeville Township from rural to mixed residential and commercial use.

The historical Masters Advisory Group and Jurisdiction representatives officials list was updated to reflect persons input for the people of Barry County; Township Supervisors, Village Presidents, Barry County Municipalities, Board of Commissioners, Gun Lake Tribe of Pottawatomi Indians (Match E Be Nash She Wish Band of Bodewademi), Land Use Planners, Barry-Eaton County Health Department, Law Enforcement, City Police, County Sheriffs, Fire Service City and County Fire Departments, Farmland Preservation, MSU Extension Service, Barry County Intermediate School Districts, Utility companies, and County Governmental Administrations (includes Schools). A Questionnaire Form was sent to the officials for Community Input (see Appendix A).

Barry County published the plan for outreach of the public meeting and hearing for the HMP update contents on August 18, 2021, and circulated notices using the local newspaper (see Appendix B Public Hearing Notice). Barry County is unique in that local municipalities are under the planning and zoning of the County.

All jurisdictions are **continuing participants** from the previous version of the HMP with the following authorized officials for each jurisdiction (see Table 1. Jurisdictions and Table 2. Community Input).

Table 1. Jurisdictions

Local Planning and Zoning Jurisdiction	Representatives	Barry County Planning and Zoning Jurisdiction	Representatives
City of Hastings	Howard Gibson D. Boulter	Irving Township	Jon Smelker
Thornapple Township	Catherine Getty Jon Smelker	Orangeville Township	Vivian Conner
Prairieville Township	Vivian Conner Brant Mitchell	Barry Township	David Jackson
Hope Township	David Jackson	Carlton Township	Jon Smelker Ben Geiger
Rutland Charter Township	Jon Smelker David Jackson	Hastings Township	Ben Geiger
Yankee Springs Township	Catherine Getty Vivian Conner	Baltimore Township	Bruce Campbell
Village of Woodland	Ben Geiger	Johnstown Township	Bruce Campbell
Village of Nashville	Ben Geiger	Assyria Township	Bruce Campbell
Village of Freeport	Jim Yarger	Woodland Township	Ben Geiger
Village of Middleville	Dar Leaf Jim Yarger	Maple Grove Township	Bruce Campbell
		Castleton Township	Ben Geiger

Community Input officials, including economic land development, public schools, utility companies, local Health Department, Gun Lake Tribe, and others include:

1. Jim McManus Planning Director, Barry County, responded 6/22/2021 via completed Questionnaire form.
2. Howard Gibson, Commissioner, Board of Comm., District 1 City of Hastings, responded 6/19/2021 via Jim Yarger.
3. Catherine Getty, Commissioner, District 2; Thornapple Twp, Yankee Springs, responded 6/19/2021 via Jim Yarger.
4. David Jackson, District 3; Barry Twp, Hope Twp, Rutland Twp, responded 6/19/2021 via Jim Yarger.
5. Jon Smelker, District 4; Carlton Twp, Irving Twp, Rutland Twp, Thornapple Twp, responded 6/18/2021 via Jim Yarger.
6. Ben Geiger, District 5; Carlton Twp, Castleton Twp, Hastings Twp, Woodland Twp, Village of Nashville, responded 6/19/2021 via Jim Yarger.
7. Vivian Conner; District 6; Orangeville Twp, Prairieville Twp, Yankee Springs Twp, responded 6/19/2021 via Jim Yarger.
8. Bruce Campbell, District 7; Assyria Twp, Baltimore Twp, Maple Grove Twp, Johnstown Twp, responded 6/19/2021 via Jim Yarger.
9. Colette Scrimger, Barry-Eaton District Health Department, responded 6/19/2021 via Rebecca Hart to contact Jan VanStee, and responded with a complete Questionnaire form.
10. Jimmie Woodall, Spectrum Hospital, Barry-Eaton District Health Dept. responded 6/19/2021 via Jim Yarger.

11. Jennifer Heinzman, Barry County Economic Development Alliance, responded 6/19/2021 via ETC.
12. Nichole Lyke, Barry County Economic Development Alliance.
13. Jim Dull, Barry County Planning, responded 7/19/2021 via Jim Yarger.
14. Steve Allen, Pierce Cedar Creek Institute Barry and Kalamazoo County.
15. Michelle Skedgell, Pierce Cedar Creek Institute.
16. Sara Lien Edelman, Pierce Cedar Creek Institute.
17. Erin Moore, MSU District 7.
18. Valerie Christofferson, Director of Economic Development, CMS Energy.
19. Chris [sir name], Morgan Electric Services, Inc.
20. Bonnie Getty, Barry County Farmland, Barry Conservation District.
21. D. Boulter, City Manager, City of Hastings.
22. Dar Lear, Sheriff, Barry County Sheriff Department, responded 6/19/2021 via Jim Yarger.
23. Michael Brown, County Administrator, County of Barry.
24. Richard Franklin, Administrator, Barry County Intermediate School District, responded 6/19/2021 via ETC.
25. R. Vinster.
26. Sara Nelson, Barry Conservation District responded 7/21/2021 via ETC.
27. Bara Newsletter, local newspaper.
28. Jeff Corser, MDNR Yankee Springs Lake area (via phone call, only, to ETC)
29. Brant Mitchell, glt-nsn.gov Tribal Representation responded 6/22/2021 with a completed Questionnaire form.
30. Jim Yarger, Emergency Coordinator, Barry County, Village of Freeport, responded 6/19/2021.
31. Sgt. William Hoskins, Ionia County Emergency Management Division via Jim Yarger.
32. Thomas Weaver, USGS surrounding counties (Kalamazoo) responded 6/16/2021.
33. Jay Vanstee, Barry-Eaton District Health Department responded on 6/25/2021.
34. Notice of Public Meeting 7/28/2021 held 8/18/2021 local newspaper with the draft HMP update available for comment by August 4, 2021.
35. Public Meeting on 8/18/2021 in the Community Room of the County building in Hastings, MI; one attendee, a resident of Assyria Township was engaged in the presentation and asking questions on an HMP purpose and hazards of Barry County's HMP for 2.5 hours with computer overhead projection presentation.

2.3 Acknowledgements

The corroboration of Barry County officials has been instrumental in the success of this HMP, with many thanks and acknowledgements to community residents and public officials that are all **continuing participants** of the update:

Table 2. Community Input

Name	Title	Designee	Represented Agency Name
Jeff Pratt	Police Chief	Law Enforcement	Hastings City Police Dept.
Dar Leaf	Sheriff	Law Enforcement	Barry County Sheriff Dept.
Jim Yarger	Emergency County Coordinator	Fire Service and Emergency Mgmt	Barry County Emergency Management
Jim McManus	Planning Director	County Planning	Barry County Planning
Brant Mitchell	Manager	Gun Lake Protective Society	Gun Lake Protective Association
Sarah Nelson	Administrator	Barry Conservation District	Barry Conservation District
Colette Scrimger	Health Officer	Public Health	Barry-Eaton District Health Dept.
Jimmie Woodall	Medical Director	Public Health	Barry-Eaton District Health Dept.
E. Thompson	Emergency Preparedness Coordinator	Public Health	Barry-Eaton District Health Dept.
Jim Dull	Drain Commissioner	Vision 20/20	Barry County Drain Commission
Brant Mitchell	Emergency Mgmt./ Safety Manager	Tribal Cultural Resources	Gun Lake Tribe of Pottawatomi Indians
Brad Lamberg	Managing Director	Public Works	Barry County Road Commission
Michael C. Brown	County Administrator	Governmental Adm.	County of Barry
Willie Doolittle	President	Communications	Barry County Amateur Radio Association
Gregg Guetschow	Interim City Manager	County and City Governments	County of Barry and City of Hastings
Bonnie Getty	President/CEO	Farmland Preservation	Barry County Farmland
Howard Gibson	Commissioner	Board of Commissioners	District 1 City of Hastings
Catherine Getty	Commissioner	Board of Commissioners	District 2 Thornapple Twp Yankee Springs
David Jackson	Commissioner	Board of Commissioners	District 3 Barry Twp Hope Twp Rutland Twp
Jon Smelker	Commissioner	Board of Commissioners	District 4 Carlton Twp, Irving Twp Rutland Twp Thornapple Twp
Ben Geiger	Chair-Commissioner	Board of Commissioners	District 5 Carlton Twp Castleton Twp Hastings Twp Woodland Twp Village of Nashville
Vivian Conner	Vice Chairperson, Commissioner	Board of Commissioners	District 6 Orangeville Twp Prairieville Twp Yankee Springs Twp
Bruce Campbell	Commissioner	Board of Commissioners	District 7 Assyria Twp Baltimore Twp Maple Grove Twp Johnstown Twp

Name	Title	Designee	Represented Agency Name
Steve Allen	Vice President	Four Township Water Resources Council	Richland Twp Vice President
Michelle Skedgell	Executive Director	Pierce Cedar Creek Institute	Pierce Cedar Creek Institute
Sara Lien Edelman	Communications Coordinator	Pierce Cedar Creek Institute	Pierce Cedar Creek Institute
Erin Moore	District 7 Director	MSU Extension Service	MSU Extension Service
Valerie Christofferson	Director of Economic Development	Utilities	CMS Energy Co.
Chris		Utilities	Morgan Electrical Services, Inc.
Jennifer Heinzman	President/ CEO	Barry County Economic Development Alliance	Barry County Economic Development Alliance
Nichole Lyke	Coordinator	Barry County Economic Development Alliance	Barry County Economic Development Alliance
D. Boulter	Interim City Manager	Governmental Admin.	City of Hastings
Richard Franklin	BC-ISD Administrator	Barry County School District	Barry County Intermediate School District
Michigan DNR	Forest Fire Manager	Jeff Corser	MDNR-Forestry Division
Local News		Public Outreach	Barry Amateur Radio Station

2.4 Chronological Summary

Community officials were provided opportunities to participate and comment on the process of planning and updating this plan by phone and by email, due to the pandemic shutdown. The community officials listed in the previous sections were initially sent a blanket e-mail to solicit input to the HMP and follow-up communications were conducted via phone and email. The planning process included the following:

- June 17, 2021 - Questionnaire Form for input on historical hazards, and potential future hazards that face Barry County.
- June 18, 2021 - FEMA LOMA data and tables since 2008 (historical data available from 2009 to 2021 was used for the planning process).
- July 7, 2021 - Nitrogen in Drinking Water input, due to livestock/fertilization of farms.
- July 22, 2021 - Thornapple Watershed, flooding information and input.
- July 28, 2021 - A notice was sent to the local newspaper to read the draft HMP update and send comments by August 4, 2021, for the public meeting to be held on August 18, 2021.
- August 18, 2021 - Public Meeting at the County Conference Room from 7 to 9:30 pm.
- December 14, 2021 - Public Hearing and Adoption of the Barry County HMP Update 2021.
- June 10, 2022, ISSA for NFIP Barry County, Michigan results on repetitive loss from floods.

The input of the community officials provided no changes to the HMP, except:

- Adding Pandemics as a significant hazard due to COVID-19 (10% probability).
- Adding Nitrogen in Drinking Water as a very low hazard (30% probability).
- Adding the Proximity to the Palisades Nuclear Power Plant (50 miles downwind per FEMA 2013 emergency planning zones) as a very low hazard.
- Upgrading Tornados to a high hazard, based on historical data.
- Upgrading Hail to a significant hazard, based on historical data.

3.0 VULNERABILITY ASSESSMENTS

3.1 Evaluation Criteria

In addition to the discussion in the succeeding chapter, a controlled community input process was implemented in June 2021 to re-estimate the vulnerability to the hazards affecting Barry County and to include emerging issues such as the downwind effect from Nuclear Power Plant (changed to a 50 mile radius by FEMA in 2013) and the hazards associated with the COVID-19 pandemic in 2020. The following discussion identifies specific hazards, the harms they pose, and frequency of occurrence. The Vulnerability Assessment discloses the hazards ranked by the community as the most hazardous to Barry County with the community input available in Section 2.0.

Based on calculations from 2009 to 2021, NOAA's *Risk Assessment, Future Risk to Socioeconomic Vulnerabilities*, shows Barry County at minus (-) 0.71%, indicating a decreasing risk trend for the next 10 years. [Source: ncei.noaa.gov/access/billions/mapping, DOI: 10.25921/stkw-7w73].

Weighted Average. Using a weighted average to rank hazard aspects, participants concluded in the original HMP, with no changes to this update, that the following hazard aspects were pertinent, and important, for Barry County to consider when ranking vulnerabilities in each jurisdiction (Please see Appendix C - Community Input, Hazard Aspect Ratings):

- Likelihood of Occurrence (20%)
- Potential for Causing Casualties (20%)
- Percent of Population Affected (18%)
- Capacity to Cause Physical Damages (15%)
- Duration of Threat from Hazard (15%)
- Corollary Effects (causing other hazards) (12%)

3.2 Hazard Ratings

Hazards were first ranked on a scale of 1 to 10 and then rated by multiplying the rank by the weight (i.e., the percentage listed above). Complete results are presented in Appendix D Community Input, Hazard Type Ratings and are summarized in Figure 1. No changes to the 20 hazards of the 2005 HMP were made, except to upgrade Tornados, and Hail, and add Livestock Operations (nitrogen), pandemic, and downwind from Nuclear Plant (War/Nuclear-Large Scale).

Community members rated 22 hazards with the County's Top 6 Hazards as High; 3 natural hazards and 3 man-made hazards (see Appendix D for Hazard Type Ratings):

Figure 1. Community-Ranked Hazard Matrix

HAZARD THREAT

Natural Hazards (Rank)	Man-made Hazards (Rank)
Severe Winter Weather (High)	Hazardous Materials Incidents - Transportation (High)
Extreme Temperatures (High)	Terrorism/Sabotage – Small Scale (High)
Tornadoes (High)	War/Nuclear Attack/WMD- Large Scale (High)
Lightning (Significant)	Structural Fires (Significant)
Severe Winds (Significant)	Hazardous Materials Incidents – Site (Significant)
Riverine Flooding (Significant)	Pandemic (Significant)
Hail (Significant)	
Drought (Low)	Infrastructure Failures (Low)
Wildfires (Low)	Pipeline Accidents – Oil/gas (Low)
	Transportation Accidents – Emergency (Very Low)
	Civil Disturbance (Very Low)
	Scrap Fire Tires (Very Low)
	Dam Failures (Very Low)
	Livestock Operations (Nitrogen-impact) (Very Low)

Note: earthquakes were not rated and considered zero risk.

4.0 NATURAL HAZARDS

Dating back to 1950, Barry County had 315 events reported for 16 different types of natural hazards; 113 event-days incurred property damage ($32.52M), 24 event days with crop damage ($960K), and 4 event days with injury and no deaths.

An F3 magnitude tornado occurred on April 3, 1956, with a cost in property damage of $2.5M (todays cost $24.9M), and no crop damage. Eight injuries occurred from reported natural hazards; known injuries occurred from 3 tornado events and 1 lightning event. National Risk Index places natural hazards for the County at an expected annual loss (EAL) as very low at a score of 6.59; the average for Michigan is a score of 9.74, and the national score is 13.33. Other top-ranking natural hazards for the County are:

Table 3. Top-Ranking Natural Hazards Reported to FEMA

Natural Hazard	Date	Property Damage Cost	Crop Damage Cost	Jurisdiction
High Wind	2/24/2019	$3,000,000	$0	Not provided
High Wind	3/8/2017	$10,000,000	$0	Woodland Twp and Lakewood High School roof
Ice Storm	12/21/2013	$5,000,000	$0	Not provided
Flood	4/17/2013	$5,000,000	$0	Middleville
Flood	5/21/2004	$1,000,000	$200,000	Nashville area

Due to reported top-ranking hazards, Barry County has increased the hazard for tornadoes to a high hazard, and hail to a significant hazard (costs to crop damage and frequency of events).

Table 4. Natural Hazard Expectancy (Annual)

Natural Hazard	Hazard Ranking for Barry County	Annual Expectancy Rating (National Risk Index)
Thunderstorms - Lightning	Significant	48.6 events
Severe Winter Weather	High	5.6 events
Thunderstorms - Severe Winds	Significant	3.7 events
Thunderstorms - Hail*	Significant	2.2 events
Extreme Temperature	High	0.7 events
Riverine Flooding	Significant	0.5 events
Thunderstorms -Tornadoes	High	0.2 events
Drought*	Low	0.024% or 22% county records
Wildfire*	Low	0.002% or ave. 7 per year county
Earthquake	No Incidents	0 events

* NRI is lower than local data provided by NOAA, because NRI is formulated by U.S. Census, and NOAA Storm Events is local weather-based, not based on population (U.S. Census).

4.1 Severe Winter Weather

Barry County has ranked severe winter weather as a high hazard. Every structure, building, and person in Barry County is subject to the hazards associated with winter weather because the

County is situated in southwestern lower Michigan, where snowstorms occur from November to early April. Utility companies are more susceptible to ice storms as ice freezes on overhead wires and trees weighing them down to breaking and stress from ice. Barry County has an expectancy of 5.6 events per year, according to NRI.

The FEMA National Risk Index (NRI) places Barry County with a very low historic loss ratio for winter weather. Severe winter weather-related events, in Barry County, include 1) blizzards, 2) extreme cold/ wind chill, 3) frost/ freeze, 4) ice storms, 5) lake effect snow, 6) sleet, 7) winter storm, and 8) winter weather.

The highest costs to Barry County are from Ice Storms in 2013 at $5M. The following table is a compilation of severe winter weather-related events that were reported in the local NOAA Storm Events database for Barry County:

Table 5. Severe Winter Weather (2005 through 2021)

Severe Winter Weather Hazards	Year	Cost
Extreme Cold/Wind Chill	None	$0
Frost/ Freeze	None	$0
Ice Storm	2006	$25,000
Blizzards	2007	$0
Winter Storm	2007	$25,000
Winter Storm	2008	$0
Winter Storm	2009	$0
Winter Weather	2009	$0
Winter Storm	2011	$0
Winter Weather	2011	$0
Blizzards	2011	$0
Ice Storm	2013	$5,000,000
Lake Effect Snow	2013	$0
Lake Effect Snow	2014	$0
Sleet	2015	$0
Winter Storm	2015	$0
Winter Storm	2016	$25,000
Winter Storm	2018	$100,000
Winter Storm	2019	$0
Winter Storm	2022	$0

Individual jurisdictions of severe winter weather reports were not provided in local NOAA's storm event database.

Since 1953, thirteen (13) FEMA disasters were declared for Barry County, including five (5) winter storms (blizzards) that occurred in 1972, 1977, 1978, 1999, and 2001. Presidential declarations exist for Barry County for these years, as well. Also, the Governor issued a state of emergency during an ice storm in 1985. Blizzards are the deadliest and damaging of all winter snowstorms with excessive cold temperatures and high winds that are over 35 mph winds. The amount of snowfall during a blizzard can cause damage to structures and can have a duration of one week or more from the final effects; fixing electricity, structures, snow removal of roads, and ice-related

travels. Households that are heating with propane tanks need to plan and prepare for refueling prior to hazards that inhibit travel and access to propane tanks via snowy driveways and icy roadways. Many households in Barry County have private generators to power essential home utilities during a winter storm hazard, drinking water well pumps, refrigerators, and furnaces.

4.2 Extreme Temperatures

Barry County has ranked extreme temperatures as a high hazard. Extreme temperatures are inclusive of cold weather and hot weather depending on the season, as the southern Lower Peninsula of Michigan experiences all four seasons. Every structure, building, and person in Barry County is subject to the hazards associated with extreme temperatures. Barry County had the recorded coldest temperature of minus (-) 40°F on January 4, 1896, and the hottest recorded temperature of 109°F on July 14, 1936. This hazard can affect the most vulnerable of society such as children, elderly, impoverished individuals, and malnourished persons. Although the entire population of Barry County is subject to extreme temperatures, Barry County has not previously filed economic losses from this hazard and has an expectancy of 0.7 events per year.

The following table is a compilation of extreme temperature events that were reported in local NOAA's storm events database.

Extreme Temperature	Year	Cost
Extreme Cold/Wind Chill	None	$0
Extreme Heat	None	$0

Vulnerable Citizens: According to the U.S. Bureau of Census, an estimate of the population of Barry County in July 2019 was 61,500 with 18.9% of the population over 65 years of age, 27.2% under 18 years of age, and 7.8% living in poverty; the culmination of the vulnerable persons is significant at 53.9% when added together. Barry County has a reportable good trend towards protecting vulnerable citizens. Based on calculations from 2009 to 2021, NOAA's *Risk Assessment, Future Risk to Socioeconomic Vulnerabilities*, for Barry County, Michigan, shows a risk trend decrease of minus (-) 0.71%. [Source: ncei.noaa.gov/access/billions/mapping, DOI: 10.25921/stkw-7w73].

Barry County experiences between 90 and 180 days per year below freezing temperatures and approximately 60 days of heat in the summer. The County temperature is colder than the Michigan mean temperature, and cold weather is more likely to be a hazard than hot weather in the County with temperatures dipping below 20°F in January through March (Michigan mean is 21.8°F in January and February with 32.8°F in March). Extreme Cold/ Wind Chill from 2006 to 2022 has no reports, according to the NOAA storm event database; however, the County is susceptible to both cold and hot temperatures.

According to the State Hazard Analysis, extreme high temperatures have more of an affect on large, populated cities, rather than rural areas like Barry County. Even though Barry County is less likely to experience high temperatures; it is listed as a high risk of 2.7% probability and 10 days at 109°F (occurred in 1936). Barry County experiences exceptional humidity with uncharacteristically high temperatures over a protracted period, deemed a "heat wave." The

average summer weather can feel muggy 35% of the year in Barry County because of humidity. Spectrum Pennock Hospital, in the City of Hastings, sees less than 5 injury incidents per year. Barry County has no reports of Excessive Heat from 2006 to 2022, according to the local NOAA storm event database.

Extreme hot weather is more hazardous to farmland with either crops or livestock, which includes approximately 47% of agricultural land in Barry County. Aquifers are in use more during this hazard for sprinkler systems and watering of crops and livestock. Very hot temperatures can also aggravate fire hazards and increase the likelihood of wildfires according to the State Hazard Analysis.

Data on physical damages to infrastructure during extreme temperatures includes buckled roads, failed bridges and railroad tracks, utilities, and home damage.

4.3 Thunderstorms

Thunderstorms and thunderstorm-related events include severe winds (significant), lightning (significant), tornados (high), and hail (significant) and have the capacity to harm persons and property in Barry County. On average, Barry County has 35 thunderstorm days per year. Barry County is most susceptible to tornadoes between March and August, from noon to midnight, though tornadoes can happen at any time. The Michigan HMP of 2019, lists Barry County as a prioritized natural hazard for thunderstorm-related events of severe winds for Localized Identified Hazard Vulnerabilities with $12M in damages from the National Center for Environmental Information (NCEI) database that ranges back to 1996 for crop damage and property damage. No casualties were recorded for Barry County, although other counties had casualties. Thunderstorm damage estimate to the present year would be equivalent to $25M in property damage in today's property value, and crop damage equivalent to $500,000 in today's crop values.

Michigan's Lower Peninsula is subject to approximately 30 to 40 thunderstorm days per year. This means that about 30 to 40 thunderstorms will occur in any given year in Barry County. In 1975, a Presidential Declaration was issued for damaging flooding, rain, and tornadoes associated with severe thunderstorms. The Declaration included Barry and 20 other southern Michigan Counties. Since 1953, thirteen (13) FEMA disasters were declared for Barry County, including two severe storms with tornadoes and flooding that occurred in 2004 and 2008, and a third severe storm with tornado in 1965.

4.3.1 Lightning (Significant Hazard)

Each year in the United States at least 75 people are struck and killed by lightning [Source: FEMA]. Lightning is one of the leading weather-related causes of death and injury in the U.S. Lightning is a giant discharge of electricity that can heat the air as much as 50,000°F over a 5-mile stretch. Lightning detection in the US monitors 25 million strokes of lightning from clouds to ground during some 100,000 thunderstorms every year. According to National Geographic, talking on the phone during a lightning storm is a leading cause of lightning injury in the home,

and standing under a tree or an open field are the most dangerous places to be. Barry County expectancy for lightning is 48.6 events per year, according to NRI.

While Barry County residents are fairly accustomed to the possibility of thunderstorms and corollary natural events, residents may encounter dangerous lightning on land or on water. One child was treated for minor injuries (9/19/1997). Barry County has over 92 inland lakes (private and public) and at least 9 rivers with numerous tributaries. Barry County is known for fishing, boating, and water recreation, which results in an increased risk of encountering lightning. Water is a good conductor of electricity, including lakes, rivers, pools, and bodies of water. Although water strikes affect the surface, fish are not harmed because they swim beneath the surface [Source: NOAA, National Weather Service]. Local and national weather stations provide daily alerts to avoid the water when a chance of lightning is present. Barry County has a code, MIC015, for NOAA, National Weather Service that is updated every 2 to 3 minutes.

No property or crop damage was reported for Barry County from lightning, according to the NCEI storm events database for years 2005 through 2021. However, the NCEI maps database identify several lightning strikes throughout Barry County in the past 15 years, with as many as 39 strikes within one section of Barry County at one time in Barry Township and Hope Township (District 3). Specific locations of lightning strikes were not provided.

4.3.2 Tornados (High Hazard)

Since 1950, at least 4 people were killed as a result of a severe thunderstorm-related event in Barry County. On May 19, 2019, Barry County experienced a tornado touchdown (EF-0) with damage to three barns on one farm, and to a utility telephone pole. In September 2018, a tornado (EF-0) damaged property in Hickory Corners (Barry Township). The County experiences tornadoes of an expectancy of 0.2 events per year; 1955, 1956, 1965-67, 1972-73, 1977, 1980, 1982-83, 1986-87, 2001,2008, 2018-19.

Since tornadoes can occur at any place in Michigan at virtually any time, all county facilities are vulnerable. Especially susceptible buildings are those with large interior span areas, such as schools, gyms, theaters, and grocery stores. The County has not documented all facilities that may be classified as large span structures; however, most large span buildings, both public and private, provide emergency shelter locations in the event of a tornado.

The following table provides local storm event data regarding tornado touchdowns that have impacted Barry County since 2005, and additional data is below:

Table 6. Thunderstorm-related Tornados (2005 through 2021)

Location	Date	Magnitude	Property Damage Costs	Crop Damage Costs
Doster	4/9/08	EF-1	$100,000	$0
Cressery	9/1/18	EF-0	$150,000	$0
Lacey	5/19/19	EF-0	$20,000	$0

Barry County Tornadoes 1950 - 2012 [Source: Michigan Tornado Project Online]

ID	Date	Event Num	Time	Dead	Inj	F-Scale	Beg Coor	End Coor	County
508	AUG 6, 1955	10	15:35	0	1	2	42.65 -085.28	00.00 0	15
154	APR 11, 1965	5	18:40	0	5	3	42.65 -085.30	42.77 -085.07	15
264	JUN 9, 1966	6	8:00	0	0	2	42.52 -085.38	00.00 0	15
190	APR 21, 1967	7	18:00	0	1	2	42.72 -085.45	42.80 -085.18	15
656	SEP 17, 1972	17	19:55	0	0	1	42.67 -085.48	00.00 0	15
477	MAY 27, 1973	4	19:10	0	0	0	42.60 -085.50	00.00 0	15
275	MAY 17, 1977	9	15:40	0	0	1	42.43 -085.30	42.38 -085.25	15
629	JLY 5, 1980	13	4:30	0	0	1	42.57 -085.05	00.00 0	15
809	JLY 14, 1982	17	14:30	0	0	1	42.52 -085.42	42.55 -085.38	15
772	AUG 21, 1983	19	15:15	0	0	0	43.62 -085.53	00.00 0	15
539	JLY 15, 1986	8	18:38	0	0	2	42.55 -085.52	42.25 -084.75	15,25
642	AUG 26, 1986	16	14:40	0	0	2	42.58 -085.40	00.00 0	15
458	JLY 20, 1987	18	16:45	0	0	0	42.60 -085.52	00.00 0	15
823	JLY 18, 1993	9	14:38	0	0	0	42.75 -085.52	42.73 -085.45	15
891	MAY 21, 2001	9	12:50	0	0	0	42.62 -085.45	42.62 -085.45	15

4.3.3 Hail (Significant Hazard)

Hail events are thunderstorm-related events that have a propensity to impact Barry County and has an expectancy of 2.2 events per year (National Risk Index). Hailstones exceeding 0.75 inches in size were considered severe, until 2009, when the threshold was changed to 1.00 inches. Most Hail Signature Events are **not** indicative of a severe hail probability in NOAA's inventory (NEXRAD); however, NOAA's Storm Events database provides costs filed for damage caused by severe hail storms. The National Weather Service forecasts of severe thunderstorms usually provide sufficient warning time to allow residents to take appropriate action to reduce the effects of hail damage on vehicles and property; however, does not prevent damage to crops.

NOAA Inventory (NEXRAD by County)
Hail Signature Events from 2005 to 2021

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
# Events	105	103	101	115	64	72	131	94	105	75	35	40

Year	2017	2018	2019	2020	2021
# Events	110	77	80	110	107

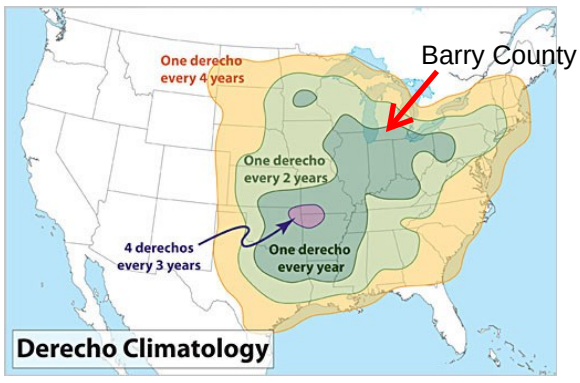
According to the NOAA Storm Events Database from 2005 to 2021 (ncc.noaa.gov/stormevents), Barry County filed for $30,000 damage costs in 2006, and provides jurisdiction location. No other storm damage costs were identified in this database, which explains the events per year risk expectancy of 2.2 events.

Table 7. Thunderstorm-related Severe Hail Events (0.75 inch or larger)

Location	Date	Size (inches)	Property Damage Cost	Crop Damage Costs
Delton	6/28/06	0.75	$5,000	$5,000
Doster	9/6/06	0.75	$15,000	$5,000
Delton	3/1/07	0.75	$0	$0
Hastings	10/18/07	0.88	$0	$0
Nashville	6/6/08	0.75	$0	$0
Hastings	7/2/08	1.00	$0	$0
Woodland	7/23/09	0.88	$0	$0
Bowens Mills	5/12/11	1.00	$0	$0
Hastings	03/15/12	0.88	$0	$0
Bowen Mills	5/3/12	1.00	$0	$0
Nashville	5/3/12	0.75	$0	$0
Banfield	5/20/14	1.00	$0	$0
Orangeville	6/25/14	1.00	$0	$0

4.3.4 Severe Winds (Significant Hazard)

Damage from severe winds accounts for half of all severe reports in the 48 states and is more common than tornados. According to NOAA, thunderstorm-related severe winds defined at 50 knots (58 miles per hour) or greater are called, *straight-line winds*, and if long-lived and extended over a 240-mile swath, are called a *derecho wind*, and can cause damage on the ground as a result of outflow generated by a thunderstorm's downdraft. In August 2020, a derecho occurred across the Midwest US and portions of Ontario, Canada, at reported wind speeds of up to 126 mph. Barry County is within the path of a *derecho* at a rate of 1 per year.



NOAA, National Weather Service

Two season types of derechos may form, a *Progressive Derecho* (warm season) in which 70% of all derechos occur (May, June, July, and August), and a *Serial Derecho* (cool season) that affects the southern states but are rare in the northern states. Derechos cause more fatalities than EF0

tornadoes, and fatalities are typically associated with fast-moving vehicles (60 to 70 mph) and or persons caught in exposed areas. On May 31, 1998, a derecho occurred in Barry County and all of Michigan, with gusts up to 130 mph near Grand Rapids, and sustained winds at 60 to 90 mph. No other derechos were reported for Barry County since then.

While Barry County has experienced only three tornados every 10 years, 32 severe wind events were recorded in 2005-2021, approximately 2-5 thunderstorm wind events each year, and 1 high wind every 2 years. The County expectancy of strong wind is 3.7 events per year. The total cost for property and crop damage was $877,000. The National Weather Service does not issue "derecho" warnings, but warnings are issued for severe thunderstorm and these warnings are usually provided in plenty of time to prepare and seek shelter. However, a derecho is a fast-moving storm with an extremely rapid deterioration of weather. The Michigan HMP states that Barry County has experienced $12M in losses based on data compiled from the NCEI database, dating back to 1997.

Sirens. Notifications to the residents and people of Barry County are helpful to prepare for a spotted storm system or tornado event to allow people to seek shelter; Barry County has a siren system in place and offers locations for shelter in such events. The map below provides working locations for shelter and sirens. Sirens exist in the Village of Woodland, the Village of Freeport, the City of Hastings, the Village of Nashville, and Orangeville Township (burg of Orangeville).

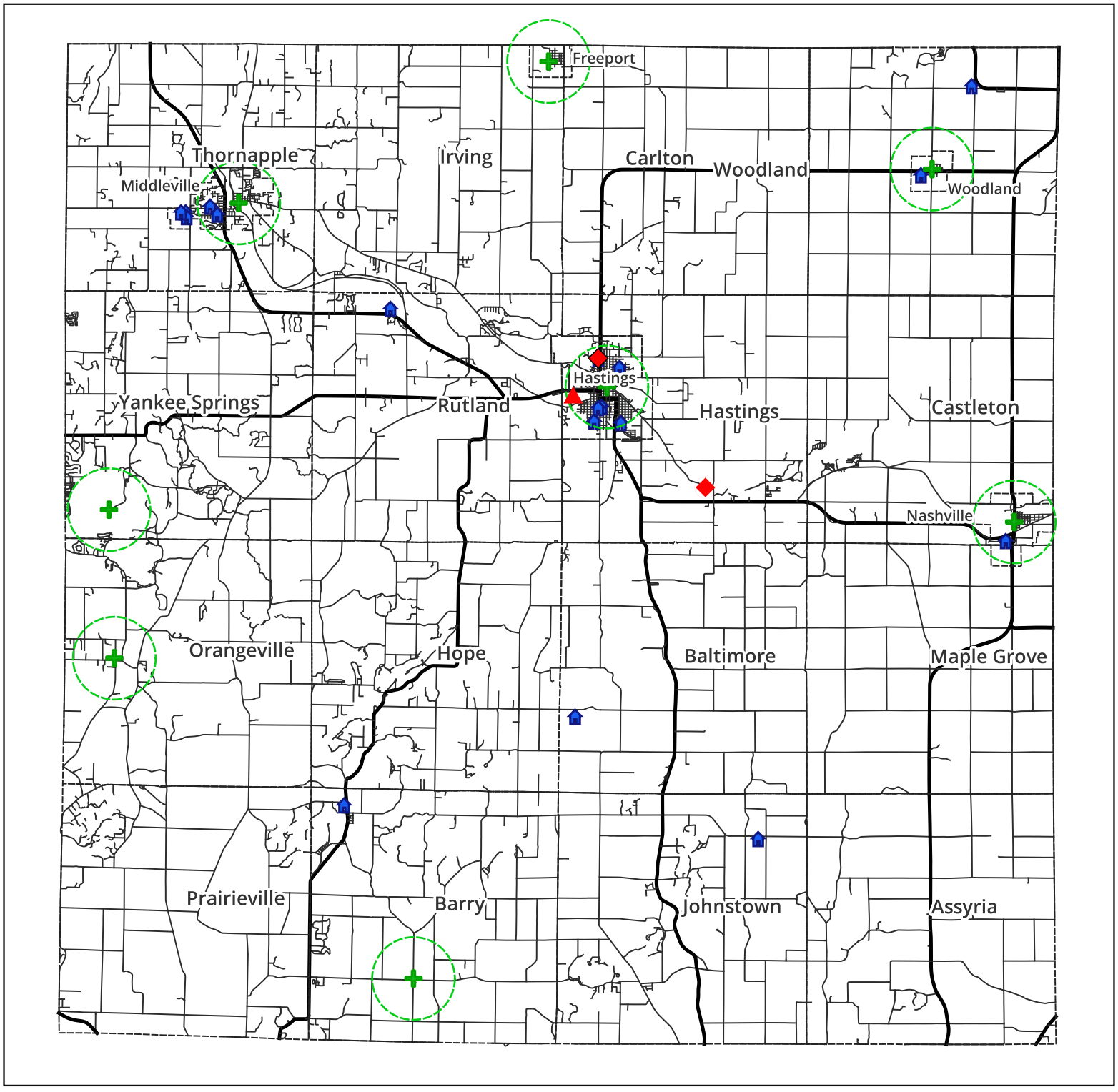
Table 8. Thunderstorm-related Severe Wind Events (2005 through 2021)

Location	Date	Estimated Wind Gusts (knots)	Property Damage Costs	Crop Damage Costs
Woodland	6/5/05	52	$20,000	$0
Orangeville	6/26/05	52	$15,000	$0
Hastings	6/30/05	52	$10,000	$0
Assryria	7/4/05	53	$10,000	$0
Orangeville	7/20/05	60	$30,000	$0
Cloverdale	5/30/06	52	$15,000	$5,000
Hastings	7/17/06	53	$50,000	$5,000
Freeport	7/27/06	53	$30,000	$5,000
Middleville	7/27/06	53	$25,000	$0
Hastings	8/23/07	50	$75,000	$0
Assyria	10/18/07	52	$5,000	$0
Gun Lake	12/23/07	56	$0	$0
Hastings Airport	12/23/07	65	$25,000	$0
Nashville	6/6/08	60	$0	$0
Delton	6/7/08	61	$0	$0
Hastings	7/7/08	52	$0	$0
Irving	6/8/09	52	$0	$0
Parmelee	6/19/09	50	$0	$0
Hastings	7/11/09	52	$0	$0
Orangeville	7/11/11	65	$100,000	$0
Delton	6/12/13	52	$5.000	$0
Coats Grove	11/17/13	52	$15,000	$0
Gun Lake	6/25/14	52	$100,000	$0
Yankee Springs	6/28/14	52	$15,000	$0
Milo	8/25/14	52	$10,000	$0
Middleville	7/7/17	61	$100,000	$0
Schultz	6/1/19	52	$150,000	$0
Middleville	7/20/19	52	$25,000	$0
Freeport	8/29/20	52	$2,000	$0
Assyria	6/9/20	52	$25,000	$0
Cloverdale	8/11/21	52	$5,000	$0

[Source: NCEI database]

Shelter & Siren Locations

Barry County, Michigan



Siren (1 mile buffer)

Shelter

ALTERNATE EOC
Barry/Eaton County Health Dept.
330 W. Woodlawn

PRIMARY EOC
Barry County Central Dispatch
2600 Nashville Rd.

Communications

ALTERNATE DISPATCH
Barry County Sheriff's Dept.
1212 W. State St.

Barry County Land Information Services
08/03/2021
NAD83 / Michigan South (ft)

4.4 Floods

Floods are devastating to public and private property, essential utilities, roadways, agricultural lands, bridges, and emergency services. According to Michigan's Hazard Analysis 2019, Barry County has experienced $7,310,000 in total property damage and $700,000 in crop damage from 1996 to 2017 due to floods. Since 1950, Barry County has recorded approximately one flood event every 5 to 10 years with a loss of $6.21M; 1997, 2001, 2004, 2013. The County has an expectancy of 0.5 events per year; flooding does not occur annually.

Thornapple Watershed information. Thornapple River is 88.1 miles long, covering approximately 80% of Barry County, and flows westward through the center of Barry County toward the Grand River, which flows to Lake Michigan. Since 1953, fourteen (14) FEMA disasters were declared for Barry County, including three flooding events (in 1975, 2005 [EM-3225-MI], and 2013.

Frequent flooding occurs within the Thornapple River Watershed. Barry County has experienced an increase in development near Grand Rapids, MI, (Thornapple Township and Irving Township) resulting in an increased volume of runoff, which places stress on sub-watershed creeks and rivers. Developed areas with impervious surfaces, such as streets, parking lots, and concrete/ asphalt coverings, have a higher potential to cause flooding (Urban Flooding).

In 2000, a Floodplain study, based on FEMA's Floodplain maps, showed that some Public Service buildings are partially situated within a floodplain. The total cost of flood damage would be $165,159,672 using inflation calculation rate. The following buildings are expected to be affected by a 100-year flood hypothesis:

- City of Hastings, US Post Office
- Hastings/Birch Fire Department
- City of Hastings Municipal Offices
- Hastings Charter Township Municipal Offices
- Rutland Charter Township Municipal Offices

Barry County has 11 of the 24 Thornapple River sub-watersheds including, from east to west:

- Headwaters of Mud Creek
- Mud Creek (409 acres and 30 feet deep)
- Thornapple Lake
- Quaker Brook
- Butler Creek
- High Bank Creek (Fine, Mill, Long and Bristol Lake chain)
- Cedar Creek (Wall Lake)
- Fall Creek (Jones, Wilkinson, Cloverdale and Long Lake chain)
- Glass Creek (Guernsey Lake)
- Algonquin Lake (on Sand Creek)
- Turner Creek
- Duncan Creek (Duncan Lake)

The Thornapple River near the City of Hastings, Michigan, is monitored by the US Geological Survey and published in its Waterwatch station database. For the monitoring location identified as USGS04117500, the table below summarizes the results from June 10, 2021.

USGS04117500 Thornapple River near Hastings, MI

Date – current:	6/10/2021
Drainage area:	385 mi^2
Discharge:	124 cubic feet per second (cfs)
Stage:	3.03 ft^2
Flood Stage	7 ft
Percentile	13.14%
Length of Record	75 years
% Normal (median)	59.05%
% Normal (mean)	39.56%

https://waterwatch.usgs.gov/?m=real&r=mi&w=map:

Other historical Flood Stages recorded in high flood stage years, using the USGS Waterwatch station for the Thornapple River near Hastings, MI:

- 2004, Flood Stage 9.74 ft with 5,530 cubic feet per second (cfs) discharge in 2004.
- 2018, Flood Stage 9.79 ft with 5,640 cfs discharge.

The table below represents Barry County's expenditures from flooding in 2004 (Presidential Declaration 5/20/04 to 6/8/04); damage to 500 dwellings (multi-family and single family) occurring in that year:

2004 Flood Costs

County Expenditure Type	Amount
Debris Clearance	$84,000
Emergency Protective Measures	$11,000
Roads and Bridges	$206,000
Parks/Recreation Facilities	$78,000
Total	**$379,000**

On April 17, 2013, the Village of Middleville, Michigan, in Thornapple Township of Barry County, filed for $5M in property damages, and no crop damage, due to a rainfall and high river crest that lasted 2 to 5 days. The Governor of Michigan declared a state disaster for 19 counties with a total estimated cost of $32M; homes were flooded, 300 roads closed, but no lives were lost [Source: ncdc.noaa.gov/stormevents/]. No other flooding events were recorded from 2009 through 2021 in the storm event database.

Since 2017, the Delton area, Jordan Lake, and Thornapple River have experienced flooding events causing the Drain Commission to apply for and receive permits from the State to lower the

lake levels and pump waters from one location to another. On May 7, 2018, the Watson Drain Drainage District began to significantly increase the drainage area to encompass Barry Township, Hope Township, Orangeville Township, and Prairieville Township as funding becomes available (Please see Map of District with Added Lands).

Precipitation in Barry County. According to NOAA, the three wettest years in Barry County were 2008, 2019, and 2011. [NOAA, County Ranking].

The FEMA Repetitive Loss data was reviewed and sorted to identify jurisdictions that have flooded. The Michigan HMP of 2019 lists 36 properties in Barry County with repetitive losses since 2001. Table 9 summarizes repetitive losses of 43 properties by jurisdiction.

Table 9. Summary of Repetitive Losses (1979 through 2021)

Jurisdiction	District	No. of Properties	Type of Property
Castleton Township	5	28	SFR
Hastings Township	5	8	SFR
Hope Township	3	1	SFR
Nashville Village	5	1	SFR
Rutland Township	3	1	SFR
Thornapple Township	4	3	SFR
Yankee Springs Township	6	1	SFR

SFR = Single-Family Residence

On May 4, 2009, FEMA published a Flood Insurance Study for Barry County, Michigan (all jurisdictions) that provided new zones for certain areas and in September 2013, FEMA published a revised Yankee Township Map in September 2013, that increased the area (AE Zone-1% Annual FP) around Gun Lake (comprising 2,680 acres). Gun Lake is one of the largest lakes in Michigan's lower peninsula that is situated in Yankee Springs and Orangeville Township and extends beyond the county line. See Table 10 for a summary of Barry County jurisdictions that participate in the National Flood Insurance Program (NFIP).

Table 10. FEMA Barry County Community Flood Insurance Program (NFIP)

Community Name	Initial Identification	Current Effective Date	Sanction Date	Emergency Date
Assyria Township	May 4, 2009	May 4, 2009	May 4, 2010	NA
Baltimore Township	July 29, 1977	May 4, 2009	NA	July 18, 1985
Barry Township	May 4, 2009	May 4, 2009	NA	Aug 28, 2019
Carlton Township	May 4, 2009	May 4, 2009	NA	March 21, 2013
Castleton Township	Aug 5, 1977	May 4, 2009	NA	May 17, 1988
Freeport Village	No special hazards	No special hazards	NA	NA
Hastings, City of	April 12, 1974	May 4, 2009	NA	Feb 18, 1981
Hastings Township	Dec 16, 1977	May 4, 2009	NA	June 15, 1981
Hope Township	Jan 20, 1978	May 4, 2009	NA	Feb 6, 1984
Irving Township	April 15, 1977	May 4, 2009	NA	Jan 1, 1992
Johnstown Township	Aug 15, 1975	May 4, 2009	NA	April 2, 1986
Maple Grove Township	Aug 19, 1977	May 4, 2009	NA	Feb 1, 1986
Middleville Village	July 18, 1975	May 4, 2009	NA	Aug 1, 1986
Nashville Village	Dec 6, 1999	May 4, 2009	NA	Dec 6, 1999
Orangeville Township	May 4, 2009	May 4, 2009	NA	May 21, 2009
Prairieville Township	May 4, 2009	May 4, 2009	May 4, 2010	NA
Rutland Township	Nov 4, 1977	May 4, 2009	NA	Aug 19, 1986
Thornapple Township	March 3, 1978	May 4, 2009	NA	Feb 1, 1986
Woodland Township	May 4, 2009	May 4, 2009	NA	Sept 4, 2009
Woodland Village	No special hazards	No special hazards	NA	NA
Yankee Springs Township	May 4, 2009	May 4, 2009	NA	June 29, 2009

NA = not applicable

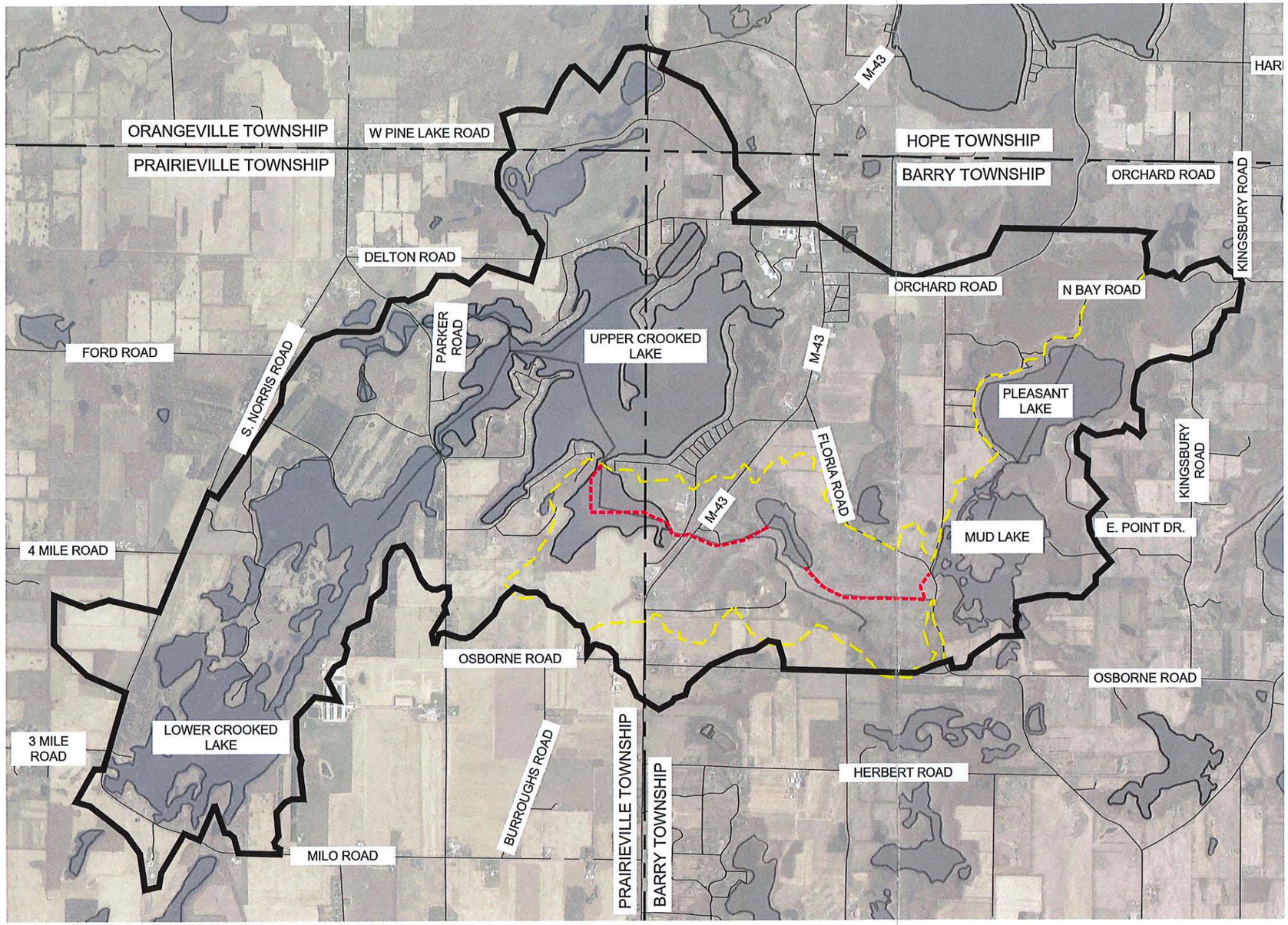
Traveling by ground can be limiting for residents and businesses due to flooding by washouts, and damage to infrastructure over a period of minutes during flash flooding. Below is a table that summarizes FEMA NFIP repetitive losses compiled from documentation; all are single-family resident (SFR) properties.

One jurisdiction cannot maintain a 1-foot BFE, therefore, is not an NFIP participant; Prairieville Township. Freeport Village and Woodland Village are stated to be "No Special Flood Hazard" areas, and are not NFIP participants. The completion of the Watson Drain Expansion will reduce flooding in Prairieville Township (6,400 acres or 10 square miles of Prairieville Township) and crosses into Orangeville, Hope and Barry Townships; the southwest quarter of the County.

Table 11. FEMA NFIP Repetitive Losses

SFR-Single Family Resident	**Repetitive Loss Breakdown**	
Jurisdiction	**Dates of loss**	**Costs**
Castleton Township, Hastings SFR – 8 events	1/12/2009, 2/9/2008, 1/13/2005, 5/22/2004 2/22/1997, 4/21,1993, 11/30/1990, 6/2/1989	$130,910
Castleton Township, Hastings SFR – 5 events	11/29/1990, 3/1/1990, 3/10/1986 3/1/1985, 3/15/1979	$26,394
Castleton Township, Hastings SFR – 3 events	2/25/1985, 3/15/1982 3/6/1979	$10,603
Castleton Township, Nashville SFR – 2 events	2/26/1985 3/17/1982	$3,953
Castleton Township, Hastings SFR – 2 events	3/15/1982 3/7/1979	$14,578
Castleton Township, Hastings SFR – 6 events	2/10/2001, 2/10/1997, 2/25/1985 3/16/1982, 2/20/1981, 3/8/1979	$26,648
Castleton Township, Thornapple Lake SFR – 2 events	2/26/1985 3/16/1982	$7,490
Castleton Township, Hastings SFR – 2 events	2/26/1985 3/16/1982	$5,810
Castleton Township, Hastings SFR – 3 events	6/2/1989, 3/1/1985 3/13/1982	$14,327
Castleton Township, Nashville SFR – 2 events	2/25/1985 3/15/1982	$16,360
Castleton Township, Hastings SFR – 3 events	5/21/2004, 3/13/1982 3/5/1979	$41,427
Castleton Township, Nashville SFR – 2 events	2/25/1985 3/17/1982	$10,467
Castleton Township, Thornapple SFR – 2 events	2/25/1985 3/16/1982	$2,478
Castleton Township, Nashville SFR – 2 events	2/25/1985 3/16/1982	$3,151
Castleton Township, Nashville SFR – 4 events	5/18/2020, 2/22/2018 2/25/1985, 3/14/1982	$73,187
Castleton Township, Potterville SFR – 2 events	2/25/1985 3/17/1982	$7,068
Castleton Township, Nashville SFR – 3 events	5/24/2004, 2/10/1985 3/16/1982	$30,039
Castleton Township, Hastings SFR – 3 events	2/22/2018, 1/15/2005 5/24/2004	$113,176
Castleton Township, Hastings SFR – 2 events	6/8/2008 5/22/2004	$10,350
Castleton Township, Hastings SFR – 2 events	6/7/2008 5/23/2004	$18,387
Castleton Township, Nashville SFR – 3 events	12/29/2008, 6/10/2008 5/23/2004	$34,144
Castleton Township, Nashville SFR – 4 events	4/20/2013, 7/29/2011 6/7/2008, 5/24/2004	$30,763
Castleton Township, Hastings SFR – 4 events	5/20/2020, 2/22/2018 4/7/2017, 5/25/2004	$50,415
Castleton Township, Nashville SFR – 3 events	32/22/2018, 4/11/2017 4/20/2013	$71,925
Castleton Township, Hastings SFR – 4 events	5/19/2020, 2/22/2018 4/7/2017, 5/25/2004	$81,776
Castleton Township, Nashville SFR – 3 events	5/19/2020, 2/22/2018 5/21/2004	$51,935
Castleton Township, Hastings SFR – 2 events	2/23/2018 5/25/2004	$135,773

SFR-Single Family Resident	**Repetitive Loss Breakdown**	
Jurisdiction	**Dates of loss**	**Costs**
Castleton Township, Hastings SFR – 2 events	6/8/2008 5/22/2004	$105,661
Hastings Township, Hastings SFR – 2 events	2/28/1985 3/17/1982	$12,212
Hastings Township, Hastings SFR – 2 events	3/15/1982 3/5/1980	$8,610
Hastings Township, Hastings SFR – 2 events	3/20/1982 3/8/1979	$3,448
Hastings Township, Hastings SFR – 4 events	2/21/1997, 2/26/1985 3/16/1982, 3/6/19798	$15,425
Hastings Township, Hastings SFR – 5 events	5/19/2020, 2/21/2018, 5/23/2004 2/25/1985, 3/15/1982	$88,249
Hastings Township, Hastings SFR – 9 events	5/18/2020, 12/31/2019, 2/21/2018, 4/8/2017 4/14/2013, 7/28/2011, 5/25/2011, 6/8/2008, 1/14/2005	$90,560
Hastings Township, Hastings SFR – 4 events	4/19/2013, 5/23/2004 2/27/1985, 3/15/1982	$84,348
Hastings Township, Hastings SFR – 2 events	5/22/2020, 2/22/2018 4/19/2013, 5/25/2004	$27,550
Hope Township, Delton SFR – 2 events	5/21/2020 7/15/2019	$17,562
Nashville Township, Nashville SFR – 2 events	8/19/2019 7/28/2011	$26,667
Rutland Township, Hastings SFR – 3 events	5/24/2004, 6/3/1989 3/15/1982	$67,379
Thornapple Township, Middleville – 5 events	4/12/2013, 4/28/2011, 6/15/2010 7/2/2008, 3/3/2008	$25,688
Thornapple Township, Hastings – 2 events	6/9/2008 5/23/2004	$16,269
Thornapple Township, Caledonia – 3 events	6/26/2021 4/18/2013	$100,213
Yankee Springs Township, Middleville – 2 events	2/20/2018 6/25/2014	$20,451
	Total	**$1,733,811**



LEGEND

- DRAINAGE DISTRICT BOUNDARY PRIOR TO MAY 7, 2018 B.O.D. (1,760 AC.)
- DRAINAGE DISTRICT BOUNDARY ADOPTED ON MAY 7, 2018 BY B.O.D (6,850 AC.)
- EXISTING DRAIN CENTERLINE (10,774 FT)
- PROPOSED DRAIN CENTERLINE (TO BE DETERMINED)
- TOWNSHIP LINE

GENERAL DESCRIPTION OF LANDS COMPRISING THE WATSON DRAIN DRAINAGE DISTRICT:

BARRY TOWNSHIP (T1N, R9W)
SECTIONS 3, 4, 5, 6, 7, 8, 9, 16, 17, 18

HOPE TOWNSHIP (T2N, R9W)
SECTION 31

ORANGEVILLE TOWNSHIP (T2N, R10W)
SECTION 36

PRAIREVILLE TOWNSHIP (T1N, R10W)
SECTIONS 1, 2, 10, 11, 12, 13, 14, 15, 22, 23

GENERAL ROUTE AND COURSE OF THE WATSON DRAIN:

THE DRAIN CENTERLINE DESCRIBED IN THE FINAL ORDER OF DETERMINATION OF THE WATSON DRAIN DATED 1899

AND ALSO

THE DRAIN CENTERLINE DESCRIBED IN THE FINAL ORDER OF DETERMINATION OF THE WATSON DRAIN EXTENSION DATED APRIL 19, 1909

N

GRAPHIC SCALE IN FEET
0 1500 3000 6000

Drawn By: N.J.D. Date: 06/13/18
Approved By: Date:

JIM DULL
BARRY COUNTY DRAIN COMMISSIONER

4963 Grand Oak Drive Suite A109
Lansing, Michigan 48911
517.887.1100
18630 Robbins Road, Suite 105
Grand Haven, MI 49417
616.743.7070
engdpt.com
Eng
Engineering & Surveying

WATSON DRAIN DRAINAGE DISTRICT

BARRY TOWNSHIP, HOPE TOWNSHIP, ORANGEVILLE TOWNSHIP, & PRAIREVILLE TOWNSHIP, BARRY COUNTY, MICHIGAN

PROPOSED DISTRICT BOUNDARY

PROJECT NO. 18008

SHEET NO. 1 OF 2

4.5 Wildfires

As more residential development encroaches on forestlands and wetlands, protecting people and structures from wildfires becomes a greater challenge. Of the natural hazards, wildfires can result in damage to both ecological and recreational resources. Wildfire hazard zones include all forested (heavy fuel), woody (medium fuel), and grassy (light fuel) areas. Neglectful human behavior is the cause of 4 out of 5 forest fires. Specific causes of wildfires include outdoor burning/debris burning (32%), unattended campfires (9%), arson (6%), and smoking (1%). Natural causes for wildfires include lightning (4%). Regardless of cause, wildfires are exacerbated by drought. The expectancy of wildfires is 0.002%, according to NRI.

Local average, Barry County has 7 wildfires per year, according to the Michigan Department of Natural Resources (DNR), Forest Management Division, that owns land in Barry County, approximately 31,000 acres (48.4 square miles, 8.4% of the total land). The MDNR operates a fire field office in Yankee Springs Township near the Yankee Springs State Park and Barry State Game Area that comprise the bulk of the Forest designation.

Wildfires generate very minor damage in Barry County. In 2019, Yankee Springs Township had a large field fire (7.95 acres brush fire) which required the response of many departments to control (Yankee Springs Township/ Wayland Fire Departments, Orangeville, Leighton, Maring Township fire departments, Thornapple Township Emergency Services, Hopkins area fire department, DNR Forest Fire Division, Wayland Area EMS, MSP and Barry County Sheriff's Office). The wildfire took 45 to 60 minutes to control. The local fire departments provide First Response to a fire and the DNR provides assistance if the fire is too large (large equipment) or if the local departments need support traversing through difficult terrain. The DNR responded to 10 wildfires in 2021 and to 4 wildfires in 2020.

Barry County is one of many counties on the western side of the Lower Peninsula of Michigan with Commercial Forested Land (privately owned): 159 acres in Orangeville, and 66.84 acres in Thornapple as of 2021. The number of wildfires has the potential to increase during drought conditions. According to the Michigan HMP of 2019, Michigan estimated an annual loss of $1.1M resulting from wildfires; however, did not provide loss estimates for individual counties because the cost is under $1M per county. According to the NOAA storm event database, no costs or reports of wildfires were filed for the County from 2006 to 2022. The USDA has a Community Wildfire Defense Grant that can fund a 10-year program up to $10M (FY-2022).

The forested lands in the State Park and Game Area comprise a large urban-forest interface, due to relatively dense residential development near Gun Lake. This represents the most significant risk area in the County, because fires ignite in forests, putting nearby homes at risk. The Gun Lake Tribe along with the Natural Resources Conservation Service has been working with Barry Conservation District to develop a successful and sustainable Forestry Plan to manage and support wildlife habitats and to promote healthy growth of trees [Source: Barry Conservation District Annual Report 2020].

4.6 Drought

In September 2012, 54.8% of the nation was in drought, according to the Drought Monitor Index, and in February 1977, 22.9% of the nation was in an exceptional drought. Barry County has ranked drought as a low hazard. According to the storm events database, Barry County has not filed damages from a drought between the years 2004 through 2021 that incurred costs to FEMA.

Drought is measured as follows by NOAA and USDA National Agricultural Statistics Service (NASS):

Drought Index	Name	Description
D0	Abnormally Dry	grass fires increase, lawns are brown, landscape and gardens need watering
D1	Moderate Drought	most crops and vegetation are stressed, farmed Christmas trees, and well levels
D2	Severe Drought	Corn and soybean yields are low, mature trees are stressed; streamflow is extremely low (for irrigation)
D3	Extreme Drought	Fire danger is extreme, buildings destroyed, and people evacuated, crop yields are down, irrigation costs, power plants operate at reduced capacity or temporarily close
D4	Exceptional Drought	Michigan has no experience with a D4 drought, and no data is available.

Drought trends for Barry County were provided from the year 2000 to the present, showing a severe drought (D2) in early 2003, late 2005, mid-2012, and 2021. While Barry County has experienced short intervals of severe drought, no destruction or damage was reported as a loss.

The database for Barry County reported D2 drought as summarized in Table 12 (no higher index was recorded):

Table 12. Drought Index (2000 to 2022) for Barry County

Drought Index	Percentage of County and Description	Date
D1/D2	58 to 42% of Barry County from January to March 2003 a D2; Corn and soybean yields are low, mature trees are stressed; streamflow is extremely low (for irrigation)	2/25/2003
D2	68% of Barry County; Corn and soybean yields are low, mature trees are stressed; streamflow is extremely low (for irrigation)	11/15/2005
D1	most crops and vegetation are stressed, farmed Christmas trees, and well levels	7/31/2007
D2	100% of Barry County; Corn and soybean yields are low, mature trees are stressed; streamflow is extremely low (for irrigation)	8/7/2012
D2	100% of Barry County; Corn and soybean yields are low, mature trees are stressed; streamflow is extremely low (for irrigation)	6/16/2021

Barry County has experienced D1 moderate droughts every 2 to 3 years, according to the drought index; the database is updated every Thursday, by NOAA, National Integrated Drought Information System (NIDIS) [Source: drought.gov/states/Michigan/county/barry]. The Drought Chart, from 2000 to the present, is provided in Appendix E.

Agriculture Technology (Agri-Tech) has advances in recent years to develop farms that can withstand drought and reduce amounts of water usage and less fertilizer infiltration into aquifers; recycling water, and drip irrigation. The USGS estimates 118,000 million gallons/per day (Mgal/d) water usage, with 63,500 thousand acres of irrigation in 2015. This number can be reduced to 8.6% of this water usage (5,490 thousand acres) with drip irrigation.

Barry County has 4,901 acres of irrigated farms. Drip irrigation (micro irrigation) uses perforated piping along the base of the plants aboveground, and water slowly drips on the crop roots and stems, where water is most needed and infiltration into the ground is less and evaporation is less (cost of $500 to $4,000 per acre to install). The cost to install drip irrigation for the County is $2.45M to $19.6M. The U.S. recycles only 10% of water, while other Agri-Tech countries recycle 90% water. Michigan dairy farmers have reduced water use by 30.5%, 17.5% less feed, and 20.2% less fuel in 2017. Recycling water on a cow farm can be accomplished by a device called, a plate cooler, according to the Journal of Animal Science. The plate cooler provides animal hydration, cleaner farms, and field feed production, a sustainable practice.

Barry County has an average annual rainfall of 37 inches, and the U.S. average is 38 inches. Barry County is more likely to experience wet conditions with a 70 to 80% probability of wet conditions. Social vulnerability index (CDC data) is 0.09% health data for Barry County, with no risk, currently, from drought/ heat, air quality, or wildfire. The severe drought expectancy is 22% annual chance by County records with 0% chance of extreme or exceptional drought.

4.7 Earthquakes

The USGS **Earthquake Hazard Map** (2018 Long-term National Seismic Hazard Map) shows Barry County in the second lowest hazard seismic area (See USGS Seismic Map). According to the NCEI, Natural Hazards Viewer, no “significant earthquakes” have been recorded in Barry County, or in Michigan, Indiana, Ohio, or Wisconsin.

The nearest ***significant/destructive*** earthquakes (defined as causing >$1M damage, causing a tsunami, >7.5 magnitude, or >10 deaths) to Barry County are recorded as follows:

- On April 18, 2008, a 5.3 magnitude earthquake occurred in West Salem, Illinois, which is 300 miles south-southwest of Barry County. This earthquake occurred along the Wabash Valley Seismic Zone, a potentially dangerous Seismic Zone (possible >7.0 magnitude).

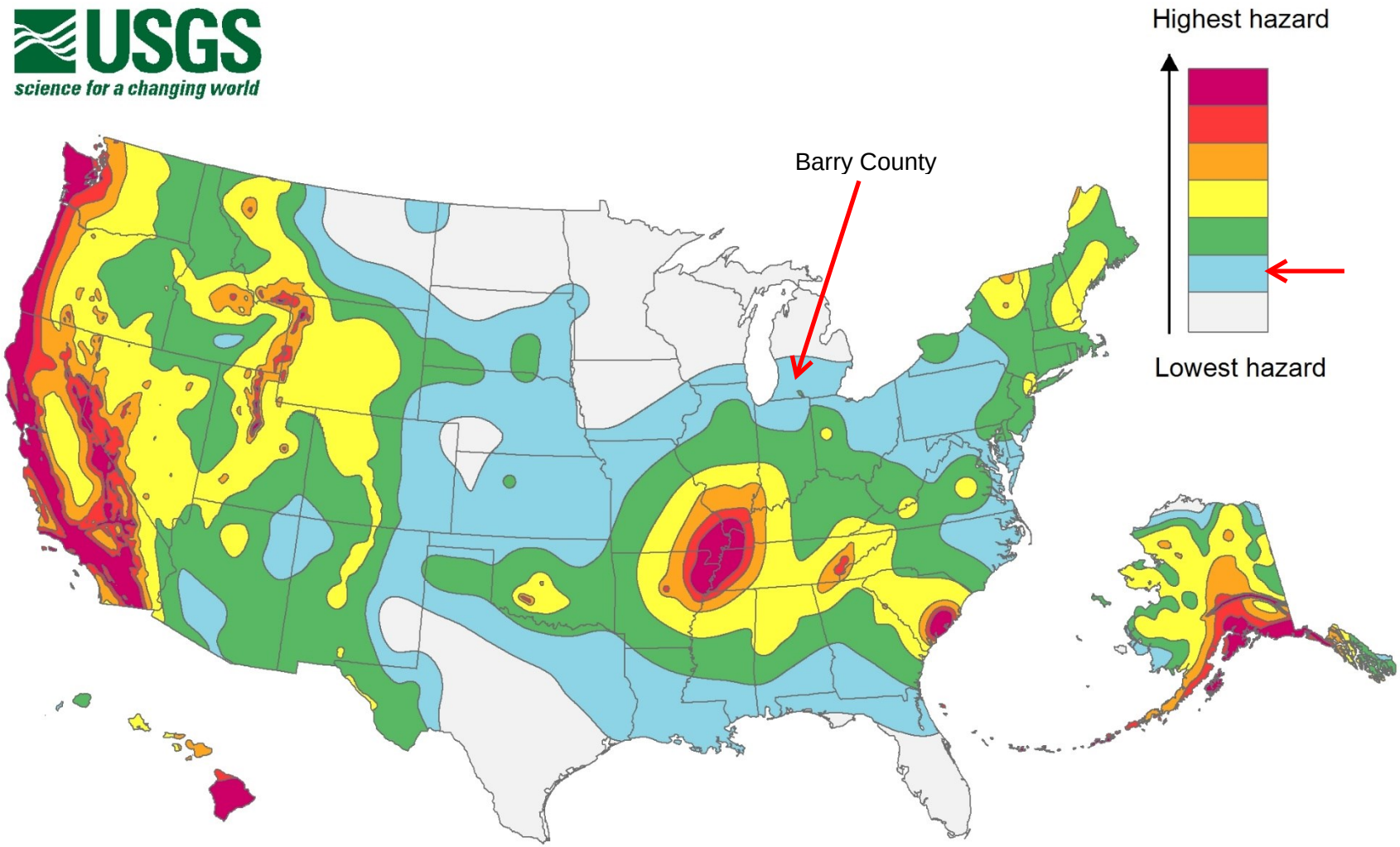
- On May 30, 1823, an earthquake of unknown intensity occurred in Lake Erie, west of Buffalo, New York, approximately 326 miles east of Barry County. During this earthquake, the water rose 9 feet along the coast of Lake Erie and was classified as a tsunami when it was later reported by Bingham in 1870.

Lower magnitude earthquakes have been recorded in Michigan, Indiana and Ohio.
In 1931, the USGS ranked Barry County at a very low risk (0.4% chance) of a major earthquake within 50 km for a 50-year span. No earthquakes have been reported for the County. The probability for a 5.0 EQ remains at 0.4% for Barry County with the probability of a higher intensity even lower for the next 50 years, and a 0.0% probability of a 6.9 EQ or higher. The USGS earthquakes interactive map shows the nearest *non-significant* earthquakes to Barry County (2009-2021) are:

- On May 2, 2015, a 4.2 magnitude earthquake occurred in Galesburg, Michigan, 9.3 miles south of Barry County.

- On June 30, 2015, a 3.3 magnitude earthquake occurred near Burlington, Michigan, 26 miles southeast of Barry County.

While these low-impact earthquakes can occur, the likeliness of loss to life or property damage in Barry County is minimal, and the County has not included this hazard in the ranks and the annual expectancy of a major earthquake is zero incidents for the next 50 years.



Seismic Map, United States

5.0 TECHNOLOGICAL HAZARDS

According to FEMA, technological hazards have little or no warning preceding an incident. Technological hazards can include airports, traffic, industrial and hazardous materials, landfills, dams, and combined sewers. Although FEMA includes nuclear power plant failures as a technological hazard, this hazard is discussed in Section 6.0 Man-made Hazards to follow the established 2005 HMP for War/Nuclear hazard.

5.1 Airports

According to the Michigan HMP, Michigan has 19 airports, of which one is located in Barry County (Hastings Airport–9D9). Hastings Airport-9D9 is designated for public use and is situated 2.48 miles northwest of the City of Hastings. Barry County is rural in comparison with the other counties in Michigan and the Michigan HMP notes how important rural areas are to Michigan.

The State Hazard Analysis performed by the Emergency Management Division of the MSP and Homeland Security, lists four types of hazards for airports:

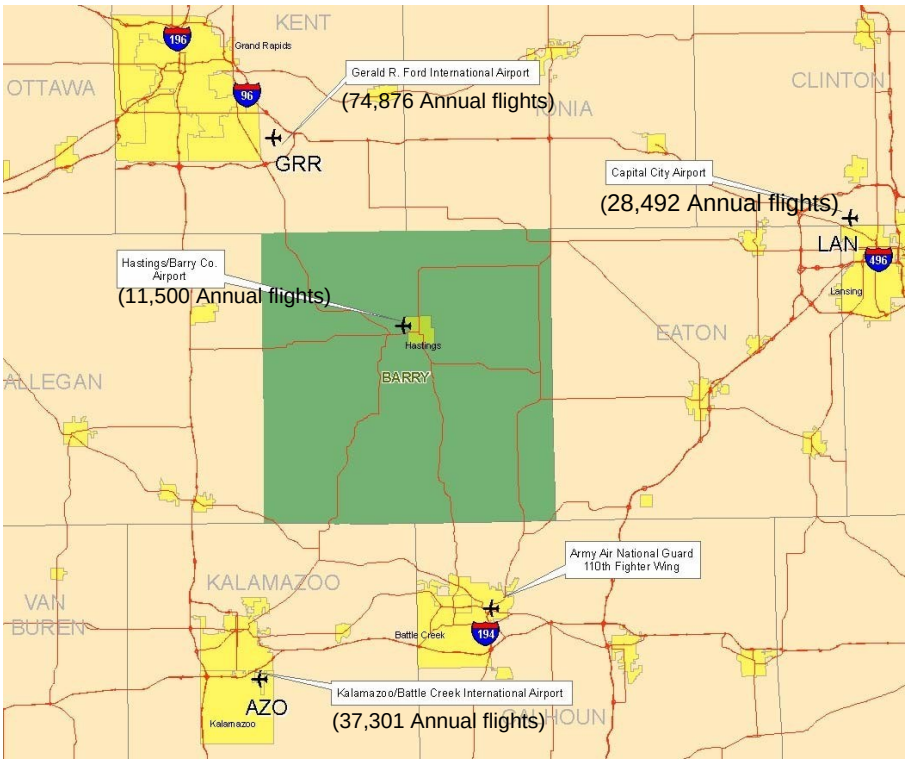
1) The collision of two aircraft in flight
2) The collision of an aircraft due to mechanical malfunctions, human error, terrorism, or other causes while in flight
3) The collision of an aircraft during take-off or landing (HUD-Airport Runway Clear Zones)
4) The collision of two aircraft during staging or taxi operations (HUD-Airport Runway Clear Zones)

Federal Housing and Urban Development (HUD) may mitigate federally funded property within 1,500 feet of a civilian airport (or 6 miles for projects) and 15,000 feet (or 25 miles for projects) within a military airport and has limiting factors within 250 feet of Airport Runway Clear Zones. The Hastings area is the County's most densely populated community. An aviation-related incident near the airport could cause a potentially serious damage to property and population.

Airport-related pollution is a potential hazard to community water resources due to the use of Aviation-fuel, oil, de-icers, and other chemicals that may runoff pavement, rooftops, and impervious surfaces and accumulate in the environment. According to the Hastings Airport staff, flooding has never occurred on airport property, to exacerbate potential release of chemicals or contaminants.

Barry County is within flight patterns of other major airports: Gerald R. Ford International Airport (8 miles north of the County) over Middleville, Irving Township, and Thornapple Township. The Kalamazoo-Battle Creek International Airport and the Battle Creek Air National Guard (military) facility may also pose a risk for residents of southern Barry County. The South Metro medical emergency team of the Gerald R. Ford International Airport responds to the area's needs, as well. According to the Kent County Department of Aeronautics, flights preparing for arrival at the Gerald R. Ford International Airport line up with the runway just over 6 miles away from the airport, extending into Barry County. The approach angle is 3°, little consistency in approach and departure patterns at a large airport due to destinations and weather patterns playing an integral role in flight pattern determination.

New development and increasing population near Grand Rapids, MI, within Barry County may play a role in overall safety of the population in the northwest portion of Barry County; with growth and new development, comes more air traffic for businesses and residents with a larger impact from a potential incident. The Gerald R. Ford International Airport is the largest in West Michigan and the second busiest in Michigan and is eight miles north of Thornapple Township borders.



Regional Airports (Green is Barry County, MI)

An Accident Report was recorded at the Hastings 9D9 airport, with damage to a Piper plane and signage on the runway. Although four other incidents list Hastings 9D9 as the destination, no other incidents happened in Barry County, Michigan. In 2017, a small flight was heading to Hastings 9D9 Airport, but did not arrive due to engine trouble with a non-fatal crash near the Manistee-Ludington area. Other malfunction aircraft incidents have occurred at the international airports in neighboring counties, but the events had negligible impact and no loss of life. No incidents have occurred at the military airfield, as well.

5.2 Traffic

Transportation accidents/ hazards (very low hazard ranking) are a hazard for every community, and Barry County has decreased traffic accidents from 2002 that listed 1,333 accidents from just from deer-related incidents. According to the Michigan State Police, there were 1,466 traffic accidents in Barry County in 2020, of which 5 were fatal. A summary of traffic accidents and their causes is provided below:

- 55 alcohol-related
- 3 involved bicycles
- 4 involved construction zones
- 724 deer-related
- 59 distracted drivers
- 17 drug-related,
- 6 farm equipment-related
- 1 fleeing Police
- 23 motorcycle incidents
- 7 ORV incidents
- 4 pedestrian-related
- 11 police-ambulance-fire related
- 1 school bus
- 0 snowmobile
- 0 train
- 20 truck-bus related incidents

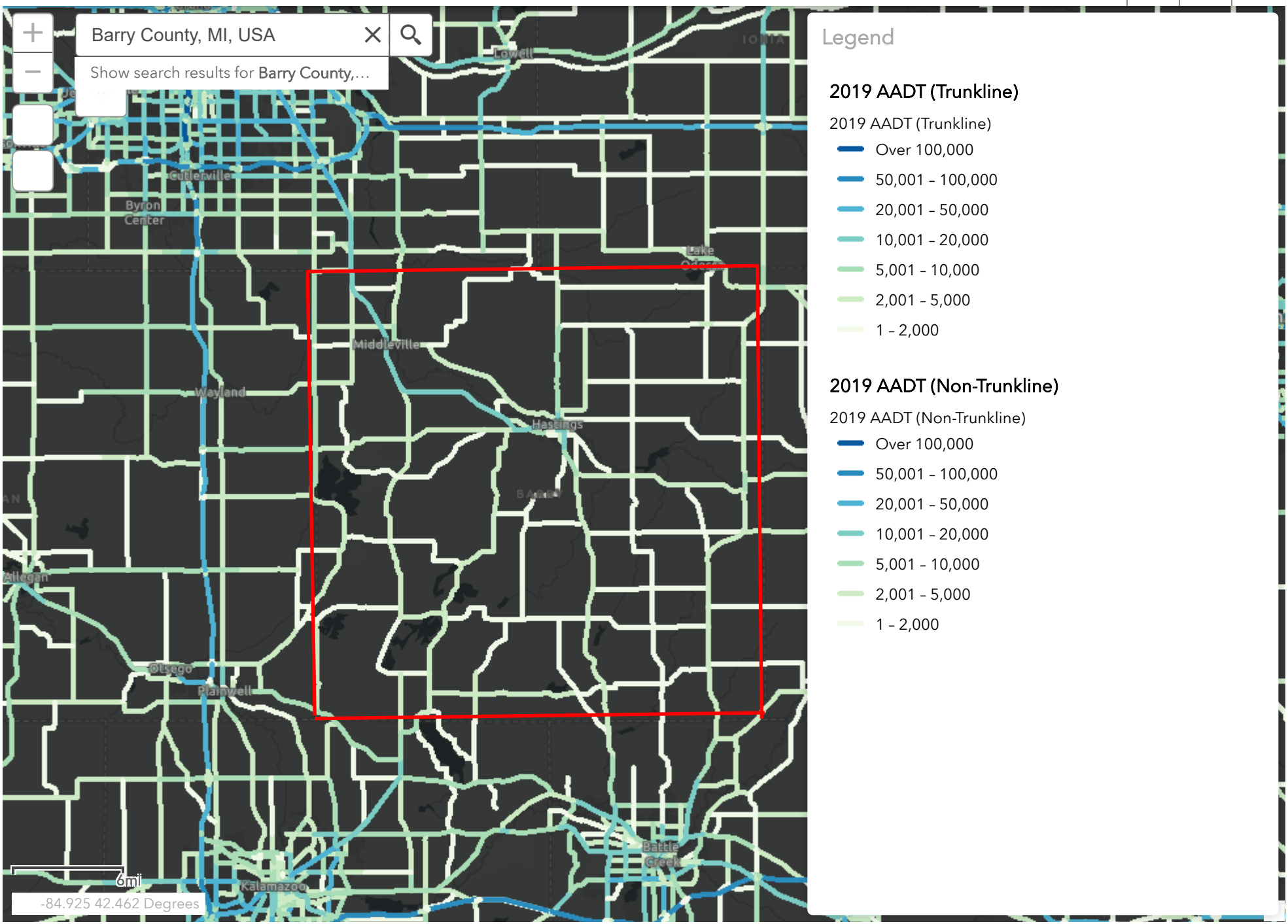
The intersection near M-37, M-43, and M-179 in Rutland Township is subject to heavy traffic volumes and has been identified as potentially dangerous for both volumes of traffic and speed. The area northwest of Hastings along M-37 is expected to have more traffic due to development near Grand Rapids, MI. According to the Michigan HMP, less frequently selected planning topics include roads, highways, and bridges (repairs, maintenance) at 3.2% relevance in 2018. Suggestions for road traffic include construction of relatively straight and flat driveways, open spaces to turn, bridges that can support emergency vehicles, and means to locate homes visibly from the road for local fire departments.

5.2.1 Hazardous Materials Incidents-Transportation (High Hazard)

According to the State Hazard Analysis, all modes of transportation (highway, rail, air, and marine) carry hazardous materials regularly, with statistics showing that all incidents are unintentional motor vehicle accidents or train derailments. Trucks represent 95% of highway shipments. The Federal Motor Carrier Safety Administration issues the *National Hazardous Materials Route Registry* by state, and only the Detroit area (not Barry County) has a restrictive requirement in Michigan.

Barry County, while experiencing fewer traffic accidents, has recorded low-level hazardous materials transportation incidents, locally, that have placed this hazard as a high hazard ranking for the Emergency Planning Committee; three incidents. A general search of highway incidents revealed no reports on HAZMAT incidents from 2013 to 2021 in Barry County that were reported on the HAZMAT Incidents Form 5800.1. [*Source*: USDOT, Pipeline and Hazardous Materials Safety Administration database, Yearly Incident Summary Reports].

Traffic Volumes Map



Barry County has 16 fire departments with trained personnel to respond to a HAZMAT incident, representing one fire department per 34 square miles.

Highway Incidents in Michigan (2013-2021)

Year	Highway Incidents in Michigan	Highway Incidents in Barry County	Cost
2013	278	0	$303,213
2014	358	0	$1,634,280
2015	347	0	$1,865,932
2016	340	0	$1,010,087
2017	323	0	$632,955
2018	410	0	$3,110,208
2019	515	0	$663,975
2020	468	0	$277,649
2021	453	0	$164,190

5.3 Industry and Hazardous Materials

Barry County has several industrial and non-industrial operations that most likely use hazardous materials in processes and operations or generate hazardous waste. Near the City of Hastings, alone, 39 locations have permits to generate hazardous waste under the Resource Conservation and Recovery Act (RCRA). In Hope Township, along Cedar Creek, industrial development is considered as a potential hazard, causing water pollution for communities. Storm water can get polluted when precipitation mixes with chemicals on asphalt/ concrete parking lots prior to discharge. Most industrial firms have operations in place to reduce a release of hazardous materials and must apply for RCRA generator permits, depending on the amount of a hazardous substance within the facility every month, and hold a RCRA permit;

- RCRA non-generator (<100 kilograms (kg) of regulated hazardous waste per month),
- RCRA very small quantity generator (<220 lbs. or <22 gallons of haz waste per month)
- RCRA small quantity generator (>100 kg, but <1,000 kg of haz waste per month)
- RCRA large quantity generator. (>1,000 kg per month)

Businesses may want to notify the local fire departments of the type of hazardous chemicals in the event of an emergency. The SARA Title III, Emergency Planning and Community Right to Know Act of 1986 (EPCRA), allows for the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. Barry County has six (6) SARA Title III facilities that handle hazardous chemicals.

5.3.1 Facility-Specific

RCRA-permitted locations are periodically inspected by the State, and if violations are noted, the company usually is required to pay fines and fix the issue. Most violations involve paperwork

such as transport manifest errors, and are not usually indicative of a release of hazardous chemicals. Other processes are in place, including the SARA Title III, Right to Know Act, that allows firms, either using hazardous chemicals or generating hazardous waste, to inform personnel and persons on the premises about potential risks. Prevention and knowledge are a best practice to prevent a release of hazardous substances. The Governor of Michigan appoints 17 commissioners to the State Emergency Response Commission (SERC) which is chaired by the Michigan State Police. Barry County's Emergency Management Coordinator is the key personnel for the Local Emergency Planning Committee (LEPC).

In 2018, the USEPA made changes to SARA Tier II EPCRA and Tier II Reporting to include physical and Health Hazards and safety thresholds onto Safety Data Sheets (SDS) (formerly called, Material Safety Data Sheets (MSDS)). The list of chemicals under EPCRA updated in August 2020 are found on the USEPA website https://www.epa.gov/epcra/consolidated-list-lists. A review of the USEPA Toxic Release Inventory (TRI) shows 6 SARA Tittle III facilities listed for Barry County (shown on the following page);

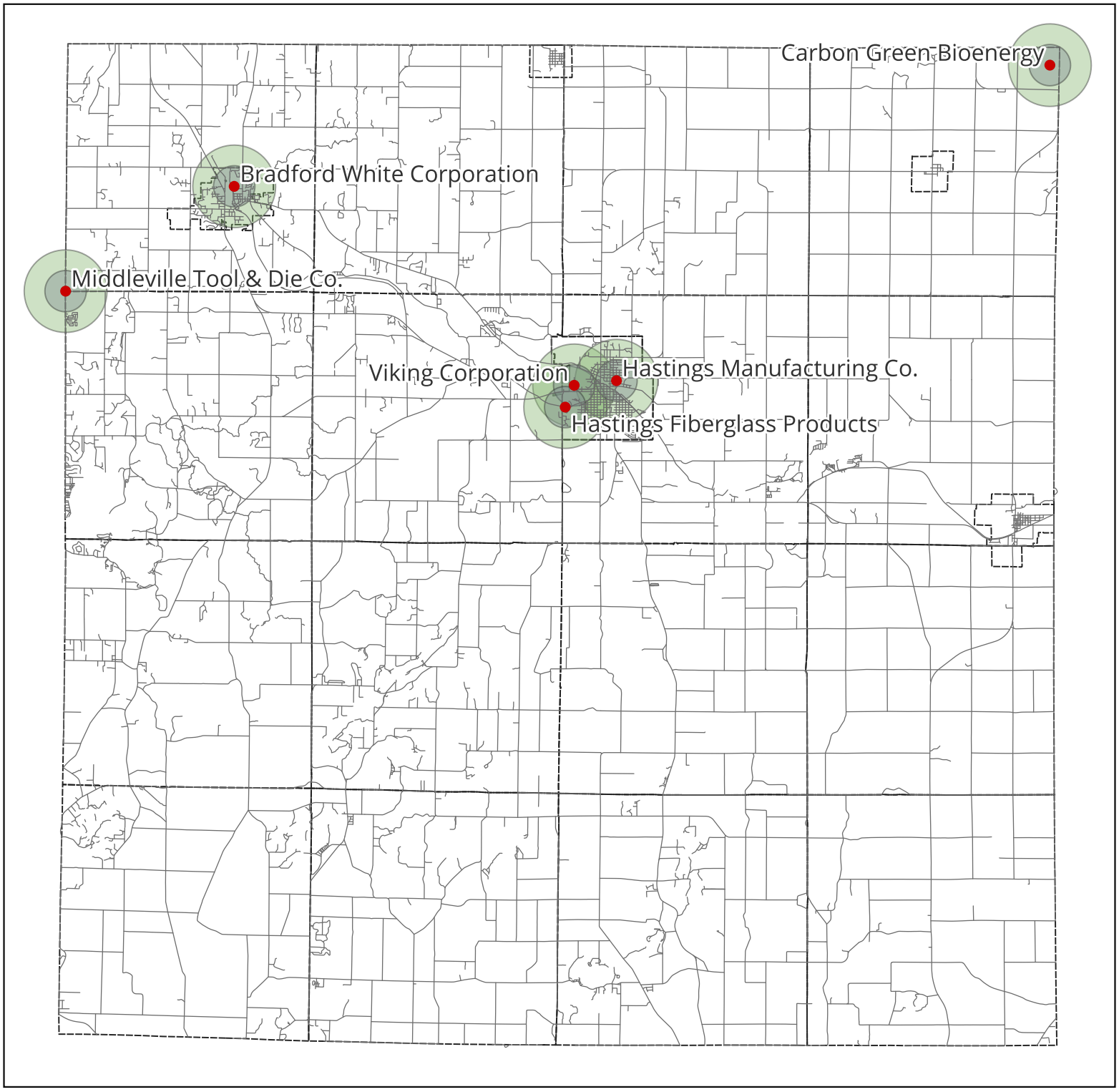
1) Middleville Tool & Die Co., 1900 Patterson Rd, Middleville, MI
2) Bradford White Corporation, 200 Lafeyette St, Middleville, MI
3) Viking Corporation, 210 N. Industrial Park Dr, Hastings, MI
4) Hastings Manufacturing, Co, 325 N. Hanover St, Hastings, MI
5) Hastings Fiberglass Products, 1301 W Green St, Hastings, MI
6) Carbon Green Bioenergy, 7795 Saddlebag Lake Rd, Lake Odessa, MI (Ionia County)

Even though hazardous substances are regulated, incidents still can occur. A release of hazardous substances into the environment is damaging to resources like potable drinking water wells that supply many homes and businesses in Barry County. Some industrial businesses have potable drinking water wells and septic systems, as opposed to municipal water supply and municipal sewer systems. Barry County has several Wellhead Protection Zones that restricts development within these zones (See Figure 2 Wellhead Protection Zones Map).

In the event of a fire or system failure, First Responders may be challenged by a lack of substantial on-site water and water-pressure for fire suppression.

TRI (SARA TITLE III) Sites

Barry County, Michigan



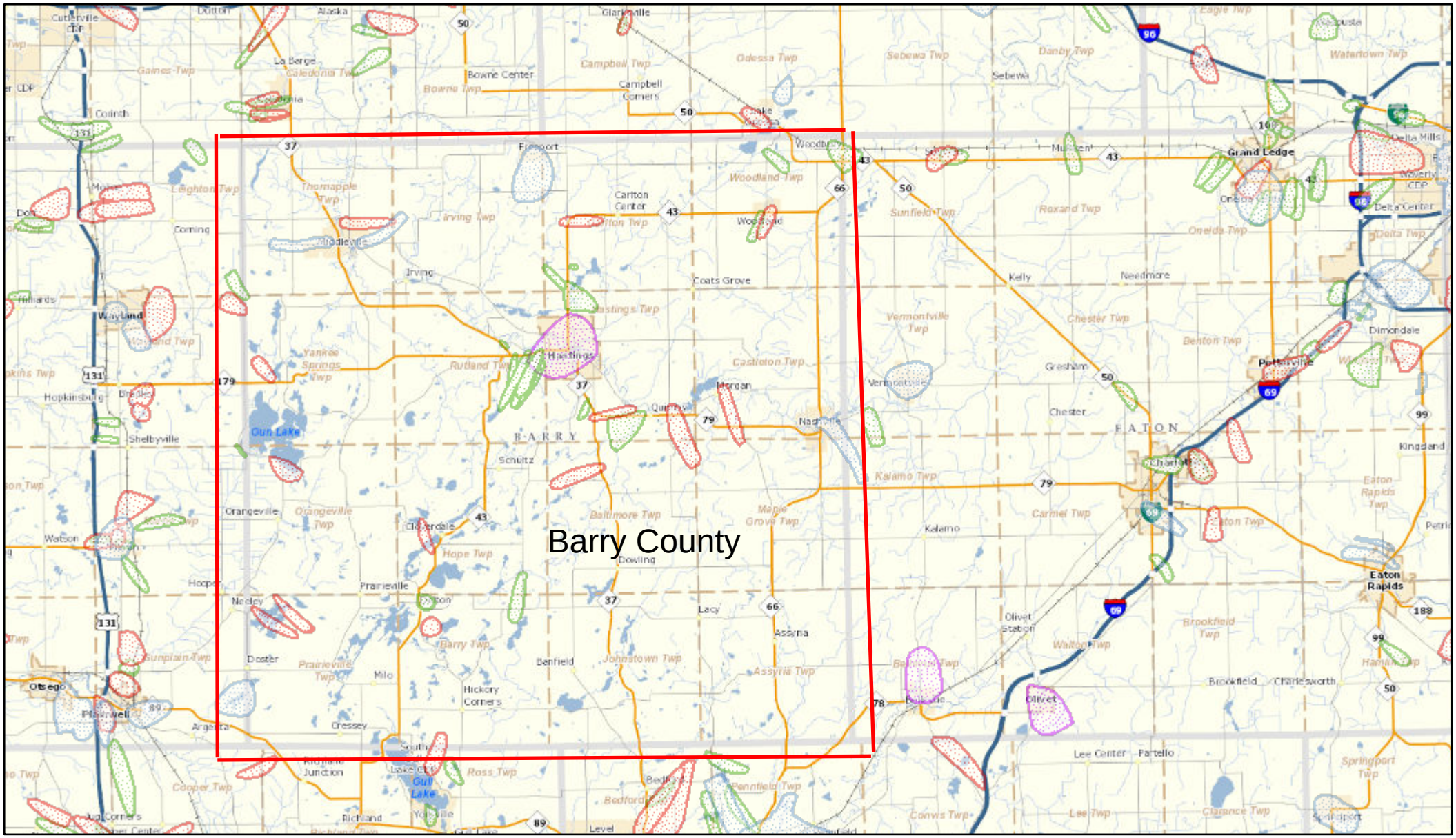
0 2 4 mi

0.5 Mile Buffer

1 Mile Buffer

Barry County Land Information Services
09/07/2021
NAD_1983_StatePlane_Michigan_South_FI

Figure 2. Wellhead Protection Zones Map



5.3.2 Railroad Transport

Transportation of hazardous substances can be performed either by road or by rail. CSX Transportation, the railroad company that operates 2.6 miles of rails in Woodland Township (northeast corner of Barry County), has identified the following six incident types (from most to least frequent):

1) Leaking container with no offsite impact, fire or injury
2) Leaking container with offsite impact, fire or injury
3) Ruptured fuel tank on locomotive
4) Derailment with no release, no tank damage (upright)
5) Derailment with tank overturned, serious tank damage
6) Derailment with a release of hazardous substances

The area near the CSX railroad is sparsely populated and the risk of a release and subsequent impact is very low for Barry County. However, Jordan Lake and associated lake residences are south of the rail line and would be impacted in the event of a release due to train derailment. This affects those living in Sections 1, 2, (General Industrial) and 3 (Rural Residential). It is estimated that approximately 1,014 persons and 200 structures would be impacted by an incident. Please see Woodland Township Zoning Map on the following pages.

Projected disruption to residents and businesses includes pre-disaster preventative measures, evacuation time, cleanup and repair, and time for insurance claims/ disaster-related matters. Disruption time is estimated at $26.84/hour (US Average wage) per person in handling losses due to a release of hazardous substances and the cost for complete cleanup can range from $500K to $1.5M depending on the type of materials released and the extent of the impact, as well as the down-time of the railroad line. Also, serious injury and even death can occur from a train derailment, although this has not occurred in Barry County. Municipal offices and fire station in the Village of Woodland and a hazardous materials employers are located along Clark Road, north of the railroad, and all are within 3 miles of the railroad. The potential lands that would be impacted by a train derailment are currently valued at $20.6M (See Appendix F Hazardous Materials Traffic-Railroad).

5.3.3 Pipeline Accidents–Oil/Gas (Low hazard)

Barry County has ranked pipeline accidents–oil/gas as a low hazard. Oil from the Traverse Limestone formation has been produced in Barry County since 1939; in Hope Township, Johnstown Township, Thornapple Township, and Freeport Village. In 1973, 641,976 barrels of oil were produced from the Traverse formation in the County. Barry County has over 300 producing oil wells and permits, and at least one gas well in Baltimore Township, with most oil wells on the west side of the County. Every township has at least three or more oil wells with mineral permits.

Since 2005, the year of highest production (i.e., 28,962 barrels of oil) was 2012. In 2021, 4,500 barrels of oil were produced [Source: MineralAnswers.com]. The geologic formations beneath

Barry County are Paleozoic (Pennsylvanian and earlier Mississippian epoch) and 1,000 feet thick), consisting of limestone and shale. The Bayport formation, at 300 to 500 feet depth beneath glacial drift, can be a good water producer (323.2 to 358.9 million years of age), and combined with Pennsylvanian to Cambrian is 7,000 feet thick in the southern part and 8,000 feet thick in the northern part of Barry County [Source; State of Michigan, DNR, Report of Investigation 15, Subsurface Geology of Barry County, Michigan, by R. T. Lilienthal, 1974].

No significant pipeline incident has occurred in the County, although incidents have occurred in neighboring counties. The USDOT database shows two "significant incidents" (defined by over $50,000 property damage costs, serious injury or death, a release of over 50 barrels of liquid, or a fire or explosion) including:

- Kent County had an excavation that damaged a pipeline of gas transmission with property damage of $146,585 in Wyoming, Michigan, on October 4, 2005.

- Kent County had a gas distribution line with one injury and property damages of $1,082,932 in Grand Rapids, Michigan, on February 26, 2008.

In 2012, 23,421 acres mineral leases were purchased for drilling oil and gas wells in Barry County out of a total of 100,000 acres available for Michigan. At that time, the community had concerns regarding fracking technologies (high-pressured water and oil injection). 211 parcels can be used for fracking with environmental conditions being met to the satisfaction of Michigan EGLE regulatory agency.

5.3.4 Land Use Projection

According to the County Master Plan, the land cover describes vegetation or land use that occupies the land in a given community. Land use and development trends may play a role in the population's safety. FEMA grants have become available to improve land use; Flood Mitigation Action (FMA) and Build Resilient Infrastructure and Communities (BRIC) since 2018.

Barry County has increased in population from 59,177 in 2010 to 61,550 by July 2019, according to the US Census Bureau. Barry County Ordinances include zoning ordinances to provide a plan for recommendations on future roads, utility extensions and land use. Maple Grove Township is 90 percent agriculture land and had the greatest loss of population.

The County Master Plan provides the Land Cover Map by Michigan Resources Information System (MIRIS), not intended for zoning use, and is categorized into eighteen groupings with the acreage percentage estimated as:

Table 13. Population Change

Land Use Class	Percent of Total County Land Cover
Residential	5.43%
Commercial, Business, Institutional	0.37%
Open Water	0.01%
Reservoir	0.02%
Forested Wetland	5.72%
Non-Forested Wetland	2.37%
Coniferous	2.65%
Deciduous	25.03%
Cropland	45.24%
Other Agricultural Lands	0%
Permanent Pasture	0.75%
Orchards, Bush-Fruits, Ornamentals, Vineyards	0.16%
Herbaceous Rangeland	5.18%
Shrub Rangeland	2.60%
Confined Feeding Operations	0.09%
Industrial	0.12%
Extractive	0.33%
Transportation	0.09%

The following articles and amendments are found on Barry County's website to change zoning:

- Barry Township property rezone in Delton, in Section 7 - Change from low density residential to general commercial; Ordinance # A-2-2022 of 4/1/2022.

- Hastings Township property rezone in Nashville, in Section 25 - Change from mixed use to rural residential; Ordinance # A-4-2021 of 12/21/2021.

- Maple Grove Township property rezone in Nashville, in Section 16 - Change from agriculture to rural residential; Ordinance # A-3-2021 of 12/21/2021.

- Orangeville Township property rezone – Change from rural residential to mixed use; Ordinance # A -2-2021 of 10/1/2021.

- Irving Township rezone - Change from conservation reserve to rural residential; Ordinance # A-1-2021 of 4/30/2021.

- Hastings Area Overlay District, 5/29/2009 - Barry County joined Rutland Charter Township, Hastings Charter Township, Carlton Township, and the City of Hastings to adopt a Joint Future Land Use Plan; Ordinance # A-1-2009, Article 21, Sections 2100 through 2107.

- Nonconformities, 10/13/2009 - Barry County zoning for Riparian lots on Gun Lake yards must be set back 5 feet or more; Ordinance # A-1-2010, Article 4 and Article 10 Special Land Use, Section 1002 provides minimum building setbacks for riparian lots on Gun Lake.

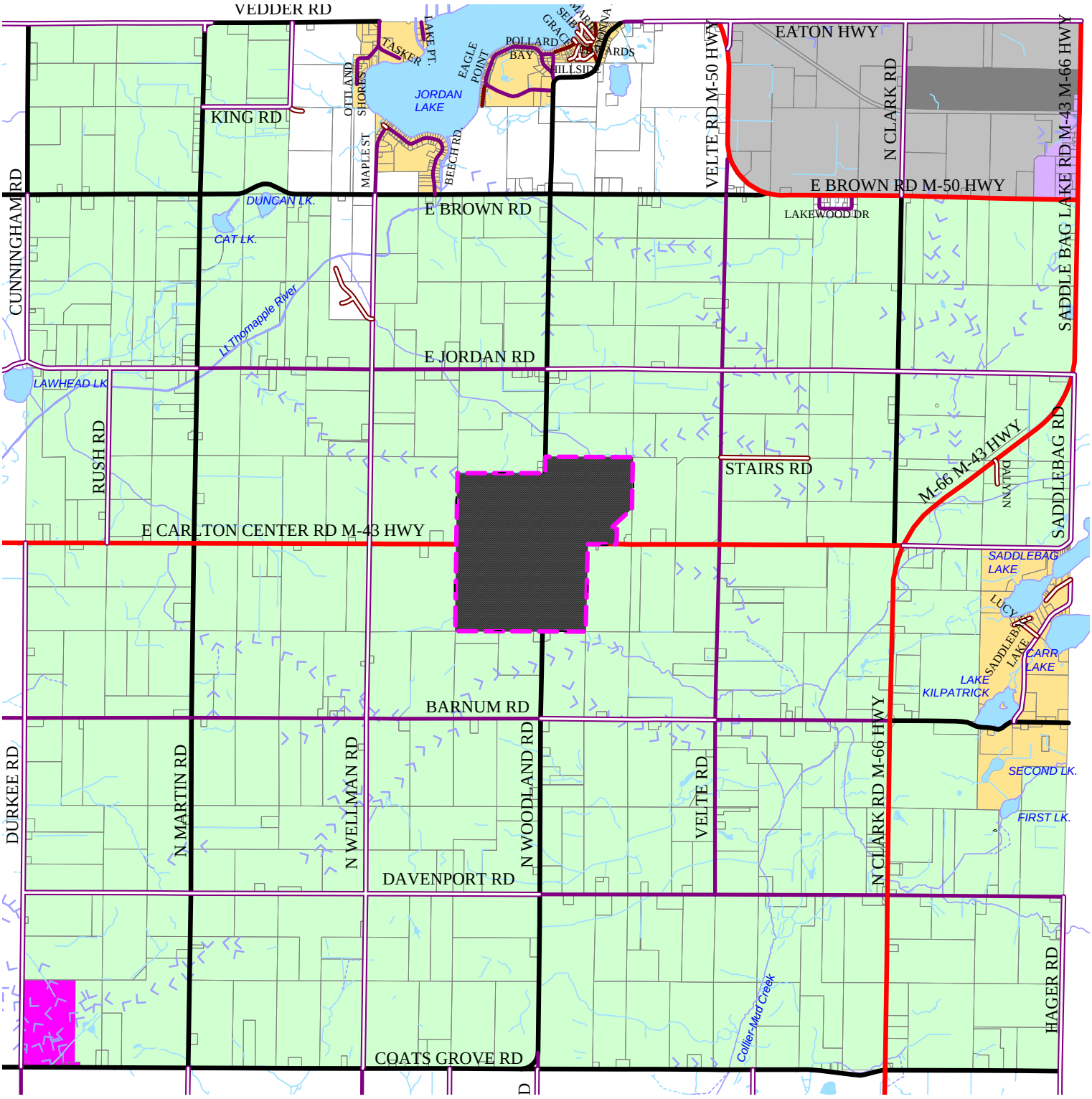
Irving Township has seen the greatest increase in population in the past 10 years contributing to Barry County's population and is near Grand Rapids, Michigan (Kent County); previously, Thornapple Township saw a 20% increase from 1990 to 2005.

Maple Grove Township has seen a great decrease in population from 2010 (1,593 persons) that can affect the township's ability to respond to hazards. Since 2010, the population percentage difference by jurisdiction is depicted [Source: US Census Reporter];

Population Change from 2010 to 2020

Thornapple 6.5%	**Irving 23.8%**	**Carlton 0%**	**Woodland 5.38%**
Yankee Springs 2.0%	**Rutland 0.3%**	**Hastings -1.25%**	**Castleton 0.64%**
Orangeville 0.3%	**Hope 0.09%**	**Baltimore 6.7%**	**Maple Grove -13.9%**
Prairieville 3.3%	**Barry 2.3%**	**Johnstown 2.5%**	**Assyria 7.6%**

Barry County has experienced an increase in population, and the chart above indicates residents are remaining in the County, itself. According to the Michigan HMP, a community that sees a decrease of 5% or more in its population may be in "crisis temptation" which seeks to attract residents and employers (that could be riskier) through incentives, tax abatements, zoning changes, or unusually permissive behaviors. However, since residents are remaining in the County and the population is stable, crisis temptation is not a concern, and Barry County has not provided permissive behaviors.



Barry County Zoning
Assyria, Baltimore, Barry, Castleton, Carlton, Hastings Charter, Irving, Johnstown, Maple Grove, Orangeville, and Woodland Townships
Barry County, Michigan
07/25/2008

- Agricultural
- Rural Residential
- Low Density Residential
- Moderate Density Residential
- Recreational Lakes
- High Density Residential
- Natural Lakes
- General Commercial
- Mixed Use
- Light Industrial
- General Industrial
- Conservation Reserve

Woodland Township Zoning

N
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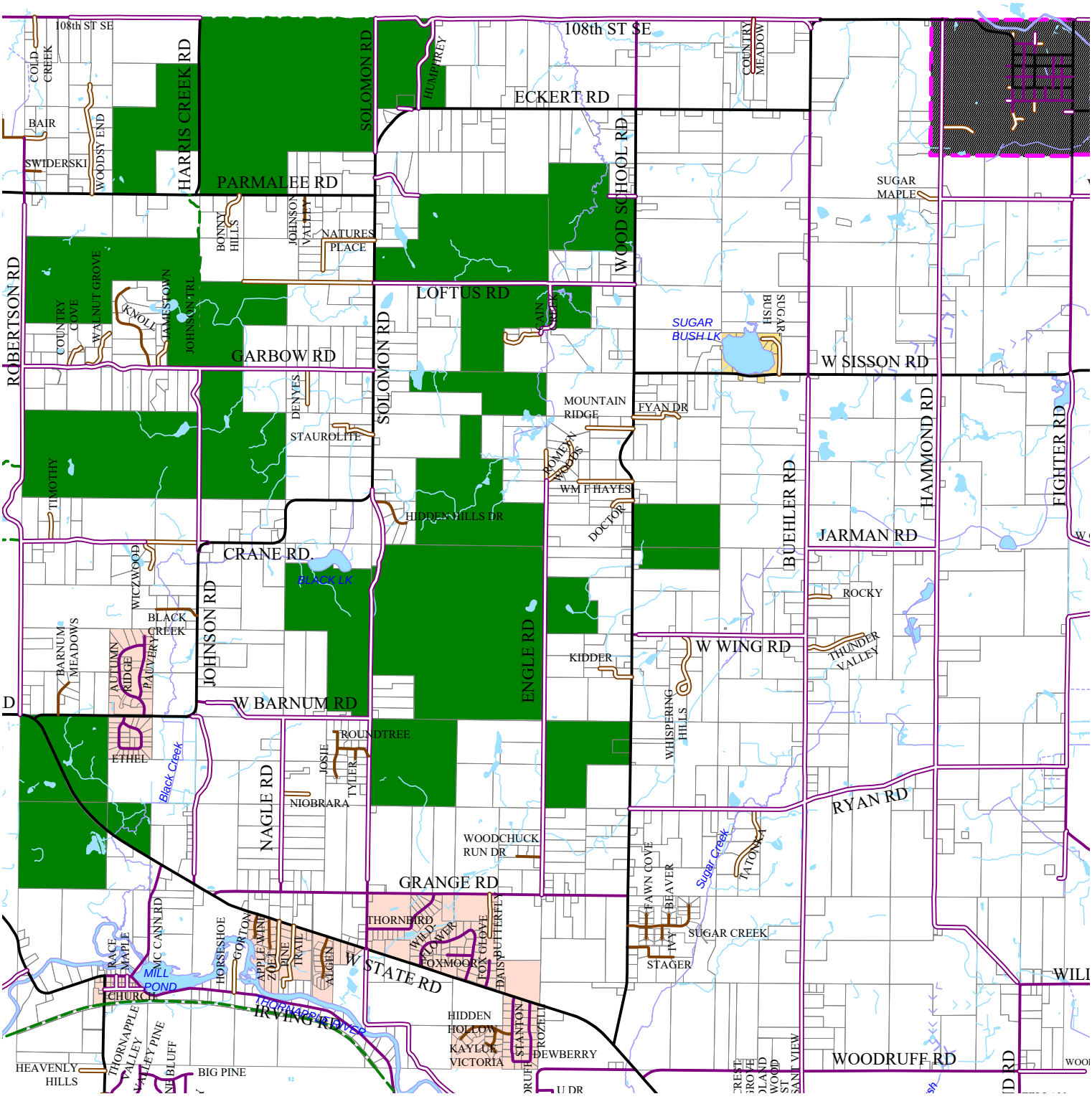
Scale 1:50,000



Barry County Zoning
Assyria, Baltimore, Barry, Castleton, Carlton, Hastings Charter, Irving, Johnstown, Maple Grove, Orangeville, and Woodland Townships
Barry County, Michigan
04/06/2017

- Agricultural
- Rural Residential
- Low Density Residential
- Moderate Density Residential
- Recreational Lakes
- High Density Residential
- Natural Lakes
- General Commercial
- Mixed Use
- Light Industrial
- General Industrial
- Conservation Reserve

Irving Township Zoning

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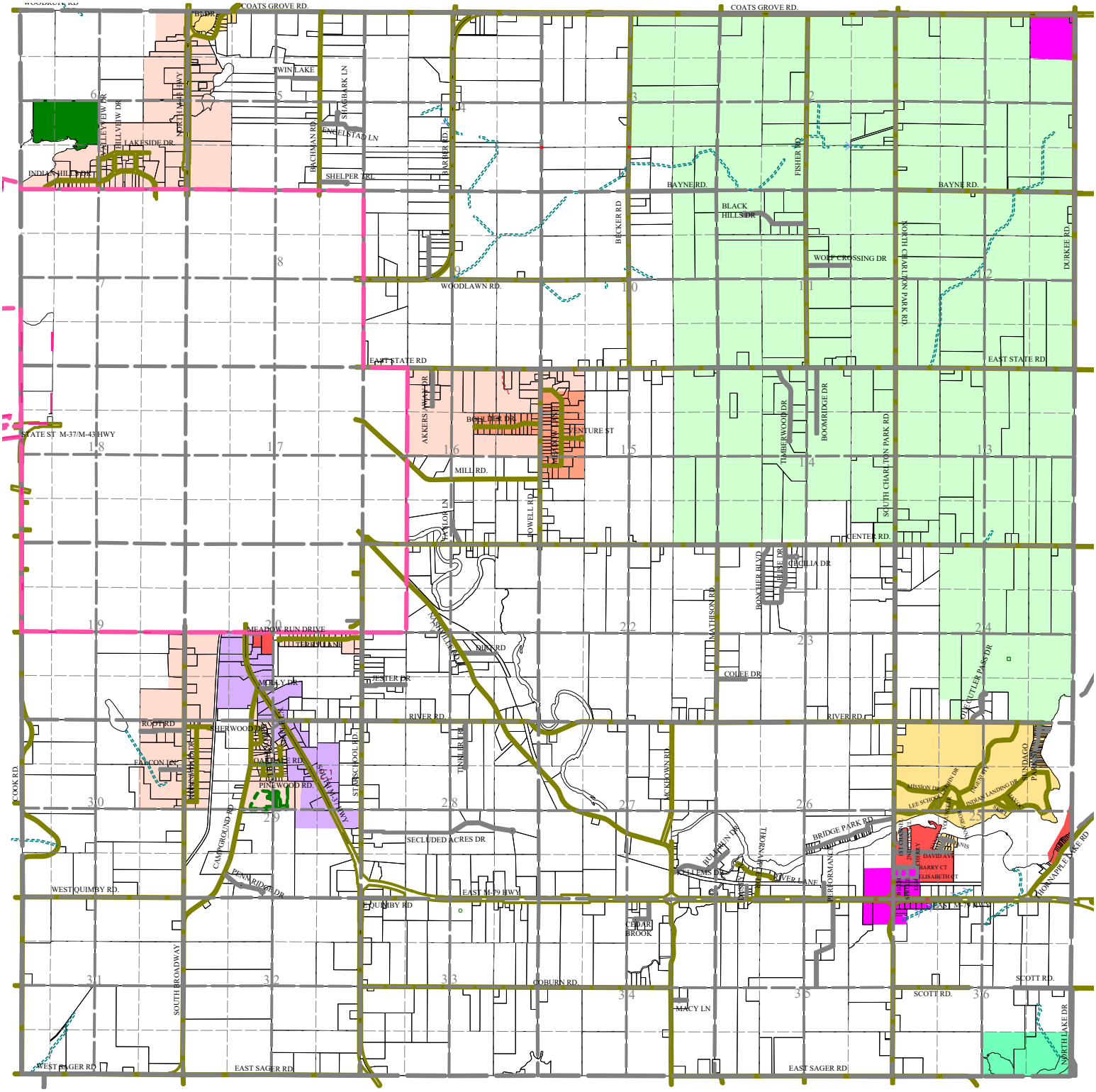
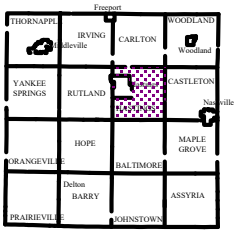
Scale 1:50,000



Map Locator



Barry County, Michigan

Hastings Charter Township Zoning

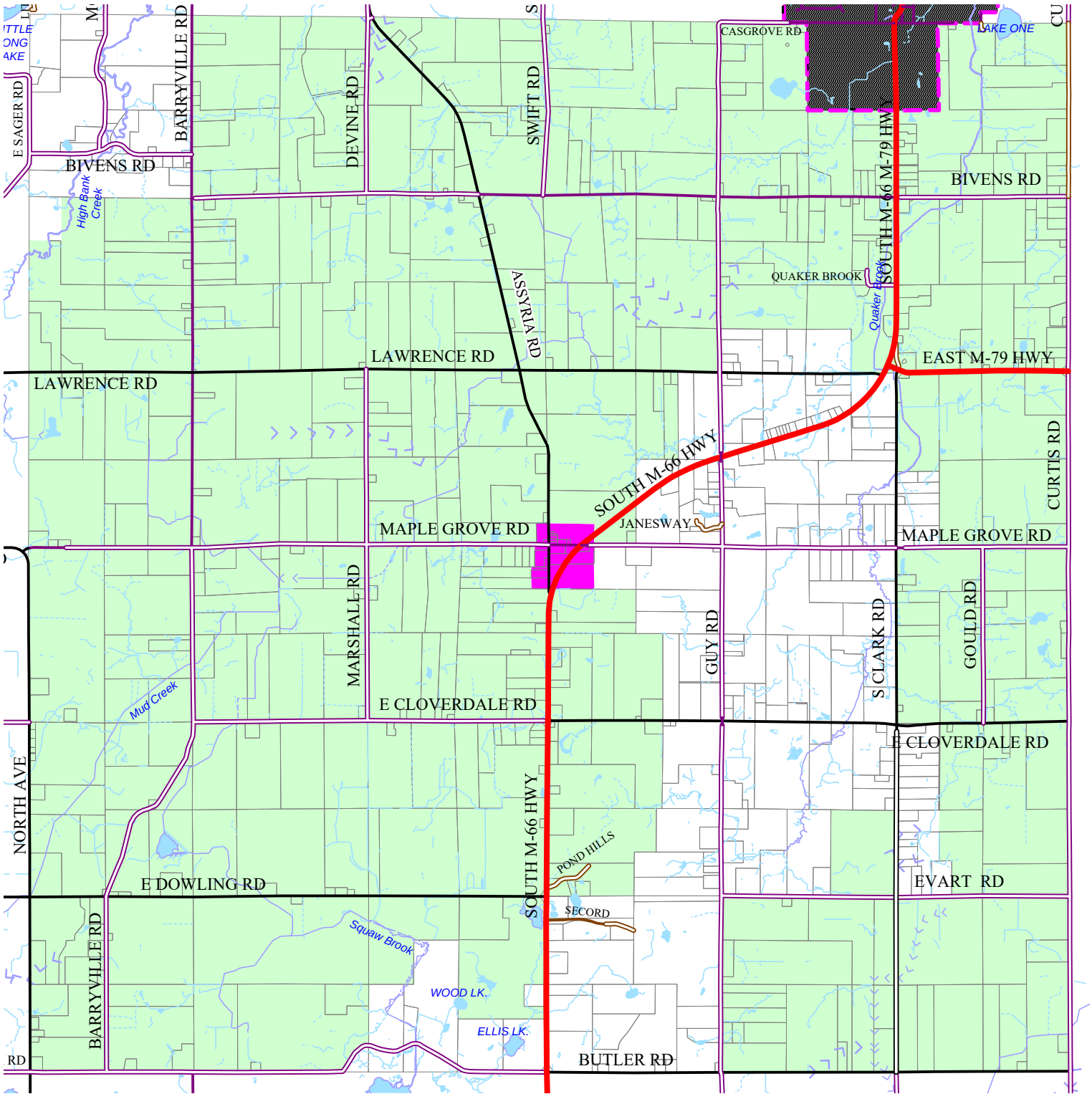
Barry County Zoning
Assyria, Baltimore, Barry, Castleton, Carlton, Hastings Charter, Irving, Johnstown, Maple Grove, Orangeville, and Woodland Townships
Barry County, Michigan
04/06/2017

- Agricultural
- Rural Residential
- Low Density Residential
- Moderate Density Residential
- Recreational Lakes
- High Density Residential
- Natural Lakes
- General Commercial
- Mixed Use
- Light Industrial
- General Industrial
- Conservation Reserve

N W E S

Scale
1" = 2000 '

Barry County Land Information Service
April 2017



Barry County Zoning
Assyria, Baltimore, Barry, Castleton, Carlton, Hastings Charter, Irving, Johnstown, Maple Grove, Orangeville, and Woodland Townships
Barry County, Michigan
04/06/2017

- Agricultural
- Rural Residential
- Low Density Residential
- Moderate Density Residential
- Recreational Lakes
- High Density Residential
- Natural Lakes
- General Commercial
- Mixed Use
- Light Industrial
- General Industrial
- Conservation Reserve

Maple Grove Township Zoning

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Scale 1:50,000

5.4 Structural Fires (Significant hazard)

Structural fires hazard is ranked as a Significant hazard. On January 25, 2020, a metal pole barn with cars, parts, and likely scrap tires caught fire that firefighters responded with several water tankers to aid in extinguishing this rural area fire.

The Michigan HMP of 2019 declares annual losses from major structural fires have cost $1M or more statewide with further development in the future to include greenfield development and urban development. The Michigan Hazard Analysis of 2019 states that structural and industrial fires combined have annual losses of $57M with the top priority hazard in Dearborn, Michigan in 1999, at an industrial plant explosion.

A few structural fires in Barry County are listed below; however, due to lack of data, actual costs and causes of the fires were not always identified:

Year	Structural Fires	Cost
2022	Buskirk Lumber Commercial Building, Freeport	Not Reported
2021	The Royal Coach Building, Hastings (arson)	$20,000
2021	Cobb Lake near Yankee Springs	Not Reported
2021	Residential, Hastings (generator)	Not Reported
2021	Middleville	Not Reported
2020	Metal Barn, Hastings Township	Not Reported
2020	Old Hastings Manufacturing building, Hastings	Not Reported
2020	Abandoned Home, Hastings	Not Reported
2018	Thornapple Township	Not Reported
2017	Bradford White Corp, Middleville	Not Reported

Firefighters from other counties and townships, and Michigan State Police, respond to each structural fire to aid in extinguishing these fires. Some structural fires have caused power outages to nearby public schools, homes, and businesses.

5.5 Infrastructure Failures (Low hazard)

Infrastructure failures are ranked as a Low hazard. The National Cybersecurity & Infrastructure Security Agency defines infrastructure failure as primary or corollary events to other incidents, that can be a hazard to communications, health, mobility, power, water, and sewer, mainly, utilities and transportation, and has a written National Infrastructure Protection Plan (NIPP). The causes of infrastructure failures include damage to construction, underestimated design flaw for extreme primary events, or aging and deteriorating systems.

In 2021, high winds and thunderstorms left over 800,000 without power across Michigan, and more extreme weather events are a challenge to Michigan's infrastructure and appear to be increasing in number of events. The American Society of Civil Engineers gave Michigan a D+ grade for infrastructure, and a C- grade for energy grid with weather-related power outages increasing by 55% from 2000 to 2019 due to aging infrastructure.

Barry County's infrastructure includes dams, bridges, roads, as well as utilities. Private and public entities of a community must work together to recover as quickly as possible in the event of an infrastructure failure.

Subsequent sections of this HMP discuss dams, traffic–egress, hazardous materials transportation, extreme temperatures, and severe wind, as the primary factors that could potentially affect infrastructure.

5.6 Landfills

In Barry County, there are six landfills as listed below;

1) Waste Management, Inc. – City of Hastings Landfill (active) not listed in database.

2) Hastings City Landfill, (old) West State Road, Hastings, MI 49058, contamination in the Michigan EGLE database as a Part 201 site of Public Act 451 of 1994.

3) KAVCO Landfill in Prairieville Township, sealed by Michigan ELGE in 2001 with contaminants of dry-cleaner like volatile compounds, petroleum-type compounds, and PFAs, continued groundwater monitoring by Michigan EGLE. Residents use other drinking water sources other than groundwater in this area.

4) Historic landfill at Patterson Road/ M-179 in Yankee Springs Township (listed as Patterson Road Residential Wells, Patterson Road & Cobb Lake Road, Yankee Springs, MI 49348, with contaminants of dry-cleaner like volatile compounds, and petroleum-type compounds.

5) Misak Landfill, 1075 South Patterson Road, Yankee Springs, MI 49348, with contaminants of dry-cleaner like volatile compounds, petroleum-type compounds, and PFAs.

6) M-43/ Willitts Road in Carlton Township.

The State has programs in place to mitigate soil and groundwater contamination due to a release of hazardous substances (non-petroleum) and petroleum-related substances, inorganic substances (Michigan 10 metals), PFAs, and other contaminates. The Delton area has two Wellhead Protection zones that prohibit certain uses and practices that could potentially contaminate drinking water well supplies (i.e., municipalities use groundwater wells for Public Water Supply).

5.7 Dams (Low hazard)

Barry County has ranked Dams as a Very Low hazard. Barry County has fourteen (14) dams listed by the US Army Corp of Engineers, National Inventory of Dams (NID). The average age is 81 years old with 64% regulated by the State, and 14% are regulated by the Federal Agency because they provide hydropower. No dams are considered a High Hazard in Barry County, however, three are listed as Significant Hazard and the remainder are listed as a Low Hazard. A Significant Hazard is defined as, Disoperation or any failure results is no loss of human life, but will likely be disruptive to property, the environment, critical facilities, or others. In Michigan,

some dam failures have a corollary effect of algae blooms living along streams, lakes and rivers due to high temperatures and, though not toxic, can remain harmful to humans and pets and should be avoided.

The dams in Barry County are listed below:

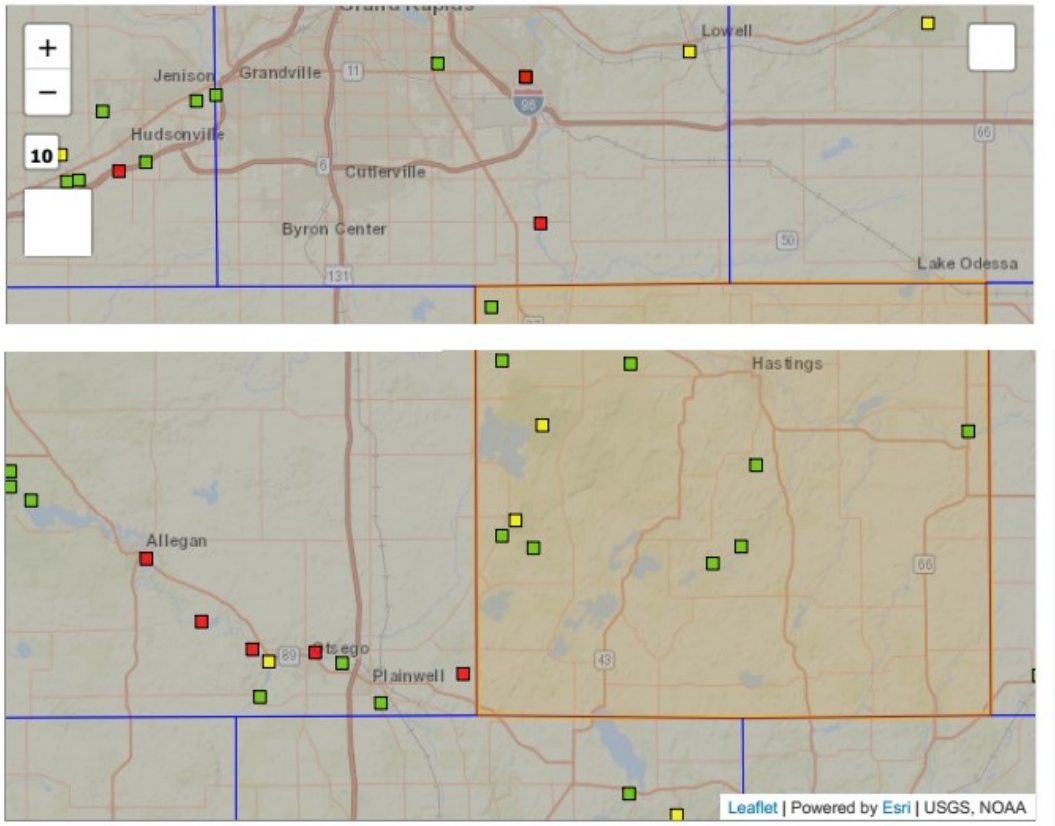
- Algonquin Lake Dam (**Significant Hazard**)
- Cedar Creek Dam (Cedar Lake)
- Nashville Dam (used only as a weir to promote aquatic habitat) owned by the Village of Nashville
- Orangeville Dam (**Significant Hazard**) (also called Mill Pond Dam)
- Bowen Mill Dam
- North Branch Cedar Creek Dam
- Lower Crystal Lake Dam (Crystal Lake Dam)
- Topski Dam
- Irving (FERC hydropower dam), Commonwealth Power Company is downstream from Thornapple Lake and has 3 dams: a power dam at the west end of a power canal, andtwo (2) flow control dams to the east. The dam failed in 2018 when a 60-foot stretch of embankment washed away. FERC was required to provide approval for repairs southeast of McCann Road between Hastings and Middleville.
- Middleville (FERC hydropower dam) Commonwealth Power Company W. Main Street crosses over Thornapple River.
- Canterbury Lake Dam (Bourdo Brothers Dam)
- Hall Lake Dam (**Significant Hazard**)
- Duncan Lake Creek Dam
- Albion

Low Hazard Potential is the disoperation or any failure that results in no loss of human life and minimal economic and environmental loss, with losses limited to the owner's property.According to the State Hazard Analysis (SHA) performed by the Emergency Management Division (EMD) of the Michigan State Police, Barry County has had three documented damfailures. The EMD also estimates there are four dams in the County that pose a "Significant Hazard" at the time of the writing of the SHA.

Nashville Dam (Village of Nashville) was on the Thornapple River and was removed in 2009; however, a weir still exists to promote fish habitat. Michigan DNR and other funding ($498,000) has allowed for removal of the dam and floodplain plantings to increase dissolved oxygen (DO) for the heath of fisheries to a 10.0 Daily Maximum by August 2012. The Crystal Lake Dam (Orangeville Township) and Irving Dam (Irving Township) were both concerns of local officials. The Federal Energy Regulatory Commission (FERC) inspects Irving and Middleville Dams since they both generate power.

The last year of inspection for the Significant Hazard dams was listed as June 2018, but the list may not be updated by the NID. FERC inspected the hydropower dams in August 2018, but again, the list by NID may not have been updated. The Drain Commissioner also inspects dams that are over 6 feet in height and creates an impoundment with a surface area of 5 acres or more subject to requirements of Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, PA 451 of 1994. All dams have a scheduled inspection with reports to be completed by Engineers and submitted to Michigan EGLE.

One dam poses a High Hazard and is in the neighboring county of Allegan County (Gunplain Township); Lake Doster Dam is west of Prairieville Township and is within 1 mile downstream of Barry County and the risk is 0 to low effect for Barry County residents. New national funding in 2019 allows funding for repairs to High Hazard Dams (but Barry County has none). Please see the USACE map of Barry County and the surrounding county dams below.



5.8 Combined Sewers–Drainage Pathways

The Drain Commissioner has plans in place to increase Watson Drain Drainage and to improve drainage that involves 11 lakes in Barry County. Combined Sewers carry both stormwater and sanitary wastewaters for treatment to the wastewater treatment plant. The Village of Nashville has combined sewers and, during heavy rainfall, a combined sewer may overwhelm the treatment capacity, resulting in a direct discharge of diluted untreated wastewater to Thornapple River. The County has deemed changing combined sewers as not feasible; however, the expansion of Watson Drain will improve drainage throughout the County ($6.675M).

5.9 Scrap Tire Fires/Piles (Low hazard)

Scrap Tire Fires are ranked as a Very Low Hazard in Barry County. On January 25, 2020, a metal pole barn with cars, car parts, and likely scrap tires, caught fire. Firefighters responded with several water tankers to aid in this rural area fire for extinguishing. The Michigan HMP of 2019 declares less than $100,000 annual loss from, specifically, scrap tire fires statewide, however, agrees that scrap tire piles are a technological hazard that should be addressed for not only fires, but for pest hazards.

Michigan Department of Agricultures (MDARD) issues emergency pest control 1 to 2 times per year in Barry County for various diseases that can affect both humans and animals; Eastern Equine Encephalitis (EEE) in 2021 was one such emergency, that is mosquito-borne that can breed in a scrap tire pile; rainwater can accumulate inside the tires and promote mosquito habitat. EEE can be 90% fatal in livestock (if not vaccinated) and 33% fatal in humans. The State has policies and regulations for management and disposal; earthen berms, distances to property lines, chemical treating, control of vegetation, proper storage, and training for emergency response operations.

Barry County holds several waste collections events for the public that include household wastes, scrap tires, and medicines collections each year that take place in the Spring and Fall with fees waived for cars, truck, and tractor tires.

5.10 Civil Disturbances (Very low hazard)

Barry County has added civil disturbances with a rank of Very Low hazard. A civil disorder incident is usually considered when three or more people are involved in the unrest. Planning for civil disturbances is required under the National Fire Protection Association Standard 1500, according to FEMA. A civil disturbance is defined as an incident which disrupts a community and requires intervention to maintain public safety. Civil disturbances, while rare, can include injury, property damage, crop damage, substance abuse, and, in extreme cases, even death. Causes of civil disturbances can be due to social stressors, such as the recent pandemic, social issues, quality of life, and many more. CDC and NIOSH have more dramatic definitions of civil disturbance. According to FEMA, first responders, police, firefighters, and EMS professionals can be in harm's way and experience serious injury and fatalities, while responding to civil

disturbances that have escalated beyond the community resources [Source: Mitigation of Occupational Violence to Firefighters and EMS Responders, 2017]. https://nfa.usfa.fema.gov/pdf/efop/efo248668.pdf

From 2001 to 2020, 69 instances of civil unrest occurred in the U.S., which does not count riots in a correctional facility, involving groups of people of a united confrontation, who invoke the community; 14 were at sports events, 12 are related to parties, 29 are political and economic-related, and 17 have occurred during confrontations with law enforcement.

During the 1992 riots in Los Angeles, many attempts to harm firefighters and paramedics were documented in the first three hours with nine fire engine trucks destroyed, and serious injuries. An underlying philosophy exists that values protection of free speech rights, tolerance for some disruption, de-escalation, and avoidance of law enforcement, unless absolutely necessary, to maintain public safety and order. Two of the 69 civil disturbances were reported in Michigan, one in 2003 in Benton Harbor, Michigan, and one in 2020, that became nationally known involving a resident of Barry County.

6.0 MANMADE HAZARDS

6.1 Terrorism/ Sabotage (Small Scale) (High hazard)

According to the 2019 Terrorism Risk Insurance Report, globally, 230,000 people lost their lives to terrorism in the last decade, however, that number decreased in 2018 by ¼. On the rise is near-work place terrorist incidents that are a growing concern for employers and communities.

In 2002, FEMA published, "*Managing the Emergency Consequences of Terrorist Incidents; Interim Planning Guide for State and Local Government*," in response to the incident of the 9/11 attack on the Pentagon, New York and Washington D.C to provide a perspective on issues and protocols that need to be incorporated into the planning process. Our country has seen other attacks on federal buildings and public schools that also are provided as acknowledgements in the 2002 FEMA guidance. According to the SHA, terrorism hazards may include:

- Bombings
- Information warfare
- Ethnic/ religious/ gender intimidation, or hate crimes
- State and local militia groups that advocate the overthrow of the federal government
- Eco-extremism, or attempting to destroy or disrupt specific research or resource-related activities
- Premeditated attacks on schools, workplaces, transportation systems or other facilities of public assembly
- Organized criminal activities

Terrorism is unpredictable, though the County can be prepared to mitigate certain situations. Small Scale Terrorism is an intentional event to cause harm and even death to specific targets and to a premeditated extent using weapons, and chemical and biological agents. Any public facility or infrastructure can be vulnerable to a small-scale attack, especially businesses engaged in controversial activities, and public and private computer systems are potential targets. Also, large events of recreational and cultural nature are especially vulnerable and attract people from outside the County.

A public event, held many times a year, can attract large gatherings of over 2,500 people in Barry County. In Hastings Township, Charlton Park holds several large events, consisting of crowds of up to 22,000 people, and the County Fair draws a large crowd of 12,000 people every year. Significant losses could occur during these events in a premeditated terrorism attack with no warning. Types of small-scale terrorism can be in the form of the following in Barry County:

- Agriterrorism, contamination of food, food supplies, crops, introduction of disease agents, pests, or harmful means to harm crops and livestock,
- Airport terrorism, hijacking of an airplane, airplane theft or flight training can lead to a terrorist attack,
- Hazardous Material Release, release into the soil, gaseous, or liquid contamination, even leading to explosions and fire,

- Explosives, detonation of any device of varying sizes,
- Arson/ Armed Assault, and
- Water Supply Pollution contaminates into a local water supply and can have extended hazard duration (Hastings, Middleville, Nashville, Gun Lake, Freeport, and Delton have municipal water supply)

The Strategic National Stockpile Program (SNS) was developed to respond to small scale terrorism and Public Act 12 of 2014 amends the Fire Prevention Code to modify school drill requirements, to adopt and implement practices and must hold six fire drills, two "lockdown" drills, and at least one tornado drill per school year to aid in prevention and preserve health and life in such an incident.

6.2 War/ Nuclear Attack/ Weapons of Mass Destruction (WMD) (Large Scale) (High hazard)

In 1961, President John F. Kennedy had a solution for nuclear war; fallout shelters. In the 1950s and 60s public schools, even elementary schools, were built with basements for use only as a fallout shelter with symbols on access doors that have since been torn down, or are no longer in use. Barry County is not a major population center and is not home to a major political, cultural, or controversial economic symbol, the potential targets of an international-profile terrorist attack or war in Barry County are slight. The large-scale terrorism hazards listed in the FEMA guidance of 2002 are:

- Weapons of Mass Destruction (WMD) Hazard Agents, poisonous chemicals, disease organisms, radioactivity, explosives, combination of hazards.
- Low-Tech Devices and Delivery
- Infrastructure Attack (electric power, oil and gas fields, banking and financing, telecommunications)
- Cyber Terrorism, malicious use of information technology

Public service buildings in Barry County still could be a potential target; County Court offices, local schools, the County jail, water supply facilities, the Spectrum Health Pennock Hospital, and the Hastings City/Barry County Airport.

Potential costs from losses are difficult to estimate on vulnerable structures, however, the value of real and personal property for these facilities may provide an approximate base estimation using today's inflation rate:

- Barry County Courthouse - $4,542,853
- Barry County Courts and Law Offices - $9,238,136
- Barry County Sheriff Dept/Jail - $4,024,441
- Water Supply Facilities;
    - Village of Middleville - $6,311,173
    - City of Hastings - $12,622,346
    - Village of Nashville - $3,155,586
- Spectrum Health Pennock Hospital and Equipment - $157,779,323
- Hastings Airport 9D9 - $473,338 (Hangars and Administration Building)

If there were a large-scale attack on nearby highly populated cities, such as Chicago and Grand Rapids, Barry County may experience corollary effects with inbound migration for those evading an attack. Chicago and Grand Rapids are home to large corporations, entertainment icons, and may have damage to economic, and cultural effects.

FEMA Downwind Effects - 50 mile

In July 2013, FEMA increased downwind effects from a Nuclear Power Plant to 50 miles (ingestion exposure pathway) for the Emergency Planning Zone (EPZ) which ranges 10 miles into Barry County at the southwest corner (Prairieville Township) from Palisades Nuclear Power Plant, Covert, Michigan (40.59 miles WSW of Barry County).

Palisades is a one-unit, pressurized water reactor rated at 789-megawatt capacity with an estimate of 1,440,338 population affected by an EPZ incident that includes Barry County (2007 FEMA estimates). A failure of Palisades could potentially impact 9,000 people in Barry County (Please see Barry County 10-mile impact map):

- Prairieville Township – 3,520 population
- Orangeville Township – 3,469 population
- Cloverdale – 1,000 population
- Delton – 872 population
- Hickory Corners – 159 population

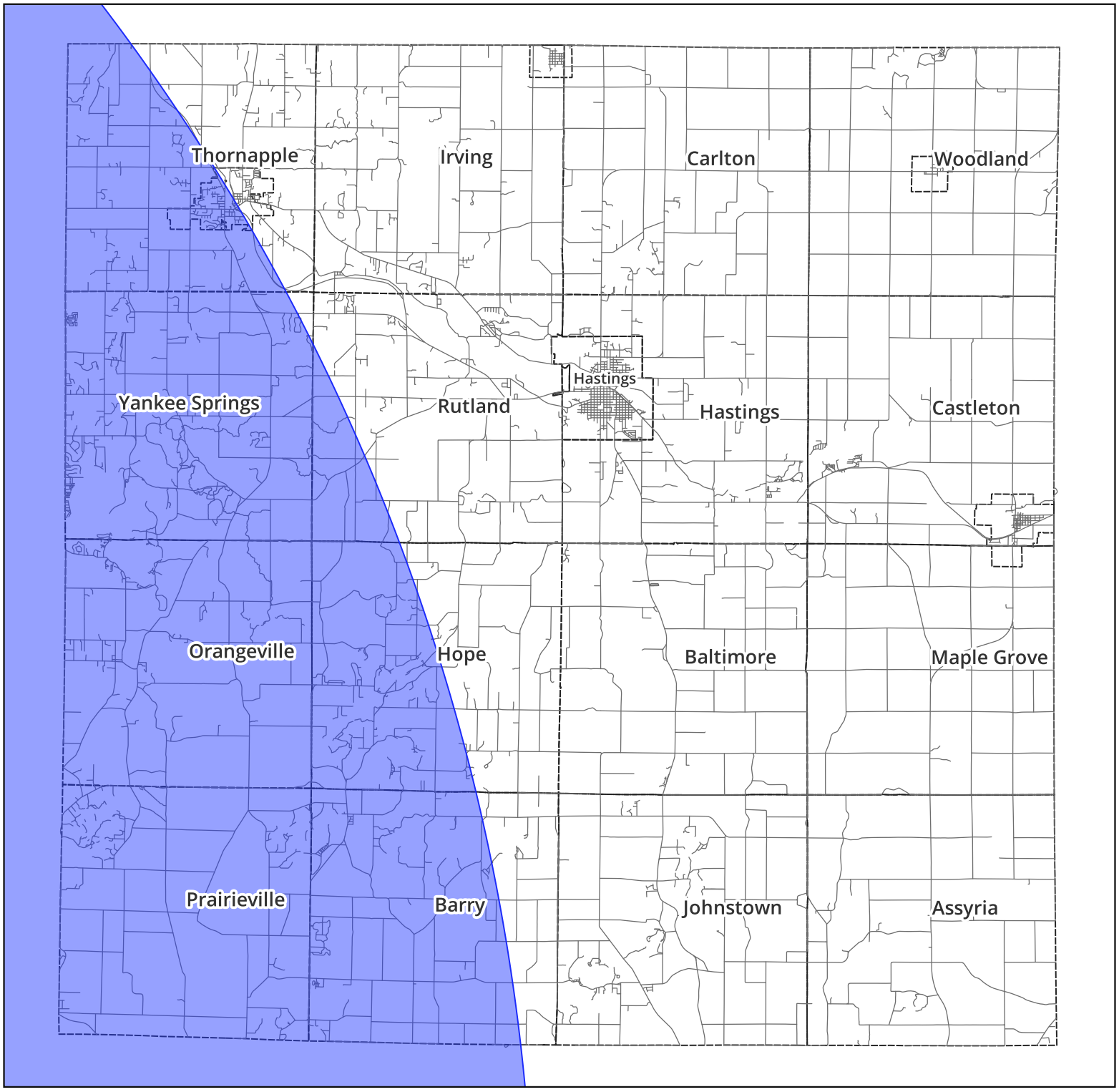
On February 27, 2015, the Nuclear Regulatory Commission (NRC) increased oversight to the Palisades Nuclear Power Plant due to a clerical error, that did not result in any harm, and in 2005, the plant petitioned to continue operations for another 20 years. Donald C. Cook Nuclear Plant in Bridgman, MI (Cook), is not within the 50-mile range to Barry County being further south along the Lake Michigan shoreline. Cook comprises two pressurized water reactors; one rated at 1,020 megawatts, and the other at 1,090 megawatts that would impact an estimated 1,328,075 population if a failure occurred (2007 FEMA estimates). A potential hazard from these two nuclear facilities would include pollution and radiation because Barry County is downwind from them. The Michigan HMP of 2019 states that less than $100,000 annual loss with few occurrences for Michigan's three (3) Nuclear Power Plants.

6.3 Livestock Operations (Very low hazard)

Michigan is the number two dairy-producer in the US. Dairy Farms are 24% of Michigan's Agricultural Revenues ($15.7B). Barry County is home to Dairy Farms and livestock operations in the Village of Freeport, Johnstown Township, and Prairieville Township with approximately 8,000 and more cows in the area. The cattle/cow industry is regulated by the State and provides NPDES permits that increases crops to agriculture farms but can produce waste by runoff (especially in sandy soil). The State limits the waste disposal in certain winter months, under Concentrated Animal Feeding Operations (CAFO), and farmers must have 6 months of storage capacity. Barry County's acreage of fertilized land is between 50,000 to 100,000 acres and is surrounded by counties with 100,000 to 300,000 acres fertilized land. Michigan Department of Agriculture and Rural Development (MDARD) updates the Right to Farm program annually to aid and protect farmers from complaints and provides generally accepted practices.

Palisades Nuclear Plant 50-mile Buffer

Barry County, Michigan



Barry County Land Information Services
09/21/2021
NAD_1983_StatePlane_Michigan_South_FI

The hazard from fertilizer and dairy wastes is nitrates, nitrites, and other contaminants that can accumulate and infiltrate into drinking water aquifers. Growing trends from 2007 to 2017 showed an increase in nitrates and nitrites (indicators of nitrogen) to over 5 milligrams per liter (mg/L) Nitrates in drinking water well sources. Approximately 30% of drinking water wells in Barry County have exceeded limits for nitrates/nitrites (over 10 mg/L Nitrates and over 1 mg/L Nitrites) according to the Barry-Eaton Health Department and is approaching these limits in many more water wells.

Since 2016, *Barry Conservation District* has been reducing nitrogen, phosphorous, Biological Oxygen Demand (BOD), and sediments annually. BCD's Annual 2020 Report provides a reduction in nitrogen by 22,952 lbs., phosphorous by 6,314 lbs., BOD by 72,584 lbs., and sediments by 1,342 tons along the Thornapple River Watershed. The reductions in waste are ongoing with a 10-year plan that has over $17M in funding that 38% (or $6.5M) will be spent on the Thornapple River Watershed Management Plan (TRWMP) to continue improving the natural resources of Barry County, including aquifers, fishing habitat, and many other benefits. The funding is 40% Federal, 44% State, and 8% County contributions.

To recap from flooding, the Thornapple River Watershed covers 80% of Barry County and 11 of the 24 sub watersheds are sub-Thornapple River Watersheds that range through Barry County, East to West sub watersheds:

1. Headwaters of Mud Creek -start of the subwatersheds
2. Mud Creek (409 acres and 30 feet deep)
3. Thornapple Lake
4. Quaker Brook
5. Butler Creek
6. High Bank Creek (Fine, Mill, Long and Bristol Lake chain)
7. Cedar Creek (Wall Lake)
8. Fall Creek (Jones, Wilkinson, Cloverdale and Long Lake chain)
9. Glass Creek (Guernsey Lake)
10. Algonquin Lake (on Sand Creek)
11. Turner Creek
12. Duncan Creek (Duncan Lake)

The Glass Creek watershed has an annual groundwater recharge from infiltration at a rate of 12 to 22 inches with the remaining watersheds in Barry County at 7 to 11 inches annually. Glass Creek is more vulnerable to contamination due to a higher rate of infiltration. Most impacted subwatersheds were reported to be Turner Creek, High Bank Creek, Algonquin Lake, Cedar Creek, and Quaker Brook [Source: TRWMP, June 2016, p.12].

Methods of reducing nitrates, nitrites, and nitrogen in soil and groundwater includes, no till, reduced till, and cover crop methods, which are practiced by farms in Barry County. In Barry County, 16% are no till, 14% are reduced till, and 8% are cover crop, and in using these methods allows for the land to recover from over fertilizing and further protection of natural resources. Thus, Barry County has implemented action strategies to reducing nitrogen in the environment.

6.4 Agricultural Pesticides

Agricultural pesticides are not ranked; however, agriculture is a large industry in Barry County with data to aid other ranked hazards. Agricultural pesticides and herbicides were mainly used in potato and cotton crops in 1960 to 2008 (in general), and trends in pesticides have increased for corn, soybean, and wheat, as well, by the 1980s, due to economic factors influencing pesticide use.

Barry County has 157,624 acres of farmland (2017 report of USDA):

- 4,901 acres are irrigated farmland (3% of total farmland)
- 48,000 acres of crops (31% of crop farmland)

The Agriculture Promotion Board oversees Barry County's agriculture preservation program, which protects farmland from development, ensuring its economic, ecological, and cultural benefits for future generations. Agricultural pesticides and herbicides are used on farmland throughout Barry County, which is mapped on the following page (Land Cover for Barry County, MI). Agricultural lands in the County are mainly used for corn for grains, corn for silage or green chop, oilseeds, dry beans (soybeans), and dry peas, nurseries (greenhouse, floriculture and sod), and for other crops and hay.

Pesticides and herbicides are necessary in rural communities. A pesticide is any substance meant to destroy, mitigate or prevent a pest. Mosquitos play a role in the use of pesticides due to the outbreak of diseases spread by them to animals. In 2019 and 2020, MDARD issued an emergency rule for pesticide-use to fight a disease that can impact both human and animal health. Pesticides can infiltrate into the environment by rainwater run-off, accidental application, irrigation and wind transport. If improperly managed, pesticides can pose risks to the environment effecting water quality.

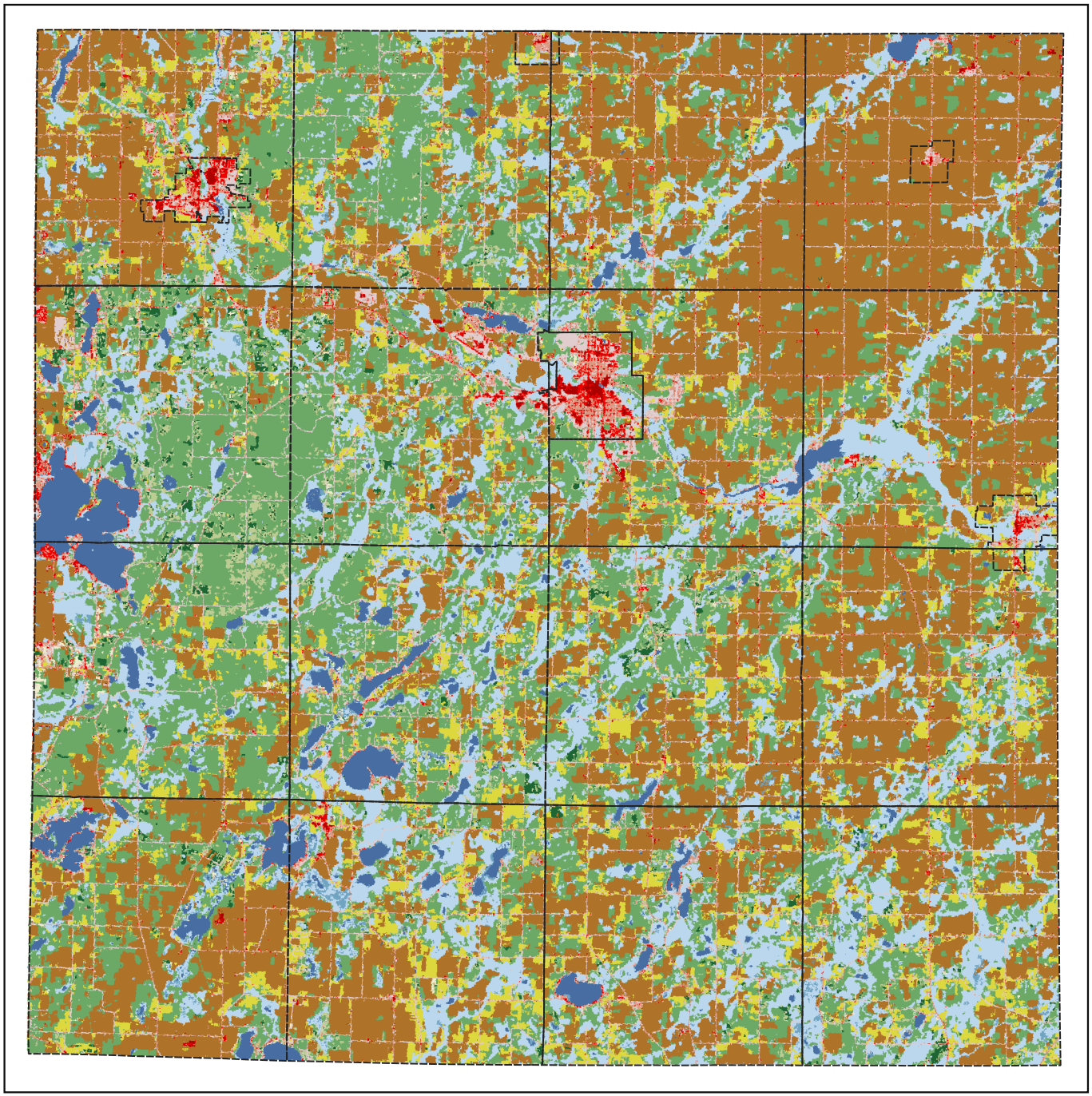
6.5 Pandemics (Significant hazard)

According to the Center for Disease Control and Prevention (CDC), a pandemic is a global outbreak of a new (or novel) virus (usually influenzas) emerging which is able to infect people easily and spread from person to person in an efficient and sustained way and very few people have an immunity against the pandemic virus with a capacity for causing illness and even loss of life. The United States is currently not experiencing an influenza pandemic, rather, there is an ongoing pandemic to the novel coronavirus (COVID-19) and subsequent variants (alpha, and delta variants).

Should the United States experience an Influenza A virus pandemic, the Influenza A can change in two different ways; 1) Antigenic drift, which are small changes or mutations in the genes of the influenza virus which humans may be able to build an immunity from existing antibodies, and 2) an Antigenic shift (can be animals to human infection), meaning abrupt, major change in an influenza A virus that can result in the emergence of a new influenza virus where no immunity is built. In 2009, the H1N1 virus was a potential pandemic threat to the United States, fortunately, this did not happen, but gave the US a heads-up on potential pandemics and governments and

Land Cover

Barry County, Michigan



NLCD 2019

- Open water
- Perennial ice
- Developed, open space
- Developed, low intensity
- Developed, med intensity
- Developed, high intensity
- Barren land
- Deciduous forest
- Evergreen forest
- Mixed forest
- Dwarf shrub
- Shrub/scrub
- Grassland
- Sedge
- Lichens
- Moss
- Pasture/Hay
- Cultivated crops
- Woody wetlands
- Herbaceous Wetlands

0 2 4 mi

Soruce: National Land Cover Database
mrlc.gov/

Barry County Land Information Services
08/03/2021
ESRI:102690

businesses developed critical/ essential preparedness plans to identify critical personnel and essential activities to maintain business and public safety at minimal staffing and operations.

On March 27, 2020, FEMA declared a Michigan COVID-19 Pandemic Disaster (DR-4494-MI), a pandemic was identified on January 20, 2020, and the public was notified. As of August 2022, twenty-five percent (25%) of Barry County residents have been diagnosed with COVID-19, and 10 deaths have occurred. The initial reaction to the novel coronavirus was testing individuals for the virus at local testing stations or areas in a manner to not spread the disease at these testing centers; drive-thru testing, social distancing, wearing facial masks and other PPE (gloves, face shields). Then, the response progressed to limiting "traffic" through grocery stores, restaurants, gyms, and public schools and governmental buildings were not allowing in-person visits and many relied upon virtual visits and online computer communications to provide social distancing to prevent the spread of the coronavirus. Other practices included social distancing (6 feet), washing hands frequently, using hand sanitizer, wearing masks, and later, vaccinations to inhibit exposure and the spread of a virus, and limit effects of the disease.

The cost of this devastating pandemic in Michigan is listed on FEMA as follows, as of July 29, 2021):

Individual Assistance Approved -	$ 28,659,756.73
Public Assistance Grants -	$400,110,215.03
Hazard Mitigation Assistance (Hazard Mitigation Grant Program (HMGP) -	$0

Barry County had an unemployment rate of record high at 22.0% in April 2020 due to the pandemic and the shutdown of many business and public services (schools and government), and recovery is happening with unemployment at 4.6% in May 2021. As of July 29, 2021, 42.07% of the population in Barry County is fully vaccinated, against the COVID-19 virus. No counties are 100% vaccinated most likely because of availability of the vaccine or choice. Neighboring counties are in the process of a fully vaccinated population (July 29, 2021);

Allegan County	43.53%
Calhoun County	39.83%
Kalamazoo County	51.11%
Ionia County	39.66%
Kent County	51.60%
Eaton County	48.72%

Long-term effects of the COVID-19 pandemic are still being felt across the country. The Pandemic of 2020 is still affecting response time and business and government in 2021 due to a lack of personnel and availability of products; for instance, roadways in Barry County could not have dust control due to a lack of truck drivers in June 2021. In June 2021, reports in the media have stated that availability and delay of retail consumer goods will be affected by the pandemic and many business closures happened in the first half of 2020; motor vehicles and parts, furniture and home stores, electronics and appliances, building materials (lumber) and equipment, food and beverages, health care and personal products, cleaning supplies, clothing, and many other products.

7.0 MITIGATION PLAN

The Mitigation Plan addresses the hazards identified for Barry County and a planning process for implementing Goals and Objectives and Action Strategies to reduce or eliminate business losses, loss of life, property, and functions due to any of the hazards in the HMP. Not all hazards were identified for an Action Strategy for this HMP, rather, a selection of action strategies are presented based on the education of the public, regulatory codes such as zoning and ordinances, cooperation with state entities, and acquisition/ relocation to flood-prone areas.

7.1 Goals and Objectives

The 2005 HMP established the committee, and since, hazards have been addressed, and much progress for mitigation is documented in this update. The most effective goal statements will be in a positive term, realistically achievable, and reflect a consensus. Barry County has over 90 plans and over 100 programs, including Capital Projects, Special Assessment Capital Projects, and General, and will include Capital Improvements and local ordinances to implement the HMP.

7.1.1 Severe Winter Weather (High hazard)

In 2021, Barry County experienced a severe winter storm that impacted parts of the County for 15 consecutive days without electrical power.

7.1.1.1 Goals of Severe Winter Weather Mitigation

The goal of this HMP is to improve response times and recovery from severe winter weather hazards; blizzards are the deadliest. This HMP will effectively protect the lives, economy, and health of people in Barry County, and prepare the community for a severe winter weather condition.

7.1.1.2 Objectives of Severe Winter Weather Mitigation

The objectives of severe winter weather mitigation are as follows:

a) Work with local jurisdictions to prepare emergency plans to define the capacity of County and local government to save lives, prevent injuries, protect property, and maintain and support for the jurisdictions' residents.

b) Promulgate self-protection measures to mitigate the effects of hazards on private property. Research Resilient Structures, and implement new policies of buildings.

c) Improve strategies for jurisdictions to snow plow and augment cost effectiveness measures in areas with sensitive population (elderly and disabled).

d) Winter warning system, usually through the news, is in place to provide an immediate warning or at least a 24-hour warning and what to do for precautions.

e) Wind chill temperatures and winter storm watches are usually issued through weather stations or the news.

7.1.2 Extreme Temperatures (High hazard)

Michigan is within the humid climate and while the summers are not as warm, the humidity can be a factor in the heat index in Barry County (Appendix G Heat Stress/ Heat Stroke/ Cold Stress). Data on physical damages to infrastructure during extreme temperatures includes buckled roads, failed bridges and railroad tracks, utilities, and home damage.

In May 2022, MDOT has completed rebuilding a 1959 bridge over Battle Creek River in Eaton County along Ainger Road that will provide loaded truck transportation into Barry County; part of a $210M investment to rebuild the I-69 through the Rebuilding Michigan Program using MTF dollars.

7.1.2.1 Goals of Extreme Temperature Mitigation

Educate the populous on the dangers of extreme cold (cold stress, frostbite) and extreme heat (Heat Stress, Heat Exhaustion, and Heat Stroke) and the dangers posed by this hazard to protect and for prevention.

7.1.2.2 Objectives of Extreme Temperature Mitigation

The objectives of extreme temperature mitigation are as follows:

a) Develop and promulgate educational materials on identifying danger symptoms, the hazards, corollary effects, and mitigation techniques of extreme temperatures.

b) Organize an outreach to vulnerable populations during extreme temperature periods, including fostering awareness of accessible heating and cooling centers within Barry County.

c) Encourage families to develop a family disaster plan that includes preparation of a disaster supply kit. Resilient Structure funding will be researched for residents.

d) Seek grants and other funding and implement resultant programs to educate and assist farmers of devastated crops due to severe weather conditions.

7.1.3 Thunderstorms

Natural hazards associated with thunderstorms for Barry County are:

- Tornadoes-high hazard,
- lightning strikes-significant hazard,

- severe wind (straight-lined winds, called, Derecho)-significant hazard, loss of $12M since 1997, and
- hail-significant hazard, loss of $40,000 in 2006.

The County thunderstorm damage estimate to present year would be equivalent to $25M in property damage in today's property value.

7.1.3.1 Goals of Thunderstorms Mitigation

The goal of this HMP is to improve notification time of an oncoming thunderstorm event; tornadoes, lightning strikes, severe wind, and hail, and to reduce impact from a thunderstorm event.

7.1.3.2 Objectives of Thunderstorms Mitigation

The objectives of thunderstorms mitigation are;

a) Work with local jurisdictions on a method of notification; sirens are in high density population, and the NOAA weather app can provide notification to rural areas ($20/monthly IOS or Android). LEPC, District 7, District 6, and District 1 seem to have a higher incident of tornado. District 3 has a higher incident of lightning strikes. Districts 2, 4, and 5 have a higher incident of severe wind.

b) Work with local jurisdictions on upgrades for new construction to withstand high winds.

c) Study grants that provide upgrades; BRIC (federal grant of $1.16B awarded FY 2021 with $700K in MI), ATRs that detect powerline problems (State of Michigan-$5.4B funding), and state funding for home upgrades for a safe room in residential homes (new funding).

d) Educating the public on lightning mitigation; safety, protect yourself in a lightning storm, surge protectors for electrical appliances, smoke alarms (house fires at night from lightning-NFPA statistics), First Aid, water activities, and keep away from electrical outlets and running water.

7.1.4 Industrial and Hazardous Substances Transportation (High hazard)

7.1.4.1 Goals of Industrial and Hazardous Substances Mitigation

Protection for people and property from a hazardous material transportation incident. An oil tanker roll over can cost $100K to $170K for environmental cleanup of each incident with a duration of 2 months for cleanup completion, if a ditch is impacted with petroleum fuel that requires booms to control spreading of fuel (usually paid by insurance firms).

7.1.4.2 Objectives of Industrial and Hazardous Substances Mitigation

The objectives of industrial and hazardous substances mitigation are as follows:

a) Develop a Regional Transportation Plan in cooperation with the County Road Commission and Michigan Department of Transportation (MDOT) to identify heavily trafficked roadways and to propose a rerouting scheme so that substantial shipments of hazardous materials avoid significant population and critical facilities. $210M project to increase the I-69 has completed a 1959 bridge reconstruction in May 2022 to reroute trucks through Barry County as part of the MTF $22M/annual program.

b) Create public/private partnerships, where the County and various corporations agree regarding the routes of heavy vehicles transporting hazardous materials.

c) Use planning and zoning within local municipalities to minimize the impact of potentially hazardous industry by using buffers, landscaping, and performance standards, especially near residential areas and critical facilities. Such plans should be incorporated into the Master Plan.

d) Construct additional Class A roads, where appropriate, to lessen truck traffic on major thoroughfares.

7.1.5 Terrorism/ Sabotage (Small-Scale) (High hazard)

7.1.5.1 Goals of Terrorism/ Sabotage

The goal of this hazard is predominantly preparedness because this hazard has no warning. Since 1941, terrorism and sabotage have been difficult for the federal government to provide a policy to plan and fund with a history of differing philosophies, depending on the president. Civil defense, protection and prevention is considered a local government responsibility, although the federal government can supply equipment and suggest a plan for mass evacuation. Mass evacuation is plausible with a warning; shelters are more plausible without a warning in a small scale or large-scale attack. Both measures, mass evacuation verses shelters, cost the county. Local measures include morale maintenance, promotion of volunteer involvement, nutrition, physical education, air raid drills, black outs and sand bag stockpiling, according to the 1941 establishment of the Office of Civilian Defense.

7.1.5.2 Objectives of Terrorism/ Sabotage Mitigation

The objectives of terrorism/sabotage mitigation are as follows:

a) Review a plan to alert residents to take cover or shelter; review existing gaps in siren coverage; Six sirens are located in Barry County (i.e., in Freeport, Hastings, Middleville, Orangeville, Woodland, and Gun Lake State Park) and testing occurs in April through October at 1:00 pm on the first Saturday of each month. Android and iOS phone systems have apps available, locally ($20/month iOS or Android).

b) Establish and solidify a network of trained volunteers throughout the jurisdictions and hold drills periodically. Meet bi-monthly to discuss new ideas on how the unit can prepare for an attack.

c) Seek grants to fund improvement to respond to this hazard; mass evacuation plans and/ or shelters. State has new grants for resident safe room ($25K residential and $500K commercial with cost share); CDBG, HMGP, and Pre-Disaster Fund.

d) Include a HAZMAT team that is trained in mitigation of a biological hazard attack; Spectrum Health Pennock Hospital has a HAZMAT program for decontamination. Barry County has 16 HAZMAT teams trained for potential incidents.

e) Prepare a mobile readiness response and command center with pre-designated personnel and provide a list of personnel and contact information; communication between jurisdictions; Spectrum Health Pennock Hospital has an Emergency Response mobile unit.

7.1.6 War/ Nuclear Attack/ WMD/Nuclear Power Plant Failure (Large Scale) (High hazard)

In Michigan, the MSP, Critical Incident Management System (CIMS) will respond to a FEMA National Incident Management System (NIMS), a part of the Incident Command System (ICS), through the Integrated Public Alert & Warning System (IPAWS), and notify local municipalities via the State Emergency Operation Center (SEOC) in Lansing, MI. The MSP will work with local requests through CIMS and coordinate with FEMA state representatives.

Four factors exist to prevent and mitigate a nuclear incident:

1. Prevent and Mitigation
2. Preparedness (Hazard Mitigation Plan (HMP) and Emergency Operation Plan (EOP))
3. Response (Training & Residents Education)
4. Recovery (shelters for people - sites) and network with the state.

7.1.6.1 Goals of War/ Nuclear Attack/ WMD/ Nuclear Power Plant Failure Mitigation
In the event of a large-scale war incident or Palisades Nuclear Power Plant failure, damage to public and private property will be minimized, residents will be protected from injury, and essential services will be maintained.

7.1.6.2 Objectives of War/ Nuclear Attack/ WMD/ Nuclear Power Plant Failure Mitigation
The objectives for mitigating war or nuclear incident are as follows:

a) Annually, review the local access to MSP SEOC or notification system to determine adequacy in the event of an incident to notify the population.

b) Review the local access alert system to Palisades Nuclear Power Plant, Covert, MI, due to the 50-mile downwind impact and establish a chain of command.

c) Evaluate the adequacy of existing shelters throughout the County, Capital Improvments.

d) Work with local municipalities to develop and promulgate policy for insertion into building codes and other regulatory documents that require new public structures and buildings to

include adequate shelter areas. State has new grants for residential and commercial safe rooms ($25K-$500K with cost share).

e) Implement a siren improvement program for existing siren coverage, since an incident could wipe out digital communications (cell phones, satellites).

7.1.7 Structural Fires (Significant hazard)

7.1.7.1 Goals of Structural Fires Hazard

The goals for structural fires hazard are to provide public safety, preserve property (reduce the number of properties affected in an incident) and crops, and protect and recovery. During dry seasons, wildfires have an increased potential to spread to other structures and fields, due to high winds and available tinder.

7.1.7.2 Objectives of Structural Fires Hazard

The objectives of structural fires hazard are specific, measurable, attainable, relevant, and time sensitive and include:

a) Uphold emergency drills for the public schools; 6 fire drills per year, two “lockdown” drills per year, and at least one tornado drill per year.

b) Maintain training and lines of communication with emergency responders to the public throughout the County to help prevent an incident. (First Response 911 dispatch, police, fire, hazmat, EMS)

c) Provide warning and evacuation (role of the local government), situation assessment, local agency coordination.

d) Request for mutual aid (other counties) or for State Assistance (State’s role to provide technical assistance). CDBG, HMGP, and EMPG grant programs can provide aid for reinforcing wood frame structures with concrete ($25K-$500K with cost share).

7.1.8 Floods (Significant hazard)

7.1.8.1 Goals of Flood Mitigation

The goals for flood mitigation include education in loss of property, elimination of repetitive loss from floods, and improve egress. Growth via development has occurred in Thornapple Township and Irving Township due to the proximity to the large city of Grand Rapids that is 8 miles from Barry County. Barry County has experienced $7M in flooding damage from 1996 to 2019 (State HMP of 2019). Repetitive losses have occurred in Districts 3, 4, 5, and 6 with the most in District 5 (37 out of 43 repetitive losses) found from 1979 through 2021.

From 2014 to 2019, Barry County has been the recipient of $343,076 grant funds for hazard mitigation projects ($256,124 federal share):

- Hazard Mitigation Grant Program,
- Flood Mitigation Assistance program,
- Pre-Disaster Mitigation program, and
- Repetitive Flood Claims program (no longer exists).

Thornapple River Watershed has an approved Management Plan that was developed by *Barry Conservation District* in June 2016 and is approved by the State, therefore is eligible for grants from Michigan EGLE (i.e., Non-Point Source (NPS) program).

7.1.8.2 Objectives of Flood Mitigation
The objectives for flood mitigation include planning mechanism; local ordinances:

a) Barry County has established an ordinance, *Barry County Zoning Ordinance*, adopted on 7/8/2008, *Article Twenty; Flood Hazard Overlay*, per FEMA (published in the Federal Register, Vol. 41, No. 207 10/26/1976), to allow for development while maintaining a base flood elevation (BFE) of 1-foot to prevent new development flooding, annually. Base flood is defined in the ordinance as *"a flood having a one percent (1%) chance of being equaled or exceeded in any given year."* This objective is to establish an ongoing Floodplain Acquisition Plan that includes identification of flood prone properties, prioritization based on likelihood of event occurrence, and a capital improvements element for the purchase of property for conversion into less intensive uses.

b) Where appropriate, rezone identified high-risk flood-prone areas to preclude further development. In 2013, FEMA revised the Gun Lake Area, annual flooding, in Yankee Springs.

c) Develop and adopt a Flood Response and Recovery Plan that includes provisions to remove homes that flood annually and to raise homes at the fringe of floodway areas above the 100-year floodplain. Watson Drain will improve drainage throughout the County ($6.675M).

d) Create and promulgate comprehensive storm water management stipulations and work with local municipalities and neighboring counties, so stipulations are adopted Countywide and within the greater region. The Drain Commission has responded to flooding by reducing water lake levels with NPDES permits from the State to address immediate flooding in the past 3 years.

e) Develop a program which would construct alternative bridges to promote egress and minimize isolation in wash-out events. A FEMA *Building Resilient Infrastructure and Communities (BRIC)* grant was developed in 2018 for mitigation funding to improve egress from flooding roads by constructing drainage areas and other egress issues (HUD and FEMA cost share, CDBG–Disaster Recovery (DR) funds). In May 2022, MDOT completed the 1959 bridge over Battle Creek River on Ainger Road that has improved loaded truck traffic into Barry County using MTF dollars.

f) Barry County Drain Commission has the opportunity to request funds via "The American Rescue Plan Act (ARPA)" to offset $6,675,000 cost of the proposed 2018 Watson Drain

Project, under the category of *Public Health, Economic Negative Impact, Services to Disproportionately Impacted Communities*, *and Water/ Sewer/ Broadband Infrastructure*. The Watson Drain Project will construct storm water infrastructure in the Upper Crooked Lake, Barry County, Barry Township, and Prairieville Township, where residents are low-income and fixed-income, and the drain currently has no surface water outlet.

7.1.9 Pandemic (Significant hazard)

7.1.9.1 Goals of Pandemic Mitigation

Barry County's goal is public health and safety. In May 2021, FEMA released "COVID-19 Pandemic Operational Guidance; All Hazards Incident Response and Recovery," for state, local, tribal, and territorial (SLTT) governments to use.

7.1.9.2 Objectives of Pandemic Mitigation

The objectives for pandemic mitigation are as follows:

a) Apply Lessons Learned from the 2020 Pandemic pertinent to the communities.

b) Provide up-to-date resources (checklists, reports) to adapt and revise to best respond and for recovery plans.

c) Review the preparedness plans for the communities for critical personnel (i.e. public safety) and essential activities (i.e. utility companies) to maintain county operations at minimal staffing.

d) Perform necessary activities to ensure public health and safety daily, when necessary; temperature checks, social distancing, hand-washing and sanitizer, wearing face masks.

e) Keep the County informed as the pandemic progresses and on recovery processes; from shut downs to opening back up and necessary activities.

7.1.10 Scrap Tire Fires Mitigation (Very low hazard)

7.1.10.1 Goals of Scrap Tire Fires Mitigation

A fire requires all three of the following: 1) fuel, 2) heat, and 3) oxygen. Most scrap tires are stored outside, but some locations may have scrap tires stored inside. Water is not a useful extinguishment of a scrap tire fire and requires other means. The goal of mitigation is to locate and remove scrap tires (i.e., remove the fuel).

Scrap tire piles can also be a human health risk due to the accumulation of mosquitos that can carry and spread disease to both animals and humans, such as Eastern Equine Encephalitis (EEE) the deadliest disease spread by mosquitos in Michigan where 90% of horses infected become fatal (if not vaccinated) and 33% of humans infected become fatal from this disease, according to MDARD. The goal is to remove scrap tires to eliminate habitats where mosquitos can breed.

7.1.10.2 Objectives of Scrap Tire Fires Mitigation

Eliminate a potentially dangerous fire from forming in scrap tire piles. Scrap tire fires billow with hazardous smoke and can cause an area-wide evacuation to prevent potential inhalation exposure; according to the USEPA, 34 target compounds can be emitted into the air from a scrap tire fire. Water and Fire-fighting foam is futile against a scrap tire fire, and the best way is to cover the fire with sand or dirt, although water can help adjacent buildings to succumbing to a fire.

Reduce the chances of potential exposure for both humans and animals to mosquito-borne diseases, such as EEE.

7.1.11 Civil Disturbance Mitigation (Very low hazard)

FEMA's U.S. Fire Administration has much preparedness and training information for first responders, police, firefighters, and EMS. Preparing for Civil Unrest by the National Fire Academy (FEMA), March 3, 2019, recommends a standardized operational command concept associated with the National Incident Management System (NIMS) across disciplines, and develop incentives and tracking methods to improve planning, and measure effectiveness of measures taken to mitigate. In 2020, FEMA launched grant options for civil unrest expenses, Emergency Management Performance Grant (EMPG) for local governments as part of implementing the National Preparedness System and the National Preparedness Goal of a secure and resilient nation ($405.1M for FY-2022).

7.1.11.1 Goals of Civil Disturbance Mitigation

The goals of mitigation begin with preparing prior to the disturbance (when the community is not in an agitated state), and establish or adopt guidelines. The goal of the guidelines is to prevent a crowd from getting out of control, if possible. To achieve these goals, a team of critical stakeholders should be established as the emergency planning board. Mitigation measures include mutual aid agreements between nearby jurisdictions' first responders, establish response routes that may be blocked, prepare for ambush, maintain appropriate equipment, establish a mobile command center, establish the person in charge on-scene, prepare for fire hydrant damage/ tampering, prepare an exit strategy, and good communications, during the incidence. Finally, the goal is to recover from the incident as a community, establish loss, rebuild structures, rebuild crops, record the happenings and metrics of the incident; FEMA documentation states that few bench marks, data, and record of a civil disturbance are on record, even though up to 20 events happen annually in the U.S.

Civil unrest situations cannot be predicted as to location and are sporadic, except for fairs, sports events, and planned community events. Civil unrest due to political or economic unrest, and the result of law enforcement, are unpredictable and difficult to plan for except by blocking routes and establishing exit strategies, and can involve a larger number of protestors, requiring more resources to mitigate a situation.

7.1.11.2 Objectives of Civil Disturbance Mitigation

Objectives to mitigate civil disturbances include keeping up with national standards and bench marks of other incidents (few are actually recorded, according to FEMA), schedule annual interagency practice drills, train police and firefighters and EMS, obtain proper equipment for

crowd control, obtain protective equipment (helmets, shields, vests, etc.), obtain or appoint a command center trailer/vehicle, respond to duty and return safely, prepare for escalation or de-escalation, and to identify persons involved to prevent further civil unrest. State has new grants for resident and commercial safe rooms under the CDBG, HMGP, and EMPG funds.

7.2 Action Strategies

Barry County has preparedness for many hazards, which is vital to protect from, and reduce harm from disasters. While the County can prepare, they cannot prevent all natural and manmade disasters. Since 2005 (approved HMP), many of the ranked hazards have been addressed and continue to be addressed in the long-term ($235,750,000 in approved funding through 2026).This update used the Questionnaire form to add, rank, and prioritize all hazards, most that were previously ranked had no change to this update.

Mitigation strategies have been established to prioritize and implement the goals and objectives of the HMP. The primary responsibilities for implementing the HMP rests with the County:

- County Planning Commission
- LEPC
- Board of Commissioners
- Emergency Management Coordinator
- County Planning Director
- Local Jurisdictions

The afore-mentioned entities are also responsible for modifying the prioritization of the strategies set forth in this HMP to respond to shifting social and economic circumstances. A Hazard Mitigation Committee (Nov. 2005) was developed to monitor the implementation of the Plan, and reports to the County Board, Planning Commission and local municipalities (jurisdictions) on its progress, and recommend revisions to this Plan as necessary. The Local Planning Team, as required by the MSP Emergency Management Division, works with the Hazard Mitigation Committee, and is also accountable for implementation and maintenance of this Plan.

The major accomplishment of the previous 2005 HMP Action Strategies was administrative by adopting the HMP and establishing the committee for handling ranked hazards. The Action Strategies in the 2005 HMP lists 10 strategies (4 are administrative), while this update lists 22 strategies and is hazard-specific, because of administrative accomplishments and mitigation measures already addressed through available funds (See Table 14. 2005 Summarized Current Status).

Table 14. 2005 Summarized Current Status

2005 Mitigation Goal Strategy	Current Status	Priority Level in 2023 HMP Update
1. Adopt HMP	Adopted in October 2005	No Priority Assigned: Not included, since adoption in 2005
2. Create an HMP Committee	Created in November 2005	No Priority Assigned: Not included, since HMP Committee is created.
3. Conduct Additional Research; Additional Research; storm activity, mapping large span structures, refining $ losses, severe winter weather trends, extreme temperature (buckled roads, failed bridges and railroad tracks)	Ongoing as trends dating back to 1950 or the 2005 HMP. 2021 installed ATR's on wires. MDOT rerouted truck traffic in 2022 rebuilding bridge in Eaton County; Developed Emergency Weather Plan; Developed Regional Transportation Plan; roadways are identified; Evaluate and Augment Shelter areas; school systems are involved with shelter.	Tornado (changed from Significant to High and is TOP) Hail (changed from Low to Significant and is MEDIUM) Severe Winter Weather (TOP) Extreme Weather (TOP) Infrastructure Failures (LOW)
4. Improve Siren System	Not feasible to add Sirens; weather apps are used instead; American Red Cross; NOAA	TOP: Weather Apps; NOAA app for cellphones
5. Continue and Improve Cooperation	Ongoing since 2005 with weekly meetings/agendas with all jurisdictions; Educate and Encourage the Public; minus (-) 0.7% socioeconomic risk rating.	No Priority Assigned: Board of Commissioners represent all jurisdictions on a weekly basis.
6. Educate and Encourage the Public	Ongoing since 2005 with weekly meetings/agendas with all jurisdictions	No Priority Assigned: Board of Commissioners posts all weekly meeting agendas online (Barry County website).
7. Winter Weather Strategies	Ongoing; 2021 installed ATR's on wires throughout the county, and the county continues to implement emergency plans, promulgate self-protection measures, and augment winter weather services. Plowing efforts have been prioritized in areas with elderly or disabled populations.	TOP: seeking weather apps; NOAA and American Red Cross weather apps.
8. Transportation Strategies	Ongoing; Ainger Road bridge finished in 2022	Still a High hazard, priority changed to MEDIUM, because infrastructure (bridges and roads) are being addressed.
9. Terrorism/War Strategies	High hazard with no change, except to add FEMA downwind to 50 miles in 2013 EPZ.	Still a High hazard, MEDIUM as the county seeks funding for resilient shelters.

Table 14. 2005 Summarized Current Status (page 2)

2005 Mitigation Goal Strategy	Current Status	Priority Level in 2023 HMP Update
10. Repetitive Flood Loss Strategies	2008 Zoning Ordinance on Flood Acquisition Plan; 2009 FEMA published Flood Study for the county; Approved Thornapple Watershed Program in 2016 by BCD.	Still a Significant hazard, TOP, as the county is seeking to complete the Watson Drain expansion.
11. Storm Water Management Policies Strategies	Combined Sewer in Nashville is not feasible; other strategies in 2018 to current date are implemented.	The Drain Commissioner is seeking to complete the Watson Drain expansion that will improve drainage for the entire County.
Participating Jurisdictions	2005 HMP assigned the City of Hastings, only, for implementing; Currently, all jurisdictions are assigned differing responsibilities based on events.	No Priority Assigned; All jurisdictions have been assigned responsibilities on hazards, based on the trends within that jurisdiction, and to encourage cooperation and corroboration for the County.

Implementation of the HMP will be accomplished through planning mechanisms; local ordinances, Capital Improvement programs for public structures, and administrative procedures. Some implementations and strategies require significant public and private investment (building safe rooms), and some are modest and can be immediately implemented (NOAA weather App). Prioritization and implementation of the action strategies will be the decision of the Hazard Mitigation Committee or the entities afore-mentioned for the best practice and feasibility of the strategy in the best interest for Barry County; estimated benefits, costs of implementation, inter-governmental cooperation, and public approval.

Barry County has provided an action strategy and implementation plan for ranked hazards; while the County lists hazard ranks as High, Significant, Low, and Very Low, the priorities are based on Top, Medium, and Low, due to hazards that are already addressed, availability of the County and jurisdictions to act upon the hazard mitigation. The selected Responsible Agencies (jurisdictions) were based on the highest incidents of a hazard within that local jurisdiction; however, all jurisdictions will benefit from each mitigation.

Prioritization (Top, Medium, Low) are based on the need to address the hazards that have not, previously, been addressed (Civil Disturbance, Resilient Structures). While some ranks are High or Very Low, the County has already addressed the High and Significant hazards (except War and Terrorism) and allows the entities to focus on other ranking hazards in the future through the Hazard Mitigation Committee. This HMP update assigns jurisdictions (not just City of Hastings) to evaluate and research the ranked hazards. Please see Table 15. Priority Table.

Table 15. Priority Table

Hazard Mitigation Strategy	Priority	Implementation (Long Term)	Responsible Agencies	Potential Funding	Benefits/Costs
NATURAL HAZARDS					
Severe Winter Weather (High)	Top	2021 state ATRs 2023 NOAA App	LEPC, City of Hastings, State	City of Hastings Energy firms, BRIC, State	Educate and notify public, Develop resilient structures; $22M/annual state funding for ATRs on overhead wires.
Extreme Temperatures (High)	Top	2021 state ATRs 2023 NOAA App	LEPC, Assyria Twp, Baltimore Twp, Maple Grove Twp, Johnston Twp, State	City of Hastings Energy firms, BRIC, State	Educate and notify public, Develop resilient structures; $22M/annual state funding for ATRs on overhead wires.
Tornadoes (High)	Top	2023 NOAA App	LEPC, Assyria Twp, Baltimore Twp, Maple Grove Twp, Johnston Twp, Orangeville Twp, Prairieville Twp, Yankee Springs Twp, City of Hastings	City of Hastings Energy firms, FEMA, State	Emergency warning system (NOAA app $20/annual IOS or Android), safe rooms (residential MI grants), shelter, ATR grant ($5.4B), education
Lightning (Significant)	Top	2023 NOAA App	Barry Twp, Hope Twp, Rutland Twp	FEMA, State	Emergency warning system (NOAA app $20/monthly IOS or Android), safe rooms (residential MI grants), shelter, ATR grant ($5.4B), education
Severe Winds (Significant)	Top	2023 Alerts NOAA App	Barry Twp, Hope Twp, Rutland Twp, Carlton Twp, Irving Twp, Thornapple Twp, Castleton Twp, Hastings Twp, Woodland Twp, Nashville Village	FEMA, State	Emergency warning system (NOAA app $20/annual IOS or Android), safe rooms (residential MI grants), shelter, ATR grant ($5.4B), education
Riverine Flooding (Significant)	Top	2018-2025, Watson Drain expansion	Drain Commissioner, Carlton Twp, Irving Twp, Thornapple Twp, Castleton Twp, Hastings Twp, Woodland Twp, Nashville Village, Yankee Springs Twp	EMPG, CDBG-DR, ARPA	Emergency warning system, ordinances, increase water capacity of drains, improve drainage throughout the County, especially Prairieville Twp/ $6.675M
Hail (Significant)	Medium	2022 NOAA App	Thornapple Twp, Castleton Twp, Hastings Twp, Woodland Twp, Nashville Village, Orangeville Twp, Prairieville Twp, Yankee Springs Twp, Emer. Coord.	FEMA	Emergency warning system (NOAA app $20/annual IOS or Android), safe rooms (residential MI grants), shelter, ATR grant ($5.4B), education
Drought (Low)	Low	2023	City of Hastings, Assyria Twp, Baltimore Twp, Maple Grove Twp, Johnston Twp	FEMA	Drip Irrigation ($2.45M-$19.6M to install), recycle water (plate cooler) ($2,500 for cooler and $4,000/annual electricity), improve water usage and quality
Wildfires (Low)	Low	2016 to present	Sheriff, 16 Fire Depts, BCD and MDNR, Orangeville Twp, Prairieville Twp, Yankee Springs Twp	BCD resources, County, USDA-Community Wildfire Defense Grant	Forest management and aiding walkways $17M funded through 2026, and $10M for 10 years through USDA-CWDG
TECHNOLOGICAL HAZARDS					
Transportation – Emergencies (Very Low)	Low	2020	WMRPC, Thornapple Twp, Yankee Springs Twp	LEPC, County, BRIC, ARPA, MTF	Improve egress of roadways, visibility, and reduce water across the road in floods, Watson Drain ($6M) will aid in flooding roads ($210M).

Blue - means approved funding, or partially approved funding and in progress (long-term).

Table 15. Priority Table (page 2)

Hazard Mitigation Strategy	Priority	Implementation (Long Term)	Responsible Agencies	Potential Funding	Benefits/Costs
TECHNOLOGICAL HAZARDS (continued)					
HazMat – Transportation (High)	Medium	2005 to present	LEPC	City of Hastings, County, MTF	Prohibit certain transporters on specified roadways, MDOT Bridge complete in Eaton County ($210M) to reroute heavy truck traffic
Structural Fires (Significant)	Top	2023 Bldg Ord.	LEPC, Board of Commissioners	City of Hastings Energy firms, BRIC	Resilient structures, building ordinances (14'x14' $25,500 to reinforce wood frame)
HazMat – Sites (Significant)	Medium	2005 to present	Local BRA-Brownfield Redevelopment Association	EGLE, EPA	Redevelopment and Brownfields/$300K-$600K (3-year) per region or combined region
Pipeline Accidents – Oil/Gas (Low)	Low	1973	State EGLE, County LEPC	OPA-USCG	In the event of an incident, OPA can assist with cleanup (federal) on navigable water ($1B funding).
Dam Failures (Very Low)	Low	Annual inspections	Drain Commissioner	County, FEMA-HHPD	No high hazard dams in Barry County ($10.3M available)
Infrastructure Failures (Low)	Low	2023	Barry County Road Commission, Building Dept, MDOT for bridges	FEMA-Dams MDOT, BRIC, MTF	Resilient structures, rip-rap in ditch expansions to reduce flooding (BRIC-$2.295B available)
Scrap Tire Fires (Very Low)	Low	Spring and Fall at Fairgrounds	BEDHD, Sheriff, Hastings PADNOs and local pharmacies, Commissioner, City of Hastings	EGLE grants	Allows removal of wastes that can cause pests and tire fires ($2/tire)
Civil Disturbance (Very Low)	Medium	2021	LEPC, Sheriff	FEMA-EMPG, LEPC, County, State	Improve communication for emergencies/EMPG-$405.1M available, and may require a share cost. State has new grants for resident safe room (14'x14' - $25,500 and commercial $500K with cost share).
MANMADE HAZARDS					
Terrorism – Small Scale (High)	Medium	2023	LEPC, Sheriff	FEMA, CDBG, HMGP, State	Develop a checklist, bug-out bags (evacuation), or shelter, State has new grants for resident safe room and commercial safe rooms ($25K-$500K).
War/Nuclear – Large Scale (High)	Medium	2023	LEPC, Sheriff, Emergency Planning Committee, Orangeville Twp, Prairieville Twp, Yankee Springs Twp, LEPC	FEMA, CDBG, HMGP, State	Develop a checklist, bug-out bags (evacuation), State has new grants for resident safe room ($25K-$500K).
Pandemic (Significant)	Medium	2020 Response Plan	Barry County Health Dept.	County, FEMA	Develop a checklist, bug-out bags (expenditures-$400M in public assistance grants and $28M Individual assistance grants); No dollars were requested under the HMGP.
Livestock Op – Nitrogen Impact (Very Low)	Low	2016 to 2026 by Barry Conservation District	Commissioners, BCD and Barry-Eaton Health Department	BCD resources, County	Reduction in nitrates, phosphorous in drinking water, no till, cover crops, $17M funded through 2026

Blue - means approved funding, or partially approved funding and in progress (long-term).

7.2.1 Severe Winter Weather Strategy (High hazard, Top priority)

Barry County has an Emergency Winter Weather plan to prepare for severe winter weather; snow-plowing, de-icing, and public services for the communities. Barry County has preparedness for winter weather and has provisions for residents including shelter, fuel for household generators, food, and potable water during severe winter weather that causes downed wires and leaves residents without electrical power for long durations. Snow plowing and de-icing are also a part the of Winter Weather strategies and responsibilities of the Emergency Management Committee. The Hazard Mitigation Committee directs studies and development processes with the Planning Commission, County Board, local jurisdictions, and County staff.

Winter storm warning systems are provided through weather stations and news stations. Preparedness measures include:

1) Listen to NOAA Weather Radio for updates on emergency.
2) Provide emergency heating fuel (wood, fuel for a home generator).
3) Most residents in Barry County are prepared with a generator in case of a power outage.
4) Provide emergency shelter to residents, in case of, no heat or water in their homes.
5) Vehicle check; battery, antifreeze, winter tires, full tank of gas.
6) Keep in your vehicle for shelter, if traveling.
7) Use brightly colored cloth (preferably red) and tie to antenna.
8) Keep cell phone charged or communications device charged before duties during a storm.
9) Use the Buddy System; always be in communication with at least one other person.

Barry County has taken reasonable steps to protect the public from a severe winter weather hazard. The most damaging winter hazard from ice storms is to infrastructure; wastewater and potable water, power lines, transportation (roads, railways and waterways), communication systems, and energy pipelines and storage. Local Emergency Planning Committee will provide a way to retrofit resilient structures and underground utilities, which was a mitigation strategy in the original 2005 approved HMP. This strategy has not been feasible and will be evaluated for feasibility, a cost of millions and much collaboration required.

However, Barry County was selected in the State of Michigan's 5-year $22M/annual project to install automatic transfer reclosers (ATRs); part of a larger $5.4B "electric reliability plan," for Michigan's infrastructure upgrade, forestry management and grid modernization (a 15% improvement in reliability performance). The ATRs played a role in a windstorm in Barry County in April 2021, that detected a power outage and transferred power to reduce impact to communities in Prairieville township, according to an article by Consumer Energy, April 27, 2022.

7.2.2 Extreme Temperatures Strategy (High hazard, Top priority)

As stated above, Barry County has an Emergency Winter Weather plan to implement strategies on property protection, snow-plowing, de-icing and public services for the communities. The Hazard Mitigation Committee directs studies and development processes with the Planning Commission, County Board, local jurisdictions, and County staff.

Barry County has preparedness for winter weather to provide and protect public safety and has provisions for residents including shelter, fuel for household generators, food, and potable water during severe winter weather that causes downed wires and residents are left without electrical power for long durations. Snow plowing and de-icing are also a part the of Winter Weather strategies and responsibilities of the Emergency Management Committee.

As in Section 7.2.1, the state has $22M/annual funding to improve and reduce impact to residents in Barry County by the installation of ATRs that can detect trees on wires.

7.2.3 Thunderstorm Strategy (High/Significant hazards, Top/Medium priority)

The anticipated natural hazards with a thunderstorm are tornadoes, lightning strikes, severe wind (straight-line winds, called, Derecho), and hail. Emergency warning systems and shelter is available in Barry County; 6 working sirens with a one-mile radius warning in high population density areas. According to FEMA and the Institute for Business & Home Safety, strategies include;

- accepted building codes in flying debris;
- install windows or laminate glass,
- impact resistant patio doors,
- strengthen doors,
- install strong garage doors,
- repair roofing,
- new construction safe rooms for schools, daycares and nursing homes through CDBG, and Pre-Disaster funding through FEMA and the State,
- develop a local grant program to assist homeowners with a new safe room construction,
- consult guidance from ICC-600 Standard for Residential Construction in High-Wind Regions,
- conduct recommended tornado drills, fire drills, and lockdown drills.

Funding for thunderstorm mitigation is available through federal (BRIC), and Michigan. FEMA and the State have a new grant funding through the HMP program, CDBG, and EMPG Funding for residential safe room construction; commercial safe construction has been funding for several decades, through these programs.

7.2.4 Industrial and Hazardous Substance Transportation Strategy (High hazard, Medium priority)

Barry County has 408 miles of federal aid road and 118 miles of trunkline roadways and receives funding from 0.3% ($5.9M in 2006) of the total Michigan Transportation Fund (MTF-$1.98B in 2006), and the County's 16 townships. Barry County Road Commission meets regularly on a monthly basis to address social and economic changes that affect transportation, including dust control of roads during summer, improvements to bridges and roadways in all seasons, and provides a budget to handle these mitigation measures. Since the Drain Commission affect the

Road conditions and travel, Barry County works with the Board of Commissioners throughout the jurisdiction to plan and mitigate drainage, storm water pathways, and travel (egress) within the entire County.

In May 2022, MDOT completed rebuilding a 1959 bridge over Battle Creek River in Eaton County along Ainger Road that provides loaded truck transportation into Barry County; part of a $210M investment to rebuild the I-69 through the Rebuilding Michigan Program.

7.2.5 Terrorism/ War (Nuclear hazards) Strategy (High hazard, Medium priority)

FEMA has published several risk management series with risk assessments for mitigation of building assets in 2005, biological/chemical/radiological attacks on people in 2001, infrastructure attacks on utilities, and school attacks. FEMA 452, *A How-To Guide to Mitigate Potential Terrorist Attacks Against Buildings* of January 2005 outlines 5 steps listed below and the guide suggests developing a checklist to collect and report information related to building infrastructure:

1) Collect information; conduct a threat assessment and rating process, quantify and identify; how many individuals would be impacted by a threat.
2) Identify the value of a building's asset and need for protection.
    a. distance to threat; curb lane, sidewalks, and grassy yards
    b. landmarks, iconic buildings, law enforcement, fire departments, hospitals, key commercial property, telecommunications and utilities services. Consider differing scenario.
    c. building core functions include administrative, daycare; warehousing, food service, data center, and engineering
3) Vulnerability assessment of critical assets identified in step 2.
    a. level of skills need by response teams
    b. pre-meetings and on-site meetings with building owner or chief engineer
    c. review key documents, emergency response, disaster recovery
    d. checklist of building vulnerability
4) Analyze the threat and likelihood of associated threats
    a. cyber attack
    b. vehicle attack
    c. chemical attack
    d. biological attack
5) Minimize risks and consider mitigation options.
    a. prioritize observations (which threat exists from step 4)
    b. evaluate resources; personnel, equipment, cost, and support
    c. use worksheets in the guide document.

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Barry County has established a Local Planning Team that comprises of the County Planning Commission, Board of Commissioners, Emergency Management Coordinator, and County Planning Director; a team that is able to handle more than one hazard threatening Barry County. The County will perform a study of existing and potential shelter areas, the capacity of each to

provide necessary protection and ways to improve evacuation and response to an incident. All jurisdictions will be responsible for participating in potential sheltering and evacuation procedures.

Barry County will review mitigation procedures for evacuation procedures of people within the above-referenced communities, and devise a plan to recover property, cleanup measures of an ingestion hazard to a nuclear failure, and work closely with communities that this disaster would affect. Notably, both Cook and Palisades Nuclear Power Plant are aging, and a petition to keep Palisades in operation until 2025 currently exists. Funding is available through FEMA (estimated costs; 8x8 feet room $13,100 and 14x14 feet room $25,500):

- CDBG - construction of safe rooms (residential and commercial)
- EMPG Funding for construction of safe rooms (residential and commercial)
- HMP program has funding available for construction of safe rooms

In 2000, Michigan State University child care center, with a HMGP fund, constructed a one-story wood frame for 170 children capacity, reinforced with concrete to withstand 250 mph winds of a cost of $500K with cost share.

7.2.6 Structural Fires Strategy (Significant hazard, Top priority)

Barry County has an emergency plan to implement strategies on property and public services for the communities. Strategies are defined for rescue, exposure, confining the fire, extinguishing, overhaul, ventilating, and salvage, according to FEMA training guides. The Hazard Mitigation Committee directs studies and development processes with the Planning Commission, County Board, local jurisdictions, and County staff. Barry County has 16 fire departments with capabilities to employ the county resources of Ionia, Kent, Eaton, and Kalamazoo.

According to the County's Master Plan of 2005, 1,076 building permits were issued in 2004 for a broad range of building types; utility buildings, single-family homes, commercial structures, and industrial structures. Barry County's Master Plan proclaims design of new buildings should be with high quality stone, brick and other natural materials; these building materials can inhibit a structural fire and are a part of mitigation strategy.

Barry County has preparedness with 911 dispatch, police, firefighters, and EMS with access to other county and state resources. According to FEMA documentation, establishing a command system (to select the tactics with resources available, identify types of building construction, and identify fire behavior factors) is the first step for structural fires:

1) Fire confinement (incident stabilization)
2) Exposure protection (life safety of responders)
3) Fire extinguishment (explosion hazards and smoke explosions/ back drafts)
4) Rescue and ventilation
5) Water supply, fixed-fire protection systems or mobile systems, apparatus, equipment, special extinguishing agents.

Barry County structures are built with conventional construction techniques; CDBG and EMPG can be used to reinforce structures, safe rooms. The types of building construction are listed as follows:

Type 1 – fire-resistive, office buildings, steel has a protective compound, demands extensive resources.
Type 2 – noncombustible, structural steel exposed and retains heat.
Type 3 – ordinary construction, common walls allowing rapid fire spread, heavy signs with a falling/safety hazard.
Type 4 – heavy timber, substantial timber construction, wood beams in open ceilings, slow-burning and linger a long time.
Type 5 – wood frame, wall studs are placed on the floor deck, and a balloon wood frame allows fire to travel uninterrupted.

Recovery plans will include feedback and training through lessons learned, as the fire service is always seeking ways to improve operation, according to FEMA, although an ongoing investigation can delay information to differing departments.

7.2.7 Floods (Significant hazard, Top priority)

On May 4, 2009, FEMA published Barry County, Michigan (All Jurisdictions) Flood Insurance Study and provided new zones for certain areas and revised the Yankee Township Map in September 2013 to increase the area (AE Zone-1% Annual FP) around Gun Lake (that comprises 2,660 acres). Gun Lake is one of the largest lakes in Michigan's lower peninsula and is situated in Yankee Springs and Orangeville Township and crosses the county line.

In April 2009, the Village of Nashville adopted an ordinance for Barry County to take responsibility for floodplain management provisions in flood prone hazard areas designated by Barry County's FEMA Flood Insurance (NFIP).

In 2013, Barry County entered a Floodplain Acquisition Plan and Flood Response and Recovery Plan to limit development within floodplains. Repetitive losses were recorded in FEMA documentation. The Plan would be to aid the County when demolition of a property is infeasible, cost prohibitive, or refused by property owner, and the Plan would identify high-risk structures to be moved or raised while remaining on the flood prone property. The Plan would also further identify areas where flooding occurs over roadways; Jordan and Cunningham Roads, Charlton Park Road, Wellman Road, Lammers Road, and Cloverdale Road. Flooding occurs on Pleasant Shores subdivision in Section 19 of Castleton Township, Bridge Park subdivision in Hastings Township, and Howard Point subdivision in Castleton Township. The new FEMA Building Resilient infrastructure Communities (BRIC) grant became available in 2018 to improve egress during times of flooding. The USGS Water Alert service started in August of 2010, and enables users to receive text messages or emails for any USGS stream gauge stations and alert for floods or pre-flood states (htt/://water.usgs.gov/wateralert/).

Watson Drain expansion ($6.675M) will improve drainage throughout the entire County and is part of the Village of Nashville and Prairieville Township; Districts 6 and 5, respectively. District 5 has had 37 of 43 repetitive losses from floods from 1979 to 2021.

7.2.8 Storm Water Management Polices

Much of Barry County flooding is handled through the Drain Commissioner by receiving NPDES permits to lower lake levels and pump water using storm water drainage systems from one area to another as an interim measure prior to a long-term strategy. The Watson Drain was adopted to be increased in 2018, and plans for connecting 11 lakes via drain systems is in the plans for the Drain Commission to mitigate flooding in the Delton, and Upper Crooked Lake area that has experienced annual flooding, since 2017, and encompasses Hope Township, Barry Township, Orangeville Township, and Prairieville Township (Please see Proposed District Boundary for the Watson Drain Drainage District).

In 2021, Barry County Drain Commission and Planning Commission are preparing for improvements for the Garbow Drain (Thornapple Township) and Wolcott Drain (Woodland Township). In addition, plans and revisions to the Watson Drain are under review to add and remove lands and are near the stage for decisions on contractors to begin construction. Each improvement must have a Notice of Public Hearing for the public's input and a consensus across the county prior to commencing contractor selection and implementation of the improvement.

7.2.9 Pandemic Strategy (Significant hazard, Medium priority)

To best prepare for emerging incidents, emergency managers are encouraged to review response plans and guidance and synchronize community response actions with federal planning efforts and take protective measures for first responders for the disaster workforce. The following is a "Response Consideration Checklist" developed by FEMA:

- Prepare a Response Consideration Checklist.
- Research funding-grants through FEMA Coronavirus Pandemic Response Starter Kit
- Research funding-grants; FEMA Emergency Non-Congregate Sheltering

FEMA has a grant-funding program for non-Congregate shelters; hotels, motels, and dormitories, "FEMA Emergency Non-Congregate Sheltering during the COVID-19 Public Health Emergency (Interim)" as part of the recovery plan from the pandemic.

FEMA's primary registration methods can be used in communities with little FEMA presence, www.DisasterAssistance.gov.

FEMA encourages communities to include in an evacuation planning, the need for social distancing and to account for limited traveling and sheltering options, and increased time needed for evacuation of health care facilities.

Also, Barry County is dedicated to maintaining a system with partner jurisdictions that can facilitate response and recovery from a pandemic.

7.2.10 Scrap Tire Fires/Piles Strategy (Very low hazard, Low priority)

According to EGLE, Section 16908(2)(c) of Part 169, Scrap Tires, of the Natural Resources and Environmental Protection Act, of 1994 PA 451, requires that the Scrap Tire Regulatory Fund shall be used for cleanup or collection of abandoned scrap tires and scrap tires at collection sites.

Since 2017, the State has provided Scrap Tire Grants annually. The grant for 2021 required applications to be submitted by April 20, 2021, however, a grant should become available in 2022, and subsequent years for a community to remove scrap tires. To be a part of the grant program, Barry County may contact Michigan EGLE early next year (FY2022) at EGLE-ScrapTire@Michigan.gov, although Barry County already has several annual scrap tire collections as part of a public waste collection program in the Spring and Fall that includes car tires, truck tires, and tractor tires with the fee waived for most collections.

On April 30, 2021, Michigan EGLE provided $4.7M in awards to firms and County Road Commissions to develop new uses for used scrap tires. Some beneficial re-uses include shredding scrap tires to use as Rip-rap or pellets for improving drainage along ditches and water streams, for modified asphalt covering, for golf course bunker lining, and even for use in wetlands. https://www.michigan.gov/som/0,4669,7-192-47796-558153--,00.html

7.2.11 Civil Disturbance Strategy (Very low hazard, Medium priority)

Barry County has established a Local Planning Team that consists of County Planning Commission, Board of Commissioners, Emergency Management Coordinator, and County Planning Director that is structured to handle more than one hazard threatening Barry County. The County will perform a study of existing and potential shelter areas, the capacity of each to provide necessary protection and ways to improve evacuation and response to an incident. All jurisdictions will be responsible for participating in potential shelters and evacuation procedures. FEMA offers the following response activities:

- Contact FEMA Regional to enquire about EMPG funding and availability.
- Develop an incident action plan; communicate, exercise, follow and adapt a plan between organizational and jurisdictional partners.
- Activate the Emergency Operations Center to support the area.
- Assign fire fighters and EMS to assist with coordination and to screen calls.
- Unified law enforcement with other agencies.
- Mobile command center.
- Ensure command post security.
- If a single incident, establish a hot zone, warm zone and cold zone.
- Maintain communications.
- Protect and maintain apparatus, equipment, fuel and other logistical support.

CDBG, HMGP and EMPG grants may be used to reinforce wood frame structures for safe rooms; residential $25,500 and commercial $500,000 with cost share. FEMA's Emergency Management Program Grant (EMPG) has funds available of $405.1M for FY2022.

8.0 PLAN MAINTENANCE

The continued planning process will be monitored on a weekly basis, in the Board of Commissioners meetings, which Agenda is provided in the County web site for public viewing, and represents all jurisdictions, to discuss all aspects of County and jurisdictions' business, to involve a community consensus. Annually, the Local Planning Team for Barry County, will compile revisions and additions, and evaluate County issues from the weekly meetings that should be included in the 5-Year planning process for the future HMP update.

The HMP will be evaluated, annually, by:

- Assessing the results of studies or research conducted in response to recommendations provided in previous versions of the plan.
- Reviewing the annual reports of the Emergency Management personnel.
- Evaluating public comments received at public hearings and other meetings, regarding issues as they arise.

Barry County leaders provide information to enhance the actions and responsibilities of all people of Barry County, not just leadership, and promotes corroborative response measures for potential situations that are pertinent to the people of Barry County. The goal is to modify the Plan, and update, as necessary to reflect new Hazard information, progress report conclusions, and concerns of the public in a 5-Year update. The plan will be:

- Monitored weekly (by the Board of Commissioners)
- Evaluated annually (by the Local Planning Team)
- Updated every 5 years (by the County, LEPC, and Emergency Manager)

Local governments comprising Barry County, but not under County planning and zoning jurisdiction, are represented at the weekly meetings, encouraged to incorporate the standards, objectives, and implementation mechanisms in this HMP into local planning strategies, where appropriate.

9.0 ACRONYMS AND TERMINOLOGY

ARPA	American Rescue Plan Act
BCD	Barry Conservation District
BEDHD	Barry Eaton District Health Department
BRIC	Building Resilient Infrastructure and Communities (new FEMA grants in 2018)
CDBG	Community Development Block Grant (a CPD program-Federal funding)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CIMS	Critical Incident Management System
CPD	Community Planning and Development (HUD Office of)
DNR	Michigan Department of Natural Resources
DR	Disaster Recovery
EGLE	Michigan Department of Environment, Great Lakes and Energy
EMD	Michigan State Police Emergency Management Division
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission (regulates dams with hydropower)
FMA	FEMA's Flood Mitigation Action grant
HHPD	High Hazard Potential Dam Grant Program
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
HUD	Department of Housing and Urban Development
LEPC	Local Emergency Planning Committee
MDARD	Michigan Department of Agriculture and Rural Development
MHA	*Michigan Hazard Analysis*, Michigan State Police and Homeland Security Department
MSP	Michigan State Police
MTF	Michigan Transportation Fund
NCEI	National Center for Environmental Information (formerly known as National Climatic Data Center (NCDC))
NID	United States Army Corp of Engineers, National Inventory of Dams
NIMS	National Incident Management System (a part of Incident Command System (ICS))
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
OPA	Oil Pollution Act of 1980
PADNOs	PADNOs Waste Removal/Recycling, Inc.
RCRA	Resource Conservation and Recovery Act of 1976
SARA	Superfund Amendments and Reauthorization Act of 1986
SEOC	State Emergency Operation System
SHA	State Hazard Analysis
USEPA	United States Environmental Protection Agency
USCG	United States Coast Guard
USGS	United States Geological Survey

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US Census Bureau 2020

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Barry County, Board of Commissioners Libraries online

Funding References from FEMA

• The current State of Michigan Hazard Mitigation Plan identifies a number of potential funding resources for various mitigation actions. In addition, the Michigan State Police Division of Emergency Management and Homeland Security website contains valuable information related to mitigation in Michigan.
http://www.michigan.gov/msp/

• Information about applying for grants, available publications, and training opportunities can be obtained from Matt Schnepp, the Michigan State Hazard Mitigation Officer at schneppm1@michigan.gov.

• Consider what actions can be funded by various governmental agencies (federal and state), especially when meeting multiple community goals. Federal agencies may support integrated planning efforts such as rural development, sustainable communities and smart growth, wildfire mitigation, conservation, etc.

• Seek out other non-governmental or non- emergency management funding sources such as from private organizations and businesses, federal initiatives (Smart Growth, Sustainable Communities), Federal Highways pilot projects, and historic preservation programs.

• Refer to the Michigan State Hazard Mitigation Plan for more resources available to local communities in Michigan.

HMGP
The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, in areas of the State requested by the Governor.

BRIC
Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Reach out to your SHMO for more information on BRIC.

FMA
The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act (NFIA) of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

National Climatic Data Center (NCDC) Storm Events Database
The National Climatic Data Center (NCDC) Storm Events Database contains information at a countywide level for past hazard events. Property damage, crop damage, death, and injury records are available for each hazard. Where available, a narrative also accompanies many events, particularly those where there was an exceptional toll on the County. https://www.ncdc.noaa.gov/stormevents/

Tornado History Project
The Tornado History Project is a free, searchable database of all reported US tornadoes.
http://www.tornadohistoryproject.com

Technical Assistance
Technical assistance is available through Risk MAP to assist communities in identifying, selecting, and implementing activities to support mitigation planning and risk reduction; Attend any Risk MAP's discovery meetings that may be scheduled in the State (or neighboring communities with shared watersheds boundaries) in the future.

Publications
Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards
http://www.fema.gov/media-library/assets/documents/30627?id=6938

APPENDICES

Appendix A

Questionnaire Form and Responses

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

CURRENT HAZARD RANKING FROM 2005 PLAN:

Hazard Threat Rating: Red - High Hazard Threat

Dark Green – Significant Hazard Threat

Yellow – Low Hazard Threat

Grey – Very Low Hazard Threat

Natural Hazards (Rank)	Man-made Hazards (Rank)
Winter Weather Hazards (High)	Hazardous Materials Incidents - Transportation (High)
Extreme Temperatures (High)	Terrorism/Sabotage – Small Scale (High)
Lightning (Significant)	War/Nuclear Attack/WMD- Large Scale (High)
Severe Winds (Significant)	Structural Fires (Significant)
Riverine Flooding (Significant)	Infrastructure Failures (Low)
Tornadoes (Low)	Pipeline Accidents – Oil/gas (Low)
Drought (Low)	Transportation Accidents – Emergency (Very Low)
Hail (Very Low)	Civil Disturbance (Very Low)
	Scrap Fire Tires (Very Low)
	Dam Failures (Very Low)

Barry County's most severe and frequent hazards are extreme temperatures, severe winter conditions, and flooding in the past and on an annual basis. The most vulnerable is the aging community. The latest information of at-risk population is persons 65 years and over as 18.9 percent (11,633 persons) in Barry County with the latest population count of 61,550 population (July 2019). Please keep in mind the Hazards in the past 15 years:

Agency Representing:

Match E Be Nash She Wish Band of Bodewademi (aka: Gun Lake Tribe Tribe of Pottawatomi Indians)

Name and Title: Brant Mitchell Emergency Management/Safety Manager

Contact information: (phone)269-397-1836, (mobile)616-916-2153

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Please review each question, and provide your opinions and email your responses to Rebecca.hart@2etc.com :

1.) Does your agency deem **severe weather** (temperature extremes and winter conditions) is still the highest hazard threat to Barry County residents (Vulnerability Assessment (44 CFR Part 201.4(c)(2)(ii) and (iii)) Note: Thorn Apple Lake, Jordan Lake, Delton area have been impacted with flooding in the past 15 years.? XX Yes _____No If no, please provide the highest hazard conditions that should be included in the HMP update:

2.) In reference to question 1. Does your agency have accumulated "costs of losses to assets" that occurred providing your community with aid during severe weather conditions (flooding conditions – repetitive losses)? ____ Yes XX No if yes, can you provide a brief cost to losses?

3.) FEMA has increased **downwind impact** hazard to 50-mile radius (July 2013). Barry County's SW corner (Lat North 42.423409 Long West -85.528322) is 40.59 miles ENE of Palisades Nuclear Plant, Covert, MI, that would potentially impact 9,000 people (10 miles into Barry County)

Prairieville Township 3,520	Cloverdale 1,000	Delton 872
Orangeville Township 3,469	Hickory Corners 159	

Does your agency deem this potential hazard to be ranked? XX Yes _____No If so, please provide a Hazard Threat Rank ___High ___Significant XX Low ____Very Low

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

4.) The 2005 HMP discusses development updates proposed:

- overhead electrical moved to underground and
- drain/drainage updates and include them in the update plan (Barry Township – Delton area). (44 CFR Part 201.4(d)).

Does your agency have information that these updates were performed, or due to circumstances, these proposed activities remain to be updated? __ Yes **XX** No Please explain, **W**e currently do not have structures in the Barry County area. We do however focus on utilizing best practices to minimize negative impacts.

5.) In review of question 4. Does your agency have plans to updated or provide development for improvements? And Does your agency have further Proposed developments for this 5-year HMP update? ____Yes **XX** No, if yes, Barry County is most interested in your agencies proposed developments:

6.) Mitigation Goals and Objective and Action Strategies Updates: Approximately 788 properties have been affected from flooding in the past 15 years In Barry County (NFIP and US Army Corp of Engineers data).

Due to the popularity of the City of Grand Rapids (15 miles north of the county line) in the adjacent Kent County, Barry County has seen an increase in development in areas that may be sensitive to flooding and may need to provide a new or updated goal to include recent property development in floodplain areas (repetitive loss due to flooding) pursuant to 44 CFR Part 201.4(c)(3). Does your agency deem a limit/ordinance on infrastructure to prevent development

QUESTIONNAIRE for HAZARD RANKING

within frequent floodplains to be beneficial to Barry County to future plans? ____Yes XX No

Please explain

7.) Consider the current hazard rankings on Page 1. Does your agency deem that any changes or updates be made to the Hazard Rank Threat for each hazard? If so, please provide an explanation. (High, Significant, Low, Very Low)

Natural Hazards (Rank)

Winter Weather Hazards (High)

Extreme Temperatures (High)

Lightning (Significant)

Severe Winds (Significant)

Riverine Flooding (Significant)

Tornadoes (Low)

Drought (Low)

Hail (Very Low)

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING
Man-made Hazards (Rank)

Hazardous Materials Incidents - Transportation (High)

Terrorism/Sabotage – Small Scale (High)

War/Nuclear Attack/WMD- Large Scale (High)

Structural Fires (Significant)

Infrastructure Failures (Low)

Pipeline Accidents – Oil/gas (Low)

Transportation Accidents – Emergency (Very Low)

Civil Disturbance (Very Low)

Scrap Fire Tires (Very Low)

Dam Failures (Very Low)

8.) Potential Low Hazard, Much of Barry County is agriculture and cattle/dairy farms. The potential hazards are low from methane; however, some dairy/cattle farms may have excessive nitrogen that can impact groundwater should a shallow water well contain elevated nitrogen (an odorless gas that displaces oxygen); can cause blue-baby syndrome by asphyxiation, this is a rare condition

and requires much liquid fertilizer to be pumped by usage of a water well causing drawdown and infiltration of contaminants. Does your agency deem this to be considered on the Hazard Rank, or just educational information? ___Yes on Hazard Rank XX No, educational info only

9.) Other Hazards, not discussed or considered, that your agency deems should be addressed in the Update to the HMP: (Barry County values your input and considerations). Request notification of the Gun Lake Tribe Historical Preservation Office when situations may impact cultural history prevalent in Michigan and particularly SW Michigan.

THANK YOU FOR YOUR PARTICIPATION IN THIS CORROBORATION. If you have any questions, please feel free to contact Rebecca Hart, ETC at cell phone (734) 486-5661 or by email rebecca.hart@2etc.com .

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

CURRENT HAZARD RANKING FROM 2005 PLAN:

Hazard Threat Rating: Red - High Hazard Threat

Dark Green – Significant Hazard Threat

Yellow – Low Hazard Threat

Grey – Very Low Hazard Threat

Natural Hazards (Rank)	Man-made Hazards (Rank)
Winter Weather Hazards (High)	Hazardous Materials Incidents - Transportation (High)
Extreme Temperatures (High)	Terrorism/Sabotage – Small Scale (High)
Lightning (Significant)	War/Nuclear Attack/WMD- Large Scale (High)
Severe Winds (Significant)	Structural Fires (Significant)
Riverine Flooding (Significant)	Infrastructure Failures (Low)
Tornadoes (Low)	Pipeline Accidents – Oil/gas (Low)
Drought (Low)	Transportation Accidents – Emergency (Very Low)
Hail (Very Low)	Civil Disturbance (Very Low)
	Scrap Fire Tires (Very Low)
	Dam Failures (Very Low)

Barry County's most severe and frequent hazards are extreme temperatures, severe winter conditions, and flooding in the past and on an annual basis. The most vulnerable is the aging community. The latest information of at-risk population is persons 65 years and over as 18.9 percent (11,633 persons) in Barry County with the latest population count of 61,550 population (July 2019). Please keep in mind the Hazards in the past 15 years:

Agency Representing_Barry County Planning_____

Name and Title:___James McManus Planning Director

Contact information:___269-945-1290

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Please review each question, and provide your opinions and email your responses to Rebecca.hart@2etc.com :

1.) Does your agency deem **severe weather** (temperature extremes and winter conditions) is still the highest hazard threat to Barry County residents (Vulnerability Assessment (44 CFR Part 201.4(c)(2)(ii) and (iii)) Note: Thorn Apple Lake, Jordan Lake, Delton area have been impacted with flooding in the past 15 years.? ____Yes ___x___No If no, please provide the highest hazard conditions that should be included in the HMP update:
Flooding and Ice storms have the greatest impact on Barry County Residents. When people are displaced for days or weeks because of a lack of access or power, it is huge risk to maintain and protect their residences.

2.) In reference to question 1. Does your agency have accumulated "costs of losses to assets" that occurred providing your community with aid during severe weather conditions (flooding conditions – repetitive losses)? ____Yes __x__No if yes, can you provide a brief cost to losses?

3.) FEMA has increased **downwind impact** hazard to 50-mile radius (July 2013). Barry County's SW corner (Lat North 42.423409 Long West -85.528322) is 40.59 miles ENE of Palisades Nuclear Plant, Covert, MI, that would potentially impact 9,000 people (10 miles into Barry County)

Prairieville Township 3,520 Cloverdale 1,000 Delton 872

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Orangeville Township 3,469 Hickory Corners 159

Does your agency deem this potential hazard to be ranked? ___Yes __x___No If so, please provide a Hazard Threat Rank ___High ___Significant _____Low __x__Very Low

4.) The 2005 HMP discusses development updates proposed:

- overhead electrical moved to underground and
- drain/drainage updates and include them in the update plan (Barry Township – Delton area). (44 CFR Part 201.4(d)).

Does your agency have information that these updates were performed, or due to circumstances, these proposed activities remain to be updated? ___Yes __x__No Please explain,

5.) In review of question 4. Does your agency have plans to updated or provide development for improvements? And Does your agency have further Proposed developments for this 5-year HMP update? ____Yes __x____No, if yes, Barry County is most interested in your agencies proposed developments:

6.) Mitigation Goals and Objective and Action Strategies Updates: Approximately 788 properties have been affected from flooding in the past 15 years In Barry County (NFIP and US Army Corp of Engineers data).

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Due to the popularity of the City of Grand Rapids (15 miles north of the county line) in the adjacent Kent County, Barry County has seen an increase in development in areas that may be sensitive to flooding and may need to provide a new or updated goal to include recent property development in floodplain areas (repetitive loss due to flooding) pursuant to 44 CFR Part 201.4(c)(3). Does your agency deem a limit/ordinance on infrastructure to prevent development within frequent floodplains to be beneficial to Barry County to future plans? __x__Yes ____No

Please explain

Barry County does have a floodplain ordinance for new development that requires structures to be built one foot above the floodplain elevation. Many of the structures that were impacted were existing structures that were built before the ordinance was in effect. Further, in places like Delton, there was no documentation of floodplain risk around the lakes, so new development was not subject to the ordinance

7.) Consider the current hazard rankings on Page 1. Does your agency deem that any changes or updates be made to the Hazard Rank Threat for each hazard? If so, please provide an explanation. (High, Significant, Low, Very Low)

Natural Hazards (Rank)

Winter Weather Hazards (High)

Extreme Temperatures (High)

Lightning (Significant)

Severe Winds (Significant)

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Riverine Flooding (Significant)

Tornadoes (Low)

It only takes one strong tornado to impact a community so this may need to be considered to be significant

Drought (Low)

Hail (Very Low)

Man-made Hazards (Rank)

Hazardous Materials Incidents - Transportation (High)

Terrorism/Sabotage – Small Scale (High)

War/Nuclear Attack/WMD- Large Scale (High)

While war needs to be listed, any war, nuclear attack, etc is likely going to exceed the capabilities of a local emergency management plan…not really practical for Barry County to plan for global chaos!

Structural Fires (Significant)

Infrastructure Failures (Low)

Road washouts and bridge/culvert failures are becoming more common due to the lack of infrastructure dollars….may want to upgrade this item

Pipeline Accidents – Oil/gas (Low)

QUESTIONNAIRE for HAZARD RANKING

Transportation Accidents – Emergency (Very Low)

Civil Disturbance (Very Low)

In this current state of the world, civil unrest is becoming more of a threat and Hastings as the county seat would be a target. There was a Barry County resident who was part of the kidnap the governor plan. I know we talk about the potential of civil unrest in our office often so this item may need to be elevated.

Scrap Fire Tires (Very Low)

Dam Failures (Very Low)

8.) Potential Low Hazard, Much of Barry County is agriculture and cattle/dairy farms. The potential hazards are low from methane; however, some dairy/cattle farms may have excessive nitrogen that can impact groundwater should a shallow water well contain elevated nitrogen (an odorless gas that displaces oxygen); can cause blue-baby syndrome by asphyxiation, this is a rare condition and requires much liquid fertilizer to be pumped by usage of a water well causing drawdown and infiltration of contaminants. Does your agency deem this to be considered on the Hazard Rank, or just educational information? ___Yes on Hazard Rank __x__No, educational info only

9.) Other Hazards, not discussed or considered, that your agency deems should be addressed in the Update to the HMP: (Barry County values your input and considerations)

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

THANK YOU FOR YOUR PARTICIPATION IN THIS CORROBORATION. If you have any questions, please feel free to contact Rebecca Hart, ETC at cell phone (734) 486-5661 or by email rebecca.hart@2etc.com .

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

CURRENT HAZARD RANKING FROM 2005 PLAN:

Hazard Threat Rating: Red - High Hazard Threat

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Natural Hazards (Rank)	Man-made Hazards (Rank)
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Extreme Temperatures (High)	Terrorism/Sabotage – Small Scale (High)
Lightning (Significant)	War/Nuclear Attack/WMD- Large Scale (High)
Severe Winds (Significant)	Structural Fires (Significant)
Riverine Flooding (Significant)	Infrastructure Failures (Low)
Tornadoes (Low)	Pipeline Accidents – Oil/gas (Low)
Drought (Low)	Transportation Accidents – Emergency (Very Low)
Hail (Very Low)	Civil Disturbance (Very Low)
	Scrap Fire Tires (Very Low)
	Dam Failures (Very Low)

Barry County's most severe and frequent hazards are extreme temperatures, severe winter conditions, and flooding in the past and on an annual basis. The most vulnerable is the aging community. The latest information of at-risk population is persons 65 years and over as 18.9 percent (11,633 persons) in Barry County with the latest population count of 61,550 population (July 2019). Please keep in mind the Hazards in the past 15 years:

Agency Representing:____Barry-Eaton District Health Department_____

Name and Title:____Colette Scrimger, Health Officer_____

Contact information:_____cscrimger@bedhd.org_____

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Please review each question, and provide your opinions and email your responses to Rebecca.hart@2etc.com :

1.) Does your agency deem **severe weather** (temperature extremes and winter conditions) is still the highest hazard threat to Barry County residents (Vulnerability Assessment (44 CFR Part 201.4(c)(2)(ii) and (iii)) Note: Thorn Apple Lake, Jordan Lake, Delton area have been impacted with flooding in the past 15 years.? ____Yes __X__No If no, please provide the highest hazard conditions that should be included in the HMP update: As of today, we would place the pandemic as the biggest threat.

2.) In reference to question 1. Does your agency have accumulated "costs of losses to assets" that occurred providing your community with aid during severe weather conditions (flooding conditions – repetitive losses)? ____Yes __X_No if yes, can you provide a brief cost to losses?

3.) FEMA has increased **downwind impact** hazard to 50-mile radius (July 2013). Barry County's SW corner (Lat North 42.423409 Long West -85.528322) is 40.59 miles ENE of Palisades Nuclear Plant, Covert, MI, that would potentially impact 9,000 people (10 miles into Barry County)

Prairieville Township 3,520	Cloverdale 1,000	Delton 872
Orangeville Township 3,469	Hickory Corners 159	

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Does your agency deem this potential hazard to be ranked? _X_Yes _____No If so, please provide a Hazard Threat Rank ___High X Significant ____Low ____Very Low

4.) The 2005 HMP discusses development updates proposed:

- overhead electrical moved to underground and
- drain/drainage updates and include them in the update plan (Barry Township – Delton area). (44 CFR Part 201.4(d)).

Does your agency have information that these updates were performed, or due to circumstances, these proposed activities remain to be updated? ___Yes _X_No Please explain,

5.) In review of question 4. Does your agency have plans to updated or provide development for improvements? And Does your agency have further Proposed developments for this 5-year HMP update? ____Yes __X_No, if yes, Barry County is most interested in your agencies proposed developments:

6.) Mitigation Goals and Objective and Action Strategies Updates: Approximately 788 properties have been affected from flooding in the past 15 years In Barry County (NFIP and US Army Corp of Engineers data).

Due to the popularity of the City of Grand Rapids (15 miles north of the county line) in the adjacent Kent County, Barry County has seen an increase in development in areas that may be sensitive to flooding and may need to provide a new or updated goal to include recent property

development in floodplain areas (repetitive loss due to flooding) pursuant to 44 CFR Part 201.4(c)(3). Does your agency deem a limit/ordinance on infrastructure to prevent development within frequent floodplains to be beneficial to Barry County to future plans? _X_Yes ____No Please explain

7.) Consider the current hazard rankings on Page 1. Does your agency deem that any changes or updates be made to the Hazard Rank Threat for each hazard? If so, please provide an explanation. (High, Significant, Low, Very Low)

Natural Hazards (Rank)

Winter Weather Hazards (High)

Extreme Temperatures (High)

Lightning (Significant)

Severe Winds (Significant)

Riverine Flooding (Significant)

Tornadoes (Low)

Drought (Low)

Hail (Very Low)

BARRY COUNTY
HAZARD MITIGATION UPDATE PLAN

QUESTIONNAIRE for HAZARD RANKING

Man-made Hazards (Rank)

Hazardous Materials Incidents - Transportation (High)

Terrorism/Sabotage – Small Scale (High)

War/Nuclear Attack/WMD- Large Scale (High)

Structural Fires (Significant)

Infrastructure Failures (Low)

Pipeline Accidents – Oil/gas (Low)

Transportation Accidents – Emergency (Very Low)

Civil Disturbance (Very Low)

Scrap Fire Tires (Very Low)

Dam Failures (Very Low)

8.) Potential Low Hazard, Much of Barry County is agriculture and cattle/dairy farms. The potential hazards are low from methane; however, some dairy/cattle farms may have excessive nitrogen

that can impact groundwater should a shallow water well contain elevated nitrogen (an odorless gas that displaces oxygen); can cause blue-baby syndrome by asphyxiation, this is a rare condition and requires much liquid fertilizer to be pumped by usage of a water well causing drawdown and infiltration of contaminants. Does your agency deem this to be considered on the Hazard Rank, or just educational information? _X__Yes on Hazard Rank ____No, educational info only

There are some inaccuracies in this question that are concerning and do not fully represent the actual risk. Contact Jay Van Stee, Environmental Health Director at BEDHD at 517-541-2618 if you need to discuss.

9.) Other Hazards, not discussed or considered, that your agency deems should be addressed in the Update to the HMP: (Barry County values your input and considerations) Pandemic and other emerging health threats such as PFAS, HABs, drinking water quality, etc.

THANK YOU FOR YOUR PARTICIPATION IN THIS CORROBORATION. If you have any questions, please feel free to contact Rebecca Hart, ETC at cell phone (734) 486-5661 or by email rebecca.hart@2etc.com .

Appendix B

Public Hearing Notice

Barry County Hazard Mitigation Plan Update
Public Hearing Notice for
August 18, 2021 Public Hearing

The County provided a regular public notice posting, which includes publication in the Hastings Banner of the Public Meeting that was held on August 18, 2021, in the Community Room of the County Building, Hastings, Michigan from 7:00 pm to 9:00 pm to explain the Barry County HMP Update.

A total of three (3) persons were present for the public meeting

1) James Yarger, Emergency Coordinator, Barry County, Michigan.
2) Rebecca Hart, Environmental Testing and Consulting, Inc., Romulus, MI.
3) One resident of Assyria Township.

Memo To: All governmental jurisdictions within and surrounding Barry County

From: Jim Yarger, Emergency Management Coordinator

Re: Hazard Mitigation Plan update 2021 Public Hearing

On August 18, 2021, the Barry County Emergency Management Department will hold a public hearing on the Draft Hazard Mitigation Plan for Barry County. The meeting will begin promptly at 7:00 PM in the Community Room of the Courts and Law Building in Hastings.

For your convenience, we will be posting the draft plan on our Planning website, www.barrycounty.org by August 4th. We invite you to review the plan and bring any questions or comments you have to the public hearing. Representatives from Environmental Testing and Consulting, Inc., our consultants, and the Emergency Management will be available to respond to your questions and to record any comments that may be able to be incorporated into the final document.

If you are unable to access the HMP, and would like a hard copy, please contact the Barry County Emergency Management and we will send one to you. Likewise, if you have any questions about the Planning process, feel free to contact Barry County.

The update to the HMP include, increase of 50 miles downwind of the Nuclear Power Plant (Section 6.2 of the HMP), Pandemics (very low hazard), and Nitrogen in drinking water wells (very low hazard).

We are also inviting County Planning Directors from the Counties of Eaton, Ionia, Kent, Kalamazoo, and Calhoun.

Appendix C

Community Input, Hazard Aspect Ratings

Hazard Aspect Ratings

Hazard Aspect	Always Very Important	Usually Important	Sometimes Important	Rarely of Importance	Not worth Considering	Total
Likelihood of Occurrence	19	2				**3.9**
Capacity to cause physical damages	9	10	1			**3.4**
Size of Affected Area	8	8	5			3.1
Speed of Onset (lack of warning time)	3	12	5	1		2.8
Percent of population affected	14	6				**3.7**
Potential for causing casualties	20		1			**3.9**
Potential for negative economics		4	16	1		2.1
Duration of threat from hazard	10	10	1			**3.4**
Seasonal risk pattern (all/part of year)		3	17	1		2.1
Environmental Impact	1	13	7			2.7
Predictability of hazard		6	11	3		2.2
Ability to mitigate hazard on local level	1	11	8			2.7
Availability of warning systems	4	12	1	1	2	2.8
Public awareness of hazard	2	4	9	3	1	2.2
Corollary effects (causing other hazards)	6	12	3			**3.1**
Other?						0.0

BOLD – selected aspects for the Barry County Hazard Ranking weighted average.

Appendix D

Community Input, Hazard Type Ratings

Hazard Type Rating

Please rate the following identified Hazard Potentials from 0-10; (0-Lowest Threat 10-Highest Threat)

Hazard Type	Likelihood of Occurrence (20%)	Potential for Causing Casualties (20%)	Percent of Population affected (18%)	Capacity to cause physical damage (15%)	Duration of threat from hazard (15%)	Corollary effects (causing other hazards) (12%)	Total	Probability
Extreme Temperatures	5	4	9	4	3	6	5.19	100%
Hazardous Material Incidents- transport	8	8	8	4	3	4	6.17	1/yr
War/Nuclear Attach/ WMD	1	5	7	6	5	10	5.31	*
Terrorism/ Sabotage	3	6	8	7	5	4	5.52	*
Tornadoes	5	6	2	6	2	7	4.6	50%
Winter weather hazards	10	5	10	5	4	10	7.35	100%
Structural Fires	5	5	2	8	2	4	4.34	*
Riverine Flooding	6	1	3	7	3	5	4.04	100%
Hail	8	1	5	6	2	1	4.02	100%
Severe Wind	8	2	2	4	2	7	4.1	35%
Lightening	9	3	3	5	1	8	4.8	35%
Pandemic (COVID-19)	8	1	3	1	2	1	3.27	100%
Drought	4	0	4	1	5	4	2.9	*
Infrastructure failures	6	2	5	2	3	5	3.85	*
Pipeline Accidents (Oil, Gas)	2	6	2	4	2	2	3.1	*
Civil Disturbances	3	3	1	4	1	1	2.25	1%
Scrap Tire Fires	2	1	2	1	2	3	1.77	*
Dam Failures	2	1	1	2	1	3	1.59	3%
Transportation Accidents (emergency level)	2	6	3	2	2	2	2.98	13/yr
Nitrogen in Drinking Water Wells	4	1	1	1	1	2	1.72	30%
Downwind to Nuclear Powerplant	1	1	1	3	2	2	1.57	*
Earthquakes	0	0	0	0	0	0	0	2.9%
Urban Flooding	4	1	1	1	1	1	1.6	*
Shoreline Flooding	0	0	0	0	0	0	0	*
Hazardous Materials Incidents – site	8	8	8	4	3	4	4.8	*
Subsidence (Surface Land collapse)	0	0	0	0	0	0	0	*

Very Low – Grey Low – Green Significant – Orange High- Red Not previously rated in 2005 or no pertinent incidents – Black *No major experiences or not enough info.

Appendix E

Drought Chart

Drought.gov
National Integrated Drought Information System

DATA & MAPS

Historical Data and Conditions

By looking back at historical data, communities can get a better understanding of the drought and extreme weather threats to be prepared for. The resources below help document and quantify historical drought conditions in order to help inform planning. Three historical drought datasets can be explored side by side: the U.S. Drought Monitor (weekly, 2000–present); Standardized Precipitation Index (monthly, 1895–present); and June-July-August Palmer Modified Drought Index values from tree-ring reconstructions and instrumental data (yearly, 0–2017).

54.8%
of the U.S. was in drought in September 2012, according to the U.S. Drought Monitor record since 2000

66.2%
of the lower 48 states were in drought in Summer 1934, the most in the lower 48, according to the Living Blended Drought Product since year 0

22.9%
of the U.S. was in Exceptional Drought (D4) in February 1977, according to the Standardized Precipitation Index (SPI) since 1895

82.3%
of the U.S. was Abnormally Wet in May 2019, the most according to the Standardized Precipitation Index (SPI) since 1895

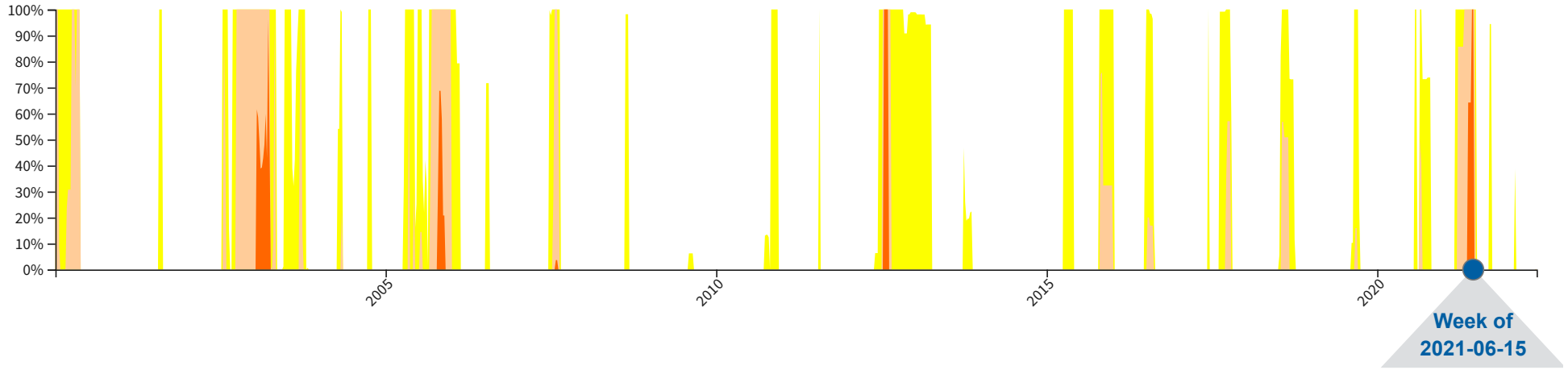
Explore Historical Drought Conditions in Barry County, MI

Share/Embed

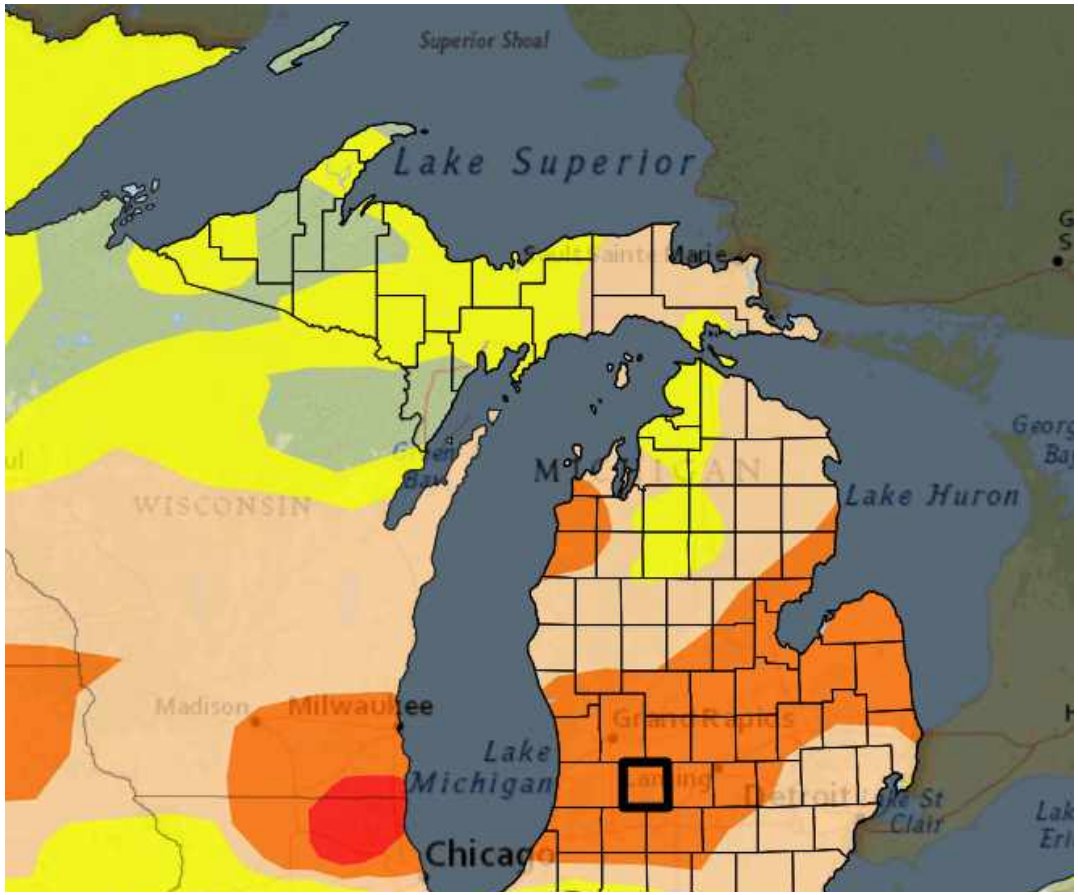
2000 - Present (Weekly) 1895 - Present (Monthly) 0 - 2017 (Yearly)

The U.S. Drought Monitor (USDM) is a national map released every Thursday, showing parts of the U.S. that are currently in drought. The USDM relies on drought experts to synthesize the best available data and work with local observers to interpret the information and is a joint effort of the National Drought Mitigation Center, U.S. Department of Agriculture, and National Oceanic and Atmospheric Administration. The USDM also incorporates ground truthing and information about how drought is affecting people, via a network of more than 450 observers across the country, including state climatologists, National Weather Service staff, Extension agents, and hydrologists. Learn more.

Time Period (Years): to Update Graph Reset Graph



Drag to update map and leg



D0 - Abnormally Dry
Grass fires increase
Lawns are brown; landscape and gardens are watered more frequently

100.00%
of Barry County
(D0-D4)

D1 - Moderate Drought
Most crops and vegetation are stressed; farmed Christmas trees are stressed
Well levels decline

100.00%
of Barry County
(D1-D4)

D2 - Severe Drought
Corn and soybean yields are low
Mature trees are stressed
Streamflow is extremely low, potentially too low to irrigate

100.00%
of Barry County
(D2-D4)

D3 - Extreme Drought
Fire danger is extreme; buildings are destroyed, and people are evacuated
Crop yields are down; irrigation costs rise
Power plants operate at reduced capacity or temporarily close

0.00%
of Barry County
(D3-D4)

D4 - Exceptional Drought
Michigan has experienced little or no exceptional (D4) drought, so there are no D4-level drought impacts recorded in the Drought Impact Reporter.

0.00%
of Barry County
(D4)

Impact descriptions are state level.

Combine Historical Data
This tool allows you to combine multiple states or counties, so you can view historical conditions for a custom region.

Combine States

Combine Counties

Download screenshot of this panel Download screenshot of this map

Get Historical Drought Data

Drought Since 2000
The U.S. Drought Monitor (USDM) is a map released every Thursday, showing parts of the

Drought Since 1895
Statewise time series graphs and downloadable data going back to 1895 from NOAA's National

Drought Since Year 0
The Living Blended Drought Product (LBDP) is a recalibrated data series of June-July-August

Appendix F

Hazardous Materials Traffic-Railroad

Hazardous materials carloads represent about 5 percent of total CSX carloads in Michigan.

*Data represents movements between **January 1 and December 31, 2015***

Class 1 - Explosives	<1%
Class 2 - Gases	38%
Class 3 - Flammable Liquids	21%
Class 4 - Other Flammable Substances	1%
Class 5 - Oxidizing Substances & Organic Peroxides	<1%
Class 6 - Toxic (Poisonous) & Infectious Substances	2%
Class 7 - Radioactive Material	<1%
Class 8 - Corrosives	17%
Class 9 - Miscellaneous Hazardous Materials	20%
Total	100%

https://www.csx.com/index.cfm/about-us/safety/hazardous-materials1/michigan/

FIRST RESPONDERS can download AskRail Mobile App launched in 2014 to connect with immediate access to accurate, timely data about what type of hazardous materials a railcar is carrying to make an informed decision about how to respond to a rail emergency.

CSX TRANSPORTATION
HAZARDOUS MATERIAL TRAFFIC (CARLOADS)
HAZMATS THROUGH BARRY COUNTY, MI
01/01/01 THRU 12/31/01

BY FREQUENCY

STCC CODE	SHIPPING NAME	HAZARD CLASS	ELMDALE GRAND LE
4907265	STYRENE MONOMER, INHIBITED	CLASS 3	577.0
4905421	PROPANE	CLASS 2.1	513.0
4905752	PETROLEUM GASES,LIQUEFIE	CLASS 2.1	349.0
4905752	LIQUEFIED PETROLEUM GAS		
4935240	SODIUM HYDROXIDE SOLUTIO	CLASS 8	263.0
4930247	PHOSPHORIC ACID	CLASS 8	187.0
4930228	HYDROCHLORIC ACID	CLASS 8	170.0
4930228	HYDROCHLORIC ACID		
4930228	SOLUTION		
4930040	SULFURIC ACID	CLASS 8	154.0
4930040	SULFURIC ACID		
4810560	WASTE	CLASS 3	94.0
4810560	FLAMMABLE LIQUIDS,		
4810560	N.O.S.		
4904210	AMMONIA, ANHYDROUS	CLASS 2.2	61.0
4904210	AMMONIA, ANHYDROUS,		
4904210	LIQUEFIED		
4904210	AMMONIA SOLUTIONS		
4960196	ENVIRONMENTALLY HAZARDOU	CLASS 9	59.0
4960196	SUBSTANCES, LIQUID,		
4960196	N.O.S.		
4908105	ACETONE	CLASS 3	58.0
4909230	METHANOL	CLASS 3	57.0
4909230	METHYL ALCOHOL		
4909152	DENATURED ALCOHOL	CLASS 3	48.0
4966109	OTHER REGULATED	CLASS 9	32.0
4966109	SUBSTANCES,		
4966109	LIQUID, N.O.S.		
4945770	SULFUR, MOLTEN	CLASS 9	30.0
4945770	SULFUR, MOLTEN		
4914256	PETROLEUM DISTILLATES,	CLASS CL	23.0
4914256	N.O.S.		
4914256	PETROLEUM PRODUCTS,		
4914256	N.O.S.		
4932329	FERROUS CHLORIDE,SOLUTIO	CLASS 8	21.0
4918723	SODIUM CHLORATE	CLASS 5.1	19.0

4920523	CHLORINE	CLASS 2.3	18.0
4960131	ENVIRONMENTALLY HAZARDOU	CLASS 9	18.0
4960131	SUBSTANCES, LIQUID,		
4960131	N.O.S.		
4915185	COMBUSTIBLE LIQUID,N.O.S	CLASS CL	17.0
4960133	ENVIRONMENTALLY HAZARDOU	CLASS 9	17.0
4960133	SUBSTANCES, SOLID,		
4960133	N.O.S.		
4909130	BUTANOLS	CLASS 3	16.0
4913230	COMBUSTIBLE LIQUID,N.O.S	CLASS CL	11.0
4912215	BUTYL ACRYLATES,	CLASS 3	8.0
4912215	INHIBITED		
4905791	PROPANE	CLASS 2.1	6.0
4809188	WASTE	CLASS 3	5.0
4809188	FLAMMABLE LIQUIDS,		
4809188	N.O.S.		
4909305	TOLUENE	CLASS 3	5.0
4909382	PETROLEUM DISTILLATES,	CLASS 3	5.0
4909382	N.O.S.		
4909382	PETROLEUM PRODUCTS,		
4909382	N.O.S.		
4830201	WASTE	CLASS 8	4.0
4830201	CORRROSIVE LIQUIDS,		
4830201	N.O.S.		
4835258	WASTE CORROSIVE LIQUID,	CLASS 8	4.0
4835258	BASIC, INORGANIC,		
4835258	N.O.S.		
4905417	PETROLEUM GASES,	CLASS 2.1	4.0
4905417	LIQUEFIED		
4905417	LIQUEFIED PETROLEUM		
4905417	GAS		
4909205	ISOPROPANOL	CLASS 3	4.0
4909205	ISOPROPYL ALCOHOL		
4909205	ISOPROPYL ALCOHOL		
4936655	CORROSIVE LIQUIDS, N.O.S	CLASS 8	4.0
4908225	METHYL FORMATE	CLASS 3	3.0
4908255	PENTANES	CLASS 3	3.0
4908255	ISOPENTANE		
4912079	CYCLOHEXANONE	CLASS 3	3.0
4914007	ALCOHOLS, N.O.S.	CLASS CL	3.0
4917404	PARAFORMALDEHYDE	CLASS 4.1	3.0
4921598	PHENOL, MOLTEN	CLASS 6.1	3.0
4905419		FLAMMABLE GAS	2.0

4905789 BUTANE 4905789 BUTANE MIXTURES	CLASS 2.1	2.0
4907219 DICYCLOPENTADIENE	CLASS 3	2.0
4907230 ISOPRENE, INHIBITED	CLASS 3	2.0
4909349 XYLENES	CLASS 3	2.0
4905414 METHYLAMINE, ANHYDROUS	CLASS 2.1	1.0
4909381 METHANOL 4909381 METHYL ALCOHOL	CLASS 3	1.0
4909383 PETROLEUM DISTILLATES, 4909383 N.O.S. 4909383 PETROLEUM PRODUCTS, 4909383 N.O.S.	CLASS 3	1.0
4912498 DIESEL FUEL	CLASS 3	1.0
4915209 COMBUSTIBLE LIQUID,N.O.S	CLASS CL	1.0
4918765 SODIUM CHLORATE, AQUEOUS 4918765 SOLUTION	CLASS 5.1	1.0
4920508 SULFUR DIOXIDE 4920508 SULFUR DIOXIDE, 4920508 LIQUEFIED	CLASS 2.3	1.0
4921496 DRUGS, SOLID, N.O.S.	POISON B	1.0
4930022 HYDROFLUORIC ACID 4930022 HYROFLOURIC ACID 4930022 SOLUTION	CLASS 8	1.0
4960149 ELEVATED TEMPERATURE 4960149 LIQUID, N.O.S.	CLASS 9	1.0
4963399 ENVIRONMENTALLY HAZARDOU 4963399 SUBSTANCES,SOLID,N.O.S.	CLASS 9	1.0
TOTAL		2,900.0

CSX TRANSPORTATION
HAZARDOUS MATERIAL TRAFFIC (CARLOADS)
HAZMATS THROUGH BARRY COUNTY, MI
01/01/01 THRU 12/31/01

BY HAZARD CLASS

STCC CODE	HAZARD CLASS	SHIPPING NAME	ELMDALE GRAND LE
4913230	CLASS CL	COMBUSTIBLE LIQUID,N.O.S	11.0
4914007	CLASS CL	ALCOHOLS, N.O.S.	3.0
4914256	CLASS CL	PETROLEUM DISTILLATES,	23.0
4914256		N.O.S.	
4914256		PETROLEUM PRODUCTS,	
4914256		N.O.S.	
4915185	CLASS CL	COMBUSTIBLE LIQUID,N.O.S	17.0
4915209	CLASS CL	COMBUSTIBLE LIQUID,N.O.S	1.0
4905414	CLASS 2.1	METHYLAMINE, ANHYDROUS	1.0
4905417	CLASS 2.1	PETROLEUM GASES,	4.0
4905417		LIQUEFIED	
4905417		LIQUEFIED PETROLEUM	
4905417		GAS	
4905421	CLASS 2.1	PROPANE	513.0
4905752	CLASS 2.1	PETROLEUM GASES,LIQUEFIE	349.0
4905752		LIQUEFIED PETROLEUM GAS	
4905789	CLASS 2.1	BUTANE	2.0
4905789		BUTANE MIXTURES	
4905791	CLASS 2.1	PROPANE	6.0
4904210	CLASS 2.2	AMMONIA, ANHYDROUS	61.0
4904210		AMMONIA, ANHYDROUS,	
4904210		LIQUEFIED	
4904210		AMMONIA SOLUTIONS	
4920508	CLASS 2.3	SULFUR DIOXIDE	1.0
4920508		SULFUR DIOXIDE,	
4920508		LIQUEFIED	
4920523	CLASS 2.3	CHLORINE	18.0
4809188	CLASS 3	WASTE	5.0
4809188		FLAMMABLE LIQUIDS,	
4809188		N.O.S.	
4810560	CLASS 3	WASTE	94.0
4810560		FLAMMABLE LIQUIDS,	
4810560		N.O.S.	
4907219	CLASS 3	DICYCLOPENTADIENE	2.0
4907230	CLASS 3	ISOPRENE, INHIBITED	2.0
4907265	CLASS 3	STYRENE MONOMER,	577.0

4907265		INHIBITED	
4908105	CLASS 3	ACETONE	58.0
4908225	CLASS 3	METHYL FORMATE	3.0
4908255	CLASS 3	PENTANES	3.0
4908255		ISOPENTANE	
4909130	CLASS 3	BUTANOLS	16.0
4909152	CLASS 3	DENATURED ALCOHOL	48.0
4909205	CLASS 3	ISOPROPANOL	4.0
4909205		ISOPROPYL ALCOHOL	
4909205		ISOPROPYL ALCOHOL	
4909230	CLASS 3	METHANOL	57.0
4909230		METHYL ALCOHOL	
4909305	CLASS 3	TOLUENE	5.0
4909349	CLASS 3	XYLENES	2.0
4909381	CLASS 3	METHANOL	1.0
4909381		METHYL ALCOHOL	
4909382	CLASS 3	PETROLEUM DISTILLATES,	5.0
4909382		N.O.S.	
4909382		PETROLEUM PRODUCTS,	
4909382		N.O.S.	
4909383	CLASS 3	PETROLEUM DISTILLATES,	1.0
4909383		N.O.S.	
4909383		PETROLEUM PRODUCTS,	
4909383		N.O.S.	
4912079	CLASS 3	CYCLOHEXANONE	3.0
4912215	CLASS 3	BUTYL ACRYLATES,	8.0
4912215		INHIBITED	
4912498	CLASS 3	DIESEL FUEL	1.0
4917404	CLASS 4.1	PARAFORMALDEHYDE	3.0
4918723	CLASS 5.1	SODIUM CHLORATE	19.0
4918765	CLASS 5.1	SODIUM CHLORATE, AQUEOUS	1.0
4918765		SOLUTION	
4921598	CLASS 6.1	PHENOL, MOLTEN	3.0
4830201	CLASS 8	WASTE	4.0
4830201		CORRROSIVE LIQUIDS,	
4830201		N.O.S.	
4835258	CLASS 8	WASTE CORROSIVE LIQUID,	4.0
4835258		BASIC, INORGANIC,	
4835258		N.O.S.	
4930022	CLASS 8	HYDROFLUORIC ACID	1.0
4930022		HYROFLOURIC ACID	
4930022		SOLUTION	
4930040	CLASS 8	SULFURIC ACID	154.0

4930040		SULFURIC ACID	
4930228	CLASS 8	HYDROCHLORIC ACID	170.0
4930228		HYDROCHLORIC ACID	
4930228		SOLUTION	
4930247	CLASS 8	PHOSPHORIC ACID	187.0
4932329	CLASS 8	FERROUS CHLORIDE,SOLUTIO	21.0
4935240	CLASS 8	SODIUM HYDROXIDE SOLUTIO	263.0
4936655	CLASS 8	CORROSIVE LIQUIDS, N.O.S	4.0
4945770	CLASS 9	SULFUR, MOLTEN	30.0
4945770		SULFUR, MOLTEN	
4960131	CLASS 9	ENVIRONMENTALLY HAZARDOU	18.0
4960131		SUBSTANCES, LIQUID,	
4960131		N.O.S.	
4960133	CLASS 9	ENVIRONMENTALLY HAZARDOU	17.0
4960133		SUBSTANCES, SOLID,	
4960133		N.O.S.	
4960149	CLASS 9	ELEVATED TEMPERATURE	1.0
4960149		LIQUID, N.O.S.	
4960196	CLASS 9	ENVIRONMENTALLY HAZARDOU	59.0
4960196		SUBSTANCES, LIQUID,	
4960196		N.O.S.	
4963399	CLASS 9	ENVIRONMENTALLY HAZARDOU	1.0
4963399		SUBSTANCES,SOLID,N.O.S.	
4966109	CLASS 9	OTHER REGULATED	32.0
4966109		SUBSTANCES,	
4966109		LIQUID, N.O.S.	
4905419	FLAMMABLE GAS		2.0
4921496	POISON B	DRUGS, SOLID, N.O.S.	1.0
TOTAL			2,900.0

Appendix G

Documentation of Adoption

Resolution

RESOLUTION TO ADOPT THE 2021 BARRY COUNTY HAZARD MITIGATION PLAN

WHEREAS, the Mission of Barry County Emergency Management includes protecting the health, safety, and general welfare of the people of Barry County; and

WHEREAS, the County of Barry, Michigan is subject to flooding, tornadoes, winter storms, and other natural, technological, and human hazards; and

WHEREAS, the Barry County Hazard Mitigation Plan Advisory Committee, comprised of representatives from the County, municipalities, and stakeholder organizations, has prepared a recommended Hazard Mitigation Plan that reviews the options to protect people and reduce damage from these hazards; and

WHEREAS, the County of Barry has participated in the planning process for development of this Plan, providing information specific to local hazard priorities, encouraging public participation, identifying desired hazard mitigation strategies, and reviewing the draft Plan; and

WHEREAS, Barry County Emergency Management, together with Environmental Testing and Consulting, has developed the BARRY COUNTY HAZARD MITIGATION PLAN (the "Plan") as an official document of the County and established a County Hazard Mitigation Coordinating Committee, pursuant to the Disaster Mitigation Act of 2000 (PL-106-390) and associated regulations (44 CFR 210.6); and

WHEREAS, the Plan has been widely circulated for review by the County's residents, municipal officials, and state, federal, and local review agencies and has been revised to reflect their concerns;

NOW THEREFORE BE IT RESOLVED, by the Barry County Board of Commissioners, Michigan, this 14th day of December 2021 that approval be, and is hereby granted authorizing the adoption of the Barry County Hazard Mitigation Plan as an official plan of the County of Barry, Michigan; and

BE IT FURTHER RESOLVED, that the Barry County Emergency Management Coordinator is charged with supervising the implementation of the Plan's recommendations, as they pertain to the County of Barry, and within the funding limitations as provided by the Barry County Board of Commissioners or other sources.

Passed by the Barry County Board of Commissioners on December 14, 2021.

Jim Yarger
Barry County Emergency Management Coordinator

Benjamin D. Geiger, Chairperson
Barry County Board of Commissioners

Adopted 12/14/21

Appendix H

Heat Stress/Heat Stroke/ Cold Stress Information

Heat Stress and Cold Stress Mitigation

Heat Stress occurs when the body cannot get rid of excess heat and the body's core temperature rises, and if not treated can progress to Heat Exhaustion, then worst-case Heat Stroke.

Heat Stress Symptoms:

- Thirst (first sign of dehydration)
- Profuse Sweating
- Irritability
- Confusion or Loss of Concentration
- Fatigue
- Nausea
- Muscle Cramps
- Loss of Appetite
- Heat Rash

Heat Exhaustion Symptoms:

- Dizziness
- Fainting
- Fatigue
- Headache
- Muscle or Abdominal Cramps
- Diarrhea
- Pale Skin
- Profuse Sweating

Heat Stroke is a condition caused by the body overheating due to prolonged exposure to physical exertion in high temperatures and can occur when body temperature reaches 104°F (40°C); classified as either "classic" or "extertional" (strenuous exertion) heat stroke, the latter is more common in workplace settings; usually hot and dry, but even hot and sweating can be an indication of heat stroke according to studies [Source: NIOSH, CDC].

Heat Stroke Symptoms (Emergency and Seek Immediate Medical Treatment):

- Confusion or Agitation

- Slurred speech
- Delirium (seeing things that are not present- “Oasis in a Desert” or mirage is a common delirium)
- Fainting
- Coma
- Seizures
- Body Core Temperature at 104°F (40°C)
- Altered Mental State or Behavior

Mitigating Heat Stress and Heat Stroke:

Identifying the symptoms is the first step to mitigating a potentially dangerous situation, and the number one way is to use the **Buddy System**.

- Awareness and education on Heat Stress and Heat Stroke
- **Monitor each other** for flushed or pale skin, sweating, and talk to one another and monitor for slowed speech, confusion, difficulty with words, lethargy, and either sweating or too dry (historically, dry was indicative of a potential heat stroke). If your Buddy faints, if they are sweating was indicative of heat exhaustion, and if dry this is potentially indicative of a heat stroke, but new studies say that even sweating can be indicative of a heat stroke.
- If in heat <2 hours should drink water every 15-20 minutes, and if all day in heat should include electrolytes
- Use of potable water <59° (<15°C)
- Find shade or Air Conditioning to cool body core temperature
- Work 50 minutes and take a 10-minute rest, preferably in a cool area (AC or shade), should have an umbrella nearby if no shade or AC is available.
- If one should lose power due to high use of local AC units, fill a tub with cool water and step in (careful of water depth of only 2 to 4 Inches, in case of loss of consciousness)
- **EMERGENCY, Seek immediate medical assistance with signs of a Heat Stroke**

For more technical guidance, the below is a source from NIOSH and CDC:

https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf?id=10.26616/NIOSHPUB2016106

Heat Stress and Cold Stress Mitigation

Cold Stress

According to OSHA, **Cold Stress** occurs by driving down the skin temperature, and eventually the internal body temperature; when the body is unable to warm itself, serious cold-related illnesses and injuries may occur, such as trench foot, frostbite, and hypothermia. Again, as in Heat Stress, use the "Buddy System," and monitor each other when working or being outside in cold weather. Wind chill can be a factor in exposure to severe cold weather in Michigan. Schools in Michigan are required to close if the temperature is -2°F due to a cold wait at school bus stops and emergency vehicles needed for salting roads. This information is to aid one on the education and prevention of succumbing to Cold Stress.

Trench foot is caused by prolonged exposure to wet and cold conditions and symptoms include reddening skin, tingling, pain swelling, leg cramps, numbness, and blisters. CALL for IMMEDIATE MEDICAL ATTENTION, or seek medical assistance as soon as possible.

- Remove wet shoes/ boots and socks
- Dry the feet and avoid working on them
- Keep affected feet elevated and avoid walking

Frostbite is caused by the freezing of the skin and tissues and can cause permanent damage to the body. People with reduced blood circulation or not properly dressed for extremely cold temperatures are in danger of frostbite; reddened skin develops gray/white patches on fingers, toes, nose, or ear lobes, tingling, aching, a loss of feeling, firm/hard, and blisters. CALL for IMMEDIATE MEDICAL ATTENTION, or seek medical assistance as soon as possible.

- Do NOT break blisters
- Do NOT apply snow or water
- Do NOT rub affected areas on the skin
- Do NOT rewarm the area before getting medical attention (can become frozen again)
- Give sweet warm drinks (no alcohol)

Hypothermia occurs when the body temperature drops below 95°F, then the body begins to use stored energy in a prolonged cold situation; shivering, loss of coordination, confusion, slurred speech, heart

rate/breathing slow, unconsciousness. CALL for IMMEDIATE MEDICAL ATTENTION, or seek medical assistance as soon as possible.

Cold Stress Mitigation

Measures can be taken when being and working in severe cold weather to prepare for potential emergency situations:

- **Be aware of weather forecast**; before going outside, watch the weather forecast and prepare
- Keep a **Cellphone** or two-way radio with you and make sure the battery charge is full for the amount of time being in the cold.
- **Buddy System**, monitor each other for signs of Cold Stress
- **Dress in layers**; for footwear, cold weather layers can include
    - **nylon** near the skin (socks) to keep the skin from drying out instead of cotton (some people may experience dry rash patches with cotton directly on the skin), followed by
    - **cotton** for absorbing sweat near the skin, with a final layer of
    - **wool** hunting socks and then
    - **boots** (get one to two sizes larger to fit all the footwear protection), especially if wearing steel-toe workboats.
- Drink warm sweet drinks (not alcohol), keep a thermos nearby
- Seek warm shelter and take periodic breaks (vehicle, building); try to **keep at least ½ tank fuel** in vehicle at all times in case of emergency (stranded in storm, or need to seek assistance with no power to fueling stations)
- Hand warmers can be used inside gloves (hands) and socks (feet)
- Keep away from downed electrical wires; downed energized power lines
- Keep away from tree limbs that are stressed from the weight of snow or ice
- Do not break icicles that are above (fall with injury could occur)
- Slipping on ice or snow; wear proper rubberized footwear, take shorter steps, and walk slower
- **Do not leave a vehicle**, if stranded, keep the exhaust pipe clear of snow to prevent carbon monoxide poisoning
- **Turn on Dome Light** in vehicle for added visibility to on-comers to find you
- Do minor exercises to maintain good blood circulation
- Keep blankets in the vehicle for added warmth (use car mats, newspapers, and maps, too)

Heat Stress and Cold Stress Mitigation

For additional information; https://www.osha.gov/winter-weather/hazards

Appendix I

SARA Title III Toxic Release Inventory; Wastes

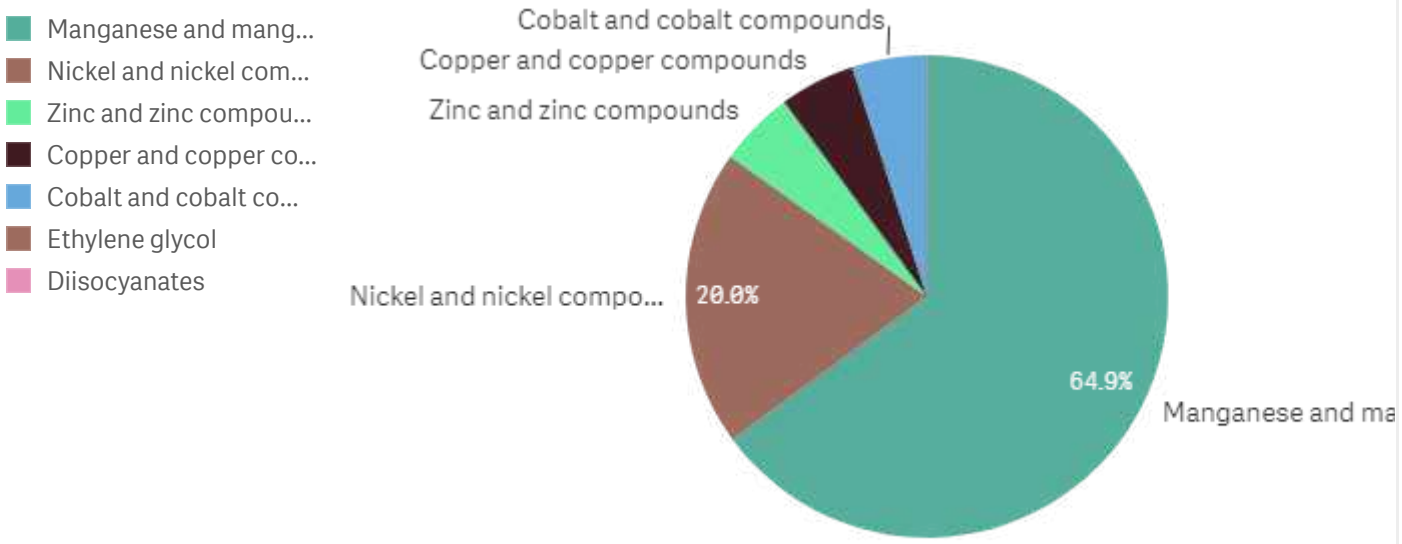
Facility Summary for BRADFORD WHITE CORP - 49333BRDFR200LA

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 265,825 lb



** The data set contains negative or zero values that cannot be shown in this chart.*

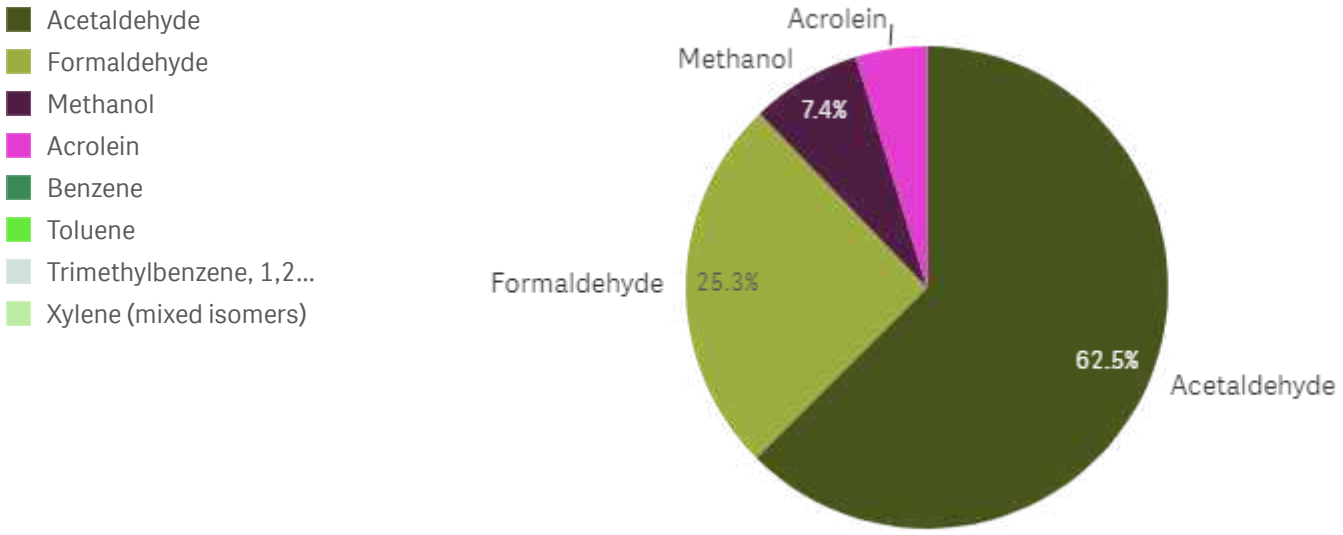
Facility Summary for CARBON GREEN BIOENERGY - 48849SBWDB7795S

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 12,196 lb



** The data set contains negative or zero values that cannot be shown in this chart.*

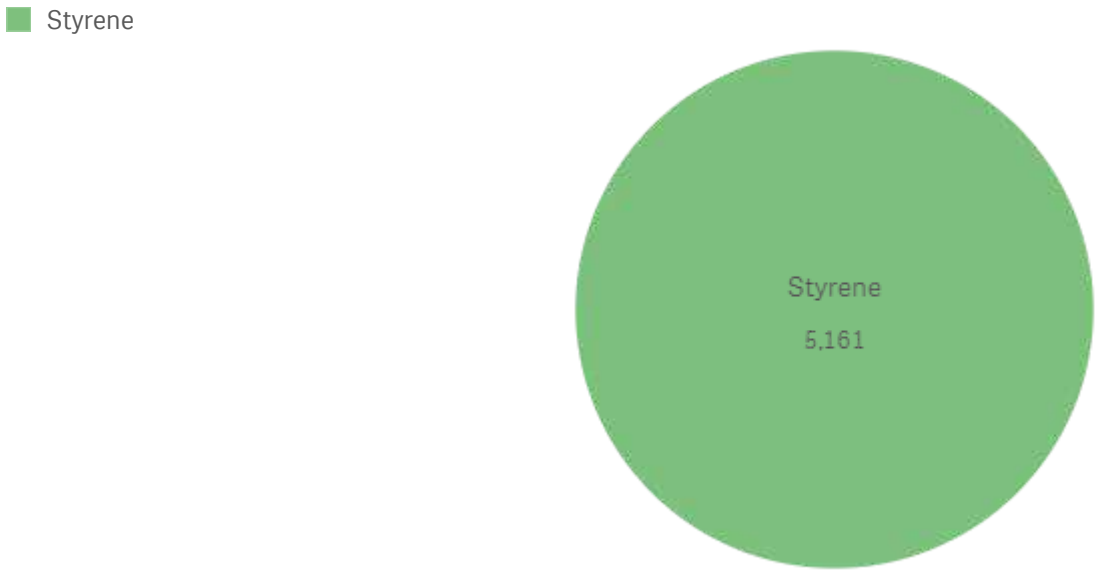
Facility Summary for HASTINGS FIBERGLASS PRODUCTS - 4905WHSTNG131WG

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 5,161 lb



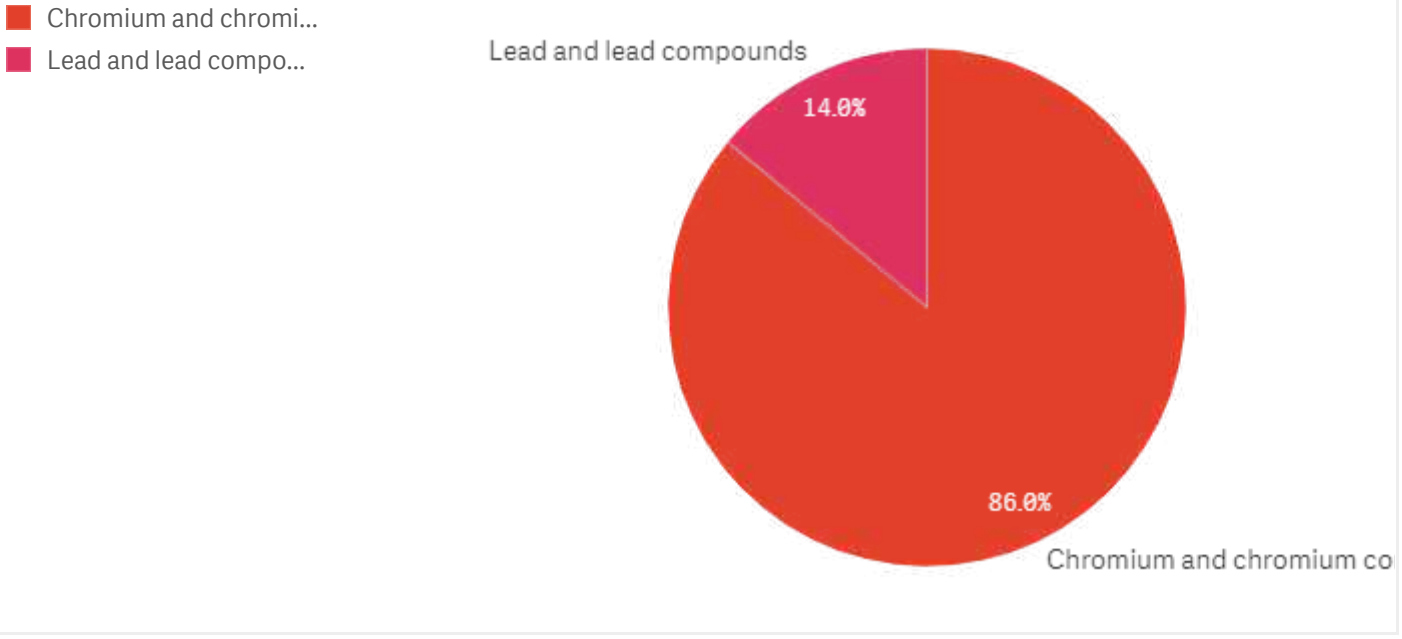
Facility Summary for HASTINGS MANUFACTURING CO - 49058HSTNG325NO

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 12,686 lb



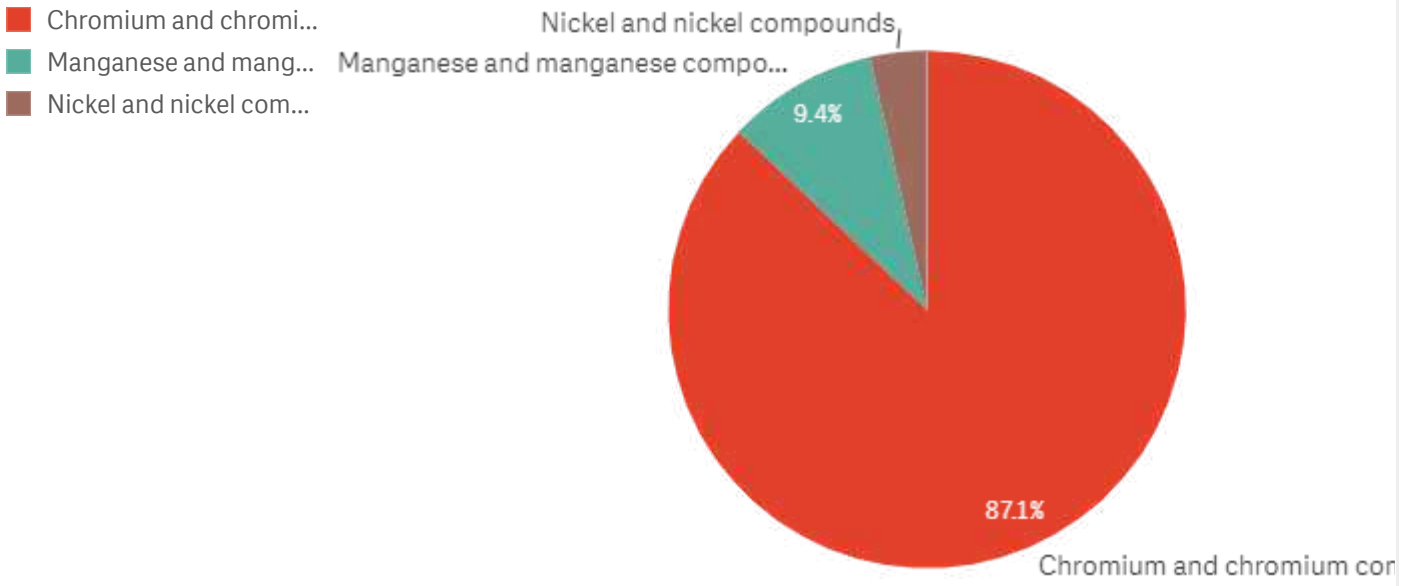
Facility Summary for MIDDLEVILLE TOOL & DIE CO INC - 4933WMDDLV19PAT

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 537,396 lb



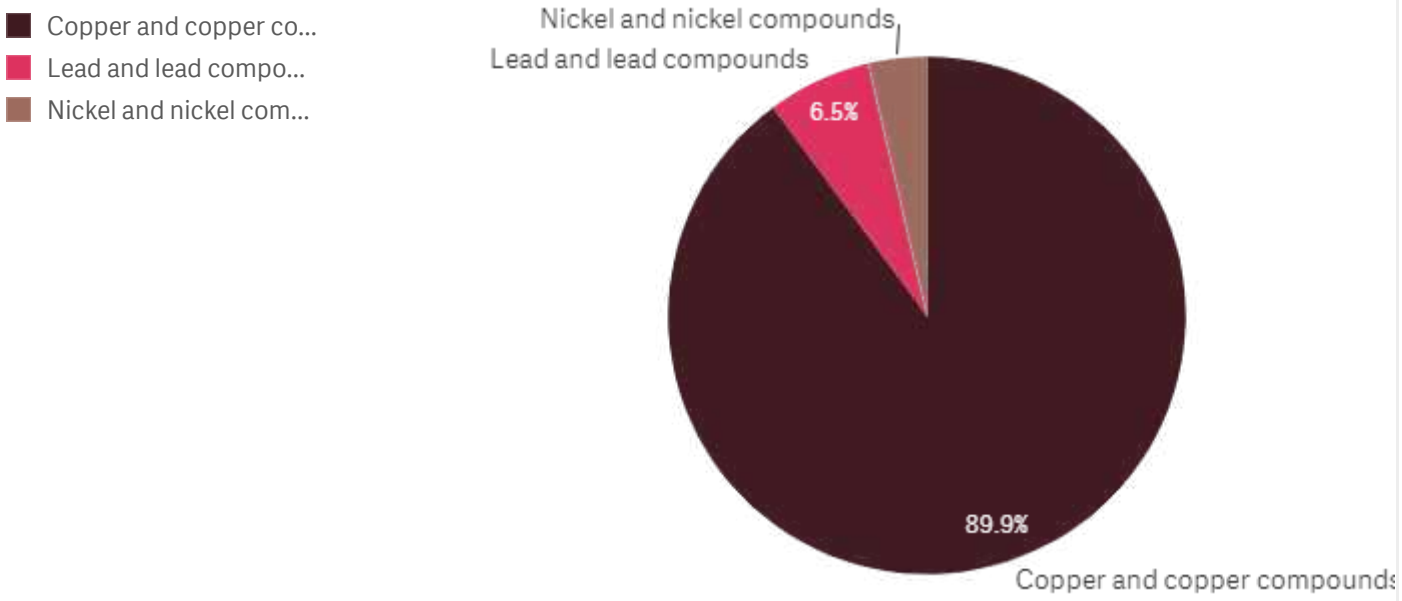
Facility Summary for VIKING CORP - 49058VKNGC21NIN

Waste Managed

Facilities report how much of each chemical is recycled, burned for energy recovery, and treated, as well as how much is disposed of or otherwise released during normal production; these are all waste management methods. Facilities also report the quantity of chemicals emitted in the event of a one-time incident, such as a spill or fire; these are also included in “waste management."

Waste Management by Chemical for 2019

Total Waste Managed: 944,512 lb



City of *Hastings* Michigan

(269) 945-2468
FAX (269) 948-9544

201 E. State Street 49058

• *City Manager*

August 23, 2005

Mr. Jim McManus
Barry County Planning Director
220 West State Street
Hastings, MI 49058

Re: Barry County Hazard Mitigation Plan

Dear Jim:

Attached please find a resolution of support for the Barry County Hazard Mitigation Plan, as well as a memorandum from me to the City Council presenting recommendations regarding appropriate responses to the draft plan as presented by Barry County. The City Council asked that we forward the memo to you and inform you that the Council supported the position as expressed in the memo. Please let me know if you have any questions regarding this matter.

Sincerely,

Jeff

Jeff Mansfield
City Manager

City Of Hastings
COUNTY OF BARRY, STATE OF MICHIGAN

RESOLUTION 2005-37

BARRY COUNTY HAZARD MITIGATION PLAN

WHEREAS, the City of Hastings, Michigan has experienced repetitive disasters that have damaged commercial, residential and public properties, displaced citizens and businesses, closed streets and bridges dividing the community both physically and emotionally, and presented general public health and safety concerns; and

WHEREAS, Barry County has prepared a Hazard Mitigation Plan that outlines the community's options to reduce overall damage and impact from natural and technological hazards; and

WHEREAS, the Hazard Mitigation Plan has been reviewed by community residents, business owners, and federal, state and local agencies, and has been revised to reflect their concerns; now

THEREFORE, BE IT RESOLVED that:

The Hazard Mitigation Plan is hereby reflective of the concerns of the City of Hastings, Michigan, and the recommendations contained within the Hazard Mitigation Plan are agreeable and formally represent the concerns of the citizens of the City of Hastings, Michigan.

The City of Hastings, Michigan will give priority attention to the following action strategies recommended by the Hazard Mitigation Plan:

Priority 1: Action Strategy Number 3 - Conduct Additional Research.
Priority 2: Action Strategy Number 1 - Adopt Hazard Mitigation Plan.
Priority 3: Action Strategy Number 2 - Create Hazard Mitigation Committee.
Priority 4: Action Strategy Number 6 - Educate and Encourage the Public.
Priority 5: Action Strategy Number 5 - Continue and Improve Cooperation.

Motion by Townsend, with support by Cybulski, that the above Resolution be adopted as read.

Yeas: Bowers, Cybulski, Hawkins, Jasperse, McIntyre, Townsend, Tubbs, and May.
Nays: None.
Absent: Campbell.

MOTION DECLARED ADOPTED.

I hereby certify that the foregoing resolution was adopted at a duly held and attended regular meeting the 22nd day of August 2005, by the City Council of the City of Hastings, by a vote of eight members voting in favor thereof and zero members voting against.

Thomas E. Emery
City Clerk

BARRY COUNTY HAZARD MITIGATION PLAN RESOLUTION

THORNAPPLE TOWNSHIP, MIDDLEVILLE, MICHIGAN

RESOLUTION No. 03-2005

Whereas, Thornapple Township, Michigan, has experienced disasters that have damaged commercial, residential and public properties, displaced citizens and businesses, closed streets and bridges dividing the community both physically and emotionally, and presented general public health and safety concerns; and

Whereas Barry County has prepared a Hazard Mitigation Plan that outlines the community's options to reduce overall damage and impact from natural and technological hazards; and

Whereas the Hazard Mitigation Plan has been reviewed by community residents, business owners, and federal, state and local agencies, and has been revised to reflect their concerns;

Now therefore, be it resolved that:

The Hazard Mitigation Plan is hereby reflective of the concerns of Thornapple Township, Michigan, and the recommendations contained within the Hazard Mitigation Plan are agreeable and formally represent the concerns of the citizens of Thornapple Township, Michigan.

Motion by Boysen, second by Vlietstra to adopt Resolution No. 03-2005.

Ayes: Boysen, Vlietstra, Buckowing, Eavey, Kelley, Harrison, Schad.

Nayes: None

Absent: None

Resolution declared adopted this 9th day of May, 2005.

Donald E. Boysen, Supervisor

Susan J. Vlietstra, Clerk

STATE OF MICHIGAN)
)
COUNTY OF BARRY)

I, the undersigned, the duly qualified clerk of the Township of Thornapple, Michigan do hereby certify that the foregoing is a true and accurate copy of a resolution adopted by the Township Board at a meeting on May 9, 2005.

Dated May 10, 2005

Susan J. Vlietstra, Clerk

been sent to Ron. Motion by Harrison, support by Eavey, to place an ad in local papers for people who wish to be considered for this appointment, with a deadline of June 1. Roll call vote: Vlietstra, yes; Boysen, yes; Buckowing, yes; Eavey, yes; Harrison, yes; Kelley, yes; Schad, yes. Motion carried.

Emergency Services report

15. Chief Marentette reported 104 calls for the month which is an increase over last year. He noted that the calls on brush fires have lessened. The Chief gave Board members a list of ways the Emergency Services would recommend toward the Township's cost reduction project. Schad suggested this list be given to the Finance Committee for their review and present a proposal for budget reductions at the June board meeting.

16. Marentette provided Board members with data concerning Fire Services Operating Cost per capita comparison and Cost per call comparison in Yankee Springs and Irving Townshps by different departments. The Chief also noted the Service has been provided with Accountability Scanners through the Barry County Emergency Management team.

17. Motion by Boysen, support by Eavey, authorizing Chief Marentette to negotiate a plan for the Barry County Red Cross to store disaster supplies in the Emergency Services building. Roll call vote: Boysen, yes; Buckowing, yes; Eavey, yes; Harrison, yes; Kelley, yes; Schad, yes; Vlietstra, yes. Motion carried.

18. Motion by Vlietstra, support by Eavey, to waive fee for ambulance on duty for 3 to 4 hours at the Pennock Foundation triathalon fundraiser on July 23. Roll call vote: Buckowing, yes; Eavey, yes; Harrison, yes; Kelley, yes; Schad, yes; Vlietstra, yes; Boysen, yes. Motion carried.

19. Marentette reported leaking pipes in the Emergency Services building. This is being discussed with architect.

Old business

20. Motion by Boysen, support by Vlietstra, to adopt Resolution 03-2005, the Barry County Hazard Mitigation Plan. Roll call vote: Eavey, yes; Harrison, yes; Kelley, yes; Schad, yes; Vlietstra, yes; Boysen, yes; Buckowing, yes. Motion carried.

New Business

21. Motion by Eavey, support by Buckowing, to appoint Shirley Eaton as the Township's representative to the Middleville LDFA for a term ending March 9, 2008. Roll call vote: Harrison, yes; Kelley,

HOPE TOWNSHIP RESOLUTION 2005-9

WHEREAS Barry County has prepared a Hazard Mitigation Plan that outlines the community's options to reduce overall damage and impact from natural and technological hazards; and

WHEREAS, the Hope Township Board of Trustees have read the proposed Barry County Hazard Mitigation Plan; and

WHEREAS, Hope Township supports Barry County and the Barry County Hazard Mitigation Plan;

NOW, THEREFORE, BE IT RESOLVED THAT;

The Hazard Mitigation Plan is hereby reflective of the concerns of Hope Township, Hastings, Michigan, and the recommendations contained within the Hazard Mitigation Plan are agreeable and formally represent the concerns of the citizens of Hope Township, Hastings, Michigan.

Board member Arlene Tonkin moved the adoption of this resolution, supported by member Meryl Peake.

Roll call: Yeas: John Woods, Linda Eddy-Hough, Arlene Tonkin, Meryl Peake and Patricia Albert.
Nays: None
Absent: None

Resolution declared adopted.

I, Linda Eddy-Hough, as Hope Township Clerk, Barry County MI, hereby certify that the foregoing resolution was duly adopted by the Hope Township Board at a regular meeting of said board at which a quorum was present as held on August 8, 2005.

Dated: August 8, 2005

Linda Eddy-Hough
Hope Township Clerk

U.S. Department of Homeland Security
FEMA Region 5
536 S. Clark St., Floor 6
Chicago, IL 60605-1509

FEMA

April 20, 2023

Mr. Matt Schnepp
State Hazard Mitigation Officer
Michigan State Police
Emergency Management and Homeland Security Division
P.O. Box 30634
Lansing, MI 48909

Dear Mr. Schnepp:

Thank you for submitting the 2023 Barry County Hazard Mitigation Plan Update for our review. The plan was reviewed based on the local plan criteria contained in 44 CFR Part 201, as authorized by the Disaster Mitigation Act of 2000. The plan met the required criteria for a multi-jurisdiction hazard mitigation plan. Formal approval of this plan is contingent upon the adoption by the participating jurisdictions of this plan. Once FEMA Region 5 receives documentation of adoption from the participating jurisdictions, we will send a letter of official approval to your office.

We look forward to receiving the adoption documentation and completing the approval process for the 2023 Barry County Hazard Mitigation Plan Update.

If there are any questions from either you or the communities, please contact Meghan Cuneo, at (202) 615-5294 or email at Meghan.Cuneo@fema.dhs.gov.

Sincerely,

John Wethington
Chief (acting), Risk Analysis Branch
Mitigation Division

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Barry County, MI	**Title of Plan:** Barry County HMP	**Date of Plan:** December 2022
Local Point of Contact: Rebecca Hart		**Address:** 38900 West Huron Drive Romulus, Michigan 48174
Title: Environmental Assessments Manager		
Agency: Environmental Testing & Consulting		
Phone Number: 734-486-5661		**E-Mail:** Rebecca.hart@2etc.com

State Reviewer: Mike Sobocinski	**Title:**	**Date:** 2/2/2023

FEMA Reviewer: Meghan Cuneo	**Title:** Community Planner	**Date:** 4/14/2023
Date Received in FEMA Region V	4/7/2023	
Plan Not Approved		
Plan Approvable Pending Adoption	X	
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Pg. 1-10, Appendix A, B, and C	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Pg. 5-9	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Pg. 5-9, Appendix B and D	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Pg. 1-2, 10, 12-31, 86, Appendix E	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Pg. 85	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Pg. 85	X	
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Pg. 12-31, 51-54, Appendix E	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Pg. 12-20, 22-31, 63, Appendix C and E	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Pg. 12-31, 51-54, 63 Appendix H	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Pg. 24, 26-27	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Pg. 4-5, 21 34-42, 44-54, 62-72, 85	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Pg. 22-28	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Pg. 63-71	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Pg. 63-83	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Pg. 77-83, Pg. 74	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Pg. 1-5, 63-64, 73	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Pg. 29, 35, 36, 43-49	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Pg. 62-78, Appendix J, Table 14	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Pg. 65-78, Appendix J, Table 14	X	
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix G, Updated Approval Pending		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Pending		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically Risk MAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

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

Element A: Planning Process

Plan Strengths

- The county and its communities completed a hazard mitigation plan during the COVID-19 pandemic rather than delaying the planning process until the pandemic ended.
- The public was given the opportunity to express their hazard vulnerabilities via a questionnaire from the planning team.

Opportunities for Improvement

- Appendix A and Appendix D detail the responses to the questionnaire for hazard ranking but the plan could be more detailed in its explanation of how these results impacted the hazard analysis and priorities. There is not strong documentation of how this questionnaire was implemented into findings and the action plan.
- Involve direct representatives from each participating jurisdiction. The approach to use County Commissioners as representatives for their respective jurisdictions does not promote strong engagement with the HMP.
- In the next plan update, develop a more robust process for engaging the public in the mitigation plan's development. This could include surveys, alerting the public of the planning process through media, and offering multiple meeting times.
- Consider using other methods to engage all jurisdictions within the planning area in the next plan update. These could include individual meetings with local government officials and sending data and draft plans for comment and review.
- The plan update needs to develop a more constructive and engaging method for continuing public engagement. Simply posting a public agenda for the County web site does not encourage participation or build upon the plan's initial outreach efforts. Considering keeping the public survey open throughout the 5 year period and gathering input consistently during the update timeframe.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- The plan includes the findings from the Questionnaire for Hazard Ranking which include narrative and context from the respondents. This qualitative data is a great supplement to the quantitative data provides from other less-localized sources.
- The natural hazard profile includes National Risk Index (NRI) data. This helps identify socially vulnerable populations that are more susceptible to hazard impacts.

Opportunities for Improvement

- While some hazards detail which jurisdictions are more vulnerable there are several that simply analyze the hazard at a county-level. Consider evaluating the hazard risk and

vulnerability for each jurisdiction in order to determine if all hazards have local specific needs.
- In addition to the national-level maps, develop county-level and jurisdictional-level maps to support the hazard profiles.
- While incorporating NRI data is important, develop more robust hazard profiles with more context. Some data sources vary widely from the reported county data. Explain why there is a difference in reporting to better convey the probability and future risk.

Element C: Mitigation Strategy

Plan Strengths

- The Mitigation goals and objectives are organized by identified hazards. Each hazards contains it's own specialized goals and strategy which is a thorough methodology for implementing necessary actions.
- The new mitigation actions include a list of benefits to clearly depict the intending implications of each action item. Potential funding for each action is identified in Table 14.

Opportunities for Improvement

- More effort and action should be dedicated to the implementation of the HMP. The next plan update should identify the ways in which the communities can implement the HMP and provide more support in exercising those actions.
- Building Resilient Infrastructure and Communities (BRIC) has replaced the Pre-Disaster Mitigation Program (PDM). Update the FEMA Grant Programs in Appendix C that identify PDM as a potential funding source. For additional information on BRIC, visit https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.
- Having multi-hazard, multi-jurisdiction mitigation actions is acceptable. However, each participating jurisdiction should develop actions that address each community's specific vulnerabilities. Developing actions specific to one hazard best links the plan's risk assessment portion to the mitigation strategy.
- Be sure each party listed as the responsible agency for mitigation actions knows its obligation to completing the actions. Some of the lead agencies listed in the mitigation strategy did not participate in the planning process.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths

- Each previous mitigation goal includes an in-depth description. Narratives that address capability deficiencies as well as portions of the project that have been implemented provide an excellent insight on the hazard mitigation progress within Barry County.

Opportunities for Improvement

- Consider using a table to document Mitigation Goals and Objectives. The narratives included in the plan are thorough but at times it's unclear to track the status or organization of each hazard's goal and its corresponding objectives. Doing so will also make it easier to

demonstrate the changes in priorities and status of action items in the next plan update. HMP updates require a comparison of the previous plan's actions and strategies, by analyzing them in a table the status tracking is simple and easily identifiable.

- Implementation of the HMP should be more robust and documented across each participating jurisdiction. The next HMP update should provide a detail process for jurisdictions to enhance their mitigation implementation and ensure the progress of action items.

B. Resources for Implementing Your Approved Plan

• The current State of Michigan Hazard Mitigation Plan identifies a number of potential funding resources for various mitigation actions. In addition, the Michigan State Police Division of Emergency Management and Homeland Security website contains valuable information related to mitigation in Michigan.
http://www.michigan.gov/msp/

• Information about applying for grants, available publications, and training opportunities can be obtained from Matt Schnepp, the Michigan State Hazard Mitigation Officer at schneppm1@michigan.gov.

• Consider what actions can be funded by various governmental agencies (federal and state), especially when meeting multiple community goals. Federal agencies may support integrated planning efforts such as rural development, sustainable communities and smart growth, wildfire mitigation, conservation, etc.

• Seek out other non-governmental or non- emergency management funding sources such as from private organizations and businesses, federal initiatives (Smart Growth, Sustainable Communities), Federal Highways pilot projects, and historic preservation programs.

• Refer to the Michigan State Hazard Mitigation Plan for more resources available to local communities in Michigan.

HMGP
The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, in areas of the State requested by the Governor.

BRIC
Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Reach out to your SHMO for more information on BRIC.

FMA
The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act (NFIA) of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

National Climatic Data Center (NCDC) Storm Events Database
The National Climatic Data Center (NCDC) Storm Events Database contains information at a countywide level for past hazard events. Property damage, crop damage, death, and injury records are available for each hazard. Where available, a narrative also accompanies many events, particularly those where there was an exceptional toll on the County. https://www.ncdc.noaa.gov/stormevents/

Tornado History Project
The Tornado History Project is a free, searchable database of all reported US tornadoes.

http://www.tornadohistoryproject.com

Technical Assistance
Technical assistance is available through Risk MAP to assist communities in identifying, selecting, and implementing activities to support mitigation planning and risk reduction; Attend any Risk MAP's discovery meetings that may be scheduled in the State (or neighboring communities with shared watersheds boundaries) in the future.

Publications
Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards
http://www.fema.gov/media-library/assets/documents/30627?id=6938

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Kalamazoo County	County	Michael Corfman									
2	Alamo Township	Township	Cindy Snyder									
3	Augusta Village	Village	Julie Glenn									
4	Brady Township	Township	Michelle Crawford									
5	Charleston Township	Township	Jerry Vander Roest									
6	Climax Township	Township	Marcia Lewis									
7	Comstock Charter Township	Township	Randy Thompson									

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
8	Cooper Charter Township	Township	Jeff Sorenson									
9	Galesburg City	City	Lori West									
10	Kalamazoo City	City	Jeff Chamberlain									
11	Kalamazoo Charter Township	Township	Don Martin									
12	Oshtemo Charter Township	Township	Libby Heiny-Cogswell									
13	Parchment City	City	Shannon Stutz									
14	Pavilion Township	Township	Karen Siegwart									
15	Portage City	City	Mike Carroll									
16	Richland Township	Township	Lysanne Harma									
17	Richland Village	Village	Kim Lewis									
18	Ross Township	Township	Christina Hutchings									
19	Schoolcraft Township	Township	Virginia Mongreig									

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
20	Schoolcraft Village	Village	Tammy Youngs									
21	Texas Charter Township	Township	Linda Kerr									
22	Vicksburg Village	Village	Jim Mallery									
23	Wakeshma Township	Township	Jasaon Gatlin									

CONDENSED HAZARD MITIGATION PLAN REVIEW SHEETS MI Aug. 2019 ed. PAGE 1

Name and date/edition of plan Barry County HMP Sept. 2022 reviewed by Mike Sobocinski on 11/23/2022
Type of plan: __Single jurisdiction; X Multijurisdictional; Update of previously approved plan? Yes ; FEMA grant HMGP4381 (exp.8/2/22)
(% estimates are given below for required planning elements, based on the amount of work that each item probably involves) *FEMA review item # follows*

Section One – Planning Preliminaries (Preparation, Participation, Process), Items 1-4 = 25% possible. Review total = 25 %

General explanation: The plan must have been developed through the coordination of multiple agencies, providing opportunities for stakeholders (and the general public) to evaluate draft materials and contribute to the plan's refinement. Each community that seeks to gain grant eligibility for hazard mitigation projects must have participated in the plan's development. Review item #1 requires these participating communities to be clearly listed and described in the plan. Item #2 requires descriptions of the plan development process to be included in the plan. Items #3-4 require the inclusion (and description) of efforts to involve various stakeholders, the general public, and existing documents/resources in the development of the plan. It is estimated that about a quarter of the overall work involved in developing the plan will be related to activities such as finding and contacting stakeholders, organizing and conducting meetings, amending the draft plan to include new information and feedback from participants, and writing descriptions of such activities.

Yes 1% 1. **(1%)** *A1* **MULTIJURISDICTIONAL PLANS ONLY:** Does the plan indicate the specific jurisdictions represented in (participating and requesting grant eligibility from) the multi-jurisdictional plan? Pages 6
1a. **Updated plans only:** Does the updated plan specify each jurisdiction's status as (1) a new participant, (2) a continuing participant, or (3) a non-participant in the updated plan? Pages 6

Yes 9% 2. **(9%)** *A1* Does the plan provide a narrative description of the process followed to prepare it?
Pages 1-10, Appendix A, B, C
2a. Does the plan indicate who was involved in the planning process? (For example, who led the plan development process? Were any consultants involved? Who represented local participating jurisdictions, served on a planning committee, responded to surveys, etc.?) Pages 5-9
2b. Does the new or updated plan describe how the [each] jurisdiction participated in the plan's development?
Pages 5-9, App. A (But additional outreach to townships, city, villages appears to be needed to complete item #17.)
2c. **Updated plans only:** Does the updated plan document [generally describe] how the planning team reviewed and analyzed each section of the plan and whether/how each section was revised as part of the update process?
Pages 2-3, 5, 9-11

Yes 10% 3. **(10%)** *A2* Does the plan discuss the opportunity for the following parties to be involved in the planning process?
(1) Neighboring communities, (2) local and regional agencies involved in hazard mitigation activities, (3) agencies that have the authority to regulate development, and (4) other interests (businesses, academia, nonprofits, etc.)?
Pages 5-9
3a. *A3* Does the plan indicate how the public was involved in the planning process during the drafting stage, prior to plan approval? (Did they have sufficient opportunity to attend at least one open meeting and comment on the plan?)
Pages 5, 7, 9, Appendix B, D

Yes 5% 4. **(5%)** *A4* Does the planning process describe the review and incorporation of appropriate existing plans, studies, reports, and technical information (e.g. high hazard-potential dams)? Pages 1-2, 10, 12-31, etc., 83, App. E

Additional comments: __.

Section Two – Hazard Analysis Section, Items 5-12 = 40% possible. Review total = 39 %

General explanation: The plan must include descriptions of all natural hazards that may affect the jurisdiction(s) in its planning area. The reasoning process involved in evaluating these hazards should be clear. The plan must present information that is specific to the local communities in its planning area, in addition to the kind of general information that is already available in state and federal-level sources. By considering past occurrences and known sources of risk, the plan should note locations that have greater vulnerability, describe the types of hazard impacts that could occur (and their extent), and use this information to provide estimates of the chance or frequency of future hazard occurrence, and descriptions of potential impacts and identified community vulnerabilities. Item #12 refers specifically to "repetitive loss properties" on a list maintained by the NFIP (please inquire for more information). The most serious and well-documented hazards are normally analyzed to a greater extent than less-serious hazards that have little documentation. Natural hazards must be explicitly considered—weather, hydrologic, geologic, and ecological hazards. Other hazards are optional. This analysis is estimated to involve about 40% of the total planning work.

_Yes 3% 5. **(3%)** *B1* Does the plan describe all the types of natural hazards (including high hazard-potential dams) that affect each jurisdiction? Pages _12-31, 49-52_

_Yes 7% 6. **(7%)** *B1* Does the plan include descriptions or maps of the location (i.e. geographic area affected) of hazards and vulnerabilities for each jurisdiction? Pages _12, 14, 16, 18, 20-29, 31, 50-52

6a. *D1* **Updated plans only:** Has the updated plan been revised to reflect any changes in local land use/development? Pages _5, 41-47_

_Yes 5% 7. **(5%)** *B1* Does the plan include descriptions of the extent (i.e. magnitude or severity) of all (measurable) natural hazards that affect each jurisdiction? Pages _12-20, 22-31, Appendix E_

_Yes 7% 8. **(7%)** *B2* Does the plan provide information on previous occurrences of each type of hazard, for each jurisdiction? Pages _12-20, 22-31, 62_

_Enhance 3% 9. **(4%)** *B2* Does the plan provide information on the probability of future hazard events (i.e. estimated chance or frequency of occurrence) for each jurisdiction? Pages _2, 10, 14?, 17?, 18, 23-24, 29-32, App. C, E (need explicit estimates for each hazard)_

_Yes 6% 10. **(6%)** *B3* Does the plan describe impacts (i.e. actual damages and effects) on the involved jurisdictions from each identified hazard (perhaps including high hazard-potential dams)? Pages _12-20, 22-30

_Yes 5% 11. **(5%)** *B3* Does the plan summarize each jurisdiction's hazard vulnerabilities (potential future damages and effects, perhaps including those from high hazard-potential dams)? Pages 10, 12-31, 49-52, 62, App. H

Yes 3% 12. **(3%)** *B4* Does the plan address NFIP-insured structures that have been repetitively damaged by floods within the jurisdiction(s)? (i.e. if they are present, describing the number and type of repetitive loss properties in each jurisdiction, without revealing confidential addresses or claim information, and how damages to these properties might be reduced) Pages _24, 26-27 Probably okay now.___

Additional reviewer comments: _Item #9: Check each natural hazard to verify its description includes a specific statement estimating its annual probability or frequency. Where such a statement is missing or left only implied by the data, please add such a statement for that hazard. TABLE 4 NATURAL HAZARD EXPECTANCY (ANNUAL) in SECITION 4.0 NATURAL HAZARDS

CONDENSED HAZARD MITIGATION PLAN REVIEW SHEETS MI Aug. 2019 ed. PAGE 3

Section Three – Action Plan Section, Items 13-17 = 30% possible; review total = 25 %

General explanation: The hazard analysis needs to lead to specific community actions in order to be truly useful. Any community vulnerabilities that had been identified should lead to relevant hazard mitigation strategies being considered, evaluated, selected, and prioritized. For item #13a, express some actions in terms of how specific resources, capabilities, programs, and authorities would be used or expanded to reduce hazard impacts or risks. Item #13 requires enough community details to be described so that hazard mitigation actions can be framed in terms of these capabilities (or reducing any gaps in the capabilities). Hazard mitigation activities need to include a reference to (1) NFIP participation or compliance (item #14 and #14a), and (2) the integration of hazard mitigation into other community plans and processes (part of item #17 but also all of item #18 in the next section). NFIP information for item #14 can be found online in FEMA's "Community Status Book." The overall plan must include concrete hazard mitigation actions (not just preparedness activities). Each participating jurisdiction endorses at least one action.

_Yes 7% 13. **(7%)** *C1* Does the plan describe each jurisdiction's existing authorities, policies, programs, and resources available to accomplish hazard mitigation? Pages 4-5, 21, 33-40, 42-52, 60, 70, 82

13a. Does the plan describe how these existing authorities, policies, programs, and resources could be expanded on and improved, to accomplish hazard mitigation? *C1* Pages 62-72

_Yes 4% 14. **(4%)** *C2* Does the plan describe each jurisdiction's current NFIP participation status (plus the availability and use of a digital Flood Insurance Rate Map)? Pages _25_

14a. *C2* Does the plan describe each jurisdiction's floodplain management program for continued NFIP compliance (or the reasons why jurisdictions are not participating in the NFIP)? Pages 22-

Yes 2% 15. **(2%)** *C3* Does the plan include hazard mitigation goals to reduce/avoid long-term vulnerabilities to the identified hazards? (GOALS are long-term, broad statements of what the community wants to achieve, such as "rehabilitate high-hazard dams," and are based on the risk assessment findings.) Pages _62-69_____

_Yes 7% 16. **(7%)** *C4* Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects that are being considered by each jurisdiction to mitigate its hazards, including an emphasis on both new and existing buildings and infrastructure (and including elements that are appropriate for FEMA hazard mitigation project funding or HHPD grants)? Pages _62-80__

_Enhance 5% 17. **(10%)** *C5* Does the plan contain an action plan that includes how specific identified actions are prioritized (i.e. the process and criteria used, including cost-benefit considerations), implemented (location, method, use of existing and/or potential resources), and administered (i.e. responsible department, time-frame) by each jurisdiction, to try to reduce hazard effects upon both new and existing buildings and infrastructure? Pages _72-80 (lacks actions for each participating community)_

17a. *D2* **Updated plans only:** Does the updated plan identify the completed, deleted, or deferred hazard mitigation actions from the previous plan, and explain why any unchanged activity ideas have not been changed since the previous plan? Pages _(61-75, App. J) (Adding the entire previous plan does not identify and explain what has changed or not, or why.)_

17b. *D2* **Updated plans only:** Does the updated plan describe progress in local hazard mitigation efforts since the previous plan had been completed? Pages _50, 71, (Appendix J) (Only the previous plan's action section is relevant, in an annotated form.)____

17c. *D3* **Updated plans only:** Does the updated plan explain any changes in priorities since the previous plan had been completed? Pages _(App. J, 64-75) (See note for item 17a and 17b, above. Describe whether/how/why action priorities had changed.)_

Additional reviewer comments: ___

CONDENSED HAZARD MITIGATION PLAN REVIEW SHEETS MI Aug. 2019 ed. PAGE 4

Section Four – Plan Maintenance/Implementation and State Requirements, Items 18-23 = 5% possible. Review total = 3 %

General explanation: The plan needs to describe activities that will occur after its completion. Although most of these items need to be included in the plan itself, the local adoption process (item #21) is assumed to take place after the main body of the plan has been completed, reviewed, and found to meet all other requirements. Therefore, plan adoption is not included in the % estimate of work involved in developing the plan itself.

_Enhance 1% 18. **(3%)** *C6* Does the plan describe a process by which local government(s) will integrate hazard mitigation into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?
Pages _1, 5, 62,_

18a. **Updated plans only:** Does the updated plan explain how the local government(s) incorporated the previous plan's hazard mitigation strategies and other information (e.g. risk assessment) into other planning mechanisms (especially community master plans), when appropriate? Pages _(This is similar to item 17b but specific to the topic of plan integration.)_

Yes* 1% 19. **(1%)** *A5* Does the plan explain how the community(ies) will continue public participation as part of a plan maintenance process? (For example: periodic presentations to community groups or at public meetings, internet and social media postings, or the use of questionnaires and surveys) Pages _81 *FEMA might want more than just 2 sentences_

Yes 1% 20. **(1%)** *A6* Does the plan describe the method and schedule for keeping the plan current? (i.e. monitoring, evaluating, and updating the plan within a 5-year cycle, including the criteria used and the department responsible)?
Pages _81_

_(a year old) 21. *E1/E2* Does the plan include documentation that it has been formally adopted by the jurisdiction(s) seeking approval of the plan (and seeking the project grant eligibility that results)? Page App.H **[Not needed until all other items pass review]**

22. **PROPOSED; NOT YET REQUIRED**: *F2* Does the plan describe how consideration was given, during the plan development or update process, to the hazard mitigation goals, priorities, and information contained in the most current edition of the Michigan Hazard Mitigation Plan? Pages _____

Additional reviewer comments (including a **list of communities participating** in a multijurisdictional plan): _listed as Barry County,
_City of Hastings, Villages of Freeport, Middleville, Nashville, Woodland, Townships of Assyria, Baltimore, Barry, Carlton, Castleton, Hastings, Hope, Irving,___
_Johnstown, Maple Grove, Orangeville, Prairieville, Rutland, Thornapple, Woodland, Yankee Springs._____
_If it is not possible to list action items for all of these communities, then the list should be reduced so that only those with actions are considered participants.

_____

_____

ARE MORE REVIEWER NOTES ADDED ON ADDITIONAL PAGES? No: _x__, Yes:_____

TOTAL OF ESTIMATED PERCENT VALUES (APPROXIMATE AMOUNT OF WORK COMPLETED):__92____%

Does the plan appear to meet the requirements for FEMA's HHPD grant (in items 4-5, 10-11, and 15-17)? ____Yes; ____No

*Is **EMHSD** willing to recommend **plan approval** to FEMA?* ____Yes; ____Yes – but revisions are recommended before submission;
_x__Not yet – revisions are required before approval can be recommended; ____No – this was a preliminary review of draft materials

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Barry County, MI	**Title of Plan:** Barry County HMP	**Date of Plan:** December 2022
Local Point of Contact: Rebecca Hart		**Address:** 38900 West Huron Drive Romulus, Michigan 48174
Title: Environmental Assessments Manager		
Agency: Environmental Testing & Consulting		
Phone Number: 734-486-5661		**E-Mail:** Rebecca.hart@2etc.com

State Reviewer:	**Title:**	**Date:**
Mike Sobocinski		2/2/2023

FEMA Reviewer:	**Title:**	**Date:**
Meghan Cuneo	Community Planner	4/5/2023
Date Received in FEMA Region V	3/24/2023	
Plan Not Approved	X	
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Pg. 1-10, Appendix A, B, and C	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Pg. 5-9	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Pg. 5-9, Appendix B and D	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Pg. 1-2, 10, 12-31, 86, Appendix E	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Pg. 85	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Pg. 85	X	
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Pg. 12-31, 51-54, Appendix E	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Pg. 12-20, 22-31, 63, Appendix C and E	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Pg. 12-31, 51-54, 63 Appendix H	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Pg. 24, 26-27	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Pg. 4-5, 21 34-42, 44-54, 62-72, 85	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Pg. 22-28	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Pg. 63-71	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Pg. 63-83	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Pg. 77-83, Pg. 74	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Pg. 1-5, 63-64, 73	X	
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Pg. 29, 35, 36, 43-49	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Pg. 62-78, Appendix J		X
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Pg. 65-78, Appendix J		X

ELEMENT D: REQUIRED REVISIONS

D2 – Pg. 72-73 has begun to meet this requirement but the information is not complete. All hazard mitigation actions from the previous plan (Appendix J) need to have a status report. Some of the actions are listed as "accomplished" but not all of the items contain explanation. For action items that were removed or not completed the HMP should provide a brief narrative as to why that item is no longer relevant for the 2023 plan or should be included in the updated action plan. Consider taking the Objectives and Action strategies from the 2005 plan and placing them appropriately in Table 14: Priority Table. Then make note of which efforts have been completed, which are ongoing since 2005, which are no longer a priority and why, and which items have continued to be a priority in the 2022 plan update. Creating this table addition (or separate table) will clearly define the progress that has occurred since 2005 and ensures that you are addressing each item.

D3 – The HMP is not clear about how priorities have changed (or not changed from the 2005 plan). Appendix J does provide the old plan goals, objectives, and actions but that information needs to be explained in a narrative or side-by-side comparison in the plan. For example, the 2023 plan should clearly state if any of the high-priority hazards have changed from the 2005 plan and why that is. This information is important for verifying that the plan update is reflecting current conditions and analyzing the changes since 2005. *See above recommendations for the table creation. Information for D2 and D3 can be addressed in the same table.*

ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix G, Updated Approval Pending		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Pending		

ELEMENT E: REQUIRED REVISIONS

ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			

ELEMENT F: REQUIRED REVISIONS

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically Risk MAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

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

Element A: Planning Process

Plan Strengths

- The county and its communities completed a hazard mitigation plan during the COVID-19 pandemic rather than delaying the planning process until the pandemic ended.
- The public was given the opportunity to express their hazard vulnerabilities via a questionnaire from the planning team.

Opportunities for Improvement

- Appendix A and Appendix D detail the responses to the questionnaire for hazard ranking but the plan could be more detailed in its explanation of how these results impacted the hazard analysis and priorities. There is not strong documentation of how this questionnaire was implemented into findings and the action plan.
- Involve direct representatives from each participating jurisdiction. The approach to use County Commissioners as representatives for their respective jurisdictions does not promote strong engagement with the HMP.
- In the next plan update, develop a more robust process for engaging the public in the mitigation plan's development. This could include surveys, alerting the public of the planning process through media, and offering multiple meeting times.
- Consider using other methods to engage all jurisdictions within the planning area in the next plan update. These could include individual meetings with local government officials and sending data and draft plans for comment and review.
- The plan update needs to develop a more constructive and engaging method for continuing public engagement. Simply posting a public agenda for the County web site does not encourage participation or build upon the plan's initial outreach efforts. Considering keeping the public survey open throughout the 5 year period and gathering input consistently during the update timeframe.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- The plan includes the findings from the Questionnaire for Hazard Ranking which include narrative and context from the respondents. This qualitative data is a great supplement to the quantitative data provides from other less-localized sources.
- The natural hazard profile includes National Risk Index (NRI) data. This helps identify socially vulnerable populations that are more susceptible to hazard impacts.

Opportunities for Improvement

- While some hazards detail which jurisdictions are more vulnerable there are several that simply analyze the hazard at a county-level. Consider evaluating the hazard risk and

vulnerability for each jurisdiction in order to determine if all hazards have local specific needs.
- In addition to the national-level maps, develop county-level and jurisdictional-level maps to support the hazard profiles.
- While incorporating NRI data is important, develop more robust hazard profiles with more context. Some data sources vary widely from the reported county data. Explain why there is a difference in reporting to better convey the probability and future risk.

Element C: Mitigation Strategy

Plan Strengths

- The Mitigation goals and objectives are organized by identified hazards. Each hazards contains it's own specialized goals and strategy which is a thorough methodology for implementing necessary actions.
- The new mitigation actions include a list of benefits to clearly depict the intending implications of each action item. Potential funding for each action is identified in Table 14.

Opportunities for Improvement

- More effort and action should be dedicated to the implementation of the HMP. The next plan update should identify the ways in which the communities can implement the HMP and provide more support in exercising those actions.
- Building Resilient Infrastructure and Communities (BRIC) has replaced the Pre-Disaster Mitigation Program (PDM). Update the FEMA Grant Programs in Appendix C that identify PDM as a potential funding source. For additional information on BRIC, visit https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.
- Having multi-hazard, multi-jurisdiction mitigation actions is acceptable. However, each participating jurisdiction should develop actions that address each community's specific vulnerabilities. Developing actions specific to one hazard best links the plan's risk assessment portion to the mitigation strategy.
- Be sure each party listed as the responsible agency for mitigation actions knows its obligation to completing the actions. Some of the lead agencies listed in the mitigation strategy did not participate in the planning process.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths

- Each previous mitigation goal includes an in-depth description. Narratives that address capability deficiencies as well as portions of the project that have been implemented provide an excellent insight on the hazard mitigation progress within Barry County.

Opportunities for Improvement

- Consider using a table to document Mitigation Goals and Objectives. The narratives included in the plan are thorough but at times it's unclear to track the status or organization of each hazard's goal and its corresponding objectives. Doing so will also make it easier to

demonstrate the changes in priorities and status of action items in the next plan update. HMP updates require a comparison of the previous plan's actions and strategies, by analyzing them in a table the status tracking is simple and easily identifiable.

- Implementation of the HMP should be more robust and documented across each participating jurisdiction. The next HMP update should provide a detail process for jurisdictions to enhance their mitigation implementation and ensure the progress of action items.

B. Resources for Implementing Your Approved Plan

• The current State of Michigan Hazard Mitigation Plan identifies a number of potential funding resources for various mitigation actions. In addition, the Michigan State Police Division of Emergency Management and Homeland Security website contains valuable information related to mitigation in Michigan.
http://www.michigan.gov/msp/

• Information about applying for grants, available publications, and training opportunities can be obtained from Matt Schnepp, the Michigan State Hazard Mitigation Officer at schneppm1@michigan.gov.

• Consider what actions can be funded by various governmental agencies (federal and state), especially when meeting multiple community goals. Federal agencies may support integrated planning efforts such as rural development, sustainable communities and smart growth, wildfire mitigation, conservation, etc.

• Seek out other non-governmental or non- emergency management funding sources such as from private organizations and businesses, federal initiatives (Smart Growth, Sustainable Communities), Federal Highways pilot projects, and historic preservation programs.

• Refer to the Michigan State Hazard Mitigation Plan for more resources available to local communities in Michigan.

HMGP
The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, in areas of the State requested by the Governor.

BRIC
Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Reach out to your SHMO for more information on BRIC.

FMA
The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act (NFIA) of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

National Climatic Data Center (NCDC) Storm Events Database
The National Climatic Data Center (NCDC) Storm Events Database contains information at a countywide level for past hazard events. Property damage, crop damage, death, and injury records are available for each hazard. Where available, a narrative also accompanies many events, particularly those where there was an exceptional toll on the County. https://www.ncdc.noaa.gov/stormevents/

Tornado History Project
The Tornado History Project is a free, searchable database of all reported US tornadoes.

http://www.tornadohistoryproject.com

Technical Assistance
Technical assistance is available through Risk MAP to assist communities in identifying, selecting, and implementing activities to support mitigation planning and risk reduction; Attend any Risk MAP's discovery meetings that may be scheduled in the State (or neighboring communities with shared watersheds boundaries) in the future.

Publications
Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards
http://www.fema.gov/media-library/assets/documents/30627?id=6938

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

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LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Barry County, MI	**Title of Plan:** Barry County HMP	**Date of Plan:** December 2022 March 24, 2023 revision
Local Point of Contact: Jim Yarger, PEM **Title:** Emergency Manager **Agency:** Emergency Management Department	**Address:** Barry County Emergency Management Department 2600 Nashville Road Hastings, Michigan 49058	
Phone Number: (269) 818-0362-office	**E-Mail:** JYarger@barrycounty.org	

State Reviewer: Mike Sobocinski	**Title:**	**Date:** 2/2/2023

FEMA Reviewer: Meghan Cuneo	**Title:** Community Planner	**Date:** March 15, 2023
Date Received in FEMA Region V	2/16/2023	
Plan Not Approved	X	
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Pg. 1-10, Appendix A, B, and C	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Pg. 5-9	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Pg. 5-9, Appendix B and D	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Pg. 1-2, 10, 12-31, 86, Appendix E	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Pg. 84		X
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Pg. 84		X
ELEMENT A: REQUIRED REVISIONS A5 – This section should be more robust. Explain how the Local Planning Team will conduct public participation moving forward. Will the citizen questionnaire mentioned in the earlier section remain open, how will the team encourage residents to engage with public hearings and meetings, how will information about future meetings and input opportunities be shared. Describe more in-depth how public participation will be integrated into future updates and the planning process. A6 – Pg. 84 does state that the Local Planning Team for Barry County will monitor the HMP annually. This element also needs to explicitly state which agency, person, or organization is responsible for evaluating and updating the HMP. If the Emergency Manager and Local Planning Team are also taking on those roles then that needs to be stated in the plan.			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Pg. 12-31, 51-54, Appendix E	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Pg. 12-20, 22-31, 63, Appendix C and E		X
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Pg. 12-31, 51-54, 63 Appendix H	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Pg. 24, 26-27	X	
ELEMENT B: REQUIRED REVISIONS B2 – The HMP does discuss previous occurrences and the probability of future hazard events however there are discrepancies between some data sources. In some instances, the NRI sources provide an expected probability that varies widely from the numbers reflected in local data reporting. For hazards like hail, wildfires, drought, and floods add context to the HMP which explains why projections may be inconsistent between sources and offer a clear explanation of how the HMP is interpreting that information into the risk assessment. If the data is saying two different things how is the HMP reconciling those differences to understand their risk.			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Pg. 4-5, 21 34-42, 44-54, 62-72, 85	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Pg. 22-28		X
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Pg. 63-71	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Pg. 63-83	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Pg. 77-83		X
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Pg. 1-5, 63-64, 73		X

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT C: REQUIRED REVISIONS C2 – For the communities that are not participants in the NFIP, include an explanation as to why they have chosen not to participate. There is a sentence on Pg. 25 that states, "remaining jurisdictions cannot maintain a 1 foot BFE therefore are not an NFIP participant". Detail the names of all jurisdictions that fall under this category and explain if there have been efforts to resolve that issue in those communities. C5a – The HMP action plan must describe the criteria used for prioritizing each objective or action item. The description of "High, Significant, Low and Very Low" and "Top, Medium and Low" categorizations must be explained in more detail so that it's clear why certain actions rank higher than others. If the HMP used the STAPLEE methodology of prioritization, then that should we stated and described. If the prioritization was based on the results of the hazard ranking questionnaire, then that process should also be explained in the narrative. C5c – Table 14 does currently identify action items for each jurisdiction. Each jurisdiction should be assigned an action item according to their corresponding vulnerabilities. In the "Responsible Agencies" column there are districts listed (assuming this related to County Commission districts) however this information needs to be listed by jurisdiction name to clearly indicate which communities are assigned to which action items. C6 (a, d, e)– The description of HMP implementation on Pg. 73 and throughout the plan is not strong enough for this element. The HMP should identify if the planning team and local jurisdictions will integrate mitigation action items and strategies into comprehensive plan updates, local ordinances, capital improvement plans, development ordinances and regulation. Simply stating "implementation of the HMP can be accomplished through ordinances, programs, and administrative procedures" does not identify the process by which the County or each jurisdiction will act on this requirement.			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))			X
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Pg. 62-78, Appendix J		X
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Pg. 65-78, Appendix J		X

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT D: REQUIRED REVISIONS D1 – The HMP does not currently contain a narrative explaining the changes in development from the 2005 plan. For this element, include residential, commercial, and industrial development trends. This information is important for verifying that the HMP update is taking into account the changes in development experienced at the county and jurisdictional level. D2 – Pg. 72-73 has begun to meet this requirement but the information is not complete. All hazard mitigation actions from the previous plan (Appendix J) need to have a status report. Some of the actions are listed as "accomplished" but not all of the items contain explanation. For action items that were removed or not completed the HMP should provide a brief narrative as to why that item is no longer relevant for the 2023 plan or should be included in the updated action plan. D3 – The HMP is not clear about how priorities have changed (or not changed from the 2005 plan). Appendix J does provide the old plan goals, objectives, and actions but that information needs to be explained in a narrative or side-by-side comparison in the plan. For example, the 2023 plan should clearly state if any of the high-priority hazards have changed from the 2005 plan and why that is. This information is important for verifying that the plan update is reflecting current conditions and analyzing the changes since 2005.			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Appendix G, Updated Approval Pending		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Pending		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically Risk MAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

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

Element A: Planning Process

Plan Strengths

- The county and its communities completed a hazard mitigation plan during the COVID-19 pandemic rather than delaying the planning process until the pandemic ended.
- The public was given the opportunity to express their hazard vulnerabilities via a questionnaire from the planning team.

Opportunities for Improvement

- Appendix A and Appendix D detail the responses to the questionnaire for hazard ranking but the plan could be more detailed in its explanation of how these results impacted the hazard analysis and priorities. There is not strong documentation of how this questionnaire was implemented into findings and the action plan.
- Involve direct representatives from each participating jurisdiction. The approach to use County Commissioners as representatives for their respective jurisdictions does not promote strong engagement with the HMP.
- In the next plan update, develop a more robust process for engaging the public in the mitigation plan's development. This could include surveys, alerting the public of the planning process through media, and offering multiple meeting times.
- Consider using other methods to engage all jurisdictions within the planning area in the next plan update. These could include individual meetings with local government officials and sending data and draft plans for comment and review.

Element B: Hazard Identification and Risk Assessment

Plan Strengths

- The plan includes the findings from the Questionnaire for Hazard Ranking which include narrative and context from the respondents. This qualitative data is a great supplement to the quantitative data provides from other less-localized sources.
- The natural hazard profile includes National Risk Index (NRI) data. This helps identify socially vulnerable populations that are more susceptible to hazard impacts.

Opportunities for Improvement

- While some hazards detail which jurisdictions are more vulnerable there are several that simply analyze the hazard at a county-level. Consider evaluating the hazard risk and vulnerability for each jurisdiction in order to determine if all hazards have local specific needs.
- In addition to the national-level maps, develop county-level and jurisdictional-level maps to support the hazard profiles.

- While incorporating NRI data is important, develop more robust hazard profiles with more context. Some data sources vary widely from the reported county data. Explain why there is a difference in reporting to better convey the probability and future risk.

Element C: Mitigation Strategy

Plan Strengths

- The Mitigation goals and objectives are organized by identified hazards. Each hazards contains it's own specialized goals and strategy which is a thorough methodology for implementing necessary actions.
- The new mitigation actions include a list of benefits to clearly depict the intending implications of each action item. Potential funding for each action is identified in Table 14.

Opportunities for Improvement

- More effort and action should be dedicated to the implementation of the HMP. The next plan update should identify the ways in which the communities can implement the HMP and provide more support in exercising those actions.
- Building Resilient Infrastructure and Communities (BRIC) has replaced the Pre-Disaster Mitigation Program (PDM). Update the FEMA Grant Programs in Appendix C that identify PDM as a potential funding source. For additional information on BRIC, visit https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.
- Having multi-hazard, multi-jurisdiction mitigation actions is acceptable. However, each participating jurisdiction should develop actions that address each community's specific vulnerabilities. Developing actions specific to one hazard best links the plan's risk assessment portion to the mitigation strategy.
- Be sure each party listed as the responsible agency for mitigation actions knows its obligation to completing the actions. Some of the lead agencies listed in the mitigation strategy did not participate in the planning process.

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

Plan Strengths

- Each previous mitigation goal includes an in-depth description. Narratives that address capability deficiencies as well as portions of the project that have been implemented provide an excellent insight on the hazard mitigation progress within Barry County.

Opportunities for Improvement

- Consider using a table to document Mitigation Goals and Objectives. The narratives included in the plan are thorough but at times it's unclear to track the status or organization of each hazard's goal and its corresponding objectives. Doing so will also make it easier to demonstrate the changes in priorities and status of action items in the next plan update. HMP updates require a comparison of the previous plan's actions and strategies, by analyzing them in a table the status tracking is simple and easily identifiable.

- Implementation of the HMP should be more robust and documented across each participating jurisdiction. The next HMP update should provide a detail process for jurisdictions to enhance their mitigation implementation and ensure the progress of action items.

B. Resources for Implementing Your Approved Plan

• The current State of Michigan Hazard Mitigation Plan identifies a number of potential funding resources for various mitigation actions. In addition, the Michigan State Police Division of Emergency Management and Homeland Security website contains valuable information related to mitigation in Michigan.
http://www.michigan.gov/msp/

• Information about applying for grants, available publications, and training opportunities can be obtained from Matt Schnepp, the Michigan State Hazard Mitigation Officer at schneppm1@michigan.gov.

• Consider what actions can be funded by various governmental agencies (federal and state), especially when meeting multiple community goals. Federal agencies may support integrated planning efforts such as rural development, sustainable communities and smart growth, wildfire mitigation, conservation, etc.

• Seek out other non-governmental or non- emergency management funding sources such as from private organizations and businesses, federal initiatives (Smart Growth, Sustainable Communities), Federal Highways pilot projects, and historic preservation programs.

• Refer to the Michigan State Hazard Mitigation Plan for more resources available to local communities in Michigan.

HMGP
The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, in areas of the State requested by the Governor.

BRIC
Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. Reach out to your SHMO for more information on BRIC.

FMA
The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act (NFIA) of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

National Climatic Data Center (NCDC) Storm Events Database
The National Climatic Data Center (NCDC) Storm Events Database contains information at a countywide level for past hazard events. Property damage, crop damage, death, and injury records are available for each hazard. Where available, a narrative also accompanies many events, particularly those where there was an exceptional toll on the County. https://www.ncdc.noaa.gov/stormevents/

Tornado History Project
The Tornado History Project is a free, searchable database of all reported US tornadoes.

http://www.tornadohistoryproject.com

Technical Assistance
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