Putnam County, Ohio

2021 Hazard Mitigation Plan

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INTERNATIONAL

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SECTION 1. INTRODUCTION

In Putnam County, safety is a top priority. An important part of being proactive toward safety is planning for natural, technological, and man-made disasters. Disasters can cause significant damage to our communities, businesses, public infrastructure, and environment, in addition to injuries and death. Their impacts include the displacement of people, economic loss and the tremendous costs of response and recovery. Preparing and using the Putnam County Hazard Mitigation Plan (HMP) helps us mitigate the effects of these hazards and return to a normal operating status sooner.

Hazard mitigation planning is a process for identifying an area's hazards, determining their likely impacts, setting mitigation goals, and prioritizing and using appropriate mitigation strategies. While we cannot prevent most disasters, we can reduce or eliminate their effects through a well-organized public education and awareness effort, preparedness activities and mitigation actions.

After a disaster, some people repair and reconstruct in ways that simply restore pre-disaster conditions. Such efforts expedite a return to normalcy, but they can result in a cycle of damage, reconstruction, and repeated damage. Hazard mitigation breaks this cycle by ensuring that post-disaster repairs and reconstruction increase the county's resiliency.

BACKGROUND AND PURPOSE

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. They also destroy or severely damage buildings and infrastructure. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Throughout Ohio, many disasters create an extreme burden on city governments, small communities and institutions.

To reduce this burden, Putnam County partnered with a consultant to develop the 2021 Hazard Mitigation Plan (HMP). The county developed this plan in accordance with the Disaster Mitigation Act of 2000. This Act provides the legislative basis for the Federal Emergency Management Agency's (FEMA) hazard mitigation planning requirements and funding, before and after a hazard event. FEMA requires HMPs to be updated every 5 years.

The federal government has made 13 disaster declarations in Putnam County since 1974. They involved severe storms, high winds, hurricane, tornadoes, blizzards, snowstorms and flooding. These recorded natural hazard events provide a hazard footprint for the region. They help mitigation planners understand the disasters that occur in and around Putnam County, and the associated risks to life and property. Understanding hazard risks provides a foundation for developing ways to mitigate or eliminate their potential impacts. These solutions include public education and outreach, preparedness activities, and mitigation actions.

For hazards that can be mitigated, the county must be prepared to apply efficient and effective short- and long-term actions, where needed. The purpose of the 2021 HMP is to provide Putnam County

with a blueprint for planning hazard mitigation actions. The plan identifies resources, information, and strategies for risk reduction. It is also a tool to measure the success of mitigation actions on a continual basis. The strategies identified in the updated HMP are intended to:

- Reduce risk, through an all-hazards approach, by creating a set of defined mitigation actions.
- Establish a basis for participating agencies and the public to coordinate and collaborate.
- Help meet the requirements of federal assistance programs.

The HMP does not supersede other current plans and strategies. Rather, it enhances the county's ability to communicate about and mitigate the risk of natural, technological, and manmade hazards. We will use the information in this plan to help guide and coordinate mitigation activities and decisions by staff and citizens. Proactive mitigation planning will help reduce the risk and cost of the county's disaster response and recovery by protecting critical facilities, reducing liability exposure, and minimizing the impacts and disruptions of all hazards.

AUTHORITY

This plan was prepared using the requirements of DMA 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations are referred to collectively as the Disaster Mitigation Act (DMA, or DMA 2000.)

DMA emphasizes the need for mitigation plans and more coordinated mitigation planning and implementation. The regulations also establish the requirements local hazard mitigation plans must meet for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). As Putnam County is subject to a variety of hazards, access to federal disaster assistance and hazard mitigation funding is vital to ensure more resilient communities.

PLAN ORGANIZATION

The HMP includes all documentation required to meet the criteria for FEMA approval. It is organized into six sections that reflect the logical procession of the activities taken to develop the plan.

- **Section 1,** Introduction. Describes the background and purpose of the plan, and the authority for developing the plan.
- **Section 2,** Community Profile. Describes Putnam County's history, geography, topography, climate, population, economy, housing, and land use and development trends.
- **Section 3,** Planning Process. Describes the 10-step HMP planning process and the meetings and outreach activities use to engage stakeholders.

- **Section 4,** Hazard Risk Assessment. Identifies and prioritizes all hazards affecting the county and assesses the vulnerability to each identified hazard.
- **Section 5,** Mitigation Strategy. Identifies mitigation goals and objectives and names and prioritizes new mitigation actions.
- **Section 6,** Plan Implementation and Maintenance. Discusses plan adoption and use, as well as the process to monitor, evaluate, update, and maintain the HMP. Discusses continued public involvement.

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SECTION 2. COMMUNITY PROFILE

The Community Profile summarizes Putnam County's history and its existing environmental and socioeconomic conditions, including geography, topography, climate, population, economic, land use and development trends.

1. HISTORY OF PUTNAM COUNTY

Putnam County was formed on April 1, 1820, from land previously included in adjacent counties and Indian reservations. The county was named for General Israel Putnam, a key figure in the French and Indian War and a general during the American Revolutionary War. The County Seat was initially Kalida, but when a fire destroyed the courthouse in 1866, a countywide vote relocated the Seat to Ottawa.

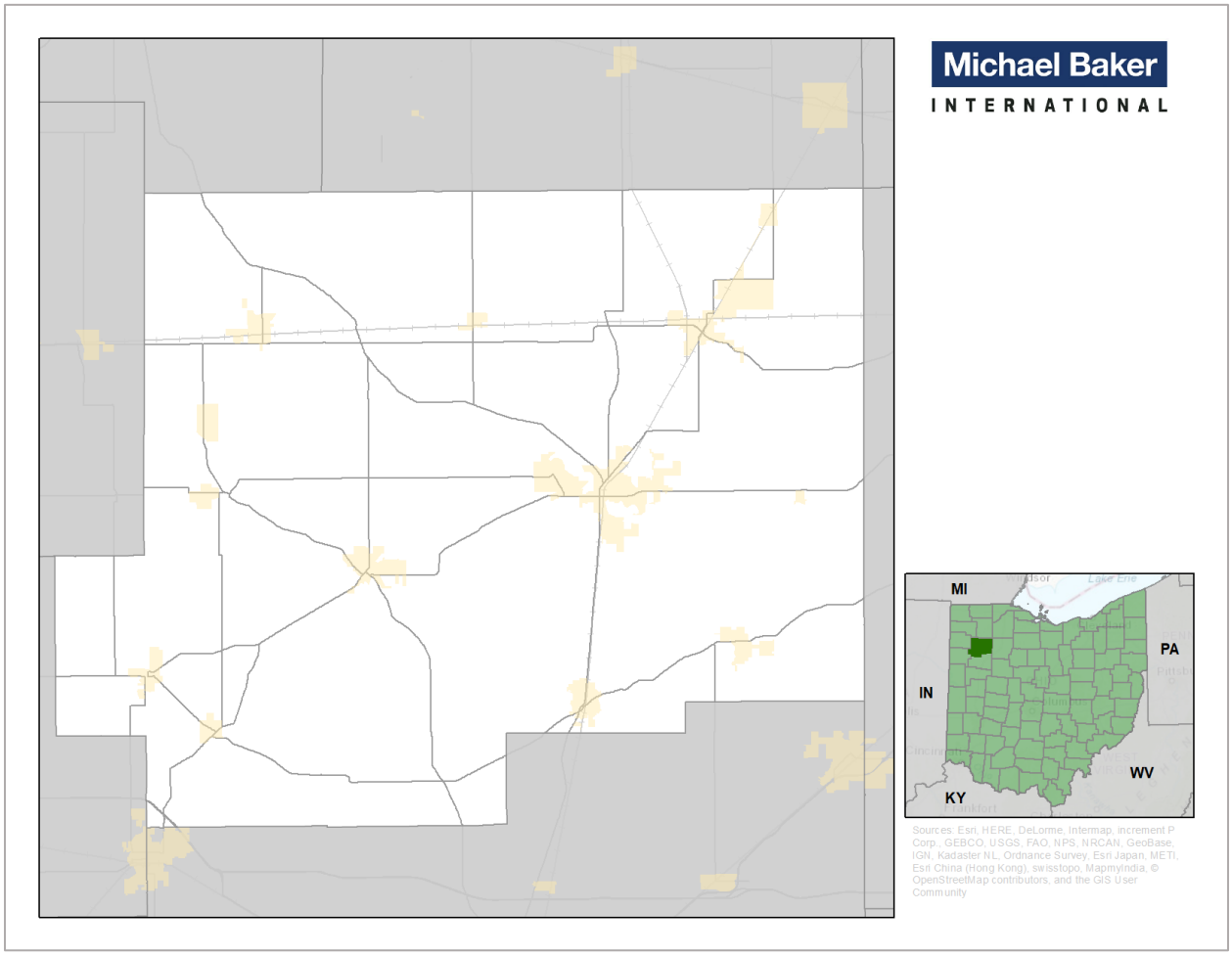
Historic resources can include landmark buildings, historic structures and sites, commercial and residential districts, historic rural resources, archaeological and cultural sites, and the environment in which they exist. Historic resources serve as visual reminders of a community's past. They provide a link to its cultural heritage and a better understanding of the people and events that shaped the patterns of its development. Putnam County is currently home to 10 properties listed on the National Register of Historic Places: the Columbus Grove Municipal Pool, Round Barn, Gilboa Main Street Historic District, St. John the Baptist Roman Catholic Church, John Edwards House, Leipsic City Hall, Dr. H. Huber Block, Ottawa Waterworks Building, Putnam County Courthouse, and Bridenbaugh District No. 3 Schoolhouse.

1.1 *GEOGRAPHY*

Putnam County is in the Northwest corner of Ohio. It is landlocked and surrounded by Wood, Paulding, Van Wert, Allen, Defiance, Hancock, and Henry counties. Putnam County covers approximately 482 square miles, of which 0.4% are open water. The Maumee River Watershed's Auglaize, Blanchard, and Ottawa rivers, which all have various creeks adding to their supply, run through Putnam County. The only notable above-ground, free-standing bodies of water are the Yellow Creek Reservoir and the Ottawa Upground Reservoir (made for water supply use). Much of the land use (87.41%) is cultivated crops. This reflects the county's continuing history of agriculture.

In addition to these natural features, several national and state routes pass through the county. Running east to west through Putnam County, US-224 intersects Ottoville, Kalida, Gilboa, and Ottawa. Although US-30 passes through the southwestern corner of the county, travelers cannot exit this roadway within the county. The state routes OH-613, OH-694, OH-12, OH-109, OH-115, and OH-65 also run through Putnam County.

FIGURE 2-1 PUTNAM COUNTY, OHIO



1.2 *TOPOGRAPHY*

Originally part of the Great Black Swamp, Putnam County is now drained and excellent land for agriculture. The county as a whole is extremely flat due to glacial erosion and its proximity to Lake Erie. Its soil is composed of glacial till, and geologists consider the county a glaciated plain.

1.3 *CLIMATE*

An area's comfort index is calculated on a number of weather factors, including temperature, probability of precipitation, humidity, wind speed, and cloud cover. The scale ranges from one to ten. The higher the comfort index, the more comfortable the climate is perceived by people across the U.S. One would expect to see a higher index with shirt-sleeve temperatures, minimal chances of rainfall, relatively low humidity, light winds, and fair skies. Lower index values could reflect cool, damp, and windy conditions.

TABLE 2-1 PUTNAM COUNTY CLIMATE SUMMARY

Climate Measurements	Putnam County	United States
Avg. Annual Rainfall (in.)	36.6	38.1
Avg. Annual Snowfall (in.)	21.4	27.8
Avg. Annual Precipitation (days)	126.2	106.2
Avg. Annual Sunny (days)	180	205
Avg. Annual July High	84.0	85.8
Avg. Annual Jan. Low	18.1	21.7
Comfort Index (higher=better)	7	7
UV Index	3.5	4.3
Avg. Elevation (ft.)	731	2443

2. POPULATION, OCCUPANCY, AND DEMOGRAPHICS

Population and demographic information provides baseline data about Putnam County. Maintaining and reviewing up-to-date data on demographics allows the county to better assess hazard magnitudes and develop more specific mitigation plans.

TABLE 2-2 COUNTY BASELINE DEMOGRAPHICS (2018 CENSUS)

Demographic Information	Total Count
Male	16,960
Female	17,009
Total Population	**33,969**
Race and Ethnicity	**Residents**
White/Caucasian	32,137
Black or African American	120
Asian American	65
Two or More Races	425
American Indian/ Alaskan Native	13
Native Hawaiian / Pacific Islander	12
Other	1,197
Previous Years' Populations	**Residents**
2017	34,037
2010	34,499
2000	34,726
1990	33,819
1980	32,991
1970	31,134
1960	28,331
1950	25,248

According to the US Census ACS Survey 2018, the county's residential population is 33,969. With 482.4 square miles of land, the population density is 70.4 people per square mile. The racial makeup of the county is approximately 95% White/Caucasian, 1% Two or More Races, 0.4% Black or African American, and 3.5% other races.

The following chart is a comprehensive list of the county's actual population in 2010, the American Community Survey estimate for 2018, the estimated change in population between 2010 and 2018, the total number of housing units, and the number of housing units occupied versus vacant.

TABLE 2-3 COUNTY DEMOGRAPHIC PROFILE WITH HOUSING

Municipality	Total Count
2010 Population	34,499
2018 Population Estimate	33,969
Population Change 2010 – 2018	-1.5%
Total Housing Units	13,857
Occupied Housing Units	13,164
Vacant Housing Units	693

TABLE 2-4 POPULATION, BY INCORPORATED AREAS

Community	Population
Belmore	144
Cloverdale	160
Columbus Grove	2,071
Continental	1,096
Dupont	305
Fort Jennings	486
Gilboa	178
Glandorf	1,020
Kalida	1,582
Leipsic	2,025
Miller City	141
Ottawa	4,333
Ottoville	963
Pandora	1,111
West Leipsic	190
Total Incorporated Population	15,805
Unincorporated Population of Putnam County	18,164

2.1 *EFFECTS OF POPULATION CHANGE ON MITIGATION*

Housing occupancy affects the community's overall resilience during and after disasters. Well-maintained homes are less likely to contribute to damage and debris during hazard events. When vacant homes deteriorate, they are more easily damaged or destroyed during hazard events (specifically high winds, thunderstorms, and tornadoes). The building materials from these homes

can become projectiles and wind-borne debris that injure people, damage vehicles and structures, and cause a more difficult response and recovery. As communities experience a population decline, blighted properties become a more significant issue.

Because Putnam County's population has been decreasing for several decades, it would seem that fewer people would be susceptible to hazards. However, that is not how it works out in reality. Putnam County has an increasingly aging population, which leaves the county *more* susceptible to hazard events, particularly when additional shelter is required. Hazards such as extreme temperatures, tornadoes, severe winter storms, and severe summer storms can cause power outages. The elderly and the very young are most at risk to the consequent losses of heating and cooling.

2.2 *EMPLOYMENT*

According to the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD), 11,631 of the county's workforce were employed as of 2017. The North American Industry Classification Systems keeps track of jobs based on census blocks. Manufacturing makes up 29.0% of the jobs in the county, followed by Health Care and Social Assistance at 11.3%. The next closest is Educational Services at 10.1%.

Commercial development is expected to continue to saturate more urban areas, like the village of Ottawa and the surrounding villages, in the next 25 years. One reason is that the retail and service market is far from being saturated in the villages of Ottawa and Leipsic. Another is that the already high transportation costs are expected to continue to rise. These are keeping more travelers closer to home in their search for goods and services.

In general terms, land use patterns within Putnam County are typical for rural counties in the midwestern United States. The manufacturing industry provides the largest percentage of the county's employment. Most of the new industrial development throughout Putnam County in the next 25 years is likely to take place within industrial park areas and individual sites that are already designated for industrial development.

TABLE 2-5 NAICS JOB INVENTORY

Industry	Count	Share
Agriculture, Forestry, Fishing and Hunting	145	1.2%
Mining, Quarrying, and Oil and Gas Extraction	15	0.1%
Utilities	3	0.0%
Construction	910	7.8%
Manufacturing	3,375	29.0%
Wholesale Trade	526	4.5%
Retail Trade	1,103	9.5%
Transportation and Warehousing	342	2.9%
Information	112	1.0%
Finance and Insurance	333	2.9%
Real Estate and Rental and Leasing	26	0.2%
Professional, Scientific, and Technical Services	262	2.3%
Management of Companies and Enterprises	0	0.0%
Administration and Support, Waste Management and Remediation	317	2.7%
Educational Services	1,170	10.1%
Health Care and Social Assistance	1,309	11.3%
Arts, Entertainment, and Recreation	34	0.3%
Accommodation and Food Services	826	7.1%
Other Services (excluding Public Administration)	473	4.1%
Public Administration	350	3.0%
TOTAL	**11,631**	**100%**

2.3 *EFFECTS OF EMPLOYMENT ON MITIGATION PLANNING*

Employment, like housing, can influence mitigation planning and disaster events. It is tied directly to housing and community stability. Many small towns in rural areas rely heavily on a particular company or industry. When these disappear or take on a reduced role, the resulting economic downturn can increase the number of blighted properties.

2.4 *LAND USE AND FUTURE DEVELOPMENT AREAS*

Very little new development or redevelopment has taken place in Putnam County since the previous HMP. Members of the community completed a Risk Evaluation to determine how they perceived their vulnerability to each hazard had changed in comparison to development trends and larger factors. Each community's future development form is available in Appendix D.

SECTION 3. THE PLANNING PROCESS

This section describes each stage of the planning process used to develop the 2021 HMP. This process provides a framework for developing the document and follows FEMA's recommended steps. The prescribed series of planning steps followed for the 2021 HMP includes organizing resources, assessing risk, developing the mitigation plan, drafting the plan, reviewing and revising the plan, and adopting and submitting the plan for approval. Each is described in this section.

1. PLANNING PROCESS

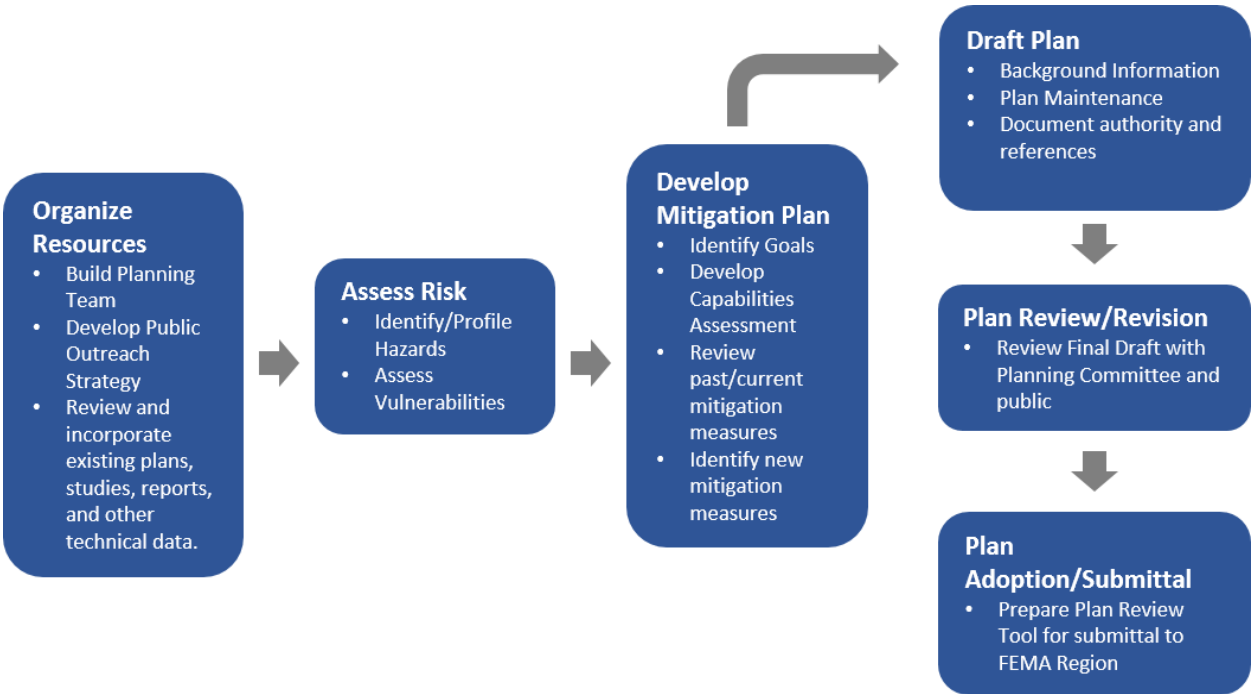
Hazard mitigation planning in the United States is guided by the statutory regulations described in DMA 2000 and implemented through 44 Code of Federal Regulations (CFR) Parts 201 and 206. FEMA's HMP guidelines outline a four-step planning process for the development and approval of HMPs. Table 3-1 lists the specific CFR excerpts that identify the requirements for approval.

TABLE 3-1 DMA 2000 CFR PLANNING PROCESS

DMA 2000 (44 CFR 201.6)	HMP Plan Section
(1) Organize Resources	**Section 3**
201.6(c)(1)	Organize to prepare the plan
201.6(b)(1)	Involve the public
201.6(b)(2) and (3)	Coordinate with other agencies
(2) Assess Risks	**Section 4**
201.6(c)(2)(i)	Assess the hazard
201.6(c)(2)(ii) and (iii)	Assess the problem
(3) Develop the Mitigation Plan	**Section 5**
201.6(c)(3)(i)	Set goals
201.6(c)(3)(ii)	Review possible activities (actions)
201.6(c)(3)(iii)	Draft an action plan
(4) Plan Maintenance	**Section 6**
201.6(c)(5)	Adopt the plan
201.6(c)(4)	Implement, evaluate, and revise

To develop the 2021 HMP, a planning process was customized to address Putnam County's unique population and demographics. This process met all basic federal guidance documents and regulations. As shown in Figure 2 and documented in the corresponding sections, the HMP planning process included organizing resources, assessing risk, developing the mitigation action strategy, drafting the plan, reviewing and revising the plan, and adopting and submitting the plan.

FIGURE 3-1 MITIGATION PLANNING PROCESS



2. ORGANIZE RESOURCES

Organizing the resources consists of developing a planning team and reviewing documents.

3. BUILDING THE PLANNING TEAM

Having a planning team, the backbone of the planning process, was critical for developing the 2021 HMP. Putnam County staff invited private and non-profit agencies and members of a consultant team to join this group, which was known as the Hazard Mitigation Planning Committee (HMPC).

4. HAZARD MITIGATION PLANNING COMMITTEE

The 2021 HMPC consisted of key decision makers in specific county functions. It included stakeholders who participated actively in the planning process. Planning processes included:

- Holding a series of structured coordination meetings;
- Collecting valuable local information and other requested data;
- Deciding on plan process and content;
- Developing mitigation actions for the HMP;
- Reviewing and commenting on plan drafts; and
- Coordinating the public input process.

Preparing the 2021 HMP required a series of meetings and workshops. These were intended to facilitate discussion and initiate data collection efforts with local community officials. More importantly, the meetings and workshops prompted local officials to provide continuous input and feedback throughout the update process.

A range of stakeholders, including neighboring communities, businesses, nonprofits, and other interested parties, were invited and encouraged to participate in developing the Plan. These stakeholders included the villages and townships within the county, the Red Cross, county staff and organizations, and local businesses. The county encouraged stakeholder involvement by inviting agencies and individuals to participate in Mitigation Planning Committee meetings and the Mitigation Solutions Workshop.

Table 3-2 provides a list of the 2021 HMP Planning Committee members, with the jurisdiction they represented, their title/role, and the meeting(s) they attended.

TABLE 3-2 2021 HMP PLANNING COMMITTEE

Name	Department	Title / Role	Meeting(s) Attended
Rick Morrison	Village of Pandora	Village Administrator	1, 2
Jeff Vance	Village of Columbus Grove	Village Administrator	1, 2
Ken Wright	Village of Columbus Grove	Mayor	1
Jeremy Liechty	Village of Pandora	Mayor	1, 2
Thomas Burkhart	Village of Cloverdale	Mayor	1, 2
Stephanie Moore	Putnam County Emergency Management Agency	PCEMS	1, 2
Robert Heidenescher	Village of Dupont	Mayor	1, 2
James Smith	Village of Fort Jennings	Mayor	Individual (3/10/2020)
Gene Warnecke	Village of Glandorf	Mayor	1
Brian Inkrott	Village of Glandorf	Council President	2
James Erford	Village of Miller City	Mayor	1
Joan Kline	Putnam County Health Department	Health Ed/PIO	1
Greg Luersman	Putnam County	GIS/Planning Commission	1
Kim Rieman	Putnam County Health Department	Health Commission	1
Jan Osborn	Putnam County Educational Service Center	Superintendent	1
Jim Gulker	Village of Kalida	Chief of Police	1, 2
Mike Klear	Putnam County Emergency Management Agency	Director	1, 2
Ronald N. Miller	Village of Ottoville	Mayor	1, 2
Matt Schnipke	Ottoville Fire Department	Firefighter	2
Catherine Reed	Red Cross	Disaster Program Manager	1
Mike Metzger	Putnam County	Hazmat	1
Walter Harper	Village of Belmore	Mayor	1, 2
Robert Alt Jr.	Village of West Leipsic	Mayor	1, 2

Name	Department	Title / Role	Meeting(s) Attended
Matt Miller	Village of Continental	Mayor	1
Thomas Armey	Village of Continental	Council Member	2
Brandon Barlage	Miller City Fire Department	Firefighter/Medic	1
Justin Barnhart	Village of Leipsic	Village Administrator	1, 2
Denise Balbaugh	Village of Ottawa	FPA	2
Karen Vorst	St. Rita's – PCACC	Director	2
Angela Recker	Putnam County Health Department	Emergency Coordinator	2
Brian Siefker	Sheriff	Sheriff	2
Brad Brubaker	Putnam County 911	911 Coordinator	2
Michelle Clymer	Village of Gilboa	Mayor	2

4.1 *PLANNING COMMITTEE MEETINGS*

The HMPC met throughout the development of the updated HMP. Table 3-3 summarizes the meetings conducted throughout the planning process, including meeting date, type, and topics discussed.

TABLE 3-3 MEETING SUMMARY

Date	Meeting Type	Topics
July 18, 2019	Internal Kickoff (Steering Committee)	• Review of Mitigation Planning Standards • Schedule and Meetings • Participation • Relevant Data and Documentation • Questions and Next Steps
October 24, 2019	Hazard Assessment Meeting (Planning Committee Meeting #1)	• Planning Committee Introductions • Hazard Mitigation Planning Process • Hazard Identification and Risk Assessment (HIRA) Exercise • Develop Mitigation Goals and Objectives
March 11, 2020	Mitigation Strategy Meeting (Planning Committee Meeting #2)	• Review of Planning Process • Review of HIRA • Review Mitigation Techniques ○ Categories of Action • Develop Mitigation Actions • Develop Mitigation Actions Plan

TABLE 3-4 JURISDICTIONAL PARTICIPATION

Jurisdiction	Meeting Participants			
	Meeting 1	*Meeting 2*	*Ind. Meeting*	*Any Meeting*
Putnam County	O	O		O
Belmore	O	O		O
Cloverdale	O	O		O
Columbus Grove	O	O		O
Continental	O	O		O
Dupont	O	O		O
Fort Jennings	X	X	O (3/10)	O
Gilboa	X	O		O
Glandorf	O	O		O
Kalida	O	O		O
Leipsic	O	O		O
Miller City	O	X		O
Ottawa	X	O		O
Ottoville	O	O		O
Pandora	O	O		O
West Leipsic	O	O		O

The village of Ottawa chose to not participate in the county's update, as they had adopted their own mitigation plan in 2018. The village of Fort Jennings was not able to attend the two group meetings, but they met the participation requirements through an individual meeting with Putnam County EMA on March 10, 2020.

The "Any Meeting" column represents participation in the planning process through meetings. These criteria can be met through participating in either scheduled group meetings or individual meetings.

4.2 *PUBLIC OUTREACH STRATEGY*

Public outreach is a major component of the 2021 HMP. Participation from the public is necessary to gain a full picture of the potential issues and hazards that affect the county.

Outreach Media

The Outreach Strategy used several methods for communicating information about the planning process to the public.

Newspaper

Two public notices in the county's newspaper, the *Putnam County Sentinel*, alerted the public to the meeting. The first notice was for the meeting on October 24; the second notice, published on February 26, 2020, announced the March 11 meeting. Both flyers provided the date, time, location, and contact information, with a short explanation of the meeting.

Flyers

Two versions of the same flyer were posted in locations throughout the county. They each provided the date, location, and times of the meetings, and contact information.

Social Media

October 22, 2019: Three separate Facebook posts described the upcoming meeting on October 24. Two posts were events created by the Putnam County Office of Public Safety, one for the 10 a.m. meeting and one for the 5 p.m. meeting. These allowed Facebook users to RSVP electronically. The third post was an informative paragraph giving the time, location, and date of the meeting. Public input was encouraged through the invitation to the meeting and by allowing electronic responses.

October 23, 2019: Putnam County Office of Public Safety posted an electronic version of the flyer that was shared around the county.

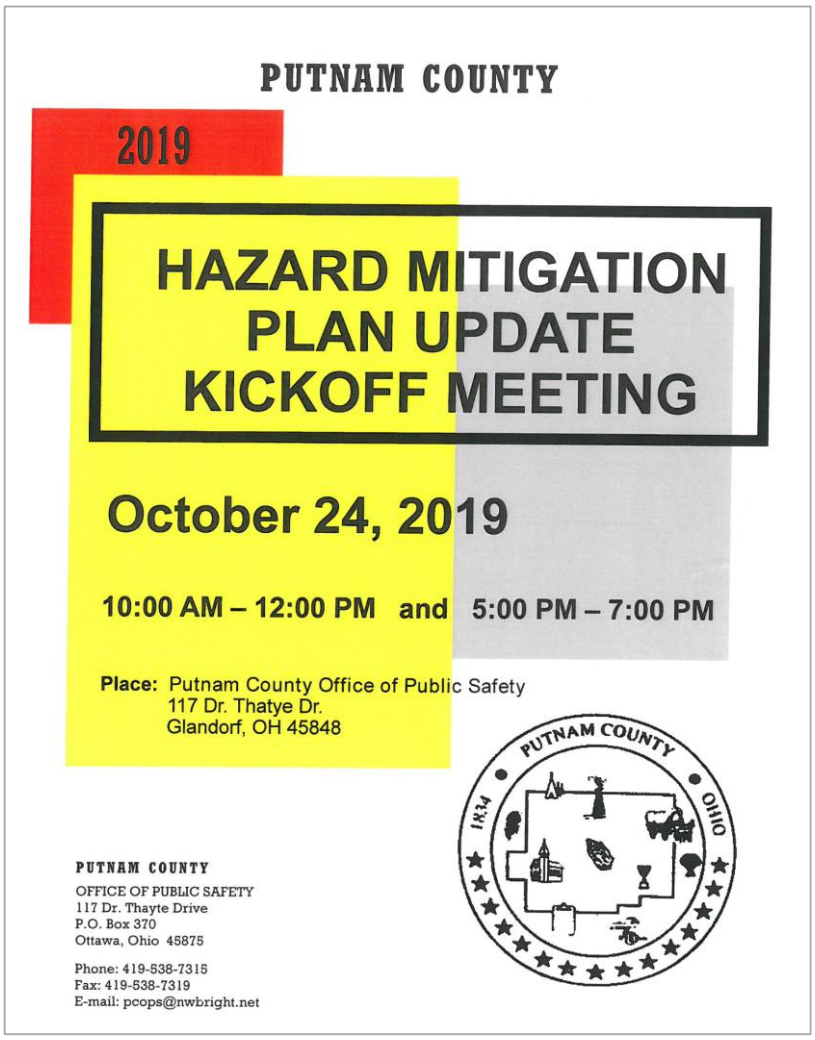
February 21, 2020: A notice was posted on the Putnam County Office of Public Safety's Facebook page to alert the county's residents of the next public meeting being held to update the plan. A date, two times, and a location were provided, along with a phone number for users to register for the meeting.

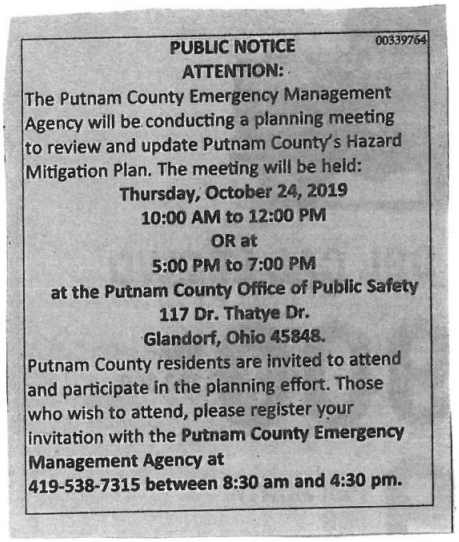
February 24, 2020: Putnam County of Public Safety posted an electronic version of the flyer that was shared around the county.

March 2, 2020: Putnam County of Public Safety posted an electronic version of the flyer that was shared around the county.

March 9, 2020: An informative paragraph inviting the public to attend the meeting on March 11 was posted on the Putnam County Office of Public Safety page.

FIGURE 3-2 PUBLIC PARTICIPATION NOTIFICATION FOR FIRST MEETING





PUBLIC NOTICE 00339764

ATTENTION:

The Putnam County Emergency Management Agency will be conducting a planning meeting to review and update Putnam County's Hazard Mitigation Plan. The meeting will be held:

Thursday, October 24, 2019
10:00 AM to 12:00 PM
OR at
5:00 PM to 7:00 PM
at the Putnam County Office of Public Safety
117 Dr. Thatye Dr.
Glandorf, Ohio 45848.

Putnam County residents are invited to attend and participate in the planning effort. Those who wish to attend, please register your invitation with the **Putnam County Emergency Management Agency at 419-538-7315 between 8:30 am and 4:30 pm.**

FIGURE 3-3 PUBLIC NOTIFICATION FOR SECOND MEETING

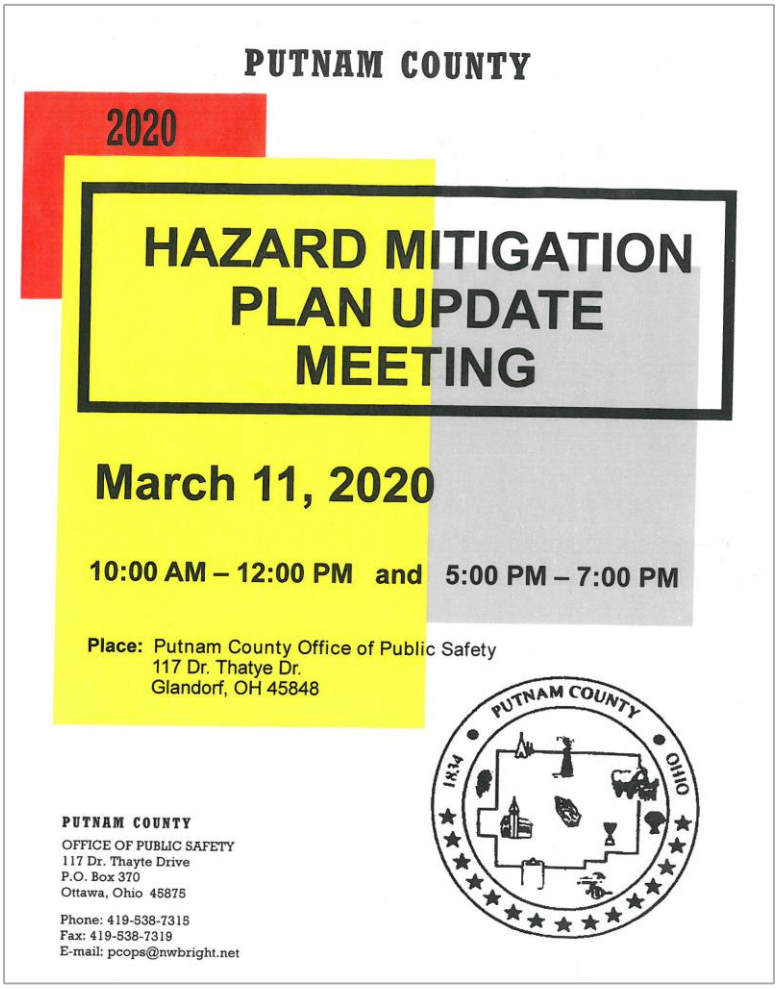


FIGURE 3-4 EMAIL TO JURISDICTIONS

We received a DRAFT copy of the Putnam County Hazard Mitigation Plan. Please review the DRAFT and submit any questions, comments, concerns, and/or errors by **December 31, 2020**.

Questions, comments, and/or concerns can be made directly to my email at stephanie@pcops.org or at 419-538-7315.

Best Regards,
Stephanie Moore
Deputy Director / Administrative Assistant / EMT

FIGURE 3-5 PUBLIC NOTICE POSTING

PUBLIC NOTICE

The Putnam County Emergency Management Agency is seeking public comment on the proposed draft of the Putnam County Hazard Mitigation Plan, which addresses the types, location, probability and vulnerability to various natural and technological hazards which may impact both property and the citizens of Putnam County. Citizens are invited to provide comments and information that will be considered for incorporation into the plan. The plan is available for review at Putnam County Office of Public Safety, 117 Dr. Thatye Dr., Glandorf, Ohio 45848 by appointment ONLY. Comments need to be made by December 31, 2020. Questions, comments, and/or concerns can be made directly to the Putnam County Office of Public Safety email at pcops@pcops.org or at 419-538-7315.

4.3 *DRAFT PLAN COMMENTS RECEIVED*

The public was notified of the draft review period for the HMP through Facebook and Twitter. Participating jurisdictions received emails regarding the completion of the draft; they were encouraged to provide input on the plan before it was submitted to the state for review. Both the public and local communities were able to submit comments from December 16 through 31. See copies of the notifications to the public and jurisdictions are on the previous pages.

Comments from the communities resulted in minor revisions, included fixing typos, and the addition of a new chart in the flooding hazard profile.

4.4 *REVIEW AND INCORPORATE EXISTING INFORMATION*

The HMPC reviewed and assessed the existing plans, studies, and data available from local, state, and federal sources. The documents reviewed and incorporated as part of the HMP planning process are shown in Table 3-5.

TABLE 3-5 EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL DATA

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process / Area of Document Inclusion
2014 Putnam County Hazard Mitigation Plan	Used to help identify problems, mitigation goals, strategies and actions; information from the previous plan was used for past data
Ohio Enhanced Mitigation Plan	This plan was consulted for background information and hazard identification
FEMA Hazard Mitigation How-to Guides	2012 Hazard Mitigation Plan Development
FEMA Local Mitigation Planning Handbook	Local Plan Integration Methods
FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013	Mitigation Strategy Development
NOAA Record Storm Events	Death and Injuries Report for past storm and disaster events
State of Ohio Mitigation Assistance Resource Guide	Referenced to identify potential funding sources and programs to assist with mitigation actions

4.5 *ASSESS RISKS*

In accordance with FEMA requirements, the 2021 HMPC identified and prioritized the natural, technological, and man-made hazards affecting the county and assessed the county's vulnerability to each one. Results from this phase of the HMP planning process later helped the HMPC identify appropriate mitigation actions to reduce risk in specific locations. This phase of the HMP planning process is detailed in Section 4.

Identify/Profile Hazards

Based on a review of past hazards and of the existing plans, reports, and other technical studies/data/information, the 2021 HMPC developed and identified a list of hazards that could affect Putnam County. The content for each hazard profile is provided in Section 4.

Assess Vulnerabilities

Hazard profiling exposes the unique characteristics of individual hazards and begins the process of determining which areas of the county are vulnerable to specific types of hazard events. Using these methodologies, the team determined vulnerable populations, infrastructure, and potential loss estimates for each hazard. Detailed information on the vulnerability assessment for each hazard is provided in Section 4.

4.6 *DEVELOP MITIGATION PLAN*

The 2021 HMP was prepared in accordance with DMA 2000 and FEMA's HMP guidance documents. It provides an explicit strategy and blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and the county's ability to expand on and improve these existing tools. Developing the mitigation plan involved identifying goals, assessing existing capabilities, and identifying mitigation actions. This step of the HMP planning process is detailed in Section 5 and summarized below.

Identify Goals

The HMPC developed goals and objectives for the 2021 HMP, based on current information. These are presented in Section 5.

Develop Capability Assessment

A Capability Assessment is a comprehensive review of the various mitigation capabilities and tools currently available to the county to apply the mitigation actions prescribed in the 2021 HMP. The HMPC identified the technical, financial, and administrative capabilities to implement mitigation actions, as detailed in Section 5.

Identify Mitigation Actions

As part of the 2021 HMP planning process, the HMPC worked to identify and develop mitigation actions with implementation elements. Mitigation actions were prioritized, and detailed implementation strategies were developed during and after Planning Committee Meeting #2. A detailed approach for the review of the existing mitigation actions, the identification and prioritization of new mitigation actions, and the creation of the implementation strategy is provided in Section 5.

Draft HMP

Once the risk assessment and mitigation strategy were completed, information, data, and associated narratives were compiled into the 2021 HMP.

Plan Review and Revision

County staff and external stakeholders reviewed the plan. All comments were incorporated into the final version.

Plan Approval

FEMA Region 5 approved the plan on April 29, 2021.

Plan Maintenance

Plan maintenance procedures, found in Section 6, include the measures the county will take to ensure the HMP's continuous, long-term implementation. The procedures also include the way the

HMP will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document.

SECTION 4. HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

Hazard Identification and Risk Assessment is the process of measuring the potential effects of natural, technological, and man-made hazards on life, property and the economy. The risk assessment is meant to identify, as much as practical given the existing/available data, a community's qualitative and quantitative vulnerabilities. The results of the risk assessment provide a framework for a better understanding potential impacts to the community and a foundation on which to develop and prioritize mitigation actions (see Section 5). Mitigation actions can reduce damage from all disasters. An implementation strategy can direct scarce resources to the areas of greatest vulnerability, as described in this section.

This risk assessment follows the methodology described in FEMA publication *386-2 (2002), Understanding Your Risks—Identifying Hazards and Estimating Losses.* The publication outlines a four-step process:

1) Identify hazards

2) Profile hazard events

3) Inventory assets

4) Estimate losses

Information related to these four steps and gathered during the planning process is incorporated into the discussions in this chapter.

This section identifies and prioritizes the identified natural, technological, and man-made hazards that threaten Putnam County. The reasoning for omitting some hazards from further consideration is also provided.

Section 4, Sub-sections 1 through 11 The Hazard Profiles describe each hazard that poses a threat to the county. They include information on the location, extent/magnitude/severity, previous occurrences, and likelihood of future occurrences.

Each hazard profile includes a Vulnerability Assessment, which presents the county's exposure to natural and man-made hazards and identifies at-risk populations and assets, including critical facilities. Where information was available, potential dollar loss estimates for facilities show a partial representation of the financial cost of a disaster.

IDENTIFYING THE HAZARDS

Per FEMA guidance, the first step in developing a Risk Assessment is to identify the hazards. The HMPC reviewed several previously prepared hazard mitigation plans and other relevant documents to determine the universe of all-hazards planning with respect to the county.

Hazards were ranked to provide structure and to prioritize the mitigation goals and actions discussed in this plan. Ranking was both quantitative and qualitative. The quantitative analysis considered all the information available, including GIS data and official government records. The qualitative approach, the Risk Factor (RF) approach, was used to rank the specific risks associated with each hazard. This process can also be used as a valuable cross-check or validation of the quantitative analysis.

The RF approach combines historical data, local knowledge, and consensus opinions to produce numerical values; they can be used to rank identified hazards against one another. During the planning process, the HMPC checked the results of the hazard profile with their local and historical knowledge to generate a set of ranking criteria. These criteria were used to evaluate hazards and identify the highest risk hazard.

RF values are obtained by assigning varying degrees of risk to five categories for each hazard: probability, impact, spatial extent, warning time, and duration. Each degree of risk was assigned a value from 1 to 4, and the HMPC agreed on a weighting factor for each category. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories is equal to the final RF value, as demonstrated in the sample equation below:

TABLE 4-1 RISK FACTOR CRITERIA

Risk Assessment Category	Level	Degree of Risk Level	Index	Weight
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**Unlikely**	Less Than 1% Annual Probability	**1**	**30%**
	Possible	Between 1 and 10% Annual Probability	**2**	
	Likely	Between 10 and 100% Annual Probability	**3**	
	Highly Likely	100% Annual Probability	**4**	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**Minor**	Very few injuries, if any. Only minor property damage and minimal disruption of quality of life. Temporary shutdown of critical facilities.	**1**	**30%**
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	**2**	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	**3**	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	**4**	
Geographic Location *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**Negligible**	Less Than 1% Of Area Affected	**1**	**20%**
	Small	Between 1 and 10% Of Area Affected	**2**	
	Moderate	Between 10 and 50% Of Area Affected	**3**	
	Large	Between 50 and 100% Of Area Affected	**4**	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**More than 24 HRS**	Self-Defined	**1**	**10%**
	12 to 24 HRS	Self-Defined	**2**	
	6 to 12 HRS	Self-Defined	**3**	
	Less than 6 HRS	Self-Defined	**4**	
DURATION *How long does the hazard event usually last?*	**Less than 6 HRS**	Self-Defined	**1**	**10%**
	Less than 24 HRS	Self-Defined	**2**	
	Less than 1 week	Self-Defined	**3**	
	More than 1 week	Self-Defined	**4**	
RF Value = [(Probability x .30) + (Impact x .30) + (Geographic Location x .20) + (Warning Time x .10) + (Duration x .10)]				

According to the default weighting scheme applied, the highest possible RF value is 4.0. The methodology illustrated above lists the categories used to calculate the variables for the RF value.

Table 4-2 provides the risk factor value for each hazard profiled in this plan, with the numerical value assigned to that hazard. The index values are averages of the values given by the committee, so they are displayed as their exact values, not whole numbers. The risk factor is developed through assessing the probability, impact, spatial extent, warning time, and duration of each hazard type.

TABLE 4-2 PUTNAM COUNTY RISK FACTOR HAZARDS

Natural Hazards		Probability		Impact		Spatial Extent		Warning Time		Duration		RF Value
1	Tornadoes	2.6	0.8	2.4	0.7	2.4	0.5	3.5	0.3	1.7	0.2	**2.5**
2	Severe Winter Storms	2.0	0.6	2.5	0.8	2.0	0.4	3.0	0.3	2.5	0.3	**2.3**
3	Temperature Extremes	2.5	0.8	2.0	0.6	2.5	0.5	2.5	0.3	1.5	0.2	**2.3**
4	Drought	1.9	0.6	2.0	0.6	2.1	0.4	3.2	0.3	2.1	0.2	**2.1**
5	Infestation	2.0	0.6	1.5	0.5	2.5	0.5	2.5	0.3	1.5	0.2	**2.0**
6	Severe Summer Storms	1.5	0.5	1.5	0.5	1.5	0.3	3.0	0.3	2.5	0.3	**1.8**
7	Flooding	1.4	0.4	1.6	0.5	1.7	0.3	2.4	0.2	2.2	0.2	**1.7**
8	Earthquake	1.5	0.5	1.0	0.3	2.0	0.4	2.0	0.2	3.0	0.3	**1.7**
9	Dam Failure	1.0	0.3	1.0	0.3	1.0	0.2	2.5	0.3	2.5	0.3	**1.3**
Technological Hazards		**Probability**		**Impact**		**Spatial Extent**		**Warning Time**		**Duration**		**RF Factor**
1	Terrorism	1.7	0.5	1.9	0.6	1.9	0.4	3.2	0.3	2.0	0.2	**2.0**
2	Epidemic	2.0	0.6	1.0	0.3	2.0	0.4	2.0	0.2	2.0	0.2	**1.7**

Table 4-3 shows the hazards that are included in Ohio's State HMP and those in the previous version of the plan, implemented in 2014. In this plan update, several hazards have been combined.

TABLE 4-3 HAZARDS INCLUDED IN THE 2021 PLAN UPDATE

Hazard Addressed	Ohio HMP	Putnam 2014	Putnam 2021	Notes
Coastal Erosion	O	X	X	Putnam County has no coastal areas.
Dam/Levee Failure	O	O	O	
Drought	O	O	O	
Earthquake	O	O	O	
Temperature Extremes	X	O	O	
Flood	O	O	O	
Infestations	O	O	O	Called “Invasive Species” in Ohio’s HMP.
Land Subsidence	O	X	X	Subsidence was not profiled since this hazard is more commonly associated with the eastern portion of the state where mining is prevalent. There are no mines of sufficient extent that are cause for concern.
Landslide	O	X	X	Terrain in County does not permit conditions to cause concern for this hazard.
Seiche/Coastal Flooding	O	X	X	Putnam County has no coastal areas.
Terrorism	X	X	O	
Tornado	O	O	O	
Wildfire	O	X	X	Not a concern for Putnam County.
Severe Winter Storm	O	O	O	
Epidemic	X	O	O	
Severe Summer Storms	O	O	O	Called “Severe Thunderstorms” in previous plan.

Previous hazard occurrences were used to validate existing hazards and identify new hazard risks. Previous occurrences provide a historical view of hazard risk and a window into hazards that could affect Putnam County and its population in the future. The information in Table 4-4 about federal and state disaster declarations in the county was compiled from FEMA and Ohio databases. According to FEMA, Putnam County has been a part of 13 disaster declarations to date; five of these received public assistance dollars and four received individual assistance.

TABLE 4-4 DECLARED DISASTERS AFFECTING PUTNAM COUNTY (OEMA, FEMA)

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-4507	3/31/2020	Covid-19 Pandemic	$25,028 submitted, not yet approved	-
EM-3457	3/13/2020	Covid-19	-	-
DR-4077	8/20/2012	Severe Storms and Straight-line Winds	$16,595,662.54*	-
EM-3346	6/30/2012	Severe Storms	-	-
DR-1720	8/27/2007	Severe Storms, Flooding, and Tornadoes	$2,740,019.03	$10,122,654.01
EM-3250	9/13/2005	Hurricane Katrina Evacuation	$2,541,599.60*	-
DR-1580	2/15/2005	Severe Winter Storms, Flooding, and Mudslides	$97,938,844.86*	$10,017,388.91*
DR-1556	9/19/2004	Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
DR-1444	11/18/2002	Severe Storms and Tornadoes	-	$226,518.39
DR-642	6/30/1981	Severe Storms, Flooding, Tornadoes	-	-
EM-3055	1/26/1978	Blizzards and Snowstorms	-	-
EM-3029	2/2/1977	Snowstorms	-	-
DR-421	4/4/1974	Tornadoes	-	-

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster, not just Putnam County.*

Based on the review of hazards identified in similar and relevant documents, previous incidents, historical knowledge of local events, and hazard trends, the HMPC identified 11 hazards to use in this HMP. Nine were natural hazards: drought, earthquake, dam failure, flooding, infestation, severe summer storms, severe winter storms, temperature extremes, and tornadoes. Two were technological or man-made hazards: epidemics and terrorism.

HAZARD EVENT DATA

A variety of information sources were consulted to develop the hazard profiles in this plan, including data from the National Oceanic and Atmospheric Administration (NOAA), the National Climatic Data Center (NCDC), and regional National Weather Service (NWS) locations. This data is largely available at a countywide scale, but jurisdiction-level details are often available as well.

EVENT NARRATIVES

Within the section for each hazard, a series of narratives provides greater detail on specific events that affected the county. This section (Historical Occurrences, or in some cases Hazard Events/ Historical Occurrences) is not meant to be a comprehensive list of Putnam County events. Rather, it provides a context for why the plan includes this hazard.

HAZARD PROFILES

Hazards are profiled individually in this section, in order of priority. These profiles have a baseline definition and describe the hazard in relation to Putnam County. Hazard profiles are used to develop a vulnerability assessment, where the community's vulnerability to each hazard deemed significant by the Planning Committee is quantified in terms of population and assets affected.

The hazards that are technological or man-made include additional details in each profile's summary that briefly discuss mitigation best practices, as these hazards are not included in standard mitigation handbooks.

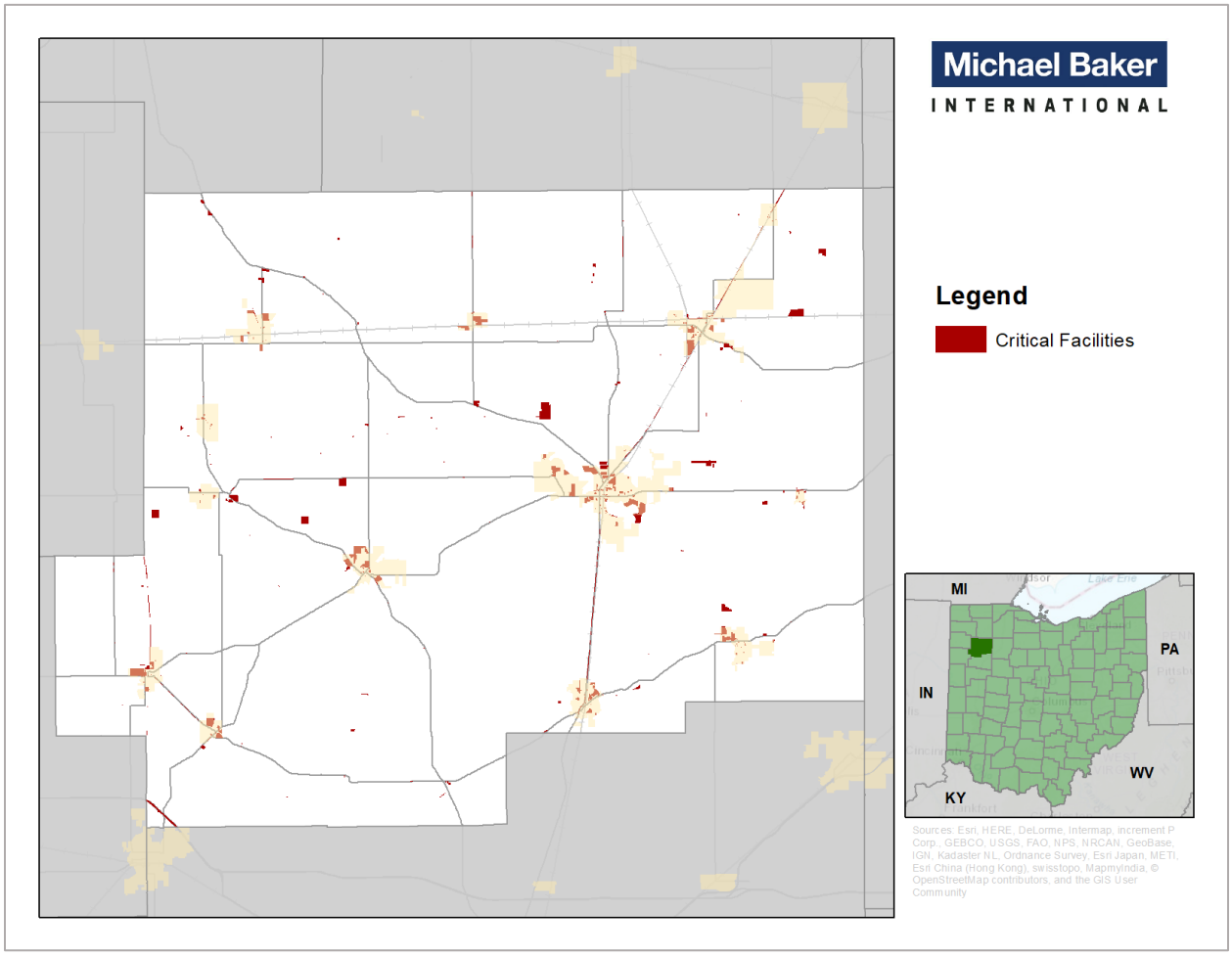
CRITICAL FACILITIES

The Planning Committee identified the types of structures they consider to be "critical" to the county's day-to-day operations. This includes educational centers (27 facilities), public safety centers (11 facilities), nursing homes (11 facilities), daycares (9 facilities), and airfields (7 facilities). Putnam County has 65 critical facilities, which are mapped in Figure 4-1.

TABLE 4-5 COUNTY CRITICAL FACILITIES COST ESTIMATES

Category	Number	Total Cost	1% Loss	5% Loss
CRIT. FACILITY TOTAL	65	$220, 196,050	$2,201,960.50	$11,009,802.50

FIGURE 4-1 COUNTY CRITICAL FACILITIES



Natural Hazards

1. TORNADO

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Tornado	2.6	0.8	2.4	0.7	2.4	0.5	3.5	0.3	1.7	0.2	**2.5**
Medium Risk Hazard (2.0 – 2.9)											

1.1 *TORNADO CHARACTERISTICS*

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms), when cool, dry air intersects and overrides a layer of warm, moist air and forces the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range from 30 to more than 300 miles per hour.

FIGURE 4-2 EXAMPLE OF A TORNADO

Tornadoes are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic, depending on the intensity, size, and duration of the storm. Structures made of light materials, such as mobile homes, are most susceptible to damage. Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.

Strong winds not associated with tornadoes, severe thunderstorms, and winter storms can also occur. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems are (one high pressure, one low pressure), the stronger the pressure gradient and, therefore, the stronger the winds.

1.2 *LOCATION*

All communities in Putnam County are affected by these occurrences. Tornadoes can touch down in any location, without any way to predict where they will occur. Generally, an entire county or region is under a tornado warning or watch.

1.3 *TORNADO EXTENT*

The Enhanced Fujita Scale, also known as the "EF-Scale," measures tornado strength and associated damages. The EF-Scale (Table 4-7) updates the Fujita scale (Table 4-6), which was published in 1971. Both scales classify U.S. tornadoes into six intensity categories, based on the estimated maximum winds within the wind vortex. Since it was applied by the National Weather

Service in 2007, the EF-Scale has become the definitive metric for estimating tornado wind speeds based on the damage done to buildings and structures.

TABLE 4-6 FUJITA SCALE AND ASSOCIATED DAMAGE

F-Scale Number	Wind Speed (MPH)	Type of Damage Possible
0	< 73	**Light damage.** Chimney damage; branches broken off trees; smaller trees/shallow-rooted trees pushed over; damage to sign boards.
1	73-112	**Moderate Damage.** Surface-layer of roofs pulled off; mobile homes pushed off foundations or pushed over; cars pushed off roads.
2	113-157	**Considerable Damage.** Entire roofs torn off homes; mobile homes destroyed; train cars pushed over; large trees uprooted; cars lifted off the ground; lighter objects become flying debris.
3	158-206	**Severe damage.** Roofs and walls torn off homes; complete trains overturned; entire forests destroyed with uprooted trees; heavy automobiles lifted off the ground and thrown.
4	207-260	**Devastating damage.** Homes completely leveled; buildings with weaker structure destroyed and turned into flying debris; cars turned into flying debris.
5	261-318	**Incredible damage.** All structures leveled; cars that are turned into flying debris traveling through the air for over 100 meters; trees debarked.

TABLE 4-7 ENHANCED FUJITA SCALE AND ASSOCIATED DAMAGE

EF-Scale Number	Wind Speed (MPH)	Type of Damage Possible
EFO	65-85	**Minor damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Extreme damage**: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft.); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.

The Storm Prediction Center (SPC) has developed damage indicators to be used with the Enhanced Fujita Scale for different types of buildings. They can be also be used to classify any high wind event. Some of the indicators for different building types are shown in Tables 4-8 through 4-11.

TABLE 4-8 SPC INSTITUTIONAL BUILDING DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	59-88 MPH (72 MPH)
Loss of roof covering (<20%)	72-109 MPH (86 MPH)
Damage to penthouse roof and walls, loss of rooftop HVAC equipment	75-111 MPH (92 MPH)
Broken glass in windows or doors	78-115 MPH (95 MPH)
Uplift of lightweight roof deck and insulation, significant loss of roofing material (>20%)	95-136 MPH (114 MPH)
Façade components torn from structure	97-140 MPH (118 MPH)
Damage to curtain walls or other wall cladding	110-152 MPH (131 MPH)
Uplift of pre-cast concrete roof slabs	119-163 MPH (142 MPH)
Uplift of metal deck with concrete fill slab	118-170 MPH (146 MPH)
Collapse of some top building envelope	127-172 MPH (148 MPH)
Significant damage to building envelope	178-268 MPH (210 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-9 SPC EDUCATIONAL INSTITUTIONS (ELEMENTARY) DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	55-83 MPH (68 MPH)
Loss of roof covering (<20%)	66-99 MPH (79 MPH)
Broken windows	71-106 MPH (87 MPH)
Exterior door failures	83-121 MPH (101 MPH)
Uplift of metal roof decking; significant loss of roofing material (>20%); loss of rooftop HVAC	85-119 MPH (101 MPH)
Damage to or loss of wall cladding	92-127 MPH (108 MPH)
Collapse of tall masonry walls at gym, cafeteria, or auditorium	94-136 MPH (114 MPH)
Uplift or collapse of light steel roof structure	108-148 MPH (125 MPH)
Collapse of exterior walls in top floor	121-153 MPH (139 MPH)
Most interior walls of top floor collapsed	133-186 MPH (158 MPH)
Total destruction of a large section of building envelope	163-224 MPH (192 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-10 SPC METAL BUILDING SYSTEMS DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	54-83 MPH (67 MPH)
Inward or outward collapsed of overhead doors	75-108 MPH (89 MPH)
Metal roof or wall panels pulled from the building	78-120 MPH (95 MPH)
Column anchorage failed	96-135 MPH (117 MPH)
Buckling of roof purlins	95-138 MPH (118 MPH)
Failure of X-braces in the lateral load resisting system	118-158 MPH (138 MPH)
Progressive collapse of rigid frames	120-168 MPH (143 MPH)
Total destruction of building	132-178 MPH (155 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-11 SPC ELECTRIC TRANSMISSION LINES DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	70-98 MPH (83 MPH)
Broken wood cross member	80-114 MPH (99 MPH)
Wood poles leaning	85-130 MPH (108 MPH)
Broken wood poles	98-142 MPH (118 MPH)

Source: Storm Prediction Center, 2009

Improved and consistent building codes have been considered a key measure for mitigating the life and property losses associated with tornadoes and wind events. All of Putnam County is equally at risk of tornado damage.

1.4 *HISTORICAL OCCURRENCES*

General Trends

Putnam County may experience intense winds from thunderstorms, tornadoes, or even the remnants of hurricanes and tropical storms. Tornadoes can occur any time of the year, though county records indicate that tornado occurrences peak from April through November (see Table 4-12).

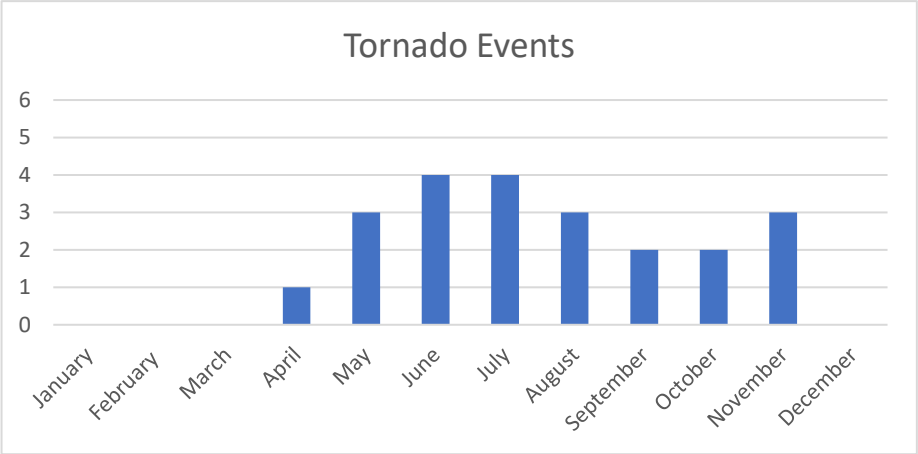
TABLE 4-12 TORNADO EVENTS IN PUTNAM COUNTY (1954-2020)

Location	Date	Time	Mag	Deaths	Injuries	Property Damage	Crop Damage
Putnam Co.	5/2/1954	6:10 PM	Unknown	0	0	$ -	$ -
Putnam Co.	6/15/1964	1:15 PM	F2	0	0	$ 25,000	$ -
Putnam Co.	7/2/1965	7:15 PM	F0	0	0	$ 25,000	$ -
Putnam Co.	6/2/1971	3:25 PM	F3	0	0	$ 2,500,000	$ -
Putnam Co.	7/20/1973	7:00 PM	F1	0	0	$ 25,000	$ -
Putnam Co.	9/9/1976	3:51 PM	F0	0	0	$ 25,000	$ -
Putnam Co.	6/27/1978	5:15 PM	F1	0	0	$ 2,500,000	$ -
Putnam Co.	7/5/1978	5:30 PM	F1	0	0	$ 250,000	$ -
Putnam Co.	4/8/1980	4:20 PM	F1	0	0	$ 250,000	$ -
Putnam Co.	9/14/1990	2:11 PM	F1	0	0	$ 250,000	$ -
Continental	5/31/1998	2:04 PM	F0	0	0	$ -	$ -
Gilboa	7/19/1998	6:45 PM	F1	0	0	$ 40,000	$ -
Pandora	6/12/2000	5:12 PM	F1	0	0	$ 40,000	$ -
Fort Jennings	10/24/2001	6:40 PM	F3	0	0	$ 1,000,000	$ -
Continental	11/10/2002	3:58 PM	F3	2	0	$ -	$ -
Fort Jennings	8/28/2006	8:45 PM	F1	0	0	$ 15,000	$ 10,000
Glandorf	5/30/2008	11:28 PM	EF0	0	0	$ 1,200,000	$ -
Dupont	10/26/2010	10:30 AM	EF1	0	0	$ -	$ -
Douglas	11/17/2013	4:52 PM	EF1	0	0	$ -	$ -
Cloverdale	11/17/2013	4:55 PM	EF2	0	0	$ -	$ -
Dupont	8/24/2016	6:26 PM	EF0	0	0	$ -	$ -

TABLE 4-13 TORNADO EVENTS IN PUTNAM COUNTY (2000-2020)

Number of Events	Property Damage	Crop Damage
10	$ 2,255,000	$ 10,000

FIGURE 4-3 TORNADO EVENTS IN PUTNAM COUNTY (1954-2020)



Historical Occurrences

Putnam County has been directly affected by 14 tornadoes that did damage and eight that had no noticeable impacts. In this last case, although the tornadoes themselves had no impacts, severe storms and flooding provided cause to receive public assistance funding. The county has been a part of four disaster declarations where tornadoes were a factor in the overall emergency.

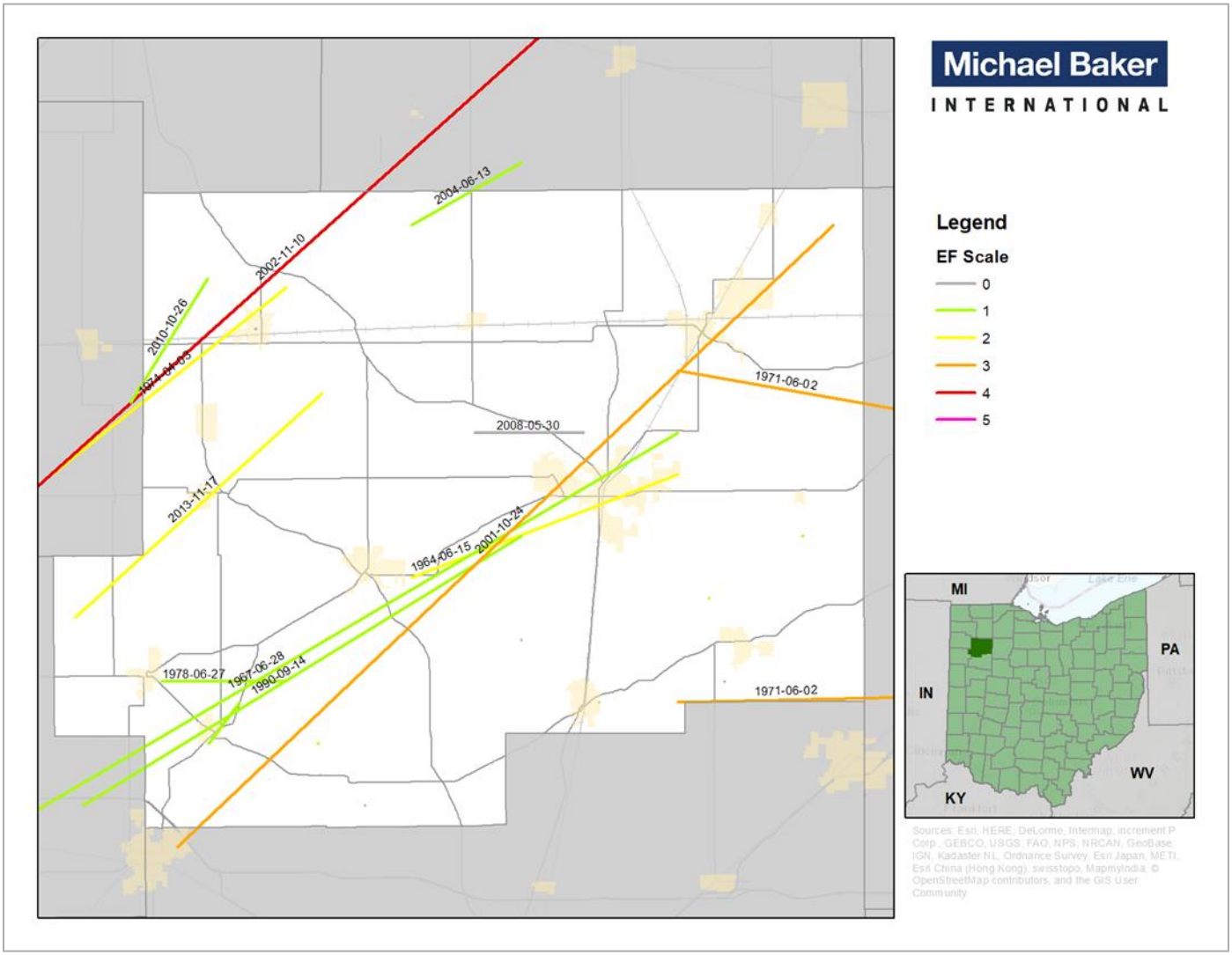
TABLE 4-14 DECLARED DISASTERS AFFECTING PUTNAM COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-1720	8/27/2007	Severe Storms, Flooding, and Tornadoes	$2,740,019.03	$10,122,654.01
DR-1444	11/18/2002	Severe Storms and Tornadoes	-	$226,518.39
DR-642	6/30/1981	Severe Storms, Flooding, Tornadoes	-	-
DR-421	4/4/1974	Tornadoes	-	-

- **June 2, 1971:** A tornado touched down in a rural area near the village of Ottawa and skipped northeast at 45 mph. The storm caused little damage (a fire caused by a lightning strike from the parent storm caused $20,000 loss in Ottawa) until it touched ground in Findlay. More than 21 buildings were hit in Hancock County. The total loss was set at near $600,000. McCutchenville reported the last touchdown along this storm's path. In Findlay, the damage path was along a 060-degree path.
- **April 4, 1974:** A 24-hour period that produced 148 tornados in 13 states earned the name of "1974 Super Outbreak." The Outbreak tornado that passed through Putnam County was ranked as an F2, not nearing the storm's strongest tornadoes. The tornadoes were estimated to cause more than $600 million in damage in Mississippi, Alabama, Tennessee, Kentucky, Illinois, Indiana, Ohio, Michigan, Georgia, Virginia, West Virginia, North Carolina, and New York.

- **June 27, 1978:** A tornado caused hit-skip damage across the southern part of the county. A number of houses and farm buildings were damaged, and a number of planted fields suffered heavy damage.
- **October 24, 2001:** A tornado touched down in extreme southeast Van Wert County, northwest of Delphos, as an F0 and moved northeast into Putnam County, southwest of Fort Jennings. F3 damage occurred 2 miles southwest of Ottawa, with significant damage to well-built homes and structures. The tornado skipped across northeast Putnam County with F1-F2 damage before lifting just south of the Henry County line, east of Belmore.
- **November 10, 2002:** A cold front that followed a deep-surface low pressure system over Lake Michigan and an unstable air mass created a squall line. In front of the squall line, a supercell thunderstorm formed and developed three tornadoes in Indiana. Once the cell crossed into Van Wert County, an F4 tornado developed and traveled northeast through Putnam County. The tornado itself traveled 53 miles, damaged 191 structures, and destroyed 43 homes.
- **May 30, 2008:** The tornado formed near Road 131, just south of Township Highway 1, and dissipated near the Firefox Lake private subdivision. As the tornado moved toward the Blanchard River, it quickly widened to a peak width of 464 yards or just a little over a quarter of a mile. The tornado continued east before crossing the river again and quickly weakening. The most significant damage occurred along Township Highway 1, between Roads 13 and 131. The tornado destroyed six outbuildings, including pole barns and well-built buildings constructed on a foundation. Over a half dozen homes were damaged, with several sustaining major damage including the complete removal of roofs. A large amount of agricultural equipment and 11 vehicles were also damaged or destroyed. Total monetary losses were initially estimated at $1,200,000.

FIGURE 4-4 HISTORICAL TORNADOES IN PUTNAM COUNTY



1.5 *PROBABILITY OF FUTURE OCCURRENCES*

Reported tornado events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing a tornado event can be difficult to quantify, but based on a historical record of 10 tornado events since 2000, it can reasonably be assumed that this type of event occurred once every 2 years from 2000 through 2020.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (10 Events) = 2 Years Between Events

The historic frequency indicates that there is a 50% chance of this type of event occurring each year.

1.6 *VULNERABILITY TO TORNADOES*

TABLE 4-15 POTENTIAL IMPACTS FROM TORNADOES

Impact	Description
People	Severe injuries or death may occur, particularly to those outside or in their vehicles. Large enough tornadoes can kill people, even in moderately sturdy structures.
Infrastructure	Damaged or completely destroyed. Weak tornadoes may only rip shingles off a roof, while the strongest can level buildings completely. Power lines can be ripped off their poles and create power outages for large areas.
Economy	Small towns will often be affected the most by significant events. Large tornadoes can hinder transportation, delaying or cutting off supplies to towns.
Natural Systems	Small trees may be completely uprooted, and large trees could lose significant branches. Crops may be destroyed or heavily damaged.
Transportation	Transportation can be severely disrupted by debris on roadways.

Inventory Assets Exposed to Tornadoes

All assets in Putnam County can be considered at risk from tornadoes and wind events. This includes 100% of the county's population and all critical facilities, structures, and infrastructure.

Potential Losses from Tornadoes

While all county assets are considered to be at risk from this hazard, a particular tornado would only cause damages along its specific track. A high-magnitude tornado sweeping through densely populated portions of the county could create extensive injuries, deaths, and economic losses. There is no way to be sure how many people would be injured or killed due to the differences in time of day and path, but property values can be used to estimate economic losses.

TABLE 4-16 PROPERTIES VULNERABLE TO TORNADOES

Category	Number	Total Cost	1% Damage	5% Damage
Residential Total Cost	16,239	$1,319,690,691	$13,196906.91	$65,984,534.55
Critical Facility Total Cost	65	$220,196,050	$2,201,960.50	$11,009,802.50
Total Value				
Grand Total	**16,304**	**$1,539,886,741**	**$15,398,867.41**	**$76,994,337.05**

1.7 *LAND USE AND DEVELOPMENT TRENDS*

Improved and consistent building codes are considered to be a key measure to mitigate the risk of life and property losses associated with tornadoes and wind events. All Putnam County property is equally at risk to tornado damage, and there are no locations of high-risk exposure.

Regulatory Environment

The formal regulations that pertain to tornadoes are negligible. While protective measures are suggested, especially for mobile/modular homes, these are not generally required in local codes.

1.8 *TORNADOES SUMMARY*

It is difficult to separate the tornado wind components that cause damage from other wind-related natural events that often generate those tornadoes. For example, hurricanes with intense winds often spawn numerous tornadoes or generate severe thunderstorms that produce strong, localized down-drafts. Tornadoes are difficult to predict, and the entire county is subject to all categories of windstorms.

In addition to improved construction standards, retrofitting infrastructure to enhance the design standards can limit exposure. Examples include structural cladding, shuttering systems, and materials that are resistant to the penetration of wind-blown debris and projectiles.

2. SEVERE WINTER STORMS

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Severe Winter Storms	2.0	0.6	2.5	0.8	2.0	0.4	3.0	0.3	2.5	0.3	**2.3**
Medium Risk Hazard (2.0-2.9)											

2.1 *SEVERE WINTER STORM CHARACTERISTICS*

Putnam County has been affected by winter storms of varying degrees over the last century, but severe winter storms are relatively infrequent. These can cause hazardous driving conditions, communications and electrical power failure, and community isolation, and they can disrupt business continuity. A severe winter storm may include one or more of the following factors:

Blizzards, as defined by the National Weather Service, combine sustained winds or frequent gusts of 35 mph or greater with visibilities of less than a quarter mile from falling or blowing snow, for 3 hours or more. A blizzard does not, by definition, indicate heavy amounts of snow, but heavy snow may happen at the same time. The strong winds usually create large drifts from the falling or blowing snow. The reduced visibility makes travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills. Ground blizzards can develop when strong winds lift snow off the ground and severely reduce visibility.

Heavy snow, in large quantities, may fall during winter storms. Six inches or more in 12 hours or 8 inches or more in 24 hours may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous but mainly causes minor inconveniences. Heavy wet snow before the leaves fall from the trees in the fall or after the trees have leafed out in the spring may break tree branches and damage power lines.

Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into the warm layer of air, it melts to rain, and then freezes when it hits the frozen ground or other cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Sleet occurs when the rain in the warm layer freezes into pellets while falling through a cold layer of air at or near the Earth's surface. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Thick accumulations can bring down trees and power lines.

Heavy snowstorms can immobilize a region and paralyze the county. These events can strand commuters, close airports, stop supplies from reaching their destinations and disrupt emergency and medical services. Accumulating snow can cause roofs to collapse and knock down trees and power lines. Homes and farms may be isolated and unprotected, and livestock may be lost. The cost of snow removal, repairing damages, and the loss of business can affect cities and towns economically.

Extreme cold, over extended periods, can occur throughout the winter months in Putnam County, though it is infrequent. While heating systems can usually compensate for the cold, people limit their time outside during extremely cold conditions. Common complaints usually include pipes freezing and cars not starting. Cold temperatures combined with wind can create dangerous wind chills.

Wind chill is how cold the weather "feels." It is based on the rate at which exposed skin loses heat. As the wind increases, it draws heat from the body. This drives down the skin temperature and, eventually, internal body temperature. Therefore, the wind makes the air feel much colder than its actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service)

The science of meteorology and records of severe winter storms are not quite sophisticated enough to identify what areas of the county have a greater risk of damage. Therefore, all areas of the county are assumed to have the same winter storm risk.

Severe winter storms can result in the closing of roads (particularly in rural locations), loss of utility services, and depletion of heating supplies. Environmental impacts often include shrubbery and tree damage due to snow loading, ice build-up, and/or high winds, which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge; however, high temperatures after heavy snow can cause rapid surface water runoff and severe flash flooding.

Ohio has an extensive history of severe winter storms. In the winter of 2005, the state was hit by a series of winter storms. These included ice storms followed by unseasonably high temperatures and high rainfall totals, all of which resulted in extensive flooding and mudslides. This series of storms resulted in Presidential Declaration FEMA-DR-1580-OH, which provided over $140 million in recovery funds via Individual Assistance, Public Assistance, Hazard Mitigation Grant funds, and a state match to the federal hazard mitigation funds.

2.2 *LOCATION*

Severe winter storm events affect all communities in Putnam County.

2.3 *WINTER STORM EXTENT*

The National Weather Service uses different terminology for winter storm events, depending on the situation.

- **Outlook** - Winter weather that may cause significant impact in the 3- to 7-day forecast period and eventually lead to a Watch or Warning is contained in a Hazardous Weather Outlook. More scientific discussion on the event can be found in the Area Forecast Discussion. Forecasts in the 3- to 7-day period typically have a lot of uncertainty (in the 30% to 50% range) about whether the event will occur and reach warning criteria. It is intended to provide information to those who need lead time to prepare for the event.

- Watch - A Watch is generally issued in the 24- to 72-hour forecast timeframe, when the risk of a hazardous winter storm event has increased (50 to 80% certainty that warning thresholds will be met). It is intended to provide enough lead time for those who need it to set their plans in motion. A Watch is issued using the WSW Winter Weather Message product and will appear as a headline in some text products, such as the Zone Forecast. It will change the color, as shown in the table below, of the counties on the NWS front page map according to the type of watch that has been issued.

TABLE 4-17 WINTER STORM WATCH DEFINITIONS

Watch Type	Description
Blizzard Watch	Conditions are favorable for a blizzard event in the next 24 to 72 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for 3 or more hours.
Lake Effect Snow Watch	Conditions are favorable for a lake effect snow event to meet or exceed local lake effect snow warning criteria in the next 24 to 72 hours. Widespread or localized lake-induced snow squalls or heavy snow showers may produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger a watch (i.e. 5 to 8 inches of snow = watch).
Wind Chill Watch	Conditions are favorable for wind chill temperatures to meet or exceed local wind chill warning criteria in the next 24 to 72 hours. Wind chill temperatures may reach or exceed -25°F.
Winter Storm Watch	Conditions are favorable for a winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) to meet or exceed local winter storm warning criteria in the next 24 to 72 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours, covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger a watch (i.e. 5 to 8 inches of snow = watch). Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.

- Advisory - Advisories are issued when a hazardous winter storm event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). An advisory is for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and/or property. Advisories are issued using the WSW Winter Weather Message product and will appear as a headline in some text products such as the Zone Forecast. The table below shows the different type of winter weather advisories and the conditions that it takes for them to be met.

TABLE 4-18 WINTER WEATHER ADVISORY DEFINITIONS

Advisory Type	Description
Winter Weather Advisory	A winter storm event (sleet, snow, freezing rain, snow and blowing snow, or a combination of events) is expected to meet or exceed local winter weather advisory criteria in the next 12 to 36 hours but stay below warning criteria. Criteria for snow is 4 inches or more in 12 hours or less, covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger advisory (i.e. 2 to 5 inches of snow = advisory). Criteria for ice is any ice accumulation less than 1/2 inch over at least 50% of the zone or encompassing most of the population. Winter Weather Advisory can also be issued for black ice. This is optional.
Freezing Rain Advisory	Any accumulation of freezing rain is expected in the next 12 to 36 hours (but will remain below 1/2 inch) for at least 50% of the zone or encompassing most of the population.
Lake Effect Snow Advisory	A lake effect snow event is expected to meet or exceed local lake effect snow advisory criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulating to 4 or more inches in 12 hours or less, but remain less than 7 inches. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger advisory (i.e. 2 to 5 inches of snow = advisory).
Wind Chill Advisory	Wind chill temperatures are expected to meet or exceed local wind chill advisory criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -15°F.

- Warning - Warnings are issued when a hazardous winter storm event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). A warning is used for conditions posing a threat to life or property. Warnings are issued using the WSW Winter Weather Message product and will appear as a headline in some text products such as the Zone Forecast. The table below discusses the various winter storm warnings that can occur and the conditions of each that are required for them to be posted.

TABLE 4-19 WINTER WEATHER WARNING DEFINITIONS

Warning Type	Description
Blizzard Warning	Blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for three or more hours.
Ice Storm Warning	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.
Lake Effect Snow Warning	A lake effect snow event is expected to meet or exceed local lake effect snow warning criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger warning (i.e. 5 to 8 inches of snow = warning).
Wind Chill Warning	Wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.
Winter Storm Warning	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger warning (i.e. 5 to 8 inches of snow = warning). Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.

2.4 *HISTORICAL OCCURRENCES*

General Trends

According to NOAA, Putnam County has had **46 winter storm events** since 2000. A disaster declaration was declared for one event that caused significant property damage, a large storm system that swept across Ohio in January 2005. Three federally or state-declared severe winter storm events have affected Putnam County since 1977, as shown in Table 4-20. While the funding totals for Putnam County are not available, nearly $98 million in public assistance was given as a result of the 2005 storm, with $10 million in individual assistance.

TABLE 4-20 DECLARED WINTER DISASTERS

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-1580	2/15/2005	Severe Winter Storms, Flooding, and Mudslides	$97,938,844.86*	$10,017,388.91*
EM-3055	1/26/1978	Blizzards and Snowstorms	-	-
EM-3029	2/2/1977	Snowstorms	-	-

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Putnam County.*

Event Narratives

- **January 26, 1978:** The "Blizzard of 1978" engulfed Ohio. Beginning on January 26, the storm produced 10 inches of snow in Putnam County. Its winds, over 65 miles per hour, created

snowdrifts over 10 feet tall. High winds also brought wind chills of 70 to 80°F below zero. The blizzard stranded people in their homes without power or access to essential items.

- **January 2, 1996:** As a low-pressure system passed through southeast Ohio, snow fell in the Ohio valley. The heaviest snowfall was around and north of Interstate 70 in west-central Ohio. Up to a foot of falling snow was accompanied by blizzard conditions. Wind gusts of up to 40 miles per hour created snow drifts 3 to 5 feet tall. In contrast, southern Ohio experienced a messy mix of precipitation. North winds created hazardous driving conditions on roads oriented east to west, despite snow removal efforts. The temperatures during this event hovered between the upper teens and twenties.
- **December 22, 2004:** A low-pressure system traveled from the western area of the Gulf of Mexico to eastern Ohio. The system's high amount of moisture created record snowfalls in northwestern Ohio, from 6 to 14 inches, with Allen and southeastern Putnam County seeing the highest accumulations. At the peak of the snowstorm, snow was falling as fast as 2 to 3 inches per hour.
- **December 17, 2016:** A combination of freezing rain, sleet, and snow encompassed the area on December 17. The wintry mix, combined with temperatures in the 20s and low 30s, created dangerous travel conditions that led to numerous accidents. The ice was reported to be around a tenth of an inch thick. Road conditions improved in the morning, but temperatures failed to move above freezing, so untreated roads refroze in the evening.
- **November 11, 2019:** Putnam County saw rain change to snow as an arctic cold front passed through during the afternoon and evening hours. The widespread snowfall continued well into the evening, piling up 3- to 6-inch accumulations. A report near Ottawa cited 5.1 inches. The precipitation caused accidents throughout the region, and cars slid off the road. Schools were delayed or closed on November 12.

2.5 *PROBABILITY OF FUTURE OCCURRENCES*

Winter events reported over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. Forty-six winter storms have been recorded since 2000, a frequency of 2.3 times per year.

(2020 CY) - (2000 HY) = **19 Years on Record**

(**46 Events**) / (**20 Years**) = **2.3 Events per Year**

The historic frequency indicates a 100% chance of this type of event occurring each year.

2.6 *COMMUNITY VULNERABILITY*

TABLE 4-21 POTENTIAL IMPACTS FROM WINTER STORMS

Impact	Description
People	Winter storms can bring severely cold temperatures, which can cause frostbite. Slips and falls resulting from ice can cause injuries, particularly to older populations. Communities may become isolated with little power, water, or food.
Infrastructure	Power outages can result from heavy snow on power lines. Roof collapses may also occur. Burst pipes may damage homes and businesses.
Economy	As transportation becomes dangerous, local shops lose customers. Some must close during storms.
Natural Systems	Rivers may freeze and cause flooding. Trees and other vegetation may be killed by ice or brought down by high winds.
Transportation	Roads can become either dangerous or completely impassable.

All Putnam County assets can be considered at risk from severe winter storms. This includes 100% of the county population and all buildings and infrastructure. Damages are primarily the result of cold temperatures, heavy snow or ice, and sometimes strong winds. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or disrupt traffic, communications, electric power, or other utilities.

A winter storm can adversely affect roadways, utilities, and business activities. They can cause loss of life, frostbite and freezing conditions and can result in the closing of secondary roads, particularly in rural locations, loss of utility services and depletion of heating supplies. Most structures, including the county's critical facilities, could suffer damage from snow load on rooftops and large deposits of ice. Facilities with back-up generators are better equipped to handle a severe storm if the power goes out, even if that generator only powers certain systems.

Winter storms do not generally have a negative impact on structures. While low temperatures and power losses can render a structure uninhabitable for a time, they are unlikely to cause structural damage. However, snow and ice accumulation can affect structures and infrastructure. Older structures are more susceptible to the impacts of winter storms due to their methods of construction and insulation.

In addition to protecting its infrastructure, the county must consider population needs. Putnam County is home to an estimated 33,969 people. At particular risk are elderly individuals. The U.S. Census Bureau estimates that approximately 17.4% of the county's population, or more than 5,900 individuals, are above the age of 65 and at risk from severe winter storms.

Inventory Assets Exposed to Winter Storms

A timely forecast may not allow the county to mitigate property loss, but it could reduce casualties and injuries. In severe winter storm events, buildings are vulnerable to widespread utility disruptions (including the loss of heat and electricity), as well as building collapse or damage from downed trees.

Putnam County is also subject to outages resulting from damage to the electrical grid in other parts of Ohio.

Winter storms affect all of Putnam County, all communities and jurisdictions, and all above-ground structures and infrastructure. Although structural losses are typically minimal and covered by insurance, they can cause lost time, maintenance costs, and contents losses.

2.7 *LAND USE AND DEVELOPMENT TRENDS*

In severe winter storm events, buildings are vulnerable to widespread utility disruptions (including loss of heat and electricity) and may collapse or be damaged by downed trees. Environmental impacts often include damage to shrubbery and trees from heavy snow loading, ice build-up and/or high winds, which can break limbs or even bring down large trees. Winter storms have an indirect effect on the environment through the treatment of roadway surfaces with salt, chemicals, and other de-icing materials, which can impair adjacent surface and ground waters. This is particularly a concern in urban areas. Another important secondary impact of winter storms is collapsing structures; the weight of snow may cause building damage or even a collapse during a heavy snowfall or a significant accumulation over time.

Winter storms have a positive environmental impact as well; gradual melting of snow and ice provides excellent groundwater recharge. However, abruptly high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

2.8 *WINTER STORM SUMMARY*

Putnam County is subject to severe winter storms, which have the potential to become a hazard via cold temperatures, heavy snow or ice, and strong winds. The range of damage to structures depends on the magnitude and duration of the storm event. Losses may be as small as lost productivity and wages, when workers are unable to travel, or as large as roof damage or building collapse. The profile for severe winter storms primarily covers past and future damages from cold temperatures, heavy snow or ice, and sometimes strong winds.

3. TEMPERATURE EXTREMES

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Temperature Extremes	2.5	0.8	2.0	0.6	2.5	0.5	2.5	0.3	1.5	0.2	**2.3**
Medium Risk Hazard (2.0-2.9)											

Climate change may exacerbate the impact of hazardous extreme temperatures. According to the State Hazard Mitigation Plan, extreme heat and heat waves are existing hazards that will be exacerbated by climate change. Heat, one of the leading weather-related killers in the United States, results in hundreds of fatalities each year. Extreme cold can cause hazardous driving conditions, communications and electrical power failures, and community isolation, as well as adversely affecting business continuity. This section defines and profiles the hazard of temperature extremes.

3.1 *EXTREME TEMPERATURE CHARACTERISTICS*

Extreme Heat

Temperatures that remain 10 degrees or more above the average high temperature for the area are defined as extreme heat. The National Weather Service (NWS) issues an Excessive Heat Warning/Advisory when an event (a "heat wave") is expected within 36 hours. The NWS bases these warnings on a "Heat Index" - a combination of heat and humidity - that is predicted to be at or above 105 degrees for two or more consecutive days. Local weather forecast offices may use different criteria for Excessive Heat Warning/Advisories, based on maximum temperatures, nighttime temperatures, and other methods.

Extreme heat is the top weather-related killer in the United States. It causes more fatalities each year than floods, lightning, tornadoes and hurricanes combined. In the Midwest, summers tend to combine high temperatures and high humidity. Heat disorders generally involve a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When the body heats up too quickly to cool itself safely, or when too much fluid is lost through dehydration or sweating, the body temperature rises, and heat-related illnesses may develop.

Extremely high temperatures cause heat stress, which can be divided into four categories (see Table 4-22). Each category is defined by apparent temperature, which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. In addition to these human risks, extreme temperatures can elevate consumers' utility costs.

Extreme Cold

Although infrequent in this county, extended periods of extreme cold could occur throughout the winter months. Heating systems compensate for the cold outside, and most people limit their time outside during extreme cold conditions, but common complaints include pipes freezing and cars not starting. When cold temperatures are combined with wind, dangerous wind chills can develop.

Wind chill is how cold the weather "feels." It is based on the rate at which exposed skin loses heat. As the wind increases, it draws heat from the body. This drives down the skin temperature and, eventually, internal body temperature. Therefore, the wind makes the air feel much colder than its actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service)

Extreme cold is also responsible for several fatalities each year. Threats such as hypothermia and frostbite can lead to loss of fingers and toes or cause permanent kidney, pancreas and liver injury or even death. Major winter storms can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall and cold temperatures. Fifty percent of cold-related injuries happen to people over 60 years old. More than 75% of injuries happen to males, and almost 20% occur within the home.

The dangers associated with extreme cold include frostbite and hypothermia. Frostbite is damage to body tissue that is frozen. Frostbite causes a loss of feeling in extremities such as fingers, toes, ear lobes, or the tip of the nose. Hypothermia, or low body temperature, can lead to uncontrollable shivering, memory loss, disorientation, slurred speech, drowsiness, and apparent exhaustion.

3.2 *LOCATION*

Extreme temperature events are region wide and affect all communities within Putnam County.

3.3 *EXTREME TEMPERATURE EXTENT*

While cold temperatures and power losses can render a structure uninhabitable for a time, they are unlikely to cause structural damages. People living in older homes are more likely to need services offered in response to extreme cold.

Extremely high temperatures cause four categories of heat stress. Each category is defined by apparent temperature, a general term for the perceived outdoor temperature caused by the combined effects of air temperature, relative humidity, and wind speed. Apparent temperature is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, fainting, heat exhaustion, heat stroke, and death. Note that while the temperatures in the following tables and figures serve as a guide for various danger categories, the impacts of high temperatures will vary from person to person, based on individual age, health, and other factors.

The National Weather Service issues temperature advisories, watches, and warnings relating to the impacts of the range of temperatures typically experienced in Ohio. Exact thresholds vary across the state, but Heat Advisories are generally issued when the heat index will be at or above 100°F, but less than 105°F. Excessive Heat Warnings are issued when heat indices will attain or exceed 105°F, and Excessive Heat Watches are issued when excessive heat warning criteria may be experienced in 12 to 48 hours.

TABLE 4-22 FOUR CATEGORIES OF HEAT STRESS

Danger Category	Heat Disorders	Apparent Temperature (°F)
I (Caution)	Fatigue possible with prolonged exposure and physical activity.	80 to 90
II (Extreme Caution)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90 to 105
III (Danger)	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105 to 130
IV (Extreme Danger)	Heatstroke or sunstroke imminent.	>130

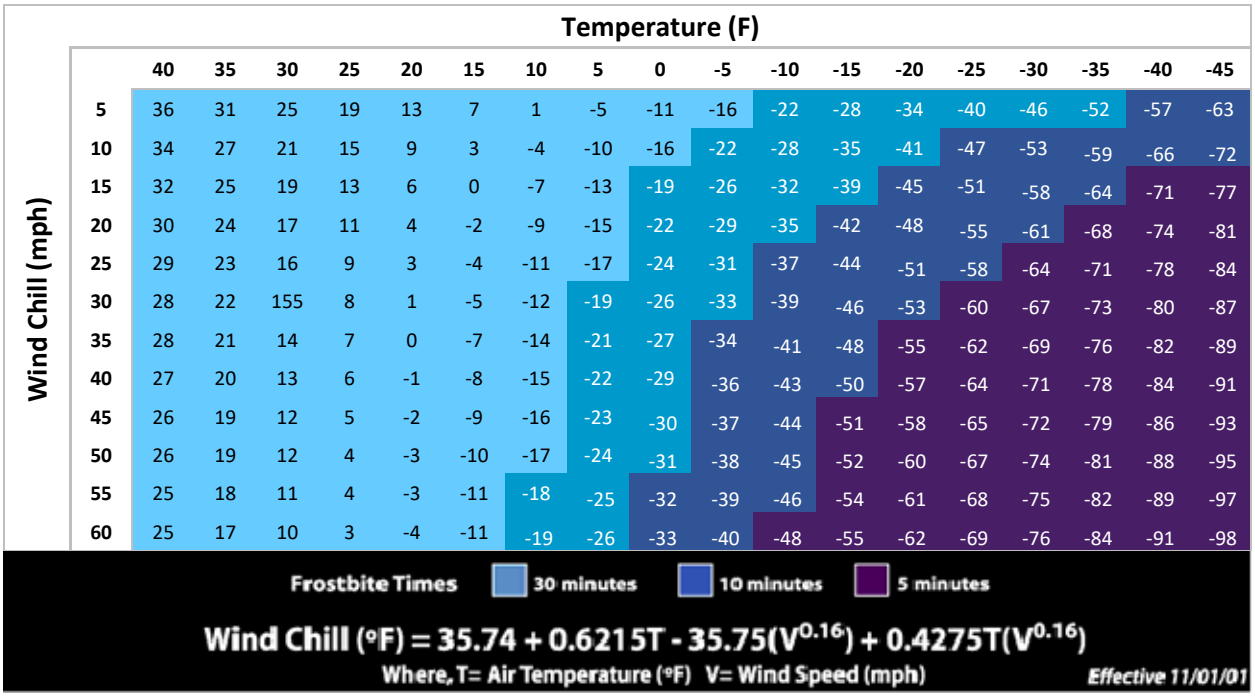
FIGURE 4-5 NWS SEVERE HEAT INDEX

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

TABLE 4-23 EXTREME COLD TEMPERATURE AND ASSOCIATED THREAT

Excessive Cold Threat Level	Threat Level Descriptions
Non-Threatening	**"No Discernable Threat to Life and Property from Excessive Cold."** Cold season weather conditions are non-threatening.
Very Low	**"A Very Low Threat to Life and Property from Excessive Cold."** It is likely that that wind chill values will drop to -10˚ to -15º F or below for 3 hours or more. Or lowest air temperature 0º to -5ºF.
Low	**"A Low Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -15º F to -20ºF or below for 3 hours or more. Or lowest air temperature -5º to -10ºF.
Moderate	**"A Moderate Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -20º to -28 ºF or below for 3 hours or more. Or lowest air temperature -10º to -15ºF.
High	**"A High Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -28º to -35ºF for 3 hours or more. Or lowest air temperature -15º to -20ºF.
Extreme	**"An Extreme Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -35ºF or below for 3 hours or more. Or lowest air temperature less than or equal to -20ºF.

FIGURE 4-6 NWS WINDCHILL CHART



3.4 *HISTORICAL OCCURRENCES*

Extreme temperatures affect areas as large as an entire state or region. As such, events for all of Putnam County were looked at as previous hazard events.

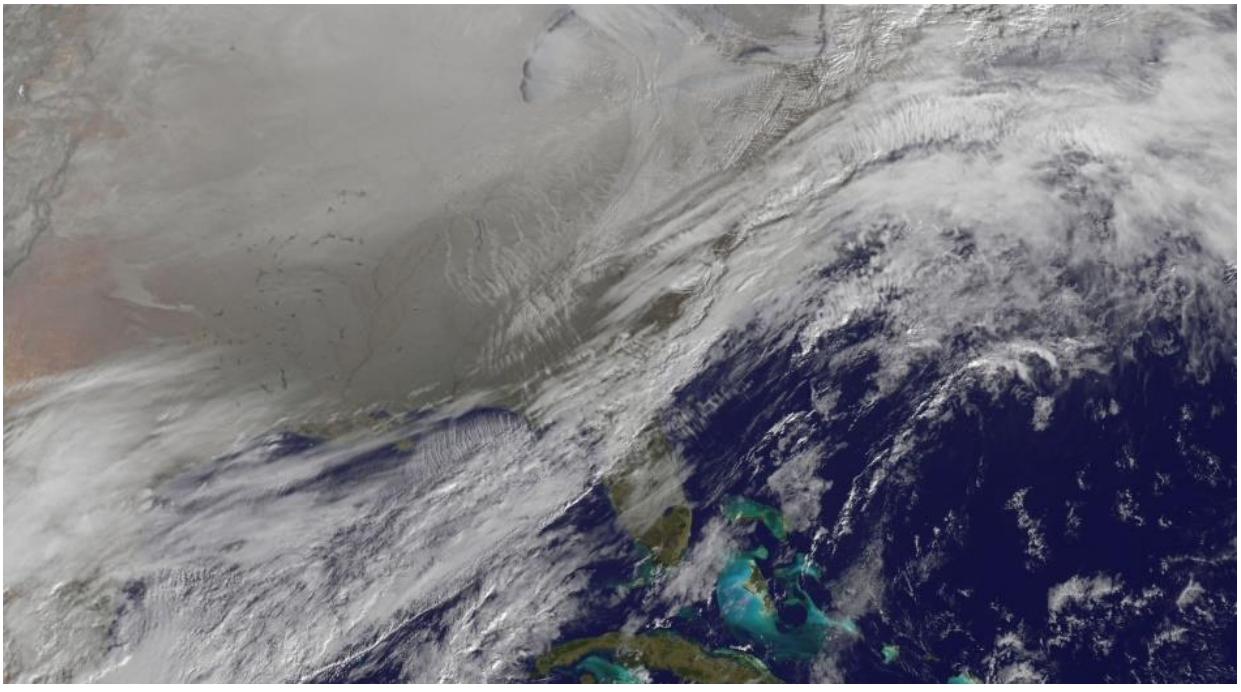
According to the NCDC, Putnam County has no documented cases of extreme heat. Since 1950, Putnam has recorded three extreme cold events, all occurring in the past 20 years.

TABLE 4-24 EXTREME TEMPERATURE EVENTS IN PUTNAM COUNTY 2000-2020

Type	Count	Injuries	Deaths	Property Damage	Crop Damage
Extreme Heat	0	0	0	$ -	$ -
Extreme Cold	3	0	0	$ -	$ -

- Cold – **January 6, 2014:** Brutally cold weather settled over the area on January 6 with an event categorized as a polar vortex. This is a whirling, persistent large area of low pressure, found typically over both North and South poles. The northern polar vortex was pushing southward over western Wisconsin and eastern Minnesota and brought frigid temperatures to half of the continental United States. Much of the nation reported extreme temperatures.
- Cold – **January 8, 2015:** From January 5 through 10, a period of extreme cold settled over the county, accompanied by sub-zero wind chills. The most extreme temperature conditions occurred on January 8, when wind chills hovered around 20 to 30 degrees below zero. The extreme cold resulted in many school closings and delays across the region.
- Cold – **January 30, 2019:** In late January, bitter cold dipped down from the Arctic, plunging the Midwest into a deep freeze. Putnam County saw temperatures in the negative single digits. The front's high winds put the wind chill at -20 degrees.

FIGURE 4-7 JANUARY 2014 POLAR VORTEX



3.5 *PROBABILITY OF FUTURE OCCURRENCES*

The probability of Putnam County experiencing an event with extreme temperatures can be difficult to quantify. Climate models suggest summer global temperatures are likely to increase, with more pronounced changes between temperature extremes. The number of days with temperatures above 100 degrees may also be significantly higher.

Reported extreme temperature events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing an extreme temperature event can be difficult to quantify, but based on the historical record of three events since 2000, it can reasonably be assumed that this type of event has occurred once every 6.67 years from 2000 through 2020.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (3 Events) = 6.67 Years Between Events

The historic frequency indicates that there is a 15% chance of this type of event occurring each year.

3.6 *IMPACTS FROM EXTREME TEMPERATURES*

TABLE 4-25 POTENTIAL IMPACTS FROM EXTREME TEMPERATURES

Impact	Description
People	**Heat:** Heat stroke and dehydration **Cold:** Frostbite and hypothermia
Infrastructure	**Heat:** Power outages and brownouts. Water may become scarce. **Cold:** Burst pipes from freezing temperatures.
Economy	By discouraging people from traveling and shopping, extreme temperatures can cause local economic slowdowns. Crop losses may damage the agricultural sector.
Natural Systems	**Heat:** Vegetation can die and dry out, making areas susceptible to wildfires. **Cold:** Crops may be lost if extreme cold occurs during a growing season.
Transportation	**Heat:** Hot vehicles may break down, causing delays. **Cold:** Extreme cold temperatures can cause ice on roads. Cars may not start.

Areas vulnerable to extreme heat were classified as those with a maximum average temperature over 85 degrees, according to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) study. This range falls within the upper limits of FEMA's heat stress index, Caution Category 1. Extreme heat does not generally affect buildings; it primarily affects people. Nonetheless, facilities must be maintained to ensure that they operate in appropriate conditions to protect people.

Additionally, areas vulnerable to extreme cold were classified as those with a minimum average temperature lower than 14 degrees, according to the USDA NRCS study. Extreme cold does not generally affect buildings; it primarily affects people. Nonetheless, facilities must be maintained to ensure that they operate in appropriate conditions to protect people.

3.7 *COMMUNITY VULNERABILITY*

Because extreme temperatures are dangerous and can be potentially life-threatening, it is important to understand how many people are exposed to such conditions, and how many buildings present potential problems if power is lost. Extreme cold can damage structures; for example, burst pipes will damage buildings and necessitate repairs.

All property in Putnam County is susceptible to the effects of extreme temperatures. While temperature extremes are not usually thought of as damaging to structures, they can make structures unusable. The age of a structure is also important to consider when discussing temperature extremes. Older homes are more susceptible to extreme temperatures, based on the construction methods prevalent at the time.

According to the 2018 American Community Survey, Putnam County had approximately 2,310 children under age 5, which is about 6.8% of the total population. An estimated 5,910 people (17.4% of the population) were above the age of 65.

TABLE 4-26 POPULATION AGE ESTIMATES, 2018

Total	Population	Percent
Under 5 years	2,310	6.8%
65 and up	5,910	17.4%

TABLE 4-27 DATE OF BUILDING CONSTRUCTION

Year Built	Percent	Number
Built 1939 or earlier	26.4%	3,659
Built 1940 to 1949	3.6%	499
Built 1950 to 1959	8.6%	1,194
Built 1960 to 1969	10.2%	1,418
Built 1970 to 1979	15.6%	2,157
Built 1980 to 1989	10.9%	1,509
Built 1990 to 1999	11.7%	1,616
Built 2000 to 2009	11.5%	1,592
Built 2010 to 2013	1.2%	169
Built 2014 or later	0.3%	44
Total:	100%	13,857

3.8 *LAND USE AND DEVELOPMENT TRENDS*

Putnam County as a whole is subject to temperature extremes. Because they affect entire regions, temperature extremes are a countywide hazard. However, their effects on the county will vary due to population density, age of population, and the age of structures.

The elderly and small children are more susceptible to temperature extremes. Additionally, buildings of significant age may be more susceptible. Older homes are generally less insulated than newer construction. In addition, modern windows and doors can improve a structure's ability to resist extreme temperatures. Older structures and infrastructure are likely to be more susceptible to both

heat waves and freezes. It is important to identify building stock and special needs populations, so that those who must respond to an emergency will be better prepared.

Regulatory Environment

The formal regulations that pertain to generalized extreme temperature events are neglible.

3.9 *TEMPERATURE EXTREME SUMMARY*

Temporary periods of extremely hot or cold temperatures typically do not have a significant environmental impact. However, prolonged periods of heat may be associated with drought conditions and can damage or destroy vegetation, dry up rivers and streams, and reduce water quality. Prolonged exposure to cold can kill wildlife and vegetation and poses a potentially grave danger to residents of Putnam County.

4. DROUGHT

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Drought	1.9	0.6	2.0	0.6	2.1	0.4	3.2	0.3	2.1	0.2	**2.1**
Medium Risk Hazard (2.0 – 2.9)											

4.1 *DROUGHT CHARACTERISTICS*

Drought is a normal, recurrent, feature of climate and originates from a deficiency of precipitation over an extended period, usually one or more seasons. Drought can result in a water shortage for some activity, group, or environmental sector. Drought is a complex natural hazard, as is reflected in the following four definitions commonly used to describe it:

- **Agricultural:** Defined principally in terms of naturally occurring soil moisture deficiencies relative to the water demands of plant life, usually arid crops.
- **Hydrological:** Related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- **Meteorological:** Defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount, based on monthly, seasonal, or annual time scales.
- **Socio-economic:** Associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of a weather-related supply shortfall. It may also be called a water management drought.

Although climate is a primary contributor to hydrological drought, factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams also affect the hydrological characteristics of a particular region. Since regions are interconnected by natural systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable stream flow and a higher incidence of hydrologic drought downstream. Land use change is one way human actions alter the frequency of water shortage, even when no change in precipitation has been observed.

Drought risk is assessed based on a combination of the frequency, severity, and spatial extent (the physical nature of drought) and the degree to which a population or activity is vulnerable to the effects of drought. The degree of Putnam County's vulnerability to drought depends on the region's environmental and social characteristics and is measured by its ability to anticipate, cope with, resist, and recover from drought.

Because drought is usually considered a regional hazard, it is not enhanced or analyzed by county-level mapping. Mapping of the current drought status is published by the National Integrated Drought Information System (NIDIS).

4.2 *LOCATION*

Droughts are region-wide events that affect all of Putnam County. All communities are affected during these occurrences.

4.3 *DROUGHT EXTENT*

The Palmer Drought Severity Index (PDSI), developed by Wayne Palmer in the 1960s, uses temperature and rainfall information in a formula to determine dryness. It has become the semi-official drought index. The Palmer Index is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses 0 as normal, and drought is shown in terms of negative numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought.

TABLE 4-28 PALMER DROUGHT SEVERITY INDEX

Drought Severity	Return Period (Years)	Description of Possible Impacts	Drought Monitoring Indices		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44 +	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies	Less than -2	D4	-5.0 or less

Drought severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity. The magnitude of drought is usually measured in time and the severity of the hydrologic deficit.

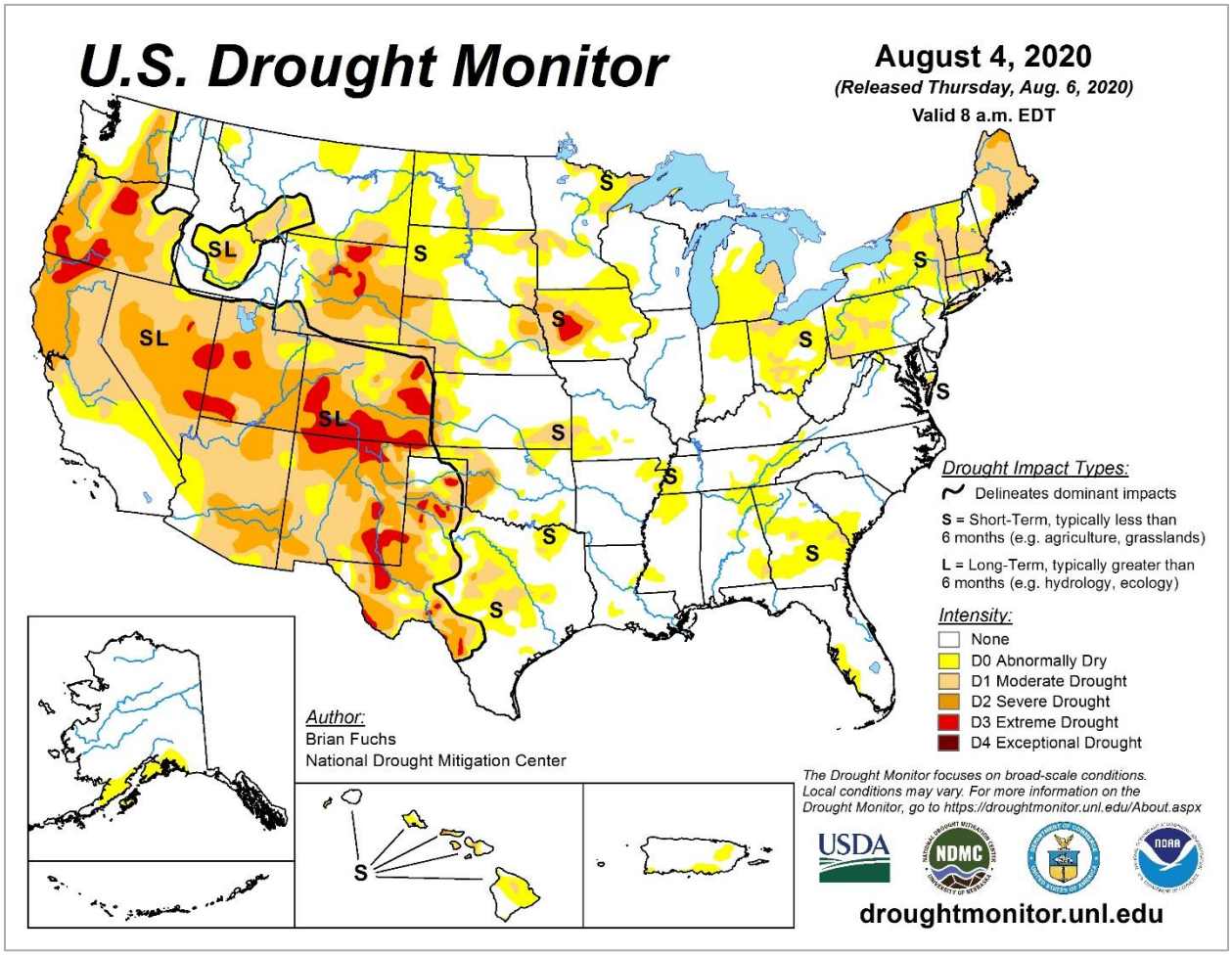
Several resources are available to evaluate drought status and estimate future expected conditions. The NIDIS Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning. The NIDIS maintains the U.S. Drought Portal (www.drought.gov), a web-based access point to several drought-related resources, including the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO).

4.4 *HISTORICAL OCCURRENCES*

Putnam County has experienced two notable drought events since 2000.

- **2012-2013:** The 2012-2013 North American droughts began in spring 2012, when the lack of snow in the continental United States resulted in very little melt water being absorbed into the soil. Drought conditions were experienced almost nationwide. Multiple Ohio counties were designated as having a moderate drought condition by June. The Governor of Ohio sent a memorandum to the USDA State Executive Director requesting primary county natural disaster designations for eligible counties due to agricultural losses caused by drought. The USDA reviewed this memorandum and determined that sufficient production losses in 85 counties warranted a Secretarial disaster designation. Extremely dry remained throughout September, resulting in crop loss throughout Ohio. According to subsidy estimates for 2012, the county received $5 million related to soybean, corn, wheat, and dairy program subsidies.
- **2016:** Little rain fell during July and August 2016, and approximately 15% of the state was labeled as being in a “severe drought” status. As a result of the drought, only 45% of corn and 54% of soybeans rated good or better. The drought ended in August, when heavy rains resulted in a wetter than normal month.

FIGURE 4-8 EXAMPLE US DROUGHT MONITOR MAP



4.5 *PROBABILITY OF FUTURE OCCURRENCES*

Drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. Drought related to climate change will increase pressure on Ohio water resources. Decreasing snowmelt and spring stream flows, coupled with increasing populations, anticipated hotter climate, and demand for water may lead to water shortages for residents.

Drought is difficult to predict, but warning indicators can be tracked and monitored. Understanding the historical frequency, duration, and spatial extent of drought can help determine the likelihood and potential severity of future droughts. The characteristics of past droughts provide benchmarks for future projections. However, the probability that the county will experience a drought in any given year is difficult to predict.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (2 Events) = 10 years between events

NOAA's Paleoclimatology Program studies drought by analyzing records from tree rings, lake and dune sediments, archaeological remains, historical documents, and other environmental indicators

to obtain a broader picture of the frequency of droughts in the United States. According to their research, "…paleoclimatic data suggest that droughts as severe as the 1950s drought have occurred in central North America several times a century over the past 300-400 years, and thus we should expect (and plan for) similar droughts in the future. The paleoclimatic record also indicates that droughts of a much greater duration than any in the 20th century have occurred in parts of North America as recently as 500 years ago." Based on this research, the 1950s drought situation could be expected approximately once every 50 years (or has a 20% chance of occurring every 10 years). An extreme drought, worse than the 1930s "Dust Bowl," has an approximate probability of occurring once every 500 years or a 2% chance of occurring each decade. (NOAA, 2003) A 500-year drought with a magnitude similar to that of the 1930s, which destroys the agricultural economy and leads to wildfires, is an example of a high-magnitude event.

Impacts to vegetation and wildlife can include death from dehydration, the spread of invasive species, or disease because of stressed conditions. However, drought is a natural part of the environment in Ohio, and native species are likely to be adapted to surviving periodic drought conditions. It is unlikely that drought would jeopardize the existence of rare species or vegetative communities.

Environmental impacts are more likely at the interface of the human and natural world. The loss of crops or livestock due to drought can have far-reaching economic effects. Wind and water erosion can alter the visual landscape, and dust can damage property. Water-based recreational resources are affected by drought conditions. Indirect impacts from drought include wildfire, which may have additional effects on the landscape and sensitive resources, such as historic or archeological sites.

4.6 *DROUGHT IMPACT CATEGORIES*

Agriculture: Impacts associated with agriculture, farming, and ranching. Drought-induced agricultural effects include: poor crop quality; income loss for farmers due to reduced crop yields; reduced productivity of cropland (due to wind erosion, long-term loss of organic matter, etc.); insect infestation; plant disease; increased irrigation costs; costs of developing new or supplemental water resources (wells, dams, pipelines); reduced productivity of rangeland; forced reduction of foundation stock; closure/limitation of public lands to grazing; high cost for/unavailability of water for livestock; and range fires.

Water/Energy: Impacts associated with surface or subsurface water supplies (i.e., reservoirs or aquifers), stream levels or stream flow, hydropower generation, or navigation. Drought-induced water/energy impacts include: lower water levels in reservoirs, lakes, and ponds; reduced flow from springs; reduced stream flow; loss of wetlands; estuarine impacts (e.g., changes in salinity levels); increased groundwater depletion, land subsidence, reduced recharge; water quality effects (e.g., salt concentration, increased water temperature, pH, dissolved oxygen, turbidity); revenue shortfalls and/or windfall profits; cost of water transport or transfer; cost of new or supplemental water resource development; loss from impaired navigability of streams, rivers, and canals.

Environment: Impacts associated with wildlife, fisheries, forests, and other fauna. Drought-induced environment impacts include: loss of plants or wildlife biodiversity; loss of trees from urban

landscapes, shelterbelts, and wooded conservation areas; reduced or degraded fish and wildlife habitat; lack of feed and drinking water; greater wildlife mortality as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation (from species concentrated near water); migration and concentration (loss of wildlife in some areas and too much in others); and increased stress on endangered species.

Fire: Impacts associated with forest and range fires that occur during droughts. The relationship between fires and droughts is very complex. Not all fires are caused by droughts, and serious fires occur when droughts are not taking place.

Social: Impacts associated with the public or the recreation/tourism sector. Drought-induced social impacts include: health-related low-flow problems (cross-connection contamination, diminished sewage flows, increased pollutant concentrations, reduced firefighting capability, etc.); loss of human life (e.g., from heat stress, suicides); public safety from forest and range fires; increased respiratory ailments; increased disease caused by wildlife concentrations; population migrations (rural to urban areas, migrants into the United States); loss of aesthetic values; reduction or modification of recreational activities; losses to manufacturers and sellers of recreational equipment; losses related to curtailed activities (hunting and fishing, bird watching, boating, etc.).

4.7 *VULNERABILITY FROM DROUGHT*

TABLE 4-29 POTENTIAL IMPACTS FROM DROUGHT

Impact	Description
People	Dehydration can occur if water reserves run out.
Infrastructure	Lack of moisture in the ground can cause roadways to crack after long periods. Water reservoirs can dry up.
Economy	Rural areas that rely on crops suffer the most damage economically. Farmers lose large amounts of money during extended drought.
Natural Systems	Vegetation can be severely damaged. Rivers and streams can dry up.
Transportation	Cracks in roads can cause delays or detours.

Inventory Assets and Potential Losses Due to Drought

Drought does not typically have a direct impact on critical facilities or structures. However, possible losses/impacts to critical facilities include the loss of function due to low water supplies. Severe droughts can negatively affect drinking water supplies. If this affects a public water system, shipping in outside water could cost millions of dollars. Private springs/wells could also dry up. Possible losses to infrastructure include the loss of potable water.

Droughts evolve slowly, and the population typically has ample time to prepare for their effects. However, if a drought affects the water available for public water systems or individual wells, the

compromised availability of clean drinking water would require emergency actions and could overwhelm the local government and financial resources.

Droughts are not likely to affect structures or infrastructure. The prolonged absence of precipitation is more likely to have an impact on agricultural operations than on urban settings. The agricultural program's various project areas in Putnam County may be affected.

Potential Losses from Drought

Due to the nature of drought, all property in the county is expected to be affected by drought conditions. However, agricultural land throughout the county would be affected the most. No injuries, death, or property damage have been recorded as a result of drought in Putnam County.

The county has an estimated $56.6 million in agriculture products. A 1% loss in crops would represent $566,000, and a 5% loss would be $2.83 million.

4.8 *LAND USE AND DEVELOPMENT TRENDS*

Society's vulnerability to drought is affected by (among other things) population growth and shifts, urbanization, demographic characteristics, technology, water use trends, government policy, social behavior, and environmental awareness. These factors are continually changing, and society's vulnerability to drought may rise or fall in response to these changes. For example, increasing and shifting populations put more pressure on water and other natural resources.

Future development's greatest impact on drought hazards could be related to ground water resources. New water and sewer systems or significant well and septic sites could use more of the water available, particularly during periods of drought. Public water systems are monitored, but individual wells and septic systems are not as strictly regulated. Therefore, future development could have an impact on drought vulnerabilities.

Regulatory Environment

The formal regulations that pertain to drought events are negligible.

4.9 *DROUGHT SUMMARY*

Drought is extremely difficult to predict, but drought indicators can be identified and monitored. The county will review and consider several mitigation measures for incorporation into future Plan updates.

- Assessment programs.
- Water supply augmentation and development of new supplies.
- Public awareness and education programs.
- Technical assistance on water conservation.
- Reduction and water conservation programs.
- Emergency response programs.
- Drought contingency plans.

Some of these actions can have long-term impacts, such as developing contingency plans and water conservation and public awareness programs. As Putnam County gains more experience in assessing and responding to drought, future actions will undoubtedly become more timely, effective, and proactive.

5. INFESTATION

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Infestation	2.0	0.6	1.5	0.5	2.5	0.5	2.5	0.3	1.5	0.2	**2.0**
Medium Risk Hazard (2.0-2.9)											

5.1 *INFESTATION CHARACTERISTICS*

Infestation of an area can be described as a foreign species overtaking local species and their resources in a hostile manner. Infestation can also occur as a foreign species living as a parasite, in or on a host. Introducing a nonnative species into an ecosystem can harm the economy, environment, and human health. The Ohio Department of Natural Resources categorizes invasive species in four categories: invasive terrestrial plants, invasive wildlife, invasive insects and diseases, and aquatic invasive species.

Invasive Terrestrial Plants

It is estimated that one-fourth of the plant species currently in Ohio are originally from other places in the world. However, not all of the nonnative plant species are invasive to their current habitats. Of the over 700 plant species that are not native to Ohio, fewer than 100 are categorized as invasive. The plant species that are invasive have the ability to cause extensive damage to the economy, natural resources of Ohio, and natural heritage of the state. These species crowd native plants, disrupt wildlife that rely on native plants for food, shelter, and reproductive habitat, and reduce biological diversity where they invade.

Invasive Wildlife

Feral swine in Ohio are the most destructive invasive wildlife. Also referred to as wild boar or hogs, they have been damaging habitat that other wildlife require to survive. The species is a mixture of Eurasian wild boar and escaped domesticated swine. They arrived in the United States in 1539 and can be found in at least 35 states. In Ohio, feral swine can weigh from 125 to 200 pounds. Feral swine damage corn and soybean crops as a food source, but they also eat turnips, watermelon, squash, orchids, and timber. They are most destructive when searching for roots. Digging holes that range from 2 inches to 3 feet deep drastically damages roots and soil. Water quality is also threatened by feral swine, due to their instinct to wallow in mud or wet areas. Bacteria transported downstream from the feral swine can contaminate more water sources. They are also known carriers of 30 viral and bacterial diseases and 37 parasites that harm people, pets, livestock, and wildlife.

Invasive Insects and Diseases

Insects, fungus, and other organisms that are nonnative to Ohio are known to be destructive to plant, forest, and wildlife health. The Ohio Department of Natural Resources, ODNR, collaborates with state and federal agencies to identify, quarantine, and remove invasive insect species and diseases.

Aquatic Invasive Species

Waterway habitats in Ohio are being altered by invasive plants and animals. Zebra mussels, bighead carp, silver carp, and curly leaf pondweed are invading the state's streams, rivers, ponds, and lakes.

ODNR and its government partners are monitoring the impacts these invasive species have on the aquatic environment.

According to the State of Ohio's Hazard Mitigation Plan, Putnam County is susceptible to several infestations: European Gypsy Moth; cicadas; the pine shoot beetle; Emerald Ash Borer; Asian long-horned beetles; spider mites; and Japanese Honeysuckle. Most of these invasive species are already in the county. The threat of a new, large-scale infestation occurring is relatively low and poses only moderate associated risk to human life.

5.2 *LOCATION*

Due to the nature of the hazard, infestation generally occurs in wildlife. While the hazard can easily spread to developed parcels of land, non-welcomed terrestrial plant species are usually eradicated. Invasive insects and diseases can be found anywhere in the county due to their ability to travel and spread. Aquatic invasive species can be in all bodies of water where they have been introduced.

The specific species identified here may not be currently found in the county. However, it is important to identify possible infestations that could occur. If an infestation occurs, the county should take steps to quarantine the area and eradicate the invasive species from the area.

5.3 *INFESTATION EXTENT*

European Gypsy Moth currently affects the county. This invasive species, a European strain of gypsy moth, is one of the most destructive defoliating insects to attack the trees and forests of the northeastern United States. Impacts of a gypsy moth infestation include economic losses through timber mortality, loss of recreational opportunities in severely defoliated areas, and the nuisance of gypsy moth caterpillars. A State Gypsy Moth quarantine was established in 1987 in an effort to minimize the movement of egg masses into non-infested areas of Ohio. Several counties around Putnam County have been quarantined due to gypsy moth infestation. The Division of Forestry's mitigation efforts have been successful in containing the gypsy moth infestation. Putnam County has yet to experience significant damage as a result of an infestation.

FIGURE 4-9 GYPSY MOTH - CATERPILLAR PHASE

FIGURE 4-10 GYPSY MOTH - MOTH PHASE

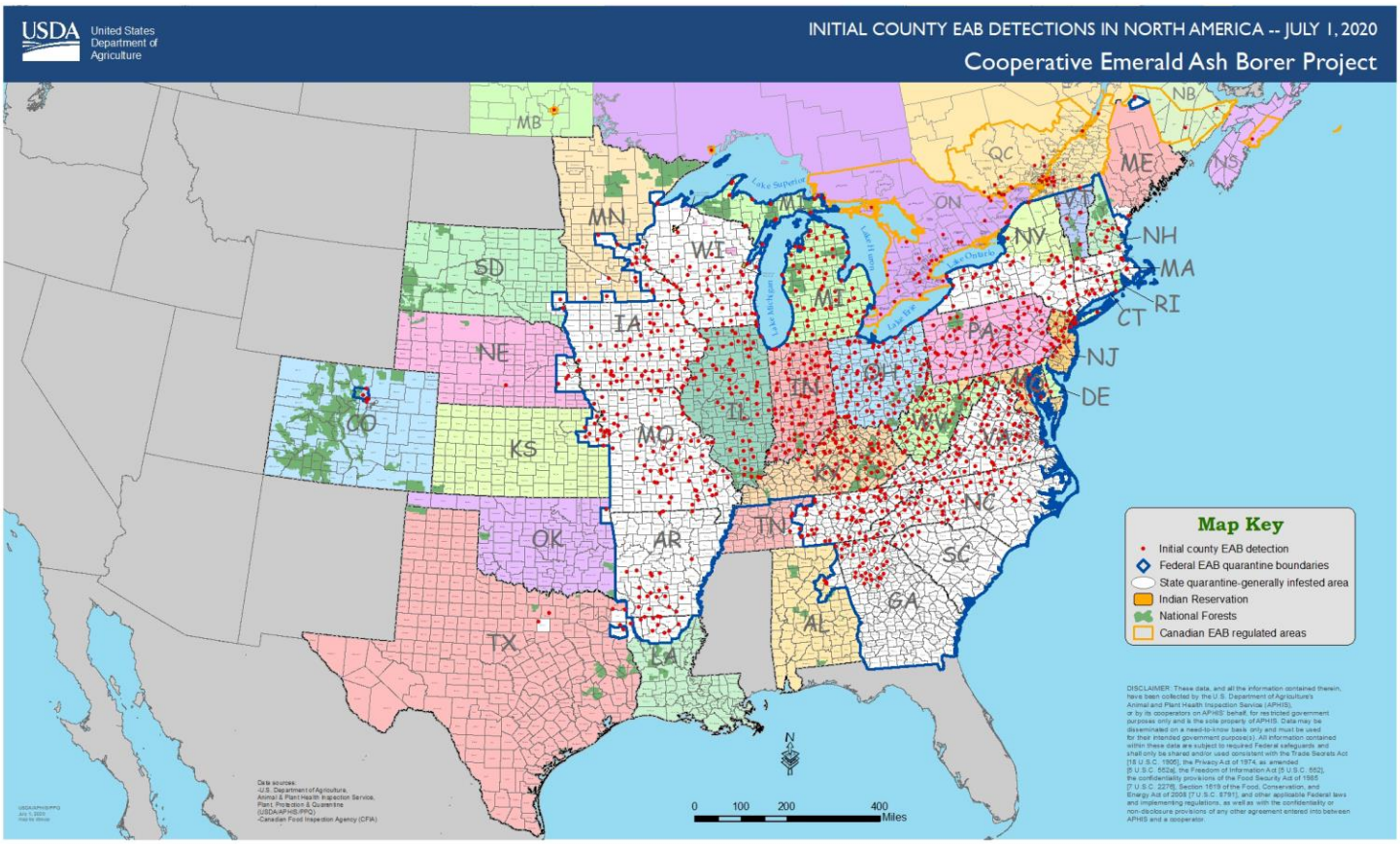
Cicada and Pine Shoot Beetle both have the capability to damage acres of foliage; they are particularly dangerous to the 14,340 acres of wooded land and 291,521 acres of agriculture land in Putnam County. According to the Division of Forestry, the southern portion of Putnam County saw an infestation of Brood X Cicadas in spring 2004. These cicadas were last seen in 1987. Adult cicadas damage deciduous trees (especially oak, apple, dogwood, and hickory), especially when the female cicada lays her eggs. The effects of cicada infestation can be mitigated by careful pruning, covering smaller trees with cheesecloth, or spraying insecticide. The

pine shoot beetle infests many species of pine, but Scotch pine is the preferred host. The beetle causes serious damage to the new growth of healthy pine trees, the trunks of weak pine trees, and bark-covered logs and lumber. Cosmetic damage to pines growing on Christmas tree farms and nurseries may result in reduced product quality and substantial economic loss. According to the most recent available information, 49 counties in Ohio are considered infested.

Emerald Ash Borer, an ash tree-killing insect from Asia, was identified in Ohio in 2003. The department has been battling the pest through detection, regulation, and public outreach in an attempt to protect the state's more than 3.8 billion ash trees over the past decade. The pest has spread from the initial detection in near Toledo to nearly all other parts of the state. Because the pest is established throughout most of Ohio, including Cincinnati, Cleveland, Columbus, Dayton and the Wayne National Forest, the state no longer has quarantine regulations for emerald ash borer. Despite that, to prevent the spread of EAB and other pests, it is still recommended that Ohioans exercise caution when moving firewood. EAB kills ash trees within 3 to 5 years of infestation. Adults are dark metallic green, 1/2 inch long and 1/8 inch wide. They fly only from mid-May to September. Larvae spend the rest of the year developing beneath the bark.

FIGURE 4-11 ADULT EMERALD ASH BORER

FIGURE 4-12 IDENTIFIED EAB INFESTATIONS IN THE U.S.



Asian Long-Horned Beetles, also known as ALBs, were first found in Ohio in June 2011. The beetle feeds on 12 host trees: Ash, Birch, Elm, Golden Raintree, London Planetree/Sycamore, Maple, Horse Chestnut/Buckeye, Katsura, Mimosa, Mountain Ash, Poplar, and Willow. The invasive bugs do not make their presence known in an area until 3 to 4 years after an initial infestation. Host trees typically die within 10 to 15 years after ALB infestation. Native to China and the Korean Peninsula, the Asian Long-Horned Beetle is from the wood-boring beetle family Cerambycidae. Adult ALBs are 1 to 1.5 inches long, with long black and white antennae and black bodies with small spots. Females chew into the bark of host trees to lay eggs. Within 2 weeks of laying the eggs, a white larva hatches and begins to bore into the tree to feed itself. Evidence of ALB infestation can be found at the trunk of trees with a sawdust-like material called frass. The larvae grow into the adult stage in a year.

Spider Mites are an invasive species that attacks both agriculture and plants. They belong to the arachnid family, rather than the insect family. In Putnam County, the pest harms soybean and corn fields. The lifespan of the spider mite is approximately 30 days, but since newborns can complete the growing stage within 5 days, infestation is difficult to eradicate. Chlorophyll is the main food for spider mites. Their eating habits leave small white spots or a spotted appearance on the leaves, which later turn brown and fall off the plant. In August 2016, the Putnam County Sentinel published an article from Ohio State on treating plants infested with spider mites.

Japanese Honeysuckle is one of the more well-known invasive species in Ohio. The plant grows rapidly in forested and residential areas. Originally introduced to the United States in 1806 as a way to control erosion and promote wildlife cover, the species spread rapidly. Its destruction comes from its method of spreading and growing. As it grows, Japanese honeysuckle crowds out native species, steals nutrients, grows on other plants, and reduces the sunlight to lower-growing plants. Eradication of the species involves removal by hand, or spraying chemicals to kill the plant.

5.4 *HISTORICAL OCCURRENCES*

TABLE 4-30 APPROXIMATE ARRIVAL OF INVASIVE SPECIES IN OHIO

Invasive Species	Approximate Arrival in the State	Approximate Location in the State
Feral Swine	1980	Southern border
European Gypsy Moth	1993	Northwest corner, central Ohio, southeast area
Cicada	Information not available – annual cicadas and periodical cicadas are both known to be destructive	Entire state
Pine Shoot Beetle	1992	Discovered near Cleveland, has traveled statewide
Emerald Ash Borer	2003	Entire state
Asian Long-Horned Beetles	2011	Clermont County
Spider Mites	Information not available.	Entire state
Japanese Honeysuckle	Arrived in the country in the early 1800s, began to spread by 1900, traveling to the Midwest	Entire state

5.5 *PROBABILITY OF FUTURE OCCURRENCE*

The recurrence frequency interval for this type of event is difficult to calculate, as infestations do not have a rapid onset or subsidence. As infestation is a long-term invasion, assigning a statistical frequency of infestation would inaccurately assess the event's impact. However, reported infestation events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing an infestation event can be difficult to quantify, but based on a historical record of seven events since 2000, it can reasonably be assumed that this type of event has occurred once every 2.86 years from 2000 through 2020.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (7 Events) = 2.86 Years Between Events

The historic frequency indicates that there is a 35% chance of this type of event occurring each year.

5.6 *COMMUNITY VULNERABILITY*

TABLE 4-31 IMPACTS FROM INFESTATION

Impact	Description
People	Infestation can reduce the well-being of human life by impairing livelihood options, food security, recreational opportunities, health risks, and social well-being.
Infrastructure	There is no threat to existing infrastructure; however, new infrastructure could require the removal of non-native plant species.
Economy	The county's economy is possibly the most vulnerable to invasive species, which can drive value and land value down. Infestation can also hinder crop productivity and require costs to terminate invasive species.
Natural Systems	Reducing biodiversity, decreasing availability and quality of natural resources, increasing pollution from chemicals, and water shortages are all impacts.
Transportation	Loss of funds in order to combat infestation along roadways.

Inventory Assets and Potential Losses Due to Infestation

Infestation does not pose a direct threat to county facilities or human life at this time. This does not preclude the potential for a life-threatening infestation or structurally damaging one in the future.

This hazard is most likely to occur in the acres of forested or farmland and will likely cause no damage to structural assets; however, it may cause significant economic loss. Infestation is considered a hazard due to the high percentage of agricultural and forest land in in Putnam County.

5.7 *LAND USE AND DEVELOPMENT TRENDS*

Land use related to agricultural crops and forested areas may be affected by infestation. With 87.41% of its land in cultivated crops and 2.48% in forest, 89.89% of Putnam County's total land use could be seriously damaged by invasive species.

Current facilities and any new developments are not at risk to infestation. However, this could change through a new infestation or if a current infestation grows out of control.

5.8 *INFESTATION SUMMARY*

Putnam County is susceptible to several infestations that may affect agricultural and forested portions of the county. Economic losses pose the greatest threat to the county; as such, mitigation efforts should be conducted to limit and eliminate infestations.

Mitigation efforts for all types of infestation should be closely coordinated with the Ohio Division of Forestry and the Ohio Department of Agriculture. Current practices by these organizations, including quarantining infested areas, have proven, as in the case of the gypsy moth, to be very successful. Some areas have also begun spraying crops or foliage to prevent further infestation. This has also proven to be very successful.

6. SEVERE SUMMER STORMS

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Severe Thunderstorms	1.5	0.5	1.5	0.5	1.5	0.3	3.0	0.3	2.5	0.3	**1.8**
Low Risk Hazard (1.0 – 1.9)											

6.1 *SEVERE THUNDERSTORM CHARACTERISTICS*

Ohio can have extreme weather conditions in any season. Thunderstorms, associated with strong winds, heavy precipitation, and lightning strikes, can be hazardous under the right conditions and locations. Strong winds and tornadoes can take down trees, damage structures, tip high-profile vehicles, and create high-velocity flying debris. Large hail can damage crops, dent vehicles, break windows, and injure or kill livestock, pets, and people. Even the remnants of tropical storms and hurricanes have brought severe wind damage and flooding to the state.

- Thunderstorms affect smaller areas than hurricanes or winter storms. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their size, thunderstorms are dangerous. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10% are classified as severe. The National Weather Service considers a thunderstorm severe if it produces hail at least 3/4 inch in diameter, winds of 58 MPH or stronger, or a tornado. Every thunderstorm needs three basic components: (1) moisture to form clouds and rain; (2) unstable air, which is warm air that rises rapidly; and (3) lift, which is a cold or warm front capable of lifting air to help form thunderstorms.

- Downburst winds can cause more widespread damage than a tornado. They occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. Cold air, being denser than warm air, falls quickly to the surface. On warm summer days, when the cold air can no longer be supported by a storm's updraft, or when an exceptional downdraft develops, the air crashes to the ground in the form of strong winds. These winds are forced to spread out horizontally when they reach the ground and can cause significant damage. This type of strong wind is also referred to as a straight-line wind. Downbursts with a diameter of less than 2.5 miles are called microbursts, and those with a larger diameter are called macrobursts. A derecho, or bow echo, is a series of downbursts associated with a line of thunderstorms. This type of phenomenon can extend for hundreds of miles and have wind speeds in excess of 100 mph.

- Lightning, although not defined as a severe hazard by the National Weather Service, can accompany heavy rain during thunderstorms. Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause electrical charges to separate. Positively charged ice particles rise to the top of the cloud, and negatively charged ones fall to the middle and lower sections. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively

charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder.

- **Hail** develops when a super-cooled droplet collects a layer of ice and continues to grow, sustained by the updraft. Once the updraft can no longer hold up the hail stone, the stone falls to the ground. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles but rarely result in loss of life. Hailstones are usually less than 2 inches in diameter and can fall at speeds of 120 miles per hour (mph), which can be destructive to roofs, buildings, automobiles, vegetation, and crops.

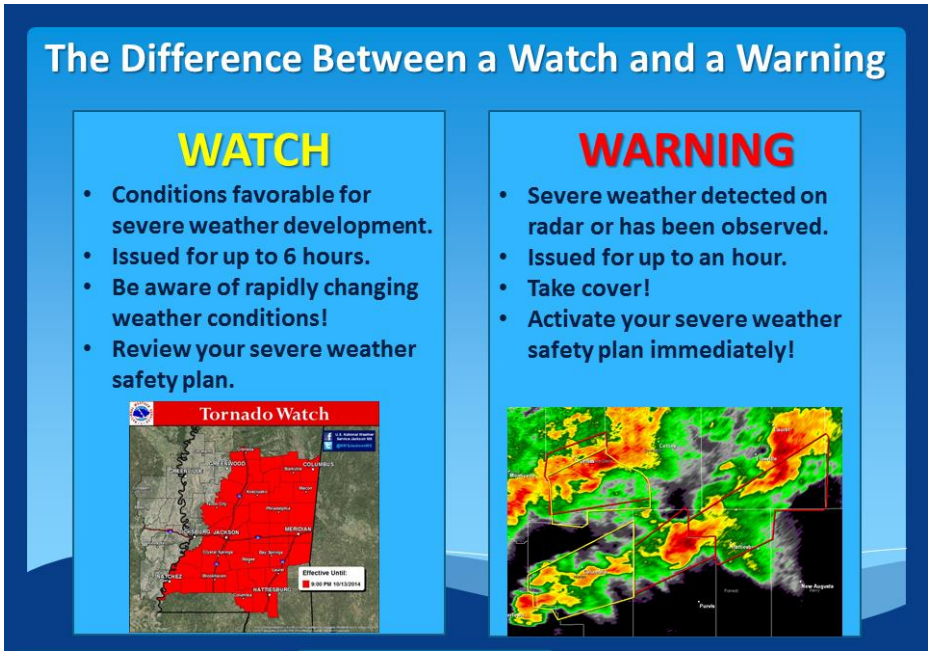
6.2 *LOCATION*

Severe thunderstorm events are generally county-wide or region-wide events that could affect all communities in Putnam County. On occasion, only part of the county experiences the weather, due to the location in which the storm develops and the path it travels.

6.3 *SEVERE THUNDERSTORM EXTENT*

The National Weather Service issues thunderstorm watches and warnings. No watches or warnings apply to lightning. Figure 4-13 explains the difference between NWS watches and warnings.

FIGURE 4-13 NWS WATCH VS. WARNING



The Beaufort scale is used to measure wind speeds. It is based on observation, rather than actual measurement. It is the most widely used system to measure wind speed today. There are 12 levels, plus 0 for “no wind.”

TABLE 4-32 BEAUFORT SCALE

Beaufort Number	MPH	Description	Observation
0	<1	Calm	Calm. Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	3-7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-17	Moderate breeze	Dust and loose paper raised. Small branches begin to move.
5	18-24	Fresh breeze	Branches of a moderate size move. Small trees begin to sway.
6	25-30	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	31-38	High wind, Moderate Gale, Near Gale	Whole trees in motion. Effort needed to walk against the wind. Swaying of skyscrapers may be felt, especially by people on upper floors.
8	39-46	Fresh Gale	Twigs broken from trees. Cars veer on road.
9	47-54	Strong Gale	Larger branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	55-63	Whole Gale/Storm	Trees are broken off or uprooted, saplings bent and deformed, poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	64-72	Violent storm	Widespread vegetation damage. More damage to most roofing surfaces, asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	≥73	Hurricane-force	Considerable and widespread damage to vegetation, a few windows broken, structural damage to mobile homes and poorly constructed sheds and barns. Debris may be hurled about.

TABLE 4-33 HAIL SIZE COMPARISON CHART

Common Object	Size in Diameter
Pea	0.25 Inch
Penny or Dime	0.75 Inch
Quarter	1.00 Inch
Half Dollar	1.25 Inch
Golf Ball	1.75 Inch
Tennis Ball	2.50 Inch
Baseball	2.75 Inch
Grapefruit	4.00 Inch

Hail sizes can differ greatly from one storm to another, depending on the strength of the storm's updraft. Stronger updrafts can create larger hailstones, which cause more damage. This makes reporting the size of hail important for public safety. The preferred hail measurement method is to use a ruler to measure the diameter of the hail stone along its longest axis. However, various coins and balls are often used when reporting hail size.

6.4 *HISTORICAL OCCURRENCES*

General Trends

Dangerous and damaging aspects of a severe storm are tornadoes, hail, lightning strikes, flash flooding, and winds associated with downbursts and microbursts. Using the severe weather events reported over the past 20 years provides an acceptable framework for determining and planning for the expected magnitude of such storms.

TABLE 4-34 SUMMARY OF HISTORICAL SEVERE THUNDERSTORMS (2000-2020)

Type	Count	Injuries	Deaths	Property Damage	Crop Damage
Hail	51	0	0	$ 0	$ 0
Heavy Rain	44	0	0	$ 0	$ 0
Lightning	0	0	0	$ 0	$ 0
Strong Wind	0	0	0	$ 0	$ 0
Thunderstorm Wind	83	2	0	$ 949,500	$ 0
Total	**178**	**2**	**0**	**$ 949,500**	$ **0**

Thunderstorm Wind Events

Non-tornadic, thunderstorm, and non-thunderstorm winds over 100 mph should also be considered in future planning initiatives. These types of winds can remove roofs, move mobile homes, topple trees, take down utility lines, and destroy poorly built or weak structures. Since 2000, there have been 83 recorded severe wind events associated with thunderstorms.

Hail Events

Large hail can damage structures, break windows, dent vehicles, ruin crops, and kill or injure people and livestock. Based on past occurrences, hail sizes greater than 2 inches in diameter are possible and should be included in future planning activities.

Since 2000, 51 recorded hail events associated with thunderstorms have either directly or indirectly affected the county and its immediately surrounding jurisdictions.

Lightning Events

Except in cases where significant forest or range fires are ignited, lightning generally does not result in disasters. No instances of lightning-related incidents in Putnam County are recorded.

Since 1953, seven federally or state declared severe thunderstorm weather events have occurred in Putnam County, as shown in Table 4-34. According to FEMA declarations (1953 to present), these events include severe storms, straight-line winds, flooding, and tornadoes.

TABLE 4-35 SEVERE STORM DISASTER DECLARATIONS

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-642	6/30/1981	Severe Storms, Flooding, Tornadoes	-	-
DR-1444	11/18/2002	Severe Storms and Tornadoes	-	$226,518.39
DR-1556	9/19/2004	Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
DR-1720	8/27/2007	Severe Storms, Flooding, and Tornadoes	$2,740,019.03	$10,122,654.01
EM-3346	6/30/2012	Severe Storms	-	-
DR-4077	8/20/2012	Severe Storms and Straight-line Winds	$16,595,662.54*	-

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Putnam County.*

Event Narratives

- **Thunderstorm Wind – July 29, 2002:** The Putnam County EMA reported straight-line winds in the area that caused $580,000 in property damage, including the destruction of three cinder block gym walls of an elementary school under construction. The winds caused a tree to fall onto a driveway; three people were sent to the hospital with injuries. Other trees fell (without causing injuries) across the county in multiple jurisdictions.

- **Hail – June 9, 2008:** Multiple thunderstorm clusters formed in front of a cold front in northeastern Indiana. As the storms moved into northwestern Ohio, they interacted with 30

to 40 knots of shear and Convective Available Potential Energy (CAPE) over 2,000 j/kg. This caused damaging winds and 3/4-inch hailstones. Possible tornado touchdowns were reported, but surveys determined later that all damage was from straight-line winds.

- **Thunderstorm Wind – July 20, 2013:** As a cold front moved through northwestern Ohio in the early morning, thunderstorms developed along the front. The scattered thunderstorms produced winds up to 55 kts as they began to collapse. The winds snapped or blew over 15 trees in a cemetery. They also caused a pole line to snap, which pulled power lines down, and damaged the roofing on barns.
- **Thunderstorm Wind – July 10, 2019:** Strong gusts were reported throughout Putnam County as the result of a thunderstorm. Wind speed of up to 65 kts was reported near Cloverdale and 62 kts by the Ottawa-Putnam County Airport AWOS. On a property near Cloverdale, part of a roof was blown off, trees were damaged, and a TV antenna was bent.

6.5 *PROBABILITY OF FUTURE OCCURRENCES*

Reported thunderstorm events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing thunderstorm winds that cause damages or injury can be difficult to predict. However, based on the historical record of 178 thunderstorm events from 2000 through 2020 (8.9 thunderstorms per year), it can reasonably be assumed that this type of event will occur multiple times per year.

(2020 CY) - (2000 HY) = **20 Years on Record**

(**178 Events**) / (**20 Years**) = **8.9 Events each Year**

Thunderstorms have occurred regularly every year. Due to climate change, it is expected that thunderstorms will grow increasingly frequent and intensify in severity.

6.6 *COMMUNITY VULNERABILITY*

TABLE 4-36 IMPACTS FROM THUNDERSTORMS

Impact	Description
People	Loss of life or severe injuries can occur, especially to those outside. Lightning will strike outdoors. Hail can cause lacerations, concussions, and even death if large enough.
Infrastructure	Roofs and building siding can be severely damaged by high winds or hail. Power outages may result from lightning strikes or downed power lines.
Economy	Mostly localized disruptions. Large-scale storms, such as hurricanes or derechos, can temporarily affect businesses.
Natural Systems	Lightning can cause wildfires and urban fires. Wind can down trees.
Transportation	Fallen trees can hinder transportation. High winds and heavy rain can temporarily make driving conditions dangerous.

Inventory Assets Exposed

The age, type, construction materials, and condition of inventory assets exposed to severe thunderstorms all affect the damage they may receive. Heavy wind loads can cause poorly constructed roofs to fail, and hail can damage the roofs and siding of structures, rendering the building more susceptible to water damage.

All county assets can be considered to be at risk of damage from severe thunderstorms including high winds, lightning strikes, hail, and flooding. Most structures, including critical facilities, should be able to adequately protect people from hail, but windows could get broken and exteriors dented. Facilities with back-up generators are better equipped to handle a severe weather situation if the power goes out.

Potential Losses

Severe thunderstorms will remain a highly likely occurrence for the county, with some storms producing lightning and hail. An individual thunderstorm is unlikely to damage large numbers of structures, but its side effects (hail, winds and lightning) can damage structures and property throughout the county.

A timely forecast may not be able to mitigate property loss, but it could reduce associated casualties and injuries. It appears possible to forecast these extreme events with some skill. Further research is needed to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. There is no way to predict the specific area that will be impacted by thunderstorm winds, hailstorms or lightning strikes.

Hail is the third leading cause of crop failure in the United States and can also damage homes and vehicles. While drought was by far the leading cause of crop failures in 2012, at 79%, thunderstorms and their hazards accounted for over $1 billion in crop losses nationwide that year. A March 2017 report by Willis Re found that the average annual loss for severe storms is $11.23 billion. These losses from thunderstorms can be difficult to overcome. Insurance policies offer some relief for both homeowners and farmers.

TABLE 4-37 PROPERTIES VULNERABLE TO SEVERE THUNDERSTORMS

Category	Number	Total Cost	1% Damage	5% Damage
Residential Total Cost	16,239	$1,319,690,691	$13,196906.91	$65,984,534.55
Critical Facility Total Cost	65	$220,196,050	$2,201,960.50	$11,009,802.50
Total Value				
Grand Total	**16,304**	**$1,539,886,741**	**$15,398,867.41**	**$76,994,337.05**

6.7 *LAND USE AND DEVELOPMENT TRENDS*

All new structures built in Putnam County will likely be exposed to severe thunderstorm damage. The county needs to adhere to building codes so that new development is built to current standards.

Regulatory Environment

The formal regulations that pertain to thunderstorm events are negligible. All structures in Putnam County are meant to be wind resistant, as recommended by the International Building Code.

6.8 *THUNDERSTORM SUMMARY*

Putnam County is subject to severe storms, ranging from thunderstorms to tropical storms, which have the potential to cause flash flooding, tornadoes, downbursts, and debris. The Severe Thunderstorms profile primarily describes past and potential damages from high winds, lightning, and hail. Flooding is covered as a separate hazard, even if it is caused by a heavy precipitation event.

Building damage has been most successful mitigated in areas where local governments enforce strict building codes for high-wind influence areas and adopt designated special flood hazard areas, and builders comply. Proven grounding techniques are also available to reduce lightning damage to buildings.

Other mitigation efforts include buyout programs, relocations, structural elevations, improved open-space preservation, and land use planning within high-risk areas. Due to the significant risk from severe storms, the county will remain proactive in its mitigation efforts to help build sustainability.

7. FLOODING

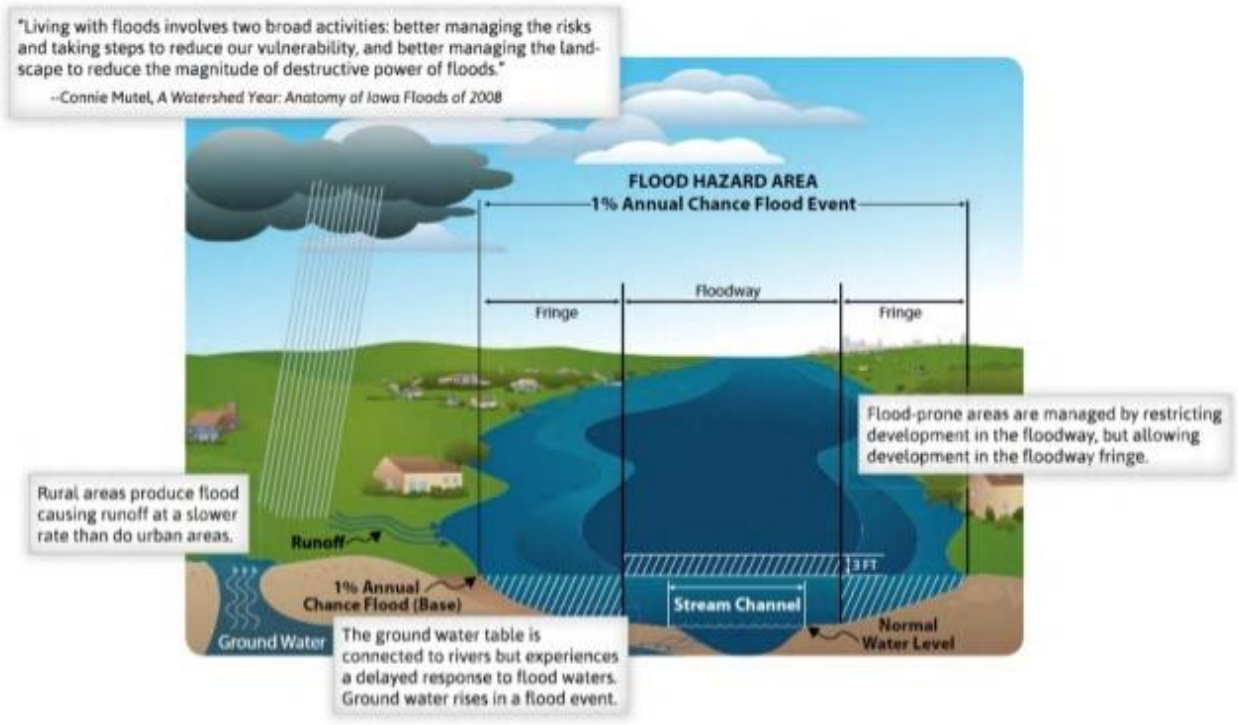
Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Flooding	1.4	0.4	1.6	0.5	1.7	0.3	2.4	0.2	2.2	0.2	**1.7**
Low Risk Hazard (1.0-1.9)											

7.1 *FLOODING CHARACTERISTICS*

A flood is a natural event for rivers and streams. It occurs when a normally dry area is inundated with water. Excess water from snowmelt or rainfall accumulates and flows over the stream banks and into adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. Flash floods usually resulting from heavy rains or rapid snowmelt. They can flood areas not typically subject to flooding, including urban areas. Extremely cold temperatures can cause streams and rivers to freeze, causing ice jams and creating flood conditions.

FEMA develops Flood Insurance Rate Maps (FIRMs) to identify the 1%-annual-chance flood zone for land use planning and the National Flood Insurance Program (NFIP). This 1%-annual-chance flood zone is used to delineate Special Flood Hazard Areas (SFHAs) and identify Base Flood Elevations. The figure below illustrates these terms. Putnam County's current FIRM became effective in June 2018.

FIGURE 4-14 DIAGRAM IDENTIFYING THE SPECIAL HAZARD FLOOD AREA



Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making it one of the most common hazards in all states and U.S. territories. In Ohio, flooding from a variety of sources is common and can occur in any season. Most injuries and deaths from flooding happen when people are swept away by flood currents. Most property damage results from inundation by sediment-filled water. Fast-moving water can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Flooding can cause extensive damage, even if it only affects a basement. It also damages crop lands and kills livestock. Several factors determine the severity of floods, including rainfall intensity and duration, topography and ground cover.

- **Riverine flooding** typically originates when rising water levels from a river, creek, or stream spread onto normally dry land. Extra water from snowmelt, rainfall, freezing streams, and/or ice flows causes the river or stream to overflow into adjacent floodplains. Winter flooding usually occurs when ice creates dams or streams freeze from the bottom up during extreme cold spells. Spring flooding is usually the direct result of melting winter snowpack, heavy spring rains, or both.

- **Flash floods** can occur anywhere that a large volume of water flows or melts over a short time period. They are usually caused by slow-moving thunderstorms or rapid snowmelt. Because flash floods are so localized, their hazard areas cannot be clearly defined. They often occur with little warning and have significant impacts. Rapidly moving water only a few inches deep can lift people off their feet, and a depth of only a foot or two is needed to sweep cars away. Most flood deaths result from flash floods.

- **Urban flooding** is the result of development without adequate drainage systems, which decreases the ground's ability to absorb excess water. Typically, urban flooding occurs when fields or woodlands are changed to roads and parking lots. Urbanization can increase runoff, which is two to six times higher in urban areas than on natural terrain (National Oceanic and Atmospheric Administration, 1992). Flooding may occur in developed areas when the amount of water generated from rainfall and runoff exceeds a stormwater system's capability to remove it.

- **Stream bank erosion** is measured by the rate of the change in the position or horizontal displacement of a stream bank over a period of time. It is generally associated with riverine flooding and may be exacerbated by human activities such as bank hardening and dredging.

- **Ice jams** are stationary accumulations of ice that restrict river flow. They can be freeze-up jams, breakup jams, or a combination. Ice jams increase upstream water levels considerably, while reducing downstream levels. When an ice jam releases, the effects downstream can be similar to those of a flash flood or dam failure. Ice jam flooding generally occurs in the late winter or spring.

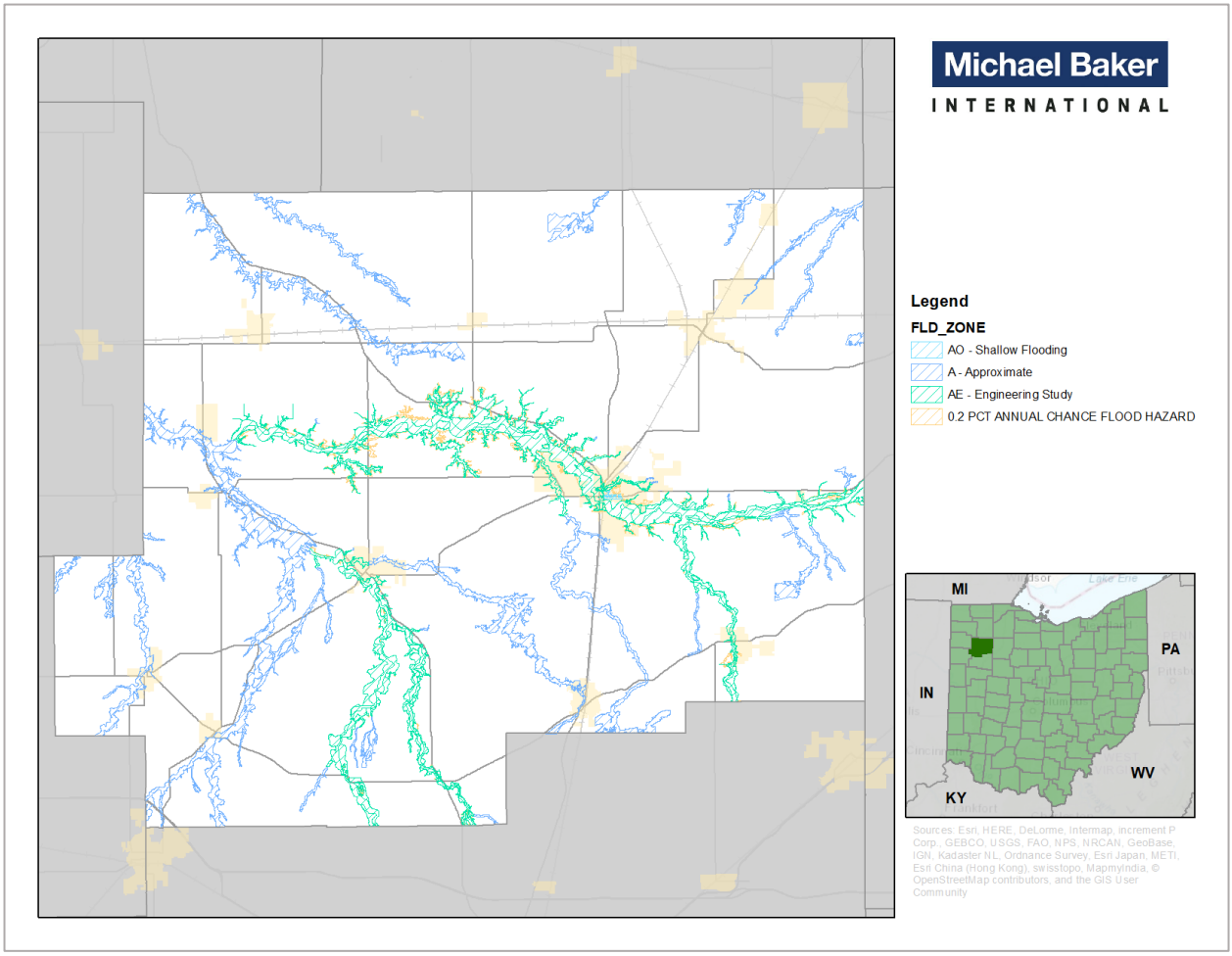
Flood reduction, prevention, and mitigation are major challenges to Putnam County residents and its floodplain manager. Many areas of the county are at risk of flooding, especially properties near

creeks. Heavy seasonal rainfall, which typically occurs from late October through April, can make streams overflow.

7.2 *FLOODING LOCATION*

Flooding in Putnam County is most likely to occur in the flood zones identified in the figure below, but flooding on a smaller scale also occurs outside of these areas.

FIGURE 4-15 PUTNAM COUNTY FLOODING LOCATION



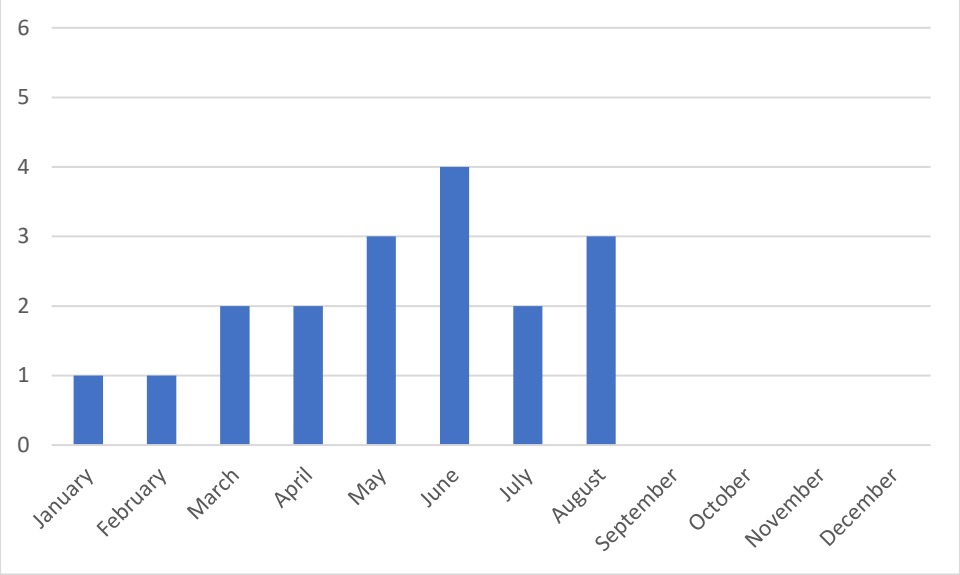
7.3 *FLOODING EXTENT*

In Putnam County, more severe flooding is generally the result of prolonged periods of heavy rainfall and high-intensity, short-duration events. Floods usually occur during the season of highest precipitation or during heavy rainfalls after long dry spells. Widespread storms over the region are common from September through April. Flooding is more severe when the ground cannot soak up the water because it is frozen or saturated. Rain on snow in the higher elevations adds snowmelt to rainfall runoff and intensifies flood conditions.

Cloudburst storms, sometimes lasting as long as 3 hours, can occur over this region from late spring to early fall. They also may occur as an extremely severe sequence within a general winter rainstorm or during unseasonable rains. The intensity of cloudburst storms is very high, and the storms can produce enough precipitation to result in significant runoff.

Surface flooding, including some street flooding, can occur during severe storms. Minor flooding to garages and outbuildings, landscape erosion, and flooded streets have been reported in and around the county. Trash and other debris can also obstruct culvert and pipe openings in smaller channels. This can lead to clogging, obstruction, and flooding of nearby properties during even moderate flows.

FIGURE 4-16 TOTAL FLOOD EVENTS BY MONTH



Flood Warning and Notification

The magnitude and severity of flood damage can be reduced with proper notification and longer warning periods before flood waters arrive. Warning times of 12 hours or more have proven adequate to prepare communities for flooding and reduce flood damages. Warning of a flood more than 12 hours in advance can reduce a community's flood damage by approximately 40% (Read Sturgess and Associates 2000). In addition, seasonal notifications about flooding can enhance the awareness of at-risk residents. When communicated effectively, advance notifications can reach target audiences on a large scale. The Putnam County EMA coordinates with the National Weather Service.

Blanchard River Characteristics

Large floods from the Blanchard River, which runs through Putnam County near the village of Ottawa, have occurred in all seasons of the year. The maximum flood of record occurred along the Blanchard River in March 1913. Along small tributaries, flood stages can rise from normal flow to extreme flood peaks, with accompanying high velocities, in a relatively short period. Along the Blanchard River, floods rise to their crest over a longer period. Water also remains out of its banks for a more extended period. Table 4-38 shows the crests recorded for the Blanchard River during the county's five largest floods. The data is recorded from a gage station west of S. Oak Street in the village of Ottawa. The gages are operated and maintained by the USGS. Table 4-39 displays the crest measurements, in feet, at various flood stages.

TABLE 4-38 HIGHEST HISTORICAL CRESTS ON THE BLANCHARD RIVER

Crest Feet	Date of Crest
33.30	3/25/1913
31.70	8/23/2007
29.75	6/15/1981
29.72	2/11/1959
29.29	2/7/2008

TABLE 4-39 FLOOD CATEGORIES FOR THE BLANCHARD RIVER IN OTTAWA

Flood Category	Crest (ft)
Action Stage	20’
Flood Stage	23’
Moderate Flood Stage	27’
Major Flood Stage	30’

7.4 *HISTORICAL OCCURRENCES*

General Trends

According to the NOAA, Putnam County has had seven flood or flash flood events since 2000. One event resulted in a death, and another caused a $500,000 in property damage. No crop damage was reported.

TABLE 4-40 FLOOD EVENTS SINCE 2000

Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Continental	4/20/2000	Flood	0	0	$ -	$ -
Leipsic	8/22/2007	Flash Flood	0	0	$ 500,000	$ -
Glandorf	3/10/2009	Flood	1	0	$ -	$ -
Glandorf	5/27/2010	Flash Flood	0	0	$ -	$ -
Cloverdale	6/15/2015	Flood	0	0	$ -	$ -
Cloverdale	6/16/2015	Flash Flood	0	0	$ -	$ -
Pandora	4/26/2019	Flood	0	0	$ -	$ -
Totals:			1	0	$ 500,000	$ -

Putnam County has been a part of four Federal Disaster Declarations that included flooding. Three resulted in public assistance, and three resulted in individual assistance.

TABLE 4-41 DECLARED DISASTERS AFFECTING PUTNAM COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-1720	8/27/2007	Ohio Severe Storms, Flooding, and Tornadoes	$2,740,019.03	$10,122,654.01
DR-1580	2/15/2005	Ohio Severe Winter Storms, Flooding, and Mudslides	$97,938,844.86*	$10,017,388.91*
DR-1556	9/19/2004	Ohio Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
DR-642	6/30/1981	Ohio Severe Storms, Flooding, Tornadoes	-	-

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Putnam County.*

Event Narratives

- March 1913: In late March, the Ohio Valley experienced an unprecedented event, still known as the greatest natural disaster in Ohio history. The Flood of 1913 brought flooding to places that had never experienced it. The most severe flooding was in Dayton from the Great Miami River, but disaster was found throughout the state. Over 20.000 homes were destroyed, and at least 428 people died.

- June 15, 1981: The third worst flood of the Blanchard River in Putnam County crested on June 15. Storms that began on June 13 added to heavy precipitation in April and May. The Findlay NOAA Weather Station recorded 4.89 inches of rain in 12 hours, with 3 inches falling in one 4-hour span. The flood caused major damage in Findlay, Ottawa, and surrounding rural areas, flooding 55% of Ottawa. The flood was estimated to cost the county $3 million in crop damages.

- August 23, 2007: Several rounds of moderate to heavy rainfall affected parts of northwestern Ohio, beginning early on the 20th and continuing through the 22nd. Much of this rain fell into the Maumee River basin. The Blanchard River near Ottawa suffered the worst effects of the rainfall, which totaled over 15 inches in some areas. Flooding started out rather generally across much of the county, with numerous road closures and some evacuations. However, the greatest damage occurred in and around Ottawa, which was completely under water as the Blanchard River hit a near-record crest of 31.7 feet.

- June 2015: Severe flooding isolated the village of Kalida by making roads impassable. Roughly 4,000 sandbags were distributed to businesses and residents to prevent damages. After the flood, the village installed gages on the Ottawa River to keep better track of water rise for future storms.

7.5 *PROBABILITY OF FUTURE OCCURRENCES*

Reported flood events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of the county experiencing a flood event can be difficult to quantify, but the historical record of seven flood events since 2000 indicates that this type of event has occurred once every 2.9 years from 2000 through 2020.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (7 Events) = 2.9 Years Between Events

The historic frequency calculates that the chance of this type of event occurring each year is 35%.

7.6 *COMMUNITY VULNERABILITY*

Potential Losses from Flooding

TABLE 4-42 IMPACTS FROM FLOODING

Impact	Description
People	Severe floods can kill those caught in their way. Injuries may also result. Illnesses from water-borne viruses, bacteria, or parasites if contact is made with floodwaters.
Infrastructure	Buildings can be severely damaged or destroyed. Mold can occur after flooding.
Economy	Local economies can sustain the most damage. If damage or transportation shortages cause enough disruption, effects may be felt at a larger scale.
Natural Systems	Land may be waterlogged, destroying crops. Vegetation may be uprooted and displaced. Animals can lose habitats.
Transportation	Roadways may become impassable. Affected railways can halt movement of goods.

Inventory of Assets Exposed to Flooding

Hazus-MH was used to determine the types and numbers of potential assets exposed to flooding. Hazus-MH is a regional multi-hazard loss estimation model developed by FEMA and the National Institute of Building Sciences. For this plan, a 100-year flood scenario was modeled. The results are presented below.

Hazus-MH 100-Year Flood Scenario

The building losses are broken into two categories: direct and business interruption. Direct building losses are the estimated costs to repair the damage or replace the building and its contents. Business interruption losses are those associated with the inability to operate a business because of the flood. Business interruption losses also include temporary living expenses for people displaced from their homes by the flood.

General Building Stock Damage

Hazus estimates that about 35 buildings will be at least moderately damaged. This is over 47% of the buildings in the scenario. An estimated 14 buildings will be completely destroyed. The Hazus Flood Technical Manual defines the various states of damage. Table 4-43 summarizes the expected damage by general building type, while Table 4-44 summarizes the expected damage to essential facilities.

TABLE 4-43 EXPECTED BUILDING DAMAGE BY TYPE

Building Type	1-10		11-20		21-30		31-40		41-50		Substantially	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
ManufHousing	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Masonry	0	0.00	0	0.00	0	0.00	1	20.00	3	60.00	1	20.00
Steel	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Wood	0	0.00	3	5.66	9	16.98	16	30.19	15	28.30	10	18.87

TABLE 4-44 CRITICAL FACILITIES DETERMINED TO BE FLOODPRONE

Critical Facilities	# of Floodprone Structures
Fire	6
Police	0
Hospitals	10
Schools	28
Total Structures	**44**

Debris Generation

Hazus estimates the amount of debris that the 1%-annual-chance (100-year) flood will generate. The model breaks the debris into three categories: a) finishes (drywall, insulation), b) structural (wood, brick), and c) foundations (concrete, slab, block, rebar). It makes this distinction because different types of material-handling equipment are required to handle the debris.

The model estimates that the flood will generate 5,948 tons of debris. Of that total amount, finishes comprise 45%, structural elements comprise 29%, and the rest are foundations. The tonnage of this debris will require 238 truckloads (@25 tons/truck) to remove.

Shelter Requirements

Hazus estimates the number of households that would be displaced from their homes by the flood and the associated potential evacuation. It also estimates how many displaced people will require accommodations in temporary public shelters. In this case, the model estimates 1,555 households will be displaced (households evacuated from within or very near to the inundated area). Of these, 1,921 people (from a Hazus-estimated total population of 34,726) will seek temporary shelter in public shelters.

Building-Related Losses

As noted, building losses are broken into two categories: direct and business interruption. Direct building losses are the estimated costs to repair the damage or replace the building and its contents. Business interruption losses are those associated with the inability to operate a business because of

the flood. Business interruption losses also include temporary living expenses for people displaced from their homes by the flood. The total building-related losses were $43.31 million, with just 1% of the estimated losses related to the region's business interruption. Residential properties made up 40.41% of the total loss. Table 4-45 summarizes the losses associated with building damage.

TABLE 4-45 BUILDING-RELATED ECONOMIC LOSS ESTIMATES

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	10.72	2.55	2.05	1.09	16.41
	Content	6.87	8.40	4.73	5.25	25.25
	Inventory	0.00	0.23	1.09	0.33	1.64
	Subtotal	**17.59**	**11.18**	**7.87**	**6.68**	**43.31**
Business Interruption						
	Income	0.00	0.06	0.00	0.01	0.07
	Relocation	0.03	0.00	0.00	0.00	0.03
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.01	0.07	0.00	0.13	0.21
	Subtotal	**0.05**	**0.14**	**0.00**	**0.15**	**0.33**
ALL	**Total**	**17.63**	**11.31**	**7.87**	**6.82**	**43.63**

The entire county is susceptible to flooding, either directly or through cleanup efforts and lasting economic impacts. Those closest to the Blanchard River and the numerous small streams throughout the county are vulnerable to river waters. Those areas and the rest of the county may also be affected by localized flash flooding.

7.7 *LAND USE AND DEVELOPMENT TRENDS*

Putnam County is mostly rural. Much of the existing development and trends are in the larger villages and existing industrial areas. Localized flooding remains a possibility throughout the county, especially in the many low-lying areas. It is essential that land use plans consider not only the dollar amount of damage that buildings near waterways could incur, but also the danger of increasing flood risk by building close to the rivers, which adds flood debris and narrows the floodplains.

Regulatory Environment

Numerous laws at the federal, state, and local levels relate to floodplain management. Putnam County continues to work to enforce the local floodplain management ordinance requirements for all flooding programs, including the National Flood Insurance Program.

Putnam County Building and Floodplain Codes

These regulations authorize a Floodplain Manager/Administrator. This individual's duties include, but are not limited to, routine monitoring of the floodplains, enforcing floodplain regulations, and providing community assistance, such as encouraging owners to maintain flood insurance. Flood regulations are codified in the Special Purpose Flood Damage Reduction Resolution.

Risk Mapping, Assessment and Planning

Putnam County completed a Flood Insurance Study in 2012. Its FIRM was updated in 2018.

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. As a participating member of the NFIP, Putnam County is dedicated to protecting homes, with 272 NFIP policies currently in force.

TABLE 4-46 PUTNAM COUNTY NFIP STATUS SUMMARY

Community	Initial FHBM	Initial FIRM	Current Effective Map Date	Reg-Emerg Date	Total Coverage	Policies in Force
Cloverdale	-	6/20/2018	6/20/2018	6/20/2019	-	-
Columbus Grove	2/8/1974	6/20/2018	6/20/2018 (M)	8/20/2018	$280,000	1
Dupont	8/9/1974	6/20/2018	6/20/2018	8/9/1975	-	-
Fort Jennings	5/31/1974	3/9/1984	6/20/2018 (M)	3/9/1984	-	-
Gilboa	8/9/1974	5/16/1995	6/20/2018	5/16/1995	$280,000	1
Glandorf	5/17/1974	3/9/1984	6/20/2018	3/9/1984	$225,000	2
Kalida	3/1/1974	10/5/1984	6/20/2018	10/5/01984	$795,000	5
Leipsic	-	6/20/2018	6/20/2018	6/20/2019	-	-
Ottawa	6/7/1974	2/15/1979	6/20/2018	2/15/1979	$34,186,400	206
Ottoville	5/3/1974	8/1/1987	6/20/2018	8/1/1987	$350,000	1
Pandora	2/8/1974	11/1/1978	6/20/2018	8/1/1987	$792,000	7
Putnam Co.	8/12/1977	12/5/1990	6/20/2018	12/5/1990	$8,162,400	49
Total	**-**	**-**	**-**	**-**	**$45,420,800**	**272**

Putnam County entered the NFIP on August 8, 1977, after all of its incorporated cities and villages joined in 1973 and 1974. As participants in the NFIP, the county and communities are dedicated to regulating development in the FEMA floodplain areas in accordance with NFIP criteria. Structures permitted or built in the county before the NFIP regulatory requirements were incorporated into the ordinances (before the effective date of the county's FIRM) and are called "pre-FIRM" structures.

FEMA designates any insured property that has made two or more claims of more than $1,000 in any rolling 10-year period since 1978 as a Repetitive Loss (RL) property. The term "rolling 10-year period" means that a claim of $1,000 can be made in 1991 and another claim for $2,500 in 2000; or one claim in 2001 and another in 2007, as long as both qualifying claims are within 10 years of each other. Claims must be at least 10 days apart but within 10 years of each other. RL properties may be classified as Severe Repetitive Loss (SRL) under certain conditions. SRL properties are those with four or more claims of at least $5,000, or at least two claims that cumulatively exceed the building's reported value. A property that sustains repetitive flooding may or may not be on the county's RL property list for a number of reasons:

- Not everyone is required to carry flood insurance. Structures that carry federally backed mortgages and are in an SFHA are required to carry flood insurance in the county;

- Owners who have completed the terms of the mortgage or who purchased their property outright may choose not to carry flood insurance and instead bear the costs of recovery on their own;
- The owner of a flooded property that does carry flood insurance may choose not to file a claim;
- Some insured properties that are flooded regularly and filed claims may not meet the $1,000 minimum threshold to be recognized as an RL property; or
- The owner adopted mitigation measures that reduce the impact of flooding on the structure, removing it from the RL threat and the RL list (in accordance with FEMA's mitigation reporting requirements).

The following table breaks down the repetitive losses in Putnam County as of the end of 2020, with information provided by the state of Ohio.

TABLE 4-47 REPETITIVE LOSS PROPERTIES

Community	Type	Bldg. Payment	Cont. Payment	Losses	# of RL Properties
Putnam County	Residential	$82,216.74	$2,722.32	9	3
	Non-Residential	-	-	-	0
Ottawa	Residential	$1,313,463.28	$54,163.06	86	30
	Non-Residential	$291,390.26	$68,957.92	11	3
Pandora	Residential	-	-	-	0
	Non-Residential	$14,393.43	$1,000.00	2	1

Extensive FEMA NFIP databases are used to track claims for every participating community. Because they maintain all, NFIP claims, FEMA databases allow users to examine single-loss (SL) and RL properties. The databases show that Putnam County has eight SRL properties.

TABLE 4-48 SEVERE REPETITIVE LOSS PROPERTIES

Community	Type	Bldg. Payment	Cont. Payment	Losses	# of SRL Properties
Ottawa	Residential	$675,968.98	$46,800.32	31	6
	Non-Residential	$336,576.32	$141,211.81	16	2

7.8 *FLOODING SUMMARY*

Severe flooding has the potential to cause significant damage along the rivers and small creeks throughout the county. Assessing flood damage requires county residents to remain alert and notify local officials of potentially floodprone areas near infrastructure such as roads, bridges, and buildings. Flooding remains a highly likely occurrence in the county. Smaller floods caused by heavy rains and inadequate drainage capacity will be more frequent, but not as costly as the large-scale floods that could occur at less frequent intervals.

8. EARTHQUAKE

Natural Hazards	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Earthquake	1.5	0.5	1.0	0.3	2.0	0.4	2.0	0.2	3.0	0.3	**1.7**
Low Risk Hazard (1.0-1.9)											

8.1 *EARTHQUAKE CHARACTERISTICS*

The term "earthquake" refers to a vibration of the Earth's surface. These can be caused by movement along a fault, a volcanic eruption, or even manmade explosions. The vibration can be violent and cause widespread damage and injury or may be barely felt. Most destructive earthquakes are caused by movements along faults. An earthquake is both the sudden slip on an active earth fault and the resulting shaking and radiated seismic energy caused by the slip (USGS 2009). Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt. The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of damage to structures during earthquakes.

Earthquakes may also cause landslides, particularly during the wet season, in areas of high water or saturated soils. The most likely areas for earthquake-induced landslides correlate to the areas of high landslide potential discussed later in this section.

Ohio lies on the outermost boundaries of the New Madrid fault, centered at New Madrid, Missouri. This particular fault has created significant activity over the last 200 years. The most intense activity occurred in 1811 and-1812, when two earthquakes estimated to be 7's on the Richter scale hit the New Madrid Fault.

Ohio has recorded more than 300 earthquakes with a magnitude of 2.0 or greater since 1776. Of these, 15 were reported to have caused noticeable to moderate damage statewide. Two major centers of seismic activity in Ohio are 1) the Anna Seismogenic Area in Shelby and Auglaize counties, and 2) the northeast area of the state on the eastern side of Lake Erie, which is referred to as the Akron Magnetic Boundary. The Anna area has had more than 40 earthquakes, while northeastern Ohio has recorded over 100. None of these were reported to cause major damage or loss of life. Most seismologists predict that the largest magnitude of earthquake that might occur in the western Ohio zone could register between 6.5 and 7.0, while the northeastern zone could generate an earthquake with a magnitude between 6.0 and 6.5. The amount of damage would be difficult to predict, due to the area's lack of historic activity.

The county's lack of noticeable activity can be partly attributed to the Peak Ground Acceleration (PGA). PGA is partly determined by an area's soils and bedrocks . Putnam County's PGA is very low.

According to the Ohio Seismic Network, poorly constructed buildings may be damaged when the peak acceleration nears 0.1g, while acceleration nearing 0.2g would create a loss of balance and greater damage to lesser quality structures. Putnam County has a peak acceleration much below that number and is thus buffered from most seismic activity.

Earthquake Mechanics

Regardless of the source of the earthquake, the associated energy travels in waves radiating outward from the point of release. When these waves travel along the surface, the ground shakes and rolls, fractures form, and water waves may be generated. Earthquakes generally last a matter of seconds, but the waves may travel for long distances and cause damage well after the initial shaking at the point of origin has subsided.

Breaks in the crust associated with seismic activity are known as "faults." They are classified as either active or inactive. Faults may be expressed on the surface by sharp cliffs or scarps or may be buried below surface deposits.

"Foreshocks," minor releases of pressure or slippage, may occur months or minutes before the actual onset of an earthquake. "Aftershocks," which range from minor to major, may occur for months after the main earthquake. In some cases, strong aftershocks may cause significant additional damage, especially if the initial earthquake affected emergency management and response functions or weakened structures.

Factors Contributing to Damage

The damage associated with each earthquake is subject to four primary variables:

- Seismic Activity: The properties of earthquakes vary greatly from event to event. Some seismic activity is localized (a small point of energy release), while other activity is widespread (e.g., a major fault slipping all at once). Earthquakes can be very brief (a few seconds) or last for a minute or more. The depth of release and type of seismic waves also play roles in the nature and location of damage; shallow quakes will hit the area close to the epicenter harder but tend to be felt across a smaller region than deep earthquakes.

- Geology and Soils: The surface geology and soils of an area influence the propagation (conduction) of seismic waves and how strongly the energy is felt. Generally, stable areas (e.g., solid bedrock) experience less destructive shaking than unstable areas (e.g., fill soils). The siting of a community or even individual buildings plays a strong role in the nature and extent of damage from an event.

- Development: A small earthquake in the center of a major city can have far greater consequences than a major event in a thinly populated place.

- Time of Day: The timing of an event controls the distribution of the population of an affected area. On weekdays, the majority of the community will commute between work or school and home. The relative seismic vulnerability of each location can strongly influence the resulting injuries and loss of life.

Types of Damage

- **Shaking:** In minor events, objects fall from shelves and dishes are rattled. In major events, large structures may be torn apart by the forces of the seismic waves. In all but the largest quakes, structural damage is generally limited to older structures that are poorly maintained, constructed, or designed. Unreinforced masonry buildings and wood frame homes not anchored to their foundations are typical victims. Loose or poorly secured objects also pose a significant hazard. These "non-structural falling hazard" objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may also be responsible for injuries and property damage. Dam and bridge failures are significant risks during stronger earthquake events, and such failures may result in considerable property damage and loss of life. In areas of severe seismic shaking hazard, Intensity VII or higher can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

- **Ground Displacement:** Often, the most dramatic evidence of an earthquake is ground displacement along a fault line. Utility lines and roads may be disrupted, but direct damage is generally limited. In rare instances displacement may destroy a structure directly on the fault line.

- **Landslides and Avalanches:** Even small earthquake events can cause landslides. Rock falls are common as unstable material on steep slopes is shaken loose, but certain conditions can also generate significant landslides or debris flows. Roads blocked by landslides may hamper response and recovery operations.

- **Liquefaction and Subsidence:** Soils may liquefy and/or subside when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils can lead to widespread structural damage. It may also result in increased water flow and/or failure of wells as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, with geyser-like waterspouts and/or flash floods. Similarly, damaged septic systems can create both inconvenience and health concerns.

8.2 *LOCATION*

No fault lines are within the county's border, so it is not possible to designate a specific area or areas as potential earthquake hazard locations. All of Putnam County is at risk.

8.3 *EARTHQUAKE EXTENT*

The most common method for measuring earthquakes is magnitude, which refers to the strength of the earthquake. Although the Richter Scale is known as a measurement for magnitude, most scientists currently use either the Mw Scale or Modified Mercalli Intensity (MMI) Scale. The effects of an earthquake in a particular location are measured by intensity. The earthquake's intensity decreases with increasing distance from its epicenter.

The magnitude of an earthquake is related to the total area of the fault that ruptured, as well as the amount of offset (displacement) across the fault. As shown in Table 4-49, the seven earthquake magnitude classes range from great to micro. An earthquake with a “great” magnitude could cause tremendous damage to county infrastructure, while a micro class results in only minor damage.

TABLE 4-49 MOMENT MAGNITUDE SCALE

Magnitude Class	Magnitude Range (M = Magnitude)	Probable Damage Description
Micro	M < 3	Minor damage
Minor	3 <= M < 3.9	Rarely causes damage.
Light	4 <= M < 4.9	Moderate damage
Moderate	5 <= M < 5.9	Considerable damage
Strong	6 <= M < 6.9	Severe damage
Major	7 <= M < 7.9	Widespread heavy damage
Great	M > 8	Tremendous damage

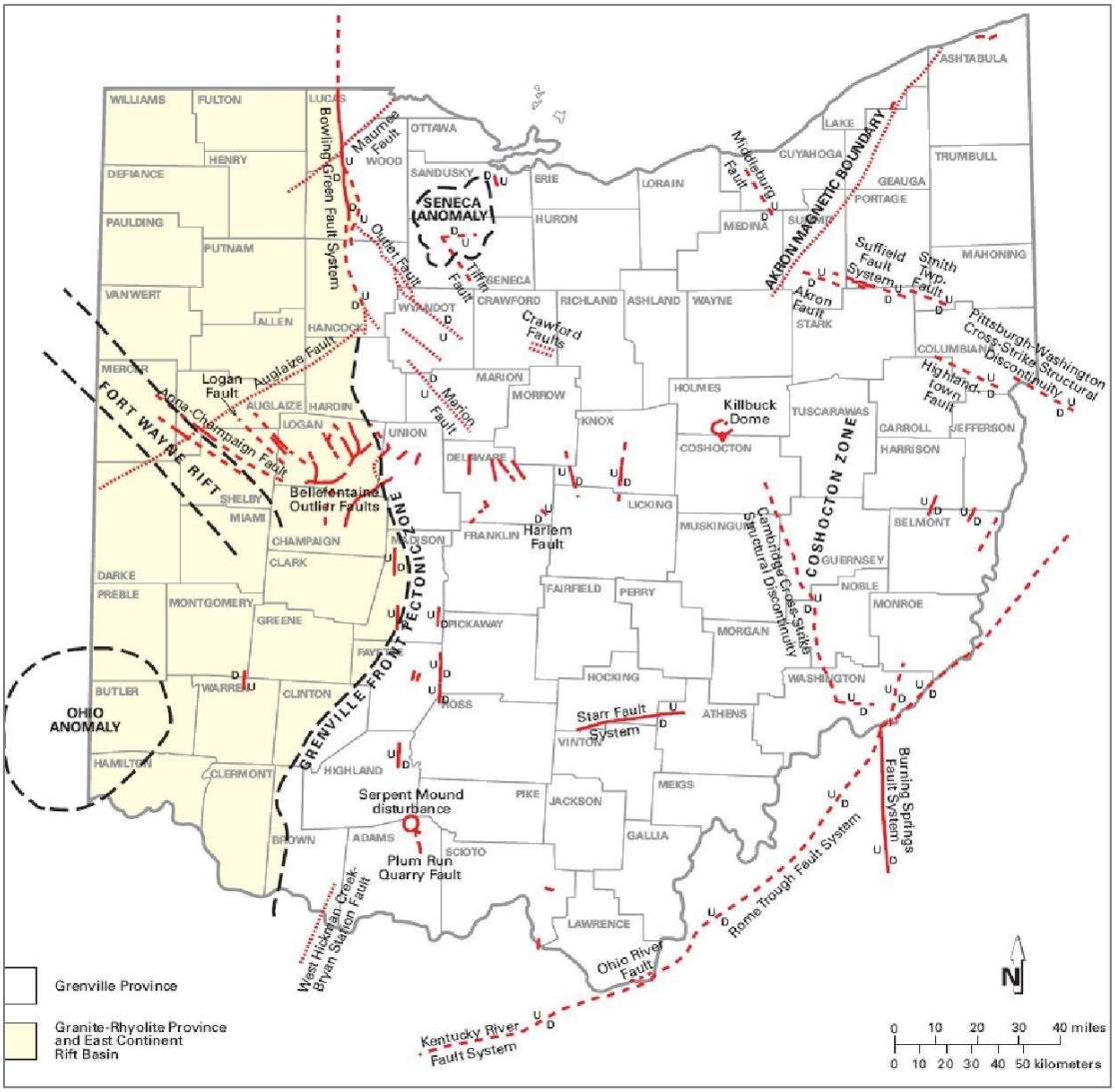
The MMI Scale measures earthquake intensity. As Table 4 50 shows, the MMI Scale has 12 intensity levels. Each is defined by a group of observable earthquake effects, such as ground shaking or damage to infrastructure. Levels I through VI describe what people see and feel during a small to moderate earthquake. Levels VII through XII describe damage to infrastructure during a moderate to catastrophic earthquake.

TABLE 4-50 MODIFIED MERCALLI SCALE WITH ASSOCIATED IMPACTS

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Usually detected only on seismographs.	<4.2
II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	Slight	Felt quite noticeably indoors, especially on upper floors. Most people don't recognize it as an earthquake (i.e. a truck rumbling).	
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in poorly built or badly designed structures; some chimneys are broken.	<6.1
VIII	Destructive	Damage is slight in specially designed structures; considerable in ordinary, substantial buildings. Moving cars become uncontrollable; masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open; damage is considerable in specially designed structures; buildings are shifted off foundations.	
X	Disastrous	Some well-built wooden structures are destroyed; most masonry and frame structures are destroyed along with foundations. Ground cracks profusely; liquefaction and landslides widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed.	<8.1
XII	Catastrophic	Total destruction; trees fall; lines of sight and level are distorted; ground rises and falls in waves; objects are thrown upward into the air.	>8.1

As indicated earlier, Ohio has multiple sources and locations of seismic activity. Many earthquakes occur along faults, and information about faults can be obtained from the Ohio Seismic Network.

FIGURE 4-17 FAULT LINES IN OHIO



8.4 *HISTORICAL OCCURRENCES*

Earthquake Events

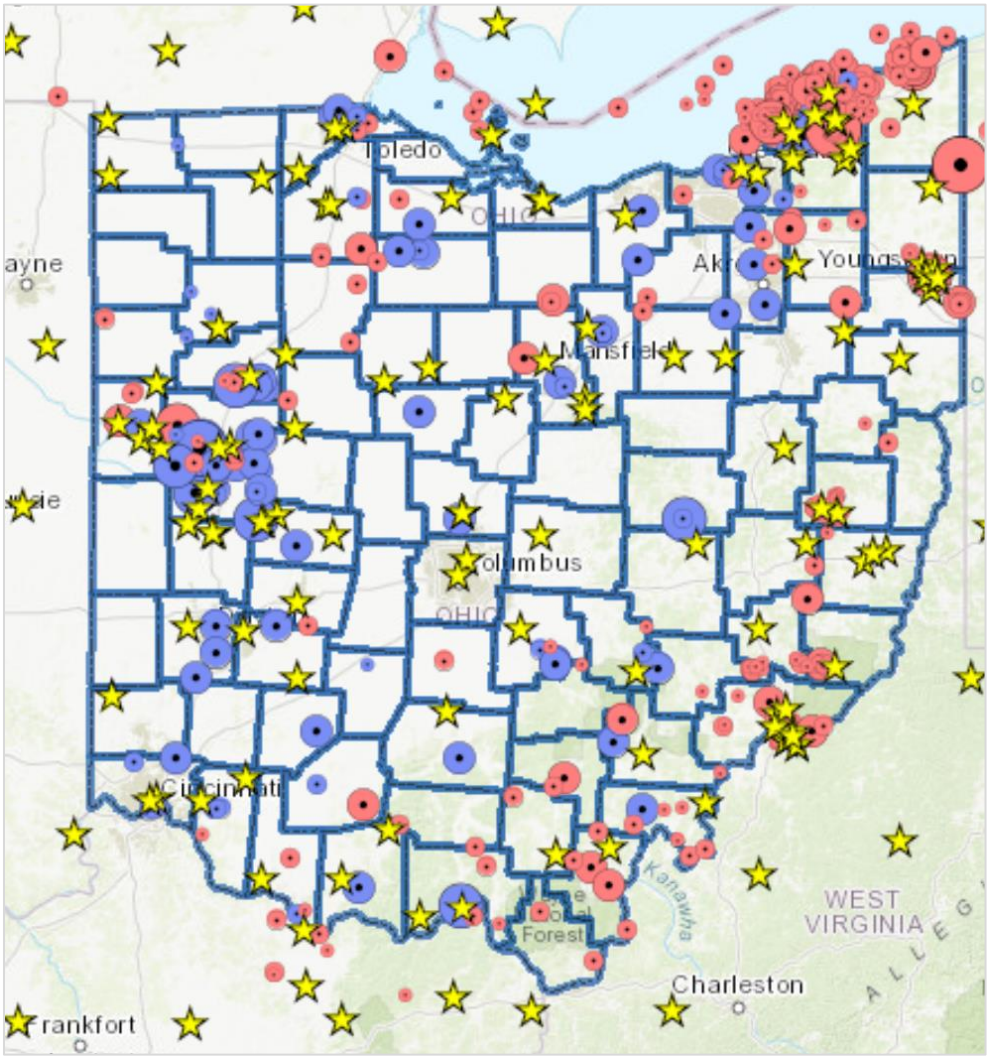
There are no records of earthquakes in Putnam County. The Ohio Department of Natural Resources recorded minor quakes in the adjacent counties of Wood, Hancock, Allen, and Van Wert. Table 4-51 displays the data on these earthquakes' data from the neighboring counties. No significant effects were recorded in Putnam County.

TABLE 4-51 EARTHQUAKES RECORDED IN SURROUNDING COUNTIES

Location	Magnitude	Year	Magnitude Type	MMF
Allen Co.	4.8	1884	2	VI
Allen Co.	2.9	1937	3	III
Allen Co.	3.1	1937	2	III
Allen Co.	3.1	1937	2	III
Allen Co.	3.1	1937	3	IV
Allen Co.	3.2	1937	2	V
Wood Co.	3	1974	1	III
Hancock Co.	2.3	1990	1	F
Wood Co.	2	1992	1	III
Wood Co.	2	1992	1	III
Wood Co.	2.5	1992	3	III
Wood Co.	2	1993	1	III
Allen Co.	2.5	2006	1	F
Allen Co.	2.8	2006	1	III
Hancock Co.	2.4	2011	1	III
Van Wert Co.	2.6	2015	1	NF

Figure 4-18 shows the epicenters of earthquakes recorded in Ohio from 1970 to 2020. The stars represent seismic stations, while the pink and purple dots represent earthquakes of various magnitudes.

FIGURE 4-18 OHIO HISTORIC EARTHQUAKE EPICENTERS



8.5 *PROBABILITY OF FUTURE OCCURRENCES*

Based on historical frequency, Putnam County has a 0% chance of experiencing an earthquake in a year.

8.6 *VULNERABILITY FROM EARTHQUAKES*

Potential Losses from Earthquakes

Hazus-MH was used to determine the types and numbers of potential assets exposed to earthquake damage. Hazus-MH is a regional multi-hazard loss estimation model developed by FEMA and the National Institute of Building Sciences. This program was conducted at the census block level, and a 5.0 magnitude earthquake was modeled. The results are presented below.

Although a 5.0-magnitude has never occurred within Putnam County, this is the accepted baseline for simulating potential losses due to seismic events. The software takes into account the depth and location of the epicenter. In addition, the program helps determine the potential losses based on the region's prevailing soil types.

TABLE 4-52 POTENTIAL IMPACTS FROM EARTHQUAKES

Impact	Description
People	Injuries may occur from falling objects during an earthquake. Landslides can result in death or injury if unexpected.
Infrastructure	Homes and businesses can suffer cracks to their structure. If they are close to a landslide, they could be potentially destroyed. Underground infrastructure may be split open during an earthquake.
Economy	Localized damaged only.
Natural Systems	Landslides can move large sections of land, killing trees and rerouting rivers.
Transportation	Entire roads can be cracked, uplifted, or otherwise made impassable until repaired. Detours would be needed in the meantime.

Hazus-MH 5.0 Earthquake

Hazus estimates that about 2,476 buildings will be at least moderately damaged. This is over 15% of the buildings in the region. An estimated 88 buildings will be damaged beyond repair. Volume 1: Chapter 5 of the Hazus technical manual defines the various states of damage. Figure 4-19 summarizes the expected damage to buildings in the region by general occupancy. Figure 4-20 summarizes the expected damage by general building type.

FIGURE 4-19 EXPECTED BUILDING DAMAGE BY OCCUPANCY

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	200	1.80	60	1.71	55	2.90	21	4.45	3	3.57
Commercial	452	4.09	152	4.34	125	6.55	44	9.25	7	8.35
Education	18	0.17	5	0.16	5	0.24	1	0.29	0	0.34
Government	24	0.22	9	0.25	8	0.43	2	0.49	1	0.59
Industrial	167	1.51	53	1.52	49	2.54	18	3.81	3	3.11
Other Residential	2,915	26.35	979	27.93	609	31.86	156	32.83	27	29.84
Religion	39	0.35	13	0.38	10	0.54	4	0.76	1	0.78
Single Family	7,246	65.50	2,233	63.71	1,051	54.96	229	48.12	48	53.42
Total	**11,062**		**3,504**		**1,912**		**475**		**89**	

FIGURE 4-20 EXPECTED BUILDING DAMAGE BY BUILDING TYPE

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	8,044	72.72	2373	67.71	876	45.84	101	21.14	8	8.93
Steel	264	2.39	79	2.25	97	5.07	42	8.77	6	6.52
Concrete	87	0.78	24	0.69	21	1.11	6	1.36	1	0.68
Precast	84	0.76	20	0.58	26	1.38	13	2.71	1	1.19
RM	70	0.63	12	0.35	14	0.75	6	1.17	0	0.24
URM	2,150	19.44	814	23.23	651	34.04	238	50.01	64	71.79
MH	363	3.28	181	5.17	226	11.81	71	14.85	9	10.65
Total	**11,062**		**3,504**		**1,912**		**475**		**89**	

Debris Generation

Hazus estimates the amount of debris that the earthquake will generated. The model breaks the debris into two general categories: a) brick/wood and b) reinforced concrete/steel. It makes this distinction because different types of material-handling equipment are required to handle the debris.

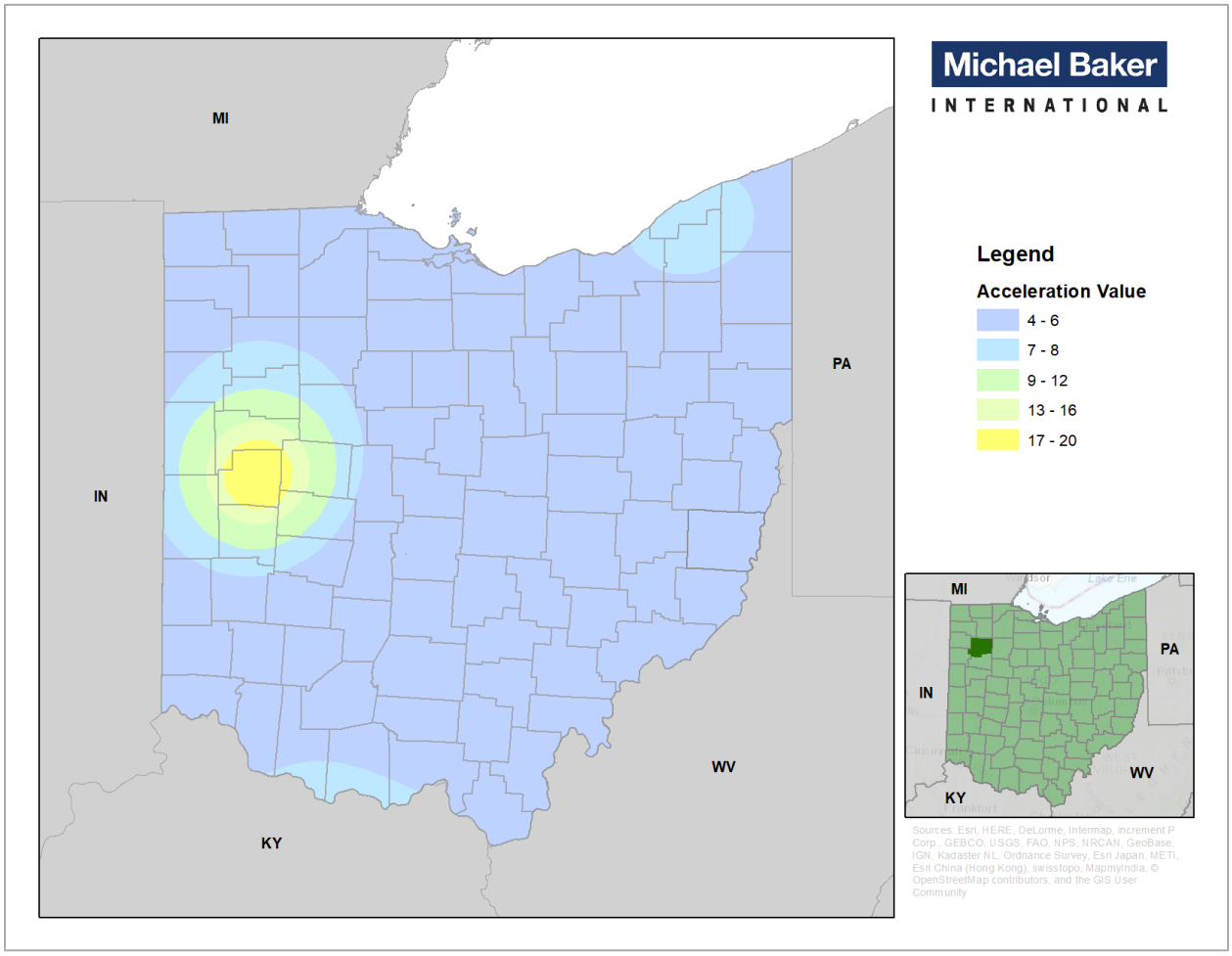
The model estimates that the earthquake will generate 0.06 million tons of debris. Of that total amount, brick/wood comprises 54%, and the remainder is reinforced concrete/steel. The tonnage of this debris will require 2,240 truckloads (@25 tons/truck) to remove.

Shelter Requirements

HAZUS estimates the number of households that would be displaced from their homes by the earthquake and the number of displaced people who will require accommodations in temporary public shelters. The model estimates 76 households will be displaced by the earthquake. Of these, 49 people (from a total population of 34,726) will seek temporary shelter in public shelters.

Putnam County has a very low vulnerability to seismic activity. The nearest major fault, New Madrid, is hundreds of miles away. The lack of major historical events in the county, along with the relatively low PGA associated with the lands around the area, put seismic events in the very low category for probability of occurrence. However, damages from a severe event with its epicenter near the county would be significant.

FIGURE 4-21 PUTNAM COUNTY PEAK GROUND ACCELERATION



8.7 *LAND USE AND DEVELOPMENT TRENDS*

Infrastructure in Putnam County, including office buildings, government buildings, and homes, are not built to withstand the effect of a major earthquake. Continued enforcement of the unified construction code should mitigate this vulnerability.

Regulatory Environment

Ohio building codes generally do not focus on construction relative to earthquake loads. Where earthquakes or seismic events are mentioned, it is usually in relation to truss design and anchoring appliances in structures. Because Ohio does not have strong earthquakes, the laws and guidelines pertaining to seismic stress on roads, bridges, or buildings are negligible.

8.8 *EARTHQUAKE SUMMARY*

Most sources in the geology science predict that the largest magnitude earthquake that might occur in Ohio would register no higher than 5. However, some sources state that an earthquake with a magnitude of 6 or higher could be registered in the Anna region. An event of this intensity would likely be felt throughout the county, but since the area has not been the epicenter to an earthquake or seismic event, it is difficult to estimate potential damage.

9. DAM FAILURE

Technological Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Dam Failure	1.0	0.3	1.0	0.3	1.0	0.2	2.5	0.3	2.5	0.3	**1.3**
Low Risk Hazard (1.0-1.9)											

9.1 *DAM FAILURE CHARACTERISTICS*

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. A dam failure (a collapse, breach, or other failure) often results in down-stream flooding.

A levee is an elongated ridge, constructed of fill or wall, that regulates water levels. These are usually earthen hills built along a river's floodplain to prevent flooding in nearby population areas. Typically, these run parallel to a river. **According to the National Levee Inventory, there are no levees in Putnam County.**

A dam impounds water in an upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of 1 foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure downstream.

Dam failures typically occur when spillway capacity is inadequate and excess flow overtops the dam, or when the dam or foundation is internally eroded (piping). Complete failure occurs if the internal erosion or overtopping results in a complete structural breach. That releases a high-velocity wall of debris-laden water that rushes downstream.

Dam failures can result from any one or a combination of the following causes:

- **Prolonged periods of rainfall and flooding**, which cause most failures;
- **Inadequate spillway capacity**, resulting in excess overtopping flows;
- **Internal erosion** caused by embankment or foundation leaks or piping;
- **Improper maintenance**, including failure to remove trees, repair internal seepage, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components;
- **Improper design**, including the use of improper construction materials and construction practices;
- **Negligent operation**, including the failure to remove or open gates or valves during high flow periods;
- **Failure of upstream dams** on the same waterway;
- **Landslides into reservoirs**, which cause surges that result in overtopping;

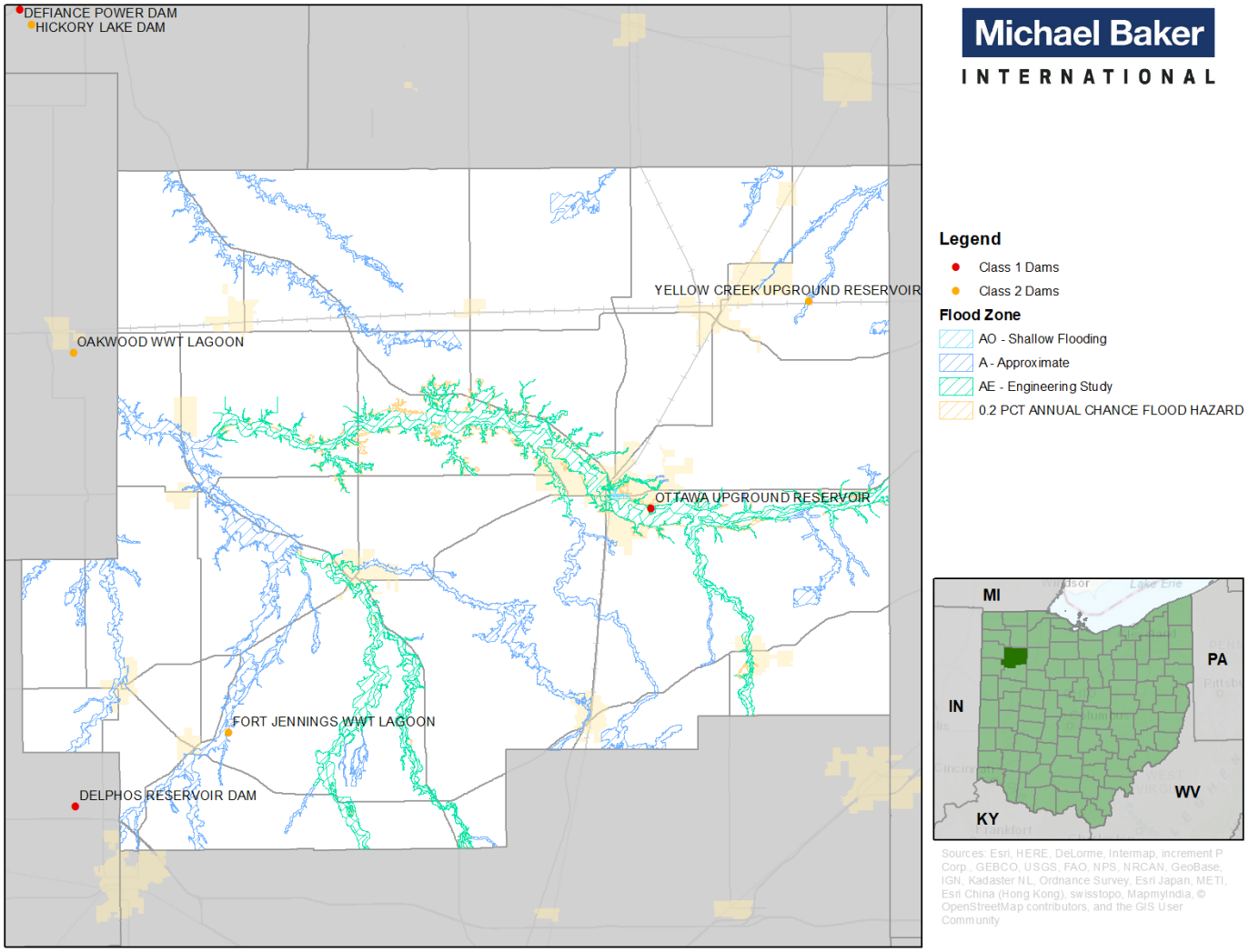
- **High winds**, which can cause significant wave action and result in substantial erosion; and
- **Earthquakes**, which typically cause longitudinal cracks at the tops of the embankments and weaken entire structures.

Dams in Ohio are considered to be localized and likely to affect only inundation areas downstream of and immediately around the dam. Discharge from a dam breach is usually several times the 1%-annual-chance flood; therefore, typical flood studies are of limited use in estimating the extent of this flooding.

It is especially difficult to estimate the potential loss of life from a dam breach, which is a function of the time of day, warning time, awareness of those affected and particular failure scenarios. Rather than "loss of life," many dam safety agencies have used "population at risk," a more quantifiable measurement of the impact to human life. Population at risk is the number of people in structures within the inundation area that would be subject to significant personal danger if they took no action to evacuate. The impacts of a dam failure are contingent on many factors and cannot be described concisely.

9.2 *LOCATION*

FIGURE 4-22 LOCATIONS OF DAMS IN PUTNAM COUNTY



9.3 *DAM FAILURE EXTENT*

The severity of a dam failure depends mostly on the dam's class, its location, and the cause of failure. The inundation zone as defined by each Emergency Action Plan (EAP) shows the areas that will be the most heavily impacted by a dam failure. During these events, hazardous materials such as agricultural chemicals and wastes, solid wastes, raw sewage, common household chemicals, and loose mud and concrete can worsen the rescue and cleanup operation. Much of the damage from a dam failure will be downstream and within the immediate area.

Many dams throughout Ohio were created at least 50 years ago. At some point, these dams may fail and damage the surrounding area. According to the Ohio Department of Natural Resources, the

damage predicted for a dam failure coincides with the class of the dam. The potential downstream hazard is broken into four classes.

- **Class I** – Probable loss of life, serious hazard to health, structural damage to high value property (i.e., homes, industries, and major public utilities.).
- **Class II** – Floodwater damage to homes, businesses, and industrial structures (no loss of life envisioned); damage to state and interstate highways, railroads; only access to residential areas.
- **Class III** – Damage to low value non-residential structures, local roads, agricultural crops and livestock.
- **Class IV** – Losses restricted mainly to the dam

9.4 *HISTORICAL OCCURRENCES*

According to the Putnam County EMA, no dam failure events are on record in the county.

9.5 *PROBABILITY OF OCCURRENCES*

As mentioned in Section 9.1, a dam can fail at any time, given the right circumstances beyond human control. However, the probability of failure can be reduced by proactive preventative action for regulated dams in compliance with the Ohio Department of Natural Resources – Dam Safety Program. Ohio's Dam Safety Program manages the regulation and safety of high-hazard dams and reservoirs throughout the state to protect the health, safety, and welfare of its citizens and their property. Historical frequency alone indicates a 0% probability of a dam failure in Putnam County.

9.6 *VULNERABILITY TO DAM FAILURE*

TABLE 4-53 ASSETS EXPOSED TO DAM FAILURE

Impact	Description
People	Loss of life and injury is most likely in Class I breaches. Dozens or hundreds of fatalities can be expected, depending on population density. Communities can become isolated by impassable roads.
Infrastructure	Entire buildings can be washed away or flooded irreparably. Disrupted underground utilities can cause power outages.
Economy	Significant or catastrophic dam failures can wipe out large portions of a single small town. Residents may move away permanently, and jobs may be lost.
Natural Systems	Flooding can destroy large tracts of land. Riverbeds can be altered. Debris can become stuck in place.
Transportation	Bridges, highways, and roads can be destroyed completely. Significant detours will be necessary.

TABLE 4-54 DAM VULNERABILITY BY COMMUNITY

Name	Department
Putnam County	There are no dams that threaten the general welfare of Putnam County.
Village of Belmore	No dams are near this community.
Village of Cloverdale	No dams are near this community.
Village of Columbus Grove	No dams are near this community.
Village of Continental	Continental has a three-cell dam to the south. An overspill of any of them could result in damages along the south end of town, particularly along Benton St. To the north, Buckeye Lake is surrounded by 27 homes, any of which could be severely damaged by a dam breach.
Village of Dupont	No dams near this community
Village of Fort Jennings	The wastewater treatment lagoon is surrounded by several homes that could have minor damage if the dam overflows.
Village of Gilboa	No dams are near this community.
Village of Glandorf	Five homes, two commercial structures, and an RV park could be severely damaged in the event of a breach from the Glandorf Rod and Gun Club Lake Dam.
Village of Kalida	No dams near this community.
Village of Leipsic	Four homes near the Yellow Creek Upground Reservoir are susceptible to a potential breach. Several small businesses and a golf course near the Leipsic Fishing and Hunting Club Lake Dam could have minor damage if a breach occurs.
Village of Miller City	No dams near this community.
Village of Ottawa	The Ottawa Upground Reservoir poses a serious threat to all the homes and businesses in its immediate vicinity. A breach on any side could have potentially catastrophic consequences. A full analysis of the village's susceptibility to a breach at this dam can be found in the village of Ottawa's 2018 Hazard Mitigation Plan.
Village of Ottoville	No dams are near this community.
Village of Pandora	A lagoon south of the village has 38 homes directly adjacent, all of which could be seriously damaged during dam failure event.
Village of West Leipsic	No dams are near this community.

Potential Losses from Dam Failure

Dam failures can have a greater environmental impact than a flood event. Large amounts of sediment from erosion can alter the landscape and change the ecosystem. Hazardous materials can be carried away from flooded-out properties and distributed throughout the floodplain. Industrial and agricultural chemicals and wastes, solid wastes, raw sewage, and common household chemicals comprise the majority of hazardous materials spread by flood waters along the flood zone. These would pollute the environment and contaminate private property and the community's water supply. The soil loss from erosion and scouring would be significantly greater, because the large amount of fast-moving water affecting a small area would likely change the ecosystem.

TABLE 4-55 HIGH-HAZARD DAM INFORMATION FOR PUTNAM COUNTY

Dam Name	Hazard Class	EAP	Owner
Ottawa Upground Reservoir	I	Yes	Village of Ottawa
Fort Jennings WWT Lagoon	II	No	Village of Fort Jennings
Yellow Creek Upground Reservoir	II	Yes	Village of Leipsic
Continental WWT Lagoon Cell 1	III	No	Village of Continental
Continental WWT Lagoon Cell 2	III	No	Village of Continental
Continental WWT Lagoon Cell 3	III	No	Village of Continental
Buckeye Lake	III	No	Village of Continental
Leipsic Fishing and Hunting Club Lake Dam	III	No	Private, Leipsic Fishing & Hunting Club
Glandorf Rod and Gun Club Lake Dam	III	No	Private, Glandorf Rod & Gun Club

For regulated dams, the probability of future occurrence is reduced through compliance with the Ohio's Department of Natural Resources, Dam Safety Program. Two of the three Class I and II dams have Emergency Action Plans (EAPs) in place.

9.7 *LAND USE AND DEVELOPMENT TRENDS*

Local communities should take proactive public awareness mitigation measures such as placing notices on final plats and providing public education on dam safety. Also, EAPs identify potential dam failure inundation areas, notification procedures, and thresholds for response to potential dam-related disaster events. No development trends are likely to affect the vulnerability of the county to dam failure.

Regulatory Environment

The Ohio Department of Natural Resources classifies dams into four classes, based on the height of the dam and the amount of water held behind it.

Dam safety laws are embodied in the Dam Safety and Encroachments Act ("DSE Act") -enacted on July 1, 1979 and last amended in 1985. Rules pertaining to dam safety are found in Title 25,-Rules and Regulations; Part I-Department of Environmental Resources; Subpart C-Protection of Natural Resources; Article II-Water Resources; Chapter 105-Dam Safety and Waterway Management ("the Rules") -adopted.

9.8 *DAM FAILURE SUMMARY*

As dams age, the likelihood for failure increases. Undesirable woody vegetation on the embankment, deteriorated concrete, inoperable gates, and corroded outlet pipes may become problems. Since dam failures are often exacerbated by flooding, the probability of dam failures can be associated with projected flood frequencies. Overall, the probability of a dam failure throughout the state should remain low if dams are well maintained. The warning plans in place for designated high-hazard dams will continue to decrease the danger for residents in potential risk areas.

Man-Made Hazards

10. TERRORISM

Technological Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Terrorism	1.7	0.5	1.9	0.6	1.9	0.4	3.2	0.3	2.0	0.2	**2.0**
Medium Risk Hazard (2.0 – 2.9)											

10.1 *HAZARD IDENTIFICATION*

The term "terrorism" refers to intentional, criminal, and malicious acts, but the functional definition of terrorism can be interpreted in many ways. The Code of Federal Regulations defines terrorism as "…the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR §0.85). Terrorists use threats to create fear, to try to convince citizens of the powerlessness of their government, and/or to get publicity for their cause.

Terrorist attacks can take many forms, including agriterrorism, arson/incendiary attack, armed attack, assassination, biological agent, chemical agent, cyberterrorism, conventional bomb, hijackings, intentional release of hazardous materials, kidnapping, nuclear bombs and radiological agent (FEMA April 2009). Explosives have been the traditional method of conducting terrorism, but intelligence suggests that the possibility of biological or chemical terrorism is increasing. The severity of terrorist incidents depends upon the method of attack, the proximity of the attack to people, animals, or other assets, and the duration of exposure to the incident or attack device. For example, chemical agents are poisonous gases, liquids or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death. In this case, the severity of injuries depends on the type and amount of the chemical agent used and the duration of exposure.

Biological agents are organisms or toxins that produce illness in people, livestock or crops. Some biological agents cannot be easily detected and may take time to develop. Therefore, it can be difficult to know that a biological attack has occurred until victims display symptoms. In other cases, the effects are immediate. Those affected by a biological agent require the immediate attention of professional medical personnel. Some agents are contagious and require victims to be quarantined.

Terrorism using **explosive** and incendiary devices includes bombs and any other technique that creates an explosive, destructive effect. Bombs can take many forms, from a car bomb to a mail bomb. They can be detonated remotely (using a variety of devices) or directly (such as a suicide bomb).

Radiological terrorism involves using radiological dispersal devices or nuclear facilities to attack the population. Exposure can cause radiation sickness, long-term illness, and even death. Terrorism experts fear the use of explosive and radiological devices in the form of a "dirty bomb" to attack the population. A "dirty bomb" is a low-tech, easily assembled and transported device that uses simple explosives to disperse a radioactive agent.

In recent years, **cyber terrorism** has become a larger threat. Cyber terrorism can be defined as activities intended to damage or disrupt vital computer systems. These acts can range from taking control of a host website to using networked resources to directly cause destruction and harm. Protection of databases and infrastructure appear to be the main goals at this time. Cyber terrorists can be difficult to identify because for individuals from various parts of the world can meet on the internet. Individuals or groups planning a cyber-attack are not organized in a traditional manner, as they can communicate effectively over long distances without delay. They have been known to overtake websites and alter the content that is presented to the public. The largest cyber terrorism threat to institutions is to any processes that are networked and controlled via computer. Any vulnerability that could allow access to sensitive data or processes should be addressed, and any possible measures should be taken to harden those resources to attack.

In recent years, **drones** have become more available and prevalent and pose a growing risk. These small, remote controlled objects are becoming a tool for criminals and terrorists. Of specific worry to law enforcement is that these small aircraft are difficult to detect and stop. Recently, drones have been used to smuggle drugs and contraband. Another concern is that these drones could be modified to mount attacks with explosives or chemical weapons. Most small drones are limited by short battery life and small payload capacity. The most popular consumer drones can carry just a few pounds. But some of the features that have made the devices increasingly attractive for businesses and photographers—that they are small, easy to fly and can capture high-definition images—also make them a potentially powerful tool for criminals and terrorists.

NOAA Alerts

When notified by a government official, the NWS has the ability to send alert messages through the Emergency Alert System and over NOAA Weather Radio. Examples include the following:

Local Area Emergency Message: This message defines an event that by itself does not pose a significant threat to public safety and/or property, but could escalate, contribute to other more serious events, or disrupt critical public safety services. Instructions other than public protective actions may be provided by authorized officials. This message may be used to alert the public to situations such as utility disruptions, road closures, and potential terrorist threats

- Civil Emergency Message: This message outlines a significant threat or threats to public safety and/or property that is imminent or in progress. The hazard is usually less specific or severe than those requiring a Civil Danger Warning.
- Law Enforcement Warning: This warning is issued for a bomb explosion, riot, or other criminal event. An authorized law enforcement agency may block roads, waterways, or facilities, evacuate or deny access to affected areas, and arrest violators or suspicious persons.
- Radiological Hazard Warning: This warning warns of the loss, discovery, or release of a radiological hazard, such as the theft of a radiological isotope used for medical, seismic, or other purposes, discovery of radioactive materials, or a transportation accident involving

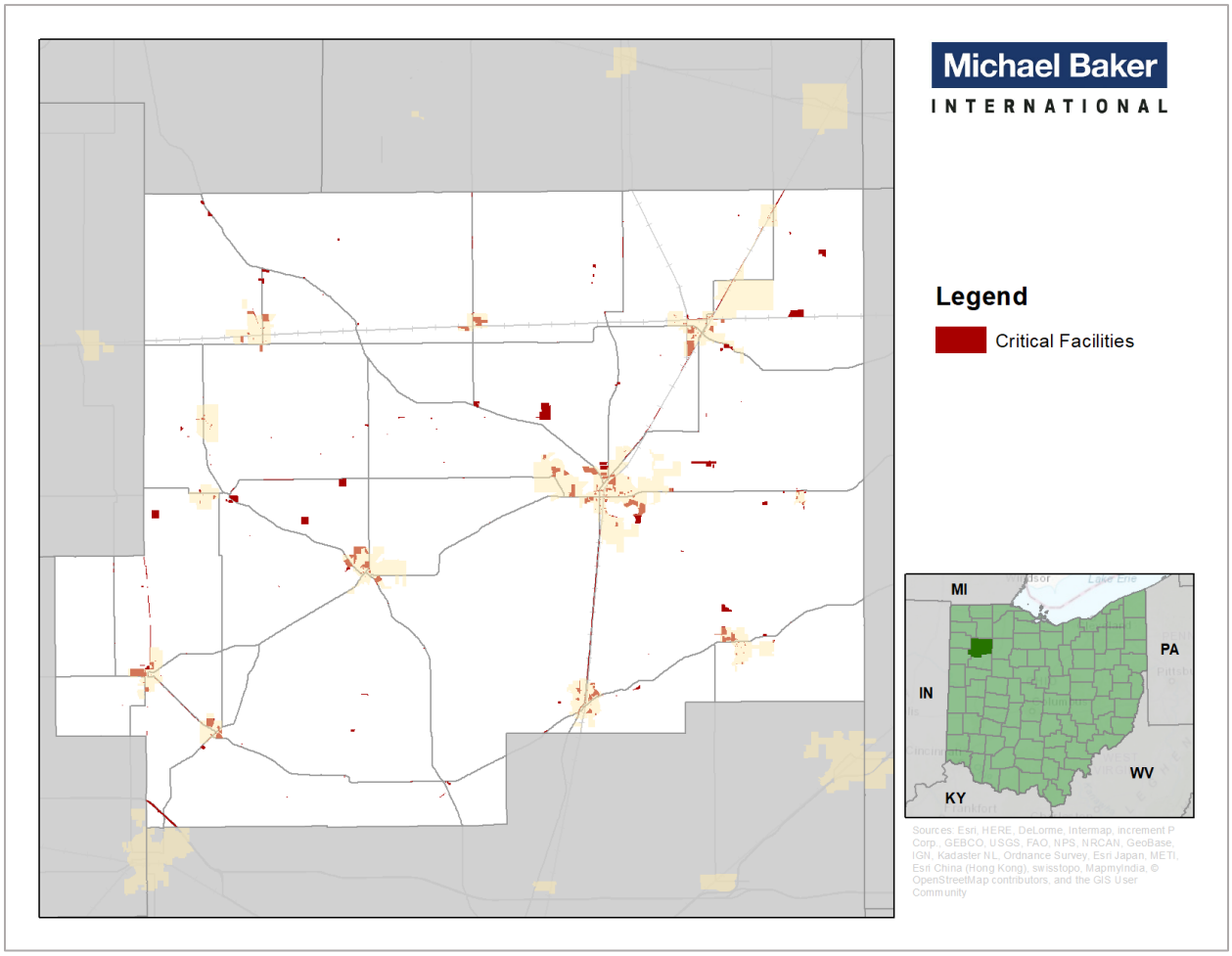
nuclear weapons, nuclear fuel, or radioactive wastes. Authorized officials may recommend protective actions if a radioactive hazard is discovered.

- Civil Danger Warning: This warning is issued when an event presents a danger to a significant civilian population. The message usually warns of a specific hazard and outlines specific protective actions such as evacuation or shelter in place.
- Shelter-in-Place Warning: This warning is issued when the public is recommended to shelter in place (go inside, close doors and windows, turn off air conditioning or heating systems, and turn on the radio or TV for more information). Examples include hazardous material releases or radioactive fallout.

10.2 *LOCATION*

There is no way to predict where a terrorist attack could occur. While critical facilities in the county could be potential targets, smaller-scale or other strategic attacks could occur. Figure 4-23 depicts the locations of critical facilities in Putnam County.

FIGURE 4-23 CRITICAL FACILITIES IN PUTNAM COUNTY



10.3 *REGULATORY ENVIRONMENT*

Terrorism, by definition, is against the law. The regulatory environment tied to terrorism falls under the jurisdiction of law enforcement. Terrorism is investigated by the Federal Bureau of Investigation (FBI).

10.4 *HISTORICAL OCCURRENCES*

While no large-scale terrorist attacks have taken place in Putnam County, incidents have occurred throughout the country in locations like those of Putnam County communities. Several small-scale incidents have been reported in the county, including numerous threats of violence. Nationally, terrorism continues to be an issue of significant importance.

May 2003: A series of over 24 sniper attacks concentrated in the Columbus metropolitan area along Interstate-270 caused widespread fear across Ohio and left one dead.

May 1, 2012: Five self-described anarchists were arrested in an alleged plot to blow up a bridge in Cuyahoga Valley National Park in Brecksville, Ohio. The group was being monitored as part of an FBI undercover operation and had considered other plots. One suspect expressed a desire to cause financial damage to companies while avoiding casualties.

July 20, 2012: In Aurora, Colorado, during the midnight screening of The Dark Knight Rises, a gunman dressed in tactical clothing, set off tear gas grenades and shot into the audience with multiple firearms. Twelve people were killed, and 70 others were injured.

December 2, 2015: In San Bernardino, California, a planned shooting at the Inland Regional Center resulted in 16 deaths and 23 casualties. A shootout between the suspects ultimately led to their deaths.

June 12, 2016: A 29-year old man armed with an automatic assault rifle, walked into a nightclub in Orlando, Florida, killing 49 people and injuring 53 more. The man swore allegiance to the leader of the Islamic State of Iraq and the Levant. It has been marked as the deadliest terror attack in the United States since the attacks on September 11, 2001.

August 4, 2019: A gunman opened fire in a bar in the Oregon Historic District in Dayton, Ohio. He killed 10 and injured 27 others before being shot dead by responding police. The FBI investigated the incident as Domestic Terrorism.

10.5 *MAGNITUDE OF EVENTS*

Events classified as terrorism can affect as few as one person to tens of thousands. One of the inherent risks of terrorism is the unpredictability. Terrorism events affect not only those who are killed or injured, but also those around them through psychological trauma afterward. Terrorists are not always easily identified, and events can be unpredictable.

Active shooters have also shown up at schools and universities around the nation, putting the many elementary, middle, and high schools at risk. Government-owned buildings of state or federal agencies also are potential targets.

Terrorism attacks can occur extremely quickly, with some events lasting just a few minutes.

10.6 *PROBABILITY OF FUTURE OCCURRENCES*

The historical precedence is not sufficient to determine the frequency or future probability of terrorism or threatened terroristic events.

Since the probability of terrorism cannot be quantified in the same way as that of many natural hazards, it is not possible to assess vulnerability in terms of likelihood of occurrence. Instead, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets, planning efforts can be put in place to reduce the risk of attack. FEMA's Integrating Manmade Hazards into Mitigation Planning (2003) encourages site-specific assessments that are based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist, and vulnerabilities, including:

- Inherent vulnerability:
    - Visibility – How aware is the public of the existence of the facility?
    - Utility – How valuable might the place be in meeting the objectives of a potential terrorist?
    - Accessibility – How accessible is the place to the public?
    - Asset mobility – Is the asset's location fixed or mobile?
    - Presence of hazardous materials – Are flammable, explosive, biological, chemical and/or radiological materials present on site? If so, are they well secured?
    - Potential for collateral damage – What are the potential consequences for the surrounding area if the asset is attacked or damaged?
    - Occupancy – What is the potential for mass casualties based on the maximum number of individuals on site at a given time?
- Tactical vulnerability:

    Site Perimeter
    - Site planning and Landscape Design – Is the facility designed with security in mind – both site-specific and with regard to adjacent land uses?
    - Parking Security – Are vehicle access and parking managed in a way that separates vehicles and structures?

    Building Envelope
    - Structural Engineering – Is the building's envelope designed to be blast-resistant? Does it provide collective protection against chemical, biological and radiological contaminants?

    Facility Interior
    - Architectural and Interior Space Planning – Does security screening cover all public and private areas?

- Mechanical Engineering – Are utilities and Heating, Ventilating and Air Conditioning (HVAC) systems protected and/or backed up with redundant systems?
- Electrical Engineering – Are emergency power and telecommunications available? Are alarm systems operational? Is lighting sufficient?
- Fire Protection Engineering – Are the building's water supply and fire suppression systems adequate, code-compliant and protected? Are on-site personnel trained appropriately? Are local first responders aware of the nature of the operations at the facility?
- Electronic and Organized Security – Are systems and personnel in place to monitor and protect the facility?

10.7 *POTENTIAL LOSSES TO TERRORISM*

Due to the unpredictable nature of terrorism, all county assets, including all structures and the entire population, can be considered at risk. Public facilities such as government buildings, sports venues, and dams can be considered as higher-potential potential targets for terrorism, since these are highly important and interrupting their operations due to terrorist threats or activity can cause a more severe disruption .

TABLE 4-56 POTENTIAL IMPACTS OF TERRORISM

Impact	Description
People	People can be killed or severely injured in terrorism attacks. Psychological scarring after the events is also extremely likely for those who survive.
Infrastructure	Infrastructure can be damaged or destroyed in an attack.
Economy	The economy can be impacted and can slow after terrorism events.
Natural Systems	Depending on the location of an attack, some natural systems can be damaged, particularly if the event is related to ecoterrorism. Drinking water supplies may be damaged if they are the target.
Transportation	Transportation systems may be severely disrupted. Transportation can be shut down for hours as situations are contained.

10.8 *LAND USE AND DEVELOPMENT TRENDS*

Land use and development are not directly tied to the prevention or discouragement of terrorism. However, structures can be designed with safety devices meant to protect the populations inside. Precautionary devices such as two-way fire alarm panels, security cameras, and alarm boxes are currently in use throughout the country.

10.9 *TERRORISM SUMMARY*

One of the primary attributes of terrorism is its unexpected nature. This makes planning for potential attacks virtually impossible. The key to terrorism mitigation lies in the planning phase and understanding the potential vulnerability of a specific area.

11. HEALTH-RELATED EMERGENCY

Technological Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Epidemic	2.0	0.6	1.0	0.3	2.0	0.4	2.0	0.2	2.0	0.2	**1.7**
Low Risk Hazard (1.0 – 1.9)											

11.1 *HAZARD IDENTIFICATION*

Pandemic

A pandemic is defined as a disease affecting or attacking the population of an extensive region, which may include several countries/continents. It is further described as extensive epidemic. Generally, pandemic events cause sudden, pervasive illness in all age groups on a global scale, though some age groups may be more at risk. As such, pandemic events cover a wide geographic area and can affect large populations. The exact size and extent of the infected population depends on how easily the illness is spread, the mode of transmission, and the amount of contact between infected and non-infected persons. Three recent pandemics that have affected Putnam County are West Nile Virus, Influenza, and COVID-19.

West Nile Virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and, in its most serious form, death. The virus spreads via mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding.

Influenza, also known as "the flu," is a contagious disease caused by the influenza virus. It typically presents with fever, headache, sore throat, cough, and muscle aches. Influenza is considered to have pandemic potential if it is novel (meaning that people have no immunity to it), virulent (it causes death in normally healthy individuals), and easily transmitted from person to person. Influenza spreads via the air among crowded populations in enclosed spaces, and it may persist on surfaces and in the air. The disease is communicable for 3-5 days after clinical onset. Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. In 2009, the United States experienced a pandemic of H1N1. Putnam County implemented its Pandemic Response Plan and Medical Countermeasures Plan to vaccinate at risk populations once a vaccine was available. Preparing and planning for future pandemics must continue. As the Ohio Department of Health Pandemic Influenza Preparedness and Response Plan states, "The impact of an influenza pandemic on the health care system could be devastating. The CDC estimates in the United States a moderate pandemic could result in 90 million people becoming ill; 45 million outpatient visits; 865,000 hospitalizations; and 209,000 deaths." This underscores the importance of planning for this hazard (Ohio Department of Health, 2006).

COVID-19, also known as Coronavirus, is a respiratory disease that spreads via person-to-person contact. This specific coronavirus, COVID-19, comes from a large group of viruses that infect people and different species of animals. Only a few strains of animal coronaviruses can infect people, but SARS-CoV-2, the virus behind the pandemic, is one of the three that can infect and spread between people. The virus has its origin from bats. The first cases of the pandemic originated in Wuhan, China. Symptoms of the virus can appear as early as 2 days or as late as 14 days after exposure. Fever, cough, and shortness of breath are associated with the virus, and symptoms can range from mild to severe to death. The illness can be more severe in patients who are older, have chronic medical conditions such as heart disease, diabetes, or lung disease, or have compromised immune systems.

Epidemic

An epidemic is defined as a disease that affects many persons at the same time and spreads from person to person in a locality where the disease is not permanently prevalent. The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This is not necessarily the desired level, which may in fact be zero, but rather the observed level. In the absence of intervention and assuming that the level is not high enough to deplete the pool of susceptible persons, the disease may continue at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease.

While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation. Sporadic occurrence refers to a disease that is seen infrequently and irregularly. Endemic refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area. Hyperendemic refers to persistent, high levels of disease occurrence.

Occasionally, the amount of disease in a community rises above the expected level. Epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. Outbreak carries the same definition but is often used for a more limited geographic area. Cluster refers to an aggregation of cases grouped in a place and time that are suspected to be greater than the number expected, even though the expected number may not be known. Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

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

- A recent increase in amount or virulence of the agent,
- The recent introduction of the agent into a setting where it has not been before,
- An enhanced mode of transmission so that more susceptible persons are exposed,

- A change in the susceptibility of the host response to the agent, and/or
- Factors that increase host exposure or involve introduction through new portals of entry.

11.2 *LOCATION*

As this hazard initially affects humans, its location is the entire county. Due to community spread, each jurisdiction within Putnam County is susceptible to a public health emergency.

11.3 *HAZARD EVENTS/HISTORICAL OCCURRENCES*

Since 1950, two disasters involving a health-related emergency have been declared. Both events occurred in 2020, linked to the COVID-19 pandemic.

TABLE 4-57 DECLARED DISASTERS AFFECTING PUTNAM COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-4507	3/31/2020	Covid-19 Pandemic	$25,028 submitted, not yet approved	-
EM-3457	3/13/2020	Covid-19	-	-

2009: The 2009 H1N1 influenza (flu) pandemic occurred against a backdrop of pandemic response planning at all levels of government, including years of developing, refining and regularly exercising response plans at the international, federal, state, local, and community levels. At the time, experts believed that avian influenza A (H5N1) viruses posed the greatest pandemic threat. H5N1 viruses were endemic in poultry in parts of the world and infected people sporadically, often with deadly results. Given that reality, pandemic preparedness efforts were largely based on a scenario of severe human illness caused by an H5N1 virus. Despite differences between the planning scenarios and the actual 2009 H1N1 pandemic, many of the systems established through pandemic planning were used and useful for the 2009 H1N1 pandemic response.

H1N1 was first detected in the United States in April 2009. This virus was a unique combination of influenza virus genes, never previously identified in either animals or people. The virus genes were a combination of genes most closely related to North American swine-lineage H1N1 and Eurasian lineage swine-origin H1N1 influenza viruses. Because of this, initial reports referred to the virus as a swine origin influenza virus. However, investigations of initial human cases did not identify exposures to pigs and quickly it became apparent that this new virus was circulating among humans and not among U.S. pig herds.

Infection with this new influenza A virus (then referred to as “swine origin influenza A virus”) was first detected in a 10-year-old patient in California on April 15, 2009, who was tested for influenza as part of a clinical study. Laboratory testing at Centers for Disease Control (CDC) confirmed that this virus was new to humans. Two days later, CDC laboratory testing confirmed a second infection with this virus in another patient, an 8-year-old living in California about 130 miles away from the first patient, who was tested as part of an influenza surveillance project. There was no known connection between the two patients. Laboratory analysis at CDC determined that the viruses obtained from

these two patients were very similar to each other, and different from any other influenza viruses previously seen either in humans or animals.

2014/2015: The 2014 Ebola epidemic was the largest in history, affecting multiple countries in West Africa. A small number of cases was reported in Nigeria and Mali, and a single case was reported in Senegal; however, these were contained, with no further spread in these countries. Two imported cases, including one death, and two locally acquired cases in healthcare workers were reported in the United States. CDC and its partners took precautions to prevent additional Ebola cases in the United States. CDC worked with other U.S. government agencies, the World Health Organization (WHO), and other domestic and international partners and activated its Emergency Operations Center to help coordinate technical assistance and control activities with partners. CDC also deployed teams of public health experts to West Africa and continued to send experts to the affected countries. At the time, the general public and media feared that the epidemic would spread to Ohio after a nurse from Texas traveled to the Akron, Ohio area in advance of a wedding.

2020: On March 11, 2020, the WHO characterized the outbreak of COVID-19 as a pandemic. Originating in the Hubei Province in China, the virus reached the United States on January 22, 2020. Over 4.7 million cases were confirmed in all 50 states. Community spread is the biggest culprit of infection. To slow the spread in Ohio, Governor Mike DeWine placed a 2-week Stay at Home order on March 23 and a continuation from April 6 to May 29, 2000. As of January 2021, Putnam County had 3,700 confirmed cases and 74 deaths.

11.4 *MAGNITUDE/SEVERITY*

The magnitude of a health-related emergency ranges significantly, depending on the aggressiveness of the disease and the ease of transmission. Pandemic influenza is more easily transmitted from person to person than West Nile, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the global impact of various pandemic influenza outbreaks over the last century has declined. The 1918 Spanish flu pandemic remains the worst-case pandemic event on record.

In contrast, the severity of illness from the 2009 H1N1 influenza flu virus has varied, with the gravest cases occurring mainly among those considered at high risk. High-risk populations include children, the elderly, pregnant women, and chronic disease patients with a reduced immune system capacity. Most people infected with H1N1 in 2009 recovered without needing medical treatment. According to the CDC, about 70% of those hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high-risk group (CDC, 2009).

COVID-19 has brought an unprecedented time upon Putnam County, Ohio, the United States, and the entire globe. The extent of the virus has changed the way of life for Ohioans. In Ohio alone, only 3 months after the pandemic was declared, 1.5 million people had filed for unemployment. In the United States, 36 million people have filed for unemployment benefits during the pandemic. The current hospitalization rate for confirmed cases of the virus is 17.9%, with 26.9% of cases requiring ICU admission. The community spread aspect of COVID-19 not only sparked a shutdown of the entire State's economy except for essential businesses for approximately a month and a half, but set forth

guidelines for Ohioans to follow as businesses begin to open back up. Wearing masks became required in July 2020. while having a 6-foot distance between consumers is required when possible. Increased surveillance of employee and consumer health is also a best-practice guideline. The extent of the pandemic is not yet complete, as the virus is far from being eradicated from Putnam County or the rest of Ohio.

The magnitude of a health-related emergency may be exacerbated by the fact that outbreaks across the United States could limit the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medications, are likely to be in short supply or unavailable. A pandemic has no true environmental impacts, but it may cause significant economic and social costs beyond the possibility of deaths. Widespread illness may increase the likelihood of personnel shortages for essential community services. In addition, high rates of illness and worker absenteeism within the business community, contribute to social and economic disruption. These disruptions could be temporary, but they may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when absenteeism impairs essential services, such as power, transportation, and communications.

11.5 *FREQUENCY/PROBABILITY OF FUTURE OCCURRENCE*

The precise timing of a health-related emergency is uncertain. Pandemic occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. Epidemic occurrences are more likely after ecological changes: the pathogen mutates or is introduced to an unprepared host population. Reported health-related emergency events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing a health-related emergency event, although it is infrequent, can be difficult to quantify, but based on the historical record of two events since 2000, it can reasonably be assumed that this type of event occurred once every 10 years from 2000 through 2020.

(2020 CY) - (2000 HY) = 20 Years on Record

(20 Years) / (2 Events) = 10 Years Between Events

The historic frequency indicates that there is a 10% chance of this type of event occurring each year.

11.6 *INVENTORY ASSETS EXPOSED TO HEALTH-RELATED EMERGENCIES*

Certain populations are at higher risk of a pandemic flu infection. This population group includes people 65 years and older, children younger than 5 years old, pregnant women, and people of any age with certain chronic medical conditions. Such conditions include but are not limited to diabetes, heart disease, asthma and kidney disease (CDC, 2015). Schools, colleges, convalescent centers, and other institutions that serve those younger than 5 and older than 65 years old, are conducive to faster transmission of pandemic influenza, since populations identified as being at high risk are concentrated at these facilities or because of a large number of people live in close quarters. The

hospital system would be the most likely point of introduction for an epidemic or pandemic to enter the county's area.

TABLE 4-58 POPULATION AGE ESTIMATES, 2018

Total	Population	Percent
Under 5 years	2,310	6.8%
65 and up	5,910	17.4%

Health-related emergencies are unlikely to directly impact buildings and infrastructure. However, losses can be measured in lost productivity by employees unable to perform their job duties and students unable to attend classes.

TABLE 4-59 POTENTIAL LOSSES FROM HEALTH-RELATED EMERGENCIES

Impact	Description
People	People are likely to bear the brunt of a health-related emergency, as they are impacted by diseases. They can become extremely sick and possibly die, depending on the illness.
Infrastructure	This hazard is not expected to affect Infrastructure.
Economy	The economy can be damaged by productivity drops due to illness.
Natural Systems	This hazard is not expected to affect Natural Systems.
Transportation	This hazard is not expected to affect Transportation.

11.7 *LAND USE AND DEVELOPMENT TRENDS*

New development in Putnam County is currently minimal. However, denser areas are more susceptible to the spread of diseases, as people tend to live closer to one another. Therefore, larger incorporated areas, including Continental, Leipsic, and Ottawa, which have populations over 2,000, are the most vulnerable to a rapidly spreading disease.

Regulatory Environment

A variety of regulations drive the health industry and, as a result, the treatment of pandemics and epidemics. The Ohio Revised Code, Chapter 3701-59 specifically deals with hospitals. Mercy Health Putnam County Medical Center and Mercy Health – St. Rita's Medical Center, LLC are both accredited by the Joint Commission, an independent, not-for-profit organization. The Joint Commission accredits and certifies nearly 21,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards.

11.8 *HEALTH RELATED EMERGENCIES SUMMARY*

Pandemic and infectious disease events cover a wide geographical area and can affect large populations. The exact size and extent of an infected population is subject to how easily the illness is

spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in areas with large concentrations of people. The transmission rate of infectious disease will depend on the mode of transmission of a given illness

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SECTION 5. MITIGATION STRATEGY

The following Mitigation Strategy is designed to be comprehensive and strategic. Its intent is to provide Putnam County and its municipalities with:

- Goals to serve as guiding principles for administering future mitigation policy and projects.
- A list of proposed actions to meet those goals and reduce the impact of natural, technological, and man-made hazards.

The process to develop the strategy included a thorough review of Putnam County's natural, technological, and man-made hazards. We also identified policies and projects that would not only reduce the future impacts of hazards, but also help the county achieve compatible economic, environmental and social goals. This section is also intended to be strategic, in that all policies and projects are linked to established priorities assigned to specific departments or individuals, who are responsible for their implementation and completion deadlines. Potential funding sources the projects are also identified.

- **Mitigation goals** are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements that represent desired long-term results.
- **Mitigation objectives** describe strategies or steps to attain the identified goals. Objectives are more specific than goals; the steps they describe are usually measurable and can have a defined completion date.
- **Mitigation Actions** provide more detailed descriptions of specific tasks to help the county and its municipalities achieve those goals and objectives.

1. GOALS

The following goals and objectives apply to this mitigation plan:

- **GOAL 1: Reduce damages from severe summer storms in Putnam County.**
  - OBJECTIVE 1.1: Increase public awareness that a severe thunderstorm, hail, and/or lightning is imminent.
- **GOAL 2: Reduce the effects of severe winter storms in Putnam County.**
  - OBJECTIVE 2.1: Minimize future damage from severe winter storms by building the county's capacity of public awareness campaigns.
- **GOAL 3: Reduce the negative effects of flooding in Putnam County.**
  - OBJECTIVE 3.1: Lessen flood damage by preserving the natural course of waterways.
  - OBJECTIVE 3.2: Increase coordination among pertinent individuals/groups to mitigate flood hazards.

    - OBJECTIVE 3.3: Reduce flood damage by using structural projects to reduce obstructions to the flow of water.

- **GOAL 4: Reduce damage from severe wind and tornadoes in Putnam County.**
    - OBJECTIVE 4.1: Increase public awareness that severe wind and tornadoes are imminent.
    - OBJECTIVE 4.2: Maintain an inventory of available shelters within Putnam County and update it on an annual basis, especially as new shelters are developed.
- **GOAL 5: Protect Putnam County's population from temperature extremes.**
    - OBJECTIVE 5.1: Increase public knowledge of protective measures to take during temperature extremes.
- **GOAL 6: Protect Putnam County's people and property from the negative effects of drought.**
    - OBJECTIVE 6.1: Develop methods to procure an emergency water supply.
- **GOAL 7: Protect Putnam County's population from an epidemic.**
    - OBJECTIVE 7.1: Increase public awareness and knowledge of how to reduce exposure to epidemics.
    - OBJECTIVE 7.2: Work with local health departments to limit or eliminate the spread of diseases by reducing the source of the infection.
- **GOAL 8: Reduce the potential effects of earthquakes in Putnam County.**
    - OBJECTIVE 8.1: Educate the public on the potential for earthquakes in Ohio, and specifically Putnam County.
- **GOAL 9: Reduce the potential for property damage from dam failure in Putnam County.**
    - OBJECTIVE 9.1: Reduce the probability of significant flood damage as a result of a dam failure.
- **GOAL 10: Protect Putnam County's population and assets from an infestation.**
    - OBJECTIVE 10.1: Lessen the potential for an infestation by educating the public and identifying areas of concern.
- **GOAL 11: Reduce or eliminate the negative effects of various other hazards in Putnam County.**
    - OBJECTIVE 11.1: Protect private and public water sources in the event of a hazardous event.
    - OBJECTIVE 11.2: Identify facilities that could be used as shelter sites with backup power, during emergency situations.

Based on participation from the Putnam County Mitigation Planning Committee, the mitigation strategy was developed. Objectives were clarified to document roles and responsibilities more clearly. Actions were added to address particular hazards the county faces, and a consensus was achieved on how to address those actions.

The last step in updating the Mitigation Strategy is to create Mitigation Action Plans (MAPs). The MAPs represent the key outcome of the mitigation planning process. They include a prioritized list of the county's proposed hazard mitigation actions (policies and projects), with accompanying information such as the agencies or individuals that are responsible for each one, potential funding sources, estimated target date for completion, and current status. The MAPs provide the individuals or agencies responsible for each mitigation action with a clear roadmap that also serves as a tool for monitoring progress over time. The combined actions listed in each jurisdiction's MAP also serve as an easily understood synopsis of activities for local decision makers.

To ensure that a broad range of mitigation actions were considered, the Mitigation Planning Committee analyzed a comprehensive range of specific mitigation actions for each hazard (after it completed the risk assessment). This helped provide sufficient span and creativity for considering the mitigation actions.

The County considered **four categories** of mitigation actions in developing its plan:

1. **Local Plans and Regulations:** These actions include work on government authorities, policies, or codes that influence the way land and buildings are developed and built.
2. **Structure and Infrastructure Projects:** These actions involve modifying existing structures and infrastructure to protect them from a hazard or to remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves constructing structures to reduce the impact of hazards. Many of these types of actions are eligible for funding through FEMA's Hazard Mitigation Assistance program.
3. **Natural Systems Protection:** These actions minimize damage and losses and preserve or restore the functions of natural systems.
4. **Education and Awareness Program:** These actions inform and educate students, faculty and staff about hazards and potential ways to mitigate them. They may include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among county officials, stakeholders, and the public is likely to lead to more direct actions.

2. 2021 PLAN UPDATE MITIGATION ACTION PRIORITIZATION METHODOLOGY

Prioritizing mitigation actions for the 2014 plan was completed with FEMA's STAPLEE methodology for each jurisdiction's actions in mind. The STAPLEE approach allows for a careful review of the feasibility of mitigation actions by using seven criteria. The criteria are described below:

- S - Social
- T - Technical
- A - Administrative
- P - Political
- L - Legal
- E - Economic
- E - Environmental

For the individual action plans in the previous plan, a STAPLEE score was calculated based on the number of favorable considerations that can be found on the STAPLEE document. Up to 23 considerations can be used to prioritize each action using this evaluation methodology. Typically, scores rank between 17 and 21. Infrastructure projects tend to incur a lower score due to their high price and lengthy completion times, while plans, regulations, and educational programs rank higher due to their ease of deployment. The figure below shows an example of the STAPLEE tool.

FIGURE 5-1 EXAMPLE STAPLEE EVALUATION

STAPLEE ACTION EVALUATION TABLE:

Alternative Actions	STAPLEE Criteria Considerations + Favorable - Less favorable N Not Applicable																								
	S (Social)		T (Technical)			A (Administrative)			P (Political)			L (Legal)			E (Economic)				E (Environmental)					
	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Staffing	Funding Allocation	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/ Water	Effect on Endangered Species	Effect on HAZMAT/ Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws	

Since then, the prioritization process has changed to incorporate a more adaptable method that allows for a more comprehensive examination of the mitigation actions. In the plan update, each mitigation action was classified as having a high, medium, or low priority.

FEMA mitigation planning requirements indicate that any prioritization system must include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects. To do this in an efficient manner consistent with FEMA's guidance on using cost-benefit review in mitigation planning, the high/medium/low ranking method was adapted to include a higher weighting for the economic feasibility factor – Benefits of Action and Costs of Action. This method incorporates concepts similar to those described in Method C of FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (FEMA, 2007).

Projects with a high priority ranking are associated with at least five of the following qualities; projects with a medium priority ranking are associated with three or more of the following qualities; and projects with a low priority ranking are associated with two or more of the following qualities:

- Low cost
- High impact
- Urgency in completion
- Widespread mitigation
- Feasibility
- General acceptance
- Additional impacts resulting from the project
- Resources required to complete the project
- Project complexity

3. PLANNING PROCESS FOR SETTING HAZARD MITIGATION GOALS AND OBJECTIVES

The mitigation strategy represents the key outcomes of the 2021 Putnam County HMP planning process. The hazard mitigation planning process conducted by the Planning Committee is a typical problem-solving methodology:

- Estimate the impacts the problem could cause;
- Describe the problem;
- Assess the existing safeguards and resources that could potentially lessen those impacts;
- Develop Goals and Objectives with current capabilities to address the problem; and

- Using this information, determine what, if anything, can be done, and select the actions that are appropriate for the community

4. PUTNAM COUNTY CAPABILITY ASSESSMENT

The mitigation strategy includes an assessment of Putnam County's planning and regulatory, administrative/technical, fiscal, and political capabilities to augment known issues and weaknesses related to identified natural, technological, and man-made hazards.

4.1 *ABILITY TO EXPAND ON EXISTING CAPABILITIES*

The planning process used surveys to determine the county's existing capabilities and those of its political subdivisions. These capabilities can be expanded upon with the proper influx of funds or personnel. If additional state or federal funding becomes available to specifically augment the existing capabilities, the jurisdictions represented in this plan would be able to improve their capabilities. Additionally, as personnel leave, they may be replaced by individuals with skillsets not captured in these surveys. The county will continue to develop its staff capabilities over time and expand upon them where they are able.

Planning and Regulatory Capability: The table below summarizes each community's planning and regulatory capabilities. These are the plans and policies that jurisdictions have in place that can help to further mitigation.

TABLE 5-1 PLANNING AND REGULATORY CAPABILITIES

Tool/Program	Putnam County	Village of Belmore	Village of Cloverdale	Village of Columbus Grove	Village of Continental	Village of Dupont	Village of Fort Jennings	Village of Gilboa	Village of Glandorf	Village of Kalida	Village of Leipsic	Village of Miller City	Village of Ottoville	Village of Pandora	Village of West Laipsic
Hazard Mitigation Plan	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD	UD
Emergency Operations Plan	X			UD	X			X		X				X	X
Disaster Recovery Plan	X			UD	X					X				X	X
Evacuation Plan	X			UD	X					X				X	
Continuity of Operations Plan	X			UD	X					X				X	
NFIP	X		X	X		X	X	X	X	X	X		X	X	
NFIP-CRS															
Floodplain Regulations	X			X			X	X		X			X	X	
Floodplain Management Plan	X			X				X		X	X		X	X	
Zoning Regulations		X		X	X		X	X	X	X	X	UD	X	X	
Subdivision Regulations	X			X	X		X		X	X	X	UD	X	X	
Other															

*UD = Under Development

Tool/Program	Putnam County	Village of Belmore	Village of Cloverdale	Village of Columbus Grove	Village of Continental	Village of Dupont	Village of Fort Jennings	Village of Gilboa	Village of Glandorf	Village of Kalida	Village of Leipsic	Village of Miller City	Village of Ottoville	Village of Pandora	Village of West Leipsic
Comprehensive Plan				UD							X			UD	
Open Space Management Plan				UD						X				UD	
Stormwater Management Plan		X		UD					X	X			X	X	
Natural Resource Protection Plan				UD										UD	
Capital Improvement Plan	X			UD						X	X		X	X	
Economic Development Plan	X			UD						X	X		X	X	
Historic Preservation Plan				UD										UD	
Farmland Preservation	X			UD										X	
Building Code				X*									X	UD	X
Fire Code				X*				X						UD	
Firewise				X*										UD	
Storm Ready				X										X	
Other															

*UD = Under Development

X* = State of Ohio

Administrative and Technical Capability: The table below summarizes the administrative and technical capabilities, organized by staff type and department. It is important to understand current administrative and technical capabilities before developing a myriad of mitigation activities.

TABLE 5-2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Tool/Program	Putnam County	Village of Belmore	Village of Cloverdale	Village of Columbus Grove	Village of Continental	Village of Dupont	Village of Fort Jennings	Village of Gilboa	Village of Glandorf	Village of Kalida	Village of Leipsic	Village of Miller City	Village of Ottoville	Village of Pandora	Village of West Leipsic
Planners (with land use / development knowledge)											X		X		
Planners or Engineers											X		X		
Engineers	X						X				X				
Emergency Manager	X										X				
Floodplain Manager	X			X			X			X	X		X		
Land Surveyor	X						X	X			X		X		
Scientists											X				
GIS Personnel	X										X		X*		
Grant Writers								X		X	X		X		
Other															

X* = village personnel currently being trained

Fiscal Capability: This section identifies the financial tools or resources that Putnam County could potentially use to help fund mitigation activities. Fiscal capabilities include community-specific as well as state and federal resources.

TABLE 5-3 FISCAL CAPABILITY

Tool/Program	Putnam County	Village of Belmore	Village of Cloverdale	Village of Columbus Grove	Village of Continental	Village of Dupont	Village of Fort Jennings	Village of Gilboa	Village of Glandorf	Village of Kalida	Village of Leipsic	Village of Miller City	Village of Ottoville	Village of Pandora	Village of West Leipsic
Capital Improvement Planning	X									X	X		X		
Community Development Block Grant	X	X		X		X				X	X		X		
Special Purpose Taxes	X									X	X		X	X	
Gas/Electric utility fees															
Water/Sewer fees		X	X	X		X	X		X	X	X		X	X	X
Stormwater utility fees									X				X	X	
Development impact fees										X	X				
General obligation, revenue, or special tax bonds	X									X	X		X		
Partnering/ Intergovernmental arrangements	X						X				X		X		
Other															

Community Political Capability: Political capability in this instance is measured by the degree to which local political leadership (including appointed boards) is willing to enact policies and programs that reduce hazard vulnerabilities in their community, even if met with some opposition. Examples may include guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management, etc.). The table below shows a qualitative ranking of each jurisdiction's political capability to enact policies and programs that reduce hazard vulnerabilities, on a scale from 0 to 5. A higher score corresponds to a higher degree of community political capability.

5-Very Willing **3-Moderately Willing** **0-Unwilling to Adopt**

TABLE 5-4 COMMUNITY POLITICAL CAPABILITY

Community	Willingness Score
Putnam County	**3**
Village of Belmore	**2**
Village of Cloverdale	**3**
Village of Columbus Grove	**3**
Village of Continental	**5**
Village of Dupont	**5**
Village of Fort Jennings	**5**
Village of Gilboa	**5**
Village of Glandorf	**3**
Village of Kalida	**5**
Village of Leipsic	**4**
Village of Miller City	**5**
Village of Ottoville	**3**
Village of Pandora	**3**
Village of West Leipsic	**3**

Self-Assessment of Capability: The table below shows each community's estimated degree of capability.

TABLE 5-5 OVERALL DEGREE OF CAPABILITY

Area	Limited	Moderate	High
Planning and Regulatory Capability	Cloverdale Belmore West Leipsic Gilboa Dupont Miller City	Putnam County Pandora Fort Jennings Kalida Ottoville Leipsic Columbus Grove Continental	Glandorf
Administrative and Technical Capability	Cloverdale Pandora Belmore Fort Jennings West Leipsic Gilboa Continental Dupont Miller City	Putnam County Glandorf Ottoville Leipsic Columbus Grove	Kalida
Fiscal Capability	Cloverdale Belmore Fort Jennings West Leipsic Gilboa Continental Dupont Miller City	Putnam County Glandorf Ottoville Leipsic Columbus Grove	Pandora Kalida
Community Political Capability	Putnam County Cloverdale Pandora Belmore West Leipsic Gilboa Miller City	Glandorf Fort Jennings Ottoville Columbus Grove Dupont	Kalida Leipsic Continental
Community Resiliency Capability	Cloverdale Pandora Belmore West Leipsic Gilboa Continental Dupont Miller City	Putnam County Fort Jennings Ottoville Columbus Grove	Glandorf Kalida Leipsic

5. MITIGATION ACTIONS

The goals and objectives form the basis for developing a Mitigation Action Strategy and specific mitigation projects to consider.

The process consists of 1) setting goals and objectives, 2) considering mitigation alternatives, 3) identifying strategies or "actions," and 4) developing a prioritized action plan that results in a mitigation strategy.

2014 Mitigation Action Review

During the second planning meeting, the mitigation actions from the 2014 HMP were reviewed and determined to be: deferred into the new plan; changed to reflect an update in priorities; completed; or deleted. These actions are found in Table 5-6. Actions marked as "Completed" were finished between the drafting of the 2014 HMP and the 2021 HMP. Deletion of an action generally refers to that action no longer being relevant to the community.

TABLE 5-6 PREVIOUS MITIGATION ACTION STATUS

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Provide additional funding to county fire departments and emergency medical services (EMS) for equipment and/or other supplies	Local Fire Departments	Ongoing – Belmore, Continental, Gilboa, Leipsic, Ottoville, Pandora Defer – Cloverdale, Columbus Grove, Fort Jennings, Glandorf, West Leipsic, Dupont
Coordinate with the Ohio Department of Natural Resources, Division of Water, in accordance with ORC Section 1512.062, to periodically reclassify any dam within the County as a result of a change in circumstances not in existence at the time of the initial classification to ensure adequate safety according to the potential for downstream damage	ODNR, Putnam County Office of Public Safety Director	Defer
Coordinate tentative contracts or agreements with water hauling companies to have emergency water supplies hauled into Putnam County	Putnam County Commissioners	Defer
Establish an ordinance to prioritize or control water use during emergency drought conditions, to be activated on the recommendation of local water providers	Putnam County Commissioners	Defer
Encourage participation in the Community Rating System (CRS) and join the National Flood Insurance Program (NFIP) where applicable to reduce flood insurance rates	Putnam County Commissioners Office, Putnam County Office of Public Safety Director	Ongoing
Continue the use of rain gauges throughout portions of the County to provide more adequate warnings of possible flooding, and develop a larger program to collect more data	Putnam County Commissioners Office, Putnam County Office of Public Safety Director, Township Trustees	Ongoing
Develop a private well testing program through the Putnam County Health Department	Putnam County Health Department	Defer, initial build requested
Conduct disease monitoring and surveillance to protect population from large scale outbreak	Putnam County Health Department Director	Ongoing
Deliver flu vaccine to at least 50% of County population through flu clinics and at health department	Putnam County Health Department Director	Ongoing
Continue public awareness campaigns on how to reduce exposure to epidemics through all available channels	Putnam County Health Department Director, Putnam County Office of Public Safety Director	Ongoing

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Coordinate with the health department to identify the source of the epidemic and determine non-pharmaceutical interventions for the general public to take to reduce or slow the spread of the disease	Putnam County Health Department Director, Putnam County Office of Public Safety Director	Ongoing
Encourage residents to receive immunizations against communicable diseases	Putnam County Health Department Director, Putnam County Office of Public Safety Director	Ongoing
Use of the Emergency Alert System (EAS) on commercial radio, television, and cable systems to send out emergency information targeted to specific areas	Putnam County Office of Public Safety Director	Remove from Plan
Encourage the use of NOAA weather radios and local alert monitors that continuously broadcast National Weather Service (NWS) forecasts and provide warnings for natural, technological, and man-made hazards and notify them of impending weather	Putnam County Office of Public Safety Director	Ongoing
Continue to update the Resource Manual database that can be used to inventory emergency resources that can be deployed to aid in emergency snow removal	Putnam County Office of Public Safety Director	Defer
Coordinate the purchase and strategic installation of warning sirens throughout uncovered portions of Putnam County so that each township is covered with at least one (1) siren	Putnam County Office of Public Safety Director	Defer
Develop plans to evacuate large populations from a confined area (e.g. county fairgrounds) if a tornado is sighted/predicted during an event at that site	Putnam County Office of Public Safety Director	Defer
Develop an informational brochure to distribute to local residents	Putnam County Office of Public Safety Director	Remove from Plan
Utilize state-developed program explaining the potential for earthquakes, as well as the potential damages from those earthquakes. The brochure includes information pertaining to measures to take to safe-proof homes and other structures from the potential effects of earthquakes	Putnam County Office of Public Safety Director	Remove from Plan
Provide potential shelter sites with generators that will allow them to remain operational during emergency situations	Putnam County Office of Public Safety Director	Defer

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Coordinate with the local media and the National Weather Service (NWS) to develop a multimedia warning system to alert residents of various hazardous events	Township Councils of Liberty, Monroe, Monterey, Palmer, and Union	Ongoing
Create and promote plan to address temperature extremes	Village of Belmore Council	Ongoing
Reduce damage to storm drains resulting from flooding through local mitigation projects	Village of Fort Jennings, Putnam County Office of Public Safety Director	Ongoing
Undertake actions to restore and improve the course of the creek in the park in the Village of Gilboa	Village of Gilboa Council	Defer
Continually assess the areas that are affected during flood events to best determine proper land use in those areas	Village of Gilboa Council	Defer
Develop a plan to provide for alternative power during severe weather and possible outages in the Village of Gilboa	Village of Gilboa Council	Ongoing
Consider regularly testing the county's water supply for chemical content - "Water testing"	Village of Continental Water Department, Columbus Grove Water Department, Kalida Water Department, Ottoville Water Department, Pandora Water Department, Leipsic Water Department, Ottawa Water Department	Remove, moved to capability assessment
Promote the use of emergency shut-off valves on the county's water systems to prevent contaminated water from flowing into other uncontaminated areas	Village of Continental Water Department, Columbus Grove Water Department, Kalida Water Department, Ottoville Water Department, Pandora Water Department, Leipsic Water Department, Ottawa Water Department	Remove, moved to capability assessment
Install two river gauges on Ottawa River for Early Warning and reduction of flood damages in the Village of Kalida	Village of Kalida Council, United States Geological Survey (USGS)	Complete
Procure snow equipment, and confirm agreements with local contractors to haul snow and provide necessary services	Village of Ottoville Council	Ongoing

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Purchase generator to provide backup power, and enter into agreements with suppliers to guarantee fuel and supplies	Village of Ottoville Council and OVFD	Ongoing
Take measures to reduce damage from snowstorms through the purchase of equipment meant to respond to these events in the Village of West Leipsic	Village of West Leipsic Council	Defer
Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm	Village of West Leipsic Council	Defer
Design and implement a maintenance program for Village drainage systems	Village of Cloverdale Council	Defer
Create and promote a plan for dealing with natural disasters in the Village of Cloverdale	Village of Cloverdale Council	Defer
Produce and distribute family emergency preparedness information pertaining to steps the general public can take to safeguard against the dangers of a severe thunderstorm	Village of Cloverdale Mayor, Putnam County Office of Public Safety Director	Defer
Repetitive Loss Property Acquisitions	Village of Columbus Grove Council, Putnam County Office of Public Safety Director	Defer
Clean and maintain storm sewers to facilitate water flow through the village	Village of Columbus Grove Maintenance Personnel, Village Council	Defer
Build safe rooms to shelter residents in case of tornado	Village of Columbus Grove Village Council, Putnam County Office of Public Safety Director	Defer
Provide cleanup and disposal of storm debris in the event of a severe storm/tornado	Village of Continental Council	Defer

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Purchase a backup generator to provide power in the event of an outage in the Village of Continental	Village of Continental Council	Defer
Develop plan of action in case of train derailment	Village of Continental Council	Defer
Develop plan of action in case of chemical spill	Village of Continental Council	Defer
Installation of a tornado/high wind siren in the Village of Continental	Village of Continental Council, Putnam County Office of Public Safety Director	Defer
Encourage residents to secure yard items, or stored items including oil, gasoline, and propane tanks that may be swept away by high winds	Village of Dupont Council	Ongoing
Installation of a generator for the Village Community Center	Village of Dupont Council	Ongoing
Install Tornado Sirens in the Village of Dupont	Village of Dupont Council, Putnam County Office of Public Safety Director	Completed
Consider the feasibility of burying power lines in the village to lessen the potential for power outages, better the aesthetics of the village, and decrease the number of obstructions to pedestrian and traffic flow	Village of Glandorf Council	Defer
Install a new warning siren on the north end of the village	Village of Glandorf Council, Putnam County Office of Public Safety Director	Defer
Perform needed maintenance and upgrades to storm sewers in the Village of Glandorf	Village of Glandorf Street Department	Defer
Increase the capacity of storm sewers to better deal with larger storm loads in the Village of Glandorf	Village of Glandorf Street Department	Defer

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / In Progress)
Determine the village's susceptibility to hazardous materials incidents	Village of Glandorf Village Council	Defer
Determine if existing storm sewers and basins in the Village of Miller City need maintenance or replacement	Village of Miller City Council	Ongoing
Identify potential for a hazardous materials incident along the railroad in the Village of Miller City, and develop evacuation plans	Village of Miller City Council and Fire Department	Ongoing
Cooperate and support all efforts regarding mitigation efforts concerning Road I-9 Bridge Approach	Maumee Conservancy District	Removed, Village of Ottawa created their own HMP.
Develop and enforce building codes in flood areas	Village of Ottawa Council	Removed, Village of Ottawa created their own HMP.
Install new water tower (200,000 gallons) in the Village of Pandora	Village of Pandora Council	Defer
Upgrade water line capacity in the Village of Pandora	Village of Pandora Council	Defer
Distribute Natural Resources Conservation Service (NRCS) information to residents	NRCS, The Ohio State University Farm Bureau	Defer
Clean/drag minor waterways in order to clear log jams, trees, shrubs, and sediment bars	U.S. Army Corps of Engineers (USACE), Putnam County Soil and Water Director	Defer

5.1 *MITIGATION ACTION DEVELOPMENT*

To identify mitigation actions, the HMP Planning Committee first reviewed the identified hazards and the mitigation goals and objectives. Based on the priorities and risk assessment results, mitigation actions were developed. Most importantly, the newly developed mitigation actions acknowledge the updated risk assessment information outlined in Section 4.

Mitigation Costs

The cost-effectiveness of each measure was a primary consideration for developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost-effectiveness is based primarily on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the selected measure's level of effectiveness.

Throughout the development of the mitigation actions, the planning committee members were encouraged to consult the State of Ohio Mitigation Assistance Resource Guide. This document compiles all funding and administrative support that is available for use. Federal and state programs are identified, as well as each program's contact information, funding restrictions and criteria, and success stories when available.

As the jurisdictions begin to create a plan to complete their designated actions, they are strongly encouraged to continue to reference the resource guide to acquire funds.

While a detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

New mitigation actions for the 2021 plan are found below:

Tornadoes					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Purchase generators for outlying areas of county	Putnam County Health Department	3 years	$60,000	Ohio Public Health	High
Construct a tornado shelter for village residents	Village of Cloverdale/ Mayor	3-5 years	$2,000,000	FEMA BRIC, HMGP	High
Purchase and install a generator	Village of Cloverdale/ Mayor	3-5 years	$10,000	FEMA BRIC, HMGP	Medium
Additional notification of impending danger by installing warning sirens	Village Of Columbus Grove/Village Administrator, Mayor	1-3 years	$15,000	Putnam County, ODNR, FEMA BRIC, HMGP	High
Construct storm shelters in the village for residents to use during extreme weather events	Village of Columbus Grove/Village Administrator, Mayor	1-3 years	$2,000,000	Putnam County, ODNR, FEMA BRIC, HMGP	Medium
Begin to transition to underground utilities	Village of Gilboa/Mayor	1-3 years	$1-2,000,000	Putnam County, Omega Grant ODNR, FEMA BRIC, HMGP	Medium
Purchase weather radios for residents to use	Village of Gilboa/Mayor	1-3 years	$5,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP	High
Update the sirens in the village	Village of Gilboa/Mayor	1-3 years	$15,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP	Medium
Install a back-up generator at the city building	Village of Ottovillle/ Fire Department, Council, Police	3 years	$150,000	Local Government Sources, FEMA BRIC	Medium
Acquire generator for storm shelter/community center	Village of Pandora/ Village Council	3 years	$40,000+	FEMA BRIC, HMGP, CDBG	Medium
Purchase weather radios for the residents to use	Village Of West Leipsic/Mayor	3-5 years	$5,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP	High
Construct storm shelters in the village for residents to use during extreme weather events	Village Of West Leipsic/Mayor	3-5 years	$2,000,000	Putnam County, ODNR, FEMA BRIC, HMGP	Medium

Purchase and install outdoor sirens	Putnam County EMA	3-5 years	$40,000	FEMA HMGP, BRIC	High
Purchase and install outdoor/tornado warning sirens in the Village of Leipsic	Village of Leipsic/Putnam County EMA	3-5 years	$15,000	Putnam County, OMEGA Grant, ODNR, BRIC, HMGP	High
Acquire a generator for the town building to use for power supply during a power outage	Village of Dupont	5 years	$10,000	Village funds, Putnam County EMA, FEMA BRIC /HMGP	Medium
Coordinate the purchase and strategic installation of warning sirens throughout uncovered portions of Putnam County so that each township is covered with at least one (1) siren	Putnam County Office of Public Safety Director	5 years	$25,000 per siren	FEMA BRIC Grants, Local Funding Mechanisms	High
Develop plans to evacuate large populations from a confined area (e.g. county fairgrounds) if a tornado is sighted/predicted during an event at that site	Putnam County Office of Public Safety Director	5 years	$20,000	FEMA BRIC Grants, FEMA Planning Grant, Local Funding Mechanisms	Medium
Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm	Village of West Leipsic Council	5 years	$2,000	Village Funds	Medium
Installation of a tornado/high wind siren in the Village of Continental	Village of Continental Council, Putnam County Office of Public Safety Director	5 years	$25,000	FEMA BRIC, Local Funding for Match	Medium
Encourage residents to secure yard items, or stored items including oil, gasoline, and propane tanks that may be swept away by high winds	Village of Dupont Council	5 years	Staff Time and Resources (~$1,000)	Village Funds	Medium
Install a new warning siren on the north end of the village	Village of Glandorf Council, Putnam County Office of Public Safety Director	5 years	$25,000	FEMA BRIC, Local Funding	High

Severe Winter Storms					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Community building with generator for water, heat, AC	Village of Belmore/ Village personnel	5 years	$5,000	Community General Fund	Medium

Continue to update the Resource Manual database that can be used to inventory emergency resources that can be deployed to aid in emergency snow removal	Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$3,000)	County General Fund	Medium
Provide potential shelter sites with generators that will allow them to remain operational during emergency situations	Putnam County Office of Public Safety Director	5 years	$25,000 per installation	FEMA BRIC Grants, FEMA HMGP Grants, Local Funding Sources	High
Procure snow equipment, and confirm agreements with local contractors to haul snow and provide necessary services	Village of Ottoville Council	5 years	$15,000	Village Funds	Low
Purchase generator to provide backup power, and enter into agreements with suppliers to guarantee fuel and supplies	Village of Ottoville Council and OVFD	5 years	$70,000	FEMA BRIC, HMA Funds, Village Funds for Local Match	Low
Take measures to reduce damage from snowstorms through the purchase of equipment meant to respond to these events in the Village of West Leipsic	Village of West Leipsic Council	5 years	$2,000	Village Funds	Medium

Temperature Extremes					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Create and promote plan to address temperature extremes	Village of Belmore Council	5 years	$20,000	Village Funding	Low

Drought					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Coordinate tentative contracts or agreements with water hauling companies to have emergency water supplies hauled into Putnam County	Putnam County EMA	3 years	Staff Time and Resources (~$1,000)	County General Fund	Medium
Establish an ordinance to prioritize or control water use during emergency drought conditions, to be activated on the recommendation of local water providers	Putnam County EMA, Putnam County Commissioners	2 years	Staff Time and Resources (~$1,000)	County General Fund	Medium
Install new water tower (200,000 gallons) in the Village of Pandora	Village of Pandora Council	5 years	$1,000,000	Ohio Public Works Grant and Loan, Village Funds	High
Upgrade water line capacity in the Village of Pandora	Village of Pandora Council	2-3 years	$420,000	Ohio Public Works Grant and Loan, Village Funds	High

Infestation					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Distribute Natural Resources Conservation Service (NRCS) information to residents	Putnam County Public Safety Director	5 years	$5,000	USDA, OSU, Putnam County	High

Severe Summer Storms					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Install generators in shelters	Putnam County 911	3-5 years	$10,000	FEMA BRIC/HMGP, State Government Assistance	Medium
Replace warning sirens	Putnam County 911	3-5 years	$15,000	FEMA BRIC/HMGP, State Government Assistance	High
Retrofitting fire and police stations to become hazard resistant	Village of Columbus Grove/Village Administrator, Mayor	1-3 years	$500,000	Putnam County, FEMA BRIC/HMGP	Medium
Finding funding to keep the fire department up to date	Village of Continental/ Continental Fire Department	3-5 years	$500,000	OMEGA	Low
Building or retrofitting a safe room/tornado shelter into new municipal building that is scheduled to be built within or by year 2020 to 2022	Village of Kalida/Mayor	2 years	$50,000	FEMA BRIC, State EMA, Putnam County Commissioners, Private businesses/ organizations	High
Install a natural gas backup generator to power new municipal building	Village of Kalida/Mayor	1-2 years	$20,000	Village Capital Improvement Fund	High
Install a permanent emergency shelter generator	Village of Leipsic/Mayor	5 years	$10,000	Putnam County EMA, FEMA HMGP, BRIC	Medium
Install a backup generator to power fire station and city building when there is loss of power	Village of Glandorf	1-5 years	$30,000	Putnam County, Village funds, FEMA HMGP, BRIC	Medium

A backup generator was installed at the well site; an additional generator is needed at the water plant for the village	Village of Continental	5 years	$50,000	FEMA BRIC, HMGP, Village funds	High
The Village of Dupont needs a storm shelter for the town to utilize in case of emergency	Village of Dupont	5 years	$50,000	Village funds, Putnam County EMA, FEMA BRIC/HMGP	Medium
Provide cleanup and disposal of storm debris in the event of a severe storm	Village of Miller City	5 years	Staff time	Village funds	High
Encourage the use of NOAA weather radios and local alert monitors that continuously broadcast National Weather Service (NWS) forecasts and provide warnings for natural, technological, and man-made hazards and notify them of impending weather	Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$2,000)	County General Fund	Medium
Coordinate with the local media and the National Weather Service (NWS) to develop a multimedia warning system to alert residents of various hazardous events	Putnam County Office of Public Safety Director	3 years	Staff Time and Resources	County General Fund	Medium
Develop a plan to provide for alternative power during severe weather and possible outages in the Village of Gilboa	Village of Gilboa Council	5 years	$8,000	Village Funds, FEMA BRIC	Low
Create and promote a plan for dealing with natural disasters in the Village of Cloverdale	Village of Cloverdale Council	5 years	$2,000	FEMA BRIC Funds, Village Funds	Low
Produce and distribute family emergency preparedness information pertaining to steps the general public can take to safeguard against the dangers of a severe thunderstorm	Village of Cloverdale Mayor, Putnam County Office of Public Safety Director	1-3 years	$2,000	Village Funds	High
Clean and maintain storm sewers to facilitate water flow through the village	Village of Columbus Grove Maintenance Personnel, Village Council	5 years	Staff Time and Resources	Village Funds	High
Provide cleanup and disposal of storm debris in the event of a severe storm/tornado	Village of Continental Council	5 years	$25,000	FEMA Public Assistance Funds, Village Funds	Medium

Flooding					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Use camera systems to record the state of our storm sewer system to identify weak or failing areas. Repair or replace areas that need improving.	Village of Fort Jennings/ Village Council	2-5 years	$1,000,000	OPWC, FEMA BRIC, HMGP, FMA	Medium
Construct levee	Village of Gilboa/Mayor	3-5 years	$10,000,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP, FMA	High
Elevate structures	Village of Gilboa/Mayor	3-5 years	$1,000,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP, FMA	High
Write a park management plan	Village of Gilboa/Mayor	3-5 years	$15,000	Putnam County, Omega Grant, ODNR, FEMA BRIC, HMGP	Medium
Encourage participation in the Community Rating System (CRS) and join the National Flood Insurance Program (NFIP) where applicable to reduce flood insurance rates	Putnam County Commissioners Office, Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$3,000)	County General Fund	Medium
Continue the use of rain gauges throughout portions of the County to provide more adequate warnings of possible flooding, and develop a larger program to collect more data	Putnam County Commissioners Office, Putnam County Office of Public Safety Director, Township Trustees	5 years	$10,000	County General Fund	Medium
Reduce damage to storm drains resulting from flooding through local mitigation projects	Village of Fort Jennings, Putnam County Office of Public Safety Director	5 years	$2,000,000	FEMA BRIC, HMP Grants, CDBG, Village Funds for local match	Low
Undertake actions to restore and improve the course of the creek in the park in the Village of Gilboa	Village of Gilboa Council	1-3 years	$5,000	Village Funds, Park Funds	Low
Continually assess the areas that are affected during flood events to best determine proper land use in those areas	Village of Gilboa Council	5 years	Staff Time and Resources (~$1,000)	Village Funds	High

Design and implement a maintenance program for Village drainage systems	Village of Cloverdale Council	5 years	$2,000	Village Funds	Medium
Perform needed maintenance and upgrades to storm sewers in the Village of Glandorf	Village of Glandorf Street Department	5 years	$150,000	FEMA BRIC, OWPA – Village Funds	Medium
Increase the capacity of storm sewers to better deal with larger storm loads in the Village of Glandorf	Village of Glandorf Street Department	5 years	$500,000	FEMA BRIC, OWPA – Village Funds	Medium
Determine if existing storm sewers and basins in the Village of Miller City need maintenance or replacement	Village of Miller City Council	5 years	$10,000	Village Funds	Medium
Clean/drag minor waterways in order to clear log jams, trees, shrubs, and sediment bars	Putnam County Office of Public Safety, US Army Corps of Engineers (USACOE), Putnam County Soil and Water Director	5 years	$100,000	USACOE, Soil and Water, Department of Labor	High
Repetitive loss property acquisitions/demolition/retrofit of flood prone properties	All Jurisdictions Participating in NFIP, Putnam County Office of Public Safety Director	5 years	$500,000	FEMA BRIC, HMP Grants, CDBG Funds, Local Match	Low

Earthquake					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Build safe rooms to shelter residents in case of tornado or earthquake	Village of Columbus Grove Village Council, Putnam County Office of Public Safety Director	5 years	$300,000	FEMA BRIC, HMP Grants, Local Match	Low
Purchase a backup generator to provide power in the event of an outage in the Village of Continental	Village of Continental Council	5 years	$45,000	FEMA BRIC, Village Funds for Local Match	Medium

Installation of a generator for the Village Community Center	Village of Dupont Council	5 years	$17,500	FEMA BRIC, Village Funds for Local Match	Medium
Consider the feasibility of burying power lines in the village to lessen the potential for power outages, better the aesthetics of the village, and decrease the number of obstructions to pedestrian and traffic flow	Village of Glandorf Council	5 years	$750,000	FEMA BRIC, CDBG Funds	High

Dam Failure					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Coordinate with the Ohio Department of Natural Resources, Division of Water, in accordance with ORC Section 1512.062, to periodically reclassify any dam within the County as a result of a change in circumstances not in existence at the time of the initial classification to ensure adequate safety according to the potential for downstream damage	Putnam County Office of Public Safety Director, ODNR	5 years	Staff time	ODNR Budgets	Medium
Rehabilitate the Ottawa Upground Reservoir High Hazard Class Dam	Putnam County Office of Public Safety Director	5 years	$500,000	FEMA HHPD, Local Match	High
Obtain inundation data for the dams within the County that do not have an EAP	Putnam County Office of Public Safety Director	1-2 years	Staff time	County Budget	High

Terrorism					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Provide increased training to local fire department regarding emergency response dangers to the first responders.	Village Of Leipsic/Mayor, Ottawa/Mayor, Columbus Grove/Mayor, Belmore/Mayor, Continental/Mayor, Miller City/Mayor	5 years	$5,000	Putnam County EMA, Local industries, railroad companies	High
Provide education to utility and village employees to organize evacuation from the area where first responders handle the emergency.	Village Of Leipsic/Mayor, Ottawa/Mayor, Columbus Grove/Mayor, Belmore/Mayor, Continental/Mayor, Miller City/Mayor	5 years	$5,000	Putnam County EMA, Local industries, railroad companies	High
Provide additional funding to county fire departments and emergency medical services (EMS) for equipment and/or other supplies	Local Fire Departments	5 years	$50,000	FEMA Assistance to Firefighters Grant, Local Funding	High
Develop plan of action in case of train derailment or chemical spill	Village of Continental Council	5 years	$6,000	Village Funds	Medium
Determine the village's susceptibility to hazardous materials incidents	Village of Glandorf Village Council	5 years	Staff Time and Resources (~$1,000)	Village Funds	High
Identify potential for a hazardous materials incident along the railroad in the Village of Miller City, and develop evacuation plans	Village of Miller City Council and Fire Department	5 years	Staff Time and Resources (~$1,000)	Village Funds	Medium

Health Related Emergency					
Action	**Lead Agency/ Department**	**Implementation Schedule**	**Estimated Cost**	**Funding Source**	**Priority Ranking**
Ensure coed chain management of vaccines	Putnam County Health Department	3 years	$60,000	Ohio Public Health	High
Develop a private well testing program through the Putnam County Health Department	Putnam County Health Department	5 years	$25,000	Putnam County Health Department Operating Budget	Medium
Conduct disease monitoring and surveillance to protect population from large scale outbreak	Putnam County Health Department Director	5 years	Staff Time and Resources (~$10,000)	Putnam County Health Department Funding	High
Deliver flu vaccine to at least 50% of County population through flu clinics and at health department	Putnam County Health Department Director	5 years	Staff Time and Resources (~$12,000)	Putnam County Health Department Funding	High
Continue public awareness campaigns on how to reduce exposure to epidemics through all available channels	Putnam County Health Department Director, Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$3,000)	County General Fund	High
Coordinate with the health department to identify the source of the epidemic and determine non-pharmaceutical interventions for the general public to take to reduce or slow the spread of the disease	Putnam County Health Department Director, Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$3,000)	County General Fund	Medium
Encourage residents to receive immunizations against communicable diseases	Putnam County Health Department Director, Putnam County Office of Public Safety Director	5 years	Staff Time and Resources (~$3,000)	Local Hospital Funds, Local Health Department Budget	Medium

SECTION 6. PLAN IMPLEMENTATION AND MAINTENANCE

As a living document, it is important that this plan becomes a tool for county resources to ensure possible damage from a hazard event is reduced. This section discusses plan adoption, implementation, monitoring, evaluating, and updating the HMP. Plan implementation and maintenance procedures will ensure that the HMP remains relevant and continues to address the changing environment in Putnam County. This section describes the incorporation of the HMP into existing planning mechanisms, and how the planning committee will continue to engage the public.

1. PLAN ADOPTION

Putnam County adopted the 2020 Putnam County Hazard Mitigation Plan on April 13, 2021.

TABLE 6-1 DATES OF 2020 PUTNAM COUNTY HMP ADOPTION

Jurisdiction	Adoption Date
Putnam County	April 13, 2021
Village of Belmore	July 16, 2021
Village of Cloverdale	May 6, 2021
Village of Columbus Grove	June 14, 2021
Village of Continental	May 25, 2021
Village of Dupont	May 18, 2021
Village of Fort Jennings	May 18, 2021
Village of Gilboa	June 8, 2021
Village of Glandorf	May 4, 2021
Village of Kalida	May 3, 2021
Village of Leipsic	July 6, 2021
Village of Miller City	May 4, 2021
Village of Ottoville	May 24, 2021
Village of Pandora	April 27, 2021
Village of West Leipsic	June 10, 2021

The 2020 Putnam County expires on **April 28, 2026**.

2. EVALUATION, MONITORING AND UPDATING

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in completing identified mitigation efforts. The effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule for maintenance activities and describes how the public will be involved on a continued basis.

The Putnam County Hazard Mitigation Planning Committee (HMPC) established for this 2021 plan is designated to lead the plan maintenance processes of monitoring, evaluation and updating, with support and representation from all participating municipalities. The HMPC will coordinate maintenance efforts, but the input needed for effective periodic evaluations will come from county-wide representatives and other important stakeholders.

The HMPC will oversee the progress made on the identified action items and will modify actions, as needed, to reflect changing conditions. The HMPC will meet annually to evaluate the plan and discuss specific coordination efforts that may be needed.

The annual evaluation of the 2021 Plan will include not only an investigation of whether mitigation actions were completed, but also an assessment of how effective those actions were in mitigating losses. A review of the qualitative and quantitative benefits (or avoided losses) of mitigation activities will support this assessment. Results of the evaluation will then be compared to the goals and objectives established in the plan; The committee will lead decisions on whether to discontinue or modify actions in any way, in light of new developments. The Mitigation Planning Committee will document progress for use in the next Hazard Mitigation Plan update. Finally, the Mitigation Planning Committee will monitor and incorporate elements of this plan into other planning mechanisms.

This plan will be updated by the FEMA-approved 5-year anniversary date, as required by the Disaster Mitigation Act of 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the 5-year review process, the following questions will be considered as criteria for assessing the effectiveness of the HMP.

- Has the nature or magnitude of hazards affecting the county changed?
- Are there new hazards that have the potential to impact the county?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the plan?
- Should additional resources be committed to address identified hazards?

Issues that arise during monitoring and evaluation which require changes to the local hazard, risk and vulnerability summary, mitigation strategy, and other components of the plan will be incorporated during future updates.

Update process for plan prior to 5-year update: Anyone interested in updating this plan sooner than the 5-year update will submit a request to the HMPC for consideration. The request should be accompanied by a detailed rationale. The request will be evaluated, and the committee will determine whether or not to act on the update request. If the decision is to act, an individual will be

assigned to author the update. A draft of the updated section, along with a detailed rationale, will be submitted to the Mitigation Planning Committee. The committee will circulate the draft updated section for comment, and after an appropriate period of time, the committee will decide whether to update the plan, at least partially based on the feedback received.

3. PLAN UPDATE AND MAINTENANCE

This section describes the schedule and process for monitoring, evaluating, and updating the 2021 HMP.

3.1 *SCHEDULE*

Monitoring the progress of the mitigation actions will be ongoing throughout the 5-year period between the adoption of the HMP and the next update process. The HMPC will meet annually to monitor the status of the mitigation actions and to develop updates as necessary.

The HMP will be updated every 5 years, as required by DMA 2000. The update process will begin at least 1 year before the HMP expires. However, the HMPC will reconvene within 30 days of any significant disaster that affects the county, to review and update the HMP as appropriate.

3.2 *PROCESS*

The HMPC will coordinate with the responsible agencies/organizations identified for each mitigation action. These agencies/organizations will monitor and evaluate the progress made on the mitigation actions for which they are responsible and report to the HMPC annually. Working with the HMPC, these responsible agencies/organizations will be asked to assess the effectiveness of the mitigation actions and modify the mitigation actions as appropriate.

Future updates to the HMP will account for any new hazard vulnerabilities, special circumstances, or new information that become available. Issues that arise while monitoring and evaluating the HMP, which require changes to the risk assessment, mitigation strategy and other components of the HMP, will be incorporated into the next update of the HMP. The questions identified above would remain valid while the update is prepared.

Public Involvement

At all stages of the plan maintenance process, the public of Putnam County will be invited to participate. Before the HMP's annual review and after major disaster events, when the HMP is revisited, the public will be invited through *The Putnam Sentinel*, posts on social media, and flyers posted at the Putnam County Court House.

Any comments received will be logged and then addressed within the main document of the plan. A new version of the plan will be created and saved for each round of major edits.

3.3 *INCORPORATION INTO EXISTING PLANNING MECHANISMS*

An important implementation mechanism is to incorporate the recommendation and underlying principles of the HMP into planning and development such as capital improvement budgeting, general plans and comprehensive plans. Mitigation is most successful when it is incorporated within

the day-to-day functions and priorities of the entity attempting to implement risk-reducing actions. The integration of a variety of departments on the HMPC provides an opportunity for constant and pervasive efforts to network, identify, and highlight mitigation activities and opportunities. This collaborative effort is also important to monitor funding opportunities that can be leveraged for the mitigation actions.

Past Integration

- **Village of Ottawa Hazard Mitigation Plan:** In 2018, the village of Ottawa adopted their own single-jurisdiction mitigation plan. All components of the Putnam County 2014 Hazard Mitigation Plan were referenced heavily throughout the village's planning process and plan creation.

Future Integration

- **Capital Improvement Plans:** Plans that involve the upgrade of existing infrastructure provide an excellent opportunity for the county to build in hazard mitigation. This may include roadways, stream embankments, riverfront upgrades, or public walkways, but is not limited to these.

- **Local Plans and Polices**: The HMP will provide information that can be incorporated into local master plans during the next plan development or update. Specific risk and vulnerability information from the HMP will help identify areas where development may be at risk to potential hazards.

- **Historic Building Inventory**: The HMP includes information on historic buildings that can help guide decisions on what actions to take with historic buildings.

- **Emergency Operations Plan**: The county uses an Emergency Operations Plan that was updated in 2014. The EOP gives emergency personnel guidelines and procedures on how to best respond to dangerous events. Hazards as described in this plan, including those that are new to the 2021 iteration, will be included in the next version of the EOP.

- **Disaster Recovery Plan:** Developed in 2016, the Disaster Recovery Plan is similar to a mitigation plan. Rather than focusing on actions on how to create a more resilient community, a disaster recovery plan lays out a set of policies, tools, and procedures on how to recover after an incident. Hazards identified in the Putnam County HMP and other relevant information will be incorporated in the next update.

- **Evacuation Plan:** Putnam County's Evacuation Plan was approved in 2013. In the next update of the plan, the HMP will provided information on hazards that may require evacuation and the current efforts that are being made through the HMP to mitigate the hazards' impacts that may lessen the need to evacuate.

- **Continuity of Operations Plan:** The most current iteration of the plan is from 2009. When the plan is updated, the HMP will be incorporated through inclusion of the critical facility data, mitigation efforts, possible hazard identification, and agencies involved in the HMP.

- **Subdivision Regulations:** The HMP will provide important information regarding flooding, NFIP information and data, and best practices regarding a resilient built environment. The last update for the regulations was approved in 2011.

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APPENDIX A. ADOPTION RESOLUTIONS

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Putnam County 2021 Hazard Mitigation Plan
County Adoption Resolution

This 13th day of April, 2021, the Board of County Commissioners of Putnam County, Ohio, met in regular session with the following members present: John C. Schlumbohm, Vincent T. Schroeder and Michael A. Lammers-via teleconference.

Mr. Schlumbohm moved the adoption of the following Resolution:

WHEREAS, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the Putnam County acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of Putnam County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for Putnam County

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of Putnam County and
- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

Mr. Schroeder seconded the motion and the roll being called upon its adoption, the vote resulted as follows:

Vincent T Schroeder, yes

_____,_____

John C Schlumbohm yes

BOARD OF COUNTY COMMISSIONERS
PUTNAM COUNTY, OHIO

ATTEST: Cindy Landwehr

Cindy Landwehr, Clerk

BY: cml

Putnam County 2021 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 2021-03

VILLAGE OF BELMORE, Putnam County, Ohio

WHEREAS, the VILLAGE OF BELMORE, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the VILLAGE OF BELMORE acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the VILLAGE OF BELMORE, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the VILLAGE OF BELMORE:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the VILLAGE OF BELMORE and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 16 day of July, 2021

ATTEST:

Tammy Rayl

VILLAGE OF BELMORE

Walter Harper
Mayor

Putnam County 2021 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 2021-3

VILLAGE OF CLOVERDALE, Putnam County, Ohio

WHEREAS, the VILLAGE OF CLOVERDALE, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the VILLAGE OF CLOVERDALE acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the VILLAGE OF CLOVERDALE, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the VILLAGE OF CLOVERDALE:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the VILLAGE OF CLOVERDALE and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 6 day of May, 2021

ATTEST:

Guerri Spencer

VILLAGE OF CLOVERDALE

Thomas Burkhart

Tom Burkhart
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-09
VILLAGE OF COLUMBUS GROVE, Putnam County, Ohio

WHEREAS, the VILLAGE OF COLUMBUS GROVE, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the VILLAGE OF COLUMBUS GROVE acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the VILLAGE OF COLUMBUS GROVE, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the VILLAGE OF COLUMBUS GROVE:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the VILLAGE OF COLUMBUS GROVE and
- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 14 day of June, 2021

ATTEST:

VILLAGE OF COLUMBUS GROVE

Ken Wright
Ken Wright
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 5-2021
VILLAGE OF CONTINENTAL, Putnam County, Ohio

WHEREAS, the VILLAGE OF CONTINENTAL, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF CONTINENTAL acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF CONTINENTAL, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF CONTINENTAL:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF CONTINENTAL and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 25TH day of MAY, 2021

ATTEST:

Susan Darby
Susan Darby
Fiscal Officer

VILLAGE OF CONTINENTAL

Mathew Miller
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-02
VILLAGE OF DUPONT, Putnam County, Ohio

WHEREAS, the VILLAGE OF DUPONT, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF DUPONT acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF DUPONT, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF DUPONT:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF DUPONT and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 18th day of May, 2021

ATTEST:
Sara J. Thomas

VILLAGE OF DUPONT
Robert L. Heidenescher
Robert L. Heidenescher
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-003
VILLAGE OF FORT JENNINGS, Putnam County, Ohio

WHEREAS, the VILLAGE OF FORT JENNINGS, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF FORT JENNINGS acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF FORT JENNINGS, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF FORT JENNINGS:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF FORT JENNINGS and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 18 day of May, 2021

ATTEST:

Amy Luebrecht

VILLAGE OF FORT JENNINGS

James D Smith

James Smith
Mayor

Putnam County 2021 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. ~~01-2021~~ 03-2021

VILLAGE OF GILBOA, Putnam County, Ohio

WHEREAS, the VILLAGE OF GILBOA, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF GILBOA acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF GILBOA, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF GILBOA:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF GILBOA and
- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 8th day of June, 2021

ATTEST:

VILLAGE OF GILBOA

Michelle J. Clymer

Michelle Clymer
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2179
VILLAGE OF GLANDORF, Putnam County, Ohio

WHEREAS, the VILLAGE OF GLANDORF, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF GLANDORF acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF GLANDORF, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF GLANDORF:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF GLANDORF and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 4th day of May, 2021

ATTEST: Marilyn Ellenbrock

VILLAGE OF GLANDORF
Charles R Schroeder
Charles Schroeder
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-05-03
VILLAGE OF KALIDA, Putnam County, Ohio

WHEREAS, the [VILLAGE OF KALIDA], Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF KALIDA acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF KALIDA, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF KALIDA:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF KALIDA and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 3rd day of May, 2021

ATTEST:
Rita Schroeder

VILLAGE OF KALIDA
Alan Gerdeman

Alan Gerdeman
Mayor

Putnam County 2021 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 3238

VILLAGE OF LEIPSIC, Putnam County, Ohio

WHEREAS, the VILLAGE OF LEIPSIC, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF LEIPSIC acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF LEIPSIC, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF LEIPSIC*:*

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF LEIPSIC and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 6 day of July, 2021

ATTEST:

Council President

Fiscal Officer

VILLAGE OF LEIPSIC

Tony Wobler
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 435
VILLAGE OF MILLER CITY, Putnam County, Ohio

WHEREAS, the VILLAGE OF MILLER CITY, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF MILLER CITY acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF MILLER CITY, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF MILLER CITY:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF MILLER CITY and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 4th day of May, 2021

ATTEST:

Jodie Lammers
Fiscal Officer

VILLAGE OF MILLER CITY

James Erford
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-03
VILLAGE OF OTTOVILLE, Putnam County, Ohio

WHEREAS, the VILLAGE OF OTTOVILLE, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF OTTOVILLE acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF OTTOVILLE, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF OTTOVILLE:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the VILLAGE OF OTTOVILLE and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 24th day of May, 2021

ATTEST:
Jeanne M. Schumacher

VILLAGE OF OTTOVILLE
Ronald N. Miller
Ronald N. Miller
Mayor

Putnam County 2021 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2021-689
VILLAGE OF PANDORA, Putnam County, Ohio

WHEREAS, the [VILLAGE OF PANDORA], Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF PANDORA acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF PANDORA, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF PANDORA:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the VILLAGE OF PANDORA and

- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 27th day of April, 2021

ATTEST:

Kimberly D. Reese
Fiscal Officer

VILLAGE OF PANDORA

Jeremy Liechty
Mayor

Putnam County 2021 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 028

VILLAGE OF WEST LEIPSIC, Putnam County, Ohio

WHEREAS, the VILLAGE OF WEST LEIPSIC, Putnam County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the* VILLAGE OF WEST LEIPSIC acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan has been developed by the Putnam County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the* VILLAGE OF WEST LEIPSIC, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Putnam County 2021 Hazard Mitigation Plan, and

WHEREAS, the Putnam County 2021 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the* VILLAGE OF WEST LEIPSIC:

- The Putnam County 2021 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the* VILLAGE OF WEST LEIPSIC and
- The respective officials and agencies identified in the implementation strategy of the Putnam County 2021 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 10th day of June, 2021

ATTEST:

Andrea Hazelton

VILLAGE OF WEST LEIPSIC

Robert Alt

Robert Alt Jr.
Mayor

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APPENDIX B. MEETING MINUTES AND AGENDAS

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Putnam County Hazard Mitigation Plan Update

Kickoff Meeting

October 24, 2019
10:00 AM – 12:00 PM, 5:00 PM – 7:00 PM

Place: Putnam County Office of Public Safety
117 Dr. Thatye Dr, Glandorf Ohio, 45848

ATTACHED: LIST OF ATTENDANCE

MEETING FACILITATORS:

Mike Klear, Director, Putnam County Emergency Management Agency

Jason Farrell, Planner, Michael Baker International

Josh Vidmar, Planner, Michael Baker International

1. Welcome and Introductions
2. Project Overview
3. Planning Process
4. Participation
5. Hazard Review
    - Exercise: Risk Factor Evaluation
    - Exercise: Hazard Evaluation
6. Capability Assessment
    - Exercise: Capability Assessment Survey
7. Planning Timeline
8. Next Steps and Action Items

Director Klear opened the meeting by thanking everyone for coming and briefly introducing the overall project. He then turned the floor over to Jason Farrell of Michael Baker International.

Jason explained the core concept of mitigation and why it is needed, and that the mitigation plan is required to receive certain funds through FEMA. In addition, he covered what is expected of the participants, both currently in attendance and those who will serve on the Putnam County Hazard Mitigation Planning Committee in future meetings.

Jason then provided those in attendance with a project timeline and an explanation of how Baker will complete the plan based on the proposed project schedule (looking at an approximate eight-month project schedule). He explained that it is a goal that the updated plan be delivered to Ohio for state review and then to FEMA for review in sufficient time for review and adoption.

IDENTIFICATION OF NEW RISKS

The first task for the group was to identify the hazards that are to be profiled in the new edition of the plan. This involved looking at those hazards currently identified in the 2013 plan and determining if they were to be carried over to the new plan. They were then prioritized using the Risk Factor worksheet:

Risk Assessment Category	Level	Degree of Risk Criteria	Index	Weight Value
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN TWO WEEKS.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	NEGLIGIBLE	LESS THAN 10% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 10% & 25% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 25% & 50% OF AREA AFFECTED	3	
	LARGE	MORE THAN 50% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	SELF DEFINED	1	10%
	12 TO 24 HRS	SELF DEFINED	2	
	6 TO 12 HRS	SELF DEFINED	3	
	LESS THAN 6 HRS	SELF DEFINED	4	
DURATION *This category may be defined as "boots on the ground," or the time period of response to a hazard, or event.*	LESS THAN 6 HRS	SELF DEFINED	1	10%
	LESS THAN 24 HRS	SELF DEFINED	2	
	LESS THAN 1 WEEK	SELF DEFINED	3	
	MORE THAN 1 WEEK	SELF DEFINED	4	

During the meeting the hazard of terrorism was added, as it was deemed a threat to the County. The rest of the hazards were reviewed for their overall priority, and it was determined that they should all remain in.

The hazards were then rescored to determine their overall change in priorities.

The resulting table of hazards and their relative Risk Factor score can be found below:

Natural Hazards		Probability		Impact		Spatial Extent		Warning Time		Duration		RF Factor
1	Tornadoes	2.6	0.8	2.4	0.7	2.4	0.5	3.5	0.3	1.7	0.2	**2.5**
2	Severe Winter Storms	2.0	0.6	2.5	0.8	2.0	0.4	3.0	0.3	2.5	0.3	**2.3**
3	Temperature Extremes	2.5	0.8	2.0	0.6	2.5	0.5	2.5	0.3	1.5	0.2	**2.3**
4	Drought	1.9	0.6	2.0	0.6	2.1	0.4	3.2	0.3	2.1	0.2	**2.1**
5	Infestation	2.0	0.6	1.5	0.5	2.5	0.5	2.5	0.3	1.5	0.2	**2.0**
6	Severe Summer Storms	1.5	0.5	1.5	0.5	1.5	0.3	3.0	0.3	2.5	0.3	**1.8**
7	Flooding	1.4	0.4	1.6	0.5	1.7	0.3	2.4	0.2	2.2	0.2	**1.7**
8	Earthquake	1.5	0.5	1.0	0.3	2.0	0.4	2.0	0.2	3.0	0.3	**1.7**
9	Dam Failure	1.0	0.3	1.0	0.3	1.0	0.2	2.5	0.3	2.5	0.3	**1.3**
Technological Hazards		**Probability**		**Impact**		**Spatial Extent**		**Warning Time**		**Duration**		**RF Factor**
1	Terrorism	1.7	0.5	1.9	0.6	1.9	0.4	3.2	0.3	2.0	0.2	**2.0**
2	Epidemic	2.0	0.6	1.0	0.3	2.0	0.4	2.0	0.2	2.0	0.2	**1.7**

EVALUATING RISK

After the hazards were decided upon, another exercise was completed by the group. The exercise was called the Risk Evaluation, in which the members of the committee determine, based on their own general knowledge, if the hazards selected pose more of a threat, less of a threat, or if there were no changes. It was explained to them that these were purely qualitative responses and that each would likely have different answers. The forms were completed and turned back in at the end of the meeting. They are enclosed in the Appendix.

1. Risk Evaluation Worksheet

Name: _____ Title: _____

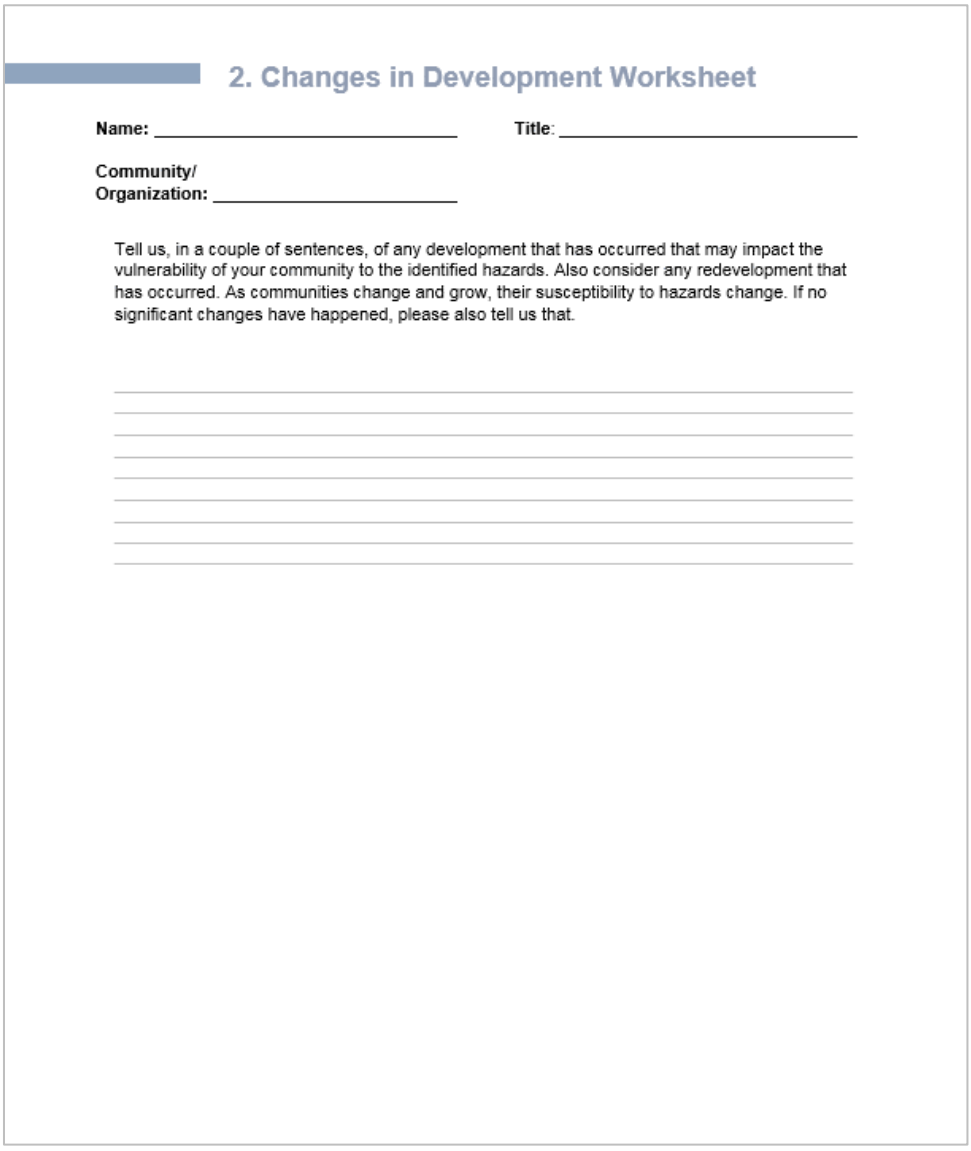
Community/
Organization: _____

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Earthquake		
Floods		
Hail		
Severe Winter Storms		
Summer Heat and Drought		
Tornado & Winds		
Other Hazards - Hurricane		

Please email completed forms to Jason.farrell@mbakerintl.com

CHANGES IN DEVELOPMENT

Upon completion of the Risk Evaluation, one more form was handed out, the Community Development Worksheet. This form asks representatives to explain what development has happened in recent years that would increase or reduce the vulnerability of their communities.



2. Changes in Development Worksheet

Name: _____ **Title:** _____

Community/ Organization: _____

Tell us, in a couple of sentences, of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

CLOSING AND NEXT STEPS

Once the Community Development exercise was completed, the final step was to go over the remainder of the project. This included a short discussion about the types of goals and objectives that would be discussed at the next meeting, as well a short talk about what mitigation actions are. After reviewing the planning schedule, those in attendance were asked if there were any further questions before adjourning. No questions were asked, and the meeting was adjourned.

Putnam County Hazard Mitigation Plan Update
Kick-off Meeting
October 24, 2019 10:00 AM

Name	Title	Jurisdiction/ Organization	Phone	E-Mail
Rick Morrison	Village Administrator	Village of Pandora	419-615-2669	villageadministrator@bright.net
JEFF VANCE	VILLAGE ADMINISTRATOR	VILLAGE OF COLUMBUS GROVE	419-231-2490	CGAdmin@Q1.NET
Ken Wright	Col Grove Mayor	Village of Col Grove	419 3035869	KJGrove@Q1.net
Jeremy Liechty	Pandora Mayor	Village of Pandora	419-348-0338	jliechty11a@gmail.com
Thomas Burkhart	Cloverdale mayor	Village of Cloverdale	419-230-1005	tomburkhart@bright.net
Stephanie Moore	PCEMS	Putnam CoEMA	419-538-7315	Stephanie@pcops.org
Robert Heidemanschick	Mayor Dupont	Village of Dupont	419-596-3041	
Gene Warnecke	Mayor Village of Glandorf	Village of Glandorf	419-538-9453	glandorfmayor@bright.net
JAMES GRFORD	MILLER CITY MAYOR	MILLER CITY	419 876 3206	jjgerford@gmail.com
Joan Kline	HEALTH ED/PIO	Putnam Co. Health Dept.	419-523-5608 ext 103	joan.kline@putnamhealth.com
Greg Luersman	GIS/Planning Comm.	Putnam Co.	419-523-8715	greg.luersman@putnamcountyoh.gov
Kimberly A Rom	Health Commissioner	Putnam Co. Health Dept	419-523-5608	kim.rilman@putnamhealth.com
Jan Osborn	Supt.	Putnam Co. ESC	419-523-5951	jan.osborn@putnamcountyesc.org

Putnam County Hazard Mitigation Plan Update
Kick-off Meeting
October 24, 2019 5:00 PM

Name	Title	Jurisdiction/ Organization	Phone	E-Mail
Ronald N Miller	Mayor	Village	419-230-8859	SMiller@Bright.net
Catherine Reed	Disaster Program Mgr	Red Cross	567-825-3349	catherine.reed@redcross.org
Mike Metzger	Harbormaster	County	419-615-7692	putnamcountyhazmat@gmail.com
Walter Metzger	Mayor	Belmore	419-231-7429	Belmore.mayor@Gmail.com
Robert Ostermeyer	Mayor	West Leipsic	4199432354	KC8JVF@HOTmail.com
Matt Miller	MAYOR	CONTINENTAL	419-439-3597	mrmiller@bright.net
Brandon Barlage	FF/Medic	Miller City FD	419-733-7687	bbarlage16@hotmail.com
Justin Barnhard	Administrator	Leipsic	419-231-1111	justinbarnhard@leipsic.com

Putnam County Hazard Mitigation Plan Update

Mitigation Strategy Meeting

March 11, 2020 10:00 AM – 12:00 PM, 5:00 PM – 7:00 PM

Place: Putnam County Office of Public Safety
117 Dr. Thatye Dr, Glandorf Ohio, 45848

ATTACHED: LIST OF ATTENDANCE

MEETING FACILITATORS:

Mike Klear, Director, Putnam County Emergency Management Agency

Josh Vidmar, Planner, Michael Baker International

Lori Duguid, Michael Baker International

Claire Fetters, Planner, Michael Baker International

1. Welcome and Introductions
2. Risk Assessment Meeting Review
3. Review and Update Goals and Objectives (2014 Plan)
4. Develop New Goals and Objectives
5. Next Steps and Action Items

Questions? Comments?

Mitigation Planner: Jason Farrell, CFM

Jason.farrell@mbakerintl.com

614-538-7610

PUTNAM COUNTY HMPU 2020 KICKOFF MEETING OVERVIEW

Mike Klear, the Director of the Putnam County Emergency Management Agency, welcomed everyone and thanked them for attending the Mitigation Strategy Meeting for the Putnam County Hazard Mitigation Plan Update. A short round of introductions then took place, including Josh Vidmar and Claire Fetters of Michael Baker International.

After introductions, Mr. Vidmar provided a brief overview of the purpose of the meeting and then spoke about the mitigation planning process.

RISK ASSESSMENT REVIEW

Mr. Vidmar began by reviewing some of the information presented in the kickoff meeting, as well as some of the information that had been gathered through the Hazard Identification and Risk Assessment process, and progress that had thus far been made on the plan. This presentation primarily consisted of presenting the maps that had been created based on the data. There was some discussion about where the data came from, and how it was used.

Natural Hazards		Probability		Impact		Spatial Extent		Warning Time		Duration		RF Factor
1	Tornadoes	2.6	0.8	2.4	0.7	2.4	0.5	3.5	0.3	1.7	0.2	**2.5**
2	Severe Winter Storms	2.0	0.6	2.5	0.8	2.0	0.4	3.0	0.3	2.5	0.3	**2.3**
3	Temperature Extremes	2.5	0.8	2.0	0.6	2.5	0.5	2.5	0.3	1.5	0.2	**2.3**
4	Drought	1.9	0.6	2.0	0.6	2.1	0.4	3.2	0.3	2.1	0.2	**2.1**
5	Infestation	2.0	0.6	1.5	0.5	2.5	0.5	2.5	0.3	1.5	0.2	**2.0**
6	Severe Summer Storms	1.5	0.5	1.5	0.5	1.5	0.3	3.0	0.3	2.5	0.3	**1.8**
7	Flooding	1.4	0.4	1.6	0.5	1.7	0.3	2.4	0.2	2.2	0.2	**1.7**
8	Earthquake	1.5	0.5	1.0	0.3	2.0	0.4	2.0	0.2	3.0	0.3	**1.7**
9	Dam Failure	1.0	0.3	1.0	0.3	1.0	0.2	2.5	0.3	2.5	0.3	**1.3**
Technological Hazards		**Probability**		**Impact**		**Spatial Extent**		**Warning Time**		**Duration**		**RF Factor**
1	Terrorism	1.7	0.5	1.9	0.6	1.9	0.4	3.2	0.3	2.0	0.2	**2.0**
2	Epidemic	2.0	0.6	1.0	0.3	2.0	0.4	2.0	0.2	2.0	0.2	**1.7**

Once the existing hazards had been reviewed, Mr. Vidmar made a call from the committee if they wanted to see any other hazards profiled than what was already covered. Committee members expressed the desire to ensure cyberterrorism is covered in the Terrorism hazard profile.

UPDATE MITIGATION GOALS AND OBJECTIVES

The next step of the meeting involved reviewing the mitigation goals and objectives from the previous version of the plan. During this review, several goals and objectives were changed to be more in-line with what the County and its communities had in mind for this update. This most revolved around slight changes in wording and eliminating objectives that were no longer relevant.

UPDATE MITIGATION ACTIONS

Each member of the committee was given a sheet that had their jurisdiction's mitigation actions from the previous plan. They were asked to review this information and, based on their best knowledge, determine if those actions had been completed, had not been completed and should be deferred into the new plan, were part of ongoing processes, or were no longer relevant and should be removed.

Mr. Vidmar then went over the next step, which was to create new mitigation actions based on the current needs of the County and its communities. He then explained the different types of actions that FEMA recommends, those being natural systems protections, public education and outreach, structure and infrastructure projects, and local plans and regulations. The committee members then filled out actions, with Mr. Vidmar, Ms. Duguid, and Ms. Fetters addressing questions.

CLOSING AND NEXT STEPS

The formal closing of the meeting came before the mitigation actions were updated so that committee members could leave as they finished their exercises. After the majority of the committee had left, Mr. Vidmar took a few moments to discuss further information requests with the consultants.

GOALS AND OBJECTIVES TABLE

The following table represents the changes made to the existing goals, and the objectives that were written for the plan update:

Goal	Objective	Defer	Change	Delete	Reason
***GOAL 1**: Reduce damages from severe summer*	***OBJECTIVE 1.1**: Increase public awareness that a severe thunderstorm is imminent, including hail or lightning*		X		
	***OBJECTIVE 1.2**: Provide local residents with advanced warning of impending hailstorms*			X	
***Goal 2**: Reduce the effects of severe winter storms in Putnam County*	***OBJECTIVE 2.1**: Minimize future damage from severe winter storms by building the response capacities throughout the county*		X		Change to public awareness
***GOAL 3**: Reduce the negative effects of*	***OBJECTIVE 3.1**: Lessen flood damage by preserving the natural course of waterways*	X			

Goal	Objective	Defer	Change	Delete	Reason
flooding in Putnam County					
	***OBJECTIVE 3.2**: Increase coordination among pertinent individuals/groups to mitigate flood hazards*	X			
	***OBJECTIVE 3.3**: Reduce flood damage by undertaking structural projects to lessen obstructions to the flow of water.*	X			
***GOAL 4**: Reduce damage from severe wind and tornadoes in Putnam County*	***OBJECTIVE 4.1**: Increase public awareness that severe wind and tornadoes are imminent*	X			
	***OBJECTIVE 4.2**: Maintain and update inventory of available shelters within Putnam County on an annual basis, especially as it related to the development of new shelters*	X			
***GOAL 5**: Protect Putnam County's population from temperature extremes*	***OBJECTIVE 5.1**: Increase public knowledge of protective measures to take during temperature extremes*	X			
***Goal 6:** Protect Putnam County's people and property from the negative effects of drought*	***OBJECTIVE 6.1:** Develop methods for the procurement of an emergency water supply*	x			
***Goal 7:** Protect Putnam County's population from an epidemic*	***OBJECTIVE 7.1:** Increase public awareness and knowledge on how to reduce exposure to epidemics*	X			
	***OBJECTIVE 7.2:** Work with local health departments to limit or eliminate the spread of diseases by reducing the source of the infection*	X			
***GOAL 8:** Reduce the potential effects of earthquakes in Putnam County*	**OBJECTIVE 8.1**: Educate the public as to the potential for earthquakes in Ohio, specifically Putnam County	X			

Goal	Objective	Defer	Change	Delete	Reason
GOAL 9: *Reduce the potential for property damage as a result of dam failure in Putnam County*	**OBJECTIVE 9.1**: Reduce the probability of significant flood damage as a result of a dam failure	X			
Goal 10: *Protect Putnam County's population and assets from an infestation*	***Objective 10.1:*** *Lessen the potential for an infestation by educating the public and identifying areas of concern*	X			
GOAL 11: *Reduce or eliminate the negative effects of various other hazards in Putnam County*	**OBJECTIVE 11.1**: *Protect private and public water sources in the event of a hazardous event*	X			
	OBJECTIVE 11.2: *Provide identified facilities that could be used as shelter sites with backup power, during emergency situations*	X			
	OBJECTIVE 11.3: *Increase emergency response capabilities to various hazards in Putnam County*			X	

10:00 a.m.

Name	Jurisdiction	title
Thomas Armey	Continental	council
Jeremy Liechty	Pandora	Mayor
Tom Burkhart	Cloverdale	Mayor
Denise Balbaugh	Village of Ottawa	FPA
Brian Inkrott	Village of Glandorf	Council President
Ronald W Miller	Village of Ottoville	Mayor
Robert ALT JR	Village of West Leipsic	Mayor
Rick Morrison	Village of Pandora	Village Administrator
Karen Voyer	St. Rita's - PCACC	Director
Angela Recker	Putnam Co. Health Dept	emerg. coord.
Robert Heidenreich	Dupont	Mayor
Matt Schnipke	Ottoville Fire Dept	Firefighter
Mike Kaan	Putnam Co. EMA	Director
Justin Barnhart	Leipsic	Administrator
BRIAN SIEFKER	SHERIFF	SHERIFF
[illegible]	Belmore	Mayor
Stephanie Moore	Putnam EMA	
Brad Brubaker	Putnam 911/EO	911 Coordinator

5:00pm

Name	Jurisdiction	Title
Jim Gulker	Village of Ralida	Chief of Police
Michelle Clymer	Village of GILBOA	MAYOR
JEFF VANCE	V. VILLAGE OF Col. Grove	VILLAGE ADMINISTRATOR

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APPENDIX C. RISK EVALUATIONS

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2. Risk Evaluation Worksheet

Name: Robert Abt J. **Title:** Mayor

Community/ Organization: Village of West Leipsic

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Tararism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Mike Klear **Title:** EMA Director

Community/ Organization: Putnam County

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	I	COVID 19
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Robert Heidelberg **Title:** Mayor

Community/ Organization: Village of Dupont

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	I	
Severe Winter Storms	I	
Temperature Extremes	NC	
Tornadoes	I	
Ter	I	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Thomas Burkhart **Title:** Mayor

Community/ Organization: Village of Cloverdale

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Columbus Grove **Title:** _____

Community/ Organization: Village of Columbus Grove

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? **NC=No Change, I=Increase, D=Decrease** ***(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)***	***Additional Comments***
Dam/Levee Failure	N.C	
Drought	N.C	
Earthquake	N.C	
Epidemic	N.C	
Flooding	I	
Infestation	N.C	
Severe Summer Storms	I	
Severe Winter Storms	I	
Temperature Extremes	N.C.	
Tornadoes	N.C	
Terrisom	I	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Jon Elford **Title:** Mayor

Community/ Organization: Village of Miller City

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Gene Warnecke **Title:** Mayor

Community/ Organization: Village of Glandorf

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terror	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Jim Bulker **Title:** Chief of Police

Community/ Organization: Village of Kalida

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	I	more rain events, more ~~development~~ upstream development and runoff
Infestation	NC	
Severe Summer Storms	I	more events occur
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: _____ **Title:** _____

Community/ Organization: _____

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	I	Climate change
Earthquake	NC	
Epidemic	NC	
Flooding	I	Climate change -
Infestation	NC	
Severe Summer Storms	I	Climate change
Severe Winter Storms	I	Climate change
Temperature Extremes	I	Climate change
Tornadoes	NC	
Cyber Terrorism	I	more vulnerability

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Mike Klear Title: EMA Director

Community/
Organization: Putnam County

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	I	Due to increase of Fracking in Ohio
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Mike Metzger **Title:** HAZMAT

Community/ Organization: Putnam County

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
TERRORISM	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Brandon Barlage Title: FF/Medic

Community/ Organization: Miller City FD

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	~~NC~~ I	anti-vaxers increasing?
Flooding	~~NC~~ D	change in Rd I-9 bridge
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	~~NC~~ D	~~reducing~~ reduction in ISIS threat

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Justin Bunhart **Title:** Administrator

Community/ Organization: Village of Leipsic

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	I	More water in and out of the reservoir more need for water
Drought	I	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: MATHEW MILLER **Title:** MAYOR

Community/ Organization: Village of Continental

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	I = GLOBAL WARMING?	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
TERRORISM	I = WORLD LOSING ITS MIND	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: C Reed Title: Disaster Program Mgr

Community/ Organization: Red Cross

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	D	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Walter Harper **Title:** Mayor

Community/ Organization: Village of Belmore

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	I	
Severe Winter Storms	D	Light winter snows.
Temperature Extremes	I	
Tornadoes	NC	
Tenaisem	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Joan Kline / Kim Rieman Title: _____

Community/ Organization: Putnam Co. Health Dept.

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	I	Building in at-risk areas
Infestation	I	Use of pesticides
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	I	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Jeremy Liechty **Title:** Mayor

Community/ Organization: Village of Pandora

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	NC	
Drought	NC	
Earthquake	NC	
Epidemic	NC	
Flooding	I	
Infestation	NC	
Severe Summer Storms	NC	
Severe Winter Storms	NC	
Temperature Extremes	NC	
Tornadoes	NC	
Terrorism	NC	Happens daily around country

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Michelle Clymer **Title:** MAYOR

Community/ Organization: Village of Gilboa

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	D	
Drought	NC	
Earthquake	D	
Epidemic	NC	
Flooding	NC	
Infestation	NC	
Severe Summer Storms	I	
Severe Winter Storms	D	
Temperature Extremes	NC	
Tornadoes	I	
Terrorism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

2. Risk Evaluation Worksheet

Name: Ronald D miller **Title:** Mayor

Community/ Organization: Village of Ottoville

	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC=No Change, I=Increase, D=Decrease *(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)*	*Additional Comments*
Dam/Levee Failure	D	
Drought	I	
Earthquake	NC	
Epidemic	NC	
Flooding	D	Clean ditch and replaced bridge under 190
Infestation	NC	
Severe Summer Storms	I	Fewer Trees in Village
Severe Winter Storms	I	" " " "
Temperature Extremes	NC	
Tornadoes	NC	
Terrizism	NC	

Please email completed forms to Jason.farrell@mbakerintl.com

APPENDIX D. CHANGES IN DEVELOPMENT

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3. Changes in Development Worksheet

Name: Michelle Chymer **Title:** MAYOR

Community/ Organization: Village of Gilboa

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

No Changes has occured.

3. Changes in Development Worksheet

Name: Robert Heidenescher **Title:** Mayor

Community/ Organization: Village of Dupont

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

New homes
slum and blite taken down

3. Changes in Development Worksheet

Name: Thomas Burkhart **Title:** Mayor

Community/ Organization: Village of Cloverdale

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

NO Changes

3. Changes in Development Worksheet

Name: _____ **Title:** _____

Community/ Organization: Village of Columbus Grove

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

NO CHANGES

3. Changes in Development Worksheet

Name: _____ **Title:** _____

Community/ Organization: Village of Miller City

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

A company has proposed building a large solar field next to the village. If this happens the village will annex the solar field.

3. Changes in Development Worksheet

Name: Gene Warnecke **Title:** Mayor

Community/ Organization: Village of Glandorf

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Since 2014 we have added 25 new homes and remodeled 5.
No Major impact on community services
We no longer have mobil homes in our Community

3. Changes in Development Worksheet

Name: Jim Gulker **Title:** Chief of Police

Community/ Organization: Village of Kalida

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

The village has seen an increase of housing developement and ~~business~~ business increase and expansion. The population has grown while village infrastructure may not be able to keep because of its age and ability to supply water and sewer in a timely manner.

3. Changes in Development Worksheet

Name: Jan Osborn **Title:** Superintendent - Put. Co. E.S.C.

Community/ Organization: Education - Putnam Co. ESC

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

The mean, or average age of a Putnam County resident is increasing. We have a decrease in total population. But those who stay in Putnam County are growing older.

Older residents become dependent on more help+support.

We have fewer younger residents to fill the role of emergency / support personel. - More need - Less Help(ers)

3. Changes in Development Worksheet

Name: Mike Klear **Title:** EMA Director

Community/ Organization: Putnam County

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Increase of Housing developments in many villages. i.e. Glandorf, Ottawa etc..
Population is growing older on average.

3. Changes in Development Worksheet

Name: Robert Alf **Title:** Mayor

Community/ Organization: Village of West Leipsic

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

The elevator is torn down to get read of mice and rats. And was falling down.

3. Changes in Development Worksheet

Name: Ronald N Miller **Title:** Mayor

Community/ Organization: Village of Ottoville

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Redone ditch on Rio and bridge under that road - Also cleaned the ditch to help move more water to decrease flooding.

3. Changes in Development Worksheet

Name: Mike Metzger **Title:** HAZMAT

Community/ Organization: Putnam County

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Increased Commercial Activity has Increased Commercial TRAFFIC, causing an Increase in HAZARDOUS MATERIALS HAULING

3. Changes in Development Worksheet

Name: Brandon Barlage **Title:** FF/Medic

Community/ Organization: Miller City FD

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Road I-9 bridge has been modified to allow flood water to flow more efficiently.

~~Depot is bringing~~

3. Changes in Development Worksheet

Name: Justin Barnhart **Title:** Administrator

Community/ Organization: Village of Leipsic

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

- Leipsic is home to an additional Steel Coil treatment facility with extreme heat levels and an increased need for water.
- We have demolished Five dilapidated downtown buildings in the last five years and continue to demolish dilapidated homes.
- Our Firedept has two new pumper tankers and has improved other equipment leading to an improved ISO rating.
- We have accessed a water Supply at the blanchard river providing up to 15 MGD of water is it is needed. State regs require us to draw no more than 3.6MGD at this time.

3. Changes in Development Worksheet

Name: MATHEW MILLER **Title:** MAYOR

Community/ Organization: Village of Continental

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

POPULATION AGING - ELDERLY NOT BEING ABLE TO CARE FOR THEMSELVES.

3. Changes in Development Worksheet

Name: CReed **Title:** Disaster Program Mgr

Community/ Organization: Red Cross

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

I am not in position to give input except that increased awareness of hazards in the community has built resilience; preparedness information is in demand.

3. Changes in Development Worksheet

Name: Walter Harper **Title:** Mayor

Community/ Organization: Village of Belmore

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Mostly seniors.
Sewer system for village.

3. Changes in Development Worksheet

Name: Joan Kline / Kim Rieman **Title:** _____

Community/ Organization: Putnam Co. Health Dept.

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

Increase risk + varying methods of terrorism (school shootings, cyber, agricultural) is a concern.
The aging population in Putnam County may have more difficulty in dealing with hazards. They may not have as much family support (kids may have moved away) so agencies may need to help more.

3. Changes in Development Worksheet

Name: Jeremy Liechty **Title:** Mayor

Community/ Organization: Village of Pandora

Tell us in a couple of sentences of any development that has occurred that may impact the vulnerability of your community to the identified hazards. Also consider any redevelopment that has occurred. As communities change and grow, their susceptibility to hazards change. If no significant changes have happened, please also tell us that.

there has been no significant changes in Pandora.

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APPENDIX E. COMPLETED ACTION FORMS

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1 NEW

6. New Mitigation Action Form

Community/Organization: Miller City

Name/Title: James Eford Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!

Assessing the Risk	
Hazard(s) addressed	PROVIDE CLEANUP + DISPOSAL OF STORM DEBRIS IN THE EVENT OF SEVERE STORM
Describing the Action	
Action description	
Implementing the Action	
Responsible party Department / Title	Private Contractor
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: Putnam Co. Health Dept.

Name/Title: Angela Recker, Emergency Preparedness Coord.

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	cold chain management of vaccine storage for mass clinics.
Describing the Action	
Action description	Purchase generators for outlying areas of county; ensure cold chain mgt. of vaccines.
Implementing the Action	
Responsible party Department / Title	Putnam Co. Health Dept.
Cost estimate Approximate, quote not needed	$60,000
Potential Partners Who can help fund/implement the action?	Putnam Co EMA, Sheriff
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	By 2023

6. New Mitigation Action Form

Community/Organization: Village of Kalida

Name/Title: Jim Gulker - Chief of Police

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Severe storms, Derecho, power outages long term. Building could serve as a temporary shelter, or emergency operations site temporarily.
Describing the Action	
Action description	By Building new municipal Building, will have installed a natural gas backup generator to power building.
Implementing the Action	
Responsible party Department / Title	Village of Kalida
Cost estimate Approximate, quote not needed	~$20,000
Potential Partners Who can help fund/implement the action?	Village Capital Improvement Fund
Potential funding sources High, Medium, Low	High
Timeline Must be in the next 5 years	Building completion date ~2021-2022

6. New Mitigation Action Form

Community/Organization: BELMORE

Name/Title: MAYOR

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	STORMS, TORNADOS & BLIZZARD
Describing the Action	
Action description	COMMUNITY BUILDING WITH GEN. FOR WATER, HEAT OR AC IN NEED OF AC UNIT.
Implementing the Action	
Responsible party Department / Title	VILLAGE PERSONAL
Cost estimate Approximate, quote not needed	$ 5000.00
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	LOW
Timeline Must be in the next 5 years	2025

6. New Mitigation Action Form

Community/Organization: West Lepsic

Name/Title: Robert ALT JR mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	formato's
Describing the Action	
Action description	Weather Radio's in need of a storm shelter
Implementing the Action	
Responsible party Department / Title	
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	grant's
Potential funding sources High, Medium, Low	High
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: Belmont

Name/Title: Walter Harper - Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Storms & Tornados Blizard
Describing the Action	
Action description	Committe Building - with Gen. for Water & Heat or AC
Implementing the Action	
Responsible party Department / Title	Village. Personal
Cost estimate Approximate, quote not needed	$5000.00
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	Low
Timeline Must be in the next 5 years	2025

6. New Mitigation Action Form

Community/Organization: Village of Kalida

Name/Title: Jim Gulker - chief of Police

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Tornado or severe storm or windstorm.
Describing the Action	
Action description	Building on retrofitting a safe room/tornado shelter into new municipal Building that is scheduled to be built within or by year 2020 to 2022.
Implementing the Action	
Responsible party Department / Title	Village of Kalida
Cost estimate Approximate, quote not needed	~$50,000
Potential Partners Who can help fund/implement the action?	FEMA / State EMA / Putnam County commissioners private businesses /organizations
Potential funding sources High, Medium, Low	High
Timeline Must be in the next 5 years	approximately 2 years from today of being built.

6. New Mitigation Action Form

Community/Organization: Columbus Grove

Name/Title: JEFF UNGE Village Administrator

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Sever Winds / Tornado
Describing the Action	
Action description	Additional notifaction Storm Shelters
Implementing the Action	
Responsible party Department / Title	Mayor / Village Administrator
Cost estimate Approximate, quote not needed	H.6H
Potential Partners Who can help fund/implement the action?	Putnam County ODNR
Potential funding sources High, Medium, Low	Fema PDM HmGP
Timeline Must be in the next 5 years	1-3-5 Years

6. New Mitigation Action Form

Community/Organization: Columbus Grove

Name/Title: JEFF VANCE VILLAGE ADMINISTRATOR

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Protect Structures
Describing the Action	
Action description	Retro fitting Fire and Police Stations To become HAZard resistant
Implementing the Action	
Responsible party Department / Title	Village Administrator / Mayor
Cost estimate Approximate, quote not needed	High
Potential Partners Who can help fund/implement the action?	Putnam County
Potential funding sources High, Medium, Low	Fema
Timeline Must be in the next 5 years	1-3 years

6. New Mitigation Action Form

Community/Organization: VILLAGE OF GILBOA

Name/Title: Michelle Clymer / MAYOR

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	SEVERE WINDS & TORNADOES
Describing the Action	
Action description	UNDER GROUND UTILITES WEATHER RADIOS UPDATED SIRENS
Implementing the Action	
Responsible party Department / Title	MAYOR
Cost estimate Approximate, quote not needed	HIGH
Potential Partners Who can help fund/implement the action?	PUTNAM COUNTY PDM OMEGA GRANT HMGP ODNR
Potential funding sources High, Medium, Low	↓
Timeline Must be in the next 5 years	1-3 years

6. New Mitigation Action Form

Community/Organization:_____

Name/Title:_____

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Warning of severe weather / Provide power to shelters
Describing the Action	
Action description	replace warning sirens / install Generators in shelters
Implementing the Action	
Responsible party Department / Title	
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	Federal + State Gov't / Federal + State
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: VILLAGE OF GILBOA

Name/Title: MICHELLE CHYMER/MAYOR

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	FLOODING
Describing the Action	
Action description	CONSTRUCT LEVEE ELEVATE STRUCTURES PARK MANAGEMENT PLAN (CORROSION)
Implementing the Action	
Responsible party Department / Title	MAYOR
Cost estimate Approximate, quote not needed	HIGH
Potential Partners Who can help fund/implement the action?	PUTNAM COUNTY OMEGA GRANT ODNR PDM HMGP FMA
Potential funding sources High, Medium, Low	↓
Timeline Must be in the next 5 years	3-5 years

6. New Mitigation Action Form

Community/Organization: Pandora

Name/Title: Jeremy Liechty Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	- Tornado - Storm Shelter - Power Outage
Describing the Action	
Action description	acquiring generator for Storm Shelter/community CTR
Implementing the Action	
Responsible party Department / Title	Village Council
Cost estimate Approximate, quote not needed	$40,000 plus
Potential Partners Who can help fund/implement the action?	- FEMA - CDBG
Potential funding sources High, Medium, Low	medium to high
Timeline Must be in the next 5 years	3 years

6. New Mitigation Action Form

Community/Organization: CONTINENTAL

Name/Title: Tom Armey - COUNCIL

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	LOCAL FIRE DEPT
Describing the Action	
Action description	FINDING FUNDING TO KEEP OUR Dept up to date
Implementing the Action	
Responsible party Department / Title	CONTINENTAL FIRE DEPT
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: Cloverdale

Name/Title: Thomas Burkhart Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	~~Tornado~~ Power Failer Down Trees
Describing the Action	
Action description	~~Power~~ ~~Failer~~ Tornado Shelter generator
Implementing the Action	
Responsible party Department / Title	
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: Ottoville

Name/Title: Ronald N Miller Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	~~Earthquake~~ + Tornado
Describing the Action	
Action description	city Building
Implementing the Action	
Responsible party Department / Title	Fire Department + Counsil + Police
Cost estimate Approximate, quote not needed	$ 150,000 generator for back up at city building
Potential Partners Who can help fund/implement the action?	goverment
Potential funding sources High, Medium, Low	Low
Timeline Must be in the next 5 years	3 years

6. New Mitigation Action Form

Community/Organization: Leipsic

Name/Title: Justin Barnhart Administrator.

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!

Assessing the Risk	
Hazard(s) addressed	Hazerdous Material Spill Railroad explosion
Describing the Action	
Action description	Provide increased training to local fire department regarding emergency response dangers to the first responders. Provide education to utility and Village employees to organize evacuation from the area while first responders handle the emergency. Villages of Leipsic, Ottawa
Implementing the Action	
Responsible party Department / Title	Columbus Grove Belmore Continental Miller City.
Cost estimate Approximate, quote not needed	$ 5,000
Potential Partners Who can help fund/implement the action?	Putnam County EMA Local Industries, Railroads
Potential funding sources High, Medium, Low	Medium
Timeline Must be in the next 5 years	5 years.

Emergency shelter generators
- We have an opportunity in Leipsic to put one in place within 3 hours but not at the time of storm.

6. New Mitigation Action Form

Community/Organization: Dupont Village

Name/Title: Robert Heidenreich Mayor

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Need a storm shelter for the town Need a generator for power supply
Describing the Action	
Action description	
Implementing the Action	
Responsible party Department / Title	
Cost estimate Approximate, quote not needed	
Potential Partners Who can help fund/implement the action?	
Potential funding sources High, Medium, Low	
Timeline Must be in the next 5 years	

6. New Mitigation Action Form

Community/Organization: Village of Glandorf

Name/Title: Charles R. Schroeder, Mayor Charles R Schroeder 7-29-2020

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	Loss of power due to storms
Describing the Action	
Action description	Install a backup generator to power fire station and city building
Implementing the Action	
Responsible party Department / Title	Village of Glandorf
Cost estimate Approximate, quote not needed	$30,000
Potential Partners Who can help fund/implement the action?	Local Fire district
Potential funding sources High, Medium, Low	High
Timeline Must be in the next 5 years	Will be completed in 5 years

[redacted] 6. New Mitigation Action Form

Community/Organization: CONTINENTAL

Name/Title: MATHEW MILLER / MAYOR

When filling out this form, consider the capabilities that you identified in Worksheet #4, as well as the hazards that can most affect your community. Try to answer the question of "how" you will reduce risks. Where applicable, be specific with locations!	
Assessing the Risk	
Hazard(s) addressed	BACKUP GENERATOR WAS INSTALLED AT WELL SITE ; ADDITIONAL AT WATER PLANT NEEDED
Describing the Action	
Action description	" " " " "
Implementing the Action	
Responsible party Department / Title	MAINTENANCE / WATER
Cost estimate Approximate, quote not needed	$ 50,000 -
Potential Partners Who can help fund/implement the action?	?
Potential funding sources High, Medium, Low	LOW
Timeline Must be in the next 5 years	5 YEARS

APPENDIX F. PLAN APPROVAL LETTER AND PLAN REVIEW TOOL

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U.S. Department of Homeland Security
FEMA Region V
536 South Clark Street, Floor 6
Chicago, IL 60605

FEMA

April 29, 2021

Mr. Steve Ferryman
Mitigation and Recovery Branch Chief
Ohio Emergency Management Agency
2855 W. Dublin-Granville Road
Columbus, Ohio 43235-2206

Dear Mr. Ferryman:

Thank you for submitting adoption documentation for the Putnam County Hazard Mitigation Plan. 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 Putnam County plan met the required criteria for a multi-jurisdictional hazard mitigation plan and the plan is now approved for Putnam County. Please submit adoption resolutions for any remaining jurisdictions who participated in the planning process.

The approval of this plan ensures continued availability of the full complement of Hazard Mitigation Assistance (HMA) Grants. All requests for funding, however, will be evaluated individually according to the specific eligibility and other requirements of the program under which the application is submitted.

We encourage the participating jurisdictions to work with Putnam County to follow the plan's schedule for monitoring and updating the plan, and to continue their efforts to implement the mitigation measures. The expiration date of the Putnam County Hazard Mitigation Plan is five years from the date of this letter. To continue project grant eligibility, the plan must be reviewed, revised as appropriate, resubmitted and approved no later than the expiration date.

Please pass on our congratulations to Putnam County for completing this significant action. If you or the participating jurisdictions have any questions, please contact Steve Greene at (312) 408-5343 or Steven.Greene@fema.dhs.gov.

Sincerely,

Julia McCarthy
Chief, 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: Putnam County	**Title of Plan:** Putnam County 2020 Hazard Mitigation Plan	**Date of Plan:** 1/21/2021 2/23/2021
Local Point of Contact: Stephanie Moore	**Address:**	
Title: Deputy Director	117 Dr Thatye Dr., PO Box 370 Ottawa, OH 45875	
Agency: Putnam County Emergency Management Agency		
Phone Number: 419.538.7315	**E-Mail:** stephanie@pcops.org	

State Reviewer:	**Title:**	**Date:**
Luan Nguyen	State of Ohio Hazard Mitigation Planner	**2/16/2021** **2/25/2021**
Maeve Hogel	Mitigation Branch Intern	**1/28/2021**

FEMA Reviewer:	**Title:**	**Date:**
Steve Greene	HM Community Planner	3/8/2021; 3/29/2021
Date Received in FEMA Region ***(insert #)***	2/26/2021; 3/23/2021	
Plan Not Approved		
Plan Approvable Pending Adoption	XX	
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))	Section 3, pp. 1-12; Appendix B	✓	
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))	Section 3, pp. 1-9	✓	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 3, pp. 3-9	✓	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 3, p. 10; References included throughout the plan	✓	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 6, p. 3	✓	
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))	Section 6, pp. 1-3	✓	
ELEMENT A: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 4, pp. 1-100	✓	
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))	Section 4, pp. 1-100	✓	
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))	Section 4, pp. 1-100	✓	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 4, pp. 66-67	✓	
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))	Section 5, pp. 5-6 to 5-12	✓	
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))	Section 4, p. 66; Section 5, pp. 5, 26-27	✓	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 5, pp. 1-2	✓	
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))	Section 5, pp. 16-29	✓	
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))	Section 5, pp. 3-29	✓	
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))	Section 6, p. 3-4	✓	
ELEMENT C: REQUIRED REVISIONS			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 2, pp. 1-6; Appendix C	✓	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 5, pp. 14-19	✓	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 4, pp. 4-5; Appendix B Appendix C	✓	
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))	Section 6, p. 1; Appendix A		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Section 6, p. 1; Appendix A		
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
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.

- Incorporating in Existing Planning Mechanisms – the plan does an excellent job in highlighting ample opportunities for the plan to be incorporated into the planning area's planning mechanisms.

- Existing Capabilities – the plan did a great job in providing discussion each community's capabilities to advance mitigation. You can clearly tell where each community may be lacking certain capabilities and can work on strengthening their capabilities.