EMERGENCY OPERATIONS PLAN

HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

DRAFT

Published: TBD

Classification Note: [redacted]

Prepared by: **Clinton County Emergency Management Agency**

Legal review date: **Pending review by the Clinton County Prosecutor's Office**

Purpose: This document provides a structured assessment of hazards, vulnerabilities, and operational risks within Clinton County to support planning, prioritization, and decision-making across all phases of emergency management.

Reason for FOUO: This document is designated as [redacted] in accordance with Ohio Revised Code 149.433, which protects records that, if disclosed, could reasonably be expected to jeopardize the security of public infrastructure or emergency response operations. Information contained herein is intended for planning, coordination, and risk-informed decision-making and is not for public distribution.

CHIEF ELECTED OFFICIAL BRIEF

Hazard Identification & Risk Assessment (HIRA)
Clinton County, Ohio

This briefing provides a high-level overview of the hazards most likely to affect Clinton County, the operational realities associated with those hazards, and key decision considerations for county leadership. The most frequent and operationally likely risks include severe thunderstorms with damaging winds, hail, and tornado potential; winter storms and extreme cold; flooding; and **long-duration power outages affecting energy, water, and communications systems**. Additional risks tied to [redacted] **Low-probability but high-consequence hazards—such as dam failure at Cowan Lake, severe geomagnetic storms, regional nuclear incidents, and mass casualty terrorism—remain significant due to their potential to disrupt multiple community lifelines simultaneously**.

Across these hazards, the county's most critical vulnerabilities center on energy systems, transportation corridors, communications, health and medical services, and food and fuel supply chains. **Disruption to two or more of these lifelines at the same time would place significant strain on local response capability and community stability**.

Clinton County's response model relies heavily on volunteer fire and EMS personnel, supported by limited full-time staffing, mutual aid agreements, and state assistance during extended incidents. While this system performs effectively during routine events, sustained or complex incidents introduce challenges related to staffing depth, resource availability, and coordination. **Multi-lifeline disruption extending beyond 72 hours may exceed locally sustainable response capability without state and federal support. Survey data indicates that both household sustainment and response system endurance begin to degrade within the first 24 to 72 hours of a prolonged disruption**, increasing demand for public assistance during extended incidents.

Several emerging risk pressures are expected to influence future conditions, including continued decline in volunteer workforce availability, increased dependence on regional energy systems, growth in hazardous freight movement, expanding cyber exposure of infrastructure, and variability in weather patterns affecting storm intensity. These trends warrant continued monitoring and periodic reassessment.

Elected official involvement may be required during significant incidents for emergency declarations, authorization of emergency expenditures, leadership in public communication, coordination with state and federal partners, and policy direction during recovery operations. While Clinton County maintains coordinated preparedness and planning, **certain high-consequence or multi-lifeline events may exceed local standalone capability**. This HIRA establishes a framework for prioritizing resilience investments, strengthening operational readiness, and supporting informed decision-making.

Contents

1. PURPOSE 5
Document Classification 5
2. SCOPE 6
3. METHODOLOGY 6
3.1. Hazard Identification Process 6
3.2. Community and Partner Data Integration 7
3.3. Exposure & Vulnerability Profile 7
3.4. Quantitative Scoring Framework 7
3.5. Risk Rating Matrix 8
3.6. Assumptions & Constraints 8
4. Hazard Summary Table 9
Tier 1 – High Operational Impact Hazards 10
Tier 2 – Cascading & Complex Hazards 10
Tier 3 – Low Probability / High Consequence Hazards 10
Composite Hazard Scoring Summary 11
Composite Score Calculation Method 11
5. Hazard Narrative Analysis (Selected Examples) 12
5.1. Severe Thunderstorms 12
5.2. Winter Storm / Extreme Cold 12
5.3. Dam Failure – Cowan Lake Dam (Class I) 13
5.4. Geomagnetic Storm (Severe CME) 13
[redacted] 13
6. Historical Incident Context 14
6.1. Community Memory Indicators 14
7. Community and Partner Perception Analysis 14
7.1. Resident Perception Summary 15
7.2. Partner Capability and Risk Perception Summary 15
7.3. Perception vs. Operational Risk Gap 15
7.4. Operational Implications 15
8. Lifeline Stress Concentration 16

8.1. Critical Infrastructure Dependency Statement 16
8.2. Community Lifeline Priorities 16
9. Lifeline Crosswalk Matrix 17
10. Comprehensive Hazard Inventory 17
10.1. Natural Hazards 17
Primary Weather Hazards 17
Secondary Environmental Hazards 18
10.2. Manmade Hazards 19
10.3. Human-Caused Hazards 21
Active aggressor incident 21
11. Hazard Evaluation Method 22
12. Composite Hazard Scoring Summary 22
13. Emerging & Escalating Risk Factors 23
14. Local Response Capacity 24
14.1. Planning-Level Information Note 24
14.2. Operational Capacity & System Stress Analysis 24
14.3. Workforce Capacity Reality 24
14.4. Sustained Operations & Degradation Risk 25
15.5. [redacted] 25
14.6. Utility Dependency & Operational Constraints 25
14.7. Economic Disruption & Community Stability Factors 26
14.8. System Stress Convergence 26
14.9. Household Preparedness Indicators 26
14.10. Operational Demand Curve 26
14.11. Operational Planning Consideration 27
Sources 27
Document Control Note 28
Version Control Format 28

HAZARD IDENTIFICATION & RISK ASSESSMENT (HIRA)

Document Overview: Clinton County's hazard environment is driven by events that impact one or more of the county's core Community Lifelines: Safety and Security, Food, Hydration, Shelter, Health and Medical, Energy, Communications, Transportation, Hazardous Materials, and Water Systems. While the county routinely experiences weather-related incidents such as severe storms, flooding, and winter weather, the greatest operational risk arises when hazards disrupt multiple lifelines at the same time—particularly Energy, Communications, and Transportation systems that support all other functions.

Operational impact is not determined solely by the hazard itself, but by the duration of disruption and the county's ability to sustain response operations. Incidents that extend beyond 24 to 72 hours begin to affect both household stability and response system capacity, increasing demand for public assistance while reducing available resources.

This HIRA prioritizes hazards based on their potential to create multi-lifeline disruption, recognizing that cascading effects across infrastructure systems, combined with workforce limitations and reliance on external support, represent the most significant threat to sustained operations in Clinton County.

1. PURPOSE

The HIRA identifies, analyzes, and prioritizes hazards that pose the greatest threat to life safety, critical infrastructure, community lifelines, and operational continuity within Clinton County, Ohio.

This annex establishes a defensible, data-informed hazard prioritization framework to guide:

- Hazard Annex development
- Playbook development
- Lifeline stabilization priorities
- Exercise design
- Resource allocation planning
- Strategic discussions with elected officials

This HIRA reflects both historical data and forward-looking threat trends.

Document Classification

This document has been reviewed and classified in accordance with the Clinton County Emergency Management Agency Document Classification Guide, which establishes standardized criteria for determining appropriate handling, distribution, and protection of planning and operational materials.

2. SCOPE

This assessment evaluates hazards that may:

- Cause loss of life or serious injury
- Overwhelm local response capacity
- Disrupt multiple FEMA Community Lifelines
- Create cascading failures across sectors
- Require sustained operational coordination

Hazards are grouped into three categories:

- Natural Hazards
- Manmade Hazards (Accidental / Infrastructure-Based)
- Human-Caused Hazards (Intentional)

3. METHODOLOGY

3.1. Hazard Identification Process

Hazards included in this HIRA were identified through:

- Review of the Clinton County Hazard Mitigation Plan
- National Weather Service historical data
- Ohio EMA and ODNR records
- LEPC hazardous materials reporting
- Infrastructure dependency analysis
- After-action reports from local incidents
- Regional risk modeling
- Emerging national threat trend analysis

This HIRA incorporates both historical recurrence data and forward-looking stressors including infrastructure aging, volunteer staffing constraints, supply chain fragility, and climate variability.

Community Hazard Perception Input. Clinton County EMA conducted a public Hazard Identification and Risk Assessment (HIRA) survey to collect community input regarding perceived hazards, preparedness levels, and lifeline priorities. The survey results do not replace the technical hazard scoring methodology used in this assessment but provide insight into how residents perceive risk and where preparedness gaps may exist. Community perception data can inform public preparedness messaging, outreach initiatives, and resilience planning by identifying areas where public concern aligns with operational hazards or where awareness may be limited.

3.2. Community and Partner Data Integration

In addition to public survey input, Clinton County EMA conducted a HIRA Partner Survey to collect operational perspectives from response agencies and stakeholders. These datasets are used to identify perception gaps, validate operational assumptions, and highlight differences between observed experience and system-level risk.

Survey findings do not directly alter numeric hazard scoring but are used to:

- Validate or challenge hazard prioritization
- Identify gaps in awareness of high-impact, low-frequency events
- Inform planning assumptions for operational capacity and public demand
- Guide public messaging and preparedness initiatives

Where significant differences exist between calculated risk and stakeholder perception, those gaps are identified as planning considerations.

3.3. Exposure & Vulnerability Profile

Risk exposure is not evenly distributed across Clinton County. Areas of concentrated vulnerability include:

- [redacted]
- Interstate 71 corridor and interchanges
- Low-lying rural flood-prone roadways
- [redacted]
- [redacted]

Risk in Clinton County is influenced by:

- Rural population distribution with limited mass transit
- [redacted]
- Interstate 71 corridor freight traffic
- [redacted]
- Agricultural economic dependency
- [redacted]]
- SNAP-dependent populations
- [redacted]
- [redacted]

Geographic concentration influences evacuation planning, debris clearance prioritization, and lifeline restoration sequencing.

3.4. Quantitative Scoring Framework

Each hazard is evaluated on a 0–5 scale in the following categories:

Category	0	5
Probability	Extremely rare	Occurs frequently
Life Safety Impact	Minimal	Catastrophic
Operational Complexity	Single-agency	Multi-agency sustained
Lifeline Disruption	Limited	Multi-lifeline collapse
Cascading Failure Potential	Isolated	Triggers secondary failures

Maximum Possible Score: 25

Hazards scoring:

- 20–25 = High Priority
- 15–19 = Elevated Priority
- 10–14 = Moderate Priority
- Below 10 = Monitoring Priority

3.5. Risk Rating Matrix

Risk Level	Percentage Range	Definition
Almost Certain	90–100%	Highly probable; expected to occur
Likely	70–89%	More likely than not to occur
Possible	50–69%	Even chance of occurring
Unlikely	30–49%	Less likely but still possible
Rare	10–29%	Uncommon; low probability
Highly Unlikely	0–9%	Very improbable

3.6. Assumptions & Constraints

Clinton County faces increased operational risk from compound or simultaneous hazard events. While individual hazards are assessed independently for scoring purposes, real-world incidents may overlap or occur in rapid succession.

Survey-informed constraints include:

- [redacted]
- [redacted]
- Awareness of multi-lifeline and cascading failure scenarios is limited among both public and response partners
- [redacted]

These constraints increase the likelihood of coordination challenges, delayed situational awareness, and increased demand for Emergency Operations Center activation during complex incidents.

Examples of compound scenarios include:

- Severe weather coinciding with a hazardous materials release along the Interstate 71 or rail corridor
- Winter storm conditions combined with a long-duration power outage
- Flooding occurring concurrently with major transportation corridor blockage
- Cyber disruption impacting communications during active emergency response operations
- Regional grid failure during extreme temperature conditions

Concurrent incidents significantly amplify operational complexity, accelerate resource depletion, and increase the probability of cascading lifeline failures. In multi-incident environments, staffing limitations, mutual aid availability, fuel access, and communications resilience may be simultaneously stressed.

Planning assumptions account for reduced surge capacity under compound hazard conditions, and Tier prioritization reflects the elevated risk posed by multi-lifeline disruption scenarios.

This HIRA assumes:

- [redacted]
- Volunteer response availability may fluctuate during sustained incidents
- Fuel and generator supply chains are externally dependent
- Communications redundancy outside public safety systems is limited
- Concurrent incidents may reduce surge capacity

These observations are intended to inform planning assumptions and do not represent a comprehensive assessment of the full capabilities of any individual agency, jurisdiction, or partner organization.

4. Hazard Summary Table

Tier designations are informed by composite numeric scoring, operational judgment, and consequence severity, particularly in low-probability/high-consequence scenarios.

Tier placement reflects both composite score and probability profile; low-probability/high-consequence hazards may be assigned to Tier 3 despite high composite scores due to limited historical frequency but extreme potential impact.

Survey data supports prioritization of hazards that produce extended disruption to energy, communications, and infrastructure systems. Both resident and partner responses indicate strong awareness of short-duration events but limited recognition of prolonged or cascading incidents.

As a result, hazard prioritization within this HIRA places additional emphasis on events capable of generating multi-lifeline disruption beyond 72 hours, regardless of public or partner perception.

Tier 1 – High Operational Impact Hazards

Hazard	Category	Risk Rating	Primary Lifelines Impacted
Severe Thunderstorms (Wind/Hail)	Natural	Likely (70–89%)	Energy, Communications, Transportation
Tornado	Natural	Possible (50–69%)	Safety & Security, Energy, Food/Hydration/Shelter
Flooding (Flash / Riverine)	Natural	Possible (50–69%)	Transportation, Water Systems
Winter Storm / Extreme Cold	Natural	Likely (70–89%)	Energy, Transportation, Food/Hydration/Shelter
Dam Failure (Class I – Cowan Lake)	Manmade	Rare (10–29%)	Safety & Security, Water Systems, Transportation
Long-Duration Power Outage	Manmade	Likely (70–89%)	Energy, Health & Medical, Communications

Tier 2 – Cascading & Complex Hazards

Hazard	Category	Risk Rating	Primary Lifelines Impacted
Hazardous Materials Release (Rail/Highway)	Manmade	Possible (50–69%)	Transportation, Health & Medical
Major Transportation Incident (I-71 Corridor)	Manmade	Likely (70–89%)	Transportation, Health & Medical
Agricultural Disease Outbreak	Natural	Unlikely (30–49%)	Food/Hydration/Shelter
Cyber Attack on Critical Infrastructure	Human-Caused	Possible (50–69%)	Energy, Communications
[redacted]	Human-Caused	[redacted]	Safety & Security, Communications

Tier 3 – Low Probability / High Consequence Hazards

Hazard	Category	Risk Rating	Primary Lifelines Impacted
Geomagnetic Storm (Severe CME)	Natural	Rare (10–29%)	Safety & Security, Energy, Communications
Pandemic-Level Public Health Emergency	Natural	Unlikely (30–49%)	Health & Medical, Food/Hydration/Shelter
Terrorism (Mass Casualty Event)	Human-Caused	Rare (10–29%)	Safety & Security, Health & Medical

Hazard	Category	Risk Rating	Primary Lifelines Impacted
Nuclear Incident (Regional Impact)	Manmade	Rare (10–29%)	Health & Medical, Water Systems, Safety & Security

Composite Hazard Scoring Summary

The following table reflects the numeric composite scoring (0–25 scale) used to inform Tier placement and qualitative risk designation.

Composite Score Calculation Method

Certain hazards with extremely low probability but catastrophic life-safety consequences may be identified as Low-Probability / High-Consequence events. While composite scoring determines the baseline priority category, professional judgment may be used to flag these hazards due to the potential for catastrophic multi-lifeline disruption despite limited historical frequency.

Composite scores are calculated using the following formula:

Total Score (T) = [redacted]

Maximum Possible Score: 25

Where:

P = Probability
L = Life Safety Impact
O = Operational Complexity
LF = Lifeline Disruption
C = Cascading Failure Potential

Hazard	P	L	O	LF	C	Total	Priority
Long-Duration Power Outage	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	21	High
Severe Thunderstorm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	Elevated
Winter Storm	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	Elevated
Tornado	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	Elevated
Dam Failure	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	18	Elevated (Low Probability / High Consequence)
Hazardous Materials Release	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17	Elevated
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	17	Elevated
Major Transportation Incident	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	15	Elevated
Flooding	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	15	Elevated

Hazard	P	L	O	LF	C	Total	Priority
CME	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	21	High (Low Probability / Extreme Consequence)

Hazard priority designations shown in the table below are derived from the composite scoring ranges defined in Section 3 (Quantitative Scoring Framework).

Composite scoring supports prioritization but does not override professional judgment when evaluating catastrophic low-probability hazards.

5. Hazard Narrative Analysis (Selected Examples)

5.1. Severe Thunderstorms

Clinton County experiences frequent severe thunderstorm activity capable of producing damaging straight-line winds, hail, and isolated tornadoes. Historical data indicates annual occurrences with measurable infrastructure impact.

Operational Considerations:

- High volume 911 surge
- Power restoration coordination
- Debris management requirements
- Damage assessment deployment
- Public messaging saturation

Risk Assessment: **Likely (70–89%)**

Trend Indicator: Increasing severe wind frequency in recent years.

5.2. Winter Storm / Extreme Cold

Snow, ice, and sub-zero temperatures create recurring impacts to transportation, utilities, and vulnerable populations. Extended cold events stress the energy grid and increase heating-related incidents.

Operational Considerations:

- Road treatment resource strain
- Vehicle accidents
- Warming center activation
- Generator safety messaging
- Medical surge from exposure incidents

Risk Assessment: **Likely (70–89%)**

5.3. Dam Failure – Cowan Lake Dam (Class I)

Cowan Lake Dam is classified as a Class I (High Hazard) structure. While inspected and regulated by ODNR, structural failure—though rare—would produce life safety impacts downstream and require rapid evacuation operations.

Operational Considerations:

- Warning timeline constraints
- [redacted]
- [redacted]
- Multi-county coordination

Risk Assessment: **Rare (10–29%)**

5.4. Geomagnetic Storm (Severe CME)

A severe coronal mass ejection capable of disrupting the bulk power grid presents a low-probability but high-consequence scenario.

Operational Considerations:

- Grid failure beyond county restoration capacity
- Communications disruption
- Fuel distribution interruption
- Long-term lifeline degradation

Risk Assessment: **Rare (10–29%)**

Note: Worst-case space weather impacts are driven not only by flare intensity but by the presence of an Earth-directed coronal mass ejection (CME with Halo). High-intensity events (X10+), particularly those approaching X20-class or greater, represent extreme but credible planning scenarios capable of causing prolonged, multi-lifeline disruption.

[redacted]

[redacted] This hazard category includes both kinetic acts (e.g., [redacted]

While Clinton County is not assessed as a strategic national target, rural jurisdictions remain vulnerable to rapid digital amplification, short-notice mobilization, and reputational destabilization.

Operational Considerations:

- Increased security posture during [redacted]

- Rapid mobilization following trigger events
- [redacted]
- [redacted]
- Surge demand on law enforcement and public information resources
- Potential convergence during disaster response operations

Risk Assessment: **Possible (50–69%)**

Trend Indicator: [redacted] 2025–2030 planning cycle.

6. Historical Incident Context

Incident Type	Notable Occurrence	Operational Impact
Severe Storm	Multiple annual wind events	Large cluster power outages, debris operations
Tornado	EF0 to EF1 events	Rural structural damage
Flooding	Recurrent high-water events	Road closures
Winter Storm	Ice and snow events	Prolonged outages
Hazardous Materials	Minor rail/highway incidents	LEPC coordination

Historical trends inform probability scoring but do not alone determine overall risk rating.

6.1. Community Memory Indicators

Public survey responses indicate that community memory of emergencies in Clinton County is strongly associated with weather-driven events and infrastructure disruptions. Residents most frequently recalled severe thunderstorms, tornado warnings, winter storms, and prolonged power outages as the incidents that shaped their perception of local risk. These experiences reinforce the prominence of recurring weather hazards within the county hazard profile and contribute to heightened concern regarding utility reliability and infrastructure resilience during extreme weather events.

7. Community and Partner Perception Analysis

Clinton County EMA conducted both Resident and Partner HIRA surveys to better understand how hazards are perceived, how long systems and households can sustain disruption, and where operational stress is likely to occur. These findings provide important context for interpreting hazard risk and planning priorities.

7.1. Resident Perception Summary

Resident responses indicate that hazard awareness is strongly influenced by lived experience, particularly weather-related events such as severe thunderstorms, tornadoes, winter storms, and power outages. Households tend to recognize immediate impacts such as loss of power, water, and communications, but show limited awareness of cascading infrastructure failure or system-wide disruption.

Survey results indicate that approximately forty-five percent of households may be unable to sustain normal operations beyond three days without electricity, suggesting that public demand for assistance may increase rapidly during extended outages.

7.2. Partner Capability and Risk Perception Summary

Partner responses reflect a system that is capable during short-duration incidents but has limited endurance for sustained or complex operations. The response system is heavily dependent on volunteer staffing, with uneven capability across jurisdictions.

Partners demonstrate strong awareness of frequent hazards such as severe weather and transportation incidents, but place less emphasis on high-impact, low-frequency risks compared to more frequently encountered incidents including long-duration power outages, cyber disruption, and multi-lifeline failure scenarios.

7.3. Perception vs. Operational Risk Gap

A consistent finding across both surveys is a gap between perceived risk and system-level risk.

- Residents focus on immediate household impacts rather than infrastructure dependency
- Partners focus on experienced incidents rather than cascading failure scenarios
- Both groups do not consistently prioritize long-duration, multi-lifeline disruption events

This gap reinforces the importance of maintaining hazard prioritization based on system impact rather than perception alone, while also shaping public messaging and training priorities.

7.4. Operational Implications

Survey findings indicate that:

- Public demand for assistance is likely to increase significantly between 24 and 72 hours of sustained disruption
- Volunteer-based response systems may experience degradation within the same timeframe
- Multi-lifeline disruption scenarios present the highest risk of exceeding local capacity

These factors are incorporated into planning assumptions, EOC activation considerations, and resilience priorities throughout this HIRA.

8. Lifeline Stress Concentration

8.1. Critical Infrastructure Dependency Statement

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

Extended disruption of any of these systems would have disproportionate impacts on life safety, economic stability, and emergency response capability.

The following lifelines appear most vulnerable across multiple hazard types:

1. Energy
2. Transportation
3. Communications
4. Health & Medical
5. Food & Fuel Supply Chains

Future annexes and playbooks should prioritize cross-lifeline stabilization strategies rather than hazard-isolated planning.

8.2. Community Lifeline Priorities

Results from the Clinton County public HIRA survey indicate that residents most frequently prioritize the following lifelines during emergencies: Safety and Security, Health and Medical services, Food/Water/Shelter, Energy, and Communications. Transportation and Hazardous Materials management were perceived as less immediate concerns by the public. Operationally, emergency management planning often prioritizes restoration of energy and communications infrastructure first due to their cascading influence on other lifelines. The difference between community perception and operational dependency highlights the importance of public messaging that explains how lifeline restoration sequencing supports life safety outcomes.

Survey findings indicate a disconnect between perceived and actual lifeline criticality. Residents consistently prioritize Safety & Security, Health & Medical, and Food/Water/Shelter, while placing less emphasis on Energy and Water Systems despite their foundational role in sustaining all other lifelines.

Partner responses similarly emphasize operational lifelines tied to direct response activities but under-recognize the cascading impacts of energy and communications disruption.

This gap reinforces the need to prioritize restoration of Energy and Communications lifelines early in incident response, even when public demand is focused on downstream effects such as sheltering or food access.

9. Lifeline Crosswalk Matrix

Hazard	Safety	Energy	Communications	Transportation	Water Systems	Health	Food	HazMat
Severe Thunderstorm	X	X	X	X				
Tornado	X	X	X	X				
Flooding				X	X			
Winter Storm	X	X	X	X		X		
Dam Failure	X			X	X			
Long-Duration Power Outage		X	X			X	X	
CME	X	X	X			X	X	
[redacted]	X		X	X		X		

10. Comprehensive Hazard Inventory

10.1. Natural Hazards

Primary Weather Hazards

Flooding (Flash / Riverine)

- Flooding occurs when water overflows natural or constructed drainage systems and inundates normally dry land. In Clinton County, flooding may result from intense rainfall producing flash flooding or from prolonged precipitation causing streams and rivers to exceed their banks. Flooding can damage infrastructure, close roadways, isolate rural areas, and pose significant life safety risks.

Severe Thunderstorm

- A severe thunderstorm is a storm system capable of producing damaging winds, large hail, intense rainfall, or lightning that can threaten life safety and damage infrastructure. In Clinton County, severe thunderstorms are among the most frequent hazards and may result in power outages, fallen trees, structural damage, transportation disruptions, and increased emergency response demand.

Tornado

- A tornado is a violently rotating column of air extending from a thunderstorm to the ground that can produce destructive winds capable of causing significant structural damage and life safety hazards. Although most

tornadoes affecting Clinton County are relatively weak, stronger events are possible and may result in localized destruction, debris hazards, power outages, and mass casualty incidents.

Winter Storm

- A winter storm is a weather event producing significant snowfall, ice accumulation, or mixed winter precipitation that disrupts transportation, utilities, and daily activities. In Clinton County, winter storms can create hazardous road conditions, strain emergency services, cause power outages from ice accumulation, and increase risk to vulnerable populations during prolonged cold periods.

Secondary Environmental Hazards

Agricultural / Livestock Disease Outbreak

- Agricultural or livestock disease outbreaks involve the spread of infectious diseases affecting crops or animal populations that can significantly disrupt agricultural production, food supply chains, and rural economic stability. In Clinton County, outbreaks affecting livestock, poultry, or crop systems could result in quarantine measures, animal depopulation, crop loss, and impacts to agricultural commerce, requiring coordination between local agencies, the Ohio Department of Agriculture, and federal partners.

Drought

- Drought is a prolonged period of significantly below-normal precipitation that leads to sustained water shortages affecting agriculture, surface and groundwater resources, and local ecosystems. In Clinton County, drought conditions may reduce crop yields, increase irrigation demand, stress livestock and agricultural production, lower water levels in streams and reservoirs, and elevate wildfire risk in fields and grasslands.

Earthquake (regional)

- A regional earthquake is a seismic event occurring within or near Ohio that produces ground shaking capable of affecting Clinton County despite the absence of a local fault line. Although damaging earthquakes are uncommon in the region, seismic activity from nearby zones such as the New Madrid or Wabash Valley seismic zones could cause structural damage, disrupt utilities and transportation infrastructure, and impact older buildings not designed for seismic resistance.

Extreme Heat

- Extreme heat is a prolonged period of abnormally high temperatures, often combined with high humidity, that creates conditions capable of causing heat-related illness, increased demand for electricity, and stress on public health systems. In Clinton County, extreme heat can impact vulnerable populations such as the elderly, young children, and individuals with chronic medical conditions, while also increasing the risk of power outages, agricultural stress, and wildfire potential during extended dry periods.

Landslide (localized)

- A localized landslide is the movement of soil, rock, or debris down a slope due to gravity, typically triggered by heavy rainfall, erosion, or ground saturation. In Clinton County, landslides are uncommon but may occur on steep

embankments, stream banks, or road cuts where saturated soils lose stability, potentially damaging roads, blocking drainage channels, or affecting nearby structures.

Public Health Emergency (Pandemic)

- A public health emergency involving widespread infectious disease transmission that significantly impacts healthcare systems, workforce availability, and community operations. Such events may require large-scale public health coordination, medical surge capacity, and protective measures for vulnerable populations.

Severe Cold (without precipitation)

- Severe cold without precipitation refers to periods of abnormally low temperatures that occur without significant snowfall or ice but still create hazardous conditions for people, infrastructure, and agriculture. In Clinton County, extreme cold can increase the risk of hypothermia and frostbite, strain heating systems and energy demand, cause frozen water lines, and impact livestock and outdoor workers, particularly during extended cold snaps when temperatures remain well below seasonal norms.

Wildland or Field Fire

- Wildland or field fires involve uncontrolled burning of vegetation, agricultural fields, or grasslands that may spread rapidly during dry or windy conditions. In Clinton County, such fires may threaten rural structures, agricultural assets, and transportation corridors.

10.2. Manmade Hazards

Dam Failure (Class I – Cowan Lake)

- Dam failure is the structural breach or uncontrolled release of water from a dam that results in downstream flooding and life safety hazards. Although Cowan Lake Dam is inspected and regulated by the Ohio Department of Natural Resources, a failure of this Class I structure could produce rapid flooding impacts downstream, requiring evacuation of affected areas and coordinated multi-agency emergency response.

Fuel Supply Disruption

- Fuel supply disruption occurs when distribution of gasoline, diesel, or heating fuels is interrupted due to infrastructure failure, transportation disruption, or regional supply shortages. Such events can affect transportation, agriculture, emergency response operations, and critical services.

Hazardous Materials Release (Transportation)

- A hazardous materials release occurs when chemicals, fuels, or other hazardous substances are unintentionally released during transportation, storage, or handling. In Clinton County, such incidents may occur along Interstate 71, state highways, or rail corridors and could result in fires, toxic vapor releases, environmental contamination, evacuation or shelter-in-place actions, and coordinated response by fire departments, hazardous materials teams, and state regulatory agencies.

Industrial fire or explosion

- An industrial fire or explosion is an accidental ignition or detonation occurring at a manufacturing, storage, or processing facility involving combustible materials, chemicals, fuels, or pressurized equipment. Such incidents can produce intense heat, structural damage, hazardous material releases, and life safety risks to workers and nearby populations. In Clinton County, an industrial fire or explosion could require large-scale fire suppression, hazardous materials response, evacuation or sheltering actions, and coordination with facility operators and regulatory agencies.

Infrastructure failure (bridge, substation)

- Infrastructure failure refers to the structural or operational breakdown of critical physical systems such as bridges, electrical substations, or other essential facilities due to aging components, mechanical malfunction, external damage, or environmental stress. In Clinton County, such failures could disrupt transportation routes, electrical distribution, or other essential services, potentially causing cascading impacts to emergency response operations, public safety, and community lifelines.

Large-scale utility failure

- A long-duration power outage is a widespread electrical service [redacted] Such outages typically exceed routine utility restoration timelines and require sustained coordination between utilities, local government, and emergency management agencies.

Major Aviation Incident (Cargo Airport Operations)

- A major aviation incident involves the crash, emergency landing, or significant operational accident involving aircraft operating at or near Wilmington Air Park. Incidents may involve cargo aircraft carrying large fuel loads, hazardous materials, or multiple flight crew members and could occur on airport property or in surrounding rural areas. In Clinton County, such events could result in fires, hazardous material concerns, mass casualty incidents, and require coordinated response among fire departments, EMS, law enforcement, airport authorities, and federal aviation agencies.

Major Transportation Incident (Interstate Corridor)

- A major transportation incident involves a significant crash, hazardous cargo spill, or mass casualty event occurring on a major transportation corridor such as Interstate 71 or a primary state route. These incidents may involve multiple vehicles, commercial transport carriers, or hazardous materials and can disrupt traffic flow, require extensive emergency response, and impact regional transportation and supply chains.

Pipeline rupture

- A pipeline rupture is the sudden release of natural gas, petroleum products, or other hazardous materials from a damaged or failed transmission or distribution pipeline. Such incidents may result from corrosion, mechanical failure, third-party damage, or ground movement and can cause fires, explosions, hazardous vapor releases, or environmental contamination. [redacted]

[redacted]

Water treatment disruption

- A water treatment disruption is the interruption or degradation of operations at a drinking water or wastewater treatment facility that prevents the safe treatment or distribution of water. Disruptions may result from mechanical failure, power outages, contamination events, cyber incidents, or damage to treatment infrastructure. In Clinton County, such events could lead to boil advisories, service interruptions, environmental discharge concerns, and impacts to public health, emergency services, and critical facilities dependent on reliable water systems.

10.3. Human-Caused Hazards

Active aggressor incident

- An active aggressor incident is a situation in which one or more individuals intentionally use weapons or other means to cause harm or threaten life in a public or private setting, often occurring with little warning and requiring immediate law enforcement response. Such incidents may involve firearms, edged weapons, or other weapons and can occur in schools, workplaces, public venues, or government facilities. In Clinton County, an active aggressor event would require rapid law enforcement intervention, coordinated emergency medical response, public warning actions, and potentially prolonged investigation and recovery operations.

Civil Unrest / Civil Disturbance

- Civil unrest refers to situations in which groups engage in disruptive or unlawful activity such as protests, demonstrations, riots, or property damage that threaten public safety or disrupt normal community operations. These events may arise from political tensions, social grievances, or controversial local or national issues. In Clinton County, civil unrest could require coordinated law enforcement response, traffic control, protection of public facilities, and public safety messaging to maintain order and protect life and property.

Coordinated cyber disruption

- Coordinated cyber disruption refers to a deliberate cyberattack or series of cyber incidents targeting computer networks, control systems, or digital infrastructure in order to disrupt operations, degrade services, or compromise sensitive information. Such incidents may involve ransomware, distributed denial-of-service (DDoS) attacks, unauthorized system access, or manipulation of industrial control systems. In Clinton County, coordinated cyber disruption could impact government operations, emergency communications, utilities, healthcare systems, or other critical infrastructure that relies on networked technology.

Mass gathering crowd surge

- A mass gathering crowd surge is a sudden, uncontrolled movement of people within a densely populated event or venue that creates dangerous pressure within the crowd and increases the risk of trampling, crushing injuries, or panic-driven movement. Such incidents may occur during concerts, festivals, sporting events, or other large

public gatherings when crowd density exceeds safe limits or when a triggering event causes rapid movement. In Clinton County, a crowd surge could require rapid emergency medical response, coordinated crowd management by law enforcement and event staff, and potential activation of mass casualty incident protocols.

[redacted]

- [redacted] require heightened law enforcement presence, coordinated public safety messaging, and protective measures for public officials, government facilities, and community gatherings.

Targeted infrastructure sabotage

- Targeted infrastructure sabotage refers to deliberate actions intended to damage, disable, or disrupt critical infrastructure systems such as electrical substations, communications facilities, water systems, transportation assets, or fuel distribution networks. These acts may involve physical damage, arson, tampering, or other intentional interference designed to interrupt essential services. In Clinton County, sabotage of key infrastructure could lead to localized or widespread service outages, require coordinated law enforcement and utility response, and potentially create cascading impacts across multiple community lifelines.

11. Hazard Evaluation Method

The following table summarizes the composite scoring results for hazards evaluated using the quantitative framework described in Section 3. Each hazard was assessed across five criteria: probability of occurrence, life safety impact, operational complexity, disruption to FEMA Community Lifelines, and cascading effects across interconnected systems. Scores assigned to each factor were combined to produce a composite risk score for comparative analysis.

This structured approach allows hazards of different types to be evaluated using a consistent methodology while still incorporating local knowledge, historical incident data, and professional judgment. The resulting composite scores support prioritization of hazards for planning, mitigation, and preparedness activities.

While the scoring framework provides a systematic method for comparing risk, the results are intended to inform decision-making rather than replace professional judgment. Certain low-probability hazards with catastrophic consequences may warrant elevated planning attention despite lower historical frequency.

12. Composite Hazard Scoring Summary

The hazards identified in the Comprehensive Hazard Inventory were evaluated using the quantitative scoring framework described in Section 3. Each hazard was assessed across five criteria: probability of occurrence (P), life safety impact (L), operational complexity (O), disruption to FEMA Community Lifelines (LF), and cascading system impacts (C). Scores

assigned to each factor were combined to produce a composite risk score used to compare hazards and support planning prioritization.

The resulting composite scores provide a structured overview of the hazards most likely to affect Clinton County and the potential operational consequences associated with each hazard type. Higher composite scores generally indicate hazards with greater likelihood, more severe impacts, or broader disruption to community lifelines and emergency response operations.

Hazards receiving the highest composite scores typically involve widespread infrastructure disruption, prolonged operational complexity, or significant life safety risk. Other hazards with lower probability may still receive elevated planning attention due to the potential for catastrophic consequences or cascading impacts across multiple lifelines.

The table below summarizes the composite scoring results for the primary hazards evaluated in this assessment and provides a comparative view of relative risk across hazard categories.

13. Emerging & Escalating Risk Factors

While historical data informs probability scoring, several forward-looking trends increase overall risk exposure:

1. Volunteer Workforce Decline. Survey responses confirm that the county's emergency response system is heavily dependent on volunteer personnel, with limited depth for sustained operations. Declining recruitment and retention will directly reduce surge capacity and increase response time variability.
2. Fire and EMS Service Sustainability. Fire protection and emergency medical response in Clinton County rely heavily on volunteer personnel and locally funded fire districts supported primarily through property tax levies. Potential changes to the property tax funding structure, declining volunteer participation, and increasing state training and certification requirements beginning 1 July 2030 may place additional strain on fire district staffing and operational capacity. Reduced responder availability could increase response times and limit surge capability during large-scale or multi-incident events.
3. Energy Grid Stress. Regional grid interdependency and increased demand may elevate risk of long-duration outages during extreme weather events.
4. Infrastructure Expansion Complexity. Planned and proposed infrastructure projects, including high-voltage transmission systems and large-scale industrial facilities, introduce new technical hazards and increase coordination requirements for local response agencies.
5. Freight and Rail Traffic Growth. Increased hazardous material transport through Interstate 71 and rail corridors elevates transportation-related risk.
6. Agricultural Consolidation. Concentration of agricultural production increases economic vulnerability to disease outbreak or supply chain disruption.
7. Cyber Threat Escalation. Critical infrastructure remains increasingly dependent on networked control systems vulnerable to cyber disruption.
8. Climate Variability. Shifts in severe storm intensity, precipitation patterns, and temperature extremes may increase hazard frequency or severity.

These factors do not independently alter current risk percentages but indicate potential upward pressure on future risk ratings and emergency response capability, warranting periodic reassessment.

14. Local Response Capacity

Local response capacity in Clinton County is influenced by workforce structure, infrastructure dependency, and the duration and complexity of incident conditions. While the county maintains strong capability for routine and short-duration incidents, sustained or multi-lifeline events introduce operational challenges related to staffing depth, resource availability, and system coordination.

While this model supports effective response during routine incidents, it creates increased dependency on a limited workforce during sustained or concurrent events.

Simultaneous disruption of multiple community lifelines lasting more than 72 hours may exceed locally sustainable response capability depending on incident duration, scale, and external support availability without state and federal assistance.

14.1. Planning-Level Information Note

The following analysis reflects planning-level observations based on available data, stakeholder input, and trend analysis. It is intended to inform preparedness and coordination and does not represent real-time operational status or incident-specific conditions.

14.2. Operational Capacity & System Stress Analysis

Clinton County's emergency response capability is shaped not only by hazard type, but by workforce structure, infrastructure dependency, and the timing and duration of incident impacts. Analysis of Fire, EMS, and district-level workforce data, combined with infrastructure and economic disruption scenarios, provides a clearer picture of how and when the system is likely to experience operational stress.

14.3. Workforce Capacity Reality

Fire and EMS response in Clinton County is supported by a combination of volunteer personnel, limited full-time staffing, and mutual aid agreements.

This structure provides flexibility during routine incidents but creates systemic risk during sustained or overlapping events, as the same personnel may be relied upon across multiple jurisdictions simultaneously.

[redacted] These factors indicate that while the system performs effectively during short-duration incidents, it may experience reduced effectiveness as operational demands extend over time.

14.4. Sustained Operations & Degradation Risk

[redacted]

This degradation is not uniform and may occur earlier in districts with lower staffing levels or higher dependency on a small number of responders.

As incidents extend beyond initial response, the system transitions from incident management to resource endurance, requiring increased coordination, prioritization, and potential reliance on external support.

15.5. [redacted]

Recent and proposed infrastructure developments introduce additional operational considerations that may increase system demand:

- [redacted]
- [redacted]
- [redacted]

These factors increase the complexity of incident response and place additional coordination demands on local agencies.

14.6. Utility Dependency & Operational Constraints

Critical infrastructure systems within Clinton County—including energy, communications, water, and fuel distribution—are dependent on regional and external providers.

[redacted]

As a result, incidents involving major infrastructure disruption may require extended operational periods with limited ability to directly resolve the underlying cause, increasing the importance of coordination, information management, and public communication.

14.7. Economic Disruption & Community Stability Factors

[redacted]

These events may not initially present as traditional emergency incidents but can generate increased demand for services, public information, and coordination with community partners.

Gradual or staggered impacts, particularly those affecting household purchasing power or food access, may create sustained pressure on local systems and contribute to increased public anxiety or misinformation.

14.8. System Stress Convergence

The most significant operational risk to Clinton County occurs when multiple stress factors converge:

- [redacted]
- [redacted]]
- [redacted]
- [redacted]

When these conditions overlap, local response capability is may be exceeded depending on incident conditions without state and federal support.

This convergence model reinforces the prioritization of hazards capable of producing long-duration, multi-lifeline impacts.

14.9. Household Preparedness Indicators

Household preparedness data indicates that a significant portion of the population may experience difficulty sustaining normal conditions beyond three days without power or essential services. This creates a predictable increase in public demand for assistance during extended incidents, particularly as disruptions approach or exceed the 72-hour mark.

14.10. Operational Demand Curve

[redacted]

- [redacted]
- [redacted]

- [redacted]

[redacted]

14.11. Operational Planning Consideration

Effective response to high-impact incidents in Clinton County depends on early recognition of system stress indicators, including rising demand, workforce fatigue, and infrastructure disruption. Planning and operational coordination should emphasize early resource prioritization, clear public communication, and integration with state and regional support systems to maintain continuity of operations.

Sources

Clinton County Emergency Management Agency. (2026). *Clinton County Area Study* (Draft, Version 20260303).

Clinton County Emergency Management Agency. (n.d.). *Clinton County Hazard Mitigation Plan*.

Clinton County Emergency Management Agency. (2026, March 25). *Emergency Medical Services (EMS) census analysis* (Draft, Version 20260324).

Clinton County Emergency Management Agency. (2026, March 25). *Firefighter census analysis* (Draft, Version 20260324).

Clinton County Emergency Management Agency. (2026, March 25). *Fire & EMS district census summary report* (Draft, Version 20260324).

Clinton County Emergency Management Agency. (2026). *Hazard Identification and Risk Assessment (HIRA) Resident Survey*.

Clinton County Emergency Management Agency. (2026). *Hazard Identification and Risk Assessment (HIRA) Partner Survey.*

Clinton County Emergency Management Agency. [redacted]

Local Emergency Planning Committee (LEPC). (2026). *Hazardous materials reporting and Tier II data*.

National Oceanic and Atmospheric Administration. (n.d.). National Weather Service – Wilmington Forecast Office. https://www.weather.gov/iln/

[redacted]

National Oceanic and Atmospheric Administration. (n.d.). Storm Prediction Center. https://www.spc.noaa.gov/

Ohio Department of Natural Resources. (n.d.). Emergency planning and hazard data resources. https://ohiodnr.gov/

Ohio Emergency Management Agency. (n.d.). Planning and hazard analysis resources. https://ema.ohio.gov/

Clinton County Emergency Management Agency. (2026). After-action reports and incident documentation.

Document Control Note

Internal planning documents referenced in this section, including the Clinton County Hazard Identification & Risk Assessment (HIRA), are maintained by Clinton County Emergency Management Agency and are subject to periodic updates. Version dates should be verified to ensure alignment between planning documents.

Version Control Format

Clinton County Emergency Management Agency utilizes a date-based version control system for planning documents. Version identifiers are formatted as an eight-digit number representing the date of issue or last major update (YYYYMMDD), consisting of a four-digit year, two-digit month, and two-digit day. This format supports clear tracking of document revisions and alignment across related planning documents.