Knox County Hazard Mitigation Plan

2025

Knox County Emergency Management Agency

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EXECUTIVE SUMMARY

Knox County is dedicated to creating and maintaining a safe, secure environment for county residents and visitors. Situated in central Ohio with Mount Vernon serving as the county seat, and northeast of Columbus, Knox County is home to many farm families and small industries that employ local residents. The Knox County Emergency Management Agency is dedicated to helping the county develop sustainable solutions to a variety of threats, including those classified as natural hazards, through a progressive program of hazard mitigation and disaster preparedness.

The Knox County Hazard Mitigation Plan was developed through community-wide participation in the assessment of risks and hazards, creation of solution-driven mitigation strategies, and planning for implementation and sustainment of loss reduction efforts. Through a series of meetings and work sessions described in this plan, the county, municipalities, and townships came together to assess the current risks and identify sustainable solutions to reduce those vulnerabilities. As a part of this action plan, they considered various regional, county, and local plan documents that provide guidance to developers, regulators, and residents as they implement community growth initiatives. They considered conservation of the environment as well as economic development and community growth. A wide array of professionals and officials were included in these meetings to look not only at Knox County today, but to consider future developments that might affect them in the future.

This plan is intended to be a tool in comprehensive community planning, construction of new facilities, and growth of residential areas, as well as a thought-provoking essay in the general evolution of local governance. It discusses the impact of natural hazards on not only buildings and infrastructure, but also on the various populations of the county. It discusses assistance available after significant incidents, for the residents of Knox County. The plan documents the history of disasters in Knox County and takes into account the unique characteristics of the county's footprint. The plan documents past casualties and identifies mitigation strategies that will effectively protect and preserve the county's many natural and man-made assets.

The Knox County Hazard Mitigation Plan process followed the guidance established by the Federal Emergency Management Agency in April of 2025. The community was involved in the process as input and feedback was sought from all county residents and workers according to that guidance. This is evidenced by documentation later in this plan.

As one of many ways to make Knox County resilient to catastrophic incidents, this plan provides a comprehensive review of mitigation needs, including its unique vulnerabilities to hazards. The mitigation strategies and planning process helped community leaders plan to implement projects and develop policies that make Knox County resistant to long-term devastation and facilitate rapid recovery when disasters do occur. It is intended to help give every resident in Knox County an opportunity to survive the disasters that strike, and enable everyone to have a chance to rebuild their lives.

1.0 THE PLANNING PROCESS

To develop a natural hazard mitigation plan that reflects Knox County's unique hazards, risks and vulnerabilities, the Knox County EMA utilized a comprehensive planning process that involved all jurisdictions, stakeholders, organizations and agencies from across the county. Input and feedback methods were designed to meet the needs of various stakeholders, providing options for both in-person and digital participation due to personal schedules and circumstances. Efforts included collecting not only information that was relevant regarding current threats and vulnerabilities, but also making sure that the entities being asked specific questions, such as the status of current mitigation strategies, would be individuals who would provide accurate feedback. Significant attention was dedicated to planning a process that would combine efficiency and effectiveness with accuracy and appropriateness. This section describes the process utilized to develop the plan and explains how stakeholders and the community were involved and included throughout the plan development process.

1.1 PLAN DEVELOPMENT

Knox County EMA projected a planning period of four to six months for development of the new mitigation plan, plus the time it would take for state and federal review, local adoption, and grant management. They intended to involve the entire community, with a focus on leadership from political subdivisions, county leadership, and key groups and organizations in the county. With a new administration in Washington D.C., new mitigation plan standards were released in mid-April, and the full effect of those changes were not yet understood, and would require additional attention.

Knox County's current Hazard Mitigation Plan expiration date is September 6, 2025; it was anticipated that there may be a gap in plan coverage due to current standards and grant changes. The EMA Director and Contractor moved forward to schedule meetings and set planning specifics in place once new standards were available and grant documents were signed and in force.

1.1.1 Initial Project Planning

Knox County EMA was awarded a Building Resilient Infrastructure in Communities (BRIC) Grant Program grant in late 2024 to update this plan as part of the required five-year approval process. The application identified the jurisdictions in Knox County that would participate in the planning process. Most officials were familiar with the mitigation plan process because they were involved in the development of the current plan and expressed interest in participating in this plan.

Upon award of the grant, Knox County EMA completed the approved procurement process to identify a contractor to manage the plan update process. The Knox County EMA Director met with Ohio EMA Mitigation Branch mitigation planner to review the requirements for plan development, and submitted the required documentation to the State of Ohio EMA Mitigation Branch.

Resource Solutions Associates LLC (RSA) was chosen as the contractor for the project. On January 28, 2025 the county entered into a contract with RSA to coordinate the project, work with jurisdictions and stakeholders to collect information, and develop the new plan. The Knox County EMA Director discussed the work plan to update the current mitigation plan with RSA, and they established intended timelines. Approval of the new plan was hoped for prior to current plan expiration date, but not assured due to federal administration changes and a late start to the project.

The EMA Director and the Contractor developed a project timeline and discussed specific methods and processes for the project that would result in the best outcomes for Knox County. Stakeholder meetings would be held in person, but makeup meetings could be done online. Invitations would be sent by email because that is what is standard practice for the county and the EMA. Some surveys would be sent by email and returned in the same way to conserve meeting time. They discussed new mitigation guidance and how those requirements would add to the core planning committee participation and meeting discussions. Many additional organizations and individuals would be involved this time, and the topics covered would expand to meet the new regulations.

The EMA Director and Contractor decided to take a new approach to meetings because, in general, attendance at local meetings is poor. Contributing factors include the fact that so many individuals fill multiple roles in the county, and their time is at a premium; local leadership has become comfortable with virtual meetings and surveys, viewing these methods as more efficient and convenient; and timing of the planning efforts would occur simultaneously with summer vacations, additional work and personal obligations, and farming season. These factors required a new approach to the meetings that would collect more information in less time.

In the past, stakeholders had suggested that specific questions, mostly about mitigation strategies, be discussed with those officials and jurisdiction employees who were involved with implementing them. That suggestion was accepted, and strategy status surveys would be distributed to jurisdictions to determine how to answer. Ideas for new strategies would be addressed in stakeholder meetings, and confirmed by jurisdictions where they would be selected, assigned, and implemented.

It was noted that most stakeholders had a good understanding of the mitigation plan development process due to prior participation, so efficient use of their time was going to be a significant consideration in obtaining good attendance. Instead of asking participants to attend multiple meetings to discuss individual topics, they would plan for a longer meeting with a comprehensive approach to mitigation components and discussion topics, including the whole spectrum of mitigation concerns in one meeting. They would begin by addressing hazards, changes in weather patterns, and recent storm events. They would immediately move into damages and consequences, as well as discussion about populations that required additional help or were disproportionately affected by the incidents. They would then discuss strategies

that could make the impact less damaging or minimize the number of residents who were affected. By consecutively discussing the parts of a mitigation plan, it was expected to produce improved quality input, better community engagement, and a higher understanding of the complete mitigation implementation process and benefit.

The efforts after initial meetings would clarify information about strategic actions in play, by asking the officials and individuals charged with implementation to provide status of current strategy assessment. The focus would be to obtain accurate and relevant status reports. Keeping this goal in mind, having the right people involved in answering status questions was critical; therefore, the best way to gather this information would be to present written surveys to key jurisdiction officials, and ask them to complete the surveys with any staff or residents involved in implementation of current strategies and decision-making about the strategies that were not implemented. After a brief orientation to the task at the meetings on May 27, and obtaining their commitment to complete this part of the project, surveys were distributed. The surveys were emailed to key jurisdiction leaders, and they were given a month to complete the surveys.

The decision was made to conduct a Mitigation Plan Kick-Off meeting on May 14, 2025 to gain the commitment of several key leaders in promoting and understanding the project, and then workshops would follow to gather the information about hazards and threats, vulnerability and strategies for the new plan. This group would be the project "cheerleaders", and would work with the EMA Director and Contractor throughout the process to foster involvement, high quality participation, and completion of necessary activities and reviews.

The timeline continued with Mitigation Workshops to be held on May 27, 2025 with a full spectrum of Knox County stakeholders in attendance. Jurisdiction elected and appointed officials, special interest groups, and elected and appointed county officials to address the planning process, hazard identification and risk assessment, and mitigation strategies would be invited. Make up sessions for anyone who could not attend would be held during June. Worksheets and surveys to gather very specific strategy status information and new strategy selection would be emailed to the jurisdictions and groups in May after the initial mitigation workshops, for completion and return by the end of June. If officials had questions or concerns, individual online discussions through meeting tools or electronic mail could resolve those issues.

Using this plan, project completion was anticipated sometime in the fall of 2025, pending any further changes to the program by FEMA. The goal to submit a new plan in September was set.

1.1.2 Planning Team Meetings

The EMA Director and Contractor developed the list of individuals and organizations that would serve as the Core Committee. They determined that the Knox County Healthcare Coalition (KC-HCC) and the Knox County Local Emergency Planning Commission (KC-LEPC) would be the best group to lead planning advocacy and promotion, and to assist the EMA staff in fostering high attendance and participation in the mitigation planning process.

On May 14, 2025 the Knox County Healthcare Coalition met for its quarterly meeting in the Ramser 4-H Center at the Knox County Fairgrounds. The Knox County LEPC also met that same day at later time. The EMA Director and Contractor were given an hour at each meeting to present the Mitigation Plan Project information, and to obtain consensus about how the two groups could help foster participation and involvement. The EMA Director and Contractor covered the purpose of the plan, the planning process requirements and details, the components of the plan, the public review and adoption process, and the duties of the Core Committee. They shared the timeline, and the attendance requirements that would be used. Both groups agreed to act as the champions of the project, encouraging and facilitating widespread participation.

The complete list of Core Committee participants is listed in Table 1-1.

Table 1-1 Mitigation Project Core Committee

Last Name	First Name	Role	Organization
Adams	Jim	President	Rise 4 Solutions
Anderson	Taylor	DPM	Red Cross
Anstide	Tony	Emergency Coordinator	ARES
Brannan	Mike	Maintenance Director	Whispering Hills Nursing Home
Christopher	Chad	Chief	Mt. Vernon Police
Cochran	Clint	Deputy Engineer	Knox Co. Engineer
Dapprich	Suzanne	EP Coordinator	Knox Public Health
DeChant	James	Trustee Director	Berlin Twp. Knox County EMA
Farmer	Chris	Ris Reduction Officer	Central OH Joint Fire District
Green	Zach	Health Commissioner	Knox Public Health
Gregg	Judy	Dir. Health Sciences	Mount Vernon Nazarene University
Hines	Nathan	Training Officer	Mount Vernon Fire
Lanuzza	Rick	Zoning Inspector Chief	Middlebury Twp. Fredericktown EMS
Lester	Barry	Commissioner	Knox County
Levering	Will	Administrator	Country Couret Nursing Home
Lybarger	Nicole	PR Coordinator	Knox Public Health
McCloud	Kristin	Executive Director	Pathways of Central OH
Montgomery	Nicole	Trainer	Knox 911
Overholt	Nate	Env. Health Director	Knox Public Health
Porter	Joe	Mobility Manager	Knox Public Health
Rice	Megan	Lieutenant	Bladensburg Fire Dept.
Roach	Travis	Field Rep	Ohio EMA
Selby	Dan	Deputy Safety Officer	Knox Co. Sheriff Knox Community Hospital
Seward	Amy	Board Member Deputy Director	Fredericktown EMS Knox County EMA

Webster	Laura	Director	Knox 911

The Core Committee members agreed to play multiple roles in the project. They were charged with not only providing input for their jurisdictions or organizations during workshops, but also to promote attendance by other workshop invitees prior to the workshops. They were provided a list of the others who would be invited, and asked to follow up with each one to promote participation in the plan process. They would answer questions, as they could, and refer to the EMA Director as needed, about the plan and the process. They would explain the purpose of the plan, the process to develop it, and the need to adopt the plan locally. Their role would be that of primary advocates and facilitators. They divided up the list of potential participants and decided who each one of them would contact.

These members would also attend the workshops to help foster involvement, promote discussion, and facilitate work groups in collaboration with the EMA Director and Contractor. They would provide information from their jurisdiction(s) and their role(s) in Knox County government or business. They would act as enthusiasts and participants in their work groups.

This group was asked to spend the following two weeks promoting the project, its benefits, and advocating for attendance at the May 27th plan workshops. Twenty-nine people attended this day and committed to helping promote the project as well as participate.

Mitigation Planning Workshops

The workshops were conducted on May 27, 2025 at the Ramser 4H Center at the Knox County fairgrounds. In an introduction, the entire mitigation project was outlined, mitigation principles were reviewed, and the benefits of widespread input was discussed. Sixty-six people attended these meetings.

The EMA Director had invited a long list of county and municipal employees, elected officials, organization leaders, and county residents to three workshops. Individuals could pick which of the three was most convenient, and were asked to make a reservation with the EMA. For the convenience of the participants, one workshop was held from 9:00 a.m. until Noon; a second from 1:00 p.m. until 4:00 p.m.; and a third from 5:00 p.m. until 8:00 p.m. Participants were asked to come to one of the three workshops. They were held at the 4H Center at the Knox County Fairgrounds, centrally located, convenient and accessible to all.

Each of the identical three workshops covered the mitigation planning process from description of the plan's purpose, definition and identification of hazards and vulnerability factors, and creation of mitigation actions to reduce losses and damages. They discussed the update process, public involvement, public review and jurisdictional adoption.

The Contractor facilitated discussions of threats and hazards, damages and consequences from these incidents, and potential mitigation actions that could lessen the impact or reduce the number affected. Participants were asked to identify recent changes in storm characteristics and consequences, new vulnerabilities or changes to critical infrastructure and key facilities, and any new or especially affected populations. Participants ranked the hazards according to

level of threat, time of warning, impact consequences, damages and recovery time. They discussed ongoing and new consequences as a result of the incidents, and any strengths or weaknesses in local capabilities to respond and recover. They talked about what the local community could do to prevent, diminish, or lessen the damages or affected populations.

The Contractor used a slide presentation to guide the process, to ensure that all topics were covered, and to allow participants to have copies of the slides if it was helpful. They were also given worksheets to complete, including one for hazards and threat assessment and prioritization, another for damages and consequence identification and description, and a third for strategy selection based upon vulnerabilities.

Multiple representatives from individual communities were encouraged to group together, and all participants were encouraged to talk to other groups or leaders in the room about their ideas. All participants were encouraged to ask questions of the Contractor and EMA staff as the discussions and work progressed. During discussions, the Contractor's staff and the EMA staff circulated to facilitate discussion, answer questions, and prompt ideas.

Work groups identified and discussed areas of the county that may need additional help or resources after any of the hazards may occur. They talked about groups like schools in session, elderly and elderly housing developments, medical needs in households, needs of ill and disabled populations, and others that came to mind who may need additional help. They discussed resources, such as public safety, transportation services, debris removal, and children's services. The availability of physical and mental health services or providers, law enforcement and security, food and water, and other critical needs after severe disasters was discussed. They discussed how community development occurs, and what future hazards might develop as the community grows. Being just north of Franklin and Delaware counties where growth and development run rampant, they considered the threat of rapid and/or unmanaged growth, and how that might impact county residents and properties.

There was discussion of mitigation actions that may be helpful in reducing the risk when hazards impact Knox County. They talked about changes in the weather and how storms affect the county, as compared to in the past. They talked about what resources are plentiful, and what is scant or non-existent, and how they might obtain those resources. Areas that are exceptionally vulnerable to damages were considered, and the specific property damage that might occur were discussed. They recalled what damages had occurred in the past, and how the recovery process took place in relation to those damages.

Climate information was shared by the Contractor, and participants added their observations regarding weather patterns and consequences in the past five years. They reviewed where damages occurred, the severity of the damages, and the duration in cascading threats and/or loss of use. Each group engaged in this kind of discussion about each hazard on the list, and determined if it was a relevant threat to the group or jurisdiction being represented. They discussed potential cascading events, and considered how that might change vulnerability or intersect with new development and community growth.

A variety of resources were used to guide the discussion and provide factual information, projections, and estimations by experts in the field of climatology. Those references are listed in Table 1-8.

Participants shared recent consequences of incidents involving those hazards and talked about what those consequences meant to their residents. They talked about the cost of repairing damages, the extent and cost of disruptions, and the kinds of cascading events that occurred due to the hazard impact. Extending the changes in climate that are projected for the mid and late-century periods, they discussed how today's damage could change in coming years, increase or decrease, and how the consequences for communities and individuals would change.

Groups all discussed how community development, such as the addition of new housing, retail, or industrial facilities, or changes to recreational use of rivers and streams might cause varied consequences in the coming years. They talked about how regulation, collaboration between various agencies and jurisdictions, and new scientific and technical information could help prevent ballooning consequences in coming decades.

Social vulnerability was addressed through discussion of what disadvantaged populations looked like in Knox County, and how those groups might be negatively impacted after significant incidents. References listed in Table 1-8 helped guide the groups to consider what socially vulnerable sets of people were in metropolitan areas, and how that set might look different, but suffer similar consequences and damages, in Knox County, Ohio. Discussion led to the identification of sets of people who are not listed in the reference documents, such as the isolated, very elderly rural residents who are common to Knox County and other rural Ohio communities. The Amish community was considered a separate but established part of the county, but their resilience and ability to help themselves was recognized as outstanding. No one had any memory of having to assist Amish to any greater degree than other community members. How community development might affect all of these groups, as well as how it may worsen their plight or not fit into their community goals, was addressed. They discussed demographic trends in Knox County and assessed how that progression might change things, even as early as 2030.

Community resilience for all sets of people was discussed, and how a small, rural county would survive without outside assistance was considered. In general, participants discussed how they would help themselves in the worst of incidents, and they identified how they would help one another. They identified and discussed problems common to many Ohio counties at this time, such as the lack of volunteers, insecurity in sheltering resources, and transportation challenges. Again, they used research documents identified in Table 1-8 to guide this discussion, but added local considerations not included in those documents.

Participants completed worksheets to select strategies for mitigation efforts in the coming five years, and turned those worksheets in at the end of the meeting. The Contractor guided them

through a discussion about the types of strategies that might be options, and how certain actions might provide mitigation results for Knox County or the communities. There was significant discussion about feasibility, affordability, and responsibility for each strategy. They were asked for input regarding the timing of strategies, who would be responsible for the action, and what the results might be. There was a brief discussion about cost-benefit analysis but without specific projects to consider, specific information was not available. Information about selected strategies would be discussed and confirmed by the municipalities and Knox County before being included in the new mitigation plan because the jurisdictions were the ones who have to budget for and work through the projects. The EMA Director and Contractor would complete that coordination.

The meetings wrapped up with a discussion about draft plan review, the public review period, state and federal plan review, approval, jurisdictional adoption, and implementation of an approved mitigation plan with dates attached to each phase. They discussed the integration of mitigation actions and concepts into community development, and specifically the strategies that support such integration. Specific reference was given to the roles and responsibilities for municipalities to participate in community development, and the roles of development professionals to ensure that all communities were included in discussions and activities
The Contractor and their staff, as well as the EMA Director and his staff, helped participants discuss their way through the worksheets with accurate, appropriate, complete and relevant answers. Questions were addressed both as individual workgroups, and as a whole body. Each person had a worksheet for each set of questions and discussion, and were asked to record their answers on the worksheet, along with their name, position and jurisdiction. There were also notes made by the Contractor when needed.

The comprehensive list of individuals who attended meetings is shown in Table 1-2 Mitigation Workshop Participants. There were only two jurisdictions that were unable to attend one of the workshops, and the EMA Director had made plans to meet with them individually on another day. Attendance exceeded reservations at all three meetings, and at the end of the day, sixty-six local residents had participated in the workshop. Discussions were incredibly robust, and worksheets appeared to help facilitate discussion and keep groups focused on the work at hand.

In addition to the elected and appointed officials mentioned previously, social agencies, adjacent county emergency managers, natural resources experts, agricultural representatives, advocacy organizations, and community development officials were invited to participate in work sessions in May. This group also included behavioral and physical health professionals and organizations, as well as private practitioners. The local hospital, Knox Community Hospital, and the Knox County Area Development Foundation, and Knox County Chamber of Commerce were invited to share their overall perspective on development activities, regulation, social needs and groups of individuals in the county. Kenyon College and Mount Nazarene College were key players in the meetings due to their close working relationships with county communities, especially Gambier and Mt. Vernon. Other key employees such as floodplain managers and building regulation or zoning coordinators were invited. All invitees

were told that all meetings were open to the public, and requested that they ask anyone with an interest to attend.

Because Knox County has just 63,568 residents, many community leaders and officials often wear multiple hats in the county. Sometimes, an individual spoke as an elected official for one jurisdiction, and as an employee of another jurisdiction. Elected officials also serve in volunteer positions in their jurisdiction of residence. Many participants, therefore, represented more than one entity as they participated in mitigation meetings. Additionally, they were also local farmers or business owners themselves, representing agriculture or another industry in addition to holding an elected position as a township trustee or clerk.

Table 1-2: Mitigation Workshop Participants

Last Name	First Name	Position	Organization or Jurisdiction
Aristide	Tony	Knox Co. Emer. Coord.	Knox County ARES
Armstrong	Brysen	Laborer	City of Mount Vernon
Ball	Brian	Engineer	City of Mount Vernon
Beckett	Buddy	Engineering Tech	City of Mount Vernon
Blanchard	Jim	Director	Village of Fredericktown Recreation District
Celmar	Bethany	Transit Director	Knox County Transit
Cook	Ben	Dir. Facility Services Operations & Campus Safety	Mt. Vernon Nazarene University
Cook	Sylvia	BZA Chair/Resident	Liberty Township
D'Angelo	AJ	Director of Operations	Damascus
Dailey	Chloe	Intern	City of Mount Vernon
Dapprich	Suzanne	Emergency Prep. Coord.	Knox Public Health
Davis	Terry	Fire Marshal	Mount Vernon Fire Dept.
DeChant	James	Trustee	Berlin Township
Engelhardt	Scott	LEPC Coordinator	Ashland County EMA
Farmer	Chris	Risk Reduction Officer	Central OH Joint Fire District
Green	Zach	Health Commissioner	Knox Public Health
Gregg	Judy	Dean	Mt. Vernon Nazarene University
Heinberger	Destiny	Administrative Assistant	Richland County EMA
Heithause	Dave	Director	Knox County Park District
Hill	Marta	Resident	Liberty Township
Hines	Nathan	EMS Chief	Mount Vernon Fire Dept.
Hinkle	Tom	Director of Public Works	City of Mount Vernon
Houston	Will N. III	Trustee	College Township
Huddleston	Joe	Communications Spec.	Mt. Vernon Nazarene University
Johnson	Nick	Laborer	City of Mount Vernon
Keaton	Cameron	Engineer	Knox County
Kirby	Daniel	Campus Safety	Mt. Vernon Nazarene University
Lanuzza	Rick	EMS Chief Zoning Inspector	Village of Fredericktown/Rec Dept. Middlebury Township
Lester	Joshua	Assistant Chief	Mount Vernon Fire Dept.
Lester	Barry	Commissioner	Knox County
Levering	Will	Administrator	Country Court Nursing Home
May	Jonny	Assistant Director	City of Mount Vernon

McCann	Mark	Fire Chief	Central OH Joint Fire District
McCloud	Kristin	Executive Director	Pathways of Central Ohio
Meleca	Morgan	Program Coordinator	Knox Public Health
Mikesell	Zane	Engineering Technician	City of Mount Vernon
Montgomery	Nicole	Training Coordinator	Knox 911
Morgan	Robert	Police Chief	City of Mount Vernon
Myers	Tracy	Police Chief School Board Member	Fredericktown Police Department Centerburg Local Schools
Overholt	Nate	Env. Health Dir.	Knox Public Health
Pever	Tonia	Attorney	Knox County Prosecutor's Office
Porter	Joe	Mobility Manager	Knox Public Health
Potes	Sarah	Director	Richland County EMA
Pursel	Bill	Commissioner	Knox County
Pursel	Randy	Parks Administrator	City of Mount Vernon
Rieman	Staci	Dispatch Supervisor	Knox 911
Rosch	Travis	District Supervisor	Ohio EMA
Ruggles	Debbie	Board Member Board Member	Kiwanis Mt. Vernon Chamber of Commerce
Selby	Dan	Safety Officer	Knox Community Hospital
Seward	Amy	Board Member	Village of Fredericktown Parks/Rec
Shaffer	Rick	Director of Safety	Mount Vernon City Schools
Snell	Bruce	Administrator	Village of Fredericktown
Stachler	Joel	Administrator	Village of Danville
Strouth	Anne	Director	Ashland Co. EMA
Thompson	Matthew	Employee	Village of Fredericktown
Thorne	Sarah	Auditor	Knox County
Trace	Trevor	Maintenance Employee	Mount Vernon City Schools
Tyson	Tim	Highway Superintendent	Knox Co. Engineer
Valentine	Mike	Campus Safety Coord.	Mt. Vernon Nazarene University
Vance	Monte	Safety Service Director Police Chief	Village of Danville
Van Horn	Duane	Engineering Technician	City of Mount Vernon
Walchle	John	Director of IT	Mt. Vernon Nazarene University
Webster	Laura	Operations Director	Knox 911
Wetzel	Diana	Zoning Commission	Liberty Township
Williams	Chris	Central Reg. Supervisor	Ohio EMA
Wilson	Rachel	Laborer	City of Mount Vernon
Wise	R.C.	Administrator	Village of Gambier

Out-of-County Participation

Several emergency managers from outside Knox County attended the workshops. While not all adjacent county directors attended, there were some who came and brought their deputies and administrators with them. There were representatives from the Ohio EMA as well. They discussed how a disaster in Knox County may affect their county, and/or how they may be able to provide additional resources for Knox County in their time of need. They compared the hazard identification and risk assessment for their counties, and how it differed, if it did, from that of Knox County. While not all external organizations came to workshops, they were all included in the draft plan public review and given an opportunity to comment on the plan. They are listed in Table 1-3.

Table 1-3: External Organization Participants

Person	Position	Organization	Participation
Travis Roach	Regional	Ohio EMA	Yes
Chris Williams	Supervisor	Ohio EMA	Yes
Sarah Potes	Director	Richland Co. EMA	Yes
Destiny Heinberger	Admin	Richland Co. EMA	Yes
Scott Engelhardt	LEPC	Ashland County EMA	Yes
Anne Strouth	Director	Ashland County EMA	Yes
Sean Grady	Director	Licking County EMA	No
Alex McCarthy	Director	Delaware County EMA	No
Michael Nelson	Director	Morrow County EMA	No
Lynn Powelson	Director	Coshocton County EMA	No
Jason Troyer	Director	Holmes County EMA	No

Surveys for Strategy Information

Many participants who attended felt that the mayors, administrators, and engineering staff of the jurisdictions would know what current mitigation strategies were being implemented, which were delayed, and those that had been completed more accurately than the large group of stakeholders. Since the strategies are developed and assigned to the municipality and county positions, the decision to ask those individuals for assessments was reinforced by the larger group. Not all municipal and county department decision makers and supervisors involved in management of the current strategies were present in workshops due to schedule conflicts and travel. Therefore, it was agreed that a current strategy worksheet would be provided for each jurisdiction to assess the status of each strategy in the 2019 plan. Each jurisdiction's lead person would then involve all appropriate entities in assessing the status of the current strategies for their jurisdiction, based upon their role and responsibility to implement the actions throughout the last five years.

The Contractor prepared survey forms for each jurisdiction using the strategies they had selected in the 2020 Hazard Mitigation Plan. Each goal was listed on the form, and the strategies associated with that goal were listed underneath the goal. Those who completed the form were asked to indicate the status of every strategy by marking one of the following:

- *Completed* indicates that the strategy was implemented, and does *not* need to be continued in the 2025 HMP.
- *Continue* indicates that the strategy is not completed, although it may have been started, but it is necessary to continue this strategy in the 2025 HMP.
- *Delete* indicates that the strategy is no longer a viable opportunity, or the impact the strategy intended to address is no longer valid.

Respondents were encouraged to add notes, explanations, and other relevant comments to the survey. They were given two full weeks to complete the forms, and were asked to email the forms to the Knox County EMA Director.

Between May 30 and June 18, 2025, completed surveys were received from all municipalities and several additional key county entities. Answers were complete, notes were added in some cases, and the EMA Director endorsed the feedback.

Individual Meetings and Discussions

Some hazards were discussed with specific individuals because the input needed is well defined and detailed, and does not lend itself to public meetings. This includes the high hazard dam threat in Knox County from six high-hazard dams. Each dam is individual, some are publicly owned and others are privately owned. The owner/operators are not necessarily residents or workers in Knox County, so the decision was made to include dam failure in the mitigation workshops, but to meet with the dam owners individually for in-depth discussion of their particular structure.

The Contractor spoke with all the dam owners about their structure at some point. Each entity was asked to share the structure's Emergency Action Plan, details about the inundation zone warning and notification as well as evacuation procedures, and ongoing maintenance and updates to the dam. Particular details about each structure and how it poses a danger to the community around it was discussed. Detailed discussions covered downstream vulnerability, structures and people who would be at risk, and warning and notification procedures. The EMA was involved in discussions, and each EAP was shared with the contractor. Two of the six dams do not have an emergency action plan. Conversations were conducted by phone, for the most part, but there was also an exchange of documents by email transfer. Two of the dams were represented in the May 27th workshops.

Knox County has six high-hazard dams, and Table 1-4 below lists the facility contacts.

Table 1-4 High Hazard Dam Owner Participants

Dam	Contact Person	Organization	Contact Methods	EAP on File
Apple Valley Lake Dam (Attended workshop)	Jeff Harmer, General Manager	Apple Valley Property Owners Association	In person; email; phone	Yes
North Branch Kokosing Dam	Mandy Ronk – USACE Huntington Bryan Muroski Walhonding Facility Manager 36007 SR 715 Warsaw, OH	United States Army Corps of Engineers	740-824-4343 Ext. 2 Or 740-304-5393	USACE – Classified per M Ronk
Knox Lake Dam	Nick Radabaugh	ODNR, Division of Wildlife	nick.radabaugh@dnr.ohio.gov 614-902-4187	Yes
Lake Viering Dam	Chris & Beth Maisenbacher	Private Ownership	3986 Glenda Pl. Columbus OH	No EAP

(Telephone and Email)			614-563-0059 614-563-0067	
Lake Damascus Dam (Attended workshop)	Aaron Richards, Executive Director of Operations & Finance	Damascus Catholic Mission Campus	740-480-1288 aaron@damascus.net 7550 Ramey Road Centerburg OH 43011	Yes
Knox Cattle Company Dam	Jack Harris	Intercept Management	Phone call; email 614-668-6808	No EAP
Pleasant Hill Dam	Bryan Muroski – as listed above	Brinkhaven is in the inundation zone	As listed above	USACE - Classified

Comprehensive Schedule of Meetings and Workshops

The following table shows an overall summary of the workshop and meeting activity conducted to update the Knox County Hazard Mitigation Plan.

Table 1-5: Mitigation Plan Project Activity Schedule

Date	Location	Purpose/Audience
5/14/2025	Ramser 4H Building Knox County Fairgrounds	Knox County HMP Kick-Off with Knox County Healthcare Coalition
5/14/2025	Ramser 4H Building @ Knox County Fairgrounds	Knox County HMP Kick-Off with Knox County Local Emergency Planning Committee
5/27/2025	Ramser 4H Building @ Knox County Fairgrounds	Mitigation Planning Meeting #1 (9:00 a.m.)
5/27/2025	Ramser 4H Building @ Knox County Fairgrounds	Mitigation Planning Meeting #2 (1:00 p.m.)
5/27/2025	Ramser 4H Building @ Knox County Fairgrounds	Mitigation Planning Meeting #3 (5:00 p.m.)
5/29/2025 through 6-18-2025	Individual Jurisdiction Offices	Assessment of 2019 Mitigation Actions by each local Jurisdiction
7-6-2025 through 8-30-2025	Individual Meetings with High Hazard Dam Owners	6 High Hazard Dams (Apple Valley, North Branch Kokosing, Lake Knox, Lake Damascus, K
8-20-2025	Telephone Conference	Chris & Beth Maisenbacher – Lake Viering Dam
8-20-2025	Telephone Conference	Nick Radagaugh – Knox Lake Dam
8-20-2025	Telephone Conference	Jason Ritter – USACE Huntington Office
8-27-2025	Telephone Conference	Mandy Ronk – USACE Huntington Office
8-27-2025	Telephone Conference	Ohio EMA Mitigation Branch regarding USACE dam
9-23-2025	Tour of Facility	Damascus Catholic Mission Camp tour of Damascus Dam
9-23-2025	Tour of Dams	North Branch Kokosing, Lake Viering, Knox Lake Dam
10-1-2025	Digital Access Physical Access @ EMA Office	Start Public Review of Knox County HMP 2025
10-16-2025	Digital Access	End Public Review of Knox County HMP 2025
10-17-2025	Digital Access	Submit Draft Plan to Ohio EMA via MIP
10-17-2025	Local Adoption	Adoption Process Began w/local jurisdictions
	Local Adoption	Adoption Process Completed
	Letter	Final Approval of Plan by FEMA/OEMA

1.2 STAKEHOLDER INVOLVEMENT

With one city and six incorporated villages, a wide array of stakeholders was identified as having a role in the mitigation planning process. The Hazard Mitigation Planning Team included broad participation from these groups. In some cases, due to the small population, individuals filled more than one role in the planning process. With limited numbers of individuals to assume leadership tasks, most of them fill multiple roles in their community.

From the beginning of the planning process, the EMA attempted to include the whole community in planning activities. The input and opinions of the general public were viewed as critical to the process, as were the opinions of elected and appointed officials and key community leaders. A broad, inclusive list of planning team members was developed with the intention of including any, every, and all agencies with an interest or role in emergency management, and thus in disaster mitigation. As the process unfolded and planning began, an inclusive planning approach was used, and even more people became part of the process. Additional descriptions of the stakeholder involvement are found on pages 1-5 through 1-12. A list of workshop participants is found in Table 1-2. Others are found in Tables 1-3, 1-4 and 1-6.

Invitations were extended to the following officials, leaders, and stakeholders from Knox County and adjacent jurisdictions:

- Incorporated jurisdictions;
- Township trustees and fiscal clerks;
- Specialized disciplines, including fire service, law enforcement, engineering, utilities, public health, healthcare, hospitals, business and industry, nonprofits, social agencies, and stakeholders as part of the general public;
- Specific appointed officials, including the county floodplain manager, GIS mapping specialist, conservation specialists, regional planning, building and zoning officials, community and economic development officials, fire chiefs, police chiefs, public health commissioner, agricultural extension agents;
- Key elected officials such as the county auditor, treasurer, engineer, and commissioners;
- Emergency management officials from the adjacent counties;
- Non-profit agencies including American Red Cross and United Way as well as community action groups;
- Special interest groups such as watershed coalitions, conservancy districts, federal partners, state agencies with facilities in the county, and others with a special interest in the well-being of Knox County;
- Residents, businesses, and stakeholders from the general public.

1.2.1 Jurisdiction Participation

All incorporated jurisdictions in Knox County chose to participate in the countywide hazard mitigation plan. Participating jurisdictions included the Villages of Brinkhaven (formerly referred to as “Gann”), Centerburg, Danville, Fredericktown, Gambier, and Martinsburg, and the City of Mount Vernon. The Village of Utica lies on the southern county line, and participates in Licking County mitigation activities. All township trustees and fiscal officers were

invited. Knox County elected and appointed officials participated on behalf of all other areas, but participation was solicited through both county officials and the township sub-structure of government to reach those community members who live in the rural areas. This methodology assured that both municipal and rural interests would be included in the mitigation plan.

In Ohio, every county is divided into sub-sections called "townships". Townships are small sections of land, sometimes as small as six square miles. Incorporated jurisdictions (villages and cities) lie within the townships and supersede the township authority as governance for those parcels is absorbed by the municipality. In general, the remaining land outside the municipalities is considered a "township", and the elected officials' duties are primarily road upkeep and cemetery maintenance. Census areas, neighborhoods, homeowner association districts, and postal zones may exist as part of the townships, but those have no governance structure, and are generally included as township entities.

Townships originally, in the 1800's and before, provided a means to identify plats of land and to create the verbiage in documents like deeds. In Ohio, townships may choose to be zoned, but other land use planning is done by the county level of government. Townships can provide very basic services such as plowing snow from tertiary roads and maintaining cemeteries. Townships do not have the same full authorities as municipalities and counties. Townships cannot levy taxes and must participate in most programs as an unincorporated area of the county, through the county government officials. There are twenty-five unincorporated communities and four census-designated places in Knox County.

Knox County has twenty-two townships, including Berlin, Brown, Butler, Clay, Clinton, College, Harrison, Hilliar, Howard, Jackson, Jefferson, Liberty, Middlebury, Milford, Miller, Monroe, Morgan, Morris, Pike, Pleasant, Union and Wayne. Each township has three elected trustees and a fiscal officer. They do not generally have any employees, and often contract Knox County for essential services.

Consistent with other types of whole community planning, these townships do not adopt the mitigation plan individually, and for the purposes of hazard mitigation, work through the Knox County Commissioners as unincorporated areas.

The townships have a countywide association that meets regularly, and other county officials attend some of those meetings. Key leaders and elected officials also participate in those meetings. Townships do not have the structural sophistication of villages, so there are few committees or commissions associated with townships. The direct connection with leaders, as mentioned, enables a solid working relationship and inclusion in strategic and development plans and activities in these townships. Some townships have adopted regulations, such as zoning, but others have not. Most townships are primarily agricultural in nature. In many cases, the Knox County Commissioners act on behalf of the townships.

Howard and Hilliar Townships are the most heavily populated townships; Howard is home to the Apple Valley Lake Property Owners Association. Hilliar is where Centerburg is located,

which is a rapidly developing area. They enjoy and manage more commercial and residential development than most other townships, but do not have extensive employees or services.

The county government handles services including ditch maintenance, plowing and repair of main and secondary roadways, bridge and culvert maintenance, land use planning, community development, emergency management, and many other humanitarian and financial functions on behalf of the township. Many daily functions of government are handled by the county because townships must, by law, meet only annually.

The officials identified in Table 1-6 served as the primary contacts for the jurisdictions. These individuals assisted by inviting additional relevant individuals to the meetings. All communication throughout the planning process was shared with this group of officials and employees. They were asked for their own input at sessions, and asked to notify others within their jurisdiction of meetings and work sessions and invite any other residents or officials to participate in the planning meetings. They were invited to the project meetings in May, and after those meetings, provided details and clarifications to information, as well as taking charge of survey completion and email communications. They provided organizational skills to complete current strategy assessments, review of plan sections, and adoption assistance.

Table 1-6: Jurisdictional Leadership Participants

Jurisdiction	Position/Title	Representative
Knox County	Commissioner	Barry Lester
	Commissioner	Bill Pursel
	Sheriff Deputy	Dan Selby
	Engineer	Cameron Keaton
	Health Department	Zach Green
	Auditor	Sarah Thorne
	Emergency Management Agency	JT DeChant Amy Seward
	Development	Sam Filkins
City of Mount Vernon	Public Safety	Josh Lester
	Administration	Tanner Salyers
	City Engineer	Brian Ball
Village of Brinkhaven	Mayor	Christopher Wyant
Village of Centerburg	Village Administrator	Teri Wise
	Centerburg Local School Board	Tracey Myers
	COJFD	Chris Farmer
Village of Danville	Police Chief	Monty Vance
	Village Administrator	Joel Stachler
Village of Fredericktown	EMS Chief	Rick Lanuzza
	Administrator	Bruce Snell
Village of Gambier	Village Administrator	R. C. Wise
Village of Martinsburg	Mayor	David Allen Denune
Townships	Berlin Township Trustee	James DeChant
	College Township Trustee	Will Houston III

Jurisdiction	Position/Title	Representative
Townships	Liberty Township Zoning Commission	Diana Wetzel
	Middlebury Township Zoning Officer	Rick Lanuzza
	Milford Township Trustee	George Blocker
Adjacent County EMA Offices	Richland County	Sarah Potes
	Ashland County	Anne Strouth
	Ohio EMA	Chris Williams
	Ohio EMA	Travis Roach
Mount Vernon Nazarene University	Safety Officer	Daniel Kirby
Healthcare	Knox Community Hospital Safety Officer	Dan Selby
American Red Cross	Disaster Program Manager	Taylor Anderson

Most municipalities and county departments participated through attendance at face-to-face meetings, but Brinkhaven and Martinsburg met with the EMA director individually due to schedule conflicts. Both are very small communities and do not have the advantage of paid employees to attend meetings. They were able to meet and discuss all the topics that were covered at the May 27th meetings, and were provided with surveys and worksheets to complete, which they both did.

The owners of the high-hazard dams met with the Contractor individually for the most part. All contact with the US Army Corps of Engineers (owner of the North Branch Kokosing Dam) in Huntington, WV was through phone calls and emails. Participation by ODNR was organized through Karen Cabrera-Gomez, and directed to Korey Brown, ODNR, for Knox Lake Dam. Chris Maisenburger, owner of Viering Lake Dam, was contacted by phone, and communication was through conversation and email. Knox Cattle Company Dam is operated by a management company in Columbus and that contact was by phone and email. Apple Lake Dam and Damascus Dam representatives attended meetings in person. There was also a tour of the Damascus Dam by the EMA and Contractor, as well as the Contractor observing the other dams in the process of writing the plan.

All jurisdictions participated in the planning process. Some worked with the EMA director to fill out surveys and worksheets and have discussions because they were unavailable to attend workshops. Others had phone calls and email communications. Since most of the villages have very limited staff, the Contractor and EMA Staff made efforts to accommodate their availability.

The following table lists the dates on which each jurisdiction participated in the phases of a mitigation plan. Because Knox County is a small rural county, there was flexibility and meetings were able to facilitate full participation in spite of scheduling challenges.

Table 1-7: Jurisdiction Participation Summary

Full Participation	Jurisdiction	A. Planning Process	B. HIRA Discussion	C. Strategy Development	D. Plan Maintenance	E. Plan Update Process &	F. Plan Adoption
Yes	Knox County	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025
Yes	City of Mount Vernon	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025
Yes	Village of Brinkhaven	5-30-2025	5-30-2025	5-30-2025	5-30-2025	5-30-2025	5-30-2025
Yes	Village of Centerburg	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025
Yes	Village of Danville	5-27-2025	5-27-2025	5-27-2025	5-27-2025	5-27-2025	5-27-2025
Yes	Village of Fredericktown	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025	5-14-2025 5-27-2025
Yes	Village of Gambier	5-27-2025	5-27-2025	5-27-2025	5-27-2025	5-27-2025	5-27-2025
Yes	Village of Martinsburg	5-30-2025	5-30-2025	5-30-2025	5-30-2025	5-30-2025	5-30-2025

Final Plan Review

The updated Knox County Hazard Mitigation Plan was released for public review on Wednesday, October 1, 2025. It was printed and available in hard copy at the EMA office at 11540 Upper Gilchrist Road in Mount Vernon. It was posted on the Knox County website at www.co.knox.oh.us. There was no access control for viewing the plan, and the plan was open to everyone. This request for review and comments was published in the Mount Vernon News, the local newspaper on <insert date>. The draft plan was sent by email to all officials and others who either participated in the planning efforts or were key individuals notified of plan activity. All communications asked for input and feedback on the draft plan by close of business on Thursday, October 16, 2025.

The release of the plan included a description of how to find the plan and access it and offered for the EMA Director and/or Contractor to meet with anyone who had questions or concerns about the content. Comments were requested by email or phone call to the Knox County EMA Director.

The plan remained open for public review through October 16, 2025. The review period was two weeks in duration. INSERT COMMENTS

- Comment
- Comment

- Comment
- Comment
- Comment
- Comment
- Comment

1.3 PUBLIC PARTICIPATION

Public involvement in the mitigation planning process was an important part of the project. Meetings were announced to the public through various methods, including news articles, social media posts, emails, and inter-department notices. Media representatives were invited to attend, participate and ask questions during all of the meetings. They were viewed as a window to the public, and were welcomed.

Workshop participants were encouraged to talk about the mitigation plan to their family, friends, neighbors and coworkers to get more input and feedback. They were told that all assemblies were open to the public, and encouraged to invite others.

When the draft plan was made available, it was accessible by the public. It was posted on an open county website so anyone would have access. There were no passwords or passkeys necessary to view the plan. Additionally, anyone who did not want to view the plan digitally was provided a printed copy by the EMA. They were directed to call or email the EMA and to ask how to view the plan. A printed version was available at the EMA or by request. Arrangements to deliver a plan or establish an alternate viewing site could be made by individual request.

The public review period was set for a full two weeks to allow for ample opportunity to view the document, provide feedback or ask questions. The entire plan was posted on Wednesday, October 1 and left for open review through close of business on Thursday, October 16, 2025.

The availability of the drafted plan was announced through emails to all involved parties, all jurisdictions, county and other public agencies and departments, as well as all jurisdiction primary contacts, on Monday, September 29, 2025 in an email from the EMA. The draft plan link was included in the emails. A printed copy of the plan was kept at the Knox County EMA Office at 11540 Upper Gilchrist Road in Mount Vernon. A link to the plan was also posted on the Knox County EMA social media page as well as several other social media sites for local jurisdictions and agencies. This methodology for communication is typical for the Knox County EMA.

The public was encouraged to actively engage in the review process and to submit any thoughts or comments to the EMA Director by email or phone call. The Contractor and EMA Director were available to answer questions, address comments, and explain segments of the plan.

There was some feedback during the public review period. Those comments and the changes made were summarized previously on pages 1-18 and 1-19 of this section.

1.4 RESEARCH METHODOLOGIES

A significant amount of research was performed to develop the hazard mitigation plan, which is based on multiple sources of information. Research was conducted through reviews of existing data, plans, and reports and through interviews and conversations with county stakeholders and subject-matter experts. This information was used both in work sessions for discussion, as well as included in the written documents.

Since Knox County's most recent plan was approved in 2020, the Contractor obtained hazard information and data from 2019 through 2023 to ensure that the new plan included current, relevant, and accurate hazard and risk information. The information contained in the previous plan that continued to be accurate and relevant was maintained as part of this plan.

Additional information was identified through research of recorded events from the National Climatic Data Center Storm Events Database. Incidents that were researched included past ones included in former plans simply for verification, and new incidents after 2019 so that the most recent storms were included. Data was presented to the stakeholders represented on the planning team. Their knowledge of the impact, consequences, and recovery efforts of any past disaster incident was documented. These anecdotal points were included as appropriate in the revised plan.

The county profile includes information discovered through the study of various county documents. Information about community development, business and industry, land use regulations, and community life were researched and findings that were relevant to mitigation planning were included as parts of narratives and explanations. Online sources like US Census Bureau data and the Ohio Knox County Profile were accessed for statistical data. Federal, state, and local government agency websites and reports were utilized for statistical and historic information.

The hazard identification was developed through research of actual recorded events based on records from the Storm Events Database of the National Climatic Data Center. Supporting data was obtained from the Ohio EMA, FEMA, Stanford University Dam Program, Ohio Department of Natural Resources, and other sources. Planning team members provided additional detail, context, and descriptions of the community impact for many historical incidents. The most significant events for each hazard are described in narrative form in the HIRA. Appendix 07 NOAA Storm Event Data includes a complete list of all recorded occurrences of each hazard, organized by type of hazard between 2019 (when the last plan was approved) and 3-31-2025.

The vulnerability assessment and risk analysis were developed using multiple data sources. The National Risk Index was used to examine and consider natural hazards and the loss estimates associated with each hazard. Current critical facility and key resource locations were identified through use of the RAPT online tool, confirmed by local residents and officials. The 2020 Knox

County Hazard Mitigation Plan contained information that was still reflective of risks, vulnerabilities, and conditions, which were retained in this plan where applicable. FEMA documents were referenced to identify how many losses were reported, when, and because of what impact in the past. Included in this estimation were possibility, probability, magnitude, and frequency of each category of hazard and its potential impact upon Knox County.

There was significant discussion about changing weather patterns and the potential for climate change to affect Knox County in all work sessions. Changes in how and when storms strike, the amount of precipitation or the force of winds was covered in detail. Discussion included considerations of urban sprawl into Knox County would mean, as well as metropolitan industrial influence on the community. These discussions, when compared to online climate projections, were in sync.

Significant discussion ensued regarding resources needed during and after catastrophic level events. Because of the modest population, all stakeholders expressed doubts that Knox County would receive outside resources in an event that involved other counties. As a rural county, the pervasive opinion was that Knox County will automatically and successfully fend for themselves. While the county residents perceive themselves as highly resilient and willing to take care of themselves, there are challenges that come with this commitment. For example, across Ohio and the Midwest, volunteerism is declining. The average age of volunteers is rising, and the younger generations to someday take their places are not as interested in volunteering as previous generations. Therefore, conversations took place about diminishing volunteerism, especially in public safety organizations. An emphasis upon mutual aid agreements, department planning for equipment purchases in collaboration with adjoining departments, and other forms of collaboration were believed to be best practices for local entities. The exodus of adequate sheltering and family assistance by social organizations that are used to help after residents were displaced from homes is a huge concern for Knox County. They now receive assistance from adjacent counties or nearby metropolitan areas. There is concern whether this regional help will continue in the coming decades. Knox County is concerned for the same response resource reasons as most rural counties in Ohio.

The following table, Table 1-8, provides a list of the written sources utilized in the research phase of this project. Many resources were online references, and others were digital documents that were shared with the planning group. Some were printed documents that were shared with the group.

Table 1-8: Studies, Reports, and References

Document	Author/Agency	Date
FEMA Flood Map Service Center Knox County FIRM	https://msc.fema.gov/portal/advanceSearch#searchresultsanchor	8-20-2025
Federal Disaster Declaration Statistics	FEMA	2024
The Climate Explorer	Online resource	2024

Document	Author/Agency	Date
Floodplain Management Community Contact List	Ohio Department of Natural Resources	2025
Knox County Community Health Assessment, Community Health Improvement Plan, & Strategic Plan	Knox County Health Dept.	2024 & 2024-26
Knox County Hazard Mitigation Plan 2020	Knox County EMA	2019
Emergency Action Plans for all included reservoirs	ODNR: USACE; Apple Valley Property Owners Association; Damascus	various
State of Ohio Enhanced Hazard Mitigation Plan	Ohio EMA	2023
Storm Events Database	NOAA	2025
Knox County Comprehensive Economic Development Plan	Knox County Area Development Foundation	2025
United States Census	US Census Bureau Knox County Profile	2020 V2024
National Pipeline Mapping System	Map of Knox County pipelines	2025
Headwaters Economics – Economic Profile System for Knox County OH	Socioeconomic and Neighborhoods at Risk Reports	2025
National Risk Index	FEMA	2025
Resilience Analysis Planning Tool (RAPT)	FEMA	2025
Climate Risk and Resilience Portal (ClimRR)	FEMA https://climrr.anl.gov/localprojections	2025
National Inventory of Dams	FEMA	2025
National Levee Database	FEMA	2025
Ohio Department of Natural Resources GIS Maps	ODNR	2025
2022 Census of Agriculture County Profile	USDA	2022
Ohio County Profile	Ohio Office of Research	2024
Ohio Economic Profile Knox County	OH DJFS	2024
Climate Risk and Resilience Portal	www.climrr.anl.gov	2025
PHMSA Hazmat Incident Report Search	Portalpublic.phmsa.dot.gov	2025

1.5 PLAN MAINTENANCE

Plan maintenance is a critical element of the hazard mitigation plan. Diligent plan maintenance establishes a schedule to re-engage stakeholders in the mitigation plan at regular intervals

during the plan's validity period and lays a solid groundwork for the required five-year update. Continual attention to mitigation allows for and facilitates purposeful actions and planning efforts. By reviewing disaster occurrences on an annual basis and frequently assessing the county's progress on mitigation activities, a five-year update can be a quick and efficient process. Upon approval of this plan, Knox County is determined to follow a regular plan maintenance schedule. The EMA Director will lead this effort and involve countywide stakeholders, jurisdictions, and the community, maintaining and strengthening the solid foundation in place for the plan update in 2030.

1.5.1 Plan Maintenance Methodology

A significant challenge in conducting annual plan reviews is the difficulty in holding meetings that are well attended. Many stakeholders perceive meetings as unnecessary, yet others struggle to combine many demands and are available. Government officials, community leaders, and other key stakeholders have competing demands on their time and must and prioritize their attendance at different events. In Knox County, most jurisdictions and organizations have only a few employees. In the villages and townships, many elected and appointed officials serve in a part-time or volunteer capacity. Yet the city and the larger villages have an array of employees to share the work and attend planning meetings. These staffing realities often make conducting community-wide meetings a challenge. Knox County's plan maintenance strategy attempts to address these barriers by incorporating other communication and data-collection methods throughout the five-year life of the plan.

Traditional face-to-face meetings have been the most common method to discuss disaster responses, catastrophic incidents, and storms. The 2019 Pandemic made face-to-face meetings impossible, and people became accustomed to online meetings, written or digital surveys, and email communication. Even in the rural communities in Knox County, officials and workers have gotten used to digital meetings, and avoiding the travel required to meet in a face-to-face manner. This familiarity has led to acceptance of alternatives to meeting in person, and those digital and remote options will be seriously considered in the coming five years. The EMA will also work closely with the villages, asking each to consider reviewing their plan sections and submitting comments each year as an individual community rather than a whole county. The EMA Director can then compile these reports and share across the entire county. Records of participation, copies of results, and other communication surrounding these events will be maintained just as it would be for a meeting.

1.5.2 Annual Plan Review

The Hazard Mitigation Jurisdictional Planning Team will be called upon to review, evaluate, and discuss the plan annually, on or about the anniversary of the plan approval date. Annual plan maintenance discussions may be conducted through traditional in-person meetings or remote meetings, electronic surveys, questionnaires, or other forms of communication. The choice of methodology will be at the discretion of the EMA Director based on what best meets the needs of stakeholders and ensures that mitigation strategies are considered on a regular basis. All information-gathering efforts will include evaluation of the past year's disaster incidents and a summary of the resulting damages, costs, and recovery efforts. Status reports on any

mitigation projects in process and an update on progress towards achieving the mitigation strategies and actions developed by each jurisdiction will also be included. The EMA will maintain records of these annual discussions.

As part of the annual review process, jurisdictions will be asked to conduct an internal analysis of the mitigation strategies developed by their jurisdiction and submit a short report to the EMA with their findings. The report will include an assessment of any disaster incidents that occurred during the year, a summary of damages and recovery efforts, and a status report on the status of adopted mitigation strategies as a result of those incidents. If a strategy has been completed, the jurisdiction will evaluate its effectiveness at reducing losses. This information will be shared with the countywide planning team during the annual countywide review process. The EMA will maintain a summary of these reports and findings.

The EMA Director may choose to convene a planning team meeting after any significant disaster or large-scale emergency to review and document any changes, needs, additions, or deletions that should be considered at the five-year update. The EMA may also convene a committee if a significant development project, change in land use, or addition of a major industry occurs to review the effect of that incident on mitigation intentions. Any time a disaster is declared in Knox County, the planning team will assemble after the incident is closed to review the plan with emphasis on the strategies and the status of each. Given the direction of new mitigation guidance, the records of incidents will include social vulnerability concerns as well as physical damage information. Who served special needs, what organizations helped the underserved, and what gaps existed will be documented. Best practices and opportunities for improvement will be recorded and addressed. They will consider the integration of mitigation goals into the emergency operations plan, and make any changes that improve the manner and extent to which Knox County can serve disadvantaged and underserved populations. The EMA will maintain records of these meetings and findings.

At each review point, the EMA will review the Hazard Identification and Risk Assessment for completeness and accuracy, as well as changes that occur due to changing weather patterns or history. Loss estimates will be evaluated for ongoing accuracy and any significant developments will be added to the list and mitigation strategies will be reviewed for progress and effectiveness. All findings will be recorded and saved for the 2030 update process.

1.5.3 Community Participation

While the EMA is responsible for leading the plan maintenance effort, that process only works if stakeholders are engaged. Ongoing consideration of hazard mitigation strategies is critical to creating a resilient and sustainable community. It is the EMA's intention that the stakeholders representing the municipalities, jurisdictions, agencies, and organizations involved in plan development will continue to participate in its ongoing review and maintenance. Without their participation, ongoing input will not be comprehensive or accurate. Therefore, all parties involved in developing this plan must perceive the annual review process as critical to the pre- and post-disaster welfare of the county. The new mitigation partners who address issues of

social vulnerability and community resilience will be critical parties moving forward, and will continue to be critical companions in mitigation planning and implementation.

Public involvement is an important component of ongoing mitigation planning efforts. To encourage public involvement in plan maintenance, notices of annual plan review activities will be published through local media and appropriate websites and social media accounts of participating jurisdictions and agencies. The general public will be invited to participate in these activities and provide input. Meeting announcements will include the date, time, and location of the session and adequate notice so that people have reasonable time to plan their attendance. As with all meetings conducted during plan development, annual update meetings will be open to the public and community input will be encouraged. If surveys and other electronic tools are utilized to collect feedback from stakeholders, these documents will also be made available to the community.

1.5.4 Integration with Community Planning Mechanisms

Local government participation in plan maintenance activities is a major factor in the implementation and achievement of mitigation strategies as well as assessment for new and additional mitigation actions. This participation occurs during intentional mitigation plan review and, more importantly, during daily operations within each jurisdiction that guide the growth and development of specific communities.

Most Knox County villages have a planning commission that addresses growth and development issues for the municipality. Mount Vernon, Centerburg, Danville, Fredericktown and Gambier have comprehensive planning and written comprehensive planning efforts, and they participate regularly in the development process. Several of the villages and townships are also part of that process, as identified in the HIRA. Community development in in Knox County is an effort by village mayors and councils, the Knox County Regional Planning, Area Development Foundation of Knox County, the Knox County Chamber of Commerce, the municipal councils and employees, and the township trustees.

There is a very collaborative and communicative relationship between Knox County officials, the municipalities, and the economic and regional planning professionals. The professionals involved in economic and community growth do communicate with individuals and municipal officials on a regular basis to remain updated on plans, issues and concerns of those communities, and to share development goals and activities that are in planning and implementation stages. Ongoing communication and collaboration are maintained between countywide partners.

Table 2-17 in Section 02 HIRA of this plan identifies the capabilities of each jurisdiction and should be used as reference for this integration discussion. This table, along with discussion in Section 2.1.11 Community Development illustrates the capabilities the various jurisdictions have to carry out mitigation projects, as well as development activities. While some jurisdictions are fully capable of implementing sophisticated projects, others have very limited resources and capacity to do the same.

Ideally officials will all bring new development and growth concepts back to their communities to implement Knox County initiatives. They provide leadership for recruiting, promoting, and securing new industries, businesses, and residential facilities. These groups work together to guide the construction of new buildings and homes, and oversee and inspect new structures.

The Regional Planning Director serves as the county floodplain manager, and most other municipalities have a designated floodplain manager. Only the villages with no floodplain lack a floodplain manager. The GIS officer is part of the Auditor's office and the tax map officer is part of the County Engineer's office. Mortgage lenders work with the floodplain managers to comply with flood prevention regulations as part of the lending process, and they use external commercial providers to validate floodplain status for mortgage purposes. The lending institutions work with the floodplain manager and county auditor to determine floodplain locations, and the zoning officers enforce land use regulations to manage construction of homes, farm facilities, and businesses. Knox County floodplain managers work with updating and improving floodplain regulations and keeping in step with county and state requirements. The EMA Director works with the various county officials in a non-official capacity to advise and assist in disaster mitigation efforts regarding potential development projects. In those communities that do not have floodplain, and therefore have no floodplain manager, the mayor or the zoning inspector serves to link mortgage lenders to residents, although with no floodplain, special insurance is not required.

Even though Knox County is a small community, there is relatively sophisticated structure to the inclusion of mitigation efforts in other economic and community development activities. The EMA Director is included in many community activities, and in turn, the EMA includes a wide array of organizations in their planning efforts. Those representatives ensure that Knox County's voices are all heard. The county has determined that they should consider hazard mitigation with all community planning efforts, especially in the comprehensive planning efforts, and intends to include information about hazards, risks, and vulnerabilities in all planning areas in future endeavors.

The EMA will share responsibility to integrate mitigation planning into economic development, land use planning, land use regulation, conservation, response plans, and other plans that are important to the daily operation of the county with other county officials. Disaster mitigation will be promoted as part of community development, making its way into a comprehensive array of disciplines and interests. Key stakeholders, including the County Commissioners, floodplain administrators, engineer's offices, zoning officials, development professionals, and public safety officers from across the county will be important partners in this effort. The elected and appointed officials from all jurisdictions are considered partners in mitigation efforts, and will work with and beside one another to include the efforts described in this plan into the guiding documents for their jurisdiction. Whether the person charged with this responsibility is the elected mayor, the appointed administrator, or a volunteer committee chairman or council member, they will be expected to work with other jurisdictions to exchange ideas, implement efforts, develop regulations, and create guidance for future efforts and

endeavors. These individuals will work through their respective agencies to promote mitigation planning and its inclusion in the plans, procedures, guidelines, and priorities of each agency, thus making mitigation a true community-wide effort.

The Hazard Mitigation Plan has previously been integrated into the Knox County Emergency Operations Plan and the Hazardous Materials Response Plan. The EMA Director is responsible for developing and maintaining the Knox County Emergency Operations Plan, and she uses the Hazard Mitigation Plan as the hazard identification and risk analysis for that plan. The emergency response actions are based upon the conditions and vulnerabilities established by the mitigation plan. The EMA Director also carries the hazard mitigation plan information into the creation of a Hazardous Materials Response Plan as the vulnerability to natural hazards intersects with a hazardous materials spill or release, either due to related or unrelated factors of natural hazard incidents. The EMA Director works with high-hazard dam owners to include what is necessary in the EOP to cover an actual emergency, and works to integrate the dam safety issues into department plans in those jurisdictions.

It is hoped that the Hazard Mitigation Plan will become a reference for the various development, strategic, and community plans that are created to guide Knox County's future. The risk assessment and vulnerability profiles can be used to develop community resources, and the strategies can be used as a window into progressive building practices and land use. With so many opportunities to grow, Knox County would benefit from such inclusion and cross-communication.

1.5.5 Documentation of Plan Maintenance

Knox County will consider communication with stakeholders and the public regarding hazard mitigation to be an annual necessity. The EMA will schedule, complete, and record these communications and the results of all meetings to facilitate an expeditious plan update in 2030. It will be the EMA's responsibility to maintain documentation of all ongoing plan maintenance activities. These records should include the date, time, and attendance at review meetings, findings of each review, and recommendations from stakeholders for changes, additions, or deletions at the next update. Results from any surveys and questionnaires used to collect information should be maintained, as well as reports submitted by jurisdictions. Electronic mail and written communication from stakeholders and the public should be saved for consideration during annual review activities. All reports, documents, and files can be saved electronically so that they are easier to find and less cumbersome to maintain.

1.5.6 Plan Update Cycle

Knox County's Hazard Mitigation Plan will expire in 2030. With generous documentation of ongoing plan maintenance, the county should be positioned to submit an updated plan well before the current plan's expiration date. To ensure the appropriate timeline is met, formal efforts to update the plan will begin in mid-2028. The EMA Director will ensure that the appropriate and necessary steps are taken to complete this process.

2.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The Hazard Identification and Risk Assessment (HIRA) addresses the type and frequency of disasters that affect Knox County and the risk to people and property. The HIRA is addressed in four sections. The County Profile provides general information about Knox County and its jurisdictions. The Hazard Identification section describes hazards that impact Knox County; the Vulnerability Assessment discusses each jurisdiction's vulnerability to the identified hazards and the Risk Analysis evaluates and ranks the hazards Knox County intends to address through mitigation efforts.

This plan section will identify and describe specific hazards for each of the municipalities in the county, describe their specific vulnerabilities, and address their local ability to respond to a variety of incidents. The social, financial, and physical vulnerability of each community and the county will be discussed. The local capacity to address core capabilities associated with response will be examined and analyzed, and gap areas where capabilities are not sufficient for worst-case scenarios will be addressed. Knox County's ability to manage all eight community lifelines will be examined and gap areas will be described, including where and how the county would compensate for and backfill those needs based upon past significant events and community history.

Various demographic and statistical online tools have been used to research and address all types of vulnerability and community resilience, factors that will provide the foundation for mitigation strategies formulated to meet the unique and individualized needs of Knox County's small communities. As a rural county with less population than many of Ohio's metropolitan areas, Knox County is unlikely to receive significant federal assistance in a widespread disaster. Most assistance from outside the immediate region would likely come from Columbus where the population is much more concentrated. To realistically discuss these potential situations, stakeholders have identified gaps in capabilities and resources, potential areas of response compromise, and the unique needs of various populations within the county. This section will address disabled and disadvantaged persons, and transient populations that are common to the county as well as the more typical populations like elderly, rurally isolated, and those without local family connections. It will address to the degree reasonable, the Amish population and their customs and capabilities that affect community resilience.

Discussions examined and analyzed community capabilities to respond in a significant disaster as well as a long-term incident, and to identify where additional help would be found if an incident reached past the limitations of local capabilities. As a rural county close to or within an area of urban sprawl, Knox County officials recognize the likelihood of receiving measurable state and federal resources in a widespread incident is highly unlikely; therefore, it is viewed as the county's burden to identify alternate and non-traditional resources to meet those potential needs as a way to minimize long-term negative effects on residents, their families and their property.

Goals included the identification of ways to ensure that every person in Knox County has an opportunity to survive a disaster, and has the ability to recover. Realizing that many residents would require more resources and services to make that happen, discussions included the identification of those probable groups of people and discussion about how that process might work to enable them to survive the worst of days.

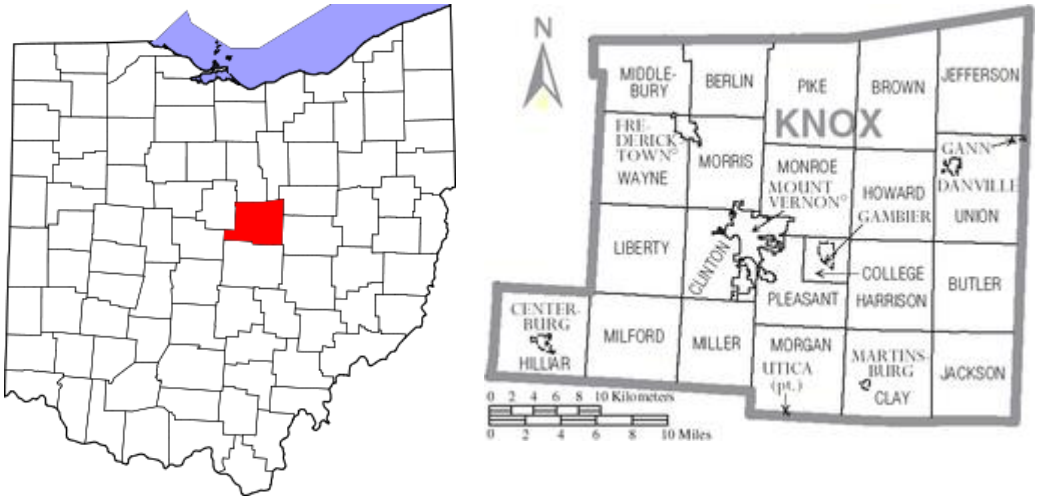
Indicators of recent weather patterns have been discussed and deliberated. Situated relatively close to Columbus, Knox County is on the edge of urban sprawl, both residentially and commercially. Managing growth that may come suddenly if a major business locates in the county, or coming slowly as one house after another is built, is a challenge. In particular, disaster mitigation actions may change more frequently than plans are updated, requiring the county to constantly monitor and assess vulnerabilities. It also requires exceptional leadership to manage growth and guide it to preserve and protect Knox County's character and resources as it occurs.

In Knox County, people all tend to know one another and take their neighbor in when disaster strikes because outside resources are limited. Many families have lived in Knox County for generations. Communities of only a few hundred or so residents have few resources, but many neighbors are willing to share their homes, supplies and help. They cite the infrequency with which disaster strikes, although they realize the possibilities. They realize that rare hazards, like earthquakes, may not be perceived as typical threats, but if they were to occur, the consequences could be devastating and expensive. While they may be limited in equipment or other goods, they are filled with the desire and willingness to help one another. They have the ability to improvise, adapt and overcome.

Needs after a severe storm may be addressed differently, and perhaps anecdotally, in the very small communities because they do not have access to fully certified shelters, commercially provided food supplies, and sufficient response personnel to meet post-disaster needs for help. Residents will identify a need, and develop a solution to solve it. Knox County residents assume they will need to help themselves, if only for the first few days in the worst situations. Although the distance to Columbus is not great, and many resources are available there, they realize resources may be in short supply, and they try to plan ahead to help themselves. These characteristics unique to small rural communities change little over the years. However, changes in storm characteristics and other natural phenomenon are noted, and discussions included these potential effects of worsening storms that hit much harder and faster.

This plan, through application of the information in this Hazard Identification and Risk Analysis section, intends to then develop mitigation strategies that will equitably and inclusively provide potential solutions for disaster outcomes likely in Knox County. Stakeholders worked to identify, characterize and understand how each group of its local society will react and respond to disasters of catastrophic or serious magnitude, and developed solutions to ensure that all populations, all communities, and all parts of this small county can survive and recover from a disaster successfully and become as whole as possible after the incident.

Map 2-1: Knox County Maps



Knox County is located in central Ohio; it is a rural county with a land area of 527.2 square miles. The county borders Richland, Ashland, Holmes, Coshocton, Licking, Delaware, and Morrow counties. Columbus, the state capital, is the closest major city and is approximately 50 miles to the southwest. Roughly one-third of the county is cultivated crops, another third is forest, and the rest is developed in some manner.

The 2024 edition of the Ohio County Profile shows a total population of 63,320, up from 61,983 in 2018 when the previous mitigation planning took place. According to the Ohio County Profile from the Ohio Department of Development, Knox County is probably at its peak population, with numbers anticipated to fall slightly by 2030 and then hold constant for the next two decades.

Knox County consists of 527.2 square miles. There are six high-hazard dams, several small to medium sized inland lakes, and two major rivers, the Kokosing and the Mohican. Adjacent counties include Delaware, Morrow, Richland, Ashland, Holmes, Coshocton, and Licking. The closest major city is Columbus, approximately 50 miles to the south-southwest. Cleveland is slightly more than 100 miles to the northeast.

The Knox County Board of County Commissioners and other elected and appointed officials provide leadership, support, and service to the county. In addition to the commissioners, elected officials include the county Engineer, Auditor, Treasurer, Clerk of Courts, Prosecutor and Sheriff, all of whom were instrumental in mitigation planning activities. Appointed officials particularly involved included the chief elected and appointed officials, floodplain managers, community development coordinators, social assistance departments, agricultural industry leaders, conservation and natural resources employees, social service departments, social organizations, healthcare providers, and many others. Many officials in Knox County fill multiple roles in the community, crossing local levels of government and combining responsibilities in a non-traditional way that allows the available staffing to fill all critical roles.

2.1.1 County Profile and Demographics

According to US Census data projections, the estimated 2023 population in Knox County is 63,320. The 2010 population was 60,921. The county is experiencing a slight upward trend in population; this is expected to continue for the next several years but then to level off at approximately current levels. This signifies a slowing urban sprawl but a constant job market and economy to continue to support current levels of population. Comparison data from 2019 is shown to illustrate local changes in demographic characteristics over the past five years.

Table 2-1: Knox County Population Statistics

Statistic	2019	2025 (2023V)
Population Density	1015.9 persons/sq. mile	120.0 persons/sq. mile
Population (2020)	61,893	63,320
Female Population	51.0%	51%
Male Population	49.0%	49%
Median Age	42.5 years	39.4 years
Population under 19	22.7%	27%
Population under 5		5.9%
Population over 65 and over	18.1%	18.7%
White	96.6%	94.5%
Hispanic or Latino	1.4%	1.7%
African-American	1.0%	0.9%
Two or More races	1.7%	3.0%
Households	23,229	23,435
Average Household Size	2.47persons	2.73 persons
Median Household Income	$51,211	$73,988
Families in Poverty	13.8%	11.0%
Percent w/o health insurance	n/a	11.2%
Persons with a disability	n/a	13.2%
Owner-occupied Residential structures	71.3%	75.1%
Language spoken other than English	n/a	6.1%
Veterans	n/a	8.0%
Households with no vehicle or access	n/a	6.7%
Households with Internet/broadband	n/a	n/a
Households with a Smartphone	n/a	85.39%
Rental Units	25.0%	24.9%
Mobile Homes	4.0%	3.6%
Total Housing Units	25,648	23,435
New home construction in 2023	137 (2019)	376 (2023)
High School Graduates >25 y/o	n/a	91.5%

Multiple special residential housing facilities are present across the county. The Ohio Department of Health and Ohio Department of Correction and Rehabilitation list the following types of facilities and statistics for each type are as follows:

Table 2-2: Special Residential Facilities

Facility Type	Number	Beds
Nursing Home Facilities	7	515
Assisted Living Facilities	6	339
Jails and confinement	1	100
Hospice	1	n/a
Hospitals	1	117

2.1.2 Incorporated Jurisdictions

Knox County has seven incorporated municipalities. Mount Vernon is the largest municipality and only city in the county. It serves as the county seat and is the primary business and retail center of the county.

The county has six incorporated villages. By definition, a village in Ohio has fewer than 5,000 residents. The village of Brinkhaven was listed as "Gann", a former name of the village, in the last mitigation plan.

A brief description of each village or city follows.

Brinkhaven

Brinkhaven sits just inside Knox County on the far northeastern side in Union County. Located on a bend in the Mohican River on State Route 62, this very small community was once known as "Gann", named after George Gann, an early settler who donated a part of his land to the railroad if they would construct a stop in the village. Folklore has it that an argument between the railroad and the Gann family caused the railroad to rename the stop "Brinkhaven" in 1890, and 1892 the post office had been renamed "Brinkhaven".

Table 2-3: Brinkhaven Demographics

Statistic	Figure
Population, V2023	139
White	71%
Hispanic or Latino	0
Households	73
Median Income	$81.010
Persons in Poverty	5.8%
Owner-Occupied Homes	47%
Disabled Population <65	n/a
Without Health Insurance	n/a
Language other than English	n/a

Elderly >65 y/o	24%
Veterans	4.2%
Households with Internet	n/a

Centerburg

This growing village lies in the far southwest corner of Knox County, closest to the metropolitan Columbus area. In Hilliar Township, it is the leader in urban sprawl growth for the county. Its claim to fame is that it is geographically the exact center of Ohio, thus the name "Centerburg".

Table 2-4: Centerburg Demographics

Statistics	Figure
Population, 2020 US Census	1952
White	95%
Hispanic or Latino	2.0%
Households	685
Median Income	$73,875
Persons in Poverty	8.2%
Owner-Occupied Homes	66%
Disabled Population	n/a
Without Health Insurance	n/a
Language other than English	n/a
Elderly >65 y/o	20%
Veterans	7.6%
Households with Internet	n/a

Danville

Danville is just southwest of Brinkhaven and Holmes County, and names itself the "Gateway to Amish Country". The Kokosing Gap Trail and the Mohican Valley Trail form in Danville. It is home to the second oldest Catholic parish in Ohio, St. Luke Catholic Church. (Note: Local data used rather than US Census data which is locally believed to be incorrect.)

Table 2-5: Danville Demographics

Statistic	Figure
Population, V 2023	1,100
White	98%
Hispanic or Latino	0
Households	591
Median Income	$60,536
Persons in Poverty	11.2%
Owner-Occupied Homes	75%
Disabled Population <65 y/0	n/a
Without Health Insurance	n/a
Language other than English	n/a
Elderly >65 y/o	24%
Veterans	12.1%
Households with Internet	n/a

Fredericktown

Fredericktown was founded in 1807 and is named after Frederick, Maryland, the home of its original settlers. It sits in the northwest corner of the county where Middlebury, Wayne, Berlin and Morris townships meet. It is surrounded by the East and North Branches of the Kokosing River and the main branch Kokosing River. Knox Lake and the NB Kokosing Reservoir are upstream of the village. It is the largest village in Knox County.

Table 2-6: Fredericktown Demographics

Statistic	Figure
Population, V2023	2634
White	97%
Hispanic or Latino	0
Households	1225
Median Income	$64,668
Persons in Poverty	14.5%
Owner-Occupied Homes	79%
Disabled Population >65 y/o	n/a
Without Health Insurance	n/a
Language other than English	n/a
Elderly > 65 y/o	21%
Veterans	7%
Households with Internet	n/a

Gambier

Gambier is home to Kenyon College, named after Lord James Gambier. As a college town, the village is home to many different people from multiple walks of life. The private college contributes to the workforce, the academic development of the community, and its diversity. It lies to the east of Mount Vernon along the Kokosing River in College Township.

Table 2-7: Gambier Demographics

Statistic	Figure
Population, V2023	2064
White	87%
Hispanic or Latino	6%
Households	273
Median Income	n/a
Persons in Poverty	11%
Owner-Occupied Homes	64%
Disabled Population	n/a
Without Health Insurance	n/a
Language other than English	n/a
Elderly >65 y/o	n/a
Veterans	0.6%
Households with Internet	N/a

Martinsburg

Located in Clay Township, Martinsburg lies at the intersection of SR 62, Martinsburg Road, and SR 541. It was founded in 1828 when Hanover and Williamsburg merged.

Table 2-8: Martinsburg Demographics

Statistics	Figure
Population, V2023	314
White	99%
Hispanic or Latino	0
Households	103
Median Income	$49,375
Persons in Poverty	7.3%
Owner-Occupied Homes	64%
Disabled Population	n/a
Without Health Insurance	n/a
Language other than English	n/a
Elderly >65 y/o	25%
Veterans	7.4%
Households with Internet	n/a

Mount Vernon

Mount Vernon, located on the Kokosing River, is the county seat of Knox County, and it is the county's only city. It serves as the major retail, industrial and manufacturing hub of the county, and is home to many critical facilities like Knox County Community Hospital and county government offices. It is the most concentrated population density in the county.

Table 2-9: Mount Vernon Demographics

Statistics	Figure
Population	16,956
White	91.2%
Hispanic or Latino	2.9
Households	7,211
Median Income	$54,335
Persons in Poverty	18.4%
Owner-Occupied Homes	54.4%
Disabled Population	18.1%
Without Health Insurance	6.0%
Language other than English	2.8%
Elderly > 65 y/o	20.9%
Veterans	5.9%
Households with Internet	n/a

2.1.3 Townships and Unincorporated Communities

The unincorporated area of Knox County is divided into 22 townships. In Ohio, townships are governed by an elected board of trustees. They meet at least once per month and are responsible for the safety and welfare of township residents. Townships also have elected Fiscal Officers who manage the township's finances. Because townships are unincorporated, they are considered part of the county for the purpose of hazard mitigation planning and activities.

Table 2-10: Township Population Statistics

Township	Population 2025	2019 Comparison
Berlin Township	1,772	1,738
Brown Township	2,048	1,862
Butler Township	1,294	1,171
Clay Township	1,542	1,604
Clinton Township	2,886	2,826
College Township	2,553	2,731
Harrison Township	854	806
Hilliar Township	3,781	3,715
Howard Township	5,873	5,617
Jackson Township	1,076	988
Jefferson Township	768	633
Liberty Township	1,906	1,716
Middlebury Township	1,406	1,278
Milford Township	1,866	1,772
Miller Township	1,095	1,006
Monroe Township	2,339	2,165
Morgan Township	1,034	1,085
Morris Township	2,098	2,049
Pike Township	1,656	1,532
Pleasant Township	1,657	1,606
Union Township	2,620	2,646
Wayne Township	993	892

Unincorporated Communities and Neighborhoods

Knox County has 23 unincorporated communities and three census-designated places. These small neighborhoods are not organized municipalities and do not have any official form of government; they function as part of the township in which they are located. Most of these locations have historical significance or were incorporated in the past but have a population that has decreased to the point that they are no longer considered a municipality. Howard (Howard Township) and Bladensburg (Clay and Jackson Townships) are two of the larger census-designated places in the county.

Apple Valley is another unincorporated community of significant size. This community, located in Howard and Brown Townships, occupies approximately 3,770 acres surrounding Apple Valley Lake. Apple Valley Lake is a 511-acre man-made lake with 9.25 miles of shoreline. The community was formed in 1972 and is a mix of year-round and seasonal residences. According

to 2010 U.S. Census figures, the population is 5,058, making it the second most populated community in Knox County.

Unincorporated communities include the following:

- Amity
- Ankenytown
- Artanna
- Bangs
- Batemantown
- Brandon
- Five Corners
- Green Valley
- Greer
- Hunt
- Jelloway
- Knox
- Lock
- Lucerne
- Millwood
- Monroe Mills
- Morgan Center
- Mt. Liberty
- North Liberty
- Palmyra
- Pipesville
- Rich Hill
- Rossville
- Waterford
- Zuck

Census-designated areas include Apple Valley, Bladensburg, Howard and South Mount Vernon.

2.1.4 Institutions and Special Facilities

Across Knox County, residents have access to abundant educational and healthcare resources. These services contribute to the quality of life and the successful development of the local economy.

Education

Students in Knox County are served by ten public school districts and several private schools. In the most rural areas of the county, several Amish schools also serve Knox County's significant Amish population.

Table 2-11: Knox County Schools

Public School Districts	Private/Parochial Schools
Centerburg Local School District	Christian Star Academy
Clear Fork Valley Local School District	Mount Vernon SDA Elementary School
Danville Local School District	St. Vincent De Paul School
East Knox Local School District	Temple Christian Academy
Fredericktown Local School District	
Knox County Career Center	
Loudonville-Perrysville Exempted Village School District	
Mount Vernon City School District	
North Fork Local School District	
Northridge Local School District	

The county is also home to several colleges and universities. Kenyon College, located in Gambier, is a private liberal arts college with approximately 1,700 students, all of whom live on

campus. Mount Vernon Nazarene University is a private college offering undergraduate and graduate programs to approximately 2,200 students. Approximately 1,000 students live on campus. Central Ohio Technical College also operates a campus in Mount Vernon that provides associate degree, certificate, and career-technical programs.

Healthcare

Knox Community Hospital is the only hospital in Knox County. This 117-bed facility, located in Mount Vernon, offers a wide range of inpatient and outpatient services, included emergency care, intensive care, and a cancer center.

Residential healthcare facilities operate throughout Knox County. These facilities include seven licensed nursing homes with a total of 557 beds and assisted living facilities with a total of 339 beds, as shown in Table 2-2. These facilities provide healthcare and housing for elderly individuals, dementia patients, and others recovering from short- and long-term illnesses and injuries.

Infrastructure

Infrastructure and utility systems provide access and critical services to residents, workers, and visitors. This section describes the county's road and rail infrastructure, airports, and utility systems.

Transportation Systems

Knox County is traversed by more than 1,335 miles of roadways. Of these, 59 miles are U.S routes, 140 miles are state highways, and 1,136 miles are county, township, and municipal roadways and streets. There are 325 Bridges and Approximately 6,300 culverts that are maintained by local government. There are no interstate routes within the borders of Knox County but I-70, I-71, and I-77 are easily accessible from various highways and routes within the county. A complete list of federal and state highways in the county is provided in the table below.

Table 2-12: Knox County Highways

Interstates	U.S. Highways	State Highways	
None	US 36	SR 3	SR 514
	US 62	SR 13	SR 541
		SR 95	SR 586
		SR 205	SR 661
		SR 229	

Rail

With only one rail line present in the county. Knox County has very limited rail traffic.

Airports

Knox County has one public and two private airports. The Knox County Regional Airport, located four miles southwest of Mount Vernon, is the only public airport in Knox County.

Utilities

The majority of Knox County homes, approximately 56.3%, are heated with natural gas. An additional 18.6% utilize electric heat. The Public Utilities Commission of Ohio regulates private companies that provide public utility services. These companies, along with municipal electric utilities, are identified in table 2-6.

Table 2-13: Knox County Utility Providers

Electric Service	Natural Gas Service
AEP Ohio	Columbia Gas of Ohio
Consolidated Electric	Consumers Gas Cooperative
Licking Rural Electrification	Dominion East Ohio
Ohio Edison/First Energy	Knox Energy Cooperative Association Inc.
	Ohio Cumberland Gas Company

The structures in the county use the following alternatives to utility gas and electric as heat sources.

- Bottled, tank, or LP gas 14.8%
- Coal, coke or wood 7.2%
- Fuel oil, kerosene 1.9%
- Solar energy or other fuel 1.0%
- No fuel used 0.3%

Within most incorporated jurisdictions, water and wastewater services are provided by municipal systems that are maintained by the jurisdiction or utility company, such as Del-Co Water. Outside of the incorporated areas and in smaller jurisdictions, these services are generally provided by private wells and septic systems that are maintained by individual property owners.

2.1.6 Topography and Climate

Knox County's landscape features river valleys, rolling hills, pastures, and woodlands. This variation is due primarily to the continental glaciers that covered the region more than 15,000 years ago. The only exception to this is the easternmost portions of Jefferson, Union, and Butler Townships which feature deep valleys and steep hills.

Knox County's average elevation is 1,113 feet above sea level. Across the county, elevations range from a high point of 1,420 feet above sea level in Liberty Township to a low of 840 feet above sea level in Butler Township. The maximum difference in elevation between the high and

low points is approximately 600 feet. The steepest slopes in the county are located in the northeast section near the Mohican River.

Climate

The humid continental climate of Knox County is consistent with most of Ohio and features cold winters and hot summers. The average annual temperature is 48.25° F. July is the warmest month with an average high temperature of 82° F. January is the coldest month with an average low temperature of 15° F. Average annual rainfall is 40.51 inches. May is typically the wettest month with average precipitation of 4.41 inches. February generally has the least precipitation with an average of 2.4 inches.

2.1.8 Waterways and Watershed[7]

Knox County has three major rivers: Kokosing River, Mohican River, and North Fork of the Licking River. The Kokosing and Mohican Rivers have both been designated State Scenic Rivers by the Ohio Environmental Protection Agency.

Within the county, there are several man-made lakes that are used primarily for recreation and flood control. Kokosing Lake is the smallest at 160 acres. It was constructed in 1971 for flood control and recreation and is a dam-controlled lake maximizing at thirty feet deep. Knox Lake is a 500-acre, dam-controlled recreational lake that is 24 feet at its deepest area. Apple Valley Lake, the largest at 511 acres, is thirty feet deep and also controlled by a dam.

In addition to the rivers and lakes, Knox County has 851 miles of ditches and streams. Intermittent streams, defined as streams where water only flows during part of the year, account for 365 miles of waterway. Another 382 miles are considered perennial streams, meaning that water flows year-round during periods of normal rainfall.

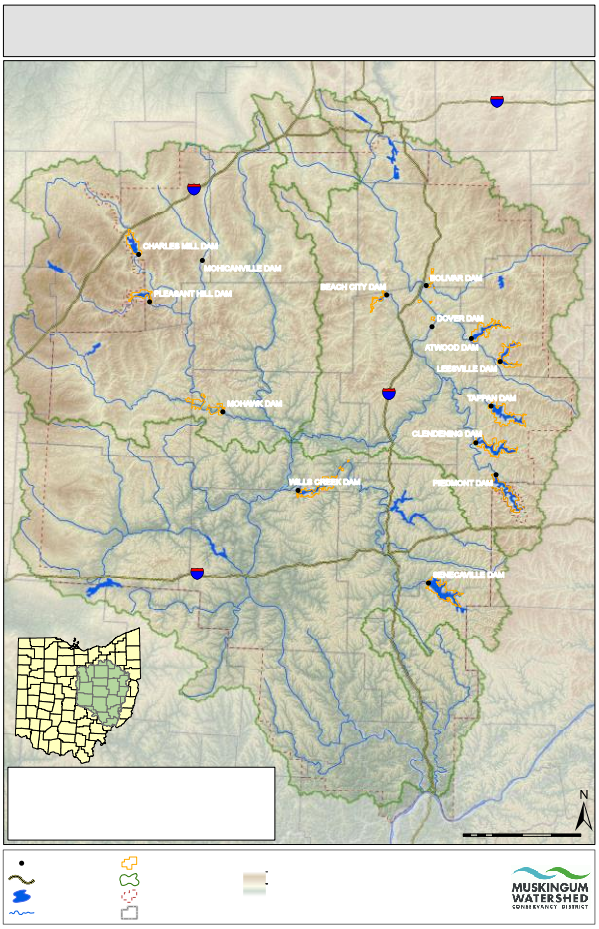
Table 2-14: Knox County Waterways

Lakes	Streams and Creeks	
Apple Valley Lake	Adams Run Armstrong Run	Jug Run
Edward Smith Lake	Barney Run	Kokosing River
Knox Lake	Beach Run	Little Jelloway Creek
Kokosing Lake	Big Run	Little Schenck Creek
Lake Hiawatha	Brush Run	Lost Run
Lake Viering	Center Run	Markley Run
Little Lake	Chambers Creek Coleman Branch	Mile Run
	Curtis Run	Muckshaw Run
	Delano Run	Mud Run
	Dowd Creek	North Branch Kokosing River Owl
	Dry Creek	Creek Stream
	Dry Run	Pleasant Valley Run
	East Branch Jelloway Creek	Prairie Run
	East Branch Kokosing River East	Pumpkin Run
	Branch Rocky	Ransoms Run
	Fork Elliot Run	Sapps Run

	Flat Run	Schenck Creek
	Ford Creek	Shadley Valley Creek
	Granny Creek	South Run
	Harrod Run	Sycamore Creek
	Honey Run	Tomaky Branch
	Indianfield Run	Tuma Run
	Ireland Creek	Wakatomika Creek
	Isaacs Run	Webster Run
	Jelloway Creek	Wolf Run.
	Job Run	

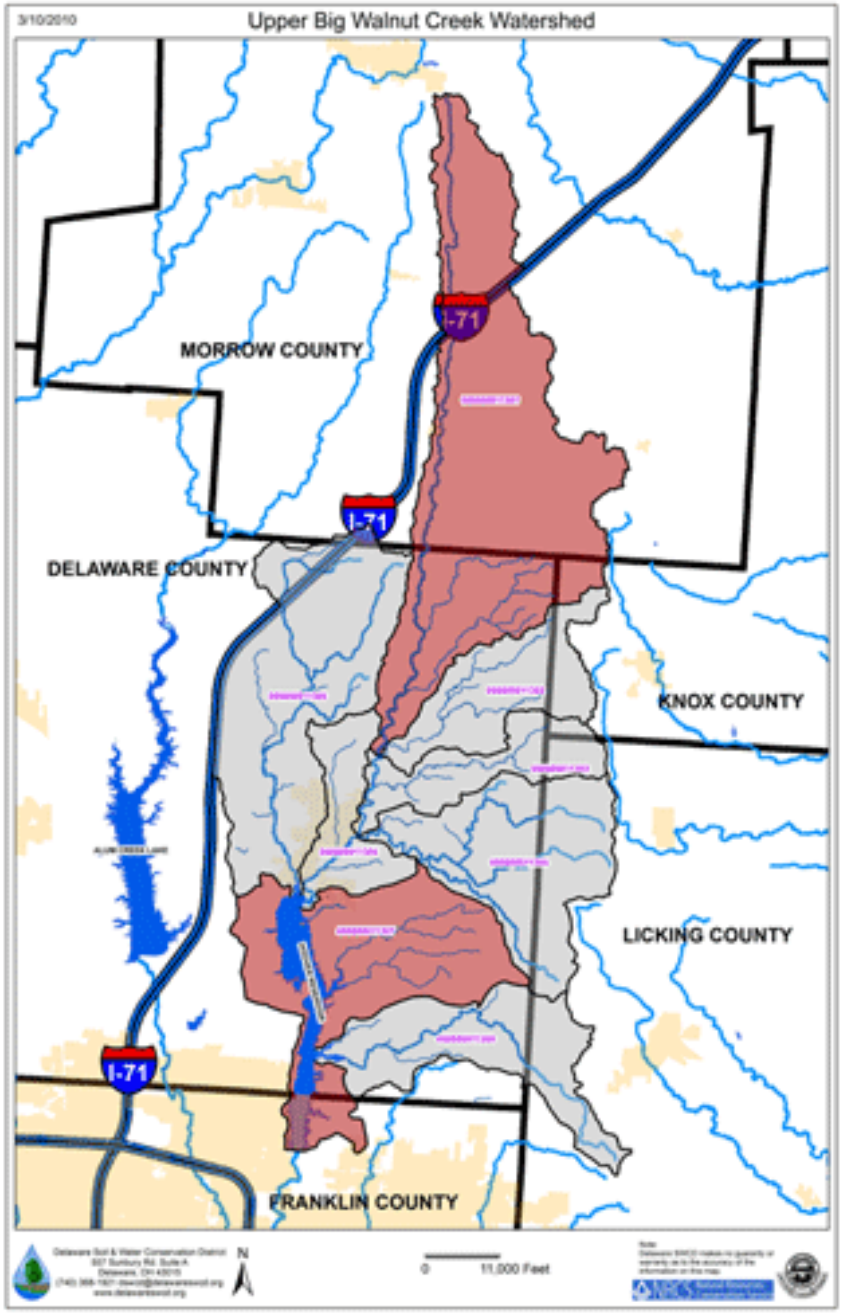
The majority of Knox County is part of the Muskingum River Watershed. This large watershed covers more than 8,000 square miles across all or part of 27 Ohio counties and encompasses more than 20% of Ohio. The watershed is divided into multiple sub-watersheds. Knox County is located in four of these sub-watersheds. The Kokosing River Watershed is the largest of these, encompassing most of the county. The upper northeast corner of the county falls in the Mohican River Watershed and the southwest section falls in the Licking River Watershed. The extreme southeast corner of the county, near Bladensburg, is located in the Wakatomika Creek Watershed.

Map 2-2: Muskingum River Watershed



The only area of Knox County that is not part of the Muskingum River Watershed is a small area on the western edge of the county, just west of Centerburg. This area is part of the Upper Big Walnut Creek Watershed, which is part of the Scioto River Watershed that run south through Columbus and the center of the state.

Map 2-3: Scioto River Watershed



2.1.8 Land Use

Cultivated crops are the highest land use category in Knox County at 35.20%. An additional 20.88% of land area is used for pasture and hay. Forested land is the second highest land use in Knox County, accounting for 33.32% of the county's land area. This includes 2,320 acres of state parks, forests, nature preserves and wildlife areas across six areas or facilities. Many of these parks and recreation areas are located in and around the Kokosing River.

As urban sprawl from Columbus continues to reach into Knox County, the need for residential growth continues. This trend was identified in the 2015 mitigation plan and has continued as of this plan update, although growth rates have slowed slightly. Much of this residential growth is occurring in the southwest section of the county near the village of Centerburg and the surrounding townships. The Apple Valley community in eastern Knox County also continues to experience growth as people build year-round and seasonal residences in this unincorporated community.

Table 2-15: Knox County Land Use

Use Category	Percentage
Cultivated Crops	35.20%
Forest	33.32%
Pasture/Hay	20.88%
Developed, Lower Intensity	7.78%
Open Water	0.73%
Developed, Higher Intensity	0.96%
Shrub/Scrub and Grasslands	0.50%
Wetlands	0.58%
Barren (strip mines, gravel pits)	0.07%

2.1.9 Regulation and Community Development Planning

The Knox County Regional Planning Office, established in 1971, is the county agency responsible for addressing development issues within Knox County that are larger than a single jurisdiction or municipality. The office is responsible for administering floodplain regulations, subdivision regulations, zoning regulations and for reviewing amendments to township zoning regulations. Additionally, the office develops and maintains the Knox County Comprehensive Plan and coordinates the Knox County Regional Planning Commission, made up of representatives of the individual jurisdictions and key entities across the county.

The Knox County Engineer is responsible for utility permits and access permits. The Knox County Soil and Water Conservation District is responsible for storm water permits, residential drainage issues, small ponds and lot splits. The Knox County Public Health Department manages septic permits, well permits, and air quality issues.

There is no contractor registration in Knox County or its municipalities.

All jurisdictions in Knox County, both township and municipal, belong to the Knox County Regional Planning Commission and participate in planning and regulatory activities except the Village of Centerburg and the City of Mount Vernon.

All floodplain, development, zoning and fire safety inspections and permits within the City of Mount Vernon are handled by city staff, led by the city's engineer, Brian Ball. Property development, zoning regulations and other permits are managed by Lacie Blankenhorn, Development Services Manager. Commercial building permits are handled by the State of Ohio; there is no contractor registration in Mount Vernon. The Engineering Department is responsible for records and permits, such as water, wastewater and stormwater lines, permits, maps of all types and historical documents related to the operation of the city.

Centerburg manages their own code compliance and regulations. The Zoning Officer issues all certificates of compliance, appropriateness, conditional use and temporary use according to their website. The officer also does all inspections, updates maps and standards, and manages the compliance of development projects in the village.

Each incorporated municipality administers its own zoning and floodplain regulations. The Knox County Regional Planning Office administers floodplain regulations in the unincorporated areas of the county Each township adopts and administers local zoning regulations. All incorporated municipalities and eighteen of the county's 22 townships are zoned, as indicated in table 2-16.

Each township or municipality has the opportunity to participate in the Regional Planning Commission. The RPC maintains and updates the Knox County Comprehensive Plan, the latest of which was approved in 2025. The RPC representatives from municipalities and townships are listed in the following table. Zoning Officials are also listed. Unzoned townships are marked as such. Jurisdictions that do not participate in the county planning commission are also marked.

Table 2-16: Jurisdictional Development/Regulation Officials

Jurisdiction	*Regional Planning Commission Rep*	*Zoning Inspector*	*Floodplain Manager*
Berlin Township	James DeChant George Hartz, Alternate	George Hartz	Darrel Severns
Brown Township	Steve Bratton Joe Fritz	Steve Lauderbaugh	Darrel Severns
Butler Township	Christa Clotola Doug Becckley, Alternate	UNZONED	Darrel Severns
Clay Township	Chodd Armfelt Bruce Conard, Alternate	UNZONED	Darrel Severns
Clinton Township		Donna Stages	Darrel Severns
College Township	Roger Yarman Ed O'Connell, Alternate	Roger Yarman	Darrel Severns
Harrison Township	Bob Elliott John Norris, Alternate	Jason Hill	Darrel Severns
Hilliar Township	Aaron Gray Eric Cockran, Alternate	Aaron Gray	Darrel Severns

		Mark McCann – Fire Inspector	
Howard Township	Craig Gilmore Greg Lawson, Alternate	Mike Sprang	Darrel Severns
Jackson Township	Scott Dugan Raymond Harris, Alternate	UNZONED	Darrel Severns
Jefferson Township	Monica Severns Roxanna Reiheld, Alternate	Maggy McKinley	Darrel Severns
Liberty Township	Marta Hill Joe Spurgeon, Alternate	Kennis Wilson	Darrel Severns
Middlebury Township	Larry Schunke Mike Gearheart, Alternate	Rick Lanuzza	Darrel Severns
Milford Township	Kris Caldwell George Blocker Jr., Alternate	Kris Caldwell Mark McCann, Fire Inspector	Darrel Severns
Miller Township	Jared Yost	Scott Stiltner	Darrel Severns
Monroe Township	Mike Carter Dave Marietta Kevin Henthorn, Alternate	Mike Carter	Darrel Severns
Morgan Township	Alan Doup Chuck Rowley, Alternate	Josh Sichina	Darrel Severns
Morris Township	Tim J. Smith Dan Humphrey, Alternate Richard Kershner, Alternate	Brian Frazier	Darrel Severns
Pike Township	Curtis Bechtel Brayden Freemon, Alternate	Rochelle Shackle	Darrel Severns
Pleasant Township	Jim Hughes Dave Smith, Alternate Chad Sims, Alternate	Stephen Haibel	Darrel Severns
Union Township	Darryl Frazier Clint Kanuckel, Alternate	UNZONED	Darrel Severns
Wayne Township	Ashton Walls Matt Ashcraft, Alternate	Ashton Walls	Darrel Severns
Village of Brinkhaven	Christopher Wyant		None
Village of Centerburg	NOT RPC MEMBER	Phil Lohmeyer, Zoning Mark McCann, Fire Prevention	Phil Lohmeyer
Village of Danville	Deb Ridgeway Jeff Furay, Alternate Scott Mickley, Alternate	Todd Bender	Freedom Desich
Village of Fredericktown	Andy Fox Ray Brewer Ryan Shoemaker, Alternate Bruce Snell, Alternate	Andy Fox	Andy Fox
Village of Gambier	Elizabeth Bonaudi Leeman Kessler, Alternate		R.C. Wise
Village of Martinsburg	Robert Collins		None
City of Mount Vernon	NOT RPC MEMBER Brian W. Ball, P.E.	Lacie Blankenhorn	Joel Daniels

Under Titles 3 and 7 of the Ohio Revised Code, the county and all municipal corporations have the authority to establish, maintain and improve a large number of capabilities listed in Tables 2-16 and 2-17. However, their ability to establish, maintain, or improve upon the capabilities vary based on their respective need, political will, and financial capacity. Compared to larger communities, smaller jurisdictions may have the same authority enabled to them by the Ohio Revised Code, but have less ability to establish, maintain, or improve the capabilities.

Factors in Knox County, in particular, that are examples of the concept stated above include significant challenges in attracting residents with leadership abilities and business availability to fill elected official roles in the villages and townships; difficulty in obtaining or raising the financial resources to implement improvements in infrastructure and amenities necessary to successfully develop areas remote to the municipal areas; and the prevailing local desire to maintain and protect a quieter and less urbanized environment in which to raise their families and spend their lives.

To summarize, all municipalities and townships are covered commercially by the Ohio Basic Building Code and the International Fire Codes. Fire safety inspections are done through locally certified fire departments and the Ohio State Fire Marshal for support. Commercial building codes are administered by the Ohio Department of Commerce and inspections are completed by state inspectors. There is no residential building code. Other regulations are enforced by the local official in the given jurisdiction.

The NFIP requires that participating communities develop and maintain floodplain regulations, and appoint a floodplain manager. Participating NFIP communities are eligible to purchase flood insurance through FEMA. The following table shows which jurisdictions participate in the NFIP and lists their designated floodplain manager. Floodplain regulations determine if and how construction can occur in a designated floodplain, and what mitigation measures must be engaged in order to build in a flood-vulnerable location. Generally speaking, any financial assistance or incentive program, and any mortgage on the property, requires a property in a floodplain to carry federally-supported flood insurance through FEMA. Floodplain managers are listed in Table 2-16.

Jurisdictional Capability for Mitigation

The capability to implement mitigation strategies and to manage mitigation projects varies across Knox County. Knox County, as a county and on behalf of the townships, is fully capable of developing, executing and administering a complex mitigation project, as is the City of Mount Vernon, which has full capabilities for designing, administering, executing, managing, and completing a significantly complex mitigation project using either full-time staff or contracted staff. They have adequate engineering staff for technical design and implementation work, and administrative staff to develop project applications and manage the deliverables. They may require assistance from contracted personnel for special projects, but it would be reasonably anticipated for them to have full capabilities to initiate and manage mitigation projects. It is likely these three jurisdictions would have the financial ability to meet the local match required unless the projects were extensive infrastructure projects with an extremely high cost.

The villages of Centerburg, Danville, Fredericktown and Gambier have village administrators who could perform many administrative duties associated with a large mitigation project. They have implemented significant projects in the past with successful results, and it would be entirely reasonable to expect them to do the same with a mitigation project. They would likely have to hire engineering assistance and technical help, but, again, have the capacity to do that.

On the other hand, the villages of Brinkhaven and Martinsburg would struggle with mitigation projects. They do not have sufficient employees, and even their council representatives and mayor are volunteers. They have limited access to individuals who would design, administer or execute a project, and would have to either hire a contractor to do this work, or forego the option of funding due to a lack of resources. With very small population, they are not afforded the benefit of paid, designated employees or officials to manage special projects, and most village work is performed by elected officials as volunteers. These two villages would only have the capacity to conduct projects if they could include project management costs for hired staff in a grant, and they were able to meet the required match at a reduced amount. If villages were allowed to work through Knox County to conduct projects, there may be additional feasibility.

The townships would work through the Knox County Commissioners for mitigation projects. They lack the personnel to manage complex projects but have a working relationship with the county to address their needs. Townships would rely upon Knox County for administration and implementation of a significant project. They would generally require a reduced local share to be able to meet match requirements because township budgets are extremely insufficient to dedicate large amounts to a special project. They would benefit greatly by being able to leverage grants and other funds, and by using an in-kind match in some circumstances.

Table 2-17: Jurisdictional Capabilities

Jurisdiction	Planning Commission	Comprehensive Plan	Commercial Building Codes	Zoning Ordinances	Floodplain Regulations	Capital Budget Mitigation	Capital Budget PW Mitigation
Knox County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Brinkhaven	Yes	Yes	Yes	Yes	No	No	No
Village of Centerburg	No	Yes	Yes	Yes	Yes	No	No
Village of Danville	Yes	Yes	Yes	Yes	Yes	No	No
Village of Fredericktown	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Gambier	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Martinsburg	Yes	Yes	Yes	Yes	No	No	No
City of Mount Vernon	No	Yes	Yes	Yes	Yes	Yes	Yes
Berlin Township	Yes	Yes	Yes	Yes	Yes	No	No
Brown Township	Yes	Yes	Yes	Yes	Yes	No	No
Butler Township	Yes	Yes	No	No	Yes	No	No

Clay Township	Yes	No	Yes	No	Yes	No	No
Clinton Township	Yes	Yes	Yes	Yes	Yes	No	No
College Township	Yes	Yes	Yes	Yes	Yes	No	No
Harrison Township	Yes	Yes	Yes	Yes	Yes	No	No
Hilliar Township	Yes	Yes	Yes	Yes	Yes	No	No
Howard Township	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Jackson Township	Yes	No	Yes	No	Yes	Yes	Yes
Jefferson Township	Yes	Yes	Yes	Yes	Yes	No	No
Liberty Township	Yes	Yes	Yes	Yes	Yes	No	No
Middlebury Township	Yes	Yes	Yes	Yes	Yes	No	No
Milford Township	Yes	Yes	Yes	Yes	Yes	No	No
Miller Township	Yes	Yes	Yes	Yes	Yes	No	No
Monroe Township	Yes	Yes	Yes	Yes	Yes	No	No
Morgan Township	Yes	Yes	Yes	Yes	Yes	No	No
Morris Township	Yes	Yes	Yes	Yes	Yes	No	No
Pike Township	Yes	Yes	Yes	Yes	Yes	No	No
Pleasant Township	Yes	Yes	Yes	Yes	Yes	No	No
Union Township	Yes	No	Yes	No	Yes	No	No
Wayne Township	Yes	Yes	Yes	Yes	Yes	No	No

2.1.10 Economy and Business

There are more service-providing businesses in Knox County than good-producing businesses, although the average weekly wage for workers in the service industry is 40% lower than for good-producing employees.

Goods-producing business includes natural resources and mining, construction, and manufacturing. Construction has more companies (124) according to the Ohio County Profile, but the manufacturing section has far more employees, whereby 77 businesses employ an average of 4,353 people. Construction employs about 1,068 people. Wages for those two groups are very similar. In contrast, the 33 natural resources and mining employers have far fewer employees (180 average) and those employees make about 62% of what the previously identified groups are paid. The goods-producing sector employs just over seventeen thousand people, or about 59% of the workforce who earn about 63% of the local wages.

The service industry is categorized into trade, transportation and utilities; information; financial services; professional and business services; education and health services; leisure and hospital; and other. While this group employs approximately 41% of the local workforce, it accounts for % of the gross wages. Individual wages in the service sector are about 60% of what they are in the goods-producing sector. There are slightly over nine hundred service-based businesses who employ just short of twelve thousand people.

According to the Ohio County Profile (2024) for Knox County, there were both job increases and decreases across the various job categories. Generally speaking, the private sector showed 8.2% growth in number of establishments but a 2.2% decrease in number of workers. Federal and local public employment increased by 2.8% and 2.9%, respectively. Construction jobs enjoyed an increase of 13.7%, financial services grew by 2.7%, and other services grew by 6.6%.

All other categories, in both goods-producing and services, fell. The most dramatic decreases were in information technology (-35.6%) and state government (-13.8%).

Table 2-18: Total Employment Statistics*

Group	2023	2022	2021	2020	2019
Civilian Labor Force	31,310	30,837	29,604	30,907	31,869
Employed	30,288	29,760	30,873	28,988	30,594
Unemployed	1,022	1,077	1,269	1,919	1,275
Unemployment Rate	3.3%	3.5%	4.1%	6.2%	4.0%

*2024 Ohio County Profile for Knox County used for data

Tables 2-19 and 2-20 list the major employers and industries in Knox County according to the Knox County Ohio Census Profile 2024.

Table 2-19: Major Employers

Employer	Sector
Ariel Ltd.	Manufacturing
FT Precision	Manufacturing
JELD-WEN Inc.	Manufacturing
Kenyon College	Service
Knox Community Hospital	Service
Kokosing Construction Co.	Construction
Mauser Packaging Solutions	Manufacturing
Mount Vernon Nazarene University	Service
Mount Vernon City School	Government
Sanoh America Inc.	Manufacturing

Table 2-20: Employment by Industry

Employment Sector	Average Employment 2024	Change Since 2017
Manufacturing	4,353	-3.8%
Education and Health Services	4,208	-1.1%
Trade, Transportation and Utilities	2,927	-0.7%
Local Government	2,402	+2.8%
Leisure and Hospitality	1,873	-2.3%
Professional and Business Services	1,217	-16.4%
Construction	1,068	+13.7%
Other services	579	+6.6%
Financial Services	533	+2.7%
State Government	249	-13.8%
Natural Resources and Mining	180	-1.1%
Federal Government	107	+2.9%
Information	96	-35.6%

Agriculture

The U.S. Department of Agriculture defines prime farmland as "land best suited to grow, feed, forage, fiber, and oilseed crops." This type of land produces the highest crop yields with the least amount of energy and economic resources. According to this definition, a great deal of acreage in Knox County is prime farmland, making agriculture a significant economic contributor.

The Ohio Department of Development shows Knox County has 1,303 farms with an average acreage of 141 acres. The major crops grown include grains (corn, soybeans, wheat), nursery products (greenhouse, floriculture and sod), and other crops and hay. There are some producers of vegetables, melons, potatoes, sweet potatoes, fruits, tree nuts and berries. Livestock include poultry and egg production, cattle and calves, cows for milking, and swine. There are some other livestock animals like sheep, goats, horses, and other small animals. Crops account for 39% of farm sales in Knox County, and livestock and associated products account for 61% of farm sales.

Agriculture is a significant employer in Knox County. Of the 1,303 farms, 97 are considered family farms. Only seventeen farms hire outside help. Of 2,264 producers, 1,470 are male and 794 are female. The majority, 1,280, are between the ages of 35 and 64 while the next largest group consists of 698 farmers who are 65 years old or older. Almost three of four farms have internet access. Only two farms are considered an organic producer, and seven sell directly to consumers.

Table 2-21: Agricultural Production Data

Crops	Acres	Livestock	Head
Land Area		Broilers & Turkeys	1,589,933
Land in Farms	184,263	Cattle and Calves	19,481
Cropland	129,291	Hogs & Pigs	34,726
Other	11,084	Sheep & Goats	9,078
Pastureland	15,886	Layers & Pullets	155,303+
Woodland	28,022	Horses & ponies	2,692
Gross Receipts	$93,284,000	Gross Receipts	$147,964,000

2.1.11 Community Growth and Development Trends

Trends in employment include decreases in some sectors and increases in others. Construction, financial services, local government and federal government jobs and businesses are on the rise. Most other job areas are diminishing. Home construction is growing consistently, enjoying an increase, almost tripling, over the past five years.

The Knox County workforce, like many other counties, has experienced ups and downs since the 2020 pandemic. In pre-pandemic years when families held down multiple jobs, the workforce was about 500 people larger than it is today. During the pandemic, it dropped by only 2,265 people. Today, it has recovered all but 559 of those. For all appearances, the workforce and the resident's perspective on working members of families has stabilized after just a slight period of instability after the pandemic.

That is not to say that Knox County has not experienced economic woes within the past five years, and is not today, experiencing the consequences of the 2019 COVID Pandemic. When shortly after the last mitigation plan was approved and adopted, the public health emergency caused the temporary closure of businesses and institutions, interrupted the flow of goods and services and therefore the natural course of economic activity, and caused widespread illness during 2020 and the years to come. Healthcare was overwhelmed with sick patients, elective and non-emergent surgeries and procedures were canceled or postponed, and only health crises were treated definitively. This placed a burden on institutions, businesses, workers, and families. Incomes dropped, expenses soared, and challenges prevailed.

Since 2023 when the pandemic was officially declared over, Knox County businesses and institutions have worked diligently to recover and grow. They have down-sized, up-sized and right-sized to accommodate the demand for their products and services. Local residents have continued to work hard, and have supported other local businesses in the process. As a result, in 2025, there is a bright outlook for new and expanded businesses and employment opportunities.

Using the 2015 Knox County Hazard Mitigation Plan for reference, housing costs and income have risen commensurately since 2015. The median value of a home today is $197,400 while it was $134,300 a decade ago, representing an approximate 47% increase. Median rent has gone from $676 per month to $925 per month, a 36% increase. Mortgage costs, however, have increased only 13% since 2015, raising to $1,376 from $1,210 per month. The median income has risen from $49,323 to $73,088 representing a 49% increase in median income. Overall, these numbers might contribute to a higher likelihood of residents owning their home as mortgage costs rise less than rent costs. This could partially attribute to the increase in home construction from 137 units in 2019 to 376 units in 2023. The surge in multi-family availability in 2023 could also be partly responsible for the modest increase in rental costs based upon supply and demand concepts.

Table 2-22: Residential Construction Information

	2023	2022	2021	2020	2019
Single Family Homes	116	260	351	128	133
Avg. Construction Cost	$337,275	$374,562	$342,580	$254,439	$251,856
Multi-Family Units	260	2	0	3	4
Average Cost per unit	$149,000	$139,462	n/a	$103,500	$102,500

Economic Development

Community growth and development in Knox County is the outcome of multiple organizations and jurisdictions working together to meet community needs and improve the local business environment and economy. Sometimes the communication is formal, and other times it is informal, but the various levels of government engage in active collaboration to improve and grow the county's economy.

New Business Development or Expansion Process

The Knox County Area Development Foundation serves as the central clearinghouse for economic development planning and implementation. They work with other organizations, including the Chamber of Commerce and all local officials, to create high quality jobs, connect employers to local workforce individuals, and to encourage the growth of Knox County communities into vibrant and successful entities. The goals of the foundation include the following:

- Develop and market inventories of high-quality available land and buildings;
- Implement incentive programs to encourage business attraction and expansion;
- Conduct regular existing business visits;
- Attract abundant affordable housing of all types and price points;
- Continue coordinating workforce development activities;
- Ensure stable funding for career development;
- Increase childcare opportunities for the local workforce;
- Conduct land planning and implementation efforts;
- Implement programs to accommodate growth and build capacity;
- Conduct educational programs to increase local officials' understanding of development opportunities, pressures, and programs.

With these goals in mind, the Area Development Foundation works with all county entities to engage and expand business and professional opportunities and options in Knox County.

The Knox County Chamber of Commerce works to create and sustain linkages between the local government, potential new businesses, existing businesses, and other key community leaders for the purpose of promoting, retaining, and improving the local business climate. They work to implement training and education programs, leadership development, job training, safety in the workplace, and assist businesses with insurance and benefit programs. They serve as the primary link between businesses and the community. They list 453 local businesses that are considered members of the Knox County Chamber of Commerce, with whom they communicate and offer information on a monthly basis.

The Knox County Regional Planning Commission provides assistance in bringing all these entities together, creating and enforcing development guidance programs and codes of regulation, and in developing and implementing the Knox County Comprehensive Plan, the latest of which was adopted in May 2025.

The Regional Planning Commission serves as the central coordinating body and advisor for floodplain regulations and enforcement, subdivision rules, zoning regulations, lot splits, curb breaks and driveways, and stormwater planning and enforcement. The RPC director serves as the floodplain manager for the townships, and provides assistance and guidance regarding floodplain management to all villages and townships. He assists, as requested, with development of floodplain and zoning regulations. Also serving as an advisor and in support of

local zoning officials, the RPC serves as a coordination entity for land use and zoning enforcement across the county.
The RPC also spearheads development of the county's comprehensive economic and community development. Comprehensive plans have been developed in years past, and are currently updated and republished on a regular basis. The last plan was adopted in May 2025, and included participation from all county offices, the city, and all villages.

The current comprehensive plan includes information about the conservation, character and development of Knox County so that from a social perspective, development of new businesses and residences is consistent with the betterment of Knox County, and honors the history and culture of the community. It discusses plans for economic, workforce and housing resilience, aiming to meet the needs of a growing community for many years to come. The plan addresses special needs of residents, such as quality of life in general, mobility and transportation services, and housing needs. The plan also considers the growth of Mount Vernon, its county seat and central commercial and retail area, and the major residential area in the county. The plan appreciates the value of existing agriculture, the rural landscape with less of a chaotic environment than large cities, and the need for services to support the population.

In development of the Comprehensive Plan, the RPC included recently developed municipal plans, including the Centerburg Village Strategic Plan (2020), Danville Village Strategic Plan (2020), Fredericktown Village Strategic Plan (2020), Gambier Village Strategic Plan (2020), Mount Vernon Downtown Plan, Mount Vernon Strategic Plan, Knox County Economic Growth Strategy (2022), and the Knox County Workforce Demand Study. These were all developed by the community or organization using input from their members and residents to develop goals and strategies for their specific jurisdiction or organization.

Overall land use planning is established in this document. Protection of natural resources and the many scenic river miles, forested areas, parks and recreational areas, and lakes are all part of the considerations of areas designated for residential area vs. commercial development. The creation of open space, green space, and historical preservation is included in the plan, and married with the concept of robust and progressive economic development. They discuss and identify the types of housing desired by the county, and what those structures might look like and function. The comprehensive plan addresses utilities and the need for adequate, contemporary services to attract business and industry. It discusses the location of new business and industry in a location that is able to serve their needs through well planned and constructed utilities.

The RPC meets monthly, and planning activities are part of their monthly agenda, as well as other specific projects or issues. Each village has a designated member(s) and alternate(s) for the RPC except for Centerburg and Mount Vernon who do not participate in the RPC (although the do participate in comprehensive community planning projects). The meetings include the jurisdictional representatives and zoning officers, as well as anyone else who chooses to attend. Table 2-16 lists the representatives who make up the RPC by their positions.

The Emergency Management Agency is informally included in a variety of development steps. In floodplain management, soil conservation activities, agricultural activities, and land use planning, the EMA director is part of the meetings. As is typical in Knox County, the EMA staff members are all part of other local governance groups outside the EMA, and therefore are included as a trustee, a village representative, or in another leadership role in the county. Either way, their input on floodplain regulation, disaster mitigation, response concerns, and recovery potential is included in conversations along the way. Close local relationships foster this communication and keep emergency management considerations on the agenda for all development activities in the county. The RPC and EMA work together well, and collaboration is key to their ongoing working relationship.

Development Summary

The Knox County Regional Planning Commission serves as a central point for information about business development and regulation in Knox County. The Chamber of Commerce and the Knox County Area Development Foundation work together to attract, recruit, and coordinate new interest in opening a business in the county, or in expanding an existing business. The villages and the city then join the mix and assist with regulations and technical information for the interested parties. Zoning, fire, and commercial inspectors and engineering staff assist with plans and inspections, helping businesses meet the requirements for sound structures that become safe workplaces. The EMA is involved to ensure resiliency and disaster mitigation efforts are part of all activities, leading to an even more resilient community when faced with various disasters.

See Section 3.0 Mitigation Strategies for more information about that include development actions.

2.2 HAZARD IDENTIFICATION

Knox County has experienced many disasters in its history, ranging from floods and tornadoes to blizzards and windstorms. In this section, the hazards that can impact the county are defined and the risk for each hazard is assessed. As part of this process, the Hazard Mitigation Planning Team analyzed the hazards and risks present throughout the county. Eleven hazards were identified as relevant to Knox County, as listed below.

- Dam Failure
- Drought/extreme heat
- Earthquake
- Fire (Wildland, field, structural)
- Flood (Pluvial, fluvial, storm system back up)
- Hazardous materials (including pipeline emergencies)
- Invasive species (Pests or plant disease, fish or animals)
- Land subsidence (Karst, erosion, landslide)
- Resource Contamination
- Severe Storms (Thunderstorm, wind, tornado, winter storm)

- Utility Failure (Power, water, water treatment)

Some hazards were excluded from this plan because they pose no risk to Knox County. The excluded hazards and the justification for the exclusion are identified in the table below.

Justification for the exclusions was discussed. Avalanche, tsunami and volcano do not exist in Knox County, and therefore were excluded. Coastal erosion is possible in Knox County because there is no coast.

Table 2-23: Excluded Hazards

Excluded Hazard	Justification
Avalanche	The county has no mountains.
Coastal Erosion	The county has no coastline.
Tsunami	Geographically impossible
Volcano	Geographically impossible

Knox County does not have a long history of federal disaster declarations or assistance. The county has been included in thirteen federal declarations. A comprehensive list of ten federal disaster declarations for Knox County is provided in Table 2-24.

Climate change was not listed as a specific hazard, but changing weather patterns and characteristics were incorporated into the discussions about all hazards, and applied as it relates to Knox County. Participants initiated discussions about how storms have changed, and how impacts are different than they used to be, even five years ago. The contrasted the extremely wet spring of 2018 where a fourth of all farm acreage in Ohio wasn't able to be planted, against an incredibly dry fall of 2024 where crops thirsted in fields and landscaping died for lack of water. Strategies were considered in the context of how these kinds of changing weather patterns and presentations would affect the incidence, circumstances, and outcomes of a particular impact. For example, as rain falls faster and more intensely, flooding was expanded to include surface runoff, flash flooding, and surface flooding. Consideration for how increased rainfall, and resulting increased runoff, would affect Knox County was given. The effects of hard, pounding rain and pooling on surfaces causes additional rapid surface drainage which worsens surface stress and topsoil erosion. All of these kinds of effects were considered in the context of what is happening now, and the plan has been modified to include those changes. Therefore, climate change in an implied part of every hazard, and will be continually assessed as this plan is implemented and later updated.

In developing this assessment, the Knox County Hazard Mitigation Planning Team analyzed the hazards and risks present throughout the county. Because of the impact on residents, they discussed all hazards, not just natural hazards.

Table 2-24: Federal Disaster Declaration History

DR/EM Number	Incident Date	Incident Type(s)
DR-90-OH	January 23, 1959	Flooding
DR-3055-OH	January 26, 1978	Severe blizzard

DR-1227-OH	June 30, 1998	Flash flooding, flooding, high winds and tornadoes
EM-3187-OH	08/14/2003	Other (Power Outage)
DR-1580-OH	February 15, 2005	Severe winter storms, flooding, mudslides
EM-3250-OH	September 13, 2005	Hurricane Katrina Emergency Shelter Ops
DR-1805-OH	09/14/2008	Wind
DR-4077-OH	06/29/2012	Wind, Severe Summer Storm
EM-3457-OH	March 13, 2020	COVID-19 Pandemic
DR-4507-OH	March 31, 2020	COVID-19 Pandemic

To understand the risk posed by natural hazards in Knox County, it is important to examine the characteristics of each hazard and evaluate local occurrences. Historical information was obtained from the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) and supplemented with information from local officials. This section defines each hazard and describes Knox County's history with each.

Climate and Weather

To enhance discussion about weather and climate modifications applicable to the local community, the potential effects of climate change are discussed in each of the hazards to which it applies. The Climate Mapping for Resilience and Adaptation website information was discussed, and the reactions are appropriate to that data and other data that was anecdotally included by participants.

How storms occur and the impact on the community is changing. Stakeholders reported various differences in thunderstorms, windstorms, and precipitation in general. Most participants felt that rain falls in more intense storms now and with greater amounts at one time, rather than gentle rains that came frequently in past years. They felt that the wind is stronger than it used to be, and blows more consistently than they remember in the past. In general, stakeholders felt that winters are less harsh, not as cold, and have less snowfall. The say little change in drought except for this past year, although they said periods between rainfall episodes are longer than they used to be, and at the time of meetings, the county was experiencing an extremely dry period. Last fall, 2024, was an anomaly because it was incredibly dry from mid-summer through fall. Precipitation ended up below normal, and many crop yields were low due to the lack of precipitation at critical times in plant and fruit development.

Data suggests that there is also a change in temperatures, although local stakeholders did not feel this change is remarkable in Knox County. They did report that cool weather lasts longer into May now than it used to, and that the warm-up to summer-like temperatures often does not happen until June. There are still cool spells in June, but there are warmer days in between the cooler ones, whereas May is generally consistently cooler than in the past. They remarked that falls seem to be warmer, and the warm weather commonly stretches into November.

Knox County stakeholders felt that climate change will have less of an effect locally than in more metropolitan areas. Located in the midst of central Ohio where there are no major cities nearby, and few carbon-dissipating industries with robust operations, they feel climate change

will impact them in a slower and less profound manner than metropolitan areas closer to Columbus and Cincinnati. With a total county population lower than many major cities, the county's contributions to pollution and environmental causative activities are far less than in a Franklin County. Therefore, climate change was considered a less imminent threat than in many other counties. While it does affect the various meteorological events, the change is not profound.

Stakeholders did recognize changes in storm patterns and the specific outcomes of major weather fronts. Almost all participants felt there is a marked increase in tornado activity the past few years, even considering that detection and monitoring has increased in capability to detect funnel clouds, rotation and debris fields. Those changes are discussed within each hazard described in the following section. Many of their comments were consistent with climate projections, only to a lesser degree with fewer drastic changes.

Data is according to the Climate Mapping for Resilience and Adaptation (CMRA) website. This tool is consistent with the USGS and NOAA datasets. Projections can be expressed in tracts similar to the Economic Justice Screening Tool and Building Code Adoption Tracking, but the following table is a countywide projection.

In general, this tool indicates that ambient temperatures are rising, and higher emissions caused a greater increase. Days between rains might increase, and the consecutive dry days will likely increase. Total rainfall will change minimally, but storms may result in more rainfall. These projections are consistent with stakeholder conversations.

Table 2-25: Climate Projections per CMRA – Knox County OH

Category of Climate Condition	1976-2005 Low	2015-2044 Low	2015-2044 High	2035-2064 Low	2035-2064 High	2070-2099 Low	2070-2099 High
EXTREME HEAT							
Annual Days max temperature > 90	8.2	20.9	23.5	29.8	38.8	39.7	73.7
Annual days with max temperature >95	0.8	4.5	5.7	8.5	13.0	13.6	37.6
Annual day max temp >100	0.0	0.5	0.9	1.7	3.3	3.6	15.5
Annual single highest max temperature >105	0.0	0.0	0.1	0.2	0.6	0.4	5.8
Annual single highest temperature	93.9	97.1	97.6	98.6	100.2	111.2	105.4
Annual highest max. temp avg. over 5 days	89.5	92.5	93.0	94.1	95.6	95.7	100.7
Cooling degree days	620.9	894.3	934.1	1060.2	1211.9	1230.2	1861.7
DROUGHT							
Average annual total precipitation	39.9	41.3	41.7	41.9	42.5	42.0	44.0
Days/year with precipitation	199.2	202.2	201.4	201.1	199.9	200.0	196.7
Day/year with no precipitation	160.0	163.0	163.7	164.0	165.3	165.1	168.5
Max # consecutive dry days	10.7	11.3	11.4	11.3	11.6	11.7	12.7
Annual day max. temp. >90	8.2	20.9	23.5	29.8	38.8	39.7	73.7
Annual days max. temp >100	0.0	0.5	0.9	1.7	3.3	3.6	15.5
WILDFIRE							

Days/year no precipitation	160.0	163.0	163.7	164.0	165.3	165.1	168.5
Max. # consecutive dry days	10.7	11.3	11.4	11.3	11.6	11.7	12.7
Days/year with precipitation	199.2	202.2	201.4	201.1	199.9	200.0	196.7
Annual days max temp >90	8.2	20.9	23.5	29.8	38.8	39.7	73.7
Annual days max temp >100	0.0	0.5	0.9	1.7	3.3	3.6	15.5
FLOODING							
Average total precipitation	39.9	41.3	41.7	41.9	42.5	42.0	44.0
Days per year with precipitation	205.2	202.2	201.4	201.1	199.9	200.0	196.7
Max number of consecutive wet days	13.1	13.1	13.2	13.3	13.3	13.2	13.6
Annual days with precipitation >1 inch	3.34	3.4	3.5	3.6	3.9	3.7	4.8
Annual days with precipitation >2 inches	0.1	0.2	0.2	0.2	0.2	0.2	0.3
Annual days with precipitation >3 inches	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Annual days > 99th percentile precipitation	4.5	5.5	5.7	5.9	6.5	6.1	7.8
Days with max temp <32	35.2	25.9	25.2	22.4	20.0	19.2	11.4

2.2.1 Dam/Levee Failure

A dam is an artificial barrier built across flowing water. This barrier directs or slows the flow of water and often creates a lake or reservoir. A dam is considered hydrologically significant if it has a height of at least 25 feet from the natural streambed and a storage capacity of at least fifteen acre-feet or an impounding capacity of at least 50 acre-feet and is six feet or more above the natural streambed. Dams are constructed for flood control purposes or to store water for irrigation, water supply, or energy generation. Many structures, especially reservoirs and wastewater treatment lagoons, are constructed upground pools where the water is held back on all sides by the "upground" earthen structure. Dams can also be created for recreational purposes. They can be composed of earth, rock, concrete, masonry, timber, or a combination of materials. Dams are classified according to an assessment of hazard potential, specifically low, significant or high hazard. Low hazard dams that fail would likely cause no loss of life, few economic or environmental losses, and damage would likely be confined to the owner's property. Significant hazard dams may cause economic or environmental damage, disruption of lifeline facilities, or impact other entities. High-hazard dams, upon failure, are expected to cause a loss of human life, in addition to economic and environmental damage, and disruption to lifeline services. Dams are commonly referred to as dams, reservoirs, and lagoons.

Levees are embankments constructed to prevent the overflow of a river and subsequent flooding of the surrounding land. They can be built using earth, rock, or other materials. Levees constructed from concrete or masonry materials are referred to as floodwalls.

A failure of these structures is defined as the uncontrolled release of the water held back by the dam in a lake or reservoir. The majority of dams have a small enough storage volume that a breach or failure will have limited impact on the surrounding community, and many are classified as low-hazard dams. A large number of dams are classified as significant hazard, and some are considered high-hazard. Failure of a large, high hazard dam can cause substantial flooding downstream and lead to significant loss of life and property.

There are many causes of dam failure, including:

- Sub-standard construction
- Geological instability
- Spillway design error
- Poor maintenance
- Internal erosion
- Extreme inflow
- Earthquake

Should the amount of rain that falls, or ice melt after significant winters, increase, dams could be at higher risk of failure. Holding back an increased amounts of water or ice that exceed the engineered strength of the dam puts excessive stress on the structure and increases the chances of failure. Over-topping of a spillway, lagoon, or upground reservoir could occur under conditions of extended heavy precipitation in the context of saturated soils and waterways already full of draining water. The additional stress through repetitive waves of heavy rainfall could potentially decrease the lifespan of a structure, or require unanticipated maintenance and repairs. Earthen dams, lagoons, or reservoirs could deteriorate faster due to the excessive gravitational drainage and the erosion that it causes. Some dams have outlets that allow for some control of the amount of water held by the dam. Some dams use the gates on a spillway to release water in a controlled fashion, thus managing the stress placed on the structure. The engineering requirements for dams that hold water back within a waterway should include scenarios that call for excessive, prolonged precipitation under conditions of high soil saturation. Dam vulnerability could also be worsened upstream circumstances. What the upstream land is used for and the details of the upstream watershed can have an impact on dam performance and stability.

Extreme drought could negatively impact a wastewater lagoon through excessive evaporation and causing natural imbalances and chemical changes. More evaporation would be reasonable to expect, further depleting the water content. Algal bloom is more robust in hot weather, and the presence of phosphates and other contaminants could cause treatment problems. Knox County currently has two wastewater lagoons.

The National Inventory of Dams (NID) identifies the dams across the United States. The NID Data Dictionary (2021) defines critical verbiage associated with that resource. Each dam has an identification number and name. The owner, dam condition, and filing of an Emergency Action Plan (EAP) is described. Other information utilized include the dam classification (high-hazard, significant hazard, etc.) and the inspection date and condition (satisfactory, fair, poor, unsatisfactory) of the dam. The dam is described in the context of size and capacity, and the river or stream that feeds the structure is identified. The nearest municipality is identified. While significant detail about the dam is included on this site, for the purpose of this mitigation plan, the basic information is used.

Dams are classified by the potential magnitude of a breach. “High Hazard” indicates that failure of that particular structure would probably cause the loss of human life. Economic,

environmental, and lifeline losses are probable as well, although the loss of human life probability is the only required indicator for high-hazard classification. "Significant" indicates that the loss of life is not anticipated, but there would be economic, environmental, and lifeline losses should a breach occur. "Low" hazard indicates the losses would likely be limited to those of the dam owner.

While the NID classifies dams as high-hazard, significant-hazard and low-hazard, the Ohio Department of Natural Resources describes them as Class I, II, III and IV. In general, Class I is consistent with high-hazard; Class II is consistent with significant-hazard, and Class III is consistent with low-hazard. Class IV dams are not included on the NID.

The National Levee Database identifies the same information for levees in all states. There are six levees identified in Mount Vernon, and all are for the purpose of flood control. There are six high-hazard dams listed in Knox County, as well. This plan will address those levees and dams.

Table 2-26: NID Listed High Hazard Dams and Levees

Structure	Owner	Purpose
Apple Valley Lake Dam	Apple Valley POA	Recreation
Lake Damascus Dam	Damascus Mission	Recreation
Lake Viering Dam	C/B Maisenbacher	Recreation
North Branch Kokosing Dam	USACE	Flood Risk Reduction
Knox Lake Dam	ODNR, Div. Wildlife	Recreation
Knox Cattle Company Dam	Landings POA	Recreation
Mount Vernon Levee	Mount Vernon	
Mount Vernon Dry Creek Levee	Mount Vernon	Flood Risk Reduction
Mount Vernon Dry Creek North	Mount Vernon	Flood Risk Reduction
Mount Vernon Segment 2	Mount Vernon	Flood Risk Reduction
Mount Vernon Segment 3	Mount Vernon	Flood Risk Reduction
Mount Vernon Segment 6	Mount Vernon	Flood Risk Reduction

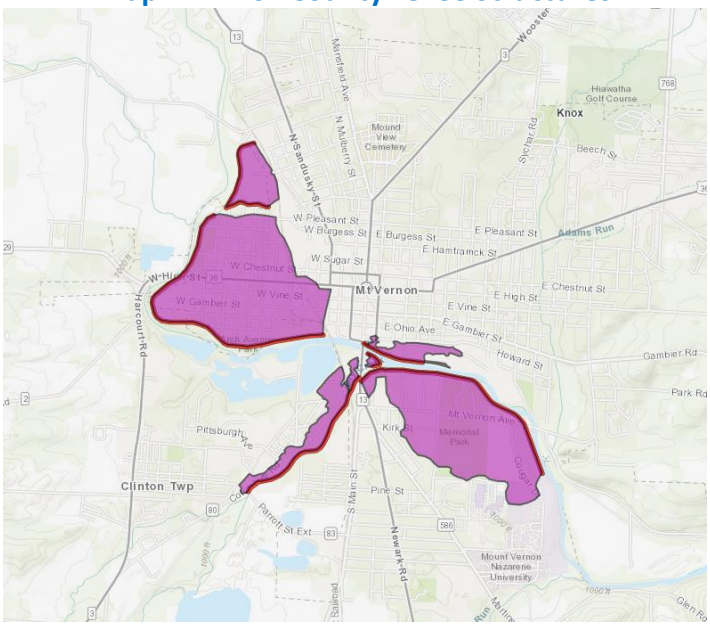
Levees

According to the National Levee Database, there are six identified levee structures in Knox County. These levees are all located in along the Kokosing River in Mount Vernon. The levees are designed to protect the city from flooding on the river. They are locally maintained and considered to be in good repair. Given their location in Mount Vernon, the most populated jurisdiction in the county, there are a number of structures located behind some of the levees. The length of the structures and population and property behind each is identified in the table below. Map 2-4 shows the potential risk zone for each levee, according to the National Levee database. Given the limited number of levees and lack of prior incidents, levee failure is considered a lower risk than dam failure for the county.

Table 2- 27 Knox County Levee Information

	Dry Creek	Dry Creek North	Mount Vernon Levee	Levee 2	Segment 3	Segment 6
Waterway	Dry Creek	Dry Creek	Kokosing River	Kokosing River	Kokosing River	Kokosing River
Levee Length	0.769 miles	0.086 mi.	0.121 mi.	2.133 mi.	1.208 mi.	0.318 mi.
Property Value	$88M	$12M	$2M	$410M	$48M	$2M
Buildings	15 Commercial 1 Public 103 Residential	9 Commercial	3 Commercial	105 Commercial 17 Industrial 6 Public 635 Residential	9 Commercial 2 Industrial 26 Residential	1 Industrial 1 Public 1 Residential
Population	218-Daytime 320-Nightime	Daytime - 1 Nighttime - 2	None	Daytime – 1639 Nighttime - 1370	Daytime – 81 Nighttime - 478	Daytime -1 Nighttime – 2
Critical Infrastructure	None	1 Intermodal terminal	None	EMS – 1 Fire - 1	None	None
Farmland	None	None	None	1 acre	2 acres	None
Endangered Species	None	None	None	None	None	None
Community Impacted	Knox County Mount Vernon	Mount Vernon	Mount Vernon	Mount Vernon	Mount Vernon	Mount Vernon

Map 2-4 Knox County Levee Structures



These levees obviously protect both public and private property, as well as commercial, industrial and residential structures. The people who occupy these buildings are protected as well. As these floodwalls hold water back in the Kokosing River as it flows through the city,

losses are prevented, business is protected, and daily operations continue to occur. Without the levees to hold back a precipitation-swollen river, losses to the city and its residents could be catastrophic. Roads near the river would close as they flooded over, in addition to the buildings within the flood zone that would be unusable. When rivers swell in busy residential areas and business zones, the incidence of entrapment, swift water rescues, and loss of life is common. Because of these levees, a normal day doesn't have to cease because of heavy rain. These levees are critical to the life, productivity, and sustenance of the city and its residents.

High Hazard Dams

There are six high hazard dams actually located in Knox County, and owned by various parties. Two of the largest dams are located in the northwest corner of the county, in Middlebury and Berlin Townships, and just north of Fredericktown. One is located at Apple Valley Lake, a large subdivision of homes in Howard Township, and is owned by the property owner's association. Lake Viering is a small private lake in Pike Township just south of the Richland County line. Lake Damascus is to the far southwest, located on the Morrow-Knox County line northeast of Centerburg and just west of Mount Liberty. Knox Cattle Company Dam is a privately HOA owned by property owners, and located on the far east side of Mount Vernon. A seventh dam, Pleasant Hill Dam located in Ashland County, would inundate parts of Jefferson and Union Townships if it failed, and would inundate the village of Brinkhaven. Each dam is described in the following pages.

Apple Valley Lake Dam (Knox County, specifically Howard Township)

Apple Valley Lake is a man-made lake and subdivision. The purpose of the lake, created by the dam, is recreation. The dam was designed by Dodson0Lindblom Associates, Inc. of Columbus, Ohio and constructed by Hol-Acc Construction Company from Wixom, Michigan. It is an earthfill dam and spillway with a drainage area of 18.55 square miles that would affect the unincorporated neighborhood of Howard. It is on stream of Jelloway Creek. The dam is 91 feet high and 650 feet long, and was constructed in 1971. The maximum storage is 252,000 cubic yards, and the maximum discharge is rated at 54,460 cubic feet per second. The surface area covers 488 acres. The dam was last inspected on 11/24/2024, but was found to be in poor condition in 2019. There is an Emergency Action Plan, but it does not include inundation maps.

The dam is on the southeast side of the south end of Apple Valley Lake. Most of the houses are to the west and north of the dam, and logically would not be affected by a failure because the creek runs to the south, and inundation waters would likely try to follow the natural path of water. The following map shows in blue when the creek flows. The unincorporated area referred to as Howard would be at high risk. Howard has about 250 residents by latest estimations. Flowing downstream from Howard, the area is all rural land covered by much forested area and farmland.

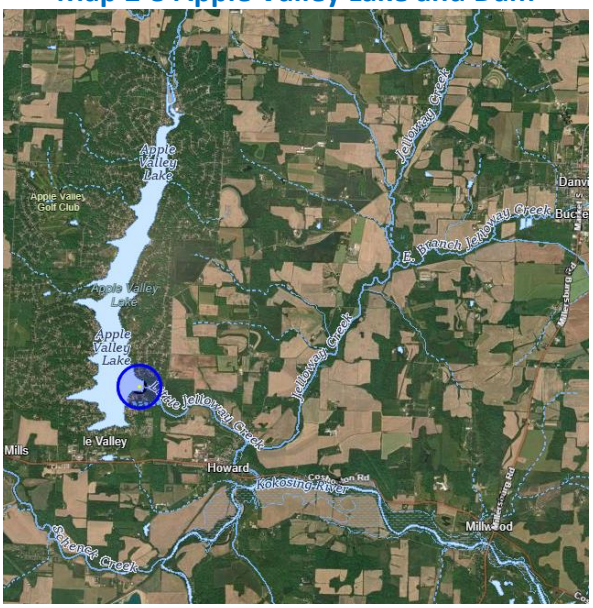
There are 5,873 residents of Howard Township, and it would be fair to assume a great majority of those people live in the Apple Valley Lake community. Anecdotal online references indicated that Apple Valley Lake has approximately 5,352 of the township's residents.

The EAP discusses the regular inspection of the dam, and identifies overtopping, seepage, and embankment stability as potential problems. They would see sink holes, whirlpools, riprap displacement, slides, stumps or sloughs as signs of a problem. The EAP tells the inspector what conditions to examine and provides fairly detailed information about what each problem would look like. The plan goes on to establish responsibilities of the property owner's association, and designates specific individuals to take specific actions. The plan includes the Knox County EMA as a party in notification and warning of the public, evacuation of endangered homes, and for communication with the general public about the status of a problem at all stages. The Sheriff is responsible for closing or protecting highways and roads, and closing any areas that would be determined to be unsafe for occupancy or travel. The dam owner – the property association – is the EAP coordinator and holds responsibility for maintaining the document and practicing the procedures. The plan outlines the equipment and supplies the association must have to handle an emergency, and it identifies the sources of those supplies should additional items be needed. It reviews how each symptom of failure should be handled, using the resources listed, to minimize the damages done during response.

The Knox County EMA holds a copy of the Emergency Action Plan, and the POA president is well acquainted with and known in the Knox County community. The POA is well represented at county meetings, and participated in person in the past three mitigation planning efforts. The EAP for the dam was last revised in May, 2008.

A map of the Apple Valley Lake and the dam location is below. The downstream ditches are also illustrated on this graphic. The circle indicates the location of the dam and spillway.

Map 2-5 Apple Valley Lake and Dam



Knox Cattle Company Dam (Mount Vernon)

This dam is part of a neighborhood in Mount Vernon, and has been the subject of controversy for many years. As lawsuits were filed and decided, the controversy is coming to an end with final determination of the dam owner, and delegation of the responsibility to that owner.

Knox Cattle Company Dam is located south of Coshocton Road on Yauger Road, between Waters Edge Drive and Mallard Point. The area is home to a subdivision of between 100 and 150 homes and condominiums. The POA is called Landings Property Owners Association, and it is comprised of the landowners in the subdivision. They have been determined to be the official, legal owners of the dam.

The dam has no EAP.

The body of water and the dam were created in 1945 on a tributary to Center Run for the purpose of recreation. There is no information available as to the design or engineering firm that assisted with development of the lake and property.

The dam is 20 feet high and 375 feet in length. There is no information available about volume held in the lake, but the body of water covers four acres. The maximum discharge is rated at 114 cubic feet per second on the NID.

The dam is rated in "unsatisfactory" condition as of 03/13/2025. The last inspection was 08/28/2024.

Stantec Consulting Services, and engineering company from Columbus, provided engineering services to assess this dam in 2022, and provided alternatives to Frost Brown Todd LLC, the attorneys representing the City of Mount Vernon, for disposition of the dam. The city agreed to perform interim risk reduction measures by lowering the reservoir water level and installing riprap on the emergency spillway channel. In 2021, the city completed additional mitigating actions, repairing the spillway outlet and removing the rusted outlet pipe.

The three alternatives Stantec proposed included the following:

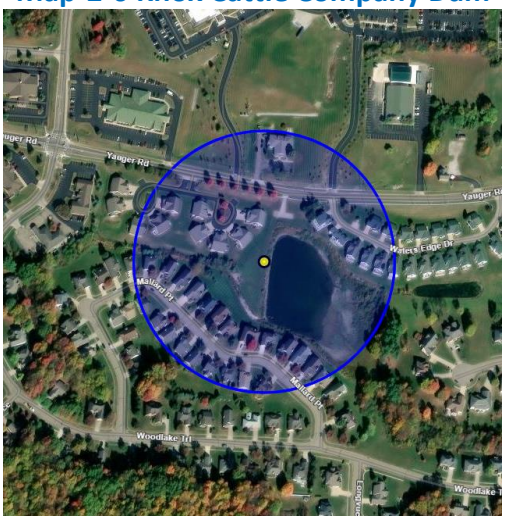
- Rehabilitate the dam and maintain the existing pool;
- Remove the dam and pool, and implement alternative stormwater management measures;
- Reduce the dam embankment height such that the dam is no longer subject to ODNR dam safety jurisdiction and implement alternative stormwater management measures.

It was noted that removal of the dam would diminish the city's ability to manage stormwater because the retention of stormwater in the pond is a critical factor. Decreasing the size of the dam would require construction of retention basins to hold stormwater. Because reduction in size of the dam wall and size would impact stormwater management, Stantec suggested that the city could incur additional liability for downstream flooding in high precipitation events.

The cost of the three options varied $1.39M at the low end to $2.5M on the high end. Operational and maintenance costs were estimated to be between $30K and $40K per year. They expected the project to last less than a year in all three cases.

In late August 2025, Jack Harris of Intercept Management recommended the solution that deregulates the dam, and restores it to its initial footprint with a low maintenance cost. ODNR had brought the case to court to determine the actual owner of the dam, and one year ago, a judge ruled that The Landings Property Owners Association owned the dam and appointed Harris as receiver for the defunct POA. Knox County Commissioners utilized ARPA funding to resolve the issue and mitigate negative outcomes. The project will be completed by the end of 2025 in an agreement between Intercept Management and Knox County.

Map-2-6 Knox Cattle Company Dam



Knox Lake Dam

This dam is located at Knox Lake in Berlin Township north of Fredericktown. It is owned by ODNR Division of Wildlife. Communication with the owner was accomplished through Karen Cabrerra for direction, and actual dam-specific information was discussed with Nick Raddabaugh from ODNR. The Emergency Action Plan was shared even though it is on file at the Knox County EMA. The EAP was written by Stantec Consulting Services Inc. in June 2015, and revised by Michael Baker International, Inc. in February, 2021.

Knox Lake Dam is an earthen dam on a lake used for recreation. Knox Lake Dam is on the East Branch of North Branch Kokosing River 1.3 miles northeast of Fredericktown. The dam is 52 feet high and 465 feet in length, and holds 86,520 cubic yards. It was completed in 1954, and covers 440 acres of surface with a drainage area of 31.7 miles. It was last inspection on 11/5/2024 and conditions were assessed on 03/17/2025 by ODNR staff. The condition is satisfactory. The EAP on file was revised in 2016.

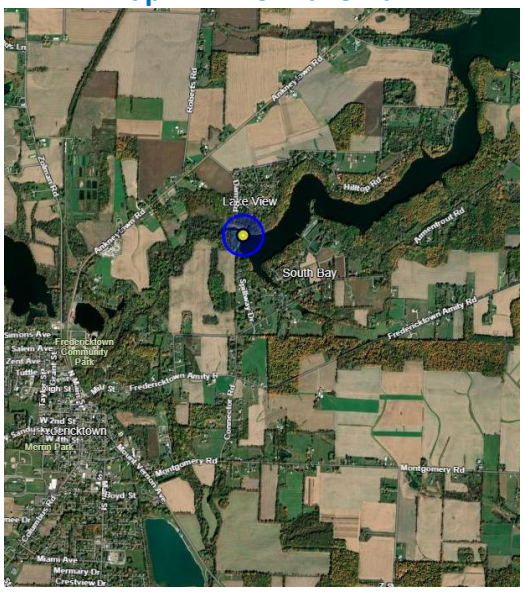
The EAP includes involvement of all the typical local and state partners, including Knox County EMA, Ohio EMA, and ODNR. It covers all the responsibilities of ownership, including those

responsibilities typical during an emergency incident. It discusses the notification, evacuation, and care of affected local residents during an incident, as well as discussing coordination responsibilities on the part of state and local entities. The EAP describes the surveillance and monitoring, access to the site, response during light and dark hours, holidays, and weekends. It discusses the effect of adverse weather conditions. They discuss the needed equipment, supplies, and other resources needed for a response. They also discuss public communication, and awareness of the dam and any incident. All relevant employees of ODNR are listed with all contact points in the EAP.

The inundation maps are clear and concise. The area would include most of Fredericktown, all east of SR 13, and then would flow south on the east side of SR 13 into Morris Township. Additional maps show the times and depth of floodwaters as the inundation travels through Fredericktown and Berlin and Morris Townships. The inundation for Fredericktown would occur between 30 and 80 minutes after the incident impact, and 196 critical structures are identified, as well as one water treatment plant. As the waters flow southward out of the village, the second screen of inundation shows 25 structures at risk within 45 to 90 minutes. The third screen shows 17 structures at risk 95 to 100 minutes after impact.

The EAP seems to indicate that most of the structures at risk are single family homes. One water treatment facility is identified. The streets and roads are clearly marked on the map, so it is easy to compare the EAP maps to the local county map. It is also easy to see which properties are expected to flood and at what time versus those that are likely more elevated and not as vulnerable. There does not appear to be a list of homeowners to contact in the plan. Notification appears to be through the Knox County EMA, and they would have to work with local 911 to determine the property owners who may be affected, or would send door to door responders to specific areas. Most of the areas have an hour or more until floodwaters are expected to strike. There would also be the option of using a targeted local wireless system.

Map 2-7 Knox Lake Dam



Lake Damascus Dam

Lake Damascus Dam is located near the Morrow County line in Hilliar Township. It is part of the Damascus Catholic Mission Campus, a private faith-based recreational facility that offers special events and camping for both children and adults throughout the year. The dam is on an unnamed tributary to Dry Creek 2.2 miles from the unincorporated area called Mount Liberty. The spillway type is a concrete riser with an outlet pipe, and the spillway is a grass-lined open channel with side slopes. The dam was built in 2010, but the engineer or construction company that built it is not listed on the NID. The dam is 31' high and 1.050' in length. It covers 22.2 acres of surface, and holds a maximum of 240-acre feet of water. The maximum discharge is 111 cubic feet per second. The last inspection was 10/30/2020 when it was rated in "poor" condition. There is an EAP on file with the Knox County EMA, and the plan does include inundation areas identified through engineering practices.

The EAP for Damascus dam was developed by Civil & Environmental Consultants, Inc. of Cincinnati Ohio. The total inundation zone is illustrated in seven screens, each that describes the structures at risk and the anticipated timeline for flooding. It interfaces the area with the 1% flood hazard area, identifies the distance downstream in the illustration, and shows location of the identified structures-at-risk. Screen #1 is of the dam itself, in Knox County. Screens #2 and #3 are property that is located in Morrow County, and are not described in this plan. Screens #4 through #7 illustrate properties as the inundation zone moves back into Knox County. Screen #4 shows six residential properties, including one outbuilding, and one bridge over a state highway. Maximum flooding would be 4.53 feet, and flooding would begin approximately thirty minutes after breach, peaking at slightly over 50 minutes. Screen #5 shows 10 residential properties that would receive water slightly more than half an hour after breach, and depth of floodwaters would not exceed 3 feet. Screen #6 shows twelve residential properties and one church that could have, with the exception of the church, a foot or so of water within 60 minutes of breach. The church appears to be situated on lower ground, and could experience four feet of water. The last screen shows one home and there is no anticipated depth of water. In general, the inundation area is along SR 3 in Mount Liberty. The EAP shows that the dam affects both Knox and Morrow counties, and both EMA directors, engineer, fire and law enforcement departments are assigned duties in the plan. The Knox County has a copy of the plan on file. It identifies monitoring practices, potential signs of failure or compromise, and sets alert levels from monitor, to watch to warming.

The buildings associated with Damascus Catholic Mission Camp are not within the inundation zone. The cottages and fellowship building are located on the grounds to the southeast of the dam, a significant distance from the lake. Most activities take place in this part of the property, and overnight campers are housed in this area. The drive to the facility is located half a mile from the dam. Ramey Road, Township Road 00, and State Route 3 that lead to the entrance ARE associated with the impact area, so ingress and egress would utilize alternate routing in a disaster.

Map 2-8 Damascus Catholic Mission Camp Dam



Lake Viering Dam

Lake Viering is a privately owned property in the northeast corner of Pike Township, near the Richland County line. It was built near the headwaters of Little Jelloway Creek in 1964, and is now owned by Chris and Beth Maisenbacher. The dam is 47 feet high and 800 feet in length, and it covers 29.8 acres. It holds 125,376 cubic yards of water, and the maximum discharge rate is 254 cubic feet per second. There is no EAP and no identified inundation zone. The dam was inspected and found to be in poor condition on 11/29/2024.

Little Jelloway Creek flows out of the dam and travels to the southeast where the creek enters Apple Valley Lake. While there are homes located on the east and west sides of Lake Viering, the land between it and Apple Valley Lake is mostly rural farmland with a few farmsteads and homes located along Little Jelloway Creek. It is not anticipated that a dam failure would impact the homes surrounding the lake, but the homes along the creek could experience flooding. There are seven recreational vehicles that are parked on the south side of the lake, in the area where a dam failure would logically cause flooding. These camping vehicles are mobile and can be moved; they are only on site from early spring to late fall, about seven months of the year.

The owner is addressing the creation of an EAP, but the cost is prohibitive. The fees paid by the vacationers who bring their recreational vehicles there pays for some grounds maintenance but not much more. The owner is trying to work with dam regulation officials to find a means to create an emergency plan.

Map 2-9 Lake Viering Dam



North Branch Kokosing Dam

The North Kokosing Dam is the largest and most dangerous dam in Knox County. It sits on the North Branch of the Kokosing River just two miles northwest of Fredericktown in Middlebury Township. It was built by, and is currently owned by, the US Army Corps of Engineers out of Huntington WV for the purpose of flood risk reduction as the North Branch Kokosing joins the Kokosing south of Fredericktown in Morris Township, and flows into the City of Mount Vernon and then the Village of Gambier. It is also used as a fish and wildlife pond, and for recreational purposes.

The dam is 71 feet high and 1,400 feet in length; it holds 990,452 cubic yards of water. The normal storage is 1,043 acre-feet, with a 45 square mile drainage area. The maximum discharge is rated at 13,500 cubic feet per second. The water covers 154 acres. The dam was built in 1972, assumably by the USACE using internal engineering and project management. The spillway is an uncontrolled type that is 60 feet wide. The dam was inspected on 08/23/2023 but no condition was listed. It is listed as having an EAP with update of emergency contacts on 07/25/2024, last revised on 07/22/2025 and last exercised on 07/25/2024.

Although numerous calls were made to attempt to get information about the dam, eventually the plan Contractor was told the EAP and other information, except what is openly available on the National Inventory of Dams, is classified information and cannot be shared. The EMA does not have information about the dam, nor do the townships where it is located or the fire departments who would respond. In conversation with state and local officials, it was decided that information on the NID would be used to the best it could be as other options did not exist. The dam is not eligible for federal funding because it is owned by the federal government.

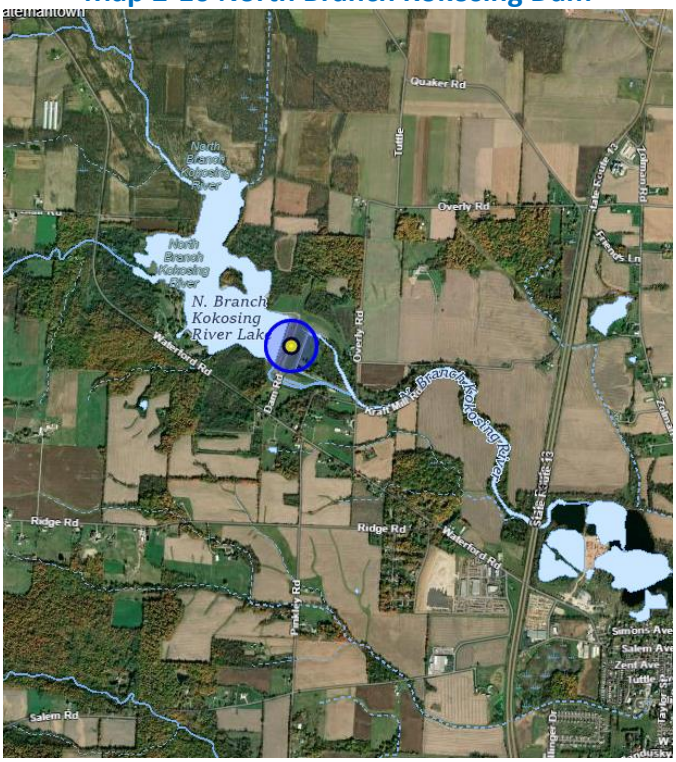
According to the NID, USACE considers the risk of failure as moderate. They indicate that the resident of Fredericktown would face the first flooding three miles downstream. USACE expects failure to be most likely caused by overtopping, leakage behind the spillway wall, or erosion of the embankment or spillway. All could create flooding downstream that could destroy homes, businesses, roads, bridges and railroads.

USACE would attempt to prevent this incent, which would most likely be the result of extremely heavy downpours, by early warning and evacuation.

USACE outlines several scenarios that have been extrapolated to identify casualties and property damage. They identify both breach and non-breach potential, rated at high, intermediate and low pool. Consequence ranges were 219-5,740 daytime people affected or 245-4,994 nighttime people affected; 186 to 2,340 buildings affected; and a cost of $20M to $663M. Note that all numbers are approximate, and no further detail was provided.

According to the flood area mapping tool, a maximum high breach scenario would inundate the area along the rivers from the Richland-Knox County line southward, around both sides of Fredericktown, and into Mount Vernon. There would be likely flooding of Fredericktown Schools, and many of the major streets and roads through the business and residential areas. The water treatment ponds and systems could be flooded. The flooding would continue east along the Kokosing River into Gambier and on into Coshocton County. The levees in Mount Vernon would be challenged to keep water back, and would probably not be sufficient barrier to flooding in the southwest corner of the city. The area west of the Public Square could flood according to the maps. The map appears to show that nearly half of Mount Vernon could be affected in some way. The riverbank in Gambier shows as flooding in this scenario as well, but most of the village would be unaffected. They may have access issues if SR 229 floods.

Map 2-10 North Branch Kokosing Dam



All-Dam Failure Flood Scenario

While it would be unlikely that all Knox County dams would fail at the same time, an extended extremely high precipitation scenario across the entire county, all dams could be negatively affected. Since several are in poor condition, breaches under extreme stress are not unimaginable. A likely all-dam scenario would include extremely high amounts of heavy precipitation over a short period of time with breaches and overtopping at North Branch Kokosing, Knox Lake Dam and Apple Valley Dam. Under those circumstances, Pleasant Hill Dam would be similarly vulnerable, and flooding could be extremely catastrophic. Complete inundation of the North Branch Kokosing River, Kokosing River, Jelloway Creek and the Mohican River could mean that most of Knox County experienced some form of flooding. Lake Viering would contribute to the Jelloway Creek overflow, and Lake Damascus would add to Dry Creek coming into Mount Vernon. Inundation of roadways across the county could be a very serious outcome, and the number of homes damaged could be catastrophic. Emergency access, ingress and egress, and access to critical services could be interrupted for several days.

ODNR Dam Listing

According to ODNR Division of Water Resources, there are 57 dams in Knox County. This duplicates some of the NID listing. Class IV and Other-classified dams do not appear on the National Inventory of Dams; that resource generally includes dams categorized as Class I through Class III only.

Table 2-28: ODNR List Knox County Dams

Dam	Class	Location	Owner	EAP
Anjecondy Lake Dam	II	Liberty Township	Private	Yes
Apple Valley Lake Dam	I	Howard Township	Private, Association	Yes
Ashley Lake Dam	II	Pike Township	Private	Yes
Balaz Lake Dam	IV	Monroe Township	Private	N/A
Baldwin Lake Dam	IV	Liberty Township	Private	N/A
Beam Lake Dam	IV	Clinton Township	Private	N/A
Bennett Lake Dam	IV	Monroe Township	Private	N/A
Breslin Lake Dam	IV	Harrison Township	Private	N/A
Burke Lake Dam	IV	Milford Township	Private	N/A
CCC Lake Dam	IV	Hilliar Township	Private	N/A
Cline Lake Dam	III	Clinton Township	Private	N/A
Coxley Lake Dam	IV	Milford Township	Private	N/A
Ewers Lake Dam	III	Middlebury Twp.	Private	N/A
G. Martin Corporation Dam	IV	Milford Township	Private	N/A
Gambier Fishing Club Lake Dam	IV	Harrison Township	Private	N/A
Golf Course Lake Dam	IV	Monroe Township	Private	N/A
Hamon Lake Dam	IV	Morris Township	Private	N/A
Hance Lake Dam	III	Liberty Township	Private	N/A
Henwood Lake Dam	IV	Monroe Township	Private	N/A

Dam	Class	Location	Owner	EAP
Hillier Lake Dam	IV	Pleasant Township	Private	N/A
Hipps Lake Dam	IV	Liberty Township	Private	N/A
Izzard Lake Dam	IV	Morgan Township	Private	N/A
Kaiser Lake Dam	IV	Morgan Township	Private	N/A
Knox Cattle Company Dam	I	Mount Vernon	Private	No
Knox County Fairgrounds Lake Dam	IV	Morris Township	Public, Local	N/A
Knox Lake Dam	I	Berlin Township	Public, State	Yes
Lake Damascus Dam	I	Hilliar Township	Private	Yes
Lake Ralph Dam	II	Howard Township	Private	N/A
Lake Viering Dam	I	Pike Township	Private	Yes
Lakes at Wolf Run Basin A Dam	IV	Monroe Township	Private	N/A
Lakes at Wolf Run Basin B Dam	IV	Monroe Township	Private	N/A
Lakes at Wolf Run Basin C Dam	IV	Monroe Township	Private	N/A
Lakeview Lake Dam	IV	Clay Township	Private	N/A
Merscher Lake Dam	IV	Harrison Township	Private	N/A
Mickley Lake Dam	IV	Jefferson Township	Private	N/A
Miller Lake Dam	IV	Milford Township	Private	N/A
Miller Pond Dam	IV	Clay Township	Private	N/A
Millwood Plant Dam	II	Union Township	Mining	
Millwood Plant Slurry Impoundment Dam	IV	Union Township	Industrial	N/A
N. Branch Kokosing River Lake Dam	I	Middlebury Twp.	Public, Federal	Yes
Neutralized Water Impoundment 2	II	Union Township	Mining	Yes
Neutralized Water Impoundment 3	II	Union Township	Mining	Yes
Olin Lake Dam	IV	Middlebury Township	Private	N/A
Pipes Lake Dam	IV	Pike Township	Private	N/A
Reed Lake Dam	IV	Berlin Township	Private	N/A
Roach Pond Dam	IV	Howard Township	Private	N/A
Robbins Lake Dam	III			N/A
Schnormeier Lake Dam	IV	College Township	Private	N/A
Simmons Lake Dam	IV	Morgan Township	Private	N/A
Tu Pond Dam	IV	Howard Township	Private	N/A
Wakatomika Lake Dam	IV	Union Township	Private	N/A
Watson Lake Dam	IV	Hilliar Township	Private	N/A
Wolfe Lake Dam	IV	Butler Township	Private	N/A
Workman Lake Dam	II	Union Township	Private	Yes
Yoder #2 Dam	IV	Brown Township	Private	N/A
Yoder Dam	IV	Brown Township	Private	N/A
Zeigler Lake Dam	IV	Liberty Township	Private	N/A

Local Dam Failure History

While there are no documented incidents of dam failure in Knox County, there have been several dam-related incidents. A list of these incidents, according to the Stanford University National Performance of Dams Program, is provided in table 2-29.

Table 2-29: Dam Incidents for Knox County

Structure Name	Hazard Potential	Incident Date	Incident	Dam Failure
Anjeconda Lake Dam	Significant	03/13/2000	Inadequate spillway capacity	No
Lake Viering Dam	Significant	03/13/2000	Inadequate spillway capacity	No
Ashley Lake Dam	Significant	03/13/2000	Inadequate spillway capacity	No
Knox Lake Dam	High	12/16/1998	Embankment erosion; concrete deterioration	No
Knox Cattle Company	High	06/27/1998	Inflow flood – Hydrologic event	No

Dam Failure Risk Summary

The risk of dam in Knox County is moderate, in part due to the generally high number of Class I, II, and III dams in the county. While most of the high hazard dams have the necessary emergency action plans in place, there are residential and commercial neighborhoods located in their inundation zones. The dams on Knox Lake and Apple Valley Lake are in highly populated areas, making maintenance of those dams a high priority. The Knox Lake dam is located north of Fredericktown and has several residential neighborhoods within its inundation zone. Because the dam is well maintained, village officials do not consider it to be a major threat but recognize that continuing maintenance is critical to protecting the surrounding community. The situation is similar for the Apple Valley Lake dam. The community surrounding this dam includes year-round and seasonal residences. The dam is well maintained and considered safe by local officials. The dam on Kokosing Lake, formally known as the N. Branch of Kokosing River Lake Dam, is federally owned and maintained and located northwest of Fredericktown. This rural area does not have many residential structures but there are several businesses and recreational areas, including a disk golf course and campground, that are near the dam and spillway. Like the Knox Lake Dam, maintaining this structure is important but it is known to currently be in good condition. The Lake Damascus Dam in Hilliar Township is owned and maintained by the Damascus Catholic Mission Camp. The dam is located in a rural area north of Centerburg. The camp, which hosts youth camps and adult retreats throughout the year, presents vulnerability to Mount Liberty homes and one church. The Lake Viering Dam is a class I structure located on Lake Viering, a man-made lake in northeast Pike Township. This dam is privately owned and located in a rural area. There are several residential structures built along the lakeshore.

The Knox Cattle Company Dam in Mount Vernon has been an area of concern, but current plans are to reduce the size and danger of the structure to significantly eliminate the risks. This dam

has been considered to be in need of extensive repairs and maintenance. Dam ownership was in question; however, the property owners' association has taken responsibility for the dam, and the Knox County Commissioners have allocated significant funding to assist in structural changes and repairs. This work is supposed to be done in 2025.

According to the National Levee Database, there are six identified levee structures in Knox County. These levees are all located in along the Kokosing River in Mount Vernon. The levees are designed to protect the city from flooding on the river. They are locally maintained and considered to be in good repair. Given their location in Mount Vernon, the most populated jurisdiction in the county, there are a number of structures located behind some of the levees. Levee failure is considered a far lower risk than dam failure for the county.

2.2.2 Drought and Extreme Heat

A drought is a deficiency of moisture that adversely impacts people, animals, and vegetation over an area of significant size. Because drought is a creeping phenomenon characterized by the absence of water, there is no defined beginning or end, nor is there a standard amount of time required for an extended dry period to be considered a drought. It is considered a drought when the dry period lasts long enough to impact the environment and economy of a region, typically a period of months or years.

There are four common types of droughts as illustrated below.

Type	Description
Meteorological	Based on the degree of dryness (rainfall deficit) and length of dry period
Hydrological	Based on impact of rainfall deficits on water supply such as stream flow, reservoir and lake levels and water table decline
Agricultural	Based on impacts to agriculture by rainfall deficits, soil water deficits, reduced ground water, and reservoir levels needed for irrigation
Socio-economic	Based on the impact of drought conditions on supply and demand of some economic goods

Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI measures dryness based on recent precipitation and temperature statistics. Drought classifications are identified in the chart below:

Measurement	Description
-4 or less	Extreme Drought
-4 to -3	Severe Drought
-3 to -2	Moderate Drought
-2 to -1	Mild Drought
-1 to -0.5	Incipient Dry Spell
-0.5 to 0.5	Near Normal
0.5 to 1	Incipient Wet Spell

1 to 2	Slightly Wet
2 to 3	Moderately Wet
3 to 4	Very Wet
4 or more	Extremely Wet

A heat wave is a period of abnormally hot and unusually humid weather, typically lasting for two or more days. This can be an extended period of time with higher-than-normal temperatures or a shorter period of time with abnormally high temperatures. Regardless of the length of time or exact temperatures, heat waves are a safety hazard to anyone exposed to the high heat. People are at risk for heat exhaustion and heat stroke, which can be fatal in the most serious cases. When heat waves are accompanied by drought conditions, the potential for a serious natural disaster rises. Between injuries, fatalities, and crop/property damage, these disasters can significantly impact the economy of a region.

Heat waves can occur in Knox County and but the incidence is rare and the duration typically short. Extreme temperatures are considered anything above 90 degrees Fahrenheit. In the humid climate of central Ohio, these temperatures are often accompanied by high humidity. Temperatures rarely exceed the mid-90s, although the region does occasionally experience higher temperatures. These brief heat waves are not uncommon, but rarely last more than a few days. A heat wave lasting longer than a week is extremely rare.

Table 2-30: Average Temperatures and Precipitation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. High	30°	37°	49°	59°	70°	77°	81°	80°	75°	63°	49°	40°
Avg. Low	20°	23°	32°	41°	52°	60°	62°	61°	56°	46°	34°	28°
Avg. Precip.	3.20”	3.50”	4.4”	5.7”	5.30”	5.90”	4.40”	3.20”	3.60”	3.50”	3.20”	4.20”

Drought/Extreme Heat Risk Assessment

Drought is not generally severe in Knox County, but many years include abnormally dry periods and even moderate drought. Dry spells can last for several weeks but most months have sufficient rainfall to support crop growth and human sustenance. Drought conditions, when they do occur, have a significant impact on the agriculture industry that prevails in the county. According to the US Drought Monitor historical information, Knox County has experienced abnormally dry conditions at some time during the year in fifteen of the past twenty-five years, and moderate drought conditions in eight of twenty-five years. There were four severe drought incidents recorded since 2000, including the worst in the fall of 2024.

Drought and extreme heat are countywide hazards and can affect all areas and jurisdictions.

One of the unanticipated consequences of drought in Knox County is the increase in frequency and severity of field or woodland fires during dry spells and drought. Fire departments from across the county expressed some concern about their manpower and ability to fight fires of this magnitude, especially when the fires are driven by high winds as often occur in northwest Ohio. With challenges to full manpower during the windiest and hottest parts of the day, it

becomes incredibly difficult to have adequate personnel to fight the fires to begin with, but if structures become involved, it is even more challenging.

Important facts related to drought and heat vulnerability are shown in Table 2-15 in the illustration of land use in Knox County. One third of the land is cropland, and one third is forest land. Drought and heat could have a devastating effect on these areas. Table 2-21 illustrates further detail of what is produced on Knox County's farms, listing the specific types of crops and livestock raised as well as the revenues that could be affected by drought and extreme heat.

The long-term effects of drought and heat wave according to climate change "high" level projections could increase the average highest temperature by as much as 4.7 (F). While those temperatures are not within what is considered "extreme" levels, one must keep in mind these are averages created by mathematical manipulation, and therefore, there will be days that reach far above those temperatures and days that fall far below. With average highs in the low 80's in July and August, this will likely bump those temperatures to the high 80's, and will perhaps increase the number of 90 (F) plus days as well. Evaporation will increase as temperatures rise, worsening drought when rainfall becomes minimal. Those days place stress on electrical systems to fuel environmental systems, and stress the water supply to feed vegetation and crops, as well as providing additional potable water for people and animals. To the contrary, the growing season is anticipated to increase by up to fifteen days, enabling higher production and opening the door to crops that used to need more time to grow than Ohio weather permitted. The stress on the electrical grid as demands grow could be significant, causing outages and interruptions in service. Should high degree days occur simultaneously while a period of no precipitation accompanies it, there would be stress on crops, reducing yields, and livestock that could potentially cause loss of animals. Pestilence may increase as might infestations of nuisance weeds because insects and weeds tend to thrive in hot, humid weather. Hot and humid weather is difficult for people with medical issues, especially respiratory or cardiac issues; therefore, this potential increase may negatively affect the elderly and medically-dependent part of the community, as well as others with economic disadvantages. When wheat and other grains and forages are growing, or are cut and drying before baling, the risk of field fires increases in hot, dry weather. Sparks from trains are more likely to cause a field fire under those conditions. Participants did not see significant changes in this area of vulnerability.

Changes in the last five years relevant to drought and extreme heat are somewhat subtle. Vulnerability to drought and extreme heat changes affect an aging population as stated in the demographics section of the Hazard Identification and Risk Analysis, with much of the population living in rural areas being elderly. While in general the population in the small villages is decreasing, all of the villages have experienced increases in the average age of the population, which makes a higher percentage of the population susceptible to heat injury when temperatures rise, especially if combined with a power outage. The concentration of drought statistics is not severe for any of the last twenty-five years, but there is more regularity and repetition of measurable drought since 2016 than there was prior to that from 2004 until 2015. Within that time period, only 2012 held significant drought.

The increasing likelihood of drought through a changing environment could potentially affect the water supply, endanger the elderly (and others) when considering potable water sufficiency; however, the major water source is the North Branch Kokosing and Kokosing Rivers, both carrying large amounts of water. Tributaries of the rivers are used for water supply as well. Those who live in service areas for distributed water have less risk than those who obtain their water from private wells. This might be off-set by the fact that as people in the small villages pass away or move into long-term facilities, the number of people at risk decreases. Younger people are not moving into the villages in any significant number, so there has not been and is not expected to be an increase in population in the villages in Knox County.

Local Drought/Extreme Heat History

Drought and extreme heat have had some impact on Knox County in recent decades but few incidents have been officially recorded by NCDC in the Storm Events Database. Per official NDCD records, Knox County has experienced five droughts and two heat events as indicated in the table below. There has been no extreme heat on record. Documented crop loss from these events is $5,000,000. These incidents of record occurred in 1996 and 1999.

A drought was declared in last 2024 but NCDC does not show it to be an official declaration for Knox County even though part of Ohio was affected. Knox County was also affected but not to the degree that it was officially declared.

Some drought events are documented in records from the United States Department of Agriculture rather than NCDC records so this information may not represent complete loss figures for all drought events. The USDA issues drought declarations and provides farmers and ranchers with disaster relief funding.

Table 2-31: Knox County Drought/Heat/Extreme Heat History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries
Drought	5	0	$5M	0	0
Extreme Heat	0	0	0	0	0
Heat	2	0	0	0	0

One of Ohio's more significant droughts was the 1988-1989 North American Drought. The incident was widespread and intense and included heat waves that killed thousands of people and substantial livestock nationwide. One of the underlying causes of the drought was the nationwide use of inappropriate land for agriculture production and continued over-pumping of groundwater. This major drought was catastrophic for the agriculture industry, destroying crops across the country. Water use restrictions were put in place across many jurisdictions. The drought continued to impact the Midwest and Northern Plains states during 1989 and was not declared over until 1990.

In the summer of 2012, Ohio was impacted by the 2012 North American Drought. This incident was an expansion of the 2010-2012 United States drought and began in the spring of 2012. Lack

of snowfall across the county led to limited snowmelt and water that absorbed into the soil. The drought included most of the United States and all of Ohio. This drought has been compared to similar droughts in the 1930s and 1950s but did not last as long. The drought caused catastrophic economic ramifications. According to most measures, this drought exceeded the 1988-1989 North American Drought, which is the most recent comparable drought. On September 5, 2012, the USDA issued a disaster declaration for all counties in Ohio affected by the drought.

The most recent drought to affect Ohio occurred in 2016. On January 6, 2017, the USDA issued a disaster declaration for drought conditions experienced from May through October 2016. The primary declaration was issued for three Ohio counties; ten contiguous counties were also included in the declaration. Knox County was not identified as a primary or contiguous county in this declaration but many adjacent or nearby counties, including Delaware, Morrow, and Richland, were included in the declaration. All counties in the central Ohio region were impacted in some way by the abnormally dry conditions.

From the mid-summer 2024 until the following winter, part of Ohio was considered to be in drought conditions. Knox County was less severely affected and no included in the designation.

2.2.3 Earthquake

An earthquake occurs when two blocks of earth, called plates, move past one another beneath earth's surface. The location where the plates meet is called a fault. The shifting of the plates causes movement along the fault line. This movement can often be felt in areas surrounding the earthquake's epicenter and can cause damage ranging from insignificant to devastating. Damage caused by an earthquake can include rattling foundations, falling debris, and, in the most severe cases, toppling buildings, bridges, and culverts. The severity of earthquake movement is measured using the Modified Mercalli Index scale as defined in the following chart:

Intensity	Shaking	Description/Damage
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on building upper floors.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motorcars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motorcars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.

VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, and walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

According to the Ohio Seismic Network, seismic risk in Ohio is difficult to evaluate because significant earthquakes are infrequent. The recurrence interval is generally very long, sometimes spanning hundreds or thousands of years. In geologic terms, this classifies Ohio's historic record as an instant. Another factor in earthquake risk is the nature of the geologic materials upon which a structure is built. ODNR states "ground motion from seismic waves tends to be magnified by unconsolidated sediments such as thick deposits of clay or sand and gravel."

The Ohio Seismic Network lists 26 earthquakes in Ohio between January 1, 2024 and March 10, 2024. None of these occurred in Knox County. The strongest one was a magnitude of 2.2 in Lake County. Most of these were in the far northeast part of Ohio.

Ohio has experienced more than 800 earthquakes since 1776. While only fourteen of these events have caused damage, there is a greater risk for earthquakes in Ohio than most people realize. The far northeast corner of Ohio has the most earthquakes, with Lake County showing 163 earthquakes of record in the Ohio Earthquake Database. In the past five years, there have been three earthquakes greater than 4.0 in Lake County. One occurred in 2023, one in 2022, and one in 2019.

Shelby County in northwest Ohio has the strongest history of earthquake with 39 on record, as long ago as 1876 and as recent as 2020. Logan County has had four earthquakes (1931-1994), and Clark County has had one (1980); Miami, Madison and Union Counties have no earthquakes on record. Wood County has had two very mile earthquakes recently. None of these areas are adjacent or closely located to Knox County.

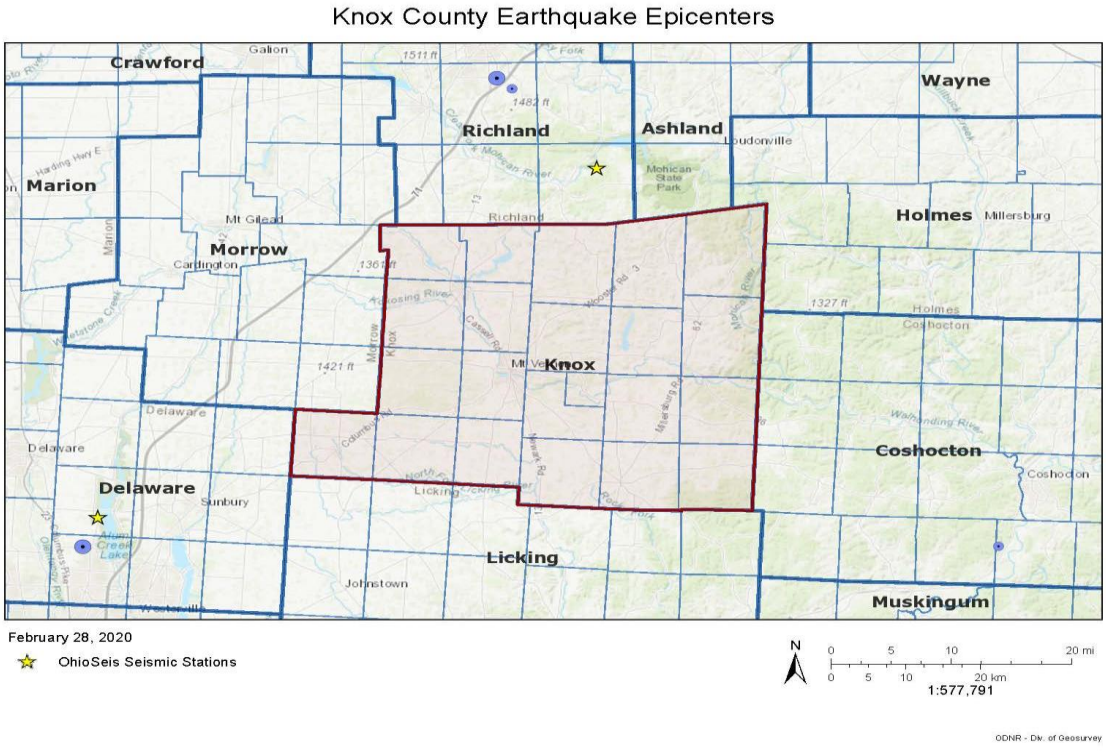
The earthquake concern in Knox County centers on infrastructure. The underground utilities such as stormwater lines, sanitary sewers, water distribution and underground pipelines are of high concern. Buried electrical lines would be highly vulnerable, and electrical danger in response could be extreme. All of these lines would be at risk of collapse, breakage, and complete failure. Likewise, the overhead utilities like cellular and two-way radio transmission towers, water towers that hold treated drinking water for distribution, and windmills would be highly vulnerable to damage and destruction. These utility components would be much more

vulnerable than buildings; although buildings, especially foundations, would be vulnerable to structural damage if an earthquake were of high magnitude. Both these categories of damages would be incredibly expensive to rebuild, and it would take months to replace everything if a significant earthquake struck Knox County. The cleanup of debris would be overwhelming, as old lines and debris like masonry and steel framing had to be removed before new could be shipped in. Old sewer, water and electrical lines would have to be removed before new could be installed. This cleanup and de-construction need would increase the recovery time by months, and the cost would be catastrophic.

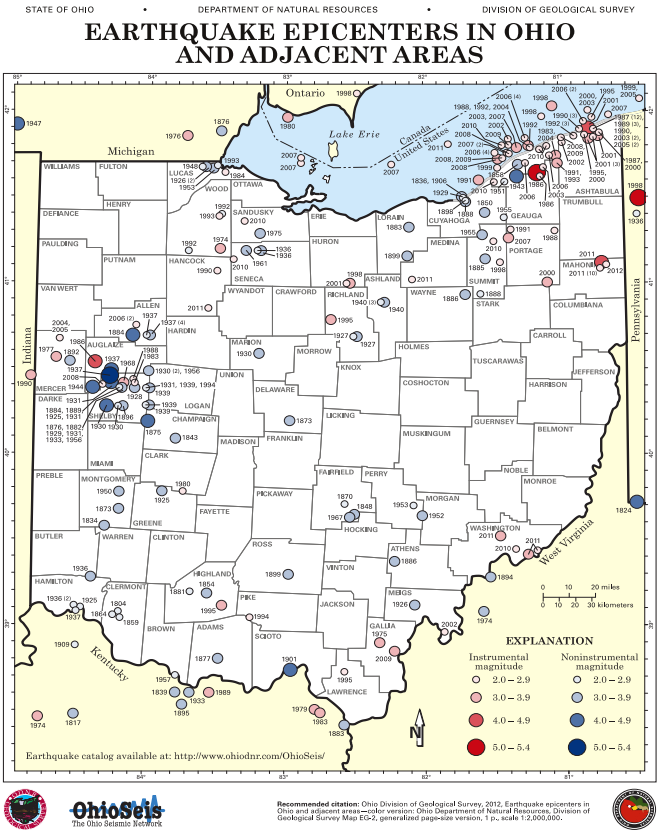
Local Earthquake History

Records from the Ohio Department of Natural Resources indicate that Knox County has experienced no earthquakes with epicenters in the county. Several earthquakes have occurred in neighboring Delaware and Richland counties but there is no documentation of any direct impact in Knox County. Map 2-11 shows earthquake epicenters in the Knox County and the surrounding region.

Map 2-11 Knox County Earthquake Epicenters



Map 2-12 Ohio Earthquake Epicenters



2.2.4 Fire

Fire is a new hazard in the Knox County mitigation plan. One third of the county is forest land, and another third is crops that consist mostly of hay and forage crops, corn and soybeans. Prior to harvest, the crops go through a natural drying process that makes all of them vulnerable to fire. Once a field catches on fire, it is difficult to put it out due to wind and the lack of enough personnel and apparatus in a fast enough time frame. If the county has experienced a dry spell or drought, which is anticipated to increase in coming years and has already increased in the past decade, conditions for wildland, forest, and field fires increases.

Field and woodland fires are frequently contained in short order and do not damage anything else. However, if dry conditions combined with high winds, that outcome would change quickly. Fire, under wind conditions, spreads very quickly and without a high number of separate crews to attack the fire from different directions, it would spread out of control.

Contributing to the vulnerability is the general lack of adequate apparatus to fight field and woodland fires. If there are no dry hydrants or other rural water supplies to connect to, and water has to be hauled in by tankers, the speed with which fires can be controlled is compromised. These fires spread and consume homes, barns, grain operations, vehicles and everything else in the area.

Structure fires in some of the older downtown areas where there are historical buildings or structures without fire suppression systems can be highly vulnerable to fire. Neighborhoods of older homes are also vulnerable, and if located close to one another, multiple homes can burn in one incident.

Every fire department in Knox County has occasional history of all these types of fire. With the burden placed on departments without adequate staffing, a problem occurring across the state at this time, outcomes can be negative. Most fire departments in Knox County, except Mount Vernon, are primarily volunteer. Staffing is dependent upon firefighters being available and in proximity to the incident. Many times, mutual aid is called early on in fires, and departments have become very sophisticated at mutual aid procedures. There is also a state mutual aid program for catastrophic fires.

All jurisdictions selected fire as a hazard, and most ranked in medium to low in priority.

2.2.5 Flood

A flood is defined as any high flow, overflow, or inundation of water over typically dry land that causes or threatens damage. Floods occur subsequent to meteorological events such as substantial precipitation, thunderstorms with heavy rainfall, rapid snowmelt, or extreme wind events along coastal waterways. In some areas, seismic activity can trigger floods.

Riverine flooding occurs when a river or stream rises to an elevation that causes the river to overflow its banks. The rising water threatens or causes damage to roadways, homes, buildings, and occupied spaces near the overflowing waterway. Lower levels of a watershed are more susceptible to this type of flooding because these waterways receive all the water from the upper levels and are responsible for carrying a much higher volume of water than the tributaries. Water that lays on the surface and is not absorbed into the soils is considered surface flooding; this can occur on concrete or other impervious surfaces, roads and streets, parking lots, or other large areas. Water that ponds and takes an extended period of time to drain even though it is laying on top of soil is considered areal flooding.

Flash floods are defined as the rapid and extreme flow of high water into a normally dry area; a flash flood can also occur when there is a rapid rise in the water level of a stream or creek and the water rises above a pre-determined flood level within six hours of a precipitation event. This type of flooding occurs when the ground is too saturated, impervious, or flat to drain rainfall into waterways through storm sewers, ditches, creeks, and streams at the same rate as the precipitation falls.

Karst flooding occurs when the drainage capacity of an underground sinkhole is not adequate enough to transfer storm water runoff to the subsurface and the excess water pushes to the surface. Unlike riverine and flash flooding, this type of flooding occurs in the days and weeks after heavy precipitation events as the rainfall is absorbed into the ground and fills subsurface karst voids. As these voids fill to capacity, the water pushes through to the surface, flooding

basements, yards, driveways, and anything else in the way. This type of flooding can only occur in areas with subsurface karst formations, and there is no known karst area in Knox County.

Worldwide, flooding is the most common and costly disaster, resulting in significant loss of life and property every year. Floods have a substantial impact on the infrastructure. Common effects include roadway breeches, bridge washouts, roadway wash away, and water-covered roadways. As floodwater moves rapidly and forcefully, it washes away the surface and sub-surface of roads, causing holes, ruts, and other problems for vehicles. Floodwater that is one foot deep is strong enough to carry vehicles away, often with occupants inside. Rescuers are powerless against rapid, rising water because they are unable to exert enough strength to counteract the physics of moving water.

Floodwaters seek the path of least resistance as they travel to lower ground and will seep into and occupy any structure in their path. Basements and lower levels of buildings can become inundated with floodwater. Installing sandbags along the exterior of a building can only serve as a temporary stopgap measure; if floodwaters do not recede quickly, the force of the water will move through the sandbags and enter the structure.

The aftereffects of flooding can be just as damaging and dangerous as the initial incident. Cleanup is often a long, protracted activity with its own set of hazards. Sewer systems can become inundated with floodwater and cease to function properly. Standing water becomes contaminated with household and industrial chemicals, fuel, and other materials that have leaked into the water. All floodwater is considered contaminated, either from germs and disease or hazardous materials. This creates a hazard for responders and residents throughout the initial recovery phase of the disaster.

Flood Risk Assessment

In Knox County, flooding is a moderate risk. It is a countywide hazard that can impact all jurisdictions. The county is susceptible to riverine flooding in some areas, primarily along the Kokosing River in central Knox County, the Mohican River in the northeast portion of the county, and the creeks, streams, and tributaries that feed into these waterways. These areas are somewhat low-lying, which increases their risk for flooding.

Flash flooding is a significantly greater risk for most areas of the county and accounts for more than half of all documented flooding incidents. Jurisdictions are susceptible to flash flooding when municipal stormwater systems are unable to keep pace with rapid precipitation events. This can also occur in rural areas of the county when ditches, creeks, and streams are unable to contain the rapid drainage caused by heavy rainfall. In jurisdictions and unincorporated areas of the county, flash flooding can cause short-term road closures and long-term damage to roadways. Some structures experience minor basement flooding. While it is possible for some homes to experience significant flooding in primary living spaces, this is very rare.

Because of Knox County's rolling topography, surface runoff in agricultural areas is a concern. In flatter areas, field may be tiled to manage surface runoff but this is not an effective practice in

areas with rolling topography. Ditches are also used to route runoff water into creeks and streams and contain runoff from roads and other properties. When flooding events occur during the winter, floodwaters tend to be deeper and take longer to drain because the ground is already frozen and cannot absorb floodwater. After heavy precipitation events, some roads are vulnerable to flooding and may be closed briefly until floodwater recedes.

Local flood damage can include damage or destruction of physical structures, infrastructure, crops, and livestock. Residential structural damages could include single and multi-family homes, group living facilities, and multi-family housing complexes. Commercial and industrial structural damages could include buildings used for manufacturing, product handling, transportation, warehousing, retail, business, and industrial, and the capital equipment associated with those uses. Agricultural structures would include barns used for livestock, storage buildings, equipment, and machinery. Government, nonprofit, and educational institutions include critical structures like fire stations, police stations, hospitals, schools, and maintenance buildings; damage could include the physical structure as well as the contents. This damage would result in large amounts of debris to manage. It is unlikely that loss of life would be attributed to flooding. If a death were to occur, it would likely be the result of two or more combined threats, such as lightning, tornado, or driving into standing water.

Floodplain Mapping and National Flood Insurance Program

Knox County's floodplain maps were updated in 2009 as part of FEMA's Map Modernization Program. The current floodplain maps became effective July 7, 2009. The tables below provide information on participation in the National Flood Insurance Program for Knox County communities as identified in FEMA's Community Status Book for Ohio. The communities in Table 2-32 participate in NFIP and are considered to be in good standing with the program. Only one community, Brinkhaven, is under sanction from NFIP, as shown in Table 2-33. The village is listed as "Gann" in the status book, but "Gann" is an old name that was changed to Brinkhaven many decades ago.

The village of Martinsburg does not have floodplain and does not participate in NFIP.

Table 2-32: NFIP Participating Communities

Community	Initial FHBM Identified	Initial FIRM Identified	Current Map Effective Date	Reg-Emer Date
Knox County	01/31/75	07/19/82	07/07/09	10/27/93
Centerburg	05/17/74	01/06/82	07/07/09	01/06/82
Danville	05/17/74	08/24/84	07/07/09(M)	08/24/84
Fredericktown	04/05/74	02/18/81	07/07/09	02/18/81
Gambier	05/17/74	01/30/81	07/07/09(M)	01/30/81
Mount Vernon	05/03/74	08/02/82	07/07/09	08/02/82

Table 2-33: NFIP Sanctioned Communities

Community	Initial FHBM Identified	Initial FIRM Identified	Current Map Effective Date	Reg-Emer Date
Brinkhaven/Gann	--	07/07/09	07/07/09	07/07/10

Communities that are participating in the National Flood Insurance Program (NFIP) are required to adopt and enforce regulations and codes that apply to new development in Special Flood Hazard Areas (SFHAs). These local floodplain management regulations must contain, at a minimum, NFIP requirements and standards that apply not only to new structures, but also to existing structures which are Substantially Improved (SI), or Substantially Damaged (SD) from any cause, whether natural or human-induced hazards.

According to 44 CFR 59.1, Substantial improvement means any reconstruction, rehabilitation, addition or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. Likewise, substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. SI/SD requirements are also triggered when any combination of costs to repair and improvements to a structure in an SFHA equals or exceeds 50 percent of the structure's market value (excluding land value).

$$\frac{(Cost\ to\ Repair) + (Cost\ of\ Improvements)}{Market\ Value\ of\ Structure} \geq 50\ Percent$$

Enforcing the SI/SD requirements is a very important part of a community's floodplain management responsibilities. The purpose of the SI/SD requirements is to protect the property owner's investment and safety, and, over time, to reduce the total number of buildings that are exposed to flood damage, thus reducing the burden on taxpayers through the payment of disaster assistance. SD/SI requirements are enforced by the local floodplain administrator and monitored by the Ohio Department of Natural Resources (ODNR) Floodplain Management Program during Community Assistance Visits. If a local floodplain administrator is overwhelmed by the number of SD/SI inspections after a large event, ODNR has developed a network of building code officials that are trained in conducting SD/SI field determinations. Help with SD/SI inspections can be requested through the county emergency management agency director.

For more information regarding Substantial Improvement and Substantial Damage, county officials can refer to FEMA's Substantial Improvement/ Substantial Damage Desk Reference, P-758 or contact the ODNR Floodplain Management Program.

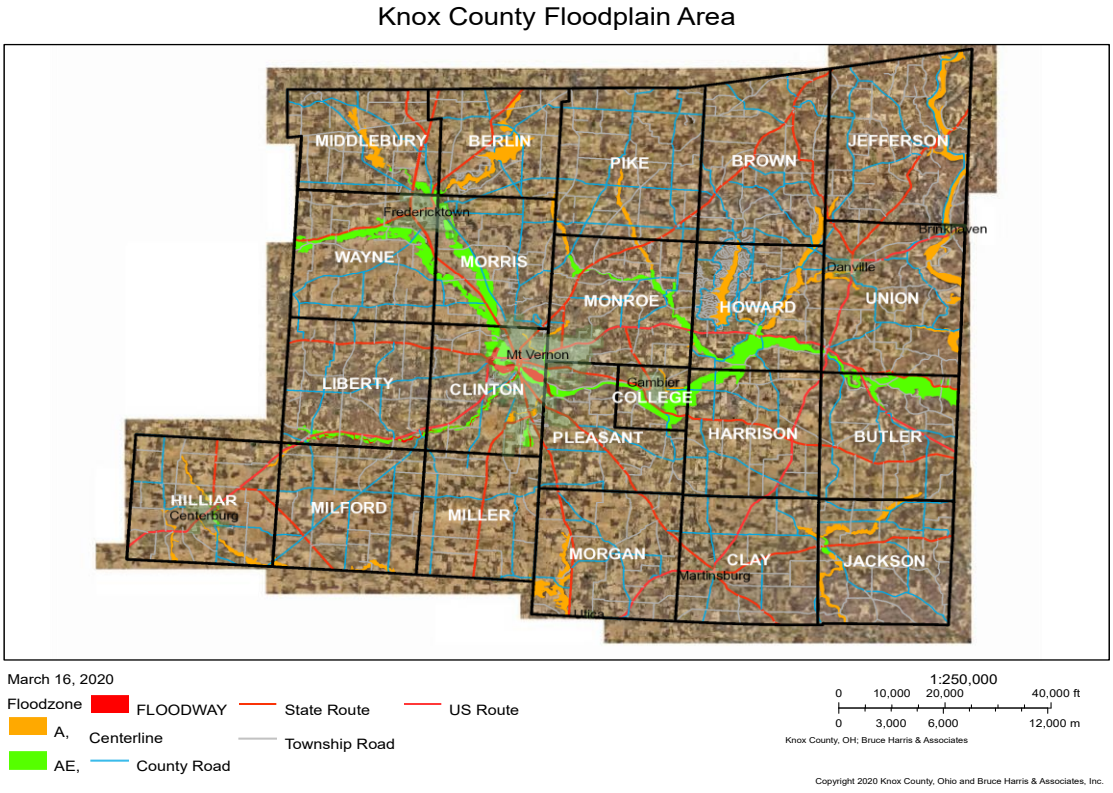
Floodplain

Knox County's floodplain follows the major waterways in the county. The North Branch of the Kokosing River enters Knox County in the northwest, and flows south, around Fredericktown and on to Mount Vernon where it turns eastward. The East Branch flows from Berlin Township southward around the east side of Fredericktown where it joins the North Branch in the southern part of Morris Township. The Kokosing River enters in Wayne Township and flows

southeast into Morris Township where it joins with the North and East Branches. In Clinton Township, Dry Creek joins the Kokosing, and the larger waterway flows around the southwest and south side of Mount Vernon, and the around Gambier. It moves northeast into Howard Township where Jelloway Creek joins. It then flows southeast and joins the Mohican River in Coshocton County.

All the municipalities are affected by floodplain issues except Martinsburg. Brinkhaven is affected by the Mohican as it sits on the far east side of the county, outside the Kokosing watershed. Centerburg is affected by ditches in the far southwest, outside the Kokosing Watershed. Fredericktown, Mount Vernon, Gambier and Danville are part of the Kokosing watershed and are affected by those rivers and ditches. Danville does not have any floodplain, and is near where the Kokosing and Mohican watersheds split. Danville does not experience a great deal of flooding. Brinkhaven is part of the Mohican watershed, and can be inundated if the Mohican River is in flood stages because the village sits inside a bend in the river.

Map 2-13: Knox County Floodplain



Repetitive and Severe Repetitive Loss Structures

Knox County has several known repetitive loss structures. See the list below for specifics. Additional repetitive loss and/or severe repetitive loss structures may exist in Knox County and not have been available or known at the time this was researched.

Table 2-34: Repetitive/Severe Repetitive Loss Properties

Knox County Rep Loss and Severe Rep Loss Structures (Unmitigated)					
JURISDICTION Occupancy	Total RL/SRL Structures	RL Structures	SRL Structures	Total Losses	Total Paid
KNOX COUNTY (UNINCORPORATED)					
Single Family Residential	4	4	0	10	$83,217
MOUNT VERNON, CITY OF					
Single Family Residential	2	2	0	5	$21,287
FREDERICKTOWN, VILLAGE OF					
Single Family Residential	1	1	0	2	$8,640
Countywide Total	**7**	**7**	**0**	**17**	**$113,144**

Knox County has experienced 11 floods and 20 flash floods since 1950, per NCDC records. Property damage from these incidents has been significant, totaling more than $1.53M.

Table 2-35: Knox County Flood History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries
Flood	11	1.454M	0	0	0
Flash Flood	20	10.822M	1.53M	0	0

The largest loss from flooding in Knox County occurred on January 20, 2005 when rain and runoff from snowmelt caused lowland flooding in several counties, including Knox. Knox County have 7.97 inches of rain in Fredericktown, 8.28 inches in Danville and 9.99 inches n Centerburg during the months. Temperatures were in the 50s the first week, and then heavy rain hit mid-month. Mohawk Lake in eastern Knox County reached its highest level ever and was up to 79 feet above normal. Brinkhaven was flooding by the Mohawk Lake flooding. Sump pumps failed when power went out and hundreds of homes sustained loss, include basement flooding. Losses totaled $750K.

In late February 2011, Jelloway Creek flooded. Following 10 inches of snow the day before, temperatures dropped and snow melt combined with rainfall. The county had one to three inches of rain. Hundreds of homes had damage and road closures were extensive. Losses totaled $400K.

Most of the flash flooding incidents have been problematic because ground was already saturated and unable to drain quickly. While there was not significant damage on July 3, 2019, multiple rounds of showers dumped enough rain to close roads in the Centerburg, Mount Liberty and Gambier areas. This was a several-day inconvenience for residents and was caused by 1.5 to 2.5 inches of rain. The most damage, amounting to $600K, was caused on May 21, 2004 when two inches of rain fell on saturated soils. Four bridges were washed out, and a retaining wall near Apply Valley fell. Many homes and businesses incurred damages.

2.2.6 Hazardous Materials Incidents

A hazardous materials spill or release occurs when a hazardous substance breaches its container. Releases can occur within facilities that store and use hazardous materials and during the transport of these substances. Hazardous materials are stored in numerous types of containers, including drums, cans, jars, pipes, and other vessels. Some releases are incidental and can be safely cleaned up by on-site facility personnel. An incidental release does not threaten the health or safety hazard to the immediate area or greater community because of the small quantity that is released. A release that requires action by first responders or agencies outside of the spiller's facility is considered an emergency response.

Every hazardous material is unique and can be toxic, flammable, explosive, or corrosive, as well as any combination of those threats. When a hazardous substance is released into the environment, it can negatively impact the safety and health of the community by contaminating the air, water, and/or ground. To protect the community, evacuation from the facility or area surrounding the spill may be necessary.

Dangerous chemicals can be hauled in a variety of ways, involving different types of containers and haulers. State and federal regulations provide guidance and regulation in the transportation of chemicals in a quantity sufficient to pose a hazard. These regulations are enforced by law enforcement and transportation officials. The majority of chemicals are transported by highway and rail, but on occasion there are chemicals flown on cargo planes. Counties generally do periodic commodity studies to determine was is hauled through and inside their county; refer to the Knox County LEPC for specific details.

Accidents on highways and roadways can cause the vehicles carrying substances to overturn, collide with other vehicles, or to ignite and burn. The runoff as liquid spreads, the vapors as a chemical dissipates, or the flash point and burning of a substance can expose those nearby to extreme danger from both traumatic injury and chemical absorption. These vehicle accidents compound the vulnerabilities of people and the environment to include both traumatic injury due to the crash or kinetics of the incident, and the negative effects of absorbing the chemical that is thrown into the atmosphere, waterways or soils.

Although Knox County has very little rail, these incidents are a growing concern as major derailments have occurred elsewhere in Ohio and across other states. The hauling of highly flammable and toxic materials on the railroads is increasing. The trains that move through the county are up to three miles long, and are staffed with minimal personnel. Crossings can be blocked for long periods, and there is no responsiveness to local lack of access by the railroads. Communities cannot open crossings for emergency needs, let alone other necessary traffic access.

The Ohio Rail Development Commission illustrates in their Rail Crossing Community Impact Index that Knox County ranks at a 25% chance of delays to road users due to blocked rail

crossings, and that a car drives across a crossing somewhere in Knox County about 54,000 times a day. (Note that the same car may cross several crossings, and each crossing is recorded.)

PUCO indicates that there are 87 railroad crossings in Knox County. All are "at grade" crossings, and most are owned by CSX Transportation. The last PUCO rail project report indicated that improvements to rail crossings was a priority in 2023. They also reported no crashes in Knox County during that time frame.

Industrial and residential exposure to hazardous substances can also involve both trauma and exposure. Most incidents involve the breech of a container or the undesirable combination of chemicals that results in a lethal substance. These spills and leaks can occur in businesses, homes, and industries or anywhere else that hazardous substances exist. Knox County LEPC maintains reporting documents from all businesses and industries that have reportable amounts of hazardous and extremely hazardous substances on their premises, and this information is shared with first responders for awareness and training purposes.

No infallible reporting system for hazardous materials incidents exists. Many times, incidents of non-lethal exposure are not recognized as an emergency. For example, old thermometers are dropped and mercury is spilled, swept up, and thrown in garbage unless individuals know of the risks. They do not always know, and thus those kinds of incidents go totally unreported.

Industrial reporting is gauged by regulation. Spills involving reportable quantities are documented according to regulation. Smaller less significant spills often go undocumented unless someone is hurt and requires medical attention. Large industrial spills and leaks are investigated by local hazardous materials teams, regulators, and government responders. There are no major distribution centers, shipping terminals or warehouses in Knox County, which helps to limit the unknown industrial spills that are cleaned up by on-site personnel and not reported to the LEPC.

Table 2-36: Hazardous Material Classifications

Class	Description
1	Explosives
2	Gases
3	Flammable liquids and combustible liquid
4	Flammable solid, spontaneously combustible, and dangerous when wet
5	Oxidizer and organic peroxide
6	Poison (toxic) and poison inhalation hazard
7	Radioactive
8	Corrosive
9	Miscellaneous

Hazardous Materials Incident Risk Assessment

Knox County has a moderate risk for hazardous materials incidents. Within the county, there are numerous facilities that manufacture, utilize, and/or store hazardous substances. There are

also multiple grain and livestock farms that use fertilizers, pesticides, and other agricultural chemicals in the course of production. Individual homes have chemicals and substances used to care for their property, such as fuel and fertilizer. Hazardous substances are transported on county roads and state highways. Populated jurisdictions along these highways are particularly vulnerable to hazardous materials incidents because of their proximity to the major transportation routes on which these substances are carried.

Pipelines are also present throughout Knox County, particularly in the central and southwest portions of the county. While it is believed that the pipelines are well maintained, there is always a risk for an incident. First responders participate in training to prepare for these potential responses.

Because of the movement of hazardous materials on different types of transportation systems throughout the county, hazardous materials incidents are a countywide hazard and can affect all areas and jurisdictions.

Local Hazardous Materials Incident History

Hazardous materials incidents in Knox County are monitored by the Local Emergency Planning Committee (LEPC). Based on these records, the county averages approximately 1.6 hazardous materials incidents per year. The majority of these are minor vehicle incidents involved diesel fuel spills. Table 2-37 identifies the number of incidents per year over the last decade.

Table 2-37: Hazardous Materials Incident History

Year	Incidents
2016	1
2017	1
2018	5
2019	4
2020	0
2021	0
2022	0
2023	2
2024	1
2025	2

2.2.8 Invasive Species

An invasive species is a plant or animal species that is not native to the local ecosystem and whose introduction is likely to cause economic or environmental harm or harm to human life. Across the United States, more than 5,000 species are recognized as invasive. Invasive species are classified as terrestrial plants, terrestrial wildlife, insects and diseases, and aquatic species.

Invasive terrestrial plants can displace native species, impact the wildlife that rely on native species as a source of food or shelter, or form monoculture plant communities that reduce

biodiversity. While more than 25% of the plant species in Ohio originate from other areas, most are not invasive; fewer than 100 species are actually considered invasive. Invasive terrestrial wildlife is much less common than other types of invasive species but can still cause significant damage to natural habitats. Aquatic invasive species are plants and animals that impact the quality of waterways. These can affect large bodies of water, such as Lake Erie, and smaller rivers, lakes, and streams. Invasive insects and diseases are small organisms that can negatively impact plants, forests, and the health of wildlife. Table 2-38 identifies the invasive species across these categories that have the greatest impact in Ohio.

Table 2-38: Invasive Species in Ohio

Aquatic	Insects and Diseases	Plants, Weeds & Shrubs	Terrestrial Wildlife
Asian Carp	Asian Longhorned Beetle	Japanese Honeysuckle	Feral Pig
Curlyleaf Pondweed	Emerald Ash Borer	Japanese Knotweed	Unwanted/Exotic Pets
Hydrillia	Gypsy Moth	Autumn Olive	
Round Goby	Hemlock Wooly Adelgid (HWA)	Buckthorns	
Ruffe		Purple Loosestrife	
Red Swamp Crayfish	Walnut Twig Beetle	Common Reed or Phragmites	
Sea Lamprey	Spotted Lanternfly	Reed Canary Grass	
White Perch		Garlic Mustard	
Zebra Mussel		Multiflora Rose	
		Bush Honeysuckles	
		Japanese Stiltgrass	
		Kudzu	
		Japanese Barberry	
		Callery Pear	
		Oriental Bittersweet	
		Apple of Peru	
		Canada Thistle	
		Cressleaf Groundsel	
		Giant Hogweed	
		Grapevines	
		Johnsongrass	
		Kochia	
		Marestail	
		Mile-a-Minute	
		Musk Thistle	
		Oxeye Daisy	
		Palmer Amaranth	
		Poison Hemlock	
		Russian Thistle	
		Shattercane	
		Wild Carrot	
		Wild Parsnip	
		Poison Ivy	

Invasive Species Risk Assessment

Knox County has many wooded areas and large numbers of trees along with rolling and flat terrain, amounting to one third of the land use in the county. These wooded areas are vulnerable to damage from invasive species. The winds that can easily down dead or diseased trees that have been impacted by an invasive species. These fallen trees become storm debris, and fall onto homes, cars and trucks, businesses, and anything else in the way. They also fall into rivers and streams, further impeding drainage and clogging waterways with excessive debris.

While ash trees have been affected by disease in recent years, Ohio is rich with all kinds of trees that could be affected by another invasive species in the future. Forested areas and waterways could also be impacted by invasive plant and animal species. Any infestation would cause extreme damage to the county. Invasive species is a countywide hazard that can affect all areas and jurisdictions.

Damage from invasive species difficult to quantify because it does not generally affect buildings or other structures. The cost comes from the cleanup phase, including removal and disposal of diseased trees and vegetation, repair of property where fallen trees cause damage; cleaning and dredging of waterways that are filled with debris; cleaning of bodies of water; and repair of infrastructure damaged by the infestation. These are expensive tasks and, when done by government providers or large contractors who respond to emergent needs for service, the cost can be extremely high, costing jurisdictions hundreds of thousands of dollars.

Climate changes could significantly affect this hazard. Invasive species, according to various experts, may increase if temperatures become warmer and precipitation amounts increase. Insects and plants generally thrive in hot, humid, wet weather. Some plant diseases also thrive in hot weather. Dependent upon the specific species, changing climate conditions could facilitate tree disease which increases debris after storms and property damage due to falling trees. It could also decrease farm yields, increase livestock pestilence, and endanger vegetation. Warmer waters promote unwanted results like algal bloom and invasive water species. Algal bloom in rivers is sometimes a problem, and an increase would worsen that situation and perhaps negate some of the efforts farmers and ecologists have taken over the past few years to improve water quality and protect the rivers.

There is no known effect that the past five years' development activities have had on invasive species, and no known effect that future development may have on invasive species. There was some conversation that increased housing development may force nuisance wildlife out of certain areas, but would also push them into other less-densely populated areas. This could potentially have a negative effect on rural areas, further forcing people out of the country and into the cities. That said, Knox County does still have very significant wooded and natural areas outside the organized communities.

Local Invasive Species History

The most recent invasive species to impact locally is the Emerald Ash Borer (EAB). EAB is an ash-tree killing insect native to Asia that kills trees within three to five years of infestation. It was

first discovered in Ohio in 2003. Since that time, the Ohio Department of Agriculture and partner agencies have worked to protect the state's 3.8 billion ash trees. Wood County and northwest Ohio were ground zero in the EAB infestation; EAB was initially identified in northwest Ohio before spreading across the entire state. According to natural resources officials, the worst of the EAB infestation has passed; the Ohio Department of Agriculture lifted the quarantine on movement of ash wood in 2011. The infestation is no longer spreading but there are thousands of dead and diseased trees that must still be removed. The process to remove these trees will take years and be a significant expense for land owners, including government agencies and municipalities. From a disaster perspective, the massive numbers of dead trees create an increased risk for property damage from high wind events. Dead and diseased trees are weak and more susceptible to wind damage than healthy trees. Along waterways, diseased trees also increase flood risk as they fall into and block streams, impeding water flow.

Other invasive species that are currently under quarantine in parts of Ohio include the Gypsy Moth, Walnut Twig Beetle, Asian Longhorned Beetle and the Spotted Lanternfly. Knox County is not currently a Spotted Lanternfly quarantined county.

Some stakeholders discussed potential pine tree disease, elephant weed, garden crest, water crest, marestail, foxtail barley, and phragmites. They reported army worms killing lawns and grass in multiple areas. The general opinion was that some insects are coming in rail cars from other parts of the United States, transplanting new species when the cars sit waiting to be unloaded, or the infested cargo is shipped to receiving parties.

All county jurisdictions have experienced significant effects from the EAB infestation. As diseased trees along rivers and streams have died, they have fallen into waterways, impacting drainage and the flow of water. Although many of these have been removed, many remain and continue to cause impediments to waterflow. Diseased trees along the public right-of-way have also impacted infrastructure, as they are more likely to fall during a storm or high wind event. County and municipal street and road departments have aggressively removed diseased trees along the public right-of-way. This has been effective at reducing the impact on utility lines and other infrastructure but has been a significant financial burden for jurisdictions. Public agencies are also not able to remove trees from private property. Individual landowners are responsible for removing dead and diseased trees from their personal property. Because this does not always occur, there are still hundreds of dead and diseased trees that will continue to cause problems across the county.

As the climate changes, if temperatures rise, humidity increases and rainfall hits new highs, insects and other invasive species may become more of a problem than they are now. Insects tend to thrive in hot weather, and weeds grow in the same. These changes exacerbate invasive species problems. If the food supply for nuisance wildlife is limited, their presence in residential and recreational lands will increase. It will become harder for them to find food, and the danger to pets and other small animals will grow. Insects and animals not indigenous to

Ohio may migrate into the area, adding to this problem in an area that is developing and growing considerably. This could become more serious as areas are created for recreation.

Invasive species are present in most counties, but become noticed when a product of value, a natural resource, or human-utilized areas are impacted. Incidents are noticed when plants or trees begin to die, crops are negatively affected, or residential areas are infested. At that point, identification of the invasive species is made and treatment programs begin to control or eradicate the pest or plant.

Residents use lawn care chemicals to control weeds and pests in lawns, landscaping and gardens. Farmers use spraying systems to eliminate weeds and pests that negatively impact crops. Homeowners use chemicals to eliminate pests. These chemicals are often controlled substances. Farmers become certified to use pesticides and herbicides, homeowners have to sign for certain chemicals or hire a licensed applicator to use them, and businesses are not allowed to use chemicals that would negatively affect customers and products for sale.

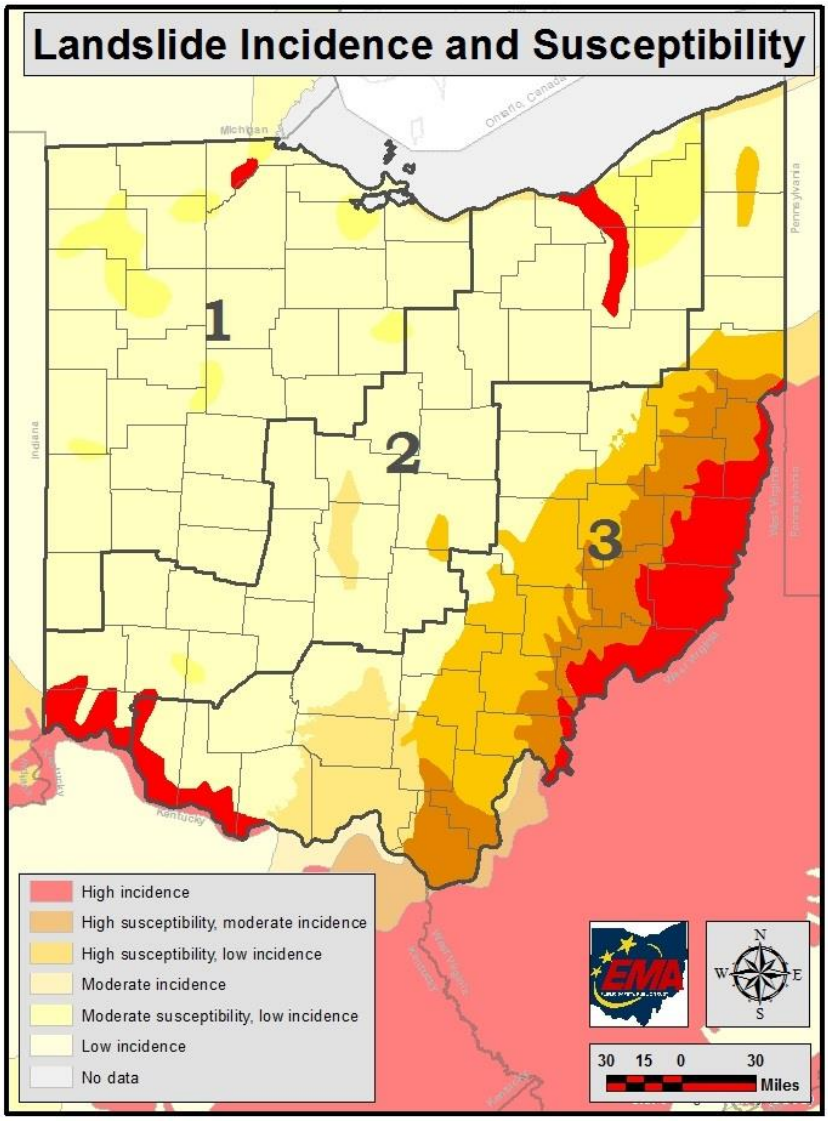
Sometimes the history of an event is marked by the compensating actions taken. For example, the management of mayflies along lake shorelines is to turn off the lights that draw the mayflies to land during their mating season, when they come onshore. At other times, the evidence of infestation is after a storm when debris has to be cleaned up. Increased debris is often the consequence of an infestation, as it was during the EAB incident in Ohio.

Five of nine jurisdictions saw invasive species as a potential threat and selected it as a hazard.

2.2.9 Land Subsidence

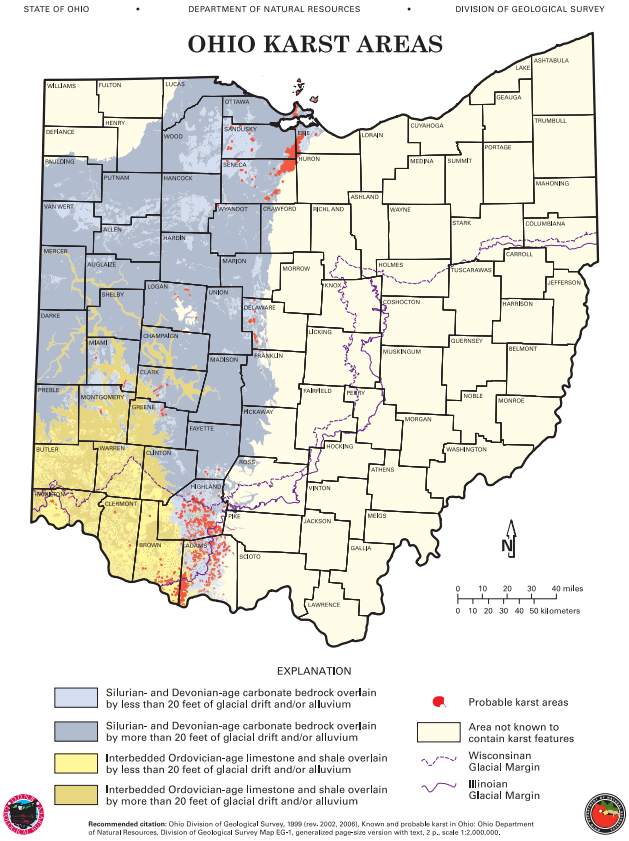
Land subsidence is the gradual or sudden sinking of the earth's surface caused by subsurface movement of earth materials. Subsidence is an issue that develops over time. The primary causes are aquifer-system compaction, underground mining, drainage of organic soils, natural compaction, sinkholes, and thawing permafrost. Land subsidence affects more than 17,000 square miles across the United States, an area equivalent to the size of New Hampshire and Vermont. For more than 80% of this area, subsidence is the result of groundwater exploitation and overuse. A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides can occur as a result of geological (weak, weathers, sheared materials), morphological (tectonic shift, thawing, vegetation removal), or human (excavation, deforestation, mining) causes. Water is the primary cause of landslides, generally due to intense rainfall or snowmelt. Seismic activity can also cause landslides. On the Ohio Landslide Incident and Susceptibility map, Knox County has low risks for landslide vulnerability.

Map 2:14: Landslide Susceptibility



Karst is a specific type of topography that can contribute to land subsidence issues. Karst is a landscape shaped by the dissolution of limestone or dolomite layers of bedrock. Surface water percolates through these layers, slowly dissolving the limestone or dolomite and creating voids. The voids may be visible or invisible, depending on their depth. Visible voids can allow surface water to flow directly into the water table. Deeper voids are not visible at the surface. Over time, the water table can change, potentially destabilizing the deeper voids. While karst topography is present in western Ohio, there is no known karst topography in Knox County.

Map 2-15: Ohio Karst Areas



Land Subsidence/Landslide Risk Assessment

The planning team considers land subsidence/landslide a low risk for Knox County. There are no known karst areas in the county and there is no known risk for sinkholes. The eastern portion of the county near the Mohican River features higher elevations and more rolling terrain than other areas of the county. Landslides are possible although not frequent in this area. The greatest concern identified in planning team meetings was the potential risk from uncapped wells. Over time, many property owners that use private wells as their water source have drilled new wells. Because there is no official process for capping an old well, there is no way to quantify these wells, identify their locations, or determine if they were properly capped. The health department is responsible for testing new wells but has no authority over old wells that are no longer in use. The planning team expressed concern over this issue and the possibility of substances infiltrating the groundwater through these wells or possibly causing sinkholes or other safety concerns.

Planning team members do not report known incidents involving land subsidence or landslide. While there is some minor risk for land subsidence issues or landslides in certain areas of the

county, there is no identifiable history of such incidents. Local concern is more of the erosion kind of problem where slight elevations or placement along waterways that flood regularly causes embankment or berm deterioration. Road surfaces can be compromised, with cracks forming and eventually developing into surfaces that have to be replaced. This can be caused by foundation soils deteriorating through flooding, or washaway of the supporting soils on the borders of the road.

There is also some concern of eroding farmland where smaller waterways increase in size as rainfall increases, or some storms are far more robust than others. The edges of fields end up becoming part of the ditch bank, and small amounts of farmland are lost.

A third application of land subsidence is eroding soils on residential or otherwise built properties along the major waterways. As a waterway filled with stormwater after precipitation flows downstream, soils from the outside curve in the waterway erode away at the bottom due to the high pressure and constant force of the water flowing through the waterway. As a result, this cuts away at the foundation of land above, and eventually the land drops into the waterway and surface area is lost. This soil becomes sediment in the waterway, and either flows through to the eventual destination of the water, or develops obstructions within the waterway, impeding the effectiveness of drainage.

While there is little specific evidence of these incidents, the conditions to allow each one to happen are present. Stakeholders felt that this was a low-level risk in some areas, and those are indicated as such within each jurisdiction. Five of nine jurisdictions selected land subsidence as a hazard.

2.2.10 Resource Contamination

Contamination of natural resources can affect life-sustaining services. Knox County residents are primarily concerned with the contamination of raw water supplies and of the air we breathe. This is basically a concern that aquifers and major waterways would be contaminated with hazardous chemicals or naturally-growing contaminants, or that the air would become contaminated by a major chemical spill, industrial gases, or smoke from a large fire, excessive pollen and allergens, or something else that is unanticipated.

Water source contamination is one form of utility failure and refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the water relative to the requirements of one or more biotic species and human need or purpose. A water quality emergency occurs when the quality of water available for human consumption is compromised. In recent years, water quality has become a growing concern in northwest Ohio as Lake Erie and its associated rivers and streams have been affected by algal bloom, aquifer threats, and groundwater contamination as well as areas of insufficient groundwater during drought. This same problem has affected inland lakes like Apple Valley Lake. Many other areas of the state have experienced water quality issues in inland lakes and reservoirs, making water quality a growing concern statewide. Algal blooms are one of the more common causes of water quality issues. These occur when colonies of algae produce toxic harmful effects on people and

animals. In Lake Erie, high phosphorous levels caused by runoff are considered a contributing factor to these harmful algal blooms. Some algal blooms produce microcystin, which is a poisonous bacterium that can sicken or kill people, fish, birds, and other animals. When microcystin or other toxins infiltrate a public water supply, the water becomes contaminated and unsafe for consumption. These incidents can have a drastic human and economic toll on the affected area.

In addition to harmful algal bloom risk, water treatment and distribution systems are susceptible to infrastructure failure in the form of lead contamination. This can include anything from long-term lack of repair, maintenance and/or upgrade to contamination from lead pipes and other substances. There is no way to definitely assess what buildings or homes may still have lead pipes that pose a danger. Most institutions are required to replace and/or refurbish plumbing systems and water delivery systems at risk; however, there is no mandate to inspect and refurbish residential properties. Knox County has many older homes that are likely to be affected by lead pipes.
In recent years as wildfires have grown in frequency and magnitude, and wind patterns have caused drift of the smoke, Ohio counties have been negatively impacted by smokey atmosphere. There have been areas in Ohio where outdoor activities have been canceled, residents have been told to stay inside if possible, and air quality alerts have been issued. This took place in the late summer 2024 when wildfires in Canada caused smoke and residue to drift into Ohio for several days. In the summer of 2025, there was some contamination in the far northwest counties, but the problem did not reach far enough south to affect Knox County.

Resource Contamination Risk Assessment
Because a water quality emergency can occur in any source body of water or water treatment facility, water quality is a countywide hazard that can affect all areas and jurisdictions. When water quality is compromised, risks to the community include public health and the economy. From a public health perspective, contaminated water can cause serious illness when consumed. Persons with special medical needs, compromised immune systems, the elderly, and children are most susceptible to this. Animals are also susceptible to illness from contaminated water. If the water supply is contaminated, residents lose access to drinking water in their homes and restaurants, grocery stores, and businesses that use water in their regular operations are forced to close until water service is restored. The loss of revenue, even if only for a short duration, can have a significant economic impact. Any compromise in the water supply also affects the public's trust of government officials. If the public is concerned about the safety of the water supply and believes local officials are not fully communicating about the issue, they may question the information provided by local officials.

To protect the community's water supply, jurisdictions must continually monitor, repair, and upgrade water treatment infrastructure. Because this is costly, jurisdictions must plan and budget for it. If the infrastructure is not well maintained and emergency work must be completed when an incident occurs, the economic cost is higher than completing work through ongoing maintenance and upgrades. In addition to the direct economic loss resulting from the emergency, the jurisdiction must immediately identify funds to make the repairs. These costs

are often recouped through increases in the fees charged to consumers, ultimately costing residents more money through increases to water rates, user fees, and local taxes.
Risk to the air quality is an issue that stakeholders felt is a developing threat. The progressive identification of systems to monitor air quality and to react and respond to incidents should be developed.

Local Water Quality Emergency History
The most significant water quality emergency in Ohio occurred on August 3, 2014. Knox County was not impacted by this event but it did bring significant attention to water quality issues in the state. On August 3, microcystin from a toxic algal bloom was detected in the water supply in Toledo, Ohio, causing the water to be declared unsafe to drink. The Toledo water system supplies municipal water to approximately 400,000 people in the northwest Ohio region. Local emergency management and government officials scrambled to provide drinking water to the affected communities. Within hours, stores across the region sold out of bottled water as residents rushed to purchase critical water supplies. Restaurants and food service businesses were forced to close until safe water could be provided and hospitals experienced a surge of patients who believed they were ill from consuming contaminated water. Within three days, Toledo's water was declared safe to drink but the economic and political ramifications lasted much longer. In the years since, the city is still working to upgrade infrastructure and coordinating with adjacent communities who rely on Toledo for their water supply. As a result of this incident, potable water supplies in a regional area were depleted for several days. The shortage of water reached, at a minimum, as far south as Richland County.

Knox County has not experienced a water crisis like the Toledo incident but the communities are concerned with protecting their water supply. Inland lakes and reservoirs in other areas of the state have experienced toxic algal blooms and other water quality issues. Across Ohio, research is continually underway to determine the root cause of the increase in toxic algal blooms and identify actions that can be taken to reduce their occurrence. There is constant effort to reduce nitrogen and phosphorus runoff from agricultural production, landscaping treatments, and manufacturing waste. There is ongoing activity to identify and replace lead pipes that cause lead particulates to disburse into the drinking water through distribution. Reservoirs have become susceptible to contamination by algal bloom and other contaminants, and are continually monitored for corrective treatment. Compromise to the water tables through ground contamination of karst openings and aquifer exposure to road salts and other chemicals is maintained as much as possible, but unknown releases can cause exposure to harmful substances in spite of these efforts.

2.2.11 Severe Storms
Severe storms include thunderstorms, tornado, windstorms, and winter storms/blizzards. All of these storms, which at times come multiple hazards at a time, all produce the same kind of damages and consequences, and cause generally the same community problems. Therefore, they have all been categorized as "severe storms".

Severe Thunderstorms

A thunderstorm is a local storm produced by a cumulonimbus cloud accompanied by thunder, lightning, and/or hail. Lightning is a brief, naturally occurring electrical discharge that occurs between a cloud and another cloud or the ground. Hail is frozen rain pellets that can damage buildings, vehicles, and other structures as they fall. Hail forms in the higher clouds and accumulates size as it falls as precipitation. If temperatures close to the ground are warm, the hail can partially melt or become freezing rain. Most thunderstorms include heavy precipitation and wind. These storms can produce hail, lightning, flash floods, tornadoes, and damaging winds that pose significant risk to people and property in the area. A thunderstorm that produces a tornado, winds of 58 mph or greater, and/or hail with a diameter of at least 1", is considered a severe thunderstorm. These storms typically develop as part of a larger storm front and are preceded and followed by regular thunderstorms.

Knox County experiences numerous thunderstorm events each year. The majority are mild or moderate in severity and include a combination of heavy precipitation, wind, and thunder. Hail and lightning are possible, but occur much less frequently than wind and heavy precipitation. Thunderstorms that include hail and lightning are much less frequent but are generally more severe. Thunderstorms are a countywide hazard and can affect all areas and jurisdictions. Lightning damages can occur countywide and have been recorded in the weather events data. There can be casualties due to lightning, especially if the storm hits suddenly and with little warning, or if the lightning is an isolated lone-standing weather event. These storms range from minor to severe, although the most are minor or moderate. Thunderstorms are relatively frequent but generally result in limited property damage.

It is not believed that development activities have had any effect on the countywide vulnerability to severe storms and thunderstorms, including rain, hail, lightning and wind. Minor improvements in storm drains and other infrastructure may have resolved some issues in specific locations. Otherwise, there has been no significant change for any village or the county as a whole. If rain becomes heavier due to climate changes, the damages from hail, lightning and heavy rain may increase as a result. Many of these kinds of damages are covered by private insurance, so it is believed that the damages numbers are under-expressed.

Severe Thunderstorm Risk Assessment

Thunderstorms occur frequently in Knox County, especially during the spring and summer. In these seasons, heat warms the atmosphere throughout the day, creating an atmosphere ripe for thunderstorms with hail, lightning, heavy rain and wind. Microbursts often include strong straight-line winds that can damage or destroy standing crops and develop quickly with little warning. Most thunderstorms include heavy precipitation, wind, and thunder. Hail and lightning are possible but less frequent. Thunderstorms are a countywide hazard and can affect all areas and jurisdictions. They range from minor to severe, although the most are minor. Thunderstorms are relatively frequent but generally result in limited property damage.

Even when minor, thunderstorms can damage property and infrastructure. Hail typically damages vehicles, roofs, and siding although injuries or loss of life are rare. Thunderstorm winds can damage standing crops, especially those at a vulnerable growth stage. Damage to

crops can drastically reduce yields, causing significant or even extreme loss to farmers for that year's crop.

Local Severe Thunderstorm History

According to NCDC records dating back to 1950 Knox County has experienced 165 thunderstorm events with 109 days reporting property damage. There are 69 events that included hail for the same time frame, with over $1.183M in cumulative damages. There is one recorded incident for lightning, and 14 that included heavy rain. The marked difference between the individual components of severe thunderstorms is that when hail is included, the losses are considerably higher and include crop damages to a significant degree. These storms do frequently also include high wind and tornadoes.

Table 2-39: Knox County Severe Thunderstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Thunderstorm/Wind	208	$5.745M	$10K	1	6	$27.67K
Hail	68	$210K	$100K	0	0	$4.5K
Lightning	2	$160K	0	0	0	$80K
Heavy Rain	2	0	$34.48K	0	0	$17.26K

Tornado

A tornado is an intense, rotating column of air that protrudes from a cumulonimbus cloud in the shape of a funnel or rope whose circulation is present on the ground. If the column of air does not touch the ground, it is referred to as a funnel cloud. This column of air circulates around an area of intense low pressure, almost always in a counterclockwise direction. Tornadoes usually range from 300 to 2,000 feet wide and form ahead of advancing cold fronts. They tend to move from southwest to northeast because they are most often driven by southwest winds.

A tornado's life progresses through several stages: dust-whirl, organizing, mature, shrinking, and decay. Once in the mature stage, the tornado generally stays in contact with the ground for the duration of its life cycle. When a single storm system produces more than one distinct funnel clouds, it is referred to as a tornado family or outbreak.

Tornado magnitude is measured using the Enhanced Fujita scale, abbreviated as EF. The rankings range from EF-0 to EF-5 and are based on damages caused by the tornado. Prior to 2012, the Fujita scale was used to measure tornado damage and was abbreviated F-1 to F-2, depending on the level of impact.

The following chart was taken from FEMA's website, and indicates the type of damages per Enhanced Fujita Scale tornado classification. Tornadoes in Knox County have historically been an EF-2 or lower.

EF-Scale	Wind Speed	Typical Damage

0	65 – 85 mph	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over,
1	86 – 110 mph	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111 – 135 mph	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
3	136 – 165 mph	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.
4	166 – 200 mph	Devastating damage. Whole frame and well-constructed houses completely leveled; cars thrown and small missiles generated.
5	>200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters; high-rise buildings have significant structural damage; incredible phenomena will occur
No rating		Inconceivable damage. Should a tornado with the maximum wind speed in excess of EF-5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. Will create serious secondary damage on structures.

Tornadoes are the most damaging of all atmospheric phenomena. While their frequency is low, the probability of significant damage is high. Because tornadoes occur as part of a storm system, they do not strike as independent incidents. Emerging out of a storm front or super cell, the tornado, especially when accompanied by heavy rain, straight-line wind, lightning, and hail, can be extremely damaging. Effects of a tornado include uprooted trees, damaged or destroyed buildings, and smashed vehicles. Twisting and flying debris turns into projectile weapons, which can cause injuries and fatalities.

Tornadoes in Knox County are generally narrow, and do not grow to the width of the mega-tornadoes in the plain states. They are generally 25-500 yards wide and stay on the ground for a few miles. While tornadoes do not occur frequently in Knox County, they can cause moderate to severe damage. Tornadoes are a countywide hazard and can affect all areas and jurisdictions.

Should weather events become stronger under the premise of climate change, tornadoes in Ohio are anticipated to come in clusters and increase in speeds, according to input from plan participants. What has typically been an EF-0 or EF-1, could easily rise by one or two categories. The formation of multiple funnels in one general front can strike multiple parts of the county simultaneously, challenging the capacity to respond and significantly increasing the damages to property, loss of property and even loss of life. The need to begin using wind-resistant building materials would help property on the periphery of the primarily damaged area, but would not save property that is directly hit. Local tornadoes come with rain, hail,

lightning, and straight-line winds, so it would be reasonable to assume all of those damages may increase as well. That would result in more damage to trees, endangering green space and destroying vegetation that would take decades to replace. In a county with little change in elevation, there would be less likelihood of inconsistent damages within neighborhoods, resulting in simply more damage over the entire county.

Stakeholders do not believe that vulnerability to tornadoes has changed in the past five years, nor has any development activity or goal changed the risk of the villages or the whole county to tornado damage. They do, however, recognize multiple incidents of a tornado cluster in Ohio. This clustering happened in June and August 2023, and again in 2024 but the funnel clouds did not touch down in 2024. There were some groupings of tornadoes in 2025, but data does not yet exist to confirm or deny that information. In all cases, some of the clustered tornadoes were in nearby counties, but did not reach Knox County.

Local Tornado History

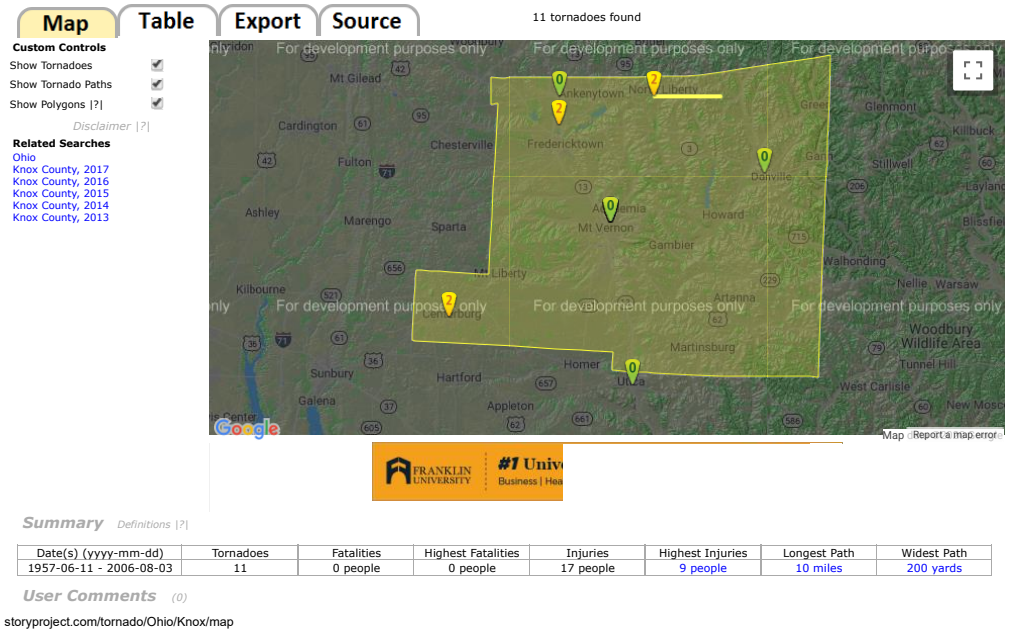
Two of the strongest tornadoes to impact Knox County occurred in 1982. On March 31, 1982, an F2 tornado touched down in Mount Vernon. The storm destroyed four homes and heavily damaged seven; total damages were $250,000. Four people also received minor injuries. Just three days later, another F2 tornado touched down in Fredericktown. This storm caused another $250,000 in damages, destroying two mobile homes and one frame home and damaging several other buildings. Nine people reported minor injuries from the tornado.

The most recent tornado in Knox County occurred on August 3, 2006. During the late afternoon, a F0 tornado touched down on the west side of Mount Vernon along State Route 13. Four businesses, including a lumberyard and car dealership, were damaged. At the car dealership, one employee sustained minor injuries and flying debris damaged at least a dozen vehicles. According to witnesses, the tornado was on the ground for several hundred feet and created a damage path approximately 50 feet wide. Property damage from the incident was $325,000.

The most severe non-tornado wind event to impact Knox County occurred on September 14, 2008. On that day, the remnants of Hurricane Ike moved northeast from Missouri across the Midwest and Ohio. In the afternoon hours, wind gusts as high as 70mph occurred in many areas of Ohio. Knox County suffered extensive property damage as thousands of trees and utility poles were downed by the extreme wind. Property damage to hundreds of homes ranges from a few missing shingles to major structural damage. Falling tree limbs and debris also damaged a significant number of vehicles. Across the county, roads and streets were closed because of downed trees and utility poles, making travel difficult for several days. Widespread power outages impacted much of the county, with some residents without power as long as ten days. Schools and universities were forced to close because of power outages and property damage. Because the storm occurred in the early fall before fields had been harvested, farmers suffered significant damage to their crops. Corn yields were reduced by three to five percent in many areas; soybean crop yields also suffered, but not as significantly as corn crops. In all, Knox County suffered $4,000,000 in property damage and $750,000 in crop damage. Across all of

northern Ohio, damages exceeded $300,000,000 from this event. Knox and many other counties received a federal disaster declaration to assist in recovery from this storm.

Map 2-16: Knox County Tornado History



Ohio ranks among the top states in injuries, fatalities, and property damage from tornado events. Recently, Ohio is one of the states with the most frequent, highest numbers of tornadoes in 2024. While it is believed that new and more effective detection is responsible for some increase in the number of recorded tornadoes, it is believed that there were significantly more tornadoes in 2024. There have also been more incidents with multiple tornadoes and funnel clouds in a given area that in years past. According to the NOAA Storm Prediction Center, there were 89 tornadoes in Ohio in 2024.

Windstorm

A windstorm is a weather event with very strong winds but little to no precipitation. Wind speed in this type of event typically reaches at least 34 mph but can be any speed that causes light or greater damage to trees and buildings. Damage can be caused by gusts, which are short bursts of high-speed wind, or longer periods of sustained wind.

A derecho is a specific type of windstorm that is widespread and fast moving. These storms can produce damaging straight-line winds over extremely large areas, sometimes spanning hundreds of miles long and more than 100 miles wide. To be defined as a derecho, the storm must produce damage over at least 240 miles, have wind gusts of at least 58 mph across most of the storm's length, and multiple gusts of 75 mph or greater. The destruction produced by a derecho can be very similar to that from a tornado. However, the damage from this type of storm generally occurs in one direction along a straight path.

Property damage from tornadoes and windstorms can include damaged roofs, gutters, downspouts, and trees. Outbuildings, barns, and storage buildings are at risk for damage because these structures are less resistant to wind damage and are frequently built on concrete slabs or dirt foundations. Damage to agriculture during the growing season when fields are planted is also a risk. High winds can damage crops and reduce yields, leaving a negative impact on the local economy.

Most residential structures in the county are constructed from wood, concrete, brick, or stone. Older homes typically have limestone or other masonry materials and are built on traditional foundations with basements or crawl spaces. Newer residential structures are often built on concrete slabs with no basement. These homes are prone to superficial damage, roof damage, and falling trees during wind events. Mobile homes are more vulnerable to wind damage because they are less secured to the ground that buildings with foundations and are constructed of less wind-resistant material than traditionally built homes.

Erosion is an outcome of extreme wind hazards in Ohio in the areas with essentially flat terrain like a few areas in Knox County. Because the soils provide fertile farmland, efforts have been sustained to use available acre of land for crop production. Land that was once wooded and lush with vegetation has been cleared and windbreaks have been removed to increase the amount of land available for productive; therefore, when winds cross the wide expanse of farm fields, the topsoil blows away. Some Knox County farmland is vulnerable to wind-caused erosion. Because the extremely flat topography cannot be changed, and because the winds cannot be stopped, the mitigating action to save the soil is to plant windbreaks, use sod strip farming techniques, and to create vegetative buffer lines where possible.

Knox County is vulnerable to damage from high winds unaccompanied by any kind of precipitation, making windstorms a countywide hazard. All areas and jurisdictions can be affected by severe wind, especially forested areas and other areas with significant tree canopy. There is come variation in elevation and wooded cover area to break up the effects of strong windstorms in many areas. Although winds in excess of 50 miles per hour can occur independently, this is uncommon. Most of the time, severe winds are part of a larger storm system. The wind occurs as precipitation and unstable air moves into the area. High winds are frequently accompanied by heavy rain, hail, ice, snow, or thunderstorms. In Knox County, wind-only incidents are rare. NCDC has few recorded wind-only events since 1950.

Although participants in the plan update felt that winds have increased modestly in frequency and consistency, the climate change predictions do not support that opinion. Overall, climate change predictions to not anticipate much change in winds. Participants felt there was more damage done by straight-line winds today than in years past. They felt the average wind is stronger than in the past. Stakeholders felt that windstorms are more common now, and that wind speeds of 35 to 50 miles per hour are frequent. Those are not necessarily tracked by the weather service because they are not considered a “storm”. Stakeholders said there is almost no damage from windstorms for the most part.

Nothing in the past five years related to land use, development trends, infrastructure improvements, or regulation has changed the countywide or village vulnerability to windstorm damages. Stakeholders felt that tree-trimming was the most effective preventive action they could take.

Local Windstorm History

Although infrequent, high wind events can occur independent of other hazards. One of the most significant windstorms in Ohio occurred on September 14, 2008 when the remnants of Hurricane Ike moved across Ohio. Damage across Ohio exceeded $500,000,000, and Knox County had $2.5M in property damage and $750K in crop damage from that storm. A derecho in June 2013 ripped across the southern and far western parts of Ohio, leaving communities in southeast and southern Ohio without power for weeks, and without the conveniences of electricity amid heavy debris and structural damages. Knox County was no affected by that storm.

There were three high wind events listed in the NOAA database since 2019, where winds gusted to 50-52 knots, in February and December of 2019 and December of 2021. There were no strong wind events. Most losses were limited to tree damage.

Table 2-40: Knox County Windstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Strong Winds	4	$80K	0	0	0	$20.00K
High Wind	34	$5.727M	$760K	0	0	$190.794K

Winter Storm

A winter storm is a weather event that includes several winter weather hazards and can develop anytime between late fall and early spring. These storms can include any combination of extremely cold temperatures, wind, snowfall, sleet, ice, rain, or freezing rain. These severe winter storms are frequent in Ohio but the specific components of each storm depend on the weather conditions at the time. Winter temperatures can be mild and relatively warm (above freezing), or they can fall below zero and stay there for several days. A winter season may include several fluctuations between cold and warm spells or be relatively constant.

A blizzard is a specific type of winter storm characterized by sustained winds or frequent gusts of 35 mph or greater and falling or blowing snow that reduces visibility to less than ¼ mile; both of these conditions must be present for at least three hours to be considered a blizzard.

A non-blizzard severe winter storm often begins with warmer air followed by very cold temperatures and heavy precipitation. An initial blast of warm air can cause temperatures to hover at the freezing point as precipitation falls, causing ¼ “to ½” ice (or more) to form on roads, trees, electrical lines, gutters and roofs, and vegetation. The precipitation starts out as freezing rain and/or sleet and, as the temperatures drop, turns to snow that adheres to the ice

and forms heavy clumps that bring down power lines and trees. As the storm system moves through and winds kick up, temperatures drop and the heavy falling snow drifts across roads, ice damages trees and buildings, and road conditions becomes treacherous. This type of storm can drop several inches of heavy, wet snow across the county.

Another type of severe winter storm that can affect Ohio begins with extremely cold weather (below 10 degrees Fahrenheit) and heavy snowfall, high winds, and extreme cold. A severe storm of this nature would likely pack sustained winds of 15-25 miles per hour, over ten inches of snow, and temperatures below ten degrees Fahrenheit for more than 24 hours. This kind of storm can easily deposit a foot or more of snow and disrupt daily activities for several days. Because the ice is not part of this kind of storm, damages are generally less as power lines are not destroyed and structural damage is not severe. However, the amount of snow is challenging in light of the extreme low temperatures. The snow tends to be fluffy and creates deep snowdrifts and blocks roads.

Ice storms are another type of winter storm event that can impact the area. An ice storm occurs when damaging ice accumulations occur during freezing rain situations. The accumulated ice can cause trees and utility lines to come down, resulting in loss of utilities and communications systems. As ice accumulates on roadways, travel also becomes dangerous. A significant ice accumulation is considered anything ¼ “or more.

Winter Storm Risk Assessment

Severe winter weather is a risk across all of Ohio. Winter storms range from short, mild bursts of snow and ice to multi-day events incidents with significant snowfall. In Knox County, winter storms are a countywide hazard and can affect all areas and jurisdictions.

Winter storms often include multiple hazards, such as ice and snow. Ice accumulates as temperatures fall then turns to snow, creating a dangerous layer of snow-covered ice, increasing the potential for vehicular accidents. Road crews work continuously to clear roadways. Occasionally, ice storms occur independent of other winter weather hazards. Although rare, when this occurs it can have a significant negative effect on the community. Power outages are a frequent outcome of ice storms when precipitation accumulates on trees and power lines causing them to break. Extremely cold temperatures can also occur without other accompanying winter weather hazards, although this is infrequent. These incidents are typically very short, lasting only a day or two, and are an inconvenience to residents and businesses more than the direct cause of property loss.

The greatest risk from winter storms is the loss of utilities. Power outages can occur during ice storms or winter storms that include significant wind or snowfall. Because most electric lines are above ground, they are vulnerable to damage from wind and ice. While many electric providers have improved their distribution systems in recent years and new construction generally includes underground utilities, the main transmission lines are still above ground and vulnerable to weather-related damage. In spite of this, power outages are infrequent and generally not widespread outside of an extreme ice event.

Anticipated losses from winter storms include content loss, such as food and perishables due to power interruptions, and minor economic loss due to short-term business closures. Except for the extreme but rare blizzard, loss of residential and commercial structures or infrastructure is not expected. Most winter storms are a short-term inconvenience that make residents uncomfortable but last for a few hours up to several days. Casualties are extremely rare, with the exception of traffic accidents resulting from dangerous road conditions.

Table 2-41: Knox County Winter Storm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Winter Storm	24	$757.904M	0	0	2	$31.580M
Winter Weather	1	0	0	0	0	0
Blizzard	0	0	0	0	0	0
Heavy Snow	6	$880K	0	0	2	$146.7K
Extreme Cold	6	0	0	0	0	0
Ice Storm	3	$6.87M	0	0	0	$2.29M
Cold/Wind Chill	3	$25.00K	0	0	0	$8.3K
Sleet	0	0	0	0	0	0

2.2.13 Utility Failure

Utility is a broad term for the many systems that provide essential services and amenities to the public. This includes water treatment and distribution, wastewater and stormwater collection and treatment, electricity, and natural gas delivery. Communications, such as cell phones, landlines, broadband service and internet of other types is not, at this time, legally considered a “utility”, but instead an entertainment or communications services. Therefore, this section does not include those components commonly considered part of utilities.

These systems can be built and maintained by a public entity, usually a jurisdiction or public cooperative, or by private companies. Water, wastewater, and storm water utilities are generally operated by public entities, although privately owned water systems and distributors do exist. There is a trend, although not prevalent yet in Ohio, to move to regional water treatment and distribution, and stormwater and sanitary sewer collection and treatment. Many times, these systems end up being “districts”, a specially formed jurisdiction for the purpose of managing this utility need.

Electricity in many jurisdictions is provided by private providers which is the case in Knox County; a few municipalities, however, own and operate their own municipal electric system. With electrical providers, most companies buy and then sell the generated energy, and provide for distribution through electrical lines that are mostly overhead, but sometimes buried. Generation can be from coal-fired generation plants (Ohio obtains much of its generated energy from plants in West Virginia and other states), solar collection units, windmills, or other

alternate generation methods. At this time, most energy in Ohio is from coal-fired plants that are located outside the State of Ohio.

In rural areas, many homes receive some basic utilities through systems that they own, such as water wells and septic systems. These systems are regulated and inspected by the public health department or soil conservation districts or county engineers.

Regardless of the type of delivery, utility systems provide critical services to the community. These systems are vulnerable to failure caused by disaster conditions or circumstances that occur independent of any hazard or storm.

Utility Systems Risk Assessment

Utility systems are vulnerable to failure caused by general system malfunction, poor maintenance, aging system components, and overuse. All utility systems, even those that are well maintained, are susceptible to these issues. Utility systems are incredibly expensive to operate and maintain even though the users of the utility pay fees for the service and products they receive. As time goes on, the systems require upgrades and replacement to continue meeting the needs of the public. Community growth and development causes the need for expansion so the systems can meet increasing demand. Changes in regulations also require systems to be upgraded or modified; these changes sometimes occur at federal and state levels, but the impact is felt locally. All of these actions are extremely expensive. While the cost is initially the responsibility of the jurisdiction or entity that manages the system, the expense is eventually passed on to the user through fees for services and products.

Because of the overwhelming expense of maintaining and upgrading these systems, many are not in good repair. Water distribution lines are old and undersized. Wastewater and stormwater systems that were combined when the system was originally built frequently have not been fully separated in spite of regulations requiring separation. Stormwater systems that were adequate 40 years ago are undersized by today's standards and unable to manage the level of precipitation communities experience today. Many electric and natural gas distribution systems have not been upgraded to keep pace with community growth. This is true for utility systems across Knox County.

Infrastructure failure was considered the second highest risk across Knox County, particularly for stormwater, wastewater, and water treatment systems. Electrical utilities were also considered a high risk because the population is so dependent on electricity for essential daily functions. Generators can provide alternate sources of power during an outage, but there are not enough generators and what is in place is often inadequate or aging. Most households cannot afford to have their own generator. Even when generators are in place, they require a constant supply of fuel. Either gas or propane powered, the availability of fuel can be challenging during and after severe storms.

Communities recognize how critical these systems are to the public and are working diligently to identify funding to upgrade and maintain their systems. These efforts include borrowing

funds, applying for grants, and increasing user fees and any other funding opportunities they can identify. Because every community relies on utility infrastructure for critical services, infrastructure failure is a countywide hazard that can affect all jurisdictions and areas of Knox County. Utility failure was ranked the second most concerning hazard by six of eight jurisdictions.

Local Utility System Failure History

Knox County has experienced several incidents that had a major impact on utility systems. Several of these occurred as a result of a natural hazard while one was specifically related to the failure of a utility system. On January 5, 2005, Knox County and a significant portion of central and northern Ohio was impacted by a severe ice storm. Thousands of trees and utility poles across the region were covered in ice, damaging electric lines and poles and causing outages that lasted as long ten days in some areas. This extended power outage created significant hardship across the community for businesses and individuals. Business operations came to a halt and people were forced to find shelter somewhere with electricity for several days. This storm caused more than $6,800,000 in damage in Knox County and $125,000,000 statewide. While this incident is classified as an ice storm, the power outages were the primary issue that caused hardship and property loss.

Several years later, in September 2008, most of Ohio, including Knox County, was impacted by another major power outage. As the sub-tropical remnants of Hurricane Ike traveled north from the Gulf of Mexico, heavy winds affected significant portions of the Midwest. In Ohio, the sustained 75 mph winds caused an estimated 2.6 million power outages. While some outages were brief, more than 300,000 people were without power for more than a week. Businesses were shut down, leading to significant economic loss. Knox County suffered $4,000,000 in property loss and $750,000 in crop damage. Like the 2005 ice storm, this incident is technically considered a natural event but the power outages were the primary source of hardship and damage to the community.

One notable utility failure that was completely independent of a storm event was the Northeast Blackout on August 14, 2003. This widespread power outage affected nearly 45 million people in eight U.S. states plus 10 million people in Canada. The outage was caused by a system failure. In Ohio, more than 500,000 people were without power. The outage area in Ohio included Knox County and many adjacent areas. Businesses were forced to close and people with special medical needs were unable to meet those needs without access to electricity.

As industrial development brings more data centers and operations to Ohio that require extensive supplies of electricity, and as temperatures during the summer tend to rise and require more demand on the electricity supply, there are concerns about the adequacy of electrical resources. There is also concern over the current electrical generation capacity of the Midwest in general as coal-fired plants start to come off-line in 2025 to comply with federal environmental regulations. A robustly growing industrial demand in the context of decreasing supplies of generated electricity could mean power problems for Knox County in the coming years.

2.3 VULNERABILITY ASSESSMENT

While the committee developed a countywide prioritization that includes hazard consequences in the unincorporated areas of the county (townships and neighborhoods) as well as the including the municipalities in their conclusions, the municipalities took into account only their individual jurisdictional perspective on each hazard. Therefore, county mitigation strategies were based on the vulnerabilities of the entire county as well as those associated with the unincorporated areas like townships and rural neighborhoods. The municipal strategies were based upon the municipality only.

Knox County is susceptible to social losses and resiliency challenges. Identification of those who need extra help in the wake of disasters can be difficult in rural communities because of resistance to asking for help, strong desires for independence, and less obvious external signs of need. Many people simply do not want to ask for help, even if they need it badly. Those who endure residential instability or borderline homelessness, a lack of dependable transportation, or the need for extensive healthcare and treatment are often silent populations in Knox County. With an aging population common to most rural areas in the state, and underserved and disabled populations who would need extra help, Knox County social services and advocacy groups could be overwhelmed by a large-scale incident in spite of the fact that people across the county willingly step up and help one another. Because the county has a smaller population than some other counties, some social programs and public services are delivered by multi-county agencies. One example is the Community Action Commission that operates in Knox, Morrow and Ashland counties. This makes delivery of services, maintenance of local volunteers, and access to assistance for those without vehicles slightly harder.

Although the culture of rural populations is one of significant self-reliance and self-sufficiency, Knox County lacks the extensive public services like mass transit options, independent food distribution programs, 24-hour behavioral health resources, and services for children and elderly in high demand situations. If a large portion of the population is negatively affected by a widespread disaster, there will be a shortage of volunteers to staff the response, and organizations like Red Cross may set up shelters and services in centralized areas instead of in individual communities. Service centers would most likely be established in Mount Vernon, again requiring transportation for intake and services, something local residents may struggle to do under extreme circumstances. The county residents may also be diverted to another county altogether, making it difficult for residents to obtain help.

Knox County is likely to experience resource gaps in any large-scale disaster, just as any other rural county would experience. As a small county with significant rural population, first responders are partly volunteers who have limited availability and equipment. Depending upon the time of day when a disaster strikes, many of these volunteers may not be available because they are at their fulltime jobs, perhaps outside Knox County. While many volunteer firefighters, EMTs and other responders work inside the county, their daytime obligation is to their employer. They sometimes wear emergency response hats at that full-time employer's location, and therefore cannot, even with special laws supporting volunteerism in Ohio, leave their jobs to respond. Special response resources and additional crews accessed through

mutual aid may not be close by when needed, or may be tied up responding to other areas. Unless an incident is limited in impact to Knox County, they are unlikely to command a remarkable response from higher levels of government. They could easily find the county alone in serving its own catastrophic needs.

Knox County and the various bodies of local government are filled with community-minded active individuals who often wear multiple hats. The church volunteer may also be the township trustee who also works for the county highway department. The village fire chief or mayor may also work out of town, and when home, fill various roles as school volunteer, church leader, and be the parent of several children with a spouse who also works out of the county. This places an extreme burden on volunteer capacity, first responder capacity, and overall ability to be self-sufficient in times of need. This was never more evident than it was in realizing who all each mitigation volunteer represented.

The vulnerabilities in Knox County are nearly the same today as in past years. There have been few changes in comprehensive planning, land use planning or regulation that affect the individual or collective risk analysis. The county is slightly increasing in population, and although there are a few new businesses, those often use structures that housed a business that ceased to operate. The development trends and goals are not ones that will likely increase vulnerability. The biggest threat may be a rapid development brought about by a large business coming into Knox County, such as an Amazon distribution center or an intel center. Creating adequate infrastructure, adequate and affordable housing, increasing broadband access, identifying sustainable agricultural practices, improving infrastructure, filling transportation gaps, and improving regulations are actions that will lessen vulnerability and improve resiliency. Knox County could be challenged to provide enough guidance to a rapidly moving and expansive new industry in the time frame needed.

All this taken into account, Knox County is highly resilient. Their work ethic and self-sufficiency are significant, and they are generally highly participatory in meeting their own needs. They have a strong tendency to take care of their neighbors. Their farm community is resourceful and willing to help neighbors, as are populations in the municipalities. They have the ability and desire to make the most of the resources they have, and to provide the leadership and inspiration for their own recovery.

2.3.1 Underserved Populations and Social Vulnerability Considerations

According to Data USA (https://datausa.io/profile/geo/knox-county-oh), Knox County had an 11% poverty rate in 2023, and the median age of resident was 39.4 years old. Less than half, 43% of the 1271 college graduates in Knox County, were men. The employed population numbered 29,518 out of 62,888 residents. Wages discrepancies between men and women equaled out slightly, with the GINI index reaching lower levels in Ohio than other states. The average household owned two cars. The larger number of persons in poverty were females ages 25 to 34, followed by females 45 to 54 years old, and then males ages 35 to 44. In 2024, 15.2% of children lived in poverty, but this was 9% less than a decade before. In 2023, the percent of uninsured citizens grew by 7.84% to an overall percentage of 11.4%. Medicaid

served 15.2% of the citizens, and 10.9% were enrolled in non-group insurance coverage. This includes all age groups.

Discussions included identification of services that assist persons with emotional, mental and addiction needs. The Mental Health & Recovery Services Board of Knox and Licking Counties provides funding and support to the independent providers of behavioral services in Knox County. There are crisis counseling and service providers, therapists for behavioral, mental and emotional conditions, and addiction services. There are multiple support groups for various situations. Many services are provided within Knox County, but others are delivered online or at locations in one of the other counties.

The Station Break Senior Citizens Center of Knox County provides services for the elderly in the county. They provide home delivered meals, on-site meals, daily activities, transportation and liaison services for those over 65 years of age or disabled. They provide linkage to the Association of Retired People (AARP), Area Agency on Aging Ohio District 5, Golden Buckeye Program, Knox County Task Force for Older Adults, Medicare Services, Project Lifesaver, and the Social Security Administration. These agencies all provide a variety of services to the elderly within their scope of services, but are generally not located in Knox County.

The Knox County Board of Developmental Disabilities provides assistance for children and adults with disabilities. These include early intervention, autism and sensory resources, community education and outreach, and service and support assistance. They provide a full scope of services that includes academic, vocational, social, physical, and emotional support.

2.3.2 Demographic Risk Assessment Tools

Recently created by the federal government, various tools exist online to assist is assessment of risks and vulnerabilities in the United States. Tools that were used for information include the National Risk Index, the Justice40 Initiative Screening Tool, and a Neighborhoods at Risk developed by Headwaters Economics, among others.

Census Tract to Political Jurisdiction Comparison

Many online assessment tools utilize census tracts rather than political jurisdictions because statistics are collected by the US Census Bureau and categorized into census tracts. While census tracts sometimes include an entire township or municipality, most times they are not consistent with those boundaries. To aid in understanding of vulnerability information and to apply it to the mitigation strategies created in this planning activity, the following chart gives and understanding of what political jurisdictions are included in specific census tracts. Unincorporated area names and census area names have been included in the description to help understand the neighborhoods that are grouped together. The National Risk Index overall ratings are included to create a quick visual assessment of relative vulnerability throughout the county, and to further understanding of comparative analysis of a countywide perspective.

There are fourteen census tracts in Knox County. Following is a description of each census area.

Table 2-42: Knox County Census Tracts

Census Tract Number	Included Political Jurisdictions
006700	This includes Jefferson and Union Township and the Villages of Danville and Brinkhaven, and part of Butler Township ending at Newcastle Rd.
006801	This includes Howard and Brown Township bordered by Monroe Mill Rd., SR 36, Magers Rd. Colopy Rd. and Danville Amity Rd. – it includes Apple Valley subdivision
006802	This is Berlin and Morris Townships east of Old Mansfield Rd.; south to SR 36 and east to Monroe Mill Rd., Danville Amity Road and Chapel Rd.
006900	This is Middlebury Township, part of Berlin Township and Fredericktown north of SR 95
007000	This includes Wayne and Liberty Townships south of SR 95, and part Clinton Township north of SR 36
007100	This is the north side of Mount Vernon between Mansfield Ave. and the Kokosing North Branch
007200	This is north Mount Vernon between SR 36 and Mansfield Ave. to North Liberty Road
007301	This is Mount Vernon north of SR 229 and South of SR 36 east to Upper Gilchrist Rd.
007302	This is Mount Vernon north of Gambier Rd., east of SR36, North of SR 229 and south of Paige Rd. and Gilchrist Rd.
007400	This includes Jackson, Clay, Morgan, most of Harrison, and part of Pleasant Townships, bordered by the county line, SR 661, Sycamore Road, Rangeline Rd., SR 13, Murray Road, Fry Rd., Baker Road, and back to Newcastle/SR 229-62.
007500	This is the City of Mount Vernon north of SR 13 and south of SR 229 to Fry and Baker Roads
007600	This is the City of Mount Vernon south of SR 13
007701	This is Hilliar Township includes Centerburg to Johnsonville Rd.
007702	This is Milford Township and part of Miller Township up to Miller Rd.

Map 2-17: Knox County Census Area Map

Add a Cencus Area Map

National Risk Index

The National Risk Index (NRI) was released in 2021. It can be found online at https://hazards.fema.gov/nri and a report was created for fourteen census tracts in Knox County. Note that census tracts do not align with political jurisdictions, so the relationship between the county, municipalities and townships in this plan is not consistent with the individual areas identified as census tracts.

This geospatial tool assesses risks and vulnerability for all counties across the USA. The NRI estimates the likelihood that a given hazard may strike a specific area, and then estimates the value of property, daily activities, or lives lost in a worst-case scenario. It also views losses in the context of social vulnerability, taking into account factors like economic status, disabilities, or other special needs. The NRI then assesses the community resilience based upon community characteristics and threat levels. The extensions then can be combined to draw estimates and conclusions about how a specific community may fare, and what needs may be, after a disaster occurs. The NRI is an overall, comprehensive assessment and does not always interface perfectly with local input obtained from stakeholders in mitigation planning meetings. The NRI is useful for property and social vulnerabilities in a monetized manner.

This tool did not include avalanche, coastal flooding, tsunami, or volcanic activity in the risks for Knox County's census tracts. It did include cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, wildfire, and winter weather as applicable hazards. The stakeholders disagreed that hurricane was relevant to Knox County. They argued that should the remnants of a hurricane reach Knox County, it has neither the magnitude nor the severity it has when classified as a hurricane or a tropical depression, and therefore becomes heavy rain, high winds, or thunderstorms when it reaches Ohio.

The census tracts in Knox County were assessed on the NRI as "Very Low" risk with reference to vulnerability to natural hazards. This data is expressed in the national context, comparing the local community to the national averages. Additionally, compared to the rest of the country, Knox County's anticipated annual loss is "Very Low", social vulnerability is rated at "Relatively Low", and community resilience is rated as "Very High". While this data gives a very broad picture of how Knox County compares to other counties, there were disagreements with some of the overall conclusions. The NRI assessment of social vulnerability was seen as understated and community resilience as overstated. This is likely due to the low population in Knox County as compared to greater metropolitan areas and highly concentrated populated areas in the national perspective. The NRI leads one to believe there is little risk of any kind in Knox County, and that would have the unintended outcome of diminishing preparedness activities and thus increasing vulnerability through lack of prevention and protection.

Speaking in the context of the county and its management of disaster consequences, stakeholders felt that their localized perspectives were more accurate, and more in sync with local capabilities to respond and serve survivors. However, the exposure and expected annual loss numbers were evaluated to be accurate and relevant. A summary of countywide data is expressed in both 05 National Risk Index Knox County and 06 NRI Exposure and Expected

Annual Loss Tables appendices. This Information is also discussed and/or referenced in various parts of the narratives.

Neighborhoods at Risk by Headwaters Economics

This tool provides census tract information about vulnerable people and neighborhoods, and provides projections regarding climate. This will allow identification of underserved populations and persons with special or extra needs by census tract within the county. Significant and applicable findings that cause groups to be more vulnerable to disaster loss are shown in the following table.

Table 2-43: Special Populations

Characteristic	Population
People in Poverty	6.0%
Families in Poverty	1,250
Families with Children in poverty	951
Single mother families in poverty	513
Occupied Rental Homes	5,847
Occupied Mobile Homes	842
Hispanics	1,243
Lack English speaking fluency	311
Over 65 years old	11,750
Over 80 years old	1,409
Under 5 years old	3,725
No High School Diploma	3,697
Over 65 y/o living alone	3,266
Single female + children	1,830
No Car households	1,577
Persons with disabilities	8,193
Persons without health insurance	6,992

Resilience Analysis and Planning Tool (RAPT)

This portal allows the user to obtain detailed resource information about the community, and to identify places and services that would be helpful after a disaster. Users can obtain specific information, like addresses, of the identified resources. It provides the following information as part of the Knox County, Ohio data.

Table 2-44: RAPT Analysis of Critical Facilities

Resource or Facility	Number
Fire Stations	10
Law Enforcement Stations	5
Mobile Home Parks	9
Public & Private School Buildings	18
Hospitals (General)	1
Long Term Care Facilities	12

This tool will allow emergency managers to instantly spot some resources and estimate the general location of various important sites. This site no longer shows wastewater treatment

facilities, churches, colleges and universities, and SNAP distributors, and no longer allows the user to see actual street addresses of the identified entities. The demographic data might help decision-makers determine the methods of warnings and notifications, shelters, and other special services for underserved populations.

Summary

These various pieces of data are somewhat consistent from one tool to another, and most find their foundational information in the 2020 US Census. There was some discussion about the accuracy of the conclusions, mostly as it related to the actual vulnerability and resilience of the areas. While overall information has been listed in this section, specific community-based data will appear in each community's vulnerability statement because every community is slightly different. Overall, these tools provide a solid method for Knox County to identify likely locations of urgent need based upon demographic information, and can quickly identify underserved populations that need extra effort and critical resources rapidly when a serious incident occurs. External sources provide a good balance to government-based resources as the underlying purpose of the data is sometimes different.

2.3.3 Comprehensive Social Vulnerability and Capability Assessment

Social vulnerability was rated as "relatively low" for most of Knox County. The lack of residential, financial and family stability appears to contribute to social vulnerability in Knox County, much like many other rural counties in Ohio. The biggest factor in this component of recovery seems to be that the resources needed are present to a lower degree than in metropolitan counties. Also, the responders are likely to be victims themselves, putting them in a position to be helping others recover while they themselves are recovering. This would require a higher level of social services and supports to be provided during and after any significant disaster event. It would require support of the lifelines that provide food, water, and shelter as well as household items and personal items. The health and medical lifeline would probably need to provide additional services, including both physical and behavioral health resources. As is true in any impoverished neighborhood, the repairs and replacement of structures and equipment after a destructive event would be significant. The structures in these areas would likely be more vulnerable to fire, wind, and water damage, rendering the structures uninhabitable to a greater degree than other locations.

Sheltering for residents when displaced from their homes is a significant vulnerability for all of Knox County, not only for the high vulnerability zones mentioned above. For those families that live in mobile homes, and due to a generalized shortage of adequate housing, it would be difficult to house great numbers of residents. Finding long-term housing solutions would be a challenge, and building new structures would likely take too much time. Without an array of temporary housing options, Knox County could easily struggle to maintain the shelter lifeline in a catastrophic event, especially in outlying areas like Brinkhaven and Martinsburg.

Historically Red Cross has provided sheltering capabilities using local churches and other public facilities. However, churches across the state are at risk of closing because church participation has decreased over recent years, and those facilities without air conditioning and generators

may not be able to be used. The liability for facilities has increased, and provides a strong disincentive to congregations to open their doors to shelter people. Historically, churches have also fed the masses, and they have funded utility bills and rent deposits and provided other financial and household support for disaster victims. With many residents likely to not have a strong church affiliation, that reduces the connection between disaster survivors and church resources. Red Cross is suffering from a lack of volunteers, just like other organizations, and they are sometimes hard pressed to operate shelters in rural communities. The void in capability includes not only a lack of facilities that are suitable, with shower, feeding and sleeping areas as well as generator power, but also includes the supplies and volunteers to operate shelters. There are schools that are well-equipped and likely to be available, but there are no supplies or trained volunteers to run them. EMAs are not sufficiently funded for them to pick up the costs of a mass care operation, although they could likely muster up the expertise and ability to operate a shelter if need be.

Stakeholders discussed non-English speaking workers who are located many Ohio counties through various employment programs. Knox County is not highly populated by temporary or permanent foreign workers, or by migrant laborers who reside permanently in other states. Although communication with some truckers can be challenging because they come from a base far away from Ohio, the stakeholders did not feel language provides much of a barrier in Knox County. They felt the most common foreign languages they encounter are Spanish and Russian.

Local schools and county Job and Family Services work with homeless and economically disadvantaged residents. All schools have a designated person who works with homeless students and children. All have intervention specialists who work with students that have special needs or social vulnerability.

Recovery and transitional homes that house individuals with disabilities or in recovery are not easily identified and located; they are individual homes with a 24/7 caregiver or manager, and they provide housing for a few individuals at a time. There was no estimated number of these homes shared in meetings. Recovery houses are sponsored and serviced by licensed organizations, and are more easily located, when necessary, through the local mental health board and the disabilities board. Relocation for the individuals is problematic due to individual needs as well as a lack of transportation. In spite of providing robust senior services and assistance programs, elder abuse and neglect numbers are on the rise, and this is another situation that would not be improved or lessened in the wake of a disaster.

Stakeholders summarized populations at most risk as first, the elderly. All agencies that serve the elderly reported an increase in services provided and requests for even more services. While these agencies meet regularly and network on a daily basis, it is impossible to meet all needs and service requests. They see consistently increasing isolation and hardship in elderly individuals, couples and families. While an informal network of residents looks out for each other in a farm community, and younger ones check in on older ones, keeping up is getting harder every day. In a disaster, this could be overwhelming. Although Knox County is a very

resilient area because neighbors help neighbors, the egress of younger generations is negatively impacting this at a rate slower than neighboring counties. Some participants spoke about tourist groups of seniors in Knox County, and expressed concern over those groups being isolated, unserved, and stranded during and after very severe weather, and talked about how their mobility and sensory needs make it difficult to ensure their safety.

Children, especially those with special needs, fill the second group of special concerns because finding the services to help them is difficult and sometimes dependent upon agencies based outside the county. Healthcare stakeholders reported that the number of grandparents raising small children is extremely high, and this is increasing every day. Many families with children do not own their own home, and the high rental numbers make those residents at risk for deteriorating and deficient housing, adding to their disadvantage. The health department provides vaccinations for all children and provides local clinics in many communities to help, but there are many other areas of need for the children in the county. Abuse and neglect statistics are on the rise, and this will only get worse in a disaster.

The economically impoverished have challenges in obtaining necessary life-sustaining services too. Just over 11.2% of the population has no healthcare coverage and are expected to self-pay for care. These are often those who can least afford to do that, so they go without healthcare. Social services staff reported that more and more families are giving up health insurance to be able to pay for necessities. Reduced benefits for behavioral healthcare impacts this as well, and prevents many people with emotional and mental health problems or addictions from requesting and obtaining care. None of those issues improve under the stress of disasters, and stakeholders anticipate this being a problem area should there be a large-scale incident.

In summary, stakeholders reported that social needs are on an upward trajectory in Knox County. While providers felt they are “keeping up”, they said that federal funding for underserved and disadvantaged populations needs to keep increasing for them to continue adequate services. In the event of a disaster, these needs will all be amplified, and they doubt that current funding will begin to meet the actual needs.

Disaster sheltering is a concern should there be a widespread, regional need for overnight shelter operations. Red Cross is less active in Knox County than in years past, and has very limited numbers of local volunteers. A regional disaster would be difficult for them to staff. Should a widespread incident like a power outage cause mass evacuations and sheltering, Knox County would have to rely upon churches and schools to provide neighborhood shelter locations, but the equipment for shelters would be a challenge without enough Red Cross resources. Collaboration between ARC and the EMA would be critical.

Most of the fire and EMS service in Knox County is provided by volunteer departments. The City of Mount Vernon Fire Department is the only full-time 24-hour staffed fire department in the county. While some departments are part-time paid and have more staff than the entirely volunteer ones, those part time staff members are often not available at peak run times. The average age of the volunteers is ever-increasing, and is probably an average of 55-60 years old

now. Younger people are not joining fire departments for a variety of reasons, and when they do, it is hard to keep young firefighters in Knox County. Being as close to Columbus as it is, it is easy for Knox County residents to travel to the Columbus area for public safety jobs, and to be paid higher wages in Franklin County than Knox. Volunteerism is at an all-time low in fire service in Knox County, just as it is across the entire State of Ohio. Retention of fire officers is incredibly difficult. People work out of the county, they work long hours, their jobs do not accommodate leaving to fight a fire or respond to a disaster. Daytimes when volunteers are working are exceptionally difficult to staff, and it may take five different departments to fight a house fire nowadays.

Providing special rescue services is difficult, but Mount Vernon Fire Department and some individuals do have specialized capabilities. While their personnel are full-time paid employees, they also have a hard time retaining workers. Training younger and newer individuals is getting harder because younger workers are not inclined to volunteer to gain experience, or to work for low wages before they come to a city like Mount Vernon. With this shortage in the availability of workers, it is even more difficult to find adequate numbers to train in hazardous materials response, technical rescue, or specialty areas because of the extensive training, personal commitment, and cost of outfitting an individual for specialized work. With the miles and miles of state highway that cross Knox County, there is ample concern over providing, maintaining and supporting workers who are capable of hazardous materials response.

EMS services are difficult to provide, but county fire departments have been able to satisfy this need. Retention of current workers difficult, especially with the medical worker opportunities available in Columbus. Many new workers demand wages higher than can be paid, and thus they move on to Columbus and other metropolitan areas outside the local community.

Because two house fires or multiple EMS calls at one time could overwhelm county resources, they have aggressively developed and utilized mutual aid agreements with surrounding counties. They use the statewide mutual aid programs as well, and rely upon regional specialty resources for unique or high-tech needs. They use the structural rescue teams from the Columbus area. Local departments work together well, and joint operations are generally smooth and effective.

There are basic commercial building regulations in Knox County consistent with those required by the State of Ohio. Building codes have not been adopted for residential development, but commercial development is enforced by State of Ohio building code enforcement services. All commercial property is required to meet State of Ohio building codes, and those codes are enforced. The county does not have a comprehensive building code to guide post-disaster clean up and rebuilding. It would be difficult, except for the efforts of some departments, to manage widespread entrance of many contractors after a significant event to limit the opportunity for low quality work and scam providers. With a robust population of Amish, there is a robust population of highly skilled tradesmen who would be actively assisting county property owners after a disaster.

Located close to Columbus, Knox County has many resources for supplies in disasters. Locally there is access to several building supply distributors that could provide adequately for the county. There are multiple distribution centers within an hour's drive for major retailers in Columbus, and those are utilized to provide life-sustaining supplies and equipment. Under usual circumstances, supplies and equipment should not present a problem.

Medical resources for resilience come mostly from the Columbus area, and perhaps from Mansfield or Delaware. Medical helicopters come from Columbus to serve the county. Millersburg, Mansfield, Marion, Galion, Mt. Gilead, Wooster, Ashland and Delaware hospitals can back up Knox Community Hospital. Ground transport services are in place to assist with patient movement. Multiple providers of durable medical equipment and medical supplies are available, and many in proximity to Knox County, making service during disasters feasible.

The county has multiple generators on hand for extended power outages, but some are perhaps worn enough that stressful use may cause them to fail. The number of generators is adequate so long as they operate without repairs or replacement so long as everything works when plugged in. Amateur radio volunteers can assist with communications when towers are down, or when power is out. Local fuel supplies are fairly redundant, but often limited to gasoline. The county keeps its own supply of fuel for emergencies. Replacement and repair of old generators is a concern, as is simply having more of them.

To summarize, Knox County is most capable of maintaining Health and Medical and Communication Lifelines through existing resources and regular external providers. Energy Lifelines may be impeded by forces beyond Knox County's control if power generation fails or if distribution lines are destroyed in mass. While providing food and water would likely be handled by the county, having the staff to provide organized shelters to a large portion of county residents would significantly tax the county's ability to meet needs, but Red Cross is a potential resource for them to do this. Extensive demands on fire service and emergency medical services would be extremely difficult for the county. They have suffered from a lack of volunteers to staff fire and EMS companies, just like most other Ohio counties. Transportation Lifelines could be unmet unless the schools were able to step up and fill the void even though there is significant capability within the county's transit program. Therefore, Safety and Security, Transportation, and Food, Water and Shelter Lifelines may cause some difficulty. An extensive hazardous materials incident would require Mount Vernon Fire to fully mobilize quickly, and to obtain assistance from other county departments. Knox County could call in outside resources very readily, making the Hazardous Materials Lifeline less difficult to maintain. All in all, Knox County is robust in their intent to take care of themselves, and in spite of limited resources, they are rated as highly resilient and self-sufficient. This characteristic will serve them well in any significant disaster.

2.3.4 Knox County Vulnerability

Knox County

Knox County is vulnerable to severe storms, including tornado/wind events, severe thunderstorms, and winter storms. In Knox County, severe thunderstorms and tornadoes can

be accompanied by heavy rain that causes flooding. They rated this as their most concerning hazard because of both frequency and widespread effects. The entire county is often affected when a severe storm front moves through, whether that is a thunderstorm, tornadoes or a blizzard. Wind and thunderstorm incidents occur multiple times per year but are not usually severe, and they cause limited damage. Tornadoes can be extremely damaging but are infrequent; however, Ohio in general is developing a history of tornado clusters over the past three summers. This recent development concerns Knox County residents. Winter storms seem to occur at least once per year but are generally brief and cause inconvenience rather than significant property damage or injury and loss of life. That inconvenience does not go without cost, however, as people cannot work due to bad roads or canceled school and staying home with children. In the most serious incidents, wind from any of these storms can damage structures, cars, trees, and utility poles. Debris can become a challenge that requires coordination among multiple agencies to manage. Disposal costs can be high, especially when the entire county is affected. Small and narrow county roads can easily be blocked by debris. These roads are hard to navigate in heavy snow, rain or wind, and the incidence and seriousness of vehicular accidents increases. Fire risk increases during winter storms as people combine furnace heat with fireplaces and space heaters to stay warm. Bridges and culverts that are old or in ill repair, or that are simply low-lying in a riverine setting, can be washed out or compromised easily. The greatest risk to residents, however, is the power outages that often accompany these storms. Brief power outages of several hours are manageable but outages that last overnight or for several days can be a huge challenge. When coupled with extreme heat and humidity, or extreme cold, power outages are miserable, expensive, and sometimes deadly. People depend on power for basic services, healthcare, and critical communications. In adverse weather conditions, people are more vulnerable from lack of power.

Knox County stakeholders identified utility failure as their hazard of primary concern. People across Knox County rely on critical utilities, including electricity, heating gas, and water for daily life. If any of these services are compromised or unavailable, the impact on the community will be felt immediately. Utility infrastructure includes water, wastewater, and stormwater systems as well as electricity and natural gas. Most water, wastewater, and stormwater utilities are provided through municipal systems. Electricity and natural gas systems are managed and maintained by private companies. In unincorporated areas, many homes utilize water wells and individual septic systems for water and wastewater. Because of the significant expense to maintain and improve these systems, many communities struggle to keep pace with community growth and evolving regulatory requirements. The same challenge applies to transportation infrastructure.

Flooding was rated as the county's third most concerning hazard. Most of Knox County is part of the Muskingum River Watershed; water in the county ultimately flows south to the Ohio River. The watershed begins in Morrow County as the North Branch of the Kokosing River and winds into Knox County, through Fredericktown, and into Mount Vernon where it joins the Kokosing River. The Kokosing then winds to the southeast through Gambier and into Coshocton County. The Mohican River flows from north to south on the eastern boundary of Knox County, through Brinkhaven and on to the south. The Kokosing and the Mohican join just east of Knox County to form the Walhonding River, a major river that later flows into the Ohio River.

While Knox County is vulnerable to flash and riverine flooding, flash flooding is considered a much greater threat than riverine. Developed areas, including Mount Vernon and Apple Valley, can experience significant short-term flash flooding in low lying areas because storm sewers are not sufficient to manage runoff as quickly as precipitation falls. As these communities have experienced residential and commercial development, this issue has worsened. Several villages, including Fredericktown and Gambier, can also experience these flash flooding incidents. Floodwaters generally drain within a few hours of the precipitation event but the long-term damage to streets, roads, and infrastructure is a financial hardship for the county and each impacted jurisdiction. Because of the county's rolling topography, flash flooding can also occur in low-lying areas in the unincorporated parts of the county. These areas feature farmland and natural habitat areas so there is little direct impact on structures and buildings. Roadways can become flooded but this is typically very short lived, with water draining within several hours of the event.

The risk of riverine flooding that interferes with threatens life and property across Knox County is moderate. When rivers and streams do leave their banks, the flooding is generally short lived. Structures are rarely impacted but roadways, including several key state highways, can be closed temporarily. These road closures create significant hardship for residents in the more remote areas of Knox County who travel to Mount Vernon and other cities for work, school, and business purposes.

Drought and extreme heat rated fourth on the list of Knox County hazards, several steps higher than five years ago. While droughts have occurred in the past, they are generally rare events. However, the past three years have shown periods of heavy rain with later periods of drought, the most severe being the second half of 2024. The most significant impact in a drought is on the county's agricultural industry. Crop yields can be greatly reduced during any given growing season under drought conditions. While many farmers purchase crop insurance, this can only somewhat limit the financial impact of a drought. Livestock operations are severely impacted during a drought when it becomes expensive and difficult to feed and water the animals. Hauling water in for them is costly but critical, and irrigation of any specialty crops is also expensive. The price of grain and feed increases during a drought. In the most extreme and prolonged drought conditions, adequate water supply from wells could become an issue. However, because groundwater is the primary water source for communities across Knox County, it would take a drought of extreme significance for this to become a concern. Excessive heat, while rare, is also a concern due to the impact on the human and animal population. Heat adversely affects the elderly, young children, and people with medical conditions. If a power outage were to occur during an extreme heat event, additional resources would likely be necessary to support these populations for the duration of the event.

Hazardous materials were identified as a risk because of the number of roadways that traverse Knox County, including multiple state highways. Commercial vehicles frequently travel through the area on state routes 13, 36, 62, 229, and others. Many of these vehicles transport hazardous materials either through the county or to and from the industrial facilities located

within Knox County. Several pipelines also traverse the county, primarily for gas transmission. Exposure to hazardous materials via rail is limited because there is only one rail line in the county.

Fire risk is a concern of Knox County residents. Over two-thirds of the county is split between use for cropland and forested land. Both, especially in late summer and fall, are very combustible. When a fire source, as simple as a tossed cigarette or a robust campfire, combines with wind, firefighting becomes terribly difficult. In the remaining area of the county, there are homes and other buildings, many of which are built with wood and are also combustible. Given the shortage of firefighters in Ohio, and the fact that most fire service in Knox County is supplied by volunteers, this is a rising concern of county residents.

Dam Failure could, in the worst of scenarios, be catastrophic for Knox County. Across the county, there are 57 dams. While many of these are class IV dams that pose little or no risk to the community, there are six that are considered a high hazard dam. Another in Ashland County has inundation areas in Knox County. The North Branch of the Kokosing River has two high hazard dams, the North Branch Kokosing Dam owned by the US Army Corps of Engineers, and Knox Lake Dam, owned by ODNR. These dams flow south around and through Fredericktown and into Mount Vernon and Gambier. Dam failure could easily inundate these communities. Lake Viering Dam and Damascus Dam are not close to these areas; however, Lake Damascus Dam would eventually end up in the Kokosing River on the southwest side of Mount Vernon. The effect of this would slightly worsen flooding. Apple Valley Lake overflow would join into the Kokosing several miles east of Gambier, and would worsen rural flooding. The other case is Pleasant Valley Dam in Ashland County. Should the Pleasant Valley Dam overtop or fail, the inundation would reach Brinkhaven and could be catastrophic as homes are situated inside a bend in the Mohican River. Without adequate warning and immediate evacuation orders, Brinkhaven residents are extremely vulnerable.

These dams are maintained by the owners, which include state and federal agencies as well as private owners. Maintenance of these structures is critical because many are located in populated areas. Fredericktown, Mount Vernon, Gambier and Brinkhaven would be at risk in a major dam failure. While none of these dams have failed in the past, it is a concern for the county.

Resource Contamination was ranked eighth on the list of county hazards. The planning team felt that the county's water supply was plentiful and safe. Groundwater is the primary source for water in the county, both for public water systems and private wells. Activities that put this resource at risk include road salting during winter months, chemical treatment of crops during the growing season, livestock waste system failure, hazardous materials incidents, and pipeline failure. Although not covered in this plan, intentional contamination through terrorism is also possible.

Land subsidence/landslide was rated as a low priority. The county has a few isolated areas along the Mohican River on the edge of the county that could experience minor landslides. This

area is steeper than the rest of the county. Landslides are possible in this area but there is no known history of their occurrence. The county has no known karst structures. There was some discussion among the planning team about concern over old water wells that may not have been properly capped when taken out of service. The quantity and location of these wells are unknown but they are considered a minor risk.

Knox County has not been impacted by invasive species with much frequency but the hazard was identified as a concern because of the potential impact on trees and vegetation, and the cost of debris removal after significant storms. As these trees are weakened by the disease, they are more vulnerable to wind damage and significantly increase the debris field and clog waterways during wind and flood events. Knox County has many wooded and tree covered areas so another infestation could be devastating to the county's natural habitats.

Earthquake is considered a very low risk. There is no history of earthquake occurrence in the county. Underground utilities and infrastructure would be the greatest vulnerability.

Table 2-45: Knox County Hazard Rank
Townships & All Unincorporated Areas

Rank	Hazard
1	Severe Storms
2	Utility Failure
3	Flood
4	Drought & Extreme Heat
5	Hazardous Materials Incident
6	Fire
7	Dam/Levee Failure
8	Resource Contamination
9	Land Subsidence
10	Invasive Species
11	Earthquake

2.3.5 Jurisdiction Vulnerability

Knox County has many common factors across the county, but each municipality considered its own unique vulnerabilities based upon the characteristics of the jurisdiction. The four larger villages (Centerburg, Danville, Fredericktown and Gambier) are a combination of residential, commercial and occasionally industrial properties. The smallest villages (Brinkhaven and Martinsburg) are very similar to the townships. While the townships are primarily agriculturally based, there are some small industries, retail and distribution, and professional services within their areas. The following section describes how each community ranked each hazard, with "1" being the most disruptive and concerning. The symbol "n/a" means that particular hazard is not applicable to that particular community.

Brinkhaven (Formerly referred to as "Gann")

Brinkhaven is the smallest jurisdiction in Knox County. Historically, the village was known as Gann until its official name was changed in the late 1800s. Located on the eastern edge of Knox County, Brinkhaven has more hills and elevation changes than the majority of Knox County and is along the banks of the Mohican River. While flooding does not occur frequently, officials ranked it as their top concerns because of the severity when it does happen. When the Mohican River overflows its banks, the water crosses State Route 62, which is the primary transportation route connecting the village to Mount Vernon and other communities. When the river reaches this level, it can take multiple days to recede. When the roads are covered, Brinkhaven residents must use narrow back roads to reach nearby cities for work and other needs, causing great inconvenience.

If the Mohican were to flood catastrophically, or if Pleasant Hill Dam in Ashland County were to breach, flooding could be fatal. While there are numerous instances whereby a problem at Pleasant Hill Dam would not affect Brinkhaven, a total failure under heavy rain circumstances could produce flooding, and the addition of inundation waters would make for dangerous circumstances. The village is located in a bend in the Mohican River, and the low-lying positioning of the residences make them extremely vulnerable to flooding and isolation. In 1913 when flood struck, there were deaths of an entire family that refused evacuation. While warning systems are vastly improved since then, and emergency action plans include notification of downstream populations, rapid flooding could be catastrophic. There is not much that could be done to protect the residents who live there except for them to be informed and evacuated. They considered flooding their highest hazard, and placed dam failure as the fourth most concerning due to probability and frequency factors.

Severe thunderstorms, wind, tornadoes and winter storms are the next most concerning incidents for the village. These incidents contribute to power outages by damaging trees and utility lines and creating hardship for residents. Residential structures are susceptible to wind damage. Storm shelter is a challenge in Brinkhaven because there are so few public buildings that are suitable to house people during an emergency. The village hall is very small and would not function well as a storm shelter. There is one church that may be available but residents would most likely travel to Danville, the nearest jurisdiction, for more appropriate storm shelter. Winter storms are part of this concern because the village can become isolated from neighboring communities. There are no retail stores so residents travel to Mount Vernon or other nearby towns to purchase necessary supplies. In severe winter weather events, it can be difficult for residents to travel for work or supplies. The village also contract with a private service provide for snow removal services, which can sometimes delay the timeframe in which the village's roads are plowed and salted, further isolating residents.

Utility outage issues were ranked as a high concern in Gann. As a very small jurisdiction with limited financial resources, the village has no public utilities. All residents utilize private wells and septic systems for water and wastewater; stormwater is managed through natural drainage. Road maintenance is performed by contractors hired by the village for snow removal and minor repairs. Gann has no direct employees. While water is considered plentiful, some

residents have had water quality issues with their wells that have required drilling of new wells; this issue does not impact all residents but is widespread enough that planning team members discussed it at length during work sessions. Electrical outages have also been a concern because the village is small and tends to be a lower priority for service restoration than larger jurisdictions. The village works to maintain trees on the public right -of-way to reduce outages as much as possible; this work is performed by contractors hired by the village. Gann's village hall is the only public building and it does not have a backup generator. There are no dams or levees within the village.

Drought is a concern because it comes with high temperatures, high demands on electricity, and limited water availability from aquifers and wells. It was ranked lower due to less probability and almost no frequency, but kept high enough that the severity of a serious incident is considered. A lack of water supply, heat without electricity and air conditioning, and isolation could be a very difficult situation, especially for the elderly part of the population.

Hazardous materials spills are a minor concern because of the substances that are carried on State Route 62. There are no facilities in the village that store or manufacture hazardous materials so the village's risk is primarily related to transport of substances. Drought was considered a low risk because it is very infrequent. Residents receive water through private wells and the supply is considered more than adequate even in drought conditions. Invasive species is considered a minor risk because of the short- and long-term damage to trees and the increased risk for debris to clog waterways and damage structures and utility lines during flood and wind events.

Fire was considered a risk because of the wooded area that would fuel a major fire, and the isolation of the village from fire protection services. Too small to operate their own department, apparatus and personnel would come from neighboring communities like Danville, and response times could be slightly longer than typical due to distance. Homes are older and made of combustible materials, and detection systems are not common. A fire that doubles in size every few minutes could potentially grow and spread in Brinkhaven, involving multiple homes and buildings.

Land subsidence, invasive species and resource contamination were not considered risks for the village.

Table 2-46: Brinkhaven Hazard Rank

Rank	Hazard
n/a	Resource Contamination
n/a	Land Subsidence
n/a	Invasive Species
1	Flood
2	Severe Storms
3	Utility Failure
4	Dam/Levee Failure
5	Drought & Extreme Heat

6	Hazardous Materials Incident
7	Fire
8	Earthquake

Centerburg

Centerburg is located in the far southwest corner of Knox County. Because of its proximity to the greater Columbus region, Centerburg and the surrounding townships are experiencing more rapid development than other areas of Knox County. I

Severe storms, including both summer and winter storms, were the highest concern in Centerburg. Centerburg has significant tree cover and is therefore vulnerable to damage from straight-line and rotational winds, as well as heavy snow and ice. While the village works diligently to maintain trees on public property and encourages residents to do the same on private property, downed trees are still a significant risk. Limbs and branches can damage structures or vehicles and break utility lines. If this causes a widespread or prolonged power outage, the village will be challenged to meet the needs of residents. The potential impact on the power supply is the primary concern for severe thunderstorms and winter storms. Severe thunderstorms occur somewhat frequently during the year but are generally minor. In the event of a serious storm, the impact on the community can be just as severe as a tornado event, including widespread power outages. In winter storms, ice is the greatest concern. Snowfall is an inconvenience to residents and businesses but is generally only a problem for a brief period of time. If a winter storm involves ice, however, power outages are a significant concern.

Utility Failure was the second highest concern. AEP, the village's electric provider, has trimmed or removed many trees and stabilized the village's power, but in a serious wind event that impacts the greater region, the village is still likely to experience an outage that could take several days to restore. Water treatment and distribution has recently been transitioned to Del-Co Water after being managed directly by the village for many years. Stormwater is an ongoing issue as the village attempts to keep pace with community growth and as precipitation events bring more rainfall over a shorter period of time. The village's stormwater system needs to be expanded to accommodate increased precipitation and additional structures but the cost of this project presents a financial challenge to the village.

Flooding was identified as the village's Third highest concern. According to local officials, flooding incidents have increased in the last decade. Flash flooding is the primary concern as streets and storm sewers become overwhelmed in excessive, rapid rainfall. While roads are generally only impacted for a few hours, this creates travel challenges for residents and causes excessive wear and tear on roadways. Basement flooding is very common across the village in these events. A very limited number of residential structures experience flooding in the living areas. These structures are located in the floodplain but are thought to no longer have active flood insurance policies. Riverine flooding can be an issue in prolonged precipitation events but this is not typical.

Centerburg officials considered drought/extreme heat and invasive species to be a risk for the village. Drought is extremely rare and generally does not directly damage structures; however, the lack of rainfall causes difficulty for residents. Limitations on the water supply and impact on residents are serious and for a long-term event, would be difficult.

Hazardous materials spills are a concern for Centerburg given the increasing amount of commercial and passenger traffic that travels through the village on a daily basis. Many of the commercial vehicles carry some type of hazardous substance. Because State Route 36 runs through the center of the village, the village would be directly impacted in an accident. Despite the level of risk, this has not happened frequently in the past.

Fire is a concern due to the challenges faced by local fire services in Ohio. With a lack of personnel who are readily available at times, and the amount of forested area and crops, fire spread during wind events or dry spells could be significant. With house fires worsening more quickly today than they used to due to contents' combustibility, an assured rapid response could be difficult. Field fires during high winds are also concerning.

Earthquake, while rare, is possible. Ohio earthquakes are generally mild, but a severe earthquake would devastate underground utilities, water towers, and communication or power poles. While this is considered extremely unlikely and rare, Centerburg did recognize the possibility.

Invasive species and landslide are minor threats, but could potentially develop further if areas around Centerburg are affected, or if an invasive species happens to be transported to the village in cargo or building supplies associated with growth.

Resource contamination and dam failure were not considered hazards in Centerburg, and none of them have any history of taking place.

Table 2-47: Centerburg Hazard Rank

Rank	Hazard
1	Severe Storms
2	Utility Failure
3	Flood
4	Drought & Extreme Heat
5	Hazardous Materials Incident
6	Fire
7	Earthquake
8	Invasive Species
9	Land Subsidence
n/a	Resource Contamination
n/a	Dam/Levee Failure

Danville

Danville is a rural community in the northeast quadrant of Knox County. The East Branch of Jelloway Creek runs through town; therefore, flooding is the top concern for local officials. The village is susceptible to riverine flooding when the creek leaves its banks and flash flooding occurs during heavy precipitation events. Flash flooding is more common than riverine flooding and contributes to more damage to buildings and infrastructure. While there are no dams within Danville's village limits, the dams downstream can cause water to back up towards Knox County as they hold water back and it drains in a controlled fashion. In extreme flood events, these floodwaters can back up all the way to Danville and block State Route 62, the primary transportation route through the village.

Tornado, windstorm, severe thunderstorm, and winter storm were ranked as the next most concerning hazard. The common thread between these incidents is the risk to Danville's power supply. Any high wind event that disrupts electricity will cause hardship for residents and businesses in Danville. Tornadoes are not a frequent occurrence but officials report that independent high wind events have increased in recent years, and there is recent history of tornado clusters in Ohio. Thunderstorms occur frequently but are generally not severe. The rare extremely severe thunderstorm can cause significant damage to structures and vehicles throughout the village. Winter storms are generally a temporary inconvenience. The exception to this is when a winter storm involves ice. Ice storms can cause significant property damage and lead to major power outages. If power restoration takes several days, which is not uncommon for rural communities if the event is widespread, residents will require assistance with sheltering and basic needs for the duration of the outage.

Utility Failure makes any incident in Danville worse. Local officials identified utility failure as their primary concern. The village maintains public utilities for water, wastewater, and stormwater. Some areas of town experience a significant number of water line breaks; the lines are old and should be upgraded but this project is cost-prohibitive for the village without external funding support. Danville recently mapped all of the wastewater system lines as an initial step to upgrading the system. The storm sewer system does not cover the entire village and should be expanded. Power outages are another concern. Upgrades to the village's power system in recent years have reduced outages. While local officials feel their electric utility is strong, an outage that impacts all or most of the village for several days is a significant concern. Loss of power would disrupt communication, worsen medical conditions of residents, and create significant hardship across the community. Utility upgrades are a challenge with the village's limited financial resources.

Like the rest of Knox County, Danville considers drought/extreme heat to be an unusual but difficult risk. While drought occurred just the past year and 90-degree days are increasing in number, this extreme is infrequent. When it does occur, the biggest impact is on the agriculture industry as crop yields are reduced and livestock management becomes difficult. Within the village, residents with medical needs, could suffer during extreme heat but it is unlikely that property damage would be incurred

Hazardous materials are a concern because of the commercial traffic that travels through Danville on State Route 62. Many of these commercial vehicles haul diesel fuel and other hazardous substances. As the highway turns through town, the spill risk increases.

Fire is a concern for a couple reasons. First, there is a great deal of wooded area near Danville, and there are significant acres of grain crops that are very combustible, especially as they dry down for harvest in the fall. Secondly, there are many wood-built structures that are combustible. With recent challenges in the fire service to maintain sufficient personnel, and with the rapidly rising cost of apparatus, the community is diligently maintaining its fire department to the best of its ability. However, when personnel are out of town at work or simply insufficient in numbers, that poses a significant threat to the community.

Danville officials consider water quality hazards to be a minor risk. The village's water treatment system is in need of upgrades to improve the distribution process but the quality of the water distributed is not a concern. The village has access to adequate groundwater and has not experienced problems recently; however, vulnerabilities occur through road maintenance, agricultural production, terrorism, and accidental contamination.

The risk from invasive species relates to the impact on trees and vegetation. If any species were to damage trees, those trees would be more likely to fall during storms and wind events. This increases the village's risk for property damage and clogs streams and waterways, which contributes to increased flooding. Dead and diseased trees are costly to remove so any significant tree damage would strain the village's finances.

Earthquake is a minor risk that could, compromise streets and highways, rattle and break underground utilities, and topple towers with water and electrical service.

There are no dams, levees or inundation risk in Danville so dam failure is not a risk. Land Subsidence poses a minimal risk in Danville.

Table 2-48: Danville Hazard Rank

Rank	Hazard
n/a	Dam/Levee Failure
n/a	Land Subsidence
1	Flood
2	Utility Failure
3	Severe Storms
4	Drought & Extreme Heat
5	Hazardous Materials Incident
6	Fire
7	Resource Contamination
8	Invasive Species
9	Earthquake

Fredericktown

Tornados, wind storms, severe thunderstorms, and winter storms were highest on the community's hazard ranking. The common thread between these incidents is the potential impact on the population from power outages. Tornadoes and wind can cause significant property damage. While not common in Fredericktown, Ohio is trending toward having tornado clusters. Just to the north of Fredericktown in southern Richland County, there is an increased recent history of tornado events. According to local officials, straight line winds are more common in Knox County, and cause more damage than tornadoes at this time. All of these events can create significant debris, which is an operational and financial challenge to clean up. Severe thunderstorms are fairly frequent, occurring many times every year. The storm that is strong can cause property damage and downed trees. With winter storms, the greatest risk is ice. Snowfall events are mostly a temporary inconvenience to residents. When the event includes ice, however, power lines are damaged, trees and branches fall, and the impact on the community is greater. If power is compromised, the situation quickly becomes very challenging.

Flooding is a significant concern. The village's streets and bridges are damaged by floodwater. The village is prone to flash flooding when storm sewers are overwhelmed. Some streets can be closed for up to 24 hours after these events. Residential structures in the north section of town experience basement flooding. A large mobile home park in this neighborhood experiences significant flooding. This flooding is not believed to impact the first floor living space of these structures but there is concern that could happen. Village officials are concerned with supporting residents during these events and preventing damage to their homes and properties. They are concerned about being able to perform essential government functions, including police, fire, and EMS services. Riverine flooding is a risk for Fredericktown. The village is located along the North Branch of the Kokosing River and not far from the Kokosing River main branch. When these rivers or their tributaries and streams rise and leave their banks, roads and properties can quickly flood. This happens much less frequently than flash flooding, but is still a concern for village officials. It would be worsened if the North Branch Kokosing Dam were to fail as the village lies within the inundation zone.

Drought and extreme heat were rated as a moderate risk for Fredericktown. Droughts and heat waves are rare, but the latter half of 2024 was considered a drought, and temperatures the past few summers have seemed to increase in temperatures. When droughts occur, there is generally very limited damage to actual property. Extreme heat is a challenge for the population, especially those with medical needs. If the heat event compromises the power supply, the impact on the community would be greater.

The biggest risk related to utility failure is power outage. A widespread power outage that lasted multiple days would create significant hardship for the community, particularly in extremely high or low temperatures. Separation of sanitary and storm sewers was necessary recently to meet current regulations and to provide better stormwater management for the village. The combined system was very easily overwhelmed by heavy precipitation events, but the current separation work has reduced this problem significantly.

Dam failure is a significant infrastructure risk. Knox Lake Dam and North Branch Kokosing Lake Dam are located north and northwest of the village; both of these man-made lakes have high-hazard dams. The dams are maintained by the Ohio Department of Natural Resources (Knox Lake Dam) and the Army Corps of Engineers (NB Kokosing Lake Dam). While they are considered structurally sound dams, there is risk to Fredericktown. If either of these dams were to experience a failure, the north end of the village would flood, and there would be widespread downstream flooding. The affected neighborhood includes single family homes, mobile homes, a public park, and multiple businesses. While dam failure is not likely, the impact could be significant should it occur.

Hazardous materials incidents are concern for the village because of the substances transported on state routes and local roadways. Industrial facilities in the area use chemicals in their facilities. There is risk for accidents and spills to impact the community and waterways.

The risk of fire was rated as moderate. The village's greatest issue is the need to upsize the lines to serve fire hydrants. Without adequate water supply and pressure, fire suppression is hard.

The water supply itself is considered plentiful and is not thought to be a significant risk in that manner. However, contamination could occur through accidental contamination, purposeful contamination, or through spills upstream that were unknown or unreported. Road maintenance during the winter and production agriculture can put the water quality at risk.

Invasive species is a risk because of the long-term impact on trees and vegetation. During wind events, these weakened trees are more likely to cause damage to property and power lines. They also fall into creeks and streams, which increases the risk for flooding

Earthquake is not considered a high risk, but utilities would be at a high risk of considerable damages.

Land subsidence is only considered a risk near the waterways under high-water conditions that wash top soil away and can erode properties along the banks.

Table 2-49: Fredericktown Hazard Rank

Rank	Hazard
1	Severe Storms
2	Flood
3	Drought & Extreme Heat
4	Utility Failure
5	Dam/Levee Failure
6	Hazardous Materials Incident
7	Fire
8	Resource Contamination
9	Invasive Species
10	Earthquake
11	Land Subsidence

Gambier

Severe thunderstorms, tornadoes, wind, and winter storms are concerning incidents for Gambier. These events contribute to power outages by damaging trees and utility lines and creating hardship for residents. Gambier has lush vegetation throughout the village. While this creates a picturesque town and campus at Kenyon College, it creates the potential for significant debris and property damage in wind storms. Tornadoes in the village are rare but straight-line wind events are increasing in frequency. Severe thunderstorms are quite common but are not usually severe. In a widespread power outage, the village and college would work together to provide shelter for residents and college students, activity that would pose significant challenges. Winter storms are a concern because of the potential for ice and a power outage. As with wind events, the heavy tree coverage in the village increases the potential for power outages. Snowfall is not a significant concern but a temporary inconvenience most of the time.

Gambier identified utility outage potential as a significant concern. There are few generators in town, including at the college. In an extended outage, the village's 800 residents and the nearly 1,700 college students would be impacted. A power outage harms the residents who require medical equipment and environmental control in the home. Water outages would close schools and college classes. Businesses would not be able to operate. While residents and campus students are very resilient, life becomes very difficult without power or water.

Officials rated water quality at risk because resources can be accidentally or purposefully contaminated. Accidents, water treatment operations, and other typical maintenance activities can affect the village's water supply and the treatment plant in a manner that would affect the water service. Other natural resources like parks, lakes and natural habitats could be negatively impacted. Air quality has become a slight issue in recent years with smoke residue from forest fires reaching northern Ohio. While Knox County has been outside the affected area for most of this, it is possible that closer fires or different atmospheric conditions could change that.

Land subsidence and landslide are at slightly higher risk in Gambier than in other areas of Knox County because of its higher elevation and location on a hill; the risk is still considered fairly low by local officials. There are no structures known to be at risk and no evidence of sink holes or other similar issues, but when combined with heavy rain, new areas could potentially develop.

Local officials identified flooding as a significant concern. Flash flooding is the most common type in Gambier. In heavy precipitation, the water rushes to the lower elevations at the edge of town. While most of this water drains quickly, there are low-lying areas where water collects. There are several small homes that can become surrounded by floodwater. Some roadways become impassible; the village attempts to warn motorists but the flooding is so brief that the water is often gone before the signs can be placed. Riverine flooding is not a direct threat to the village but does occur just outside the village limits. The Kokosing River is just south of State Route 229, which follows the southern border of Gambier. The Kokosing does breach its banks on occasion. There is significant open floodplain area along the river that generally contains this flooding. In the most serious incidents, floodwater can reach or cross State Route 229. This does not directly impact property in Gambier but does create an egress challenge.

Hazardous materials incidents are a lower risk in Gambier than many neighboring jurisdictions. Because the village is on a hill, there is limited traffic that moves through town. State Route 229 runs between the village and the Kokosing River; this is the route most likely to have commercial vehicles hauling hazardous substances. Kenyon College does have labs that utilize chemicals, some of which are hazardous. These are kept in small quantities and pose a low risk.

Gambier officials rated drought and extreme heat as a moderate risk. Drought and extreme heat are rare. The greatest risk for Gambier is to the population, especially those with medical needs. Many of the buildings on Kenyon's campus are not air conditioned. In a prolonged heat event, the student population would have needs that are not present during normal temperatures. If the heat event were strong enough to impact the power supply, the impact would be even greater.

As a tree city, Gambier could be devastated by an invasive species that created a large quantity of dead or diseased trees. These weakened trees would also increase the likelihood of severe property damage during wind events and would increase flood risk by clogging ditches and streams and preventing floodwater from draining. While an invasive species infestation is not common, it could have a serious impact on the village if it did occur. The cost of managing an infestation could be crippling.

Dam Failure is not a significant risk in Gambier. Although the city is likely included in a North Kokosing Dam and Knox Lake Dam failure inundation zone, it is on the periphery of those zones and would only be affected in the very most serious of those events, probably when widespread heavy rainfall had saturated the soils and the dams were in total failure, a very unlikely event.

Earthquake was considered a very low risk, but would involve damage to underground and elevated utilities for an extended period of time if it were severe enough.

Fire is a low risk. Village officials felt fire services are adequate to cover any incident that may occur.

Table 2-50: Gambier Hazard Rank

Rank	Hazard
1	Severe Storms
2	Utility Failure
3	Resource Contamination
4	Land Subsidence
5	Flood
6	Hazardous Materials Incident
7	Drought & Extreme Heat
8	Invasive Species
9	Dam/Levee Failure
10	Earthquake
11	Fire

Martinsburg

Damage from severe storms, including windstorms, tornadoes, severe thunderstorms, and winter storms concern the village. Wind can impact the power supply, which causes great hardship for residents. Structures are also vulnerable to wind damage, as are trees and other vegetation. This type of damage is costly for the village and residents to clean up. Winter storms were considered a hazard primarily because of the potential impact from ice storm events. Ice storms often lead to many downed trees and power lines. As a small jurisdiction, Martinsburg is often a lower priority for power restoration than larger jurisdictions, as well as the cleanup work placing a great burden on village resources.

The village identified utility failure as a significant concern. If systems were to fail, the safety of residents would be challenged. Utilities are provided by the village and private entities. Because the village is somewhat isolated from other communities, a long utility outage would be very difficult because it would force residents to travel to neighboring communities for services. The local stores do have a generator so residents would have access to some critical supplies. Ongoing storms damages roadways which are difficult for the village to repair. Power outages would cause residents to be without necessary medical equipment, heating and cooling in their homes, and other critical services for several days following a major winter or ice storm. While this does not occur frequently, it is a significant concern for village officials and residents.

Flooding ranked as a top concern. Flash flooding is the most common problem and occurs during heavy precipitation events. It generally impacts streets and intersections. Some basements flood throughout the jurisdiction but it is extremely rare for first floor living spaces to be impacted. There are no waterways in the village so riverine flooding is not likely.

Hazardous materials incidents are a concern because of the state highways that cross directly through Martinsburg. These routes bring significant commercial traffic through the village, including vehicles hauling diesel fuel and other hazardous substances. In the event of an accident or spill, much of the village would be directly affected by evacuation or shelter orders.

Drought and extreme heat ranked moderately because of it occurs very infrequently, but 2024 did end in a drought. When this occurs, the direct impact on property would be minimal. The impact on people, especially those with medical conditions and the elderly, could be significant, especially if power was interrupted or water supplies were minimized.

Fire is a low concern due to limited firefighting resources and the distance from mutual aid. Earthquake is a low concern due to infrequency and low severity, and few underground and overhead utilities. Martinsburg is not at risk for dam failure, invasive species, land subsidence, or resource contamination.

Table 2-51: Martinsburg Hazard Rank

Rank	Hazard
n/a	Resource Contamination
n/a	Invasive Species

n/a	Dam/Levee Failure
n/a	Land Subsidence
1	Severe Storms
2	Utility Failure
3	Flood
4	Hazardous Materials Incident
5	Drought & Extreme Heat
6	Fire
7	Earthquake

Mount Vernon

Tornadoes, wind events, severe thunderstorms, and winter storms were rated as the most concerning incidents for Mount Vernon. Residential and commercial structures are vulnerable to wind damage from tornadoes or straight-line winds. The city has numerous mobile home parks; these structures are more susceptible to wind damage than homes with traditional foundations, and in extreme cases can be overturned. Utility lines and trees are easily damaged by heavy wind and can block roadways and damage structures as they fall. In winter storms, ice is one of the biggest problems. Ice storms often include power outages, which significantly increase the hardship on the community. As people drive around the city, icy surfaces cause numerous accidents and injuries. This places a burden on public safety responders as they answer many simultaneous calls while experiencing the threats of ice themselves.

City participants identified utility failure as a major concern. The city maintains water, wastewater, and stormwater utilities. A few years ago, they created a stormwater utility to fund necessary maintenance and upgrades to that system. Improving and maintaining these systems is a priority but the cost is an ongoing challenge. The same issue exists for transportation infrastructure in Mount Vernon. The city maintains and upgrades roads and bridges but the ongoing wear and tear from heavy traffic, precipitation, freezing and thawing, and other issues makes this difficult. Power is provided by a commercial provider, but outages occur. When electricity, water and sewer services are not functional, everything becomes difficult. Businesses have to close, schools close, and some industries cannot operate. People with medical needs cannot maintain their treatments at home, and are at risk of worsening illnesses due to the environment. Utility outages are very expensive for the city, its businesses and its residents. While some generators are in place, there are not enough of them and some are outdated, making it difficult to provide even alternate power during an outage of any duration.

Flooding was determined to be a serious hazard. Flash, or surface, flooding is a more significant concern than riverine flooding. During heavy precipitation events, some streets will flood temporarily until the water can drain through the city's stormwater system. While this flooding does not last for long, it creates travel headaches in some locations and causes repetitive damage to city streets. Mount Vernon lies just south of the juncture of the North Branch Kokosing and the Kokosing Rivers. In heavy precipitation and snowmelt, the city can receive increased water flow through the central business district and some residential and industrial

areas. While it does not happen often, there is some risk of riverine flooding and ice jams in this area. There are few known areas where flooding reaches the living space of home, but in a worst-case scenario, this could happen. There are numerous parking lots and access points that are vulnerable to flooding, and may prevent residents from reaching critical services or supplies.

Within the city limits, there is one high-hazard dam, the Knox Cattle Company Dam which is located off Yauger Road near the county's hospital, built on a tributary to Center Run. This dam is privately owned by Landings Property Owners Association according to the National Inventory of Dams. It is listed in unsatisfactory condition. Ownership and responsibility for maintaining the structure, as well as developing the emergency action plan, has been in question for the past several years. Recent court action has placed ownership and responsibility on the homeowners' association for the subdivision that surrounds the dam, and the association has named a maintenance entity to act on their behalf. There is no emergency action plan, and at this time, no indications that there will be one developed anytime soon. The dam is located in the center of a residential area, and near numerous medical offices, businesses, and the hospital. Local officials from public safety reported that the dam sits lower than the streets and homes in the area, and that flooding or dam overtopping would occur only under the most extreme heavy precipitation circumstances. However, the city is concerned about failure and responsibility for this structure.

Drought and extreme heat are moderate to low concerns for Mount Vernon. While this hazard can occur, it is quite rare. The city's water supply is plentiful so it would take an extreme drought event for consumption restrictions to be enacted. Extreme heat is a challenge for the city's elderly population and anyone with a medical condition, especially if the power supply is impacted. The lack of air conditioning and heat would worsen this impact considerably.

Because of the number of highways that traverse Mount Vernon, hazardous materials incidents are another significant concern. Hazardous substances are routinely transported through the city on state highways, many of which twist and turn through Mount Vernon. This creates an increased risk for a spill during transit. The city is also home to numerous industrial facilities that manufacture, store, or use hazardous substances in their process. While Knox County and Mount Vernon do not have many railroad lines, there are numerous gas transmission pipelines in the area.

The planning team members identified land subsidence as a minimal risk, and vulnerability limited to heavy rains on top of completely saturated soils for the most part. Washing away of topsoil is a concern, and is the heavy impact on street berms and surfaces when inundated with precipitation.

Fire is a minor concern in the context of multi-structure fires and the need for mutual aid in a worse-case scenario. Having the only fulltime fire department in the county, the city is at risk of not having adequate assistance for a fire that occurs when the volunteer departments are at a low level of staffing, like during the workday when volunteers are at their jobs. As the

volunteer workforce in fire service lessens, so does the paid workforce. The loss of firefighters to larger metropolitan areas is significant, and becoming worse.

Water quality was rated as a fairly low risk for Mount Vernon. The city's water supply is plentiful and there are no known water quality issues in this region of Ohio. The city does closely monitor and test their public water supply, as required by EPA regulations, and works to maintain the water treatment plant to prevent water quality issues from occurring; however, contamination could occur through accidental spills or purposeful criminal activity.

Invasive species is a slight concern because of the potential impact on trees and vegetation. Any disease that impacts trees increases the debris potential during wind events. Dead and diseased trees can also fall into waterway and cause blockages, increasing the risk for flooding.

Earthquake is considered a low concern, but underground and overhead utilities would be at high risk.

Table 2-52: Mount Vernon Hazard Rank

Rank	Hazard
1	Severe Storms
2	Resource Contamination
3	Flood
4	Dam/Levee Failure
5	Drought & Extreme Heat
6	Hazardous Materials Incident
7	Land Subsidence
8	Fire
9	Utility Failure
10	Invasive Species
11	Earthquake

2.3.6 Risk-informed Approach to Vulnerability

Hazards were averaged to arrive at a county-wide vulnerability ranking. Hazard rating totals were added and divided by the number of jurisdictions that listed the hazard as valid. There was no effort to adjust the ratings according to population counts or property values. This was a rating intended to simply give the elected and appointed officials an indication of what hazards could be addressed collaboratively and how important each might be when looking at the entire county.

This approach and information will also facilitate cooperation between communities as they can, from this plan, identify those hazards that are particularly relevant to their community, but they can also see what is relevant to the entire county, joining forces in some cases to address a hazard collaboratively.

While each community would ideally address the most concerning hazards first, opportunities to address hazards do not always happen in that order. Oftentimes the chance to change or modify a risk factor comes after that hazard has impacted the community. Sometimes the most concerning hazards present no opportunities for change, or the mechanism of change is so expensive it is not realistic. Sometimes the hazards are not frequent, but the impact would cause such a severe consequence that change is highly desirable, but not necessarily likely. This plan allows communities to work together, to have information about what other communities are doing, and to use opportunity to its fullest in addressing mitigation efforts.

The following table shows the ranking of hazards by each municipality, and by Knox County's unincorporated areas. This ranking is relevant in that it is evidence of conversation and study that identified where the most damage is attributed, and which risks are dramatic but not costly or deadly. Consideration was given to special circumstances of a given risk.

Communities were asked to include those hazards that they felt, based upon findings and historical data, were a threat to the residents. They were instructed to consider how the threats might be mitigated, and those ideas and intentions appear in the next section of this plan, 03 Mitigation Strategies.

Table 2-53: Countywide Overall Average Vulnerability Prioritization

	Dam Failure	Drought Extreme Heat	Earthquake	Fire	Flood	Hazardous Materials	Invasive Species	Land Subsidence	Resource Contamination	Severe Storms	Utility Failure
Knox County 2025 Rank	7	4	11	6	3	5	10	9	8	1	2
Brinkhaven 2025 Rank	4	5	8	7	1	6	n/a	n/a	n/a	2	3
Centerburg 2025 Rank	n/a	4	7	6	3	5	8	9	n/a	1	2
Danville 2025 Rank	n/a	4	10	6	1	5	8	n/a	7	3	2
Fredericktown 2025 Rank	5	3	10	7	2	6	9	11	8	1	4
Gambier 2025 Rank	9	7	10	11	5	6	8	4	3	1	2
Martinsburg 2025 Rank	n/a	5	7	6	3	4	n/a	n/a	n/a	1	2
Mount Vernon 2025 Rank	4	5	11	8	3	6	10	7	9	1	2
TOTAL SCORE	29	37	74	57	21	43	45	40	35	11	19
# Jurisdictions ranking risk	4	8	8	8	8	8	5	5	6	8	8
Adjusted Score	**7.25**	**4.62**	**9.25**	**7.12**	**2.63**	**5.37**	**9.00**	**8.00**	**5.83**	**1.38**	**2.38**
COUNTYWIDE RANK	**8**	**4**	**11**	**7**	**3**	**5**	**10**	**9**	**6**	**1**	**2**

2.3.7 National Risk Index Vulnerability Assessment

The National Risk Index compares the fourteen census tracts by hazard and establishes a vulnerability assessment for each area. Map 2-17 shows the census areas and also illustrates how the incorporated jurisdictions relate to the census tracts. This plan uses both census area and jurisdictional information. Census tracts are described and mapped on page 87 of this section. The NRI Report for Knox County is included as 06 National Risk Index, and the vulnerability tables are 07 NRI Estimated Annual Loss Tables.

The Vulnerability Tables are included are taken from the National Risk Assessment tool. This assessment establishes the county's vulnerability by census tract and broken into individual hazard categories. It includes the exposures as well as expected annual losses for various hazards. They are included as appendix 07 NRI Exposure and Expected Annual Loss Tables.

2.4 RISK ANALYSIS

To estimate disaster losses, a damage profile that considers the potential impact and loss from each hazard is developed. In this section, loss estimates from floods, earthquakes, winter storms, tornadoes, thunderstorms, windstorms, and drought are examined. While the losses from these incidents are often more of a temporary and inconvenient nature, significant disruption to business, some property damage, and loss of life is possible under extreme or unusual circumstances. This information was used to determine Knox County's risk for each specific hazard.

2.4.1 Dam/Levee Failure Damage Profile

There are six high-hazard dams in Knox County, and there are eight significant-hazard dams, and forty-four low hazard or Class IV dams. There are no levees. Most of the structures, including three of the high hazard dams, are owned privately. The condition of the structures ranges from satisfactory, fair and poor to unsatisfactory, and they have some indication of maintenance needs in the coming years for most of them. There is an emergency action plan on file with Knox County EMA for three high-hazard and five significant-hazard dams, one high-hazard dam owner refuses to share the EAP. Two high-hazard dams do not have an EAP. Of the significant hazard dams, five have an EAP and three do not. Most of the owners work closely with the Knox County EMA to establish notification processes and to obtain assistance if a dam were ever to fail, but one high-hazard dam owner has not communicated with the EMA. There are regular inspections of the high and significant hazard dams. The inundation zones around the dams include homes, small businesses, roadways and industries. The losses would reasonably be expected to include the loss of life and significant property damage if any of the high hazard dams or levees were to fail, and damages if one of the other dams were to fail could be extensive to minor. The unclassified and Class IV dams are not expected to damage property other than the area around the structure. The dams are mostly, with the exception of two, dams that hold water back for recreational purposes.

The unclassified and Class IV dams appear on the ODNR dam locator but do not appear on the National Inventory of Dams. All of these dams are described thoroughly earlier in this section, and within the jurisdiction having authority sections.

2.4.2 Drought/Extreme Heat Damage Profile

Knox County can experience moderate drought and occasional periods of decreased precipitation during the agriculture-growing season. The climate is moderate and does not turn arid at any time. There is not any significant history of an extended drought that would cause casualties or property damage more significant than a reduction in crop yields for a single growing season nor is there any history of extensive crop losses in excess of a single crop year. Precipitation patterns can contribute to a series of years with higher or lower average yields due to slight dryness and late planting or harvest because of excessive rainfall. Drought that is

widespread and extreme could increase the likelihood of forest fires, and pose a danger to the county's wooded area and grain fields.

Climate change, varied weather patterns, and weather trends could have a significant effect on Knox County, especially for agriculture and the elderly or disadvantaged populations in the county. The ClimRR tool indicates temperatures could easily rise several degrees by the middle of the century, which puts elderly and medically challenged individuals at higher risk, and makes incidents involving power loss or storm damage more serious.

The detail of those heat projections includes the number of days with a heat index that is problematic. In general, the days of higher temperatures in the summer months will likely become more plentiful, with runs of days above ninety degrees becoming longer, and periods between rain events longer as well. This will make the vulnerable even more so.

Because Knox County has quite a few livestock producers, including beef cattle, dairy cattle, poultry, swine and sheep, the effects of high temperatures could be devastating to those individual farms. There is limited ability to control the environment in livestock barns. Death, dehydration, and illness will be far more prevalent when temperatures soar for longer periods of time and to higher levels. If increasing temperatures are combined with less rainfall, or even longer periods of time during episodes of rainfall, the limited availability of water for animals will be difficult for farmers to manage. Most livestock water is provided by wells; if wells become dry, alternate sources of water will be through commercial providers. Livestock require hydration; the absence of adequate hydration negatively impacts growth, milk production, reproduction, and the health of the animals. The negative economic impact will be significant.

Farm crop production may be negatively impacted by higher temperatures and changes in rainfall. If rain is scant after planting or during pollination seasons, germination and maturation will not occur. Forage crops don't grow without rain. If rain is extremely light or heavy, yields will be negatively impacted. If rain is excessive during either planting or harvest season, the crops cannot get planted, they don't grow when they wash away, weeds grow profusely in wet, soggy ground, and plant disease thrives on very dry or very wet conditions.

Farmsteads, as well as some rural homes, depend upon wells for water in many cases. As rainfall becomes inconsistent, wells dry up or cisterns overflow. Aquifers can be depleted from drought, or from drainage due to aggressive quarrying activities. For those water systems that pull from the ground water supply or local waterway, less rainfall up the entire watershed would result in less available water for treatment and distribution. While the average rainfall may not change much, the way in which it falls and the spread of amounts over the year will have a huge impact on household use of water. Should high temperatures occur, some rural homes are not air conditioned, and farmers who work outside don't have the ability to control an outdoors environment. The power grid would be stressed to handle such temperatures and heat index levels. Those who live with economic difficulties could find themselves unable to afford electricity at these levels. Older county residents with medical conditions may suffer due

to these circumstances. Underserved and disadvantaged people may suffer more because they have so few resources, and may eventually migrate to the cities for environmental amenities. The cascading economic downturn for the county could be damaging to all county residents and businesses.

In a rural county with open fields and significant wooded area, grain crops, and homesteads, fire could become an issue. Between cropland and forests, two-thirds of the county acreage is involved. If water is not generously available to fight fires, the spread of field fires across hundreds of acres in the hot, dry summer weather could be significant. Not only would those losses affect agriculture, but also would endanger the many small businesses, villages, residences and schools built out in the rural areas of Knox County. The ClimRR wildfire projections support this prediction. Chances of field fires is already relatively high; the fire weather index will increase by mid-century.

For the purpose of loss estimates, only the major cash grain crops were considered because those crops constitute the majority of production in Knox County. Production livestock can be sold in spite of drought, although prices are negatively impacted and some livestock may die before being sold; other cash crops such as vegetables and fruit crops are heavily insured. While many farmers purchase crop insurance for all crops, including grain, data does not exist to determine the percentage of crops that are insured in Knox County.

There are some very small vegetable and fruit farmers who produce as a seasonal activity, hobby, or micro-farm. These farms may be insured and might not be. They may be extremely vulnerable to weather conditions if uninsured.

2.4.3 Earthquake Damage Profile

Earthquakes are geologically possibly but very rare in Knox County. The county has not directly experienced any earthquakes in the past. Several have occurred in the greater western Ohio region although they have all been very minor and have caused no known damage. As such, there is little data to support committing resources to earthquake-proofing structures.

Examination of the loss projections indicated that most damage would affect wood and unreinforced masonry structures, and a great majority of those would be residential or agricultural buildings. Single family homes would be more affected than other residential buildings. Of critical facilities, schools would experience most of the damage with a couple police stations. The county EOC is at risk of damage. Underground infrastructure and above grade infrastructure would be devastated by a severe earthquake, leaving water distribution, sewer lines, and electrical and communications equipment out of order. Bridges and culverts, especially the larger ones, could be impacted to the point of structural compromise. Power lines would take the longest to repair and replace with no service to 1% of the homes at one month out according to some projections.

Because of the low risk and extremely high cost of implementing mitigation strategies related to earthquake risk, the planning team did not identify aggressive actions. As they arrived at this decision, they considered earthquake damage projections in the National Risk Index EAL.

2.4.4 Flood Damage Profile

Knox County is vulnerable to minor to moderate flood damage, mostly from flash flooding, and mild to moderate riverine flooding. The areas most likely to sustain flood damage are those adjacent or in close proximity to waterways, including some low-lying roadways and areas close to storm sewers that may be undersized or inadequate to handle runoff from heavy precipitation events. Areas along the North Branch Kokosing and Kokosing Rivers, as well as the Brinkhaven area along the Mohican are most susceptible to riverine floods. Major creeks across the county are prone to flooding, and would add water to the rivers already at maximum capacity.

In Knox County, damaging flooding is generally preceded by several days of heavy precipitation, and perhaps exacerbated by sudden melting of snow and ice or over-saturation of the soils prior to the start of rainfall because they do sit at the relative top of the watersheds. If water is unable to drain away as fast as it comes due to frozen soils or saturation, flash flooding occurs in the streets, roadways, and some low-lying properties. Most residential damage is limited to flooded basements and access issues in general. There are several repetitive loss properties in the county known to emergency managers.

Some residents feel that the rainfall is more intense and more frequent than it used to be. There is also concern that field fodder and debris from fallen trees, which has increased in the aftermath of the Emerald Ash Borer infestation, washes into storm drains and clogs the storm sewers in some of the villages and developed portions of townships where they have storm sewers. There is a general opinion that when culverts and bridges are replaced, the new structures should be larger and have greater capacity. Whatever the cause, flash flooding and the storm sewer capacity is more challenged than in the past, and this makes flash flooding more serious even though it is still a temporary condition.

Flood damage in Knox County can include damage and destruction of physical buildings, infrastructure, crops, and livestock. With livestock in the county, pastured animals could easily be trapped away from food and shelter, causing a serious threat to their well-being. Residential structural damages could include damage to single- and multi-family homes, as well as mobile homes. Mobile homes are of particular concern to local officials. Commercial and industrial structural damages could include buildings used for manufacturing, product handling, transportation, warehousing, retail, business, and industrial, and the capital equipment associated with those uses. Agricultural structures would include barns for livestock, equipment storage, and commodity storage, as well as the contents of those buildings, which constitute business assets such as production animals, equipment, and machinery. The force of water could damage grain bins, transfer legs, and elevator systems very easily. Government, nonprofit, and educational institutions include critical structures like fire stations, police.

stations, hospitals, offices, schools, and special facilities like garages and maintenance buildings, and the capital contents of those structures.

Actual structural damage could include flooding in residential basements and ground floors, compromise of the foundations and utility systems, and destruction of the contents of those structures. People are at risk from floodwater because household and industrial chemicals substances can contaminate floodwater and result in hazardous chemical exposure for rescuers, responders, and victims. Livestock could be significantly threatened by contaminated flood water and have no way to escape or the ability to protect themselves. This damage would result in large amounts of debris to manage, including finish, structural, and foundation materials and animal carcasses and waste.

Roads can flood for short periods of time in Knox County, potentially closing businesses and institutions and crippling commerce for short periods of time. This period of business shutdown generally is confined to the floodplain and flash flooding areas and lasts for only a day or two once the rain stops. Roads that cross parts of the county that are rolling and hilly are more prone to flooding in the low areas, and accidents due to roadway coverage.

Within the county's municipalities, some areas exist where storm sewers are of insufficient size and capacity to handle rapid and heavy downfall. Depending on exactly where precipitation is heaviest, if the ground is frozen, saturated, or dry, and how full waterways are at the time of the event, significant flooding can occur on roads, streets, bridges, and neighborhoods. These flood-prone areas are not highly populated with residential or commercial structures but significant inconvenience can result when businesses close, access is cut off, and drainage systems are overwhelmed. Stored farm chemicals are at risk of being absorbed into the floodwaters, distributed over flooded areas, or damaged an, depositing hazardous runoff in floodwater. In some areas, livestock in pastures may be at risk, depending on which waterways flood, and can become stranded or being injured before the floodwater recedes. Agricultural land that is heavily tiled drains quickly, facilitating rapid and significant amounts of runoff in ditches, streams, and rivers. This contributes to downstream flooding as the waterways attempt to drain the county.

Countywide flooding in Knox County would occur only under the most severe of circumstances. As the county has very logical floodplain area along the major waterways, the rainfall would have to come in catastrophic amounts to flood the entire county, and extenuating circumstances like rapid ice thaw amid heavy rainfall and snowmelt would be necessary. Specifically, a multiple-day heavy rain event of more than 10 to 12 inches is suspected to be capable of widespread flooding, especially if it comes early in the spring and is combined with snowmelt and ice melting. Should the two major dams in the northwest part of the county fail, and if a dam in Ashland County whose inundation zone reaches Knox County, were to fail during such an event, flooding could be catastrophic.

It is unlikely that loss of life would be attributable primarily due to flooding without high-hazard dam failure involvement. If fatalities did occur, it would likely be the result of these cascading

threats, including lightning, tornado, or driving into standing water. If any of the high-hazard upground reservoirs were to overtop and break due to catastrophic rainfall, there could be loss of life within that inundation zone. Power would likely be affected, but outages in most of the county would probably be short-lived and temporary.

The NRI flood exposure numbers indicate values due only to riverine flooding, but this vulnerability assessment narrative included not only riverine flooding, but also flash, surface and areal flooding. Local stakeholders felt that riverine flooding happens rarely, but the various types of pluvial flooding are far more common and frequent. With the recent downbursts and rain bombs attributed to climate change, they felt pluvial flooding was worthy of full assessment.

2.4.5 Severe Storms Damage Profile (Thunderstorm, Tornado, Wind and Blizzard)

Thunderstorms are relatively frequent but not extremely severe in Knox County. During summers when heat builds up in the afternoon, a muggy and hot day can easily end with thunderstorms that include hail, lightning and heavy rain, and/or wind. Microbursts often add strong straight-line winds that destroy standing crops ready for harvest. There has seemed to be an increase in night-time storms the past couple years, bringing heavy rain overnight. These storms can develop quickly, provide little advance warning to residents, and cause significant destruction and disruption. Sometimes forecasting is able to predict a generalized stormy environment a day or two ahead of time, but most of the time, storms develop quickly as they move across the state.

Thunderstorms that include hail are generally spotty and inconsistent. The fluctuating temperatures in the atmosphere necessary for hail to form do not occur frequently in central Ohio. When hail falls, damage most frequently occurs to vehicles, roofs, and siding on buildings, and depending upon the season and growth stage at the time, farm crops. Rarely is there a loss of life or significant bodily injury. Thunderstorm winds can damage standing crops and are most damaging when wheat, soybeans, and corn are ready for harvest. Wheat is harvested in July, but soybeans and corn are not harvested until early fall. Corn is frequently at the pollination stage in July; at any point after stalks mature, hail and wind can shred and tear the leaves, flatten the stalks, and destroy the ears that are in the formative stages. This situation drops crop production to drastically low levels, causing an extreme loss to farmers for that year's crop. Livestock, especially when at pasture, are vulnerable to injury from hail and lightning, and to isolation due to localized flooding from downpours.

The combination of hail, lightning, precipitation, and wind caused by thunderstorms can inflict damage in any area of the county. Thunderstorms are somewhat common but are typically minor and cause more inconvenience than actual damage. Lightning that directly strikes structures or objects is possible but infrequent. Moderate to severe damage from hail, lightning, and thunderstorm wind, including loss of life and property, is possible but statistics indicate the frequency is extremely low.

When severe thunderstorms are accompanied by tornadoes, damage from the tornadoes is likely to be more significant than that caused by the thunderstorm. Straight-line winds, the result of downbursts and microbursts, can be as destructive as tornado and cause damages similar to those described in the tornado EF scale. Livestock and farm equipment are at risk when standing out in unprotected countryside.

The NRI does not specifically list exposures for severe thunderstorms. It lists hail, lightning, and strong wind, all three of which are components of a strong thunderstorm. Therefore, the must be considered and added together to project an accurate estimation of loss.

Knox County is universally vulnerable to tornado damage. The county has generally rolling terrain that provides some protection as funnel clouds dissipate. Although tornado warnings are issued several times each year, tornadoes do not occur frequently in the county. They are most common in the spring although they can develop throughout the summer and fall, and most recently in Ohio, during nighttime hours. Historically, the magnitude of tornadoes in Knox County is between EF-0 and EF-1 with over eighty percent of the incidents on record involving and EF-0 or EF-1 tornado.

Knox County does have several hundred mobile homes throughout the county. Most are lived in year-round. These structures are more vulnerable to wind damage because they are less secured to the ground than buildings with foundations, have no basement or sub-terrain level, and are lighter weight and made of less wind resistant material than traditionally constructed homes.

The majority of residential structures in the county are constructed from wood, concrete, brick, and stone. Many homes are older and were constructed using limestone and other masonry materials; these homes are built on traditional foundations with basements or crawl spaces. Some newer homes are concrete slab construction without basements or crawl spaces. These homes are most prone to superficial damage, roof damage, and falling trees during tornadoes and severe windstorms.

Many farms have outbuildings that house business assets, including equipment, supplies and goods, and livestock. These buildings may be traditional stick-built wooden structures with tresses and heavy beams, or may be newer pole buildings with varying steel structure. Many of the newer buildings are large, single-story structures and are therefore very vulnerable to wind and tornado. Some of these buildings house livestock rather than equipment. Grain systems with steel bins, concrete block walls, and metal conveyor systems with multiple legs are found on large grain farms. These bins often contain very significant quantities of grain, with values in future delivery or as a commodity yet-to-sell.

Commercial buildings are constructed of concrete, brick, concrete block, stone, and wood. These structures are generally built on concrete slabs with structural support trusses and pitched roof construction to facilitate snow and ice melt and runoff. Flat roof buildings, such as

shopping centers and big-box type retail stores, are susceptible to heavy snow in blizzard conditions; there is no identifiable history of roof collapse incidents due to snow or ice.

Property damage from tornadoes in Knox County most frequently includes damaged roofs, gutters, downspouts, trees, and, occasionally, an entire building. Mobile homes are damaged or destroyed in the most serious incidents. Outbuildings, barns, and storage buildings can be damaged because these structures are less resistant to wind damage and are frequently built on concrete slabs or dirt foundations.

Wind incidents are somewhat frequent across central Ohio, including in Knox County. The county has experienced some high wind events in recent years. While not as damaging in Knox County as they have been in others, these events typically damage trees, which lead to obstructed roadways and downed power lines. Crop damage and destruction is also a concern. When high winds damage young and maturing crops, yields can be significantly reduced, which negatively impacts the county's economy. Structural damage to roofs, downspouts, and siding is not uncommon.

Winter storm damages can potentially affect homes, businesses, and properties across Knox County. No singular area is more or less vulnerable to snowfall or winter weather conditions than another. The flat terrain provides little landscape to interrupt or redirect precipitation. The varying elevations allow drifting and blowing snow to create low visibility conditions on roadways across the county. Livestock operations in the county are particularly vulnerable to blizzards, ice, snow, and other winter weather hazards. Even in adverse weather conditions, the animals must be fed, cows must be milked, manure must be removed from barns, and operations must continue. This requires daily ingress and egress to these farms, bringing in food and supplies, and hauling out raw product and waste. Winter storms threaten and restrict access to these properties, making winter weather a concern for this part of the economy.

Power outages can occur anywhere in the county during blizzards or snow storms that include significant ice, wind, or heavy amounts of snow. Residential electric lines are mostly above ground and vulnerable to wind and ice, although the power companies have improved the distribution systems in recent years. Few residential properties have buried electric lines. Major supply lines are above ground as they enter Knox County from the generation plants; therefore, power to the substations is vulnerable to wind and heavy snow and ice even if the residential lines are not. Power outages are probable, frequent, and can be widespread. Farms with livestock operations are much more vulnerable to significant loss; the feeding systems, milking and collection systems, and other critical operations are all based upon an electrical supply to run mechanized equipment. Without electricity, animals are not fed, eggs are not collected, and dairy cows are not milked. Product goes to waste, animals get sick, and farms lose a lot of income.

The loss estimates for winter storms are relatively low in spite of the recent and memorable winter seasons. There is no identifiable history of property loss due to snow pack, ice, or other winter storm-related causes. Reasonably anticipated losses from winter storms would include

content loss such as food and perishables due to power interruptions. Losses in anything but an unusual, unpredictable incident would not include structures or infrastructure.

2.4.9 Countywide Risk Analysis

Based on the available hazard and vulnerability information, Knox County has risk for damage from a variety of disasters. To determine the county's overall level of risk, each hazard was evaluated and scored based on common criteria. The criteria included frequency, response duration, speed of onset, magnitude, and impact on businesses, people, and property. Table 2-54 describes the overall scale used to score each hazard. Table 2-55 provides details on the scale used to measure magnitude. The composite scores for each hazard and their respective rank are identified in table 2-56.

Table 2-54: Vulnerability Assessment Scale

Score	Frequency	Response Duration	Speed of Onset	Magnitude	Business Impact	Human Impact	Property Impact
1	None	< ½ Day	> 24 Hours	Localized	< 24 Hours	Minimum	< 10%
2	Low	< 1 Day	12-24 Hours	Limited	1 Week	Low	10-25%
3	Medium	< 1 Week	6-12 Hours	Critical	2 Weeks	Medium	25-50%
4	High	< 1 Month	< 6 Hours	Catastrophic	> 30 Days	High	> 50%
5	Excessive	> 1 Month					

Frequency

Hazard events that occur regularly are a higher risk than those that occur infrequently.

- 1 = None/Once in 100 years
- 2 = Low/Once in 50 years
- 3 = Medium/Once in 25 years
- 4 = High/Once in 1-3 years
- 5 = Excessive/More than annual

Response Duration

Response duration is defined as the amount time the response is anticipated to last.

- 1 = Less than ½ day
- 2 = Less than 1 day
- 3 = Less than 1 week
- 4 = Less than 1 month
- 5 = More than 1 month

Speed of Onset

Speed of onset addresses the amount of warning a community has before impact occurs.

- 1 = More than 24 hours
- 2 = 12-24 hours
- 3 = 6-12 hours

- 4 = Less than 6 hours

Magnitude

Magnitude is rated using standard damage scales such as the Enhanced Fujita Scale, or through development of a local comparative scale that is comparable in damages at like levels using the established damage scales. Some scales from other geographic regions, such as the North East Snow Index Scale, were used as models to develop a comparative tool for local use.

Table 2-55: Magnitude Assessment Scale

Score	Tornado	Windstorm	Flood	Earthquake	Drought	Winter Storm
1	EF-0/1	<65 mph	Minor	<5.9	D-0 Very Dry D-1 Moderate	<8" snow
2	EF-2	65-75 mph	Moderate	6.0-6.9	D-2 Severe	8-12" snow
3	EF-3	76-85 mph	Significant	7.0-7.9	D-3 Extreme	12-16" snow
4	EF-4/5	>86 mph	Major	>8.0	D-4 Exceptional	>16" snow

Business Impact

Business impact refers to the economic impact a hazard event is likely to have on a community. The definition references the amount of time facilities are likely to be closed.

- 1 = Less than 24 hours
- 2 = 1 week
- 3 = At least 2 weeks
- 4 = More than 30 days

Human Impact

Human impact is defined as the number of lives potentially lost for a particular hazard.

- 1 = Minimum/Minor injuries
- 2 = Low/Some injuries
- 3 = Medium/Multiple severe injuries
- 4 = High/Multiple fatalities

Property Impact

Property impact is defined as the percentage of parcels potentially affected in a given event.

- 1 = Less than 10% damaged
- 2 = 10-25% damaged
- 3 = 25-50% damaged
- 4 = More than 50% damaged

The factors identified above were assigned values as described, and rated against anecdotal analysis based upon history and severity. This scoring mechanism resulted in very similar assessment of risks and vulnerabilities for the countywide vulnerability analysis. Each community evaluated their hazards and risks the same way, and results were developed and confirmed for each municipality. Some communities did not include all hazards.

Table 2-56: Comprehensive Countywide Risk Analysis

Hazard	Frequency	Response Duration	Speed of Onset	Magnitude	Business Impact	Human Impact	Property Impact	Score	Rank
Severe Storms	5	3	4	3	2	2	2	21	1
Utility Failure	5	3	4	2	2	2	2	20	2
Flood	5	4	1	2	2	1	2	17	3
Drought & Extreme Heat	3	2	1	3	2	3	2	16	4
Hazardous Materials	4	2	5	1	1	1	1	15	5
Resource Contamination	2	3	2	1	2	2	2	14	6
Fire	4	2	1	2	1	1	2	13	7
Dam/Levee Failure	1	3	2	3	1	1	1	12	8
Land Subsidence	3	2	1	2	1	1	1	11	9
Invasive Species	3	1	1	1	1	1	1	9	10
Earthquake	1	1	2	1	1	1	1	8	11

3.0 MITIGATION STRATEGIES

As Knox County's mitigation planning team and stakeholders from the broad community developed mitigation goals and strategies for the county, their goal was to address the specific risks and vulnerabilities of each jurisdiction. While many strategies are similar from jurisdiction to jurisdiction, each community's stakeholders expressed their unique circumstances and crafted strategies to address their specific issues. The result is a set of comprehensive and customized mitigation goals and strategies that address the needs of each jurisdiction.

By using consistent expression in writing the strategies, it will enable the various jurisdictions to work together to achieve goals. The detailed uniqueness of implementing each strategy from community to community can be accomplished without compromising the integrity of the collaboration between communities.

Strategies have been developed for the unincorporated parts of the county, and are listed as "Knox County". The specific area covered by this section includes all of the twenty-two townships, or rural areas that are primarily used for production agriculture on family or corporate farms, for agri-businesses services and sales, or feed production, or for rural residential homes. This also includes the four census designated areas and twenty-five unincorporated neighborhoods that have no governing structure. There are a few small businesses spattered about the rural areas, and sections where individual homes have been built. Most of the small businesses serve the residents who live in Knox County or nearby; some are larger industries.

Villages are all listed individually in each strategy. These incorporated communities include the villages of Brinkhaven (formerly listed as "Gann"), Centerburg, Danville, Fredericktown, Gambier and Martinsburg. Utica is on the border with Licking County, and participates in the Licking County mitigation plan. Mount Vernon is the only city. These municipalities are similar yet unique in disaster vulnerability, and very like one another in some mitigation needs; therefore, many strategies include many or all of them. Sometimes, due to a unique characteristic or quality, a village or two are not included on specific strategies. Likewise, a need may be unique and only include one or two municipalities. One of the biggest differences is that several communities are not inside floodplains and sit at relatively high elevations compared to the others. They, therefore, have limited flooding concerns.

Some of the villages have limited capability to engage in major mitigation projects, and do not have disposable budget to support large projects. They provide few services and have limited responsibilities because of their small size. A less assertive approach to mitigation has been taken in those villages in an effort to right-size their mitigation efforts to their capabilities. They rely upon the county to assist with efforts. Fredericktown and Gambier are the most populated of the villages, and Martinsburg and Brinkhaven are the smallest. Howard and Hilliar are the most populated townships; Jefferson, Harrison and Wayne are the least populated. (Refer to Section 2.1 Demographics in the 02 HIRA part of the hazard mitigation plan for more data.)

Each of the municipalities and Knox County will formally adopt the mitigation plan, and their chief operational official, as listed, will act as the champion of strategy promotion and annual review. Some have paid staff and others do not, but Knox County, Mount Vernon, Fredericktown, Gambier, Centerburg and Danville have paid personnel to engage in mitigation efforts and grant administration. Brinkhaven and Martinsburg have no staff and little capacity to engage in mitigation efforts that would stretch beyond daily obligations. The townships would depend upon Knox County to assist in project initiation, administration and management, and therefore are all included in the "Knox County" category.

3.1 STATUS OF PAST MITIGATION EFFORTS

The immediately preceding Knox County Hazard Mitigation Plan was developed and adopted by the KNOX County Commissioners on September 8, 2020. That plan's federal approval status expires on September 2, 2025.

This plan is a totally new plan, but the mitigation strategies in the current plan were taken into consideration, and continued if appropriate. A full assessment of the status of those strategies was completed.

Strategies from the past mitigation plan were assessed in public meetings after participating jurisdictions were given a copy of past strategies to review. Participants were usually the jurisdiction officials who would be most aware of any activities over the past five years, and some of them were also involved in the development of strategies for this hazard mitigation plan. As appropriate, other officials in administration, engineering, utilities and public works, and public safety were involved in completing the mitigation strategy surveys.

Participants discussed whether each strategy from the previous plan should be included or not included in the 2025 hazard mitigation plan. Some actions from the 2020 plan were re-worded or revised, some were repeated in very similar fashion, and others were combined when that made the plan more concise or the potential action more understandable.

3.2 RISK PRIORITIES

The HIRA (Section 02 of this plan) explains in detail the assessment and analysis of natural hazards in Knox County. The HIRA takes into account the total list of hazards possible in the county, the frequency (probability) with which each occurs, the severity (magnitude) that each hazard displays upon impact in the county, and the outcomes (impact and damages) caused by the incidents. The potential for harm to underserved and disadvantaged populations was assessed in this plan as part of the new mitigation guidance, and involved new partners and stakeholders in the discussions. Those factors are all explained in the HIRA, as well as descriptions of the hazards and how each would impact various locations and populations in the county.

Each community rated and ranked the hazards from most concerning (1) to least concerning, but some hazards were not considered a risk by some jurisdictions. For example, since the

high-hazard dams are only part of four jurisdictions, only those jurisdictions included dam/levee failure as a hazard.

The jurisdictional ratings were then combined into a countywide numerical score, adjusted for the jurisdictions not concerned about that hazard, and a countywide, comprehensive hazard rank was established. This comprehensive ranking will be utilized for countywide planning efforts, including those described in the plan.

The individual jurisdictions will utilize their individualized rankings for prioritization of the mitigation strategies, for the purpose of most accurately and appropriately applying the hazards to their community. While there were similarities from community to community, this allows for individualization of work priorities.

Overall, the county ranked severe storms and utility failure as their highest concerns. Just like in past years, rain continues to come at a greater magnitude with longer dry periods in between storms. Accompanying the precipitation is more wind, hail, lightning and tornadoes. Rain storms and snow switch back and forth regularly during the colder months, more than in the past, pelting communities with cold rain in winter as much as snow. The nature of rain and snow both falling in all seasons caused a combination of severe thunderstorms, tornadoes, and winter storms into a single “severe storm” category. The mitigation measures are nearly the same, and it was felt that the combination of those provided an approach that would be more effective in the consideration of mitigation efforts. Therefore, all storms were grouped together for the purposes of mitigation strategies.

Utility failure was the second-highest ranking concern. Utilities are all very critical services and infrastructure that, when failure strikes, wreak havoc on the families and businesses that are affected. With elderly and ill populations on the rise, utilities are even more important than they have been in the past because residents have medical equipment and electronics that are dependent upon a power source in their homes. Additionally, most lighting and heating are at least partly dependent upon electrical service or utility gas. Water is critical for many life-sustaining services, and the lack of this utility would place extreme burden on most of the county. Many manufacturing and industrial businesses, in addition to institutions like schools and colleges, must close when utilities fail. Interruption of these utilities or infrastructure simply makes work and life activities nearly impossible.

Flooding ranked third. With the Kokosing River flowing through a majority of the county in some way, and the Mohican flowing along the eastern border, riverine flooding could devastate Knox County. Very few areas are immune to catastrophic flooding. As residents were experiencing a dry period during the development of this plan, an equally wet period after, that could easily include flooding, is highly anticipated. Additionally, when rain falls fast and hard, it is difficult for the stormwater systems to keep up, and flash and surface flooding are very likely. Roads close and bridges flood, and county residents experience interruptions to their lives and damage to roads, bridges, buildings and private property.

All communities rated drought and extreme heat higher than in 2020. This was due to the perceived vulnerability to drought, and partly due to recent years' experience with extended dry spells in summer and fall. With a current dry spell hinging on the edge of mild drought, farm production sits at risk of harm. With one third of the land in production, the farm economy is critical to Knox County. The newly recognized fire-risk that goes along with drought increased concerns about dryness. The increase in fires combined with a shortage of volunteer firemen impacts the county abruptly, and makes them rely upon mutual aid more than ever. When wind combines with fire, the spread is much faster, making the hazard even more difficult. Participants noted a big difference in fire risk from dry conditions to not particularly dry, and therefore the fire risk included in the mitigation plan is that which is an outcome of tinder-dry fields and vegetation or crop debris. The fire risk to tens of thousands of acres of dry farm crops like wheat, hay, and other grains, combined with typical fire-start risks, rated much higher today than five years ago. Drought and extreme heat ranked fourth, and fire risk ranked seventh.

Hazardous materials incidents were a moderate-level risk countywide. While there are state highways, there is a section of Interstate 71 South that is inside or very near Knox County's western border. This is a major regional highway. There are also numerous state highways that connect Mansfield, Mount Vernon, Cleveland, Columbus, and all areas of Knox County with one another. Significant cargo crosses this area every day, and some of it is or contains hazardous chemicals. While incident occurrences are low, the consequences of a serious spill could be significant. Most fire departments are ready to respond, so the hazard was considered moderate.

Dam and levee failure is a significant concern for the communities that are vulnerable. Fredericktown and Mount Vernon are the most vulnerable, both located in proximity to very large dams that would all suffer in a catastrophic heavy rainfall incident. Overtopping and failure are possible, while not highly probable. Brinkhaven is very susceptible to dam failure in Ashland County, and could be catastrophically devastated. On the other hand, several communities are not vulnerable to dam failure because they are not near any inundation zones.

Bringing up the least concerning risks were those events that occur very infrequently, or that have never occurred, like earthquake, land subsidence and invasive species. Knox County has no recorded earthquake activity. They did recognize that a serious quake could have disastrous consequences because the utilities that are buried and those above on poles would be destroyed. They didn't feel that invasive species was much of a risk, and as an agricultural county, felt that the farm community is quick to address any of those issues.

Also, in the low-risk category was land subsidence that is only relevant in a few areas. This is fairly limited to a few areas along the rivers, and many of those properties are privately owned and not covered by the mitigation plan. They did not identify any critical structures or publicly owned buildings that would be at risk. The biggest concern was the wash-away of roads and bridges, and other damage to infrastructure or natural resources.

Social vulnerability and community resilience were addressed in strategies that support existing services and plans in place to use those services. The Knox County Emergency Management Agency has established and maintains an Emergency Operations Plan (EOP) that identifies agencies and departments to act in disasters, and assigns specific roles and responsibilities to each one. This plan ensures that community lifelines are maintained, and core capabilities are established with each agency or department. This mitigation plan works in concert with the EOP whereby underserved and disadvantaged populations are supported after disasters, and by whom. These standards were addressed in this manner to remain consistent and supportive of other statutory responsibilities of county officials and departments, and to maintain attention to these issues in a single area for effective management and consideration. Knox County's EOP was updated within the past five years, and updates continue on a rotational basis for specific sections of the plan.

There was added attention given to other county plans that might benefit by considering the mitigation efforts. The Regional Planning office, serving floodplain and zoning regulators as well as various other development officials, serves as the hub of planning for the future in Knox County. Knox Public Health authors several plans to assess and anticipate health and medical needs, and to address communicable disease, air quality, and wastewater regulations. A new Comprehensive Plan was adopted in the early months of 2025, led by the Regional Planning office but included all economic and community development partners, as well as all communities and jurisdictions. The EMA also maintains a hazardous materials commodity study and response plan that ties very closely to this plan in the area of risk assessment. The strategies in this plan strive to support other action plans, but not to duplicate them.

The strategies in this plan are intended to provide general options to lessen the vulnerabilities in Knox County. During the planning process, the planning team and stakeholders determined what hazards strike most frequently, which cause the most disruption, and which consequences feasibly can be prevented or lessened. With limited money and staff available to conduct mitigation projects, the planning team weighed every potential effort by measuring the benefit against the resources realistically available to conduct the activity. The planning team endeavored to prioritize strategies that could realistically be accomplished and result in actual reduction in potential and real losses.

As strategies were developed, the capacity of the jurisdiction to execute the action was considered very important; without the staff or volunteers to initiate, manage, administer and complete a project, the action would not likely be successful. Therefore, priority was given to those issues within communities that had caused documented damage or difficulty in the past, and then the cost of that consequence. This practical and feasibility-based decision-making process was intended to set communities up for success in mitigating proven damages and helping people with documented needs.

Considerations of cost, identifiable funding to support the strategy, actual benefit to the community, prevention of loss of life, and overall feasibility were all discussed. Strategies were rated against one another and ranked from most to least important. While it is impossible to

plan for or foresee every potential hazard, Knox County attempted to identify the incidents that might realistically impact their community. These goals and strategies are an outcome of that assessment.

3.3 MITIGATION GOALS AND STRATEGIES

Planning Team members and stakeholders from the county and each jurisdiction worked collaboratively to develop fitting mitigation goals and strategies. Each jurisdiction was given a list of current strategies to select which would continue into the new plan, as well as an extensive list of additional strategies that would address new plan requirements. These new potential strategies addressed, generally, community and economic development, community collaboration, social vulnerability, public safety services, and community resiliency. The Contractor drafted strategies based on the input provided by these stakeholders. The draft strategies were presented to the planning team and community for public review and comment, and modified accordingly. This section identifies the mitigation goals and strategies for each jurisdiction and the priority level, action type lead agency, timeline, and potential funding source assigned to each action. Strategies for specific municipalities vary from the countywide in priority of the problem and the potential solution.

3.3.1 Knox County and Municipalities

Knox County jurisdiction mitigation strategies are intended to reduce vulnerability to damage from wind, water, severe storms, winter storms, hazardous materials incidents, invasive species, drought and extreme heat, dam failure, and earthquake. Some isolated areas intend to limit the progression of land subsidence along major waterways. The “Knox County” identified goals and strategies include all non-incorporated areas of the county, such as twenty-two townships and the many census areas and neighborhoods. The ones labeled with a municipal name include that incorporated area.

All of these strategies will be considered as economic development and growth is guided, as regulations are written and revised, and as codes and guidance is enforced and approved. The Knox County Regional Planning office and multiple groups and individuals active in community and economic development were a robust part of the planning team, and understand the mitigation issues at hand. While the EMA Director helped in coordinating this entire process, he was also a participating member of the planning team, considering his role in collaborative and cooperative roles in mitigation amid development. He also serves as a township trustee in Berlin Township, and the Deputy Director is a Fredericktown village official and Knox County LEPC Coordinator. The county’s fire chiefs, as the lead fire official in code compliance and enforcement, were actively engaged in these efforts as well. The Knox County Commissioners, as the overall leadership of all departments and individuals, played a tremendously positive and reinforcing role by participating in meetings, and working behind the scenes to support and encourage engagement and implementation. These strategies will be reflected as local regulation is considered, zoning rules are enforced, land use regulations are enforced, economic development goals and strategies are planned and achieved, capital improvement plans are created, and budgets are managed. Projects will be conducted as funding is available,

and daily practices will be adjusted to include modifications of work that include these strategies.

Two of the villages, Brinkhaven and Martinsburg, lack the budget to implement mitigation or public works projects; therefore, they may be, at some time, dependent upon county resources to help them. They have volunteer officials and volunteer officials. They would depend upon the county officials to support them in any implementation or grant application or administration. However, they participated in the process to the fullest of their ability.

As the Knox County Commissioners represent the townships in mitigation efforts, they will communicate with the township trustees whose jurisdictions are affected. This is typically the manner in which township issues are addressed. As the county acts on behalf of the townships when it comes to mitigation efforts, as it does with other federal and state programs, the townships will fulfill their responsibility to enforce and comply with land use regulations and building codes. The county officials will work with township trustees to ensure that smart development takes place to create sustainable communities in these rural sections of the county.

This tiered partnership between levels of local government is not new and stems from statutory procedures. Knox County and townships have worked together in this way for many years. For example, they work together now to recruit new business and industry, and to develop more housing for individuals and families. Because township trustees are often volunteer officials, county commissioners take official action to benefit the townships as a cooperative effort with the trustees, especially where federal grants or requirements are concerned. Today's effort to include hazard mitigation in rural community development is an effort of collaboration.

The following table lists the mitigation actions determined to be needed in stakeholder meetings. The jurisdictions listed in each strategy, or action, are those that determined the need to take that particular action. Not all jurisdictions selected all mitigation actions, and some are relevant only to the county because of its role in the tiered system of governance. If a jurisdiction is not listed under an action, that particular action is not relevant to that jurisdiction. All jurisdictions have at least one mitigation strategy for every hazard they selected as relevant to their jurisdiction. Some actions are Knox County only actions and others include only select municipalities where that particular strategy has the potential to be implemented. All strategies are relevant to the full validity period of this mitigation plan.

Ranking was assigned in accordance with the hazard ranking developed in each individual community as the probability, frequency and magnitude of a threat are directly linked to the cost, displacement, disruption, and damage caused by it. Hazards were prioritized in the various communities based upon how the hazard typically occurs, and how it impacts both personal and business lives within the community. How an incident isolates the remote community from needed resources, how responders are able to assist people in need, and how long the impact lasts within the community were all considerations for the ranking of hazards.

Mitigation strategies were prioritized according to hazard ranking; since the communities currently engage in many of the strategies with local financial support, and because they do not know until notifications are made what grant programs will be available to them for large, costly activities, they considered all strategies equal in likelihood of being implemented. Based upon fluctuating personnel and finances, communities constantly look for opportunities for financing like grants and loan programs.

Knox County choose to develop a completely new mitigation plan in light of extensively new mitigation standards and federal approaches to mitigation and disaster management. However, the mitigation actions from the current plan were assessed for action as discussion took place, and each jurisdiction completed a worksheet that indicated what had been done, what they would like to continue, and what was no longer a viable or wise option. The Contractor used this information in developing the new mitigation actions for the county and its jurisdictions, and supplemented it with findings from the in-person and online meetings that were held. Discussions were summarized into a set of potential new mitigation actions, and each community was asked to select those they felt were appropriate for their community. The table listing the strategies was organized as one table with each participating community listed to enable them to see what other communities intended to address, and to facilitate working together on issues that involved multiple areas.

Table 3.1: Mitigation Goals and Strategies

Goal						
Mitigation Action						
Jurisdictions	**Rank**	**Action Type**	**Lead Agency/Person**	**Start Date**	**End Date**	**Funding Source**
Goal 1: The jurisdiction will reduce the vulnerability to dam failure.						
Hazard: Dam and Levee Failure						
Mitigation Action 1.1: The jurisdiction will work with dam, reservoir, lagoon and levee owners, as applicable, to create, maintain, improve and update emergency action plans and associated procedures for structures publicly owned, and will work with private owners to do the same.						
Knox County	7-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC USACE Other
Mount Vernon	4-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	9-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 1.2: The jurisdiction will work with the structure owners to ensure that first responders are familiar with emergency action plans, and encourage communication and joint exercises to facilitate rapid, effective response the need arise.						
Knox County	7-X	Natural Resource Protection	EMA Director	10-15-25	10-14-30	LOC
Fredericktown	5-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 1.3: The jurisdiction will support dam owners/operators in identifying and procuring funding for dam repairs, upgrades and replacement, using grant dollars when available and awarded.						
Knox County	7-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	

Mitigation Action 1.4: The jurisdiction will ensure that warning and notification processes and systems are in place for an emergency at all dams affecting the jurisdiction, and owners are able to effectively communicate this information with first responders and the public, especially those within an inundation zone.						
Knox County	7-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC Other
Mount Vernon	4-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 1.5: The jurisdiction will continually improve, or advocate for dam owners to improve, inundation maps for all high hazard dams within its district, and share those maps with local officials and responders.						
Knox County	7-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Brinkhaven	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	9-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 1.6: The jurisdiction will work with dam owners to identify damage and deterioration to jurisdiction owned dams, reservoirs, and lagoons and will make improvements to strengthen, harden, and protect the structures from storm, water or other damages as well as general wear and tear.						
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	LOC
Mitigation Action 1.7: Support, facilitate, and advocate for all dam owners in the repair and refurbishment of any high hazard dam that poses a danger to the nearby community within an inundation zone or area of potential damage upon failure.						
Knox County	7-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Fredericktown	5-X	Property Protection	Mayor	10-15-25	10-14-30	
Goal 2: The jurisdiction will reduce the vulnerability to drought and extreme heat.						
Hazard: Drought and Extreme Heat						
Mitigation Action 2.1: The jurisdiction will identify and make ready local facilities to be used as cooling centers to serve residents under extreme circumstances or during demand-induced power outages.						
Knox County	4-X	Prevention	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	5-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	5-X	Prevention	Mayor	10-15-25	10-14-30	
Centerburg	4-X	Prevention	Village Administrator	10-15-25	10-14-30	
Fredericktown	3-X	Prevention	Mayor	10-15-25	10-14-30	
Gambier	7-X	Prevention	Village Administrator	10-15-25	10-14-30	
Martinsburg	5-X	Prevention	Mayor	10-15-25	10-14-30	
Mitigation Action 2.2: The jurisdiction will develop water conservation plans and public information procedures for use during an extended drought or water shortage.						
Knox County	4-X	Public Outreach	EMA Director	10-15-25	10-14-30	LOC
Fredericktown	3-X	Public Outreach	Mayor	10-15-25	10-14-30	
Gambier	7-X	Public Outreach	Village Administrator	10-15-25	10-14-30	
Mitigation Strategy 2.3: The jurisdiction will help residents and business owners prepare for extreme temperature conditions by suggesting and supporting acquisition of a 3-day supply of bottled water supplies for people and pets, cooling fans, alternate heating devices, the use of smart building materials to withstand extreme temperatures or to resist excess warmth or cold, encourage redundancy for HVAC systems at facilities that house vulnerable populations, use water-saving fixtures and appliances, and promote development of additional tree canopy to reduce warming.						

Knox County	4-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	5-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	4-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	4-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	7-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	5-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 2.4 The jurisdiction will harden resources for raw water supply, search for new sources, and construct new treatment, storage, and distribution systems to ensure drought resiliency to meet community development and growth needs while not worsening a hazard.						
Knox County	4-X	Structurally Engineered Projects	Water Superintendent	10-15-25	10-14-30	LOC
Mount Vernon	5-X	Structurally Engineered Projects	Safety Service Director	10-15-25	10-14-30	
Fredericktown	3-X	Structurally Engineered Projects	Mayor	10-15-25	10-14-30	
Goal 3: The jurisdiction will reduce vulnerability to earthquake.						
Hazard: Earthquake						
Mitigation Action 3.1: The jurisdiction will identify and quantify vulnerable property, critical services, people, and potential damages (including debris estimations) and costs from a 5.0 earthquake within 20 miles.						
Knox County	11-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC USACE
Mount Vernon	11-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	8-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	7-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	10-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	10-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	7-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 3.2: The jurisdiction will identify resources, suppliers, equipment and facilities necessary to provide for the eight community lifelines after an earthquake, including the sheltering and caring for residents.						
Mount Vernon	11-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Brinkhaven	8-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	7-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	10-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	10-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	7-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 3.3: The jurisdiction will conduct an assessment of critical facility and services vulnerability to earthquake damages, and will improve resilience of these structures to improve community resiliency.						

Danville	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Fredericktown	10-X	Property Protection	Mayor	10-15-25	10-14-30	
Goal 4: The jurisdiction will reduce vulnerability to fire and wildfire.						
Hazard: Multi-structure fire, field fire, wildfire, hazardous materials fire						
Mitigation Action 4.1: The jurisdiction will work to improve public safety services, with an emphasis upon volunteer recruitment, training and retention for fire and EMS services, and effective mutual aid programs for gaps in response capabilities so that emergency needs can be met under both daily and extreme or long-term conditions by working with partners to achieve this goal.						
Centerburg	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	LOC AFG ST Other
Danville	2-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X 7-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	11-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	6-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Mitigation Action 4.2: The jurisdiction will assess the adequacy of existing firefighting apparatus and equipment, protective gear, special rescue equipment (structural, extrication, water rescue, trench or confined space, etc.), identify gaps in equipment and supplies, and develop and implement a way to obtain that equipment for local use in response during emergencies.						
Knox County	6-X	Response Enhancement	EMA Director	10-15-25	10-14-30	LOC AFG ST Other
Centerburg	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Danville	1-X 6-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X 7-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	11-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	4-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Mitigation Action 4.3: The jurisdiction will establish a plan to fill gaps in capital equipment, operational equipment, protective gear, volunteers, personnel and training programs to fill gaps and improve services where applicable.						
Mount Vernon	8-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	LOC AFG ST
Centerburg	6-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Fredericktown	6-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	11-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Mitigation Action 4.4: The jurisdiction will implement a program of dry hydrant installation in ponds throughout the area, and develop water-hauling expertise, to aid in supplying water to fire departments during drought, times of extreme water use, or during a water supply outage.						
Knox County	4-X	Property Protection	SWCD Director	10-15-25	10-14-30	AFG HMGP
Mount Vernon	8-X	Property Protection	Safety Service Director	10-15-25	10-14-30	

Centerburg	6-X	Property Protection	Village Administrator	10-15-25	10-14-30	BRIC LOC
Danville	6-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	7-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	11-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	6-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 4.5: The jurisdiction will encourage and facilitate the installation of sod strips, fire barriers or breaks that will deter fire spread in areas exceptionally vulnerable to field or wildland fires, or in recreational areas that have high vulnerability.						
Centerburg	6-X	Property Protection	Village Administrator	10-15-25	10-14-30	Other
Fredericktown	7-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	11-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 4.6: The jurisdiction will retrofit fire protection devices and systems into historical and aging structures that are critical to the community or the preservation of its history and culture.						
Gambier	11-X	Property Protection	Village Administrator	10-15-25	10-14-30	Other
Mitigation Action 4.7: The jurisdiction will utilize grant programs to upgrade and revise building codes, regulations, and inspection capacity to reduce fire vulnerability.						
Mount Vernon	8-X	Prevention	Safety Service Director	10-15-25	10-14-30	HMGP BRIC Plus-Up CDBG
Brinkhaven	7-X	Prevention	Mayor	10-15-25	10-14-30	
Gambier	11-X	Prevention	Village Administrator	10-15-25	10-14-30	
Martinsburg	6-X	Prevention	Mayor	10-15-25	10-14-30	
Mitigation Action 4.8: The jurisdiction will use public information practices to heighten awareness of fire prevention, such as proper disposal of smoking materials and campfire debris, and discourages the practice of open burning, ditch bank burning, and other uses of fire to control brush, vegetation, and waste.						
Gambier	11-X	Public Information	Village Administrator	10-15-25	10-14-30	LOC
Mitigation Action 4.9: Identify the types and possible locations of fires that would challenge local response capabilities, and require rapid deployment of outside resources.						
Mount Vernon	8-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	6-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	6-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	7-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	11-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 4.10: Identify commercial locations where fire walls and other fire behavior control devices have been removed or are no longer functional or effective.						
Mount Vernon	8-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	6-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	7-X	Property Protection	Mayor	10-15-25	10-14-30	

Gambier	11-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	6-X	Property Protection	Mayor	10-15-25	10-14-30	
Goal 5: The jurisdiction will reduce vulnerability to and loss from all types of flooding.						
Hazard: Surface, flash, areal and riverine flooding; Storm-water back up						
Mitigation Action 5.1: The jurisdiction will clear ditches, streams, creeks and road ditches of debris, crop fodder, obstructions, and fallen trees to facilitate adequate drainage due to heavy rains, flat terrain, and old drainage systems when the waterway is part of the county ditch maintenance program, and will advocate for other appropriate waterways to become part of the ditch maintenance system through the proper process.						
Knox County	3-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	8-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.2: The jurisdiction will maintain, or establish where not in place, NFIP participation, and will support flood loss reduction through regular review and update of floodplain regulations, and will actively participate in the development and adoption of new flood risk maps as that process occurs and consider CRS participation.						
Knox County	3-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.3: The jurisdiction will review, update, apply and enforce existing land use regulations, zoning rules, commercial building codes, and other permit processes as development tools, especially in areas with high flood vulnerability or in high development areas to support construction practices that mitigate damages due to flooding.						
Knox County	3-X	Prevention	Reg. Plan. Director	10-15-25	10-14-30	LOC; ICC Plus-Up
Mount Vernon	3-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Centerburg	3-X	Prevention	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Prevention	Mayor	10-15-25	10-14-30	
Gambier	5-X	Prevention	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.4: The jurisdiction will utilize acquisition and relocation programs, or retrofit options, when property owners elect to relocate after repeated or extremely severe damage from flooding, and when their properties qualify for such programs.						
Knox County	3-X	Prevention	EMA Director	10-15-25	10-14-30	FMA HMGP BRIC
Mount Vernon	3-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Prevention	Mayor	10-15-25	10-14-30	

Centerburg	3-X	Prevention	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Prevention	Mayor	10-15-25	10-14-30	
Gambier	5-X	Prevention	Village Administrator	10-15-25	10-14-30	
Martinsburg	3-X	Prevention	Mayor	10-15-25	10-14-30	
Mitigation Action 5.5: The jurisdiction will utilize structurally engineered water control structures like storm sewers, reservoirs, retention and detention ponds, dams, levees, dikes, floodwalls, and others not listed to control flooding in commercially and residentially developed areas and properties.						
Mount Vernon	3-X	Structurally Engineered Projects	Water Superintendent	10-15-25	10-14-30	HMGP BRIC FMA CDBG Ohio EPA ICC ST
Brinkhaven	1-X	Structurally Engineered Projects	Mayor	10-15-25	10-14-30	
Centerburg	3-X	Structurally Engineered Projects	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Structurally Engineered Projects	Mayor	10-15-25	10-14-30	
Mitigation Action 5.6: The jurisdiction will encourage management of surface runoff and chemical residue through techniques such as installation of grassy waterways, creation of infiltration basins and trenches, porous pavement installation, filtration techniques like us of catch basin inserts, sand and organic filters, rain gardens and vegetated filter strips.						
Knox County	3-X	Natural Resource Protection	SWCD Director	10-15-25	10-14-30	HMGP BRIC H2OH USDA
Fredericktown	2-X 8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.7: The jurisdiction will protect soil quality by advocating for agricultural conservation programs and practices that facilitate natural drainage and manage engineered drainage systems to achieve effective flood management and soil conservation.						
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	H2OH USDA ST
Mitigation Action 5.8: The jurisdiction will use stream bank protection measures such as dormant woody stakes and posts, trees, shrubs and grasses along banks and berms, gabion and riprap revetments, crib walls, deflectors or other similar methods to protect the banks and berms.						
Danville	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC Other
Mitigation Action 5.9: The jurisdiction will manage stream flow through channel modification, sedimentation, debris and obstruction and stream ecology management practices.						
Mount Vernon	3-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	LOC
Fredericktown	2-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Mitigation action 5.10: The jurisdiction will utilize biotechnical method (placement of willow posts, hardwood tree plantings, fascines, brush layering, evergreen revetments, log revetments, tree kickers, lunker structures, or paced rocks as examples) to minimize the deterioration or destruction of stream banks due to excessive flow.						
Danville	9-X	Natural Resource Protection	Safety Service Dir.	10-15-25	10-14-30	LOC
Fredericktown	11-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	

Mitigation Action 5.11: The jurisdiction will work with conservancy districts and other organizations to study countywide water drainage through the watersheds, and to identify areas where natural bottlenecks and water problems occur due to natural drainage, and to identify the consequences of those characteristics.						
Knox County	3-X	Property Protection	SWCD Director	10-15-25	10-14-30	LOC
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.12: The jurisdiction will utilize wetland and natural habitat creation and/or use of vegetative buffers inside waterways to slow the rapid flow of floodwater and/or hold excess storm water.						
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	HMGP BRIC
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.13: The jurisdiction will maintain and enforce floodplain, zoning, and building regulations to manage development in flood-prone areas.						
Knox County	3-X	Property Protection	Reg Plan Director	10-15-25	10-14-30	LOC ICC
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.14: The jurisdiction will maintain, repair, upgrade and/or replace storm sewers and related systems and increase culvert sizes and bridge spans as necessary to reduce flooding, and will improve and repair roadways and berms damaged by rapid runoff and heavy precipitation.						
Knox County	3-X	Property Protection	Water Superintendent	10-15-25	10-14-30	BRIC HMGP
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.15: The jurisdiction will conduct an awareness campaign for individual flood insurance.						
Brinkhaven	1-X	Property Protection	Mayor	10-15-25	10-14-30	LOC
Mitigation Action 5.16: The jurisdiction will elevate structures and infrastructure (buildings, roadways, bridges, culverts, etc.) to prevent flooding of streets, under passes and bridges or culverts.						
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	LOC; BRIC
Mitigation Action 5.17: The jurisdiction will improve and repair streets, sidewalks and berms damaged by rapid runoff and heavy precipitation.						
Knox County	3-X	Property Protection	County Engineer	10-15-25	10-14-30	

Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC; HMGP BRIC
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.18: The jurisdiction will maintain and add an adequate supply of rapidly deployable signs to mark flooded roadways quickly, sandbags to protect vulnerable properties, and devices to close streets.						
Knox County	3-X,	Property Protection	Sheriff; County Engineer	10-15-25	10-14-30	LOC
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Strategy 5.19: Identify repetitive loss and severe repetitive loss structures in the jurisdiction, and advocate for mitigation actions regarding these properties.						
Knox County	3-X	Property Protection	EMA Director; Reg Plan Director	10-15-25	10-14-30	BRIC HMGP FMA
Mount Vernon	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 5.20: Assess the operation of water management structures such as retention and detention ponds when overflows occur, paying attention to compliance with wise practices, code compliance, details of the weather event, degree of silt and sediment build up, and watershed characteristics beyond the particular site to determine a cause and a solution for the flooding problem.						
Knox County	3-X	Prevention	Water Superintendent	10-15-25	10-14-30	BRIC HMGP CDBG FMA
Mount Vernon	3-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Danville	1-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Gambier	5-X	Prevention	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.21: Create evacuation plans (including pre-scripted messages) for high flood risk areas that avoid the use of roads, bridges and areas that are quick to flood, and would likely be unsafe very early on during a flood event; share these plans with the officials, responders, and individuals who would be involved in evacuation						
Knox County	3-X	Response Enhancement	EMA Director; Sheriff; Engineer	10-15-25	10-14-30	LOC
Brinkhaven	1-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Fredericktown	4-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	5-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Mitigation Action 5.22: Create dry dams and wetlands in low lying areas that frequently flood.						
Knox County		Property Protection	SWCD Director	10-15-25	10-14-30	LOC

Mitigation Action 5.23: Complete a stormwater management study and plan to provide the basis for stormwater management practices and improvements that will reduce flooding, and expand ditch maintenance programs to include more waterways.						
Knox County	3-X	Property Protection	Water Superintendent	10-15.25	10-14-30	LOC
Centerburg	3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Goal 6: The jurisdiction will reduce vulnerability to damages from hazardous materials spills and releases.						
Hazard: Hazardous materials spills and releases, pipeline releases, fixed facility failures; equipment failure and human error; and Resource Contamination of rivers, streams, ditches, reservoirs or water-holding tanks, and other bodies of water that serve as recreational facilities, water sources, or drainage systems.						
Mitigation Action 6.1: The jurisdiction will work with the railroads to identify ways to lessen the impact of blocked crossings for emergency safety traffic through developing technological and/or mechanical means to identify blocked crossing and divert traffic in a timely fashion.						
Centerburg	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	LOC
Mitigation Action 6.2: The jurisdiction will seek funding for and provide training and special equipment to all first responders, including EMS, for hazmat response, and will identify best practices where hazardous materials are involved in incidents on highways, rail, airports and fixed facilities, to ensure proper response to incidents.						
Knox County	5-X 8-X	Response Enhancement	EMA Director	10-15-25	10-14-30	LOC AFG HMEP HMGP
Mount Vernon	6-X 2-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	6-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Centerburg	5-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Fredericktown	6-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	6-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	4-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Mitigation Action 6.3: The jurisdiction will work to ensure that road signage is clear and visible to hazardous materials carriers for navigational purposes, and to help limit the use of county and township roads by heavy trucks and hazardous materials haulers to lessen road damage, wear and tear, and deterioration due to excess load weights.						
Knox County	5-X	Property Protection	LEPC Coordinator	10-15-25	10-14-30	LOC
Centerburg	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	5-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	6-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	6-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 6.4: The jurisdiction will enforce load limits on county roads, bridges, and overpasses to prevent hazardous materials spills and releases due to overweight and out-of-compliance hauling, and will monitor speed digitally as vehicles move through the incorporated controlled speed zones.						
Knox County	5-X	Prevention	Engineer; Sheriff	10-15-25	10-14-30	

Mount Vernon	6-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Centerburg	5-X	Prevention	Village Administrator	10-15-25	10-14-30	LOC
Danville	5-X	Prevention	Safety Service Director	10-15-25	10-14-30	
Fredericktown	6-X	Prevention	Mayor	10-15-25	10-14-30	
Gambier	6-X	Prevention	Village Administrator	10-15-25	10-14-30	
Martinsburg	4-X	Prevention	Mayor	10-15-25	10-14-30	
Mitigation Action 6.5: The jurisdiction will identify methods to protect waterways from contamination by vehicle accident on highways and roadways through bridge improvements, culvert modifications, or bridge spans changes.						
Knox County	8-X	Natural Resource Protection	LEPC Coordinator	10-15-25	10-14-30	
Mount Vernon	2-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	5-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	BRIC LOC
Danville	7-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 6.6: The jurisdiction will work with education institutions to prevent spills in classrooms through better marking, tracking, and disposal of hazardous materials, as well as establish awareness for all first responders, including EMS, in incidents that may include radioactive or nuclear materials.						
Centerburg	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	LOC
Mitigation Action 6.7: Work with ODOT to establish detour routes and signage to lessen inappropriate commercial traffic on county and township roads that have insufficient load limits or surfaces to handle that kind of commercial truck traffic.						
Fredericktown	6-X	Property Protection	Mayor	10-15-25	10-14-30	LOC
Mitigation action 6.8: Ensure proper pre-digging procedures are followed by property owners, contractors, and technicians and that proper notifications are made in advance of the digging.						
Knox County	5-X	Response Enhancement	EMA Director	10-15-25	10-14-30	
Centerburg	5-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Fredericktown	6-X	Response Enhancement	Mayor	10-15-25	10-14-30	AFG Other LOC
Gambier	6-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	4-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Mitigation Action 6.9: Develop specific messages and warning processes to notify the public of spills and releases, and to give them specific information about the area to avoid, protective actions they must take, and other critical information.						
Knox County	5-X	Public Information	EMA Director	10-15-25	10-14-30	
Brinkhaven	6-X	Public Information	Mayor	10-15-25	10-14-30	

Centerburg	5-X	Public Information	Village Administrator	10-15-25	10-14-30	LOC
Fredericktown	6-X	Public Information	Mayor	10-15-25	10-14-30	
Gambier	6-X	Public Information	Village Administrator	10-15-25	10-14-30	
Martinsburg	4-X	Public Information	Mayor	10-15-25	10-14-30	
Goal 7: The jurisdiction will reduce the effects of invasive species and the destruction that is done to natural resources by invasive species.						
Hazard: Insects, wild animals, nuisance animals, and noxious and invasive weeds and plants.						
Mitigation Action 7.1: The jurisdiction will communicate with residents about the current status of any invasive species that is negatively affecting the jurisdiction, and identify common health and social reactions to it.						
Knox County	10-X	Property Protection	SWCD Director	10-15-25	10-14-30	
Mount Vernon	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	8-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	9-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	8-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 7.2: The jurisdiction will maintain trees and vegetation on public and jurisdiction owned property and will remove dead/diseased trees from their property, and will advocate for the same on private property.						
Knox County	10-X	Property Protection	County Engineer	10-15-25	10-14-30	
Mount Vernon	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	5-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	9-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	8-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 7.3 Establish plans that outline the roles and responsibilities of government and institutional entities and owners responding to an invasive species that endangers the public welfare or property, or interferes with the preservation of natural and historical resources.						
Knox County	10-X	Response Enhancement	EMA Director	10-15-25	10-14-30	
Mount Vernon	10-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	8-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Fredericktown	9-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	8-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Mitigation Action 7.4: Develop effective and affordable debris management procedures for trees and vegetation hat have fallen due to prior damage by invasive species, age, or other deterioration.						
Knox County	10-X	Property Protection	EMA Director	10-15-25	10-14-30	
Mount Vernon	10-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	8-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	3-X	Property Protection	Safety Service Dir.	10-15-25	10-14-30	

Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	8-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Goal 8: The jurisdiction will reduce vulnerability to land subsidence due to erosion or other degradation of soils and embankments.						
Hazard: Erosion, embankment collapse, karst movement, and sinkhole development Resource Contamination such as erosion, loss of topsoil, embankment loss, waterway contamination						
Mitigation Action 8.1: The jurisdiction will advocate for, support and implement slope protection actions along waterways and other vulnerable areas where natural causes endanger property, structures, or other vulnerabilities exist.						
Knox County	9-X	Natural Resource Protection	SWCD Director	10-15-25	10-14-30	LOC HMGP BRIC
Mount Vernon	7-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	9-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	11-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	4-X 3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 8.2 The jurisdiction will work with appropriate agencies to create an inventory of properties with reported land subsidence problems, track any issues that appear after significant development or addition of structures or devices, and will establish a county-wide contact agency and person for property owners who need assistance.						
Knox County	9-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Centerburg	9-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	11-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	4-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 8.3: The jurisdiction will incorporate soil studies and land subsidence incidents into development activities.						
Gambier	4-X 3-X	Property Protection	Village Administrator	10-15-25	10-14-30	LOC
Mitigation Action 8.4: The jurisdiction will share information and issue warnings when roadways or other public properties are imminently vulnerable to anticipated landslides or dangerous erosion.						
Knox County	9-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Gambier	4-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 8.5: The jurisdiction will encourage crop rotation, buffer strips, cover crops and other conservation practices to protect topsoil from wind and water damage.						
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	LOC
Gambier	4-X 3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation action 8.6: Protect waterway banks and land near waterways from deterioration use to rapid or excessive flow by planting vegetation, installing dormant woody stakes and posts, planting trees, shrubs and grasses along banks and berms, or using deflectors to prevent deterioration or other similar methods to accomplish this.						
Mount Vernon	7-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC

Centerburg	9-X	Property Protection	Village Administrator	10-15-25	10-14-30	HMGP USACE
Fredericktown	11-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	4-X 3-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Goal 9: The jurisdiction will reduce vulnerability to severe storms, including thunderstorms, tornadoes, windstorms and winter storms.						
Hazard: Severe thunderstorms, hail, lightning, thundersnow, tornado, high winds, blizzard or heavy snow, blowing and drifting snow, ice, microbursts, heavy rain, and other components of severe storms.						
Mitigation Action 9.1: The jurisdiction will establish, maintain, improve, and/or promote public warning and notification systems (reverse 911, opt-in systems, digital systems, outdoor warning sirens, weather radios, etc.), and will identify and fill gaps in these systems as they exist.						
Knox County	1-X	Public Information	EMA Director	10-15-25	10-14-30	BRIC; HMGP; Other; LOC
Mount Vernon	1-X	Public Information	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Public Information	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Public Information	Village Administrator	10-15-25	10-14-30	
Danville	3-X	Public Information	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Public Information	Mayor	10-15-25	10-14-30	
Gambier	1-X	Public Information	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Public Information	Mayor	10-15-25	10-14-30	
Mitigation Action 9.2: The jurisdiction will advocate for and support property owners' construction of safe rooms in single and multi-family homes and neighborhoods without basements, mobile home parks or manufactured home neighborhoods if present, or other properties to create shelter from life-threatening storms.						
Knox County	1-X	Property Protection	EMA Director	10-15-25	10-14-30	HMGP BRIC FMA LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.3: The jurisdiction will work with mobile home park owners, multi-family rental unit owners, and manufactured housing subdivision owners to establish safe rooms and shelters for their residents to be used in severe and threatening weather.						
Knox County	1-X	Property Protection	EMA Director	10-15-25	10-14-30	EMPG LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	3-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	

Martinsburg	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.4: The jurisdiction will identify, coordinate with owners, and prepare facilities, including public schools, to be used as safe areas, overnight shelters, community information centers, service centers, and comfort stations when severe storms or other conditions necessitate evacuation or sheltering services, or the delivery of other critical assistance, and ensure that facilities are equipped with generators to meet evacuees' basic needs.						
Knox County	1-X	Response Enhancement	EMA Director	10-15-25	10-14-30	LOC ICC HMGP BRIC
Mount Vernon	1-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Danville	3-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Mitigation Action 9.5: The jurisdiction will maintain public property and retrofit or repair damages with storm-resistant materials, and advocate that property owners do the same for their property; will remove dead and diseased trees to limit potential debris after storms, and will establish an affordable debris management plan to handle the debris that cannot be prevented.						
Knox County	1-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.6: The jurisdiction will provide community education about protective actions, evacuation procedures, preparedness information, and basic insurance coverage needs for residents to protect themselves from losses.						
Knox County	1-X	Public Outreach	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Public Outreach	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Public Outreach	Mayor	10-15-25	10-14-30	
Fredericktown	1-X	Public Outreach	Mayor	10-15-25	10-14-30	
Gambier	1-X	Public Outreach	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Public Outreach	Mayor	10-15-25	10-14-30	
Mitigation Action 9.7: The jurisdiction will develop local, affordable and functional countywide public safety communication systems with the capability for multi-discipline and multi-jurisdictional communication.						
Knox County	1-X	Response Enhancement	Sheriff	10-15-25	10-14-30	AFG HSGP CDBG ST LOC
Mount Vernon	1-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Gambier	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	

Mitigation action 9.8: The jurisdiction will develop storm-related redundancy through the availability of generators, alternate communication systems, and redundant suppliers of critical goods and services.						
Knox County	1-X	Property Protection	County Engineer	10-15-25	10-14-30	HMGP EMPG; LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Gambier	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation action 9.9: The jurisdiction will work to plow and clear county-maintained roadways, and remove snow, obstructions, and other debris to facilitate emergency traffic, necessary travel, and business access.						
Knox County	1-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Gambier	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 9.10: The jurisdiction will develop methods to prevent contamination of waterways or aquifers during snow removal and salting icy roads.						
Knox County	1-X 8-X	Natural Resource Protection	SWCD Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X 2-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Danville	7-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 9.11: The jurisdiction will work with providers who have vehicles that would help mobility challenged individuals in disasters, include four-wheeled drive, multi-passenger, wheelchair accessible, and such to create transportation strike teams for disaster response, when necessary.						
Knox County	1-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC EMPG
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.12: The jurisdiction will work with owners and operators of residential facilities that house elderly, disabled, or persons recovering from addictions or with ongoing mental illness to establish emergency plans to protect, shelter, and care for their clients during a significant disaster, utility outage, evacuation, shelter in place, or another emergency.						
Knox County	1-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.13: The jurisdiction will maintain trees and vegetation on public property and remove dead or diseased trees and vegetation that are vulnerable to wind damage.						
Mount Vernon	1-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC
Centerburg	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	

Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Martinsburg	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.14: The jurisdiction will establish a county-wide evacuation assessment for residential facilities that indicates which facilities are self-sufficient, which would need external help and what kind of help they would need, and which ones would need to shelter in place due to extreme resource needs that would likely impede or extend the evacuation time.						
Knox County	1-X	Property Protection	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.15: Develop a plan and resources to assist elderly, disabled, and disadvantaged person with snow removal, debris removal, and property clen up after severe storms.						
Knox County	1-X	Response Enhancement	EMA Director	10-15-25	10-14-30	LOC
Mitigation Action 9.16: Use surge protection devices to protect equipment in public offices, and in buildings where critical equipment is stored and maintained, and equip these buildings with lightning detection devices.						
Knox County	1-X	Property Protection	I.T. Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	1-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 9.17: Ensure the availability of shelters, cooling/warming centers and comfort stations, and supply equipment and supplies, using grants when possible.						
Knox County	1-X	Response Enhancement	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Response Enhancement	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Gambier	1-X	Response Enhancement	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Response Enhancement	Mayor	10-15-25	10-14-30	
Goal 10: The jurisdiction will reduce vulnerability to utility failure, including electrical outages, utility distribution interruptions, sanitary sewer failure, water treatment and distribution failure, and wastewater collection and treatment system failure.						
Hazard: Power and utility outages and Resource contamination						
Mitigation Action 10.1: The jurisdiction will repair, replace, upgrade and add storm sewer systems, or separate systems, where needed to more quickly and efficiently manage the movement of storm water after heavy precipitation and/or during flooding, to better control back flow, and add pumps, generators, street berms, stormwater basins and other means to harden services.						
Mount Vernon	9-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	BRIC; HMGP USACE
Centerburg	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	

Danville	2-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	EPA CDBG
Fredericktown	4-X	Structurally Engineered Project	Mayor	10-15-25	10-14-30	
Mitigation Action 10:2: The jurisdiction will develop a storm and sanitary sewer improvement plan to be implemented as funding is available that will match stormwater management capacity to current need under conditions of heavy and long-lasting precipitation to lessen flash flooding and protect property from flash flooding and lessen basement flooding in homes and businesses.						
Mount Vernon	9-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	BRIC; HMGP USACE EPA CDBG
Centerburg	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Structurally Engineered Project	Mayor	10-15-25	10-14-30	
Mitigation Action 10.3: The jurisdiction will repair, replace and improve roads, berms, culverts, bridges and drainage systems to more aptly handle heavy stormwater loads and to enhance drainage of critical areas.						
Knox County	2-X	Structurally Engineered Project	County Engineer	10-15-25	10-14-30	BRIC; HMGP USACE EPA CDBG
Mount Vernon	1-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	
Centerburg	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Structurally Engineered Project	Mayor	10-15-25	10-14-30	
Gambier	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	
Mitigation Action 10.4: The jurisdiction will work with utility providers to harden electrical and cellular service by installing wind-resistant poles and distribution lines, wind turbines and solar energy systems, and by providing generators for pump stations, relay stations, repeater towers, transmitters, receivers, charging stations, and other critical components.						
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Brinkhaven	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.5: The jurisdiction will repair, replace, reinforce or strengthen underground utilities, roads, sidewalks, and other utility components like treatment plants and pump stations to prevent, delay or correct damages due to heavy use during or after severe storms or during inclement weather conditions.						
Mount Vernon	9-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	BRIC; HMGP USACE EPA CDBG
Centerburg	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	

Mitigation Action 10.6: The jurisdiction will assess the status and condition of all available generators and necessary and redundant fuel supplies for the generators, priority fuel status for critical facilities, and perform the necessary repairs, purchases, and replacements to ensure an operational alternate power supply exists when it is needed.						
Knox County	2-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Martinsburg	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.7: The jurisdiction will establish guidelines for residents to properly utilize alternate power sources during power outages, including a list of generator suppliers and rental resources, the use of wind turbines and solar systems, methods of recharging personal devices, and will make this information available to the general public for use during outages.						
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X	Property Protection	Mayor	10-15-25	10-14-30	
Martinsburg	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.8: The jurisdiction will develop a countywide plan for utility mutual aid, redundancy, and assistance to provide for areas with few alternate options during a utility outage of any type						
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	LOC
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.9: The jurisdiction will advocate for improvement to water treatment plants, including distribution systems, reservoirs, enhanced testing and monitoring and improved treatment capabilities.						
Knox County	2-X	Property Protection	Water Superintendent	10-15-25	10-14-30	BRIC HMPG CDBG USACE LOC; ICC
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.10: The jurisdiction will support of measures to manage distressed watersheds and advocate for support programs to help farmers and other producers of grown goods implement measures while maintaining the economic well-being through conservation and protection programs.						
Knox County	2-X 8-X	Natural Resource Protection	SWCD Director	10-15-25	10-14-30	H2OH

Mount Vernon	2-X	Natural Resource Protection	Safety Services Director	10-15-25	10-14-30	
Danville	7-X	Natural Resource Protection	Safety Services Director	10-15-25	10-14-30	
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 10.11: The jurisdiction will develop inter connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.						
Mount Vernon	9-X 2-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Centerburg	2-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	H2OH CWA LOC
Danville	2-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 10.12: The jurisdiction will replace, improve or create sanitary sewer systems for neighborhoods, subdivisions or other areas to replace septic systems or outdated existing sewer systems.						
Knox County	2-X	Structurally Engineered Project	Water Superintendent	10-15-25	10-14-30	
Mount Vernon	9-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	
Centerburg	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	BRIC; HMGP CDBG LOC Other
Danville	2-X	Structurally Engineered Project	Safety Service Director	10-15-25	10-14-30	
Fredericktown	4-X	Structurally Engineered Project	Mayor	10-15-25	10-14-30	
Gambier	2-X	Structurally Engineered Project	Village Administrator	10-15-25	10-14-30	
Mitigation Action 10.13: Protect groundwater resources by supporting and requiring wise management of crop, lawn care and other facility use of chemicals such as pesticides and fertilizers.						
Knox County	2-X 8-X	Natural Resource Protection	SWCD Director	10-15-25	10-14-30	
Mount Vernon	6-X 2-X	Natural Resource Protection	Safety Service Director	10-15-25	10-14-30	LOC
Danville	7-X	Natural Resource Protection	Safety Services Director	10-15-25	10-14-30	
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	2-X 3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 10.14: Utilize land use planning and comprehensive community planning to ensure the availability of resilient utilities to new businesses, residential areas, and other new construction areas						
Knox County	2-X	Property Protection	Reg Plan Director	10-15-25	10-14-30	
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	LOC
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	

Fredericktown	4-X	Property Protection	Mayor	10-15-25	10-14-30	
Gambier	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Mitigation Action 10.15: Support the installation of wind resistant power poles, water towers, communication towers and other infrastructure components.						
Knox County	2-X	Property Protection	County Engineer	10-15-25	10-14-30	LOC BRIC HMGP
Mount Vernon	9-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	3-X	Property Protection	Mayor	10-15-25	10-14-30	
Centerburg	2-X	Property Protection	Village Administrator	10-15-25	10-14-30	
Danville	2-X	Property Protection	Safety Service Director	10-15-25	10-14-30	
Fredericktown	1-X 4-X	Property Protection	Mayor	10-15-25	10-14-30	
Martinsburg	2-X	Property Protection	Mayor	10-15-25	10-14-30	
Mitigation Action 8.16: Establish protective action procedures for air quality threat management and response.						
Knox County	8-X	Natural Resource Protection	Health Commissioner	10-15-25	10-14-30	LOC
Mount Vernon	2-X	Natural Resource Protection	Safety Services Director	10-15-25	10-14-30	
Danville	7-X	Natural Resource Protection	Safety Services Director	10-15-25	10-14-30	
Fredericktown	8-X	Natural Resource Protection	Mayor	10-15-25	10-14-30	
Gambier	3-X	Natural Resource Protection	Village Administrator	10-15-25	10-14-30	
Goal 11: The jurisdiction will engage in mitigation actions that enable the public to obtain emergency assistance in a timely and effective manner.						
Hazard: Applicable to all hazards.						
Mitigation Action 11.1: The jurisdiction will expand and improve its public warning and notification capability through additional or upgraded outdoor warning sirens, improvements to the software used in these systems, wireless notification systems, use of weather radios, or enhanced public education regarding warning and notification of protection orders or warnings, including the development of pre-scripted messaging or resources for translation for non-English speaking persons where it has been determined to be necessary.						
Mount Vernon	1-X	Social Resiliency	Safety Service Director	10-15-25	10-14-30	BRIC HMGP ICC LOC
Brinkhaven	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Social Resiliency	Village Administrator	10-15-25	10-14-30	
Fredericktown	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Martinsburg	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Mitigation Action 11.2: The jurisdiction will work with all municipalities and townships to review, update and improve the Emergency Operations Plan so that all populations are served in disasters, and so that entities charged with serving them are prepared to do so in a way that prevents gaps in their services.						
Knox County	1-X	Social Resiliency	EMA Director	10-15-25	10-14-30	LOC; ST
Mount Vernon	1-X	Social Resiliency	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Social Resiliency	Village Administrator	10-15-25	10-14-30	

Fredericktown	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Mitigation Action 11.3: The jurisdictions will work together to advocate for adequate and pro-active behavioral health services so that all populations can maintain comprehensive treatment without a gap in their existing services due to disasters.						
Knox County	1-X	Social Resiliency	EMA Director	10-15-25	10-14-30	LOC; ST Other
Mount Vernon	1-X	Social Resiliency	Safety Service Director	10-15-25	10-14-30	
Centerburg	1-X	Social Resiliency	Village Administrator	10-15-25	10-14-30	
Fredericktown	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Mitigation Action 11.4: The jurisdiction will work with villages, the city, and other districts and organizations or agencies to incorporate mitigation measures into emergency operations plans, comprehensive plans, economic and community development plans, resource guides, and other community growth and operation documents to facilitate the accomplishment of mitigation goals.						
Knox County	1-X	Social Resiliency	EMA Director	10-15-25	10-14-30	LOC; Other
Mount Vernon	1-X	Social Resiliency	Safety Service Director	10-15-25	10-14-30	
Centerburg	1-X	Social Resiliency	Village Administrator	10-15-25	10-14-30	
Fredericktown	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Gambier	1-X	Social Resiliency	Village Administrator	10-15-25	10-14-30	
Martinsburg	1-X	Social Resiliency	Mayor	10-15-25	10-14-30	
Mitigation Action 11.5: The jurisdiction will work with other jurisdictions, organizations, and agencies to determine linguistically appropriate emergency communication messages for their population, and will identify resources to use in communicating with non-English speaking tourists and others; these messages will be provided to dispatchers for their use as needed.						
Knox County	1-X	Public Outreach	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Public Outreach	Safety Service Director	10-15-25	10-14-30	
Centerburg	1-X	Public Outreach	Village Administrator	10-15-25	10-14-30	
Mitigation Action 11.6: The jurisdiction will establish post-disaster recovery messages to assist people with specific needs, such as medical assistance, transportation, children's services, sensory devices, assistant with mental or emotional health or financial assistance.						
Knox County	1-X	Public Outreach	EMA Director	10-15-25	10-14-30	LOC
Mount Vernon	1-X	Public Outreach	Safety Service Director	10-15-25	10-14-30	
Brinkhaven	1-X	Public Outreach	Mayor	10-15-25	10-14-30	
Centerburg	1-X	Public Outreach	Village Administrator	10-15-25	10-14-30	
Fredericktown	All	Public Outreach	Mayor	10-15-25	10-14-30	
Mitigation Action 11.7: Create a Continuity of Government or Continuity of Business plan, as appropriate, that provides hard copies of critical documents, redundant storage of documents, succession of duties identification, and prioritizes critical activities to maintain services through a long-term or highly destructive incident.						
Knox County	1-X	Community Resilience	County Commissioners	10-15-25	10-14-30	LOC
Fredericktown	1-X	Community Resilience	Mayor	10-15-25	10-14-30	
Gambier	1-X	Community Resilience	Village Administrator	10-15-25	10-14-30	

Each strategy developed is assigned a priority, action type, lead agency, timeline, and potential funding source. These elements are described below. While specific information in this chart may change prior to the implementation of a strategy, the exercise of assigning time lines required stakeholders to evaluate current resources and support programs to determine how to best reduce the effects of disaster. They had to bear in mind that many of the villages are small so they have few resources, financial and otherwise. Officials from Knox County had to consider throughout this process that county leaders generally hold the responsibility of multiple jobs, sometimes in multiple jurisdictions, as they do their work. Officials are both paid employee and volunteer in many cases. Public information campaigns, plan enhancements, and the establishment of emergency protective measures were the most likely capability and generally not significantly expensive. Upgrading notification/warning systems was second because the acquisition of equipment involves procurement and budget process, therefore taking at least one budget year. These systems are exceptionally important to small, rural communities. Collaboration with other groups and comprehensive actions, due to the need to build trust and association between groups, would take longer to accomplish goals because it involved a two-phase action plan. Last on the completion list at times were structural projects due to design time requirements, budget needs, and dependence upon outside funding sources through applications. The priorities of life safety, incident containment, and property conservation combined with budget and procurement needs were major factors in determining the priority of goals and strategies.

County assignments were split between several key officials. The EMA Director, the Water/Wastewater Department Superintendent, the Regional Planning Director, the County Engineer, the Soil and Water Conservation Director, and the Sheriff shared various strategies that fell under their typical day-to-day activities. In Mount Vernon, strategies were assigned to the Safety Service Director who manages public safety forces, engineering, code enforcement, and utilities. Danville's Safety Service Director will be responsible for the mitigation strategies, and the Gambier and Centerburg Village Administrators will handle strategies in those jurisdictions. In Fredericktown, Brinkhaven and Martinsburg, the Mayor will be responsible for the strategies.

Rank

Priority identifies the order of importance jurisdictions assigned to each strategy. Strategies might not be implemented in this exact order, depending on availability of funds and other circumstances.

Action Type

Action type describes the kind of activity described in the strategy.

- Natural Resource Protection – Reduce the impacts of natural hazard by preserving or restoring natural areas and their mitigation functions
- Prevention – Avoid hazard problems or stop impact from worsening

- Property Protection – Protect structures by modifying or strengthening building to withstand impact
- Public Information – Advise the public about hazards, hazardous areas, and mitigation techniques to protect people and property
- Structurally Engineered Project – Lessen the impact of a hazard by modifying the environment or progression of the hazard event through designed and engineered projects
- Community Resilience – Increases the community's ability to withstand and recover from disasters
- Social Vulnerability – Increases the community's ability to identify and serve members of their community in the context of allowing all people to recover from a disaster

Lead Agency

The lead agency is the entity or entities charged with championing the strategy and ensuring that jurisdiction officials consider opportunities to implement the strategy over the five-year planning cycle. This agency may not have the authority or power to make a strategy into a project, nor would they necessarily be responsible for project oversight or completion should the strategy develop into an actionable and funded project. Rather, the lead agency is responsible for coordinating the overall effort, plays a key role in championing the project, or, by default, is the entity most appropriate to lead project development at the initial stage. There were some cases where stakeholders felt more than one agency should fill this role, and those are stated as such. When the strategy becomes a feasible project, the listed agency is not the only entity that would be involved in its execution, nor is it the only entity involved in keeping the strategy on the jurisdiction's radar. For accountability purposes, the strategy is assigned to a single entity when possible. When the strategy becomes a project, the jurisdiction would identify a project manager who may or may not represent the lead agency assigned in this plan.

Timeline

The timeline identifies the time frame in which a mitigation strategy could realistically be implemented. The actual time frame may vary from what is described in this plan, depending on funding, grant opportunities, or changes in priorities as other critical activities are adjusted to meet evolving community needs. At the time of plan development, these timelines fit logically within each jurisdiction's resources and support programs. As Knox County reviews this mitigation plan annually, the timelines will be reviewed, adjusted, and modified as appropriate.

Funding Sources

Funding sources change regularly as priorities and incidents drive them. All jurisdictions were advised, and discussed, the value in outlining their most important projects ahead of time, and being ready to respond to notices of available funding quickly and accurately. Having several projects that have been well-considered and evaluated, and researched for likely cost and variables, on the shelf and ready to complete a pre-application is highly recommended.

Mitigation strategies can be funded through a wide variety of sources. Depending on the type and cost of the project, different funding sources will be available and appropriate. Sources are taken from FEMA Mitigation Funding Sources online information. This information may change on a regular basis, and is currently under extensive review.

- BRIC – Building Resilient Infrastructure in Communities Program
- FMA – Flood Mitigation Assistance Grant
- HMGP – Hazard Mitigation Grant Program
- Plus-Up – FEMA Building Code Plus-Up Program
- AFG – Assistance to Firefighters Grant
- COG – Clean Ohio Grant
- CDBG – Community Development Block Grants
- ICC – Increased Cost of Compliance (including rate increases or premiums)
- LOC – Local Funds
- ST – State Funds
- OTHER – Other (including private funds and non-governmental agency funding)
- CWA – Clean Water Act Section 319 Grants
- WDG – Wetland Development Grants
- CAPP – Community Assistance and Protection Program for education and outreach
- USDA DA – USDA programs for technical assistance to farmers
- USDA NRCS – Various programs to relieve hazards related to flooding and conservation
- USACE – Planning Assistance, Floodplain Management, and Environmental Laboratory grants for the US Army Corps of Engineers
- USGS – United States Geological services grant programs
- H2OH – H2Ohio Agricultural Program
- COG – Clean Ohio Grant
- BRP – Brownfield Remediation Program

3.4 IMPLEMENTATION

The identified mitigation strategies are general actions that could be taken to reduce the negative impact of disasters and large-scale emergencies. For any given strategy to become an actionable item, it must be converted to a specific project with funding, action steps, timelines, and project goals. For example, if a property is to be acquired and demolished and the property owner relocated, that project must begin with the identification of the specific property to be acquired and the funding to be utilized for the project. The property owner must agree to accept the buy-out and use the money to purchase another home. The jurisdiction must accept its share of cost, planning responsibility, and project management roles. Only then can the actual project be executed. A similar process must be followed for any of the strategies identified here to become projects that reduce disaster loss in Knox County.

The EMA will monitor the implementation of these strategies through ongoing communication with officials and stakeholders, but other agencies may be selected to take the lead role in executing the project. When grant opportunities arise, reasonable efforts will be made to

secure funding. For strategies that must be funded through local budgets, jurisdictions will work diligently to identify local funding sources that can be used to address disaster vulnerability. When funding is secured, a detailed project timeline will be developed and actionable steps taken to complete the project. Upon completion, effectiveness will be evaluated by the jurisdiction and findings shared with the EMA and planning team for consideration in developing future projects.

Some communities anticipate challenges in their ability to implement strategies, as discussed in section 2.1.11 Community Growth and Development Trends and Table 2-17 Jurisdictional Capabilities. Their capabilities may fluctuate depending upon the individuals who are elected and appointed to key roles and positions in Knox County's jurisdictions. In the coming five years, the grants that are available and the supporting funds that can be used for match, administration, and other project necessities will have a marked impact upon what actions are implemented and which are tabled or eliminated. Because Knox County is putting extensive effort in growth and development, and because the business world and economy are in a constant state of change, Knox County officials feel they must be adaptable and take advantage of opportunities as they arise, acting quickly based upon the growth goals they have established.

Because of this state of change and growth, this plan was written to be flexible and adaptable, allowing Knox County to take advantage of opportunities as they occur. In the coming months, as newly elected officials join those already in office, Knox County is set to move forward with both growth and mitigation efforts.

Officials expressed the desire to implement more mitigation actions in the coming five years than they were able to in the past five years. They hope that grant availability will improve, and the changes they have made in administrative issues will enable them to be able to apply for, receive and use grants where possible. With the pandemic behind them, they look optimistically to the future as they strive to make Knox County safer and more resilient, and home to more residents and businesses in the near future.

The greatest value in these strategies is the process, knowledge, and reasoning stakeholders utilized during their development. The mitigation planning process required stakeholders to collaborate to evaluate hazards and risks in their community. New mitigation standards caused a new set of social agencies and service providers to come to the planning table, forging new relationships and associations. Many new perspectives and considerations were shared across the room as various parties expressed their opinions. They were required to examine the local community, predict where and under what conditions damages would occur, and identify how to reduce or eliminate potential damages after they identified who would be affected. The solutions, in the form of mitigation goals and actions that will ultimately develop into projects, had to be developed to maximize benefit to the community while minimizing cost. This process required whole community involvement so that the community was appropriately represented in the planning process.

Ultimately, Knox County developed a set of comprehensive, thoroughly considered, relevant, and effective solutions to problems that are likely to arise. As stakeholders considered how to solve potential problems, they utilized a collaborative spirit to address community-wide problems. These strategies were original thoughts to reduce disaster vulnerability and loss at the local level.

Given the availability of funding, personnel, and support, Knox County and its jurisdictions are positioned to move forward and implement these strategies to the best of their ability to accomplish their goals. Whatever mitigation activities are achieved will be well thought out, logical, and reasonable because of the community-wide all-inclusive hazard mitigation planning process.

4.0 PLAN ADOPTION

To complete the mitigation planning process, Knox County followed the formal process for state and federal plan review and local adoption. This section describes that process and includes all dates relevant to plan approval, adoption, and expiration. Adoption resolutions from all jurisdictions are also included.

4.1 FEDERAL AND STATE PLAN APPROVAL

After extensive review by stakeholders and the community, the Knox County Hazard Mitigation Plan was submitted to the Ohio Emergency Management Agency Mitigation Branch on <Insert Date>, 2025. The Ohio EMA completed their review of the plan on <insert date>. The Contractor and EMA incorporated Ohio EMA's recommended revisions and prepared the plan for final submission. FEMA issued a final letter of approval on <insert date>. Knox County and its villages adopted the plan as recorded in Table 4-1 Jurisdictional Approval below.

4.2 LOCAL ADOPTION

The local plan adoption process began upon submission of the plan for review from FEMA. Sample legislation was provided to each jurisdiction to assist in this process. A complete list of plan adoptions by jurisdiction is provided in table 4-1. Adoption resolutions were emailed to the Ohio EMA as received.

Table 4-1: Jurisdiction Adoption

Jurisdiction	Date of Adoption
Knox County	
City of Mount Vernon	
Village of Brinkhaven	
Village of Centerburg	
Village of Danville	
Village of Fredericktown	
Village of Gambier	
Village of Martinsburg	

4.3 PLAN EXPIRATION

The Knox County Hazard Mitigation Plan was assigned an expiration date of <insert date>. The process to maintain the plan will be ongoing throughout the five-year period, as explained in section 1.0 The Planning Process.

National Risk Index

August 26, 2025

Knox County, Ohio

Summary

Risk Index is **Very Low** Score **40.9**



Expected Annual Loss is **Very Low** Score **44.2**



Social Vulnerability is **Relatively Low** Score **24.6**



Community Resilience is **Very High** Score **82.3**

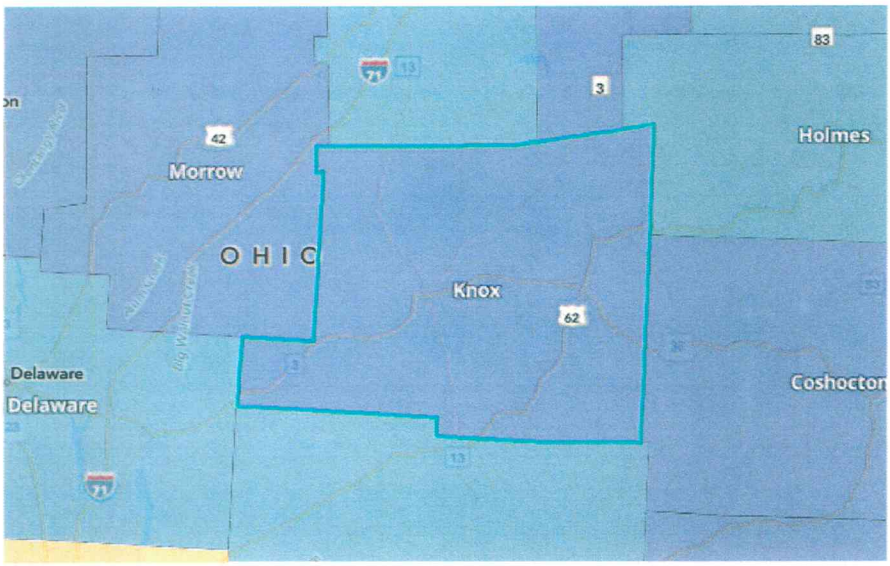


While reviewing this report, keep in mind that low risk is driven by lower loss due to natural hazards, lower social vulnerability, and higher community resilience.

For more information about the National Risk Index, its data, and how to interpret the information it provides, please review the **About the National Risk Index** and **How to Take Action** sections at the end of this report. Or, visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

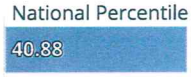
Risk Index

The Risk Index rating is **Very Low** for **Knox County, OH** when compared to the rest of the U.S.

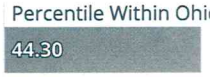


Score **40.88**

National Percentile



Percentile Within Ohio





41% of U.S. counties have a lower Risk Index

44% of counties in Ohio have a lower Risk Index

Risk Index Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

No Rating | Not Applicable | Insufficient Data

Hazard Type Risk Index

Hazard type Risk Index scores are calculated using data for only a single hazard type, and reflect a community's Expected Annual Loss value, community risk factors, and the adjustment factor used to calculate the risk value.

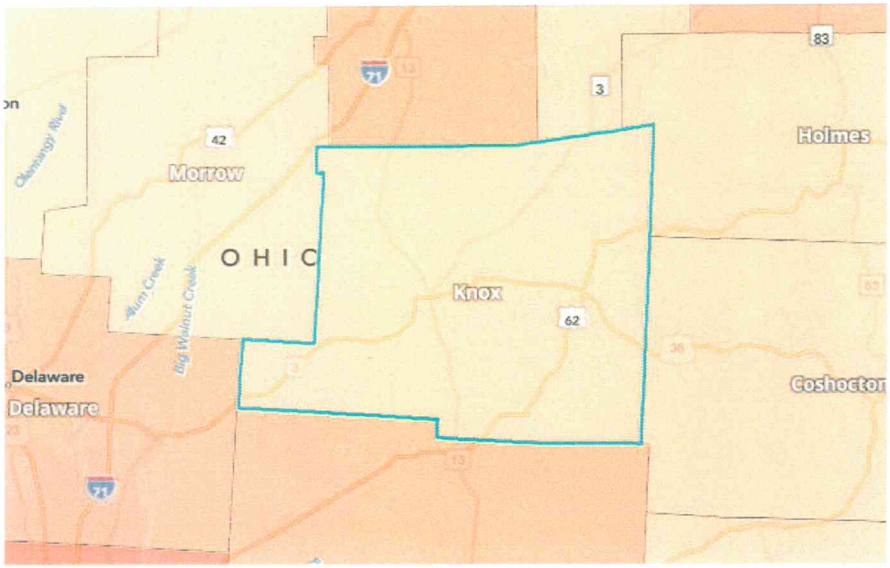
Hazard Type	Risk Index Rating	Risk Index Score	National Percentile
Avalanche	Not Applicable	--	
Coastal Flooding	Not Applicable	--	
Cold Wave	Relatively Low	34.6	0 100
Drought	No Rating	0	0 100
Earthquake	Very Low	47.8	0 100
Hail	Relatively Low	46.1	0 100
Heat Wave	Relatively Low	41.6	0 100
Hurricane	Very Low	38.1	0 100
Ice Storm	Relatively Moderate	82.2	0 100
Landslide	Relatively Low	28.1	0 100
Lightning	Relatively Low	64.3	0 100
Riverine Flooding	Relatively Low	73.6	0 100
Strong Wind	Relatively Low	58.7	0 100
Tornado	Relatively Low	58.8	0 100
Tsunami	Not Applicable	--	
Volcanic Activity	Not Applicable	--	
Wildfire	Very Low	43	0 100
Winter Weather	Relatively High	91.4	0 100

Risk Factor Breakdown

Hazard Type	EAL Value	Social Vulnerability	Community Resilience	CRF	Risk Value	Risk Index Score
Tornado	$1,553,383	Relatively Low	Very High	1.04	$1,586,266	58.8
Riverine Flooding	$1,220,894	Relatively Low	Very High	1.04	$1,354,495	73.6
Strong Wind	$486,871	Relatively Low	Very High	1.04	$498,606	58.7
Winter Weather	$471,281	Relatively Low	Very High	1.04	$481,931	91.4
Ice Storm	$325,563	Relatively Low	Very High	1.04	$329,513	82.2
Lightning	$161,036	Relatively Low	Very High	1.04	$164,905	64.3
Earthquake	$133,157	Relatively Low	Very High	1.04	$136,152	47.8
Hail	$88,990	Relatively Low	Very High	1.04	$90,909	46.1
Hurricane	$76,041	Relatively Low	Very High	1.04	$77,311	38.1
Heat Wave	$51,094	Relatively Low	Very High	1.04	$51,947	41.6
Wildfire	$26,907	Relatively Low	Very High	1.04	$26,931	43
Landslide	$21,900	Relatively Low	Very High	1.04	$22,359	28.1
Cold Wave	$12,281	Relatively Low	Very High	1.04	$12,501	34.6
Drought	$0	Relatively Low	Very High	1.04	$0	0
Avalanche	--	Relatively Low	Very High	1.04	--	--
Coastal Flooding	--	Relatively Low	Very High	1.04	--	--
Tsunami	--	Relatively Low	Very High	1.04	--	--
Volcanic Activity	--	Relatively Low	Very High	1.04	--	--

Expected Annual Loss

In **Knox County, OH**, expected loss each year due to natural hazards is **Very Low** when compared to the rest of the U.S.



Score **44.17**

National Percentile
44.17

Percentile Within Ohio
43.20

0 100

44% of U.S. counties have a lower Expected Annual Loss

43% of counties in Ohio have a lower Expected Annual Loss

Expected Annual Loss Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | No Expected Annual Losses | Not Applicable | Insufficient Data

Composite Expected Annual Loss	**$4,629,398.88**
Composite Expected Annual Loss Rate National Percentile	**7.6**

Building EAL	**$3,461,721.90**	Population EAL	**0.09** fatalities
Building EAL Rate	**$1 per $4.12K of building value**	Population EAL Rate	**1 per 680.10K people**
Agriculture EAL	**$98,403.60**	Population Equivalence EAL	**$1,069,273.38**
Agriculture EAL Rate	**$1 per $1.58K of agriculture value**		

Expected Annual Loss for Hazard Types

Expected Annual Loss scores for hazard types are calculated using data for only a single hazard type, and reflect a community's relative expected annual loss for only that hazard type.

14 of 18 hazard types contribute to the expected annual loss for **Knox County, OH**.

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Tornado	Relatively Low	$1,553,383	64.4
Riverine Flooding	Relatively Moderate	$1,220,894	74.7

Hazard Type	Expected Annual Loss Rating	EAL Value	Score
Strong Wind	Relatively Moderate	$486,871	64.3
Winter Weather	Relatively High	$471,281	92.2
Ice Storm	Relatively Moderate	$325,563	83.5
Lightning	Relatively Moderate	$161,036	68.3
Earthquake	Very Low	$133,157	50.0
Hail	Relatively Low	$88,990	50.7
Hurricane	Very Low	$76,041	38.9
Heat Wave	Relatively Low	$51,094	46.3
Wildfire	Very Low	$26,907	44.3
Landslide	Relatively Low	$21,900	49.2
Cold Wave	Relatively Low	$12,281	36.9
Drought	No Expected Annual Losses	$0	0.0
Avalanche	Not Applicable	--	--
Coastal Flooding	Not Applicable	--	--
Tsunami	Not Applicable	--	--
Volcanic Activity	Not Applicable	--	--

Expected Annual Loss Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	--	--	--	--	--
Cold Wave	$12,281	$3,291	$8,250	0.00	$740
Drought	$0	n/a	n/a	n/a	$0
Earthquake	$133,157	$102,835	$30,323	0.00	n/a
Hail	$88,990	$72,260	$3,307	0.00	$13,423
Heat Wave	$51,094	$171	$47,742	0.00	$3,180
Hurricane	$76,041	$63,232	$542	0.00	$12,267
Ice Storm	$325,563	$325,413	$149	0.00	n/a
Landslide	$21,900	$4,500	$17,400	0.00	n/a
Lightning	$161,036	$13,348	$147,689	0.01	n/a
Riverine Flooding	$1,220,894	$895,678	$265,101	0.02	$60,115

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Strong Wind	$486,871	$350,437	$129,368	0.01	$7,066
Tornado	$1,553,383	$1,190,823	$361,368	0.03	$1,192
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	$26,907	$24,876	$2,022	0.00	$8
Winter Weather	$471,281	$414,859	$56,011	0.00	$411

Exposure Values

Hazard Type	Total	Building Value	Population Equivalence	Population	Agriculture Value
Avalanche	--	--	--	--	--
Coastal Flooding	--	--	--	--	--
Cold Wave	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155
Drought	$0	n/a	n/a	n/a	$0
Earthquake	$741,826,398,000	$14,262,798,000	$727,563,600,000	62,721.00	n/a
Hail	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155
Heat Wave	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155
Hurricane	$739,213,534,174	$14,227,149,145	$724,833,428,182	62,485.64	$152,956,847
Ice Storm	$737,645,148,923	$14,157,532,885	$723,487,616,038	62,369.62	n/a
Landslide	$242,951,152,745	$4,303,806,392	$238,647,346,353	20,573.05	n/a
Lightning	$741,478,573,508	$14,262,973,508	$727,215,600,000	62,691.00	n/a
Riverine Flooding	$29,599,407,147	$589,675,526	$29,004,263,250	2,500.37	$5,468,371
Strong Wind	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155
Tornado	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155
Tsunami	--	--	--	--	--
Volcanic Activity	--	--	--	--	--
Wildfire	$340,856,809,742	$6,218,127,420	$334,577,962,042	28,842.93	$60,720,281
Winter Weather	$741,633,586,663	$14,262,973,508	$727,215,600,000	62,691.00	$155,013,155

Annualized Frequency Values

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Avalanche	--	--	--

Hazard Type	Annualized Frequency	Events on Record	Period of Record
Coastal Flooding	--	--	--
Cold Wave	0.7 events per year	12	2005-2021 (16 years)
Drought	0 events per year	0	2000-2021 (22 years)
Earthquake	0.019% chance per year	n/a	2021 dataset
Hail	4 events per year	138	1986-2021 (34 years)
Heat Wave	0.4 events per year	6	2005-2021 (16 years)
Hurricane	0 events per year	1	East 1851-2021 (171 years) / West 1949-2021 (73 years)
Ice Storm	0.4 events per year	25	1946-2014 (67 years)
Landslide	0 events per year	0	2010-2021 (12 years)
Lightning	61.9 events per year	1,363	1991-2012 (22 years)
Riverine Flooding	1 event per year	24	1996-2019 (24 years)
Strong Wind	1.9 events per year	66	1986-2021 (34 years)
Tornado	0.2 events per year	10	1950-2021 (72 years)
Tsunami	--	--	--
Volcanic Activity	--	--	--
Wildfire	0.001% chance per year	n/a	2021 dataset
Winter Weather	2.3 events per year	37	2005-2021 (16 years)

Historic Loss Ratios

Hazard Type	Overall Rating
Avalanche	--
Coastal Flooding	--
Cold Wave	Very Low
Drought	No Rating
Earthquake	Relatively Moderate
Hail	Very Low
Heat Wave	Very Low
Hurricane	Relatively Low
Ice Storm	Relatively Moderate
Landslide	Very Low
Lightning	Relatively Low

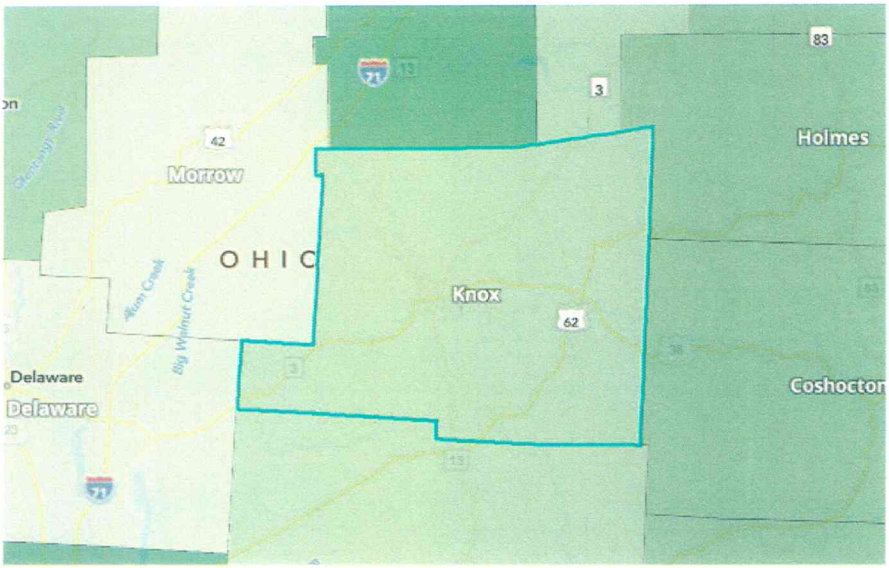
Hazard Type	Overall Rating
Riverine Flooding	Very Low
Strong Wind	Relatively Low
Tornado	Relatively Low
Tsunami	--
Volcanic Activity	--
Wildfire	Relatively Low
Winter Weather	Relatively Moderate

Expected Annual Loss Rate

Hazard Type	Building EAL Rate (per building value)	Population EAL Rate (per population)	Agriculture EAL Rate (per agriculture value)
Avalanche	--	--	--
Coastal Flooding	--	--	--
Cold Wave	$1 per $4.33M	1 per 88.15M	$1 per $209.39K
Drought	--	--	--
Earthquake	$1 per $138.70K	1 per 23.98M	--
Hail	$1 per $197.39K	1 per 219.89M	$1 per $11.55K
Heat Wave	$1 per $83.23M	1 per 15.23M	$1 per $48.74K
Hurricane	$1 per $225.57K	1 per 1.34B	$1 per $12.64K
Ice Storm	$1 per $43.83K	1 per 4.87B	--
Landslide	$1 per $3.17M	1 per 41.79M	--
Lightning	$1 per $1.07M	1 per 4.92M	--
Riverine Flooding	$1 per $15.92K	1 per 2.74M	$1 per $2.58K
Strong Wind	$1 per $40.70K	1 per 5.62M	$1 per $21.94K
Tornado	$1 per $11.98K	1 per 2.01M	$1 per $130.01K
Tsunami	--	--	--
Volcanic Activity	--	--	--
Wildfire	$1 per $573.36K	1 per 359.57M	$1 per $18.80M
Winter Weather	$1 per $34.38K	1 per 12.98M	$1 per $377.11K

Social Vulnerability

Social groups in **Knox County, OH** have a **Relatively Low** susceptibility to the adverse impacts of natural hazards when compared to the rest of the U.S.



Score 24.63

National Percentile
24.63

Percentile Within Ohio
38.60

0 100

25% of U.S. counties have a lower Social Vulnerability

39% of counties in Ohio have a lower Social Vulnerability

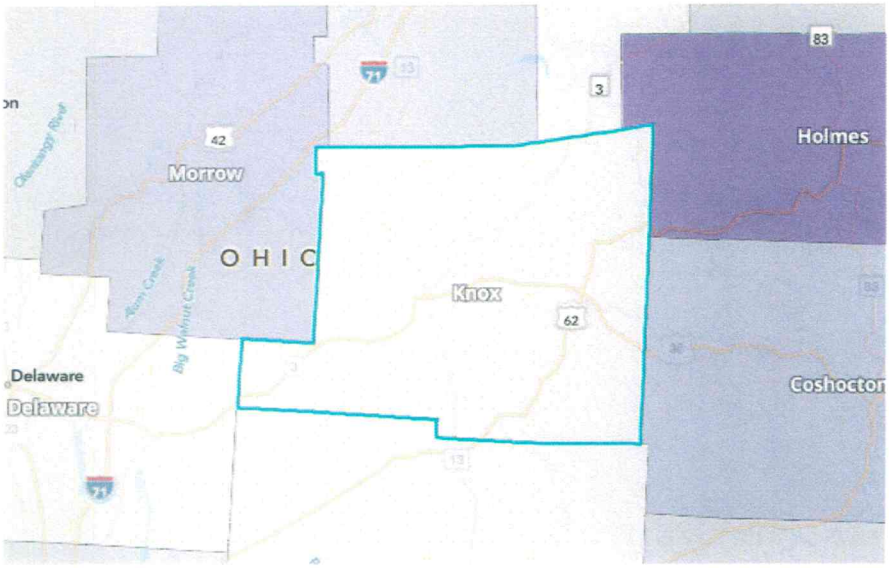
Social Vulnerability Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low

Data Unavailable

Community Resilience

Communities in **Knox County, OH** have a **Very High** ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the U.S.



Score **82.34**

National Percentile

82.34

Percentile Within Ohio

58.00

0 100

18% of U.S. counties have a higher Community Resilience

42% of counties in Ohio have a higher Community Resilience

Community Resilience Legend

Very High | Relatively High | Relatively Moderate | Relatively Low | Very Low | Data Unavailable

About the National Risk Index

The National Risk Index is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and Census tract. These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Explore the National Risk Index Map at **hazards.fema.gov/nri/map**.

Visit the National Risk Index website at hazards.fema.gov/nri/learn-more to access supporting documentation and links.

Calculating the Risk Index

Risk Index values are calculated using an equation* that combines values for Expected Annual Loss (EAL) due to natural hazards, with the Community Risk Factor (CRF), which is a function of Social Vulnerability and Community Resilience:

$$\text{Risk Index} = \text{Expected Annual Loss} \times \text{Community Risk Factor}$$

$$\text{where Community Risk Factor} = f\left(\frac{\text{Social Vulnerability}}{\text{Community Resilience}}\right)$$

*County-level risk values are derived by summing the risk values of all Census tracts within that county.

Risk is presented as a composite value and score for all 18 hazard types, as well as individual values and scores for each hazard type.

For more information, visit hazards.fema.gov/nri/determining-risk.

Calculating Expected Annual Loss

Expected Annual Loss values are calculated using an equation* that combines values for exposure, annualized frequency, and historic loss ratios for 18 hazard types:

$$\text{Expected Annual Loss} = \text{Exposure} \times \text{Annualized Frequency} \times \text{Historic Loss Ratio}$$

*Excluding Avalanche, Drought, Earthquake, and Tornado, EAL values for each hazard are calculated at the Census block level and summed together to determine Census tract and county-level hazard type EAL values.

Expected Annual Loss is presented as a composite value and score for all 18 hazard types, as well as individual values and scores for each hazard type.

For more information, visit hazards.fema.gov/nri/expected-annual-loss.

Calculating Social Vulnerability

Social Vulnerability is measured using the Social Vulnerability Index (SVI) published by the Centers for Disease Control and Prevention (CDC).

For more information, visit hazards.fema.gov/nri/social-vulnerability.

Calculating Community Resilience

Community Resilience is measured at the County level using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI).

For more information, visit **hazards.fema.gov/nri/community-resilience**.

Values, Scores, and Ratings

The National Risk Index provides three different types of results for Risk and each component used to derive Risk: EAL, Social Vulnerability, and Community Resilience:

Values. Values for Risk and EAL are in units of dollars, representing the community's average economic loss from natural hazards each year. For Social Vulnerability and Community Resilience, values are the index values for the community provided by the source data sets.

Scores. Scores represent the national percentile ranking of the community's component value compared to all other communities at the same level (county or Census tract).

Ratings. Ratings refer to the qualitative terms that describe the relative risk of an area within the same geographic level. These rating categories range from "Very Low" to "Very High". Ratings for Social Vulnerability and Community Resilience are based on quintiles of those components' scores, while Risk and EAL ratings are based on more advanced statistical calculations on values . As a result, there is no fixed range of scores or values that correspond to the rating categories.

How to Take Action

There are many ways to reduce natural hazard risk through mitigation. Communities with high National Risk Index scores can take action to reduce risk by decreasing Expected Annual Loss due to natural hazards, decreasing Social Vulnerability, and increasing Community Resilience.

For information about how to take action and reduce your risk, visit **hazards.fema.gov/nri/take-action**.

Disclaimer

The National Risk Index (the Risk Index or the Index) and its associated data are meant for planning purposes only. This tool was created for broad nationwide comparisons and is not a substitute for localized risk assessment analysis. Nationwide datasets used as inputs for the National Risk Index are, in many cases, not as accurate as available local data. Users with access to local data for each National Risk Index risk factor should consider substituting the Risk Index data with local data to recalculate a more accurate risk index. If you decide to download the National Risk Index data and substitute it with local data, you assume responsibility for the accuracy of the data and any resulting data index. Please visit the Contact Us page if you would like to discuss this process further.

The methodology used by the National Risk Index has been reviewed by subject matter experts in the fields of natural hazard risk research, risk analysis, mitigation planning, and emergency management. The processing methods used to create the National Risk Index have produced results similar to those from other natural hazard risk analyses conducted on a smaller scale. The breadth and combination of geographic information systems (GIS) and data processing techniques leveraged by the National Risk Index enable it to incorporate multiple hazard types and risk factors, manage its nationwide scope, and capture what might have been missed using other methods.

The National Risk Index does not consider the intricate economic and physical interdependencies that exist across geographic regions. Keep in mind that hazard impacts in surrounding counties or Census tracts can cause indirect losses in your community regardless of your community's risk profile.

Nationwide data available for some risk factors are rudimentary at this time. The risk profiles for the vast majority of hazard types are based on historical frequency and loss data. They represent risk and expected annual loss based on average past conditions, not future predictions. The National Risk Index will be continuously updated as new data become available and improved methodologies are identified.

For comprehensive details about how the Risk Index can help you and its limitations, see the National Risk Index Technical Documentation

Assumption of Risk

In view of the identified limitations of the National Risk Index associated data, by using the data, you acknowledge and agree that FEMA makes no representations or warranties about the accuracy, completeness, or fitness for any particular purpose of the data; that the data is provided "as is" without warranty of any kind; that you assume full responsibility for any consequences that may arise, including financial losses, legal disputes, or other adverse outcomes; and that you release FEMA and the federal government from any liability that may arise to the extent allowable by law.

Attribution, No Endorsement

Please attribute your use of the National Risk Index and its associated data to the Federal Emergency Management Agency.

However, you acknowledge and agree that nothing herein constitutes and endorsement of you or your work by FEMA or the federal government, and you shall not imply through use of the National Risk Index or its associated data or through providing attribution, that FEMA or the federal government endorses you.

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Zuzak, C., E. Goodenough, C. Stanton, M. Mowrer, A. Sheehan, B. Roberts, P. McGuire, and J. Rozelle. 2023. National Risk Index Technical Documentation. Federal Emergency Management Agency, Washington, DC.

The National Risk Index Contact Us page is available at **hazards.fema.gov/nri/contact-us**.

KNOX COUNTY COLDWAVE EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083007400	$1,417,240,828	5,700	$37,361,775	$327	$750	$178	$1,256
39083006900	$1,427,742,199	6,260	$15,047,735	$329	$824	$72	$1,225
39083006700	$1,427,881,820	5,209	$23,660,557	$329	$685	$113	$1,128
39083006802	$1,116,171,611	5,044	$27,974,937	$258	$664	$134	$1,055
39083007600	$1,587,648,578	4,775	$4,206,475	$366	$628	$20	$1,015
39083006801	$1,040,364,166	5,737	$1,789,365	$240	$755	$9	$1,004
39083007200	$815,109,201	5,323	$1,228,697	$188	$700	$6	$894
39083007500	$1,019,885,157	4,331	$1,742,763	$235	$570	$8	$814
39083007702	$779,983,461	3,395	$15,614,437	$180	$447	$75	$701
39083007000	$821,320,163	3,170	$15,807,622	$189	$417	$75	$682
39083007302	$942,544,246	3,407	$769,474	$217	$448	$4	$669
39083007100	$638,560,105	3,618	$374,955	$147	$476	$2	$625
39083007701	$653,333,273	3,283	$5,884,398	$151	$432	$28	$611
39083007301	$575,188,700	3,439	$3,549,965	$133	$453	$17	$602
Grand Total	**$14,262,973,508**	**62,691**	**$155,013,155**	**$3,291**	**$8,250**	**$740**	**$12,281**

KNOX COUNTY EARTHQUAKE EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Total)
39083007600	$1,587,633,000	4,775	$14,931	$2,629	$17,560
39083007400	$1,417,226,000	5,709	$10,426	$4,674	$15,100
39083006900	$1,427,727,000	6,260	$8,996	$2,373	$11,369
39083006700	$1,427,868,000	5,209	$9,016	$2,130	$11,145
39083007702	$779,975,000	3,395	$7,915	$2,713	$10,628
39083007000	$821,308,000	3,170	$7,736	$2,457	$10,193
39083007701	$653,322,000	3,283	$7,442	$2,320	$9,762
39083007500	$1,019,872,000	4,331	$7,367	$2,180	$9,547
39083007100	$638,546,000	3,618	$6,765	$1,854	$8,618
39083006802	$1,116,165,000	5,051	$5,864	$2,121	$7,984
39083007200	$815,097,000	5,329	$5,493	$1,787	$7,280
39083007302	$942,531,000	3,407	$4,853	$960	$5,813
39083007301	$575,174,000	3,447	$3,273	$1,403	$4,676
39083006801	$1,040,354,000	5,737	$2,759	$722	$3,481
Grand Total	**$14,262,798,000**	**62,721**	**$102,835**	**$30,323**	**$133,157**

KNOX COUNTY HAIL EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083006700	$ 1,427,881,820	5,209	$ 23,660,557	$ 7,721	$ 290	$ 2,285	$ 10,296
39083007400	$ 1,417,240,828	5,700	$ 37,361,775	$ 6,024	$ 250	$ 2,832	$ 9,106
39083006802	$ 1,116,171,611	5,044	$ 27,974,937	$ 6,060	$ 283	$ 2,710	$ 9,052
39083006900	$ 1,427,742,199	6,260	$ 15,047,735	$ 7,321	$ 335	$ 1,359	$ 9,015
39083007600	$ 1,587,648,578	4,775	$ 4,206,475	$ 7,768	$ 251	$ 323	$ 8,341
39083006801	$ 1,040,364,166	5,737	$ 1,789,365	$ 5,648	$ 322	$ 173	$ 6,143
39083007500	$ 1,019,885,157	4,331	$ 1,742,763	$ 5,486	$ 240	$ 158	$ 5,884
39083007000	$ 821,320,163	3,170	$ 15,807,622	$ 4,038	$ 160	$ 1,386	$ 5,583
39083007302	$ 942,544,246	3,407	$ 769,474	$ 5,117	$ 191	$ 75	$ 5,383
39083007200	$ 815,109,201	5,323	$ 1,228,697	$ 4,425	$ 298	$ 119	$ 4,843
39083007702	$ 779,983,461	3,395	$ 15,614,437	$ 3,301	$ 148	$ 1,179	$ 4,628
39083007100	$ 638,560,105	3,618	$ 374,955	$ 3,467	$ 203	$ 36	$ 3,706
39083007301	$ 575,188,700	3,439	$ 3,549,965	$ 3,123	$ 193	$ 344	$ 3,659
39083007701	$ 653,333,273	3,283	$ 5,884,398	$ 2,763	$ 143	$ 444	$ 3,350
Grand Total	**$ 14,262,973,508**	**62,691**	**$ 155,013,155**	**$ 72,260**	**$ 3,307**	**$ 13,423**	**$ 88,990**

KNOX COUNTY HEATWAVE EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083007400	$1,417,240,828	5,700	$37,361,775	$17	$4,341	$766	$5,124
39083006900	$1,427,742,199	6,260	$15,047,735	$17	$4,767	$309	$5,093
39083006700	$1,427,881,820	5,209	$23,660,557	$17	$3,967	$485	$4,469
39083006802	$1,116,171,611	5,044	$27,974,937	$13	$3,841	$574	$4,429
39083006801	$1,040,364,166	5,737	$1,789,365	$13	$4,369	$37	$4,418
39083007200	$815,109,201	5,323	$1,228,697	$10	$4,054	$25	$4,089
39083007600	$1,587,648,578	4,775	$4,206,475	$19	$3,636	$86	$3,742
39083007500	$1,019,885,157	4,331	$1,742,763	$12	$3,298	$36	$3,346
39083007702	$779,983,461	3,395	$15,614,437	$9	$2,585	$320	$2,915
39083007100	$638,560,105	3,618	$374,955	$8	$2,755	$8	$2,771
39083007000	$821,320,163	3,170	$15,807,622	$10	$2,414	$324	$2,748
39083007301	$575,188,700	3,439	$3,549,965	$7	$2,619	$73	$2,699
39083007701	$653,333,273	3,283	$5,884,398	$8	$2,500	$121	$2,629
39083007302	$942,544,246	3,407	$769,474	$11	$2,595	$16	$2,622
Grand Total	**$14,262,973,508**	**62,691**	**$155,013,155**	**$171**	**$47,742**	**$3,180**	**$51,094**

KNOX COUNTY ICE STORM EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Total)
39083007400	$1,417,240,828	5,700	$36,413	$15	$36,429
39083007600	$1,573,195,982	4,755	$36,412	$11	$36,423
39083006700	$1,416,130,262	5,161	$29,839	$11	$29,851
39083006900	$1,368,214,369	6,082	$26,012	$12	$26,024
39083007702	$779,983,461	3,395	$25,305	$12	$25,317
39083007701	$653,333,273	3,283	$24,303	$13	$24,315
39083006802	$1,097,698,678	4,971	$23,034	$11	$23,044
39083006801	$1,040,364,166	5,737	$21,831	$13	$21,843
39083007500	$1,018,649,452	4,329	$21,580	$10	$21,589
39083007302	$942,544,246	3,407	$19,778	$7	$19,785
39083007000	$821,320,163	3,170	$18,334	$8	$18,342
39083007200	$815,109,201	5,323	$17,104	$12	$17,115
39083007100	$638,560,105	3,618	$13,399	$8	$13,407
39083007301	$575,188,700	3,439	$12,069	$8	$12,077
Grand Total	**$14,157,532,885**	**62,370**	**$325,413**	**$149**	**$325,563**

KNOX COUNTY LANDSLIDE EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Total)
39083006802	$704,604,368	3,142	$737	$2,657	$3,394
39083006801	$531,051,967	2,814	$555	$2,380	$2,935
39083006700	$656,775,250	2,510	$687	$2,123	$2,810
39083007400	$628,953,583	2,431	$658	$2,056	$2,713
39083007200	$336,023,760	2,476	$351	$2,094	$2,446
39083006900	$375,463,259	2,021	$393	$1,710	$2,102
39083007301	$370,688,706	1,972	$388	$1,668	$2,055
39083007100	$122,168,643	925	$128	$783	$910
39083007500	$153,368,129	703	$160	$594	$755
39083007000	$105,134,319	470	$110	$398	$508
39083007702	$89,095,056	392	$93	$331	$425
39083007302	$139,705,296	257	$146	$218	$364
39083007600	$64,947,828	249	$68	$210	$278
39083007701	$25,826,228	210	$27	$178	$205
Grand Total	**$4,303,806,392**	**20,573**	**$4,500**	**$17,400**	**$21,900**

KNOX COUNTY LIGHTNING EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Total)
39083006900	$1,427,742,199	6,260	$1,356	$14,977	$16,333
39083006801	$1,040,364,166	5,737	$959	$13,317	$14,276
39083007200	$815,109,201	5,323	$809	$13,336	$14,145
39083007400	$1,417,240,828	5,700	$1,234	$12,489	$13,724
39083006700	$1,427,881,820	5,209	$1,321	$12,133	$13,454
39083007600	$1,587,648,578	4,775	$1,544	$11,688	$13,231
39083006802	$1,116,171,611	5,044	$1,007	$11,455	$12,461
39083007500	$1,019,885,157	4,331	$1,005	$10,779	$11,784
39083007100	$638,560,105	3,618	$619	$8,828	$9,447
39083007302	$942,544,246	3,407	$932	$8,507	$9,439
39083007701	$653,333,273	3,283	$602	$7,618	$8,220
39083007000	$821,320,163	3,170	$766	$7,443	$8,209
39083007301	$575,188,700	3,439	$516	$7,684	$8,200
39083007702	$779,983,461	3,395	$679	$7,434	$8,114
Grand Total	**$14,262,973,508**	**62,691**	**$13,348**	**$147,689**	**$161,036**

KNOX COUNTY RIVERINE FLOODING EAL

Census Tract	Exposure (Sq. Mi)	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083007600	0.4163	$190,053,397	910	$192,562	$288,679	$96,517	$2,117	$387,312
39083007500	0.5556	$129,171,337	268	$276,369	$196,203	$28,373	$3,038	$227,614
39083007100	0.2305	$94,432,928	686	$108,830	$143,437	$72,732	$1,196	$217,366
39083006700	3.8082	$57,328,644	121	$1,753,126	$87,078	$12,839	$19,273	$119,190
39083007702	0.4791	$21,608,146	93	$254,684	$32,821	$9,834	$2,800	$45,455
39083006802	1.0798	$20,003,849	66	$549,980	$30,385	$6,978	$6,046	$43,409
39083007000	2.2150	$15,341,541	58	$989,039	$23,303	$6,141	$10,873	$40,317
39083006900	0.5230	$18,452,787	67	$263,972	$28,029	$7,086	$2,902	$38,017
39083007302	0.0184	$10,060,067	74	$9,381	$15,281	$7,884	$103	$23,268
39083007400	1.1424	$8,028,031	41	$554,144	$12,194	$4,386	$6,092	$22,672
39083006801	0.0722	$8,187,130	25	$30,625	$12,436	$2,680	$337	$15,453
39083007301	0.7790	$5,577,517	26	$359,078	$8,472	$2,783	$3,947	$15,203
39083007701	0.2815	$6,287,274	25	$121,559	$9,550	$2,611	$1,336	$13,497
39083007200	0.0091	$5,142,878	40	$5,020	$7,812	$4,256	$55	$12,123
Grand Total	**11.6102**	**$589,675,526**	**2,500**	**$5,468,371**	**$895,678**	**$265,101**	**$60,115**	**$1,220,894**

KNOX COUNTY STRONG WINDS EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083006900	$ 1,427,742,199	6,260	$ 15,047,735	$ 37,093	$ 13,553	$ 752	$ 51,398
39083006700	$ 1,427,881,820	5,209	$ 23,660,557	$ 36,850	$ 11,189	$ 1,174	$ 49,214
39083007600	$ 1,587,648,578	4,775	$ 4,206,475	$ 37,131	$ 9,662	$ 167	$ 46,960
39083006802	$ 1,116,171,611	5,044	$ 27,974,937	$ 28,920	$ 10,896	$ 1,393	$ 41,209
39083007400	$ 1,417,240,828	5,700	$ 37,361,775	$ 28,867	$ 9,672	$ 1,462	$ 40,000
39083006801	$ 1,040,364,166	5,737	$ 1,789,365	$ 26,956	$ 12,393	$ 89	$ 39,438
39083007500	$ 1,019,885,157	4,331	$ 1,742,763	$ 26,184	$ 9,268	$ 81	$ 35,533
39083007200	$ 815,109,201	5,323	$ 1,228,697	$ 21,119	$ 11,499	$ 61	$ 32,680
39083007302	$ 942,544,246	3,407	$ 769,474	$ 24,421	$ 7,360	$ 38	$ 31,820
39083007000	$ 821,320,163	3,170	$ 15,807,622	$ 20,380	$ 6,509	$ 765	$ 27,655
39083007100	$ 638,560,105	3,618	$ 374,955	$ 16,545	$ 7,816	$ 19	$ 24,380
39083007702	$ 779,983,461	3,395	$ 15,614,437	$ 16,643	$ 6,078	$ 640	$ 23,361
39083007301	$ 575,188,700	3,439	$ 3,549,965	$ 14,903	$ 7,429	$ 177	$ 22,509
39083007701	$ 653,333,273	3,283	$ 5,884,398	$ 14,423	$ 6,043	$ 250	$ 20,716
Grand Total	**$ 14,262,973,508**	**62,691**	**$ 155,013,155**	**$ 350,437**	**$ 129,368**	**$ 7,066**	**$ 486,871**

KNOX COUNTY TORNADO EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083006900	$ 1,427,742,199	6,260	$ 15,047,735	$ 125,767	$ 37,604	$ 119	$ 163,490
39083006700	$ 1,427,881,820	5,209	$ 23,660,557	$ 123,007	$ 30,617	$ 228	$ 153,852
39083007600	$ 1,587,648,578	4,775	$ 4,206,475	$ 123,470	$ 26,272	$ 24	$ 149,765
39083006802	$ 1,116,171,611	5,044	$ 27,974,937	$ 96,563	$ 29,833	$ 223	$ 126,619
39083006801	$ 1,040,364,166	5,737	$ 1,789,365	$ 89,988	$ 33,931	$ 13	$ 123,932
39083007400	$ 1,417,240,828	5,700	$ 37,361,775	$ 95,450	$ 25,749	$ 233	$ 121,431
39083007500	$ 1,019,885,157	4,331	$ 1,742,763	$ 87,372	$ 25,347	$ 13	$ 112,732
39083007200	$ 815,109,201	5,323	$ 1,228,697	$ 70,497	$ 31,481	$ 10	$ 101,989
39083007302	$ 942,544,246	3,407	$ 769,474	$ 81,524	$ 20,150	$ 8	$ 101,683
39083007000	$ 821,320,163	3,170	$ 15,807,622	$ 70,516	$ 18,692	$ 136	$ 89,344
39083007702	$ 779,983,461	3,395	$ 15,614,437	$ 62,830	$ 19,300	$ 107	$ 82,236
39083007701	$ 653,333,273	3,283	$ 5,884,398	$ 58,843	$ 20,655	$ 44	$ 79,542
39083007100	$ 638,560,105	3,618	$ 374,955	$ 55,227	$ 21,398	$ 4	$ 76,629
39083007301	$ 575,188,700	3,439	$ 3,549,965	$ 49,769	$ 20,340	$ 31	$ 70,140
Grand Total	**$ 14,262,973,508**	**62,691**	**$ 155,013,155**	**$ 1,190,823**	**$ 361,368**	**$ 1,192**	**$ 1,553,383**

KNOX COUNTY WILDFIRE EAL

Census Tract	Exposure (Sq. Mi)	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop. Equiv)	EAL (Agriculture)	EAL (Total)
39083006700	21.3449	$ 906,305,930	3,170	$ 11,069,893	$ 3,625	$ 222	$ 2	$ 3,849
39083006801	3.0593	$ 624,743,882	3,814	$ 901,822	$ 2,499	$ 267	$ 0	$ 2,766
39083006802	21.8545	$ 610,366,543	2,755	$ 11,788,900	$ 2,445	$ 194	$ 2	$ 2,640
39083006900	9.8159	$ 471,745,488	2,182	$ 4,482,061	$ 1,887	$ 153	$ 1	$ 2,041
39083007000	9.8445	$ 324,750,858	1,414	$ 4,877,854	$ 1,299	$ 99	$ 1	$ 1,399
39083007100	0.4812	$ 108,079,272	851	$ 106,253	$ 432	$ 60	$ 0	$ 492
39083007200	1.4545	$ 242,545,447	1,640	$ 533,729	$ 970	$ 115	$ 0	$ 1,085
39083007301	3.4343	$ 293,100,602	2,448	$ 1,577,598	$ 1,172	$ 172	$ 0	$ 1,344
39083007302	1.2169	$ 414,590,565	1,457	$ 452,855	$ 1,658	$ 102	$ 0	$ 1,761
39083007400	33.2346	$ 876,057,155	3,683	$ 16,713,510	$ 3,504	$ 258	$ 2	$ 3,765
39083007500	2.0410	$ 269,433,501	1,242	$ 965,972	$ 1,078	$ 87	$ 0	$ 1,165
39083007600	3.0432	$ 415,146,908	1,073	$ 1,300,342	$ 1,661	$ 75	$ 0	$ 1,736
39083007701	2.8544	$ 255,214,491	1,197	$ 1,106,037	$ 1,021	$ 84	$ 0	$ 1,105
39083007702	10.8295	$ 406,046,777	1,917	$ 4,843,455	$ 1,624	$ 134	$ 1	$ 1,759
Grand Total	**124.5088**	**$ 6,218,127,420**	**28,843**	**$ 60,720,281**	**$ 24,876**	**$ 2,022**	**$ 8**	**$ 26,907**

KNOX COUNTY WINTER WEATHER EAL

Census Tract	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39083006700	$ 1,427,881,820	5,209	$ 23,660,557	$ 41,532	$ 4,654	$ 63	$ 46,249
39083006801	$ 1,040,364,166	5,737	$ 1,789,365	$ 30,260	$ 5,126	$ 5	$ 35,391
39083006802	$ 1,116,171,611	5,044	$ 27,974,937	$ 32,465	$ 4,507	$ 74	$ 37,046
39083006900	$ 1,427,742,199	6,260	$ 15,047,735	$ 41,528	$ 5,593	$ 40	$ 47,161
39083007000	$ 821,320,163	3,170	$ 15,807,622	$ 23,889	$ 2,832	$ 42	$ 26,763
39083007100	$ 638,560,105	3,618	$ 374,955	$ 18,573	$ 3,233	$ 1	$ 21,807
39083007200	$ 815,109,201	5,323	$ 1,228,697	$ 23,709	$ 4,756	$ 3	$ 28,468
39083007301	$ 575,188,700	3,439	$ 3,549,965	$ 16,730	$ 3,073	$ 9	$ 19,812
39083007302	$ 942,544,246	3,407	$ 769,474	$ 27,415	$ 3,044	$ 2	$ 30,461
39083007400	$ 1,417,240,828	5,700	$ 37,361,775	$ 41,222	$ 5,093	$ 99	$ 46,414
39083007500	$ 1,019,885,157	4,331	$ 1,742,763	$ 29,665	$ 3,870	$ 5	$ 33,539
39083007600	$ 1,587,648,578	4,775	$ 4,206,475	$ 46,179	$ 4,266	$ 11	$ 50,456
39083007701	$ 653,333,273	3,283	$ 5,884,398	$ 19,003	$ 2,933	$ 16	$ 21,952
39083007702	$ 779,983,461	3,395	$ 15,614,437	$ 22,687	$ 3,033	$ 41	$ 25,762
Grand Total	**$ 14,262,973,508**	**62,691**	**$ 155,013,155**	**$ 414,859**	**$ 56,011**	**$ 411**	**$ 471,281**

Storm Events Database

Search Results for Knox County, Ohio

All Available Event Types

Due to changes in the methods used by the NWS to spatially locate Waterspouts, please query by state (FL, TX, VA, etc) for Jan 1996 through Sep 2001. Beginning October 2001, please query by Marine Zone (N. Atlantic, S Atlantic, Gulf of Mexico, S Pacific, N. Pacific, Alaskan Waters, Hawaiian Waters, Great Lakes, etc) using the drop-down box for "State/Area".

Knox county contains the following zones:
Knox

444 events were reported between 01/01/1950 and 05/31/2025 (27545 days)

Summary Info:

Number of County/Zone areas affected:	2
Number of Days with Event:	333
Number of Days with Event and Death:	1
Number of Days with Event and Death or Injury:	9
Number of Days with Event and Property Damage:	234
Number of Days with Event and Crop Damage:	9
Number of Event Types reported:	17

Column Definitions:
'Mag': Magnitude, 'Dth': Deaths, 'Inj': Injuries, 'PrD': Property Damage, 'CrD': Crop Damage

*Click on **Location** below to display details.*
Available Event Types have changed over time. Please refer to the Database Details for more information.

Select: All Hail | All Tornadoes | All Wind Speeds — Sort By: Date/Time (Oldest)

Location	County/Zone	St.	Date	Time	T.Z.	Type	Mag	Dth	Inj	PrD	CrD
Totals:								1	25	791.652M	7.469M
KNOX CO.	KNOX CO.	OH	06/11/1957	15:20	CST	Tornado	F2	0	0	25.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/24/1961	14:23	CST	Hail	0.00 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	05/10/1963	17:25	CST	Hail	1.50 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	08/09/1966	13:00	CST	Hail	1.25 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/10/1968	13:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/22/1968	12:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	04/02/1970	07:35	CST	Tornado	F2	0	1	250.00K	0.00K
KNOX CO.	KNOX CO.	OH	05/13/1970	11:20	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	09/03/1970	19:15	CST	Tornado	F0	0	0	2.50K	0.00K
KNOX CO.	KNOX CO.	OH	04/14/1974	12:20	CST	Hail	1.00 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	04/14/1974	12:20	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	09/18/1977	12:45	CST	Thunderstorm Wind	52 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/05/1980	07:50	CST	Thunderstorm Wind	69 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/21/1980	15:30	CST	Thunderstorm Wind	69 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/08/1981	19:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/08/1981	19:45	CST	Tornado	F2	0	2	250.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/21/1981	12:15	CST	Tornado	F0	0	0	2.50K	0.00K
KNOX CO.	KNOX CO.	OH	03/31/1982	11:50	CST	Tornado	F2	0	4	250.00K	0.00K
KNOX CO.	KNOX CO.	OH	04/03/1982	04:55	CST	Tornado	F2	0	9	250.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/18/1982	16:45	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	04/02/1983	12:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	05/02/1983	14:15	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/21/1983	16:20	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K

KNOX CO.	KNOX CO.	OH	07/07/1985	18:10	CST	Hail	1.75 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/15/1986	17:00	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	05/14/1987	15:18	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	08/05/1988	17:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/08/1990	14:30	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/30/1990	20:55	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/09/1990	17:30	CST	Tornado	F0	0	0	25.00K	0.00K
KNOX CO.	KNOX CO.	OH	08/28/1990	19:35	CST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	07/07/1991	20:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	05/02/1992	15:52	PST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
KNOX CO.	KNOX CO.	OH	11/22/1992	20:45	CST	Hail	0.75 in.	0	0	0.00K	0.00K
Fredericktown	KNOX CO.	OH	08/31/1993	16:30	EST	Thunderstorm Wind	0 kts.	0	0	50.00K	0.00K
Fredericktown	KNOX CO.	OH	09/02/1993	14:30	EST	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
Artanna	KNOX CO.	OH	06/16/1994	13:23	EST	Thunderstorm Wind	0 kts.	0	0	50.00K	0.00K
KNOX CO.	KNOX CO.	OH	06/16/1994	15:07	EST	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
Patton Road	KNOX CO.	OH	06/16/1994	15:37	EST	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
Mt. Vernon	KNOX CO.	OH	06/29/1994	00:59	EST	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
KNOX CO.	KNOX CO.	OH	08/28/1994	16:50	EST	Thunderstorm Wind	0 kts.	0	0	50.00K	0.00K
Danville	KNOX CO.	OH	09/24/1994	21:00	EST	Thunderstorm Wind	0 kts.	0	0	5.00K	0.00K
Countywide	KNOX CO.	OH	04/11/1995	17:45	EST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
Bladensburg	KNOX CO.	OH	04/18/1995	17:55	EST	Hail	0.75 in.	0	0	0.00K	0.00K
Mount Vernon	KNOX CO.	OH	06/07/1995	22:30	EST	Thunderstorm Wind	0 kts.	0	1	700.00K	0.00K
Gambier	KNOX CO.	OH	06/07/1995	22:45	EST	Thunderstorm Wind	0 kts.	0	0	3.00K	0.00K
Centerburg	KNOX CO.	OH	06/14/1995	17:40	EST	Thunderstorm Wind	0 kts.	0	0	0.00K	0.00K
Knox City	KNOX CO.	OH	06/21/1995	15:00	EST	Hail	0.75 in.	0	0	3.00K	0.00K
Mt. Vernon	KNOX CO.	OH	06/21/1995	15:31	EST	Thunderstorm Wind	0 kts.	0	0	0.01K	0.00K
Mount Vernon	KNOX CO.	OH	06/21/1995	17:00	EST	Hail	1.00 in.	0	0	0.00K	0.00K
Countywide	KNOX CO.	OH	07/13/1995	20:30	EDT	Thunderstorm Wind	0 kts.	0	0	20.00K	10.00K
Fredericktown	KNOX CO.	OH	07/15/1995	16:15	EST	Thunderstorm Wind	0 kts.	0	0	2.00K	0.00K
Fredericktown	KNOX CO.	OH	07/16/1995	18:15	EST	Thunderstorm Wind	0 kts.	0	0	2.00K	0.00K
West half	KNOX CO.	OH	08/15/1995	14:56	EST	Thunderstorm Wind	0 kts.	0	0	15.00K	0.00K
Danville	KNOX CO.	OH	08/17/1995	16:00	EST	Thunderstorm Wind	0 kts.	0	0	2.00K	0.00K
Fredericktown	KNOX CO.	OH	09/13/1995	20:25	EST	Thunderstorm Wind	0 kts.	0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/02/1996	09:00	EST	Heavy Snow		0	0	50.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/07/1996	06:00	EST	Heavy Snow		0	0	80.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/02/1996	20:00	EST	Cold/wind Chill		0	0	20.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/19/1996	23:00	EST	Heavy Snow		0	0	0.00K	0.00K
SOUTHERN PORTION	KNOX CO.	OH	04/29/1996	06:15	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
SOUTHERN PORTION	KNOX CO.	OH	04/29/1996	07:00	EST	Flash Flood		0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/11/1996	08:15	EST	Flash Flood		0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/03/1996	16:25	EST	Hail	1.75 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/24/1996	12:30	EST	Thunderstorm Wind	50 kts.	0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	08/01/1996	00:00	EST	Drought		0	0	0.00K	0.00K
HOWARD	KNOX CO.	OH	08/15/1996	16:00	EST	Hail	0.75 in.	0	0	0.00K	0.00K
HOWARD	KNOX CO.	OH	08/15/1996	16:00	EST	Thunderstorm Wind		0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	09/07/1996	04:00	EST	High Wind	50 kts.	0	0	10.00K	10.00K
KNOX (ZONE)	KNOX (ZONE)	OH	09/07/1996	06:00	EST	Heavy Rain		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	10/30/1996	00:10	EST	High Wind	50 kts.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	11/07/1996	17:36	EST	Thunderstorm Wind		0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	12/01/1996	12:00	EST	Thunderstorm Wind	50 kts.	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/10/1997	00:00	EST	Cold/wind Chill		0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/27/1997	00:15	EST	High Wind	50 kts.	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/25/1997	12:42	EST	High Wind	55 kts.	0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/01/1997	00:00	EST	Heavy Rain		0	0	0.00K	34.48K
KNOX (ZONE)	KNOX (ZONE)	OH	05/01/1997	11:00	EST	High Wind		0	0	2.00K	0.00K

MT VERNON	KNOX CO.	OH	05/03/1997	12:00	EST	Thunderstorm Wind		0	0	2.00K	0.00K
MT VERNON	KNOX CO.	OH	05/14/1997	19:45	EST	Hail	0.88 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/18/1997	17:30	EST	Thunderstorm Wind		0	0	2.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/01/1997	09:00	EST	Flash Flood		0	0	40.00K	15.00K
COUNTYWIDE	KNOX CO.	OH	06/01/1997	12:01	EST	Flash Flood		0	0	25.00K	15.00K
HOWARD	KNOX CO.	OH	07/26/1997	19:40	EST	Hail	1.75 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/26/1997	20:15	EST	Thunderstorm Wind		0	0	2.00K	0.00K
MT VERNON	KNOX CO.	OH	07/26/1997	21:15	EST	Flash Flood		0	0	5.00K	0.00K
CENTERBURG	KNOX CO.	OH	07/27/1997	18:34	EST	Thunderstorm Wind		0	0	2.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/28/1997	10:00	EST	Thunderstorm Wind		0	0	5.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	08/16/1997	15:05	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	08/16/1997	20:00	EST	Thunderstorm Wind		0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	01/13/1998	00:00	EST	Winter Weather		0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	03/09/1998	05:30	EST	Thunderstorm Wind		0	0	3.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	04/09/1998	08:30	EST	High Wind		0	0	50.00K	0.00K
GAMBIER	KNOX CO.	OH	05/03/1998	17:33	EST	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	05/19/1998	20:15	EST	Hail	1.00 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/29/1998	17:00	EST	Thunderstorm Wind		0	0	60.00K	0.00K
MT VERNON	KNOX CO.	OH	05/31/1998	16:05	EST	Thunderstorm Wind		0	0	3.00K	0.00K
MARTINSBURG	KNOX CO.	OH	05/31/1998	19:30	EST	Thunderstorm Wind		0	0	2.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/12/1998	20:13	EST	Thunderstorm Wind		0	0	3.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/16/1998	13:55	EST	Thunderstorm Wind		0	0	4.00K	0.00K
MT VERNON	KNOX CO.	OH	06/19/1998	04:20	EST	Thunderstorm Wind		0	0	20.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/26/1998	19:00	EST	Thunderstorm Wind		0	0	4.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/27/1998	00:24	EST	Thunderstorm Wind		0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/27/1998	01:40	EST	Flash Flood		0	0	50.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/27/1998	01:43	EST	Hail	1.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/27/1998	02:06	EST	Hail	0.75 in.	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/27/1998	02:15	EST	Thunderstorm Wind		0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/27/1998	03:41	EST	Flash Flood		0	0	3.000M	1.000M
COUNTYWIDE	KNOX CO.	OH	06/27/1998	15:51	EST	Flash Flood		0	0	3.000M	500.00K
FREDERICKTOWN	KNOX CO.	OH	06/27/1998	15:52	EST	Hail	1.75 in.	0	0	0.00K	0.00K
GAMBIER	KNOX CO.	OH	06/27/1998	18:00	EST	Hail	0.75 in.	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	06/27/1998	18:15	EST	Tornado	F0	0	0	10.00K	0.00K
HOWARD	KNOX CO.	OH	06/27/1998	20:55	EST	Hail	1.75 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/28/1998	18:35	EST	Flash Flood		0	0	150.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/28/1998	19:00	EST	Thunderstorm Wind		0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/19/1998	20:50	EST	Thunderstorm Wind		0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/22/1998	22:00	EST	Thunderstorm Wind		0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	08/24/1998	18:50	EST	Thunderstorm Wind		0	0	20.00K	0.00K
BRANDON	KNOX CO.	OH	08/25/1998	14:45	EST	Thunderstorm Wind		0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	11/10/1998	11:30	EST	High Wind		0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	11/10/1998	16:26	EST	Thunderstorm Wind		0	0	15.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/02/1999	04:00	EST	Winter Storm		0	2	15.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/08/1999	04:00	EST	Winter Storm		0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/13/1999	01:30	EST	Winter Storm		0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/09/1999	00:15	EST	Heavy Snow		0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	04/09/1999	12:01	EST	Thunderstorm Wind		0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	05/06/1999	09:00	EST	High Wind		0	0	10.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	06/01/1999	00:00	EST	Drought		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	06/06/1999	00:00	EST	Heat		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	07/01/1999	00:00	EST	Heat		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	07/01/1999	00:00	EST	Drought		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/01/1999	21:36	EST	Lightning		0	0	150.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/28/1999	10:15	EST	Thunderstorm Wind		0	0	15.00K	0.00K

KNOX (ZONE)	KNOX (ZONE)	OH	08/01/1999	00:00	EST	Drought		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	09/01/1999	00:00	EST	Drought		0	0	0.00K	5.000M
MT VERNON	KNOX CO.	OH	09/29/1999	12:03	EST	Thunderstorm Wind		0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	10/13/1999	15:45	EST	Thunderstorm Wind		0	0	60.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	04/08/2000	01:00	EST	Flash Flood		0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	06/02/2000	12:50	EST	Thunderstorm Wind		0	0	10.00K	0.00K
MT VERNON	KNOX CO.	OH	06/12/2000	20:35	EST	Hail	0.88 in.	0	0	0.00K	0.00K
BRANDON	KNOX CO.	OH	06/12/2000	20:35	EST	Thunderstorm Wind		0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/14/2000	17:38	EST	Thunderstorm Wind		0	0	25.00K	0.00K
CENTERBURG	KNOX CO.	OH	07/14/2000	14:27	EST	Thunderstorm Wind		0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	07/14/2000	18:32	EST	Thunderstorm Wind		0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	07/28/2000	20:36	EST	Hail	0.88 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	08/06/2000	23:00	EST	Thunderstorm Wind		0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	09/20/2000	19:51	EST	Tornado	F1	0	0	150.00K	35.00K
FREDERICKTOWN	KNOX CO.	OH	11/09/2000	19:30	EST	Thunderstorm Wind		0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/11/2000	23:30	EST	High Wind		0	0	100.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/13/2000	14:00	EST	Winter Storm		0	0	125.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/09/2001	20:00	EST	High Wind		0	0	5.00K	0.00K
MARTINSBURG	KNOX CO.	OH	04/09/2001	16:13	EST	Hail	1.00 in.	0	0	10.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	04/12/2001	09:00	EST	High Wind		0	0	25.00K	0.00K
MT VERNON	KNOX CO.	OH	07/01/2001	12:05	EST	Lightning		0	0	10.00K	0.00K
GAMBIER	KNOX CO.	OH	07/01/2001	12:10	EST	Thunderstorm Wind		0	0	10.00K	0.00K
MT VERNON	KNOX CO.	OH	07/09/2001	18:00	EST	Thunderstorm Wind		0	0	10.00K	0.00K
MT VERNON	KNOX CO.	OH	07/19/2001	18:00	EST	Thunderstorm Wind		0	0	25.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	10/16/2001	09:30	EST	High Wind		0	0	10.00K	0.00K
MT VERNON	KNOX CO.	OH	10/24/2001	21:21	EST	Thunderstorm Wind		0	0	15.00K	0.00K
DANVILLE	KNOX CO.	OH	10/24/2001	21:30	EST	Thunderstorm Wind		0	0	100.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	10/25/2001	11:00	EST	High Wind		0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/14/2001	15:00	EST	High Wind		0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/01/2002	10:00	EST	High Wind		0	0	25.00K	0.00K
MT VERNON	KNOX CO.	OH	02/20/2002	15:20	EST	Thunderstorm Wind		0	0	15.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/09/2002	14:30	EST	High Wind		0	0	175.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/24/2002	20:00	EST	Winter Storm		0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/26/2002	01:00	EST	Winter Storm		0	0	300.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	04/19/2002	15:41	EST	Hail	1.00 in.	0	0	20.00K	0.00K
ANKENYTOWN	KNOX CO.	OH	04/19/2002	15:49	EST	Hail	0.75 in.	0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	04/19/2002	16:30	EST	Hail	0.75 in.	0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	04/19/2002	17:00	EST	Flash Flood		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	04/19/2002	17:00	EST	Thunderstorm Wind		0	0	5.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	04/19/2002	18:30	EST	Flash Flood		0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	04/28/2002	12:15	EST	Thunderstorm Wind		0	0	25.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/02/2002	01:00	EST	Thunderstorm Wind		0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	05/12/2002	11:20	EST	Thunderstorm Wind		0	0	20.00K	0.00K
GAMBIER	KNOX CO.	OH	05/30/2002	15:40	EST	Thunderstorm Wind		0	0	7.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	05/31/2002	16:35	EST	Thunderstorm Wind		0	0	175.00K	0.00K
GAMBIER	KNOX CO.	OH	05/31/2002	16:35	EST	Thunderstorm Wind		0	0	50.00K	0.00K
BLADENSBURG	KNOX CO.	OH	05/31/2002	16:50	EST	Hail	1.75 in.	0	0	25.00K	0.00K
MILLWOOD	KNOX CO.	OH	05/31/2002	17:00	EST	Hail	0.75 in.	0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	06/05/2002	15:10	EST	Thunderstorm Wind		0	0	15.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/27/2002	12:10	EST	Thunderstorm Wind		0	0	8.00K	0.00K
BLADENSBURG	KNOX CO.	OH	06/27/2002	12:50	EST	Thunderstorm Wind		0	0	10.00K	0.00K
HOWARD	KNOX CO.	OH	07/29/2002	18:30	EST	Thunderstorm Wind		1	4	50.00K	0.00K
MT VERNON	KNOX CO.	OH	08/23/2002	17:10	EST	Thunderstorm Wind		0	0	25.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	09/03/2002	16:50	EST	Thunderstorm Wind		0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	10/04/2002	18:00	EST	High Wind		0	0	75.00K	0.00K

GAMBIER	KNOX CO.	OH	11/10/2002	18:28	EST	Thunderstorm Wind		0	0	100.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/16/2003	07:00	EST	Heavy Snow		0	0	500.00K	0.00K
MILLWOOD	KNOX CO.	OH	04/04/2003	17:30	EST	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
MARTINSBURG	KNOX CO.	OH	04/20/2003	19:55	EST	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
MARTINSBURG	KNOX CO.	OH	04/20/2003	20:14	EST	Hail	1.00 in.	0	0	5.00K	0.00K
MARTINSBURG	KNOX CO.	OH	04/20/2003	20:14	EST	Hail	1.00 in.	0	0	3.00K	0.00K
DANVILLE	KNOX CO.	OH	05/07/2003	20:55	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	05/11/2003	10:00	EST	Strong Wind	35 kts. EG	0	0	40.00K	0.00K
DANVILLE	KNOX CO.	OH	07/04/2003	15:23	EST	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
MT VERNON	KNOX CO.	OH	07/07/2003	15:00	EST	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	07/08/2003	03:45	EST	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
CENTERBURG	KNOX CO.	OH	07/21/2003	08:30	EST	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/27/2003	15:45	EST	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	08/26/2003	19:05	EST	Thunderstorm Wind	61 kts. EG	0	0	300.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	08/26/2003	19:16	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	08/27/2003	04:05	EST	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K
DANVILLE	KNOX CO.	OH	08/27/2003	14:30	EST	Thunderstorm Wind	50 kts. EG	0	0	7.00K	0.00K
MT VERNON	KNOX CO.	OH	09/27/2003	02:15	EST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
MILLWOOD	KNOX CO.	OH	11/12/2003	19:10	EST	Thunderstorm Wind	50 kts. EG	0	0	100.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	11/12/2003	21:00	EST	High Wind	50 kts. EG	0	0	60.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/25/2004	18:00	EST	Winter Storm		0	0	350.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/05/2004	15:00	EST	Winter Storm		0	0	125.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/05/2004	12:30	EST	High Wind	50 kts. EG	0	0	50.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/16/2004	01:30	EST	Heavy Snow		0	0	250.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	05/07/2004	09:43	EST	Hail	1.00 in.	0	0	2.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/18/2004	11:28	EST	Thunderstorm Wind	50 kts. EG	0	0	100.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/18/2004	15:30	EST	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/21/2004	15:20	EST	Thunderstorm Wind	50 kts. EG	0	0	250.00K	0.00K
MILLWOOD	KNOX CO.	OH	05/21/2004	15:58	EST	Hail	1.00 in.	0	0	2.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	05/21/2004	16:11	EST	Flash Flood		0	0	600.00K	0.00K
GAMBIER	KNOX CO.	OH	05/30/2004	20:15	EST	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
HOWARD	KNOX CO.	OH	06/09/2004	18:04	EST	Hail	0.75 in.	0	0	0.00K	0.00K
GAMBIER	KNOX CO.	OH	06/09/2004	19:10	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/13/2004	22:25	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/14/2004	18:10	EST	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/15/2004	13:15	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
MT VERNON	KNOX CO.	OH	06/15/2004	13:30	EST	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	06/17/2004	18:00	EST	Flood		0	0	0.00K	0.00K
GAMBIER	KNOX CO.	OH	08/19/2004	02:00	EST	Thunderstorm Wind	50 kts. EG	0	0	40.00K	0.00K
GAMBIER	KNOX CO.	OH	08/19/2004	16:15	EST	Thunderstorm Wind	50 kts. EG	0	0	30.00K	0.00K
MT VERNON	KNOX CO.	OH	08/28/2004	16:37	EST	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
CENTERBURG	KNOX CO.	OH	08/28/2004	16:45	EST	Hail	1.75 in.	0	0	50.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	11/27/2004	18:00	EST	Strong Wind	35 kts. EG	0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/07/2004	12:15	EST	High Wind	50 kts. EG	0	0	15.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/22/2004	09:00	EST	Winter Storm		0	0	5.400M	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/01/2005	18:00	EST	Flood		0	0	750.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/05/2005	02:00	EST	Ice Storm		0	0	6.800M	0.00K
COUNTYWIDE	KNOX CO.	OH	05/13/2005	17:40	EST	Thunderstorm Wind	50 kts. EG	0	0	12.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/05/2005	21:00	EST	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/10/2005	15:30	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
NORTH PORTION	KNOX CO.	OH	06/10/2005	16:15	EST	Flash Flood		0	0	250.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	06/30/2005	13:35	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/25/2005	13:50	EST	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	07/26/2005	18:15	EST	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	07/26/2005	19:00	EST	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K

FREDERICKTOWN	KNOX CO.	OH	08/20/2005	15:25	EST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	09/29/2005	02:17	EST	Strong Wind	39 kts. EG	0	0	25.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/17/2006	00:00	EST	High Wind	50 kts. EG	0	0	15.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/10/2006	00:30	EST	Strong Wind	40 kts. EG	0	0	10.00K	0.00K
MT LIBERTY	KNOX CO.	OH	04/14/2006	17:00	EST	Hail	0.88 in.	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	05/25/2006	19:25	EST	Thunderstorm Wind	50 kts. EG	0	0	6.00K	0.00K
MT VERNON	KNOX CO.	OH	05/25/2006	19:55	EST	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
CENTRAL PORTION	KNOX CO.	OH	06/22/2006	15:45	EST	Thunderstorm Wind	50 kts. EG	0	0	175.00K	0.00K
MARTINSBURG	KNOX CO.	OH	07/02/2006	16:55	EST	Hail	0.75 in.	0	0	0.00K	0.00K
NORTHEAST PORTION	KNOX CO.	OH	07/10/2006	15:55	EST	Flash Flood		0	0	3.500M	0.00K
MT VERNON	KNOX CO.	OH	07/10/2006	17:00	EST	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
MT VERNON	KNOX CO.	OH	07/14/2006	20:25	EST	Flash Flood		0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	07/18/2006	16:45	EST	Hail	0.75 in.	0	0	0.00K	0.00K
COUNTYWIDE	KNOX CO.	OH	07/22/2006	03:00	EST	Flash Flood		0	0	200.00K	0.00K
MT VERNON	KNOX CO.	OH	08/03/2006	15:25	EST	Tornado	F0	0	1	325.00K	0.00K
CENTRAL PORTION	KNOX CO.	OH	08/03/2006	15:30	EST	Thunderstorm Wind	50 kts. EG	0	0	120.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/01/2006	11:00	EST-5	High Wind	50 kts. EG	0	0	20.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/13/2007	02:00	EST-5	Winter Storm		0	0	30.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/25/2007	00:00	EST-5	Ice Storm		0	0	20.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/15/2007	03:00	EST-5	Ice Storm		0	0	50.00K	0.00K
CENTERBURG	KNOX CO.	OH	04/11/2007	21:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MILLWOOD	KNOX CO.	OH	05/01/2007	20:06	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/02/2007	14:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
MARTINSBURG	KNOX CO.	OH	06/13/2007	17:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/17/2007	17:09	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
AMITY	KNOX CO.	OH	08/09/2007	15:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
BATEMANTOWN	KNOX CO.	OH	08/21/2007	06:26	EST-5	Flood		0	0	25.00K	0.00K
CENTERBURG	KNOX CO.	OH	09/25/2007	17:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	09/25/2007	18:30	EST-5	Thunderstorm Wind	50 kts. MG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/23/2007	10:15	EST-5	High Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	01/09/2008	01:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K
MT VERNON	KNOX CO.	OH	01/09/2008	01:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/30/2008	01:30	EST-5	High Wind	60 kts. EG	0	0	25.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/04/2008	04:00	EST-5	Winter Storm		0	0	400.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/07/2008	09:00	EST-5	Winter Storm		0	0	750.000M	0.00K
FREDERICKTOWN	KNOX CO.	OH	05/31/2008	03:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	05/31/2008	03:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
MT VERNON	KNOX CO.	OH	06/22/2008	15:08	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
AMITY	KNOX CO.	OH	06/23/2008	12:55	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/23/2008	13:30	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/28/2008	15:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
DANVILLE	KNOX CO.	OH	07/08/2008	17:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
DANVILLE	KNOX CO.	OH	08/01/2008	17:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
MT VERNON	KNOX CO.	OH	08/07/2008	18:59	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	08/07/2008	19:21	EST-5	Hail	0.75 in.	0	0	0.00K	100.00K
KNOX (ZONE)	KNOX (ZONE)	OH	09/14/2008	15:00	EST-5	High Wind	61 kts. EG	0	0	4.000M	750.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/19/2008	01:30	EST-5	Winter Storm		0	0	20.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/15/2009	00:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/27/2009	17:00	EST-5	Winter Storm		0	0	150.00K	0.00K
GAMBIER	KNOX CO.	OH	02/11/2009	17:50	EST-5	Thunderstorm Wind	65 kts. EG	0	0	3.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/11/2009	22:30	EST-5	High Wind	54 kts. MG	0	0	400.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/25/2009	19:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
MT VERNON	KNOX CO.	OH	08/20/2009	16:35	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/09/2009	13:00	EST-5	High Wind	50 kts. EG	0	0	150.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/05/2010	10:00	EST-5	Winter Storm		0	0	200.00K	0.00K

KNOX (ZONE)	KNOX (ZONE)	OH	02/15/2010	11:00	EST-5	Winter Storm		0	0	300.00K	0.00K
LOUDONVILLE	KNOX CO.	OH	04/25/2010	11:20	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	04/25/2010	11:45	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	05/07/2010	21:58	EST-5	Hail	1.25 in.	0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	05/07/2010	21:58	EST-5	Hail	1.25 in.	0	0	5.00K	0.00K
DANVILLE	KNOX CO.	OH	06/02/2010	12:00	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
BRANDON	KNOX CO.	OH	06/03/2010	15:12	EST-5	Thunderstorm Wind	50 kts. EG	0	0	20.00K	0.00K
ANKENYTOWN	KNOX CO.	OH	06/04/2010	17:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
GAMBIER	KNOX CO.	OH	06/05/2010	18:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
JELLOWAY	KNOX CO.	OH	06/27/2010	17:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K
CENTERBURG	KNOX CO.	OH	08/04/2010	13:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	09/07/2010	16:30	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	09/07/2010	16:30	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/01/2011	00:00	EST-5	Winter Storm		0	0	250.00K	0.00K
WATERFORD	KNOX CO.	OH	02/28/2011	02:00	EST-5	Flood		0	0	400.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	03/23/2011	14:05	EST-5	Hail	1.00 in.	0	0	2.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	03/23/2011	14:26	EST-5	Hail	1.25 in.	0	0	5.00K	0.00K
MT VERNON	KNOX CO.	OH	04/20/2011	01:46	EST-5	Hail	1.25 in.	0	0	10.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	04/28/2011	03:30	EST-5	High Wind	50 kts. EG	0	0	40.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/10/2011	20:10	EST-5	Thunderstorm Wind	50 kts. EG	0	0	20.00K	0.00K
BLADENSBURG	KNOX CO.	OH	07/07/2011	15:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/11/2011	12:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/11/2011	12:50	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
DANVILLE	KNOX CO.	OH	07/22/2011	23:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
HOWARD	KNOX CO.	OH	07/29/2011	14:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/24/2012	13:00	EST-5	High Wind	50 kts. EG	0	0	25.00K	0.00K
MT VERNON	KNOX CO.	OH	03/15/2012	03:32	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	03/27/2012	02:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	03/30/2012	18:13	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	03/30/2012	18:13	EST-5	Hail	1.75 in.	0	0	25.00K	0.00K
MARTINSBURG	KNOX CO.	OH	03/30/2012	18:50	EST-5	Hail	1.25 in.	0	0	5.00K	0.00K
MARTINSBURG	KNOX CO.	OH	03/30/2012	18:55	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	05/28/2012	14:55	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
WATERFORD	KNOX CO.	OH	06/29/2012	16:15	EST-5	Thunderstorm Wind	56 kts. EG	0	0	1.400M	0.00K
MT VERNON	KNOX CO.	OH	07/04/2012	21:36	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/04/2012	21:38	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/26/2012	15:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	07/26/2012	15:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
MONROE MILLS	KNOX CO.	OH	08/09/2012	19:58	EST-5	Hail	1.75 in.	0	0	18.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/26/2012	08:00	EST-5	Winter Storm		0	0	75.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	04/10/2013	18:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	05/10/2013	13:10	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
GAMBIER	KNOX CO.	OH	05/10/2013	14:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	10.00K	0.00K
BRANDON	KNOX CO.	OH	06/12/2013	20:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
MT VERNON	KNOX CO.	OH	06/12/2013	20:50	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/12/2013	20:58	EST-5	Hail	1.25 in.	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	06/12/2013	21:55	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MT VERNON	KNOX CO.	OH	06/12/2013	23:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
MARTINSBURG	KNOX CO.	OH	06/13/2013	01:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
ACADEMIA	KNOX CO.	OH	06/25/2013	15:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	1.00K	0.00K
DANVILLE	KNOX CO.	OH	07/08/2013	23:00	EST-5	Flood		0	0	200.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/09/2013	05:00	EST-5	Flood		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/10/2013	15:05	EST-5	Hail	0.75 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/10/2013	15:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	75.00K	0.00K
MT VERNON	KNOX CO.	OH	07/10/2013	15:32	EST-5	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K

DANVILLE	KNOX CO.	OH	07/23/2013	16:40	EST-5	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
MT VERNON	KNOX CO.	OH	10/06/2013	17:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	3.00K	0.00K
CENTERBURG	KNOX CO.	OH	11/01/2013	00:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
MARTINSBURG	KNOX CO.	OH	11/17/2013	20:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	12.00K	0.00K
MT VERNON	KNOX CO.	OH	12/22/2013	00:05	EST-5	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/06/2014	11:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/28/2014	02:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	04/29/2014	19:42	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
HOWARD	KNOX CO.	OH	05/14/2014	13:25	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
GAMBIER	KNOX CO.	OH	05/28/2014	12:15	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
HOWARD	KNOX CO.	OH	05/28/2014	12:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	5.00K	0.00K
DANVILLE	KNOX CO.	OH	05/28/2014	12:45	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	11/24/2014	12:00	EST-5	High Wind	52 kts. EG	0	0	200.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/08/2015	05:00	EST-5	Cold/wind Chill		0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	05/11/2015	16:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	25.00K	0.00K
MT VERNON	KNOX CO.	OH	06/12/2015	14:45	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
MONROE MILLS	KNOX CO.	OH	06/18/2015	16:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	4.00K	0.00K
LOCK	KNOX CO.	OH	07/14/2015	13:16	EST-5	Thunderstorm Wind	50 kts. EG	0	0	50.00K	0.00K
ACADEMIA	KNOX CO.	OH	06/15/2016	18:58	EST-5	Thunderstorm Wind	50 kts. EG	0	0	35.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	09/10/2016	16:18	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
HOWARD	KNOX CO.	OH	06/13/2017	14:30	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
CHESTERVILLE	KNOX CO.	OH	06/13/2017	15:30	EST-5	Flash Flood		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/07/2017	12:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	8.00K	0.00K
GAMBIER	KNOX CO.	OH	07/22/2017	06:00	EST-5	Thunderstorm Wind	50 kts. EG	0	0	125.00K	0.00K
PIPESVILLE	KNOX CO.	OH	07/22/2017	06:20	EST-5	Thunderstorm Wind	50 kts. EG	0	1	75.00K	0.00K
DANVILLE	KNOX CO.	OH	07/22/2017	06:29	EST-5	Thunderstorm Wind	50 kts. EG	0	0	2.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	08/19/2017	13:15	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K
MONROE MILLS	KNOX CO.	OH	08/19/2017	14:07	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
MT LIBERTY	KNOX CO.	OH	11/18/2017	19:30	EST-5	Flood		0	0	50.00K	0.00K
MT VERNON	KNOX CO.	OH	02/15/2018	17:40	EST-5	Flood		0	0	25.00K	0.00K
WATERFORD	KNOX CO.	OH	04/03/2018	16:40	EST-5	Flood		0	0	4.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/19/2019	09:00	EST-5	Winter Storm		0	0	75.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/30/2019	08:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/24/2019	10:00	EST-5	High Wind	50 kts. EG	0	0	50.00K	0.00K
MARTINSBURG	KNOX CO.	OH	04/14/2019	17:58	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
HOWARD	KNOX CO.	OH	04/14/2019	18:03	EST-5	Thunderstorm Wind	52 kts. EG	0	0	5.00K	0.00K
PALMYRA	KNOX CO.	OH	06/02/2019	00:51	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/02/2019	16:10	EST-5	Thunderstorm Wind	61 kts. EG	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	07/02/2019	16:30	EST-5	Thunderstorm Wind	52 kts. EG	0	0	10.00K	0.00K
HUNT	KNOX CO.	OH	07/02/2019	16:47	EST-5	Thunderstorm Wind	56 kts. EG	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/02/2019	17:17	EST-5	Thunderstorm Wind	56 kts. EG	0	0	10.00K	0.00K
DANVILLE	KNOX CO.	OH	07/02/2019	17:30	EST-5	Thunderstorm Wind	56 kts. EG	0	0	10.00K	0.00K
HUNT	KNOX CO.	OH	07/02/2019	17:47	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	07/02/2019	20:27	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MT LIBERTY	KNOX CO.	OH	07/03/2019	04:15	EST-5	Flash Flood		0	0	2.00K	0.00K
MILLWOOD	KNOX CO.	OH	08/06/2019	16:27	EST-5	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	08/18/2019	23:10	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	08/18/2019	23:15	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
SOUTH MT VERNON	KNOX CO.	OH	08/20/2019	15:51	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	01/12/2020	00:45	EST-5	High Wind	50 kts. EG	0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	03/28/2020	20:55	EST-5	Flood		0	0	0.00K	0.00K
CENTERBURG ARPT	KNOX CO.	OH	05/18/2020	21:05	EST-5	Flood		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	05/29/2020	14:07	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/04/2020	12:32	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/10/2020	18:20	EST-5	Thunderstorm Wind	50 kts. EG	0	0	15.00K	0.00K

MT VERNON	KNOX CO.	OH	06/13/2020	00:50	EST-5	Thunderstorm Wind	43 kts. EG	0	0	15.00K	0.00K
CENTERBURG	KNOX CO.	OH	06/21/2020	17:59	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/26/2020	17:11	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
ARTANNA	KNOX CO.	OH	06/26/2020	17:24	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	09/07/2020	16:52	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	11/15/2020	12:35	EST-5	High Wind	59 kts. MG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/24/2020	14:00	EST-5	Winter Storm		0	0	10.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/15/2021	04:00	EST-5	Winter Storm		0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	08/11/2021	16:20	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	08/11/2021	16:23	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	08/11/2021	16:25	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/03/2022	03:00	EST-5	Winter Storm		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/08/2022	19:12	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/13/2022	22:26	EST-5	Tornado	EF1	0	0	30.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/13/2022	22:32	EST-5	Thunderstorm Wind	60 kts. EG	0	0	2.00K	0.00K
JELLOWAY	KNOX CO.	OH	06/13/2022	22:40	EST-5	Thunderstorm Wind	60 kts. EG	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	06/14/2022	02:35	EST-5	Thunderstorm Wind	70 kts. EG	0	0	0.00K	0.00K
DANVILLE	KNOX CO.	OH	06/16/2022	14:43	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	06/16/2022	14:47	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	07/23/2022	11:06	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	07/23/2022	11:09	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	07/23/2022	11:25	EST-5	Thunderstorm Wind	52 kts. EG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/23/2022	01:00	EST-5	Winter Storm		0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	12/23/2022	06:00	EST-5	Extreme Cold/wind Chill		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	04/01/2023	10:47	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
FREDERICKTOWN	KNOX CO.	OH	04/01/2023	10:49	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
BRANDON	KNOX CO.	OH	07/20/2023	20:10	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
CENTERBURG	KNOX CO.	OH	07/23/2023	16:41	EST-5	Thunderstorm Wind	50 kts. EG	0	0	0.00K	0.00K
KNOX (ZONE)	KNOX (ZONE)	OH	02/16/2024	14:00	EST-5	Winter Storm		0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	03/30/2024	16:24	EST-5	Hail	0.88 in.	0	0	0.00K	0.00K
MT VERNON	KNOX CO.	OH	03/30/2024	16:34	EST-5	Hail	1.00 in.	0	0	0.00K	0.00K
BRANDON	KNOX CO.	OH	06/05/2024	19:43	EST-5	Tornado	EF0	0	0	30.00K	0.00K
PIPESVILLE	KNOX CO.	OH	06/05/2024	20:25	EST-5	Thunderstorm Wind	65 kts. EG	0	0	0.00K	0.00K
MT VERNON WYNKOOP AR	KNOX CO.	OH	06/05/2024	21:30	EST-5	Flash Flood		0	0	0.00K	0.00K
BLADENSBURG	KNOX CO.	OH	08/17/2024	16:30	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
MARTINSBURG	KNOX CO.	OH	08/17/2024	17:13	EST-5	Thunderstorm Wind	55 kts. EG	0	0	0.00K	0.00K
Totals:								1	25	791.652M	7.469M

Ohio County Profiles

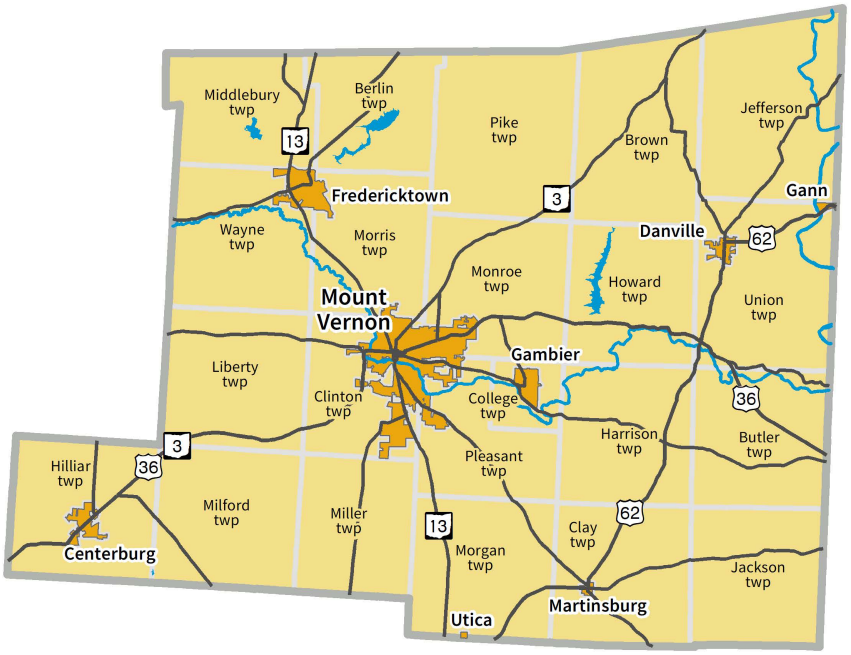
Prepared by the Office of Research **2025 Edition**

Ohio Department of Development

Knox County



Established: Act - March 1, 1808
2024 Population: 63,848
Land Area: 527.2 square miles
County Seat: Mount Vernon City
Named for: General Henry Knox, First Secretary of War



Taxes

Taxable value of real property	$2,150,098,480
Residential	$1,518,428,950
Agriculture	$475,454,840
Industrial	$34,072,730
Commercial	$121,212,000
Mineral	$929,960
Ohio income tax liability	$39,494,403
Average per return	$1,431.63

Land Use/Land Cover

	Percent
Developed, Lower Intensity	9.94%
Developed, Higher Intensity	0.81%
Barren (strip mines, gravel pits, etc.)	0.11%
Forest	30.41%
Shrub/Scrub and Grasslands	0.11%
Pasture/Hay	23.16%
Cultivated Crops	34.25%
Wetlands	0.57%
Open Water	0.64%

Largest Places

	2024	2020
Mount Vernon city	17,329	17,063
Howard twp	6,101	5,882
Clinton twp	2,843	2,859
Fredericktown village	2,658	2,650
Gambier village	2,338	2,219
Monroe twp	2,239	2,208
Hilliar twp UB	2,170	2,084
Brown twp	2,110	2,054
Morris twp	2,100	2,103
Milford twp	2,009	1,909

UB: Unincorporated balance

Total Population

Census

1800		1910	30,181
1810	2,149	1920	29,580
1820	8,326	1930	29,338
1830	17,085	1940	31,024
1840	29,579	1950	35,287
1850	28,872	1960	38,808
1860	27,735	1970	41,795
1870	26,333	1980	46,304
1880	27,431	1990	47,473
1890	27,600	2000	54,500
1900	27,768	2010	60,921

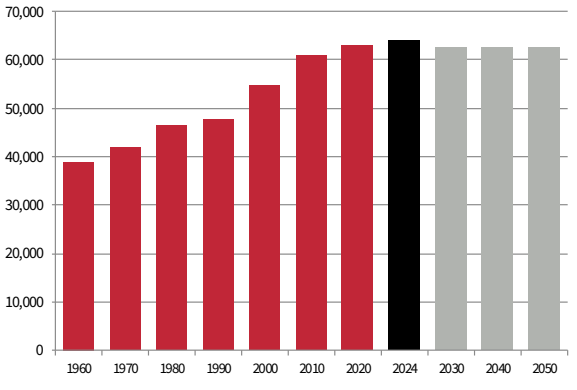
2020	62,721

Estimate

2024	63,848

Projection

2030	62,612
2040	62,361
2050	62,359



Ohio County Profiles

Knox County

Population by Race

	Number	Percent
ACS Total Population	62,888	100.0%
White	59,089	94.0%
African-American	590	0.9%
Native American	11	0.0%
Asian	444	0.7%
Pacific Islander	2	0.0%
Other	650	1.0%
Two or More Races	2,102	3.3%
Hispanic (may be of any race)	1,233	2.0%
Total Minority	4,265	6.8%

Educational Attainment

	Number	Percent
Persons 25 years and over	41,507	100.0%
No high school diploma	3,697	8.9%
High school graduate	15,792	38.0%
Some college, no degree	7,953	19.2%
Associate degree	3,960	9.5%
Bachelor's degree	6,539	15.8%
Master's degree or higher	3,566	8.6%

Family Type by Employment Status

	Number	Percent
Total Families	15,676	100.0%
Married couple, husband and wife in labor force	6,707	42.8%
Married couple, husband in labor force, wife not	2,570	16.4%
Married couple, wife in labor force, husband not	973	6.2%
Married couple, husband and wife not in labor force	2,734	17.4%
Male householder, in labor force	674	4.3%
Male householder, not in labor force	188	1.2%
Female householder, in labor force	1,002	6.4%
Female householder, not in labor force	828	5.3%

Household Income

	Number	Percent
Total Households	23,435	100.0%
Less than $10,000	827	3.5%
$10,000 to $19,999	1,484	6.3%
$20,000 to $29,999	1,663	7.1%
$30,000 to $39,999	1,837	7.8%
$40,000 to $49,999	1,962	8.4%
$50,000 to $59,999	1,811	7.7%
$60,000 to $74,999	2,257	9.6%
$75,000 to $99,999	3,914	16.7%
$100,000 to $149,999	4,147	17.7%
$150,000 to $199,999	2,112	9.0%
$200,000 or more	1,421	6.1%
Median household income	$73,988	

Percentages may not sum to 100% due to rounding.

Population by Age

	Number	Percent
ACS Total Population	62,888	100.0%
Under 5 years	3,725	5.9%
5 to 17 years	10,723	17.1%
18 to 24 years	6,933	11.0%
25 to 44 years	14,022	22.3%
45 to 64 years	15,735	25.0%
65 years and more	11,750	18.7%
Median Age	39.4	

Family Type by Presence of Own Children Under 18

	Number	Percent
Total Families	15,762	100.0%
Married-couple families with own children	4,763	30.2%
Male householder, no wife present, with own children	569	3.6%
Female householder, no husband present, with own children	1,035	6.6%
Families with no own children	9,395	59.6%

Poverty Status of Families By Family Type by Presence Of Related Children

	Number	Percent
Total Families	15,762	100.0%
Family income above poverty level	14,512	92.1%
Family income below poverty level	1,250	7.9%
Married couple, with related children	376	2.4%
Male householder, no wife present, with related children	62	0.4%
Female householder, no husband present, with related children	513	3.3%
Families with no related children	299	1.9%

Ratio of Income To Poverty Level

	Number	Percent
Population for whom poverty status is determined	59,148	100.0%
Below 50% of poverty level	2,677	4.5%
50% to 99% of poverty level	3,853	6.5%
100% to 124% of poverty level	1,951	3.3%
125% to 149% of poverty level	2,501	4.2%
150% to 184% of poverty level	4,156	7.0%
185% to 199% of poverty level	2,041	3.5%
200% of poverty level or more	41,969	71.0%

Geographical Mobility

	Number	Percent
Population aged 1 year and older	62,047	100.0%
Same house as previous year	55,515	89.5%
Different house, same county	3,405	5.5%
Different county, same state	2,023	3.3%
Different state	1,019	1.6%
Abroad	85	0.1%

Ohio County Profiles

Knox County

Travel Time To Work

	Number	Percent
Workers 16 years and over	25,563	100.0%
Less than 15 minutes	8,923	34.9%
15 to 29 minutes	7,436	29.1%
30 to 44 minutes	3,472	13.6%
45 to 59 minutes	2,434	9.5%
60 minutes or more	3,298	12.9%
Mean travel time	26.9 minutes	

Housing Units

	Number	Percent
Total housing units	26,038	100.0%
Occupied housing units	23,435	90.0%
Owner occupied	17,588	75.1%
Renter occupied	5,847	24.9%
Vacant housing units	2,603	10.0%

Year Structure Built

	Number	Percent
Total housing units	26,038	100.0%
Built 2020 or later	170	0.7%
Built 2010 to 2019	1,145	4.4%
Built 2000 to 2009	3,297	12.7%
Built 1990 to 1999	3,432	13.2%
Built 1980 to 1989	2,550	9.8%
Built 1970 to 1979	2,956	11.4%
Built 1960 to 1969	2,074	8.0%
Built 1950 to 1959	2,394	9.2%
Built 1940 to 1949	1,402	5.4%
Built 1939 or earlier	6,618	25.4%
Median year built	1972	

Value for Specified Owner-Occupied Housing Units

	Number	Percent
Specified owner-occupied housing units	17,588	100.0%
Less than $20,000	305	1.7%
$20,000 to $39,999	296	1.7%
$40,000 to $59,999	217	1.2%
$60,000 to $79,999	264	1.5%
$80,000 to $99,999	656	3.7%
$100,000 to $124,999	1,561	8.9%
$125,000 to $149,999	1,063	6.0%
$150,000 to $199,999	3,320	18.9%
$200,000 to $299,999	4,935	28.1%
$300,000 to $499,999	3,465	19.7%
$500,000 to $999,999	1,281	7.3%
$1,000,000 or more	225	1.3%
Median value	$218,300	

House Heating Fuel

	Number	Percent
Occupied housing units	23,435	100.0%
Utility gas	13,104	55.9%
Bottled, tank or LP gas	3,434	14.7%
Electricity	4,355	18.6%
Fuel oil, kerosene, etc	507	2.2%
Coal, coke or wood	1,700	7.3%
Solar energy or other fuel	251	1.1%
No fuel used	84	0.4%

Percentages may not sum to 100% due to rounding.

Gross Rent

	Number	Percent
Specified renter-occupied housing units	5,847	100.0%
Less than $100	3	0.1%
$100 to $199	6	0.1%
$200 to $299	74	1.3%
$300 to $399	206	3.5%
$400 to $499	193	3.3%
$500 to $599	197	3.4%
$600 to $699	577	9.9%
$700 to $799	480	8.2%
$800 to $899	647	11.1%
$900 to $999	666	11.4%
$1,000 to $1,499	1,758	30.1%
$1,500 or more	292	5.0%
No cash rent	748	12.8%
Median gross rent	$925	
Median gross rent as a percentage of household income	29.1	

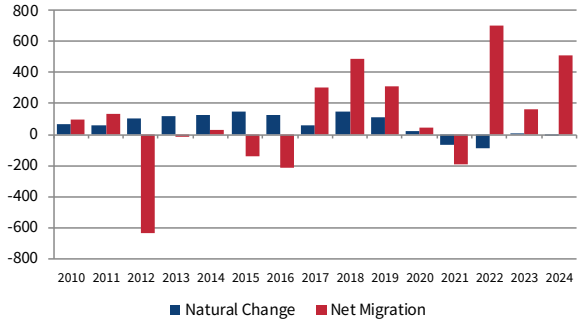
Selected Monthly Owner Costs for Specified Owner-Occupied Housing Units

	Number	Percent
Specified owner-occupied housing units with a mortgage	10,813	100.0%
Less than $400	43	0.4%
$400 to $599	145	1.3%
$600 to $799	549	5.1%
$800 to $999	1,345	12.4%
$1,000 to $1,249	2,098	19.4%
$1,250 to $1,499	1,946	18.0%
$1,500 to $1,999	2,480	22.9%
$2,000 to $2,999	1,815	16.8%
$3,000 or more	392	3.6%
Median monthly owners cost	$1,408	
Median monthly owners cost as a percentage of household income	18.8	

Vital Statistics

	Number	Rate
Births / rate per 1,000 women aged 15 to 44	702	59.4
Teen births / rate per 1,000 females 15-19	32	13.0
Deaths / rate per 100,000 population	710	1,121.3

Components of Population Change



Ohio County Profiles

Knox County

Agriculture

Land in farms (acres)	184,283
Number of farms	1,303
Average size (acres)	141
Total cash receipts	$241,248,000
Per farm	$185,148
Receipts for crops	$93,284,000
Receipts for livestock/products	$147,964,000

Education

Traditional public schools buildings	18
Students	7,014
Teachers (Full Time Equivalent)	517.2
Expenditures per student	$11,473
Graduation rate	95.7
Community/charter schools buildings	
Students	
Teachers (Full Time Equivalent)	
Expenditures per student	
Graduation rate	
Private schools	3
Students	266
Public universites, 4-year	0
Public universities/colleges, 2-year	0
Public learning centers, less-than 2-year	1
Private universities and colleges	2
Public libraries (Districts / Facilities)	2 / 5

Transportation

Registered motor vehicles	78,287
Passenger cars	42,726
Noncommercial trucks	14,994
Total license revenue	$2,433,904.93
Permissive tax revenue	$1,646,550.00
Interstate highway miles	0.00
Turnpike miles	0.00
U.S. highway miles	58.66
State highway miles	139.42
County, township, and municipal road miles	1,141.24
Commercial airports	3

State Parks, Forests, Nature Preserves, Scenic Waterways, And Wildlife Areas

Areas/Facilities	6
Acreage	2,320

Finance

FDIC insured financial institutions (HQs)	2
Assets (000)	$83,641
Branch offices	20
Institutions represented	12

Sources of Income

Total personal income	$3,506,572,000
Net earnings	$2,006,203,000
Personal current transfer receipts	$899,586,000
Income maintenance benefits	$45,918,000
Unemployment insurance compensation	$3,878,000
Retirement and other	$849,790,000
Dividends, interest, and rent	$600,783,000
Dependency ratio (Percent of total personal income from transfer receipts)	25.7%

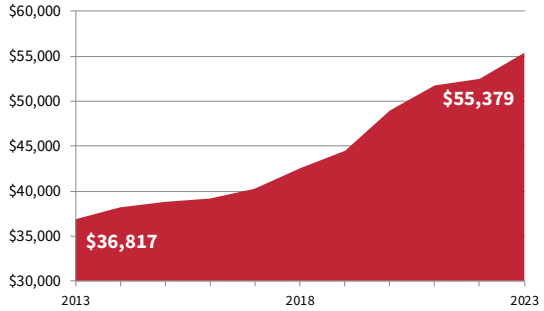
Voting

Number of registered voters	43,785
Voted in 2024 election	32,493
Percent turnout	74.2%

Health Care

Physicians	69
Registered hospitals	1
Number of beds	117
Licensed nursing homes	13
Number of beds	525
Licensed residential care	6
Number of beds	339
Persons with health insurance (Aged 0 to 64)	91.3%
Adults with insurance (Aged 18 to 64)	90.8%
Children with insurance (Aged Under 19)	92.5%

Per Capita Personal Income



Ohio County Profiles

Knox County

Civilian Labor Force

	2024	2023	2022	2021	2020
Civilian labor force	30,600	30,300	29,700	29,700	29,700
Employed	29,400	29,200	28,600	28,400	27,800
Unemployed	1,300	1,100	1,100	1,300	1,900
Unemployment rate	4.1	3.5	3.6	4.4	6.4

Establishments, Employment, and Wages by Sector: 2024

Industrial Sector	Number of Establishments	Average Employment	Total Wages	Average Weekly Wage
Private Sector	1,227	17,670	$997,636,682	$1,086
Goods-Producing	254	5,697	$457,142,536	$1,543
Natural Resources and Mining	36	195	$9,708,605	$957
Construction	137	1,166	$94,498,253	$1,559
Manufacturing	82	4,336	$352,935,678	$1,565
Service-Providing	973	11,973	$540,494,146	$868
Trade, Transportation and Utilities	275	3,103	$120,369,636	$746
Information	28	104	$10,910,208	$2,017
Financial Services	122	650	$39,018,143	$1,155
Professional and Business Services	172	1,188	$62,877,302	$1,018
Education and Health Services	151	4,423	$245,725,613	$1,068
Leisure and Hospitality	127	1,940	$40,131,669	$398
Other Services	98	565	$21,453,419	$731
Federal Government		105	$6,771,401	$1,245
State Government		240	$16,719,640	$1,342
Local Government		2,556	$123,421,503	$928

Private Sector total includes Unclassified establishments not shown.

Change Since 2017

Private Sector	10.7%	0.9%	24.6%	23.5%
Goods-Producing	14.9%	-0.6%	15.4%	16.2%
Natural Resources and Mining	9.1%	18.9%	53.7%	29.1%
Construction	22.3%	5.7%	36.3%	28.9%
Manufacturing	7.9%	-3.0%	10.1%	13.5%
Service-Producing	9.6%	1.6%	33.6%	31.3%
Trade, Transportation and Utilities	5.0%	8.2%	31.9%	21.9%
Information	40.0%	-15.4%	96.9%	131.8%
Financial Services	10.9%	16.5%	55.5%	33.5%
Professional and Business Services	19.4%	-15.7%	35.5%	60.8%
Education and Health Services	7.9%	2.1%	27.6%	25.1%
Leisure and Hospitality	6.7%	0.4%	36.9%	36.3%
Other Services	6.5%	1.4%	48.4%	46.5%
Federal Government		-4.5%	12.2%	17.6%
State Government		-18.1%	7.9%	31.8%
Local Government		4.7%	37.7%	31.4%

Residential Construction

	2024	2023	2022	2021	2020
Total units	194	376	262	351	131
Total valuation (000)	$65,164	$77,864	$97,465	$120,246	$32,876
Total single-unit bldgs	184	116	260	351	128
Average cost per unit	$342,959	$337,275	$374,562	$342,580	$254,439
Total multi-unit bldg units	10	260	2	0	3
Average cost per unit	$205,946	$149,000	$39,462		$102,500

Major & Notable Employers

Ariel Ltd	Mfg
FT Precision	Mfg
HCP Inc.	Mfg
JELD-WEN Inc	Mfg
Kenyon College	Serv
Knox Community Hospital	Serv
Kokosing Construction Co	Constr
Mauser Packaging Solutions	Mfg
Mount Vernon Nazarene University	Serv
Mt Vernon City Schools	Govt
Sanoh America Inc	Mfg

HEADWATERS ECONOMICS

Neighborhoods at Risk

Selected Tracts

Selected Location(s):

Knox County, OH

Comparison Location:

United States

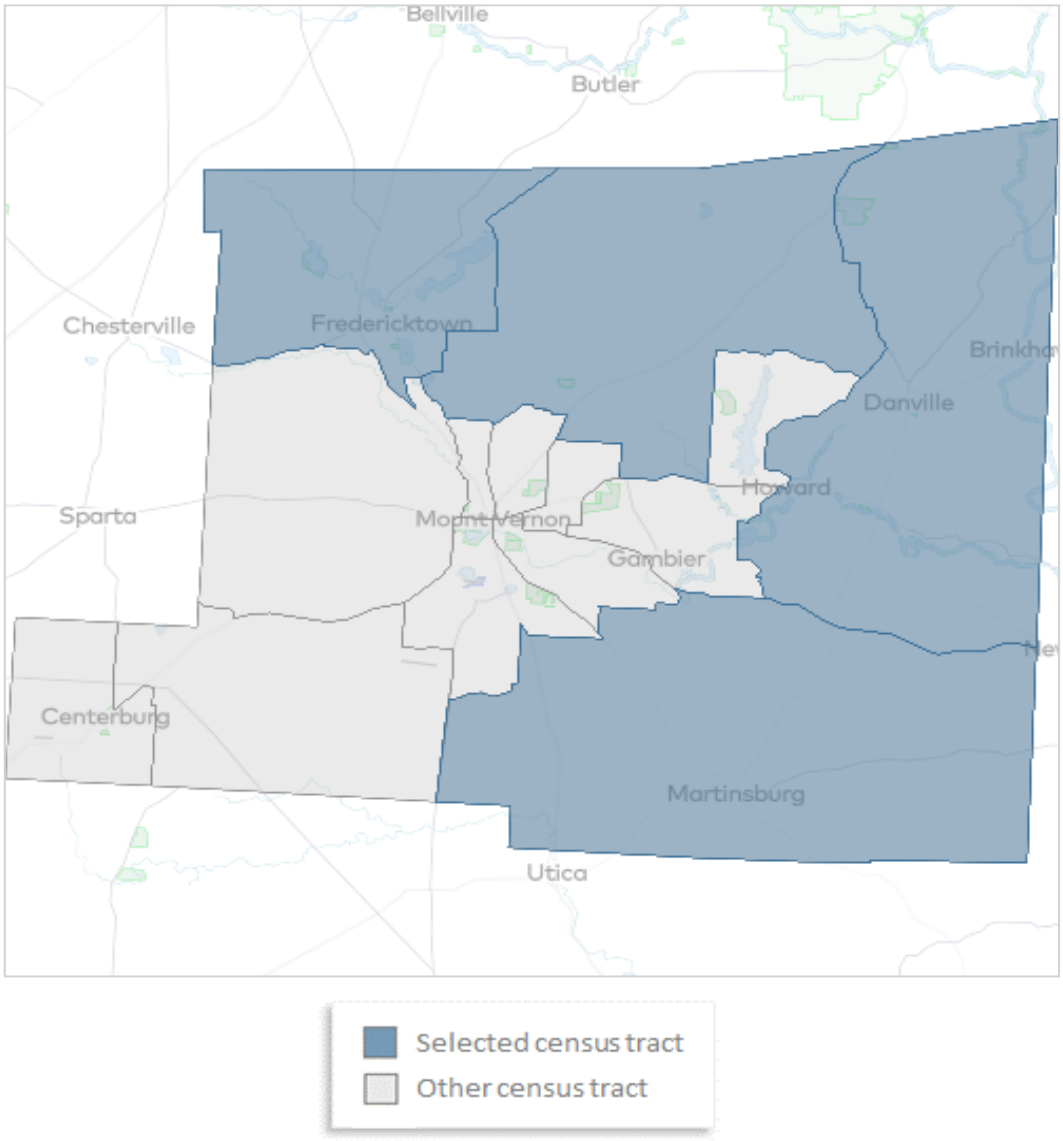
Produced by

Headwaters Economics'

Economic Profile System (EPS)

May 26, 2025

Area of Interest



Headwaters Economics

Headwaters Economics is an independent, nonprofit research group that works to improve community development and land management decisions: **headwaterseconomics.org**.

Neighborhoods at Risk

Neighborhoods at Risk is a free, web-based tool that provides cities with neighborhood-level information about at-risk populations and their vulnerability to the impacts of climate change.

Free and easy to use: Quickly create maps and reports of socioeconomic and climate data.

Available nationwide: Explore socioeconomic and climate data for any community or county in the nation.

Updated continuously: Make use of the latest available, published government data.

headwaterseconomics.org/apps/neighborhoods-at-risk

Neighborhoods at Risk

Selected Tracts

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Neighborhoods at Risk

Selected Tracts

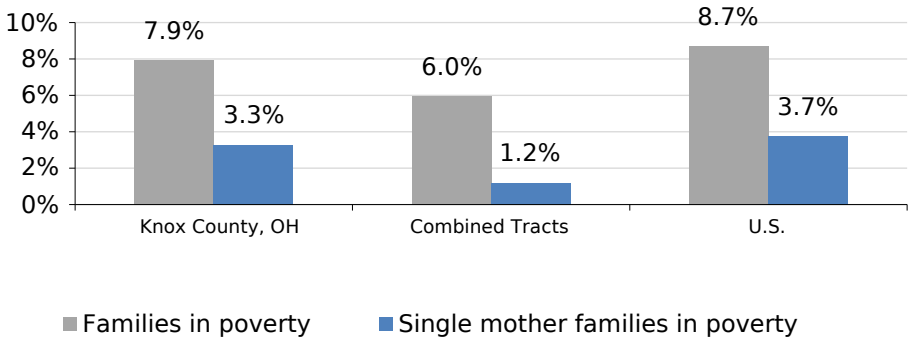
Families in Poverty

	Knox County, OH	Combined Tracts	U.S.
Total families for whom poverty status is determined, 2023*	15,762	6,063	82,220,165
Families in poverty	1,250	361	7,176,933
Families with children in poverty	951	279	5,059,541
Single mother families in poverty	513	**73**	3,074,609
Percent of Total, 2023*			
Families in poverty	7.9%	6.0%	8.7%
Families with children in poverty	6.0%	4.6%	6.2%
Single mother families in poverty	3.3%	**1.2%**	3.7%
Change in Percentage Points, 2010*-2023*			
For example, if the value is 3% in 2010* and 4.5% in 2023*, the reported change in percentage points is 1.5.			
Families in poverty	-1.1	-2.3	-1.3
Families with children in poverty	-0.9	-0.8	-1.7
Single mother families in poverty	-0.9	-1.2	-1.1

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
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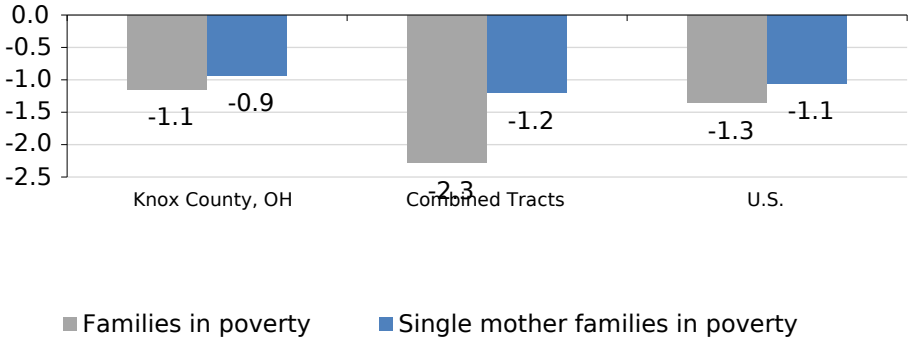
Families in Poverty, Percent of Total, 2023*

- The U.S. has the largest share of single mother families in poverty (3.7%).



Families in Poverty, Change in Percentage Points, 2010*-2023*

- The largest change in the share of single mother familes in poverty occurred in Combined Tracts, which went from 2.4% to 1.2%.



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Families in Poverty

What do we measure on this page?

This page describes the number of families living below the poverty line, and separately reports families with children and single mother families with children.

The Census defines a family as a group of two or more people who reside together and who are related by birth, marriage, or adoption.

The Census Bureau uses a set of income thresholds that vary by family size and composition to define who is poor. If the total income for a family or an unrelated individual falls below the relevant poverty threshold, then the family or an unrelated individual is classified as being "below the poverty level."

Why is it important?

Families in poverty may lack the resources to meet their basic needs. Their challenges cross the spectrum of food, housing, health care, education, vulnerability to natural disasters, and emotional stress.

To save money, families with low incomes often have to make lifestyle compromises such as unhealthy foods, less food, substandard housing, or delayed medical care.[1]

Lack of financial resources makes families in poverty more vulnerable to natural disasters. This is due to inadequate housing, social exclusion, and an inability to re-locate or evacuate.[11, 2]

Inadequate shelter exposes occupants to increased risk from storms, floods, fire, and temperature extremes.[2] Households with low incomes are more likely to have unhealthy housing such as leaks, mold, or rodents.[5]

The expense of running fans, air conditioners, and heaters makes low-income people hesitant to mitigate the temperature of their living spaces.[1, 2] Furthermore, those in high-crime areas may not want to open their windows.[2]

Families in poverty are disproportionately affected by higher food prices, which are expected to rise in response to climate change.[1]

Children in poor families, on average, receive fewer years of education compared to children in wealthier families.[12]

Low-income residents are less likely to have adequate property insurance, so they may bear an even greater burden from property damage due to natural hazards.[2]

Living in poverty can lead to a lack of personal control over potentially hazardous situations such as increased air pollution or flooding. Impoverished families may be less likely to take proactive measures to prevent harm.[11]

Superscript numbers refer to references provided at the end of the report.

CHANGES IN BOUNDARIES: Data describing change over time can be misleading when geographic boundaries have changed.
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Neighborhoods at Risk

Selected Tracts

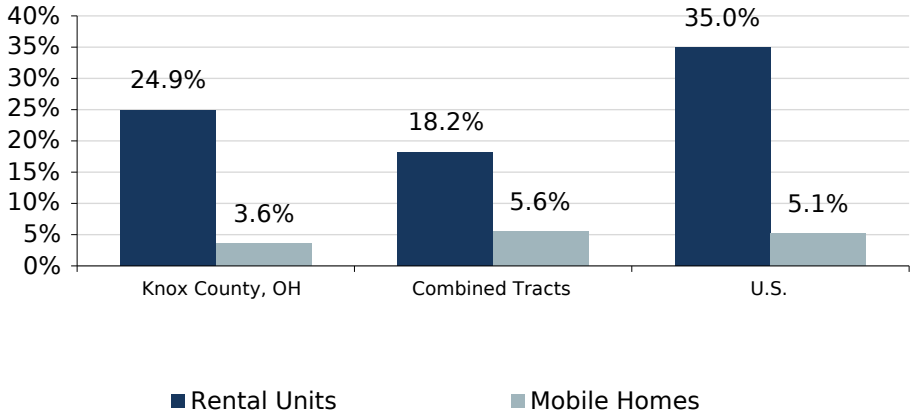
Rental & Mobile Homes

	Knox County, OH	Combined Tracts	U.S.
Total Occupied Housing Units, 2023*	23,435	7,955	127,482,865
Rental Units	5,847	1,450	44,590,828
Mobile Homes	842	444	6,559,377
Percent of Total, 2023*			
Rental Units	24.9%	18.2%	35.0%
Mobile Homes	3.6%	5.6%	5.1%
Change in Percentage Points, 2010*-2023*			
For example, if the value is 3% in 2010* and 4.5% in 2023*, the reported change in percentage points is 1.5.			
Rental Units	0.9	-0.1	5.1
Mobile Homes	-1.6	-4.4	-0.3
Median Home Value (MHV), 2023* (2024 $s)	$224,849	na	$312,502
Change in MHV, 2010*-2023* (2024 $s)	$31,150	na	$41,583

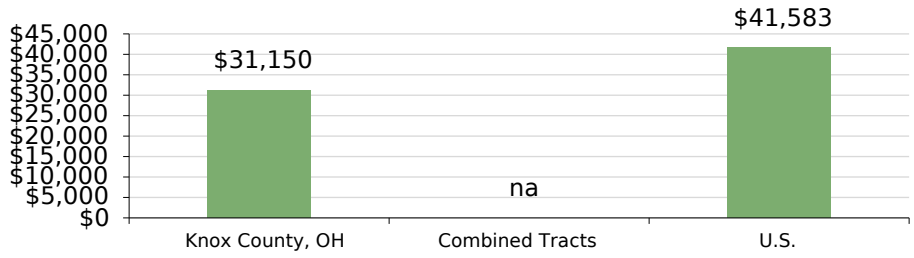
High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
Medium Reliability: Data with CVs between 12 & 40% are in orange to indicate that the values should be interpreted with caution.
Low Reliability: Data with CVs > 40% are displayed in red to indicate that the estimate is considered very unreliable.

Rental Units and Mobile Homes as a Percent of Total Housing Units, 2023*

- The U.S. has the largest share of rental units (35.0%).
- Combined Tracts has the largest share of mobile homes (5.6%).



Change in Median Home Value, 2010*-2023* (2024 $s)



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Rental & Mobile Homes

What do we measure on this page?

This page reports the numbers of housing units that are either rental units or mobile homes, and provides median home value.

Why is it important?

In general, home ownership contributes to well-being and stability. However, each type of living situation has its own risks and health concerns.

Home ownership is often associated with mental health benefits such as high self-esteem, a sense of control over one's living situation, and financial stability.[13]

The financial stress associated with losing one's home is heightened by people's emotional attachment to their home and their neighborhood.[14]

Homeowners typically pay a greater overall housing cost, but renters pay a larger proportion of their income. The high proportion of household costs for renters has further increased over the past 25 years.[15]

Rental homes are generally not maintained as well as those that are owned. Substandard housing conditions like dampness, mold, and exposure to toxic substances or allergens are linked with compromised health outcomes.[13]

Areas with high-density residences, such as urban areas, tend to have a greater proportion of renters.[1] High density living conditions and large, multistory apartment buildings exacerbate heat-related health stresses.[4]

Mobile homes are more likely to be damaged in extreme weather, which poses a risk for both the structure and the occupants.[4,11]

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People of Color and Hispanics

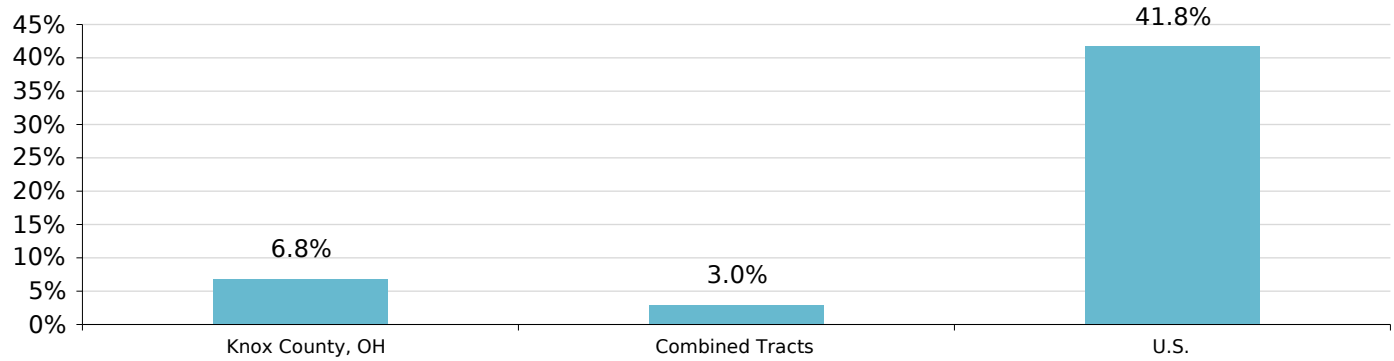
	Knox County, OH	Combined Tracts	U.S.
Total Population, 2023*	62,888	22,814	332,387,540
White alone	59,089	22,166	210,875,446
Black or African American alone	˙590	¨**83**	41,070,890
American Indian and Alaska Native alone	¨**11**	¨**4**	2,924,996
Asian alone	˙444	¨**122**	19,352,659
Native Hawaii & Other Pacific Is. alone	¨**2**	¨**0**	629,292
Some other race alone	˙650	¨**101**	21,940,536
Two or more races	˙2,102	˙338	35,593,721
Hispanic or Latino (of any race)	1,233	49	63,131,589
Not Hispanic or Latino	61,655	22,765	269,255,951
Not Hispanic & White alone	58,623	22,137	193,338,267
People of Color and Hispanics	4,265	677	139,049,273

Percent of Total, 2023*

White alone	94.0%	97.2%	63.4%
Black or African American alone	˙0.9%	¨**0.4%**	12.4%
American Indian and Alaska Native alone	0.0%	¨**0.0%**	0.9%
Asian alone	˙0.7%	¨**0.5%**	5.8%
Native Hawaii & Other Pacific Is. alone	0.0%	¨**0.0%**	0.2%
Some other race alone	˙1.0%	¨**0.4%**	6.6%
Two or more races	˙3.3%	˙1.5%	10.7%
Hispanic or Latino (of any race)	2.0%	¨**0.2%**	19.0%
Not Hispanic or Latino	98.0%	99.8%	81.0%
Not Hispanic & White alone	93.2%	97.0%	58.2%
People of Color and Hispanics	6.8%	3.0%	41.8%

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
Medium Reliability: Data with CVs between 12 & 40% are in orange to indicate that the values should be interpreted with caution.
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People of Color and Hispanics, Percent of Total, 2023*



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

People of Color and Hispanics

What do we measure on this page?

Race is self-identified by Census respondents who choose the race or races with which they most closely identify. Included in "Other Races" are "Asian," "Native Hawaiian or Other Pacific Islander," and respondents providing write-in entries such as multiracial, mixed, or interracial.

Ethnicity has two categories: Hispanic or Latino, and Non-Hispanic or Latino. The federal government considers race and Hispanic origin to be two separate and distinct concepts. Hispanics and Latinos may be of any race.

"People of Color and Hispanics" is calculated by subtracting those who identify as both "Not Hispanic or Latino" and "White alone" from "Total Population."

Why is it important?

Race and ethnicity are strongly correlated with disparities in health, exposure to environmental pollution, and vulnerability to natural hazards.[1]

Research consistently has found race-based environmental inequities, including the tendency for minority populations to live closer to noxious facilities and Superfund sites, and to be exposed to pollution at greater rates than whites.[7, 1]

Many health outcomes are closely related to the local environment. Minority communities often have less access to parks and nutritious food, and are more likely to live in substandard housing.[1]

Minorities tend to be particularly vulnerable to disasters and extreme heat events. This is due to language skills, housing patterns, quality of housing, community isolation, and cultural barriers.[8, 4]

Blacks and Hispanics, two segments of the population that are currently experiencing poorer health outcomes, are an increasing percentage of the US population.[1,9]

Research has identified measurable disparities in health outcomes between various minority and ethnic communities.

Across races, the rates of preventable hospitalizations are highest among black and Hispanic populations. Preventable hospital visits often reflect inadequate access to primary care. These types of hospital visits are also costly and inefficient for the health care system.[5]

Relative to other ethnicities and races, Hispanics and blacks are less likely to have health insurance, but rates of uninsured are dropping for both groups.[10]

Compared to other races, blacks have higher rates of infant mortality, homicide, heart disease, stroke, and heat-related deaths.[5]

Hispanics have higher rates of diabetes and asthma.[5]

American Indians have a distinct pattern of health effects different from blacks and Hispanics. Native populations are less likely to have electricity than the general population.[2] They have high rates of infant mortality, suicide and homicide, and nearly twice the rate of motor vehicle deaths than the U.S. average.[5]

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Language Proficiency

	Knox County, OH	Combined Tracts	U.S.
Population 5 years or older, 2023*	59,163	20,916	313,447,641
Speak English "not well"***	311	**119**	13,134,090
Speak English "not well"***, percent	0.5%	**0.6%**	4.2%
Speak English "not well"***, change in percentage points**, 2010*-2023*	0.0	-0.5	-0.5

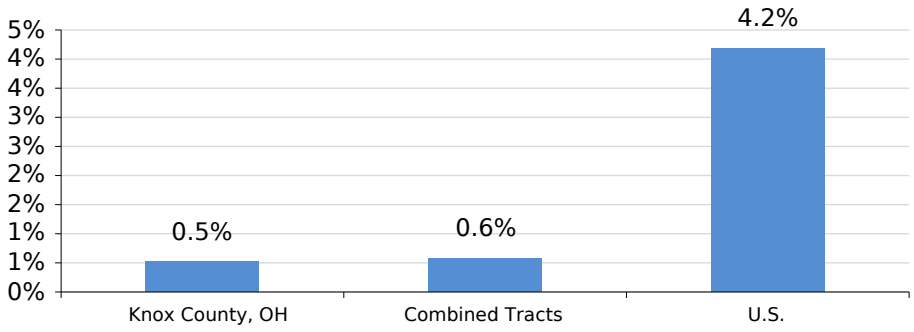
**For example, if the value is 3% in 2010* and 4.5% in 2015*, the reported change in percentage points is 1.5.

*** Includes "not well" and "not well at all".

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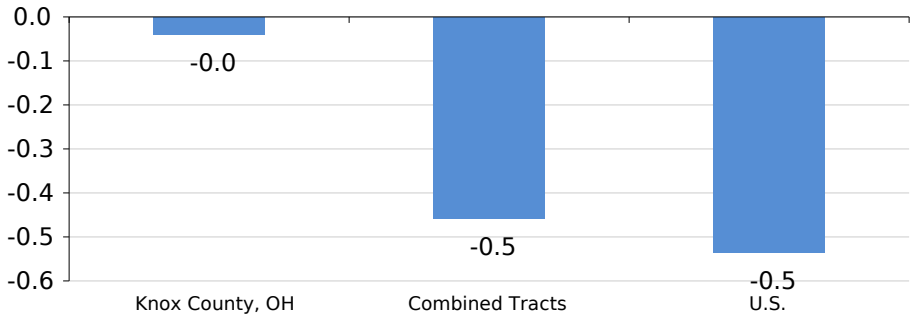
People Who Speak English "Not Well", Percent of Total, 2023*

- The U.S. has the largest share of people who speak English "not well" (4.2%).



People Who Speak English "Not Well", Change in Percentage Points, 2010*-2023*

- The largest change in the share of people who speak English "not well" occurred in the U.S., which went from 4.7% to 4.2%.



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Language Proficiency

What do we measure on this page?

This page reports the results of self-rated English-speaking ability questions in the American Community Survey.

Why is it important?

Many aspects of life in the US assume basic fluency in English. Thus, people with limited language skills are at risk for inadequate access to health care, social services, or emergency services.

A person's ability to take action during an emergency is compromised by language and cultural barriers.[4]

Poor English skills can make it harder to follow directions or interact with agencies.[4]

Lack of language skills can also instill lack of trust for government agencies.

In many industries, poor English skills can make it harder for people to get higher wage jobs.[1]

Language barriers make it harder to obtain medical or social services; and make it more difficult to interact with caregivers.[1]

Limited English skills may result in isolation from other segments of the US population, and social isolation is a health risk.[1] However some minority communities can be very tightly-knit and not isolated, so this risk factor cannot be generalized across all populations.

Neighborhoods at Risk

Selected Tracts

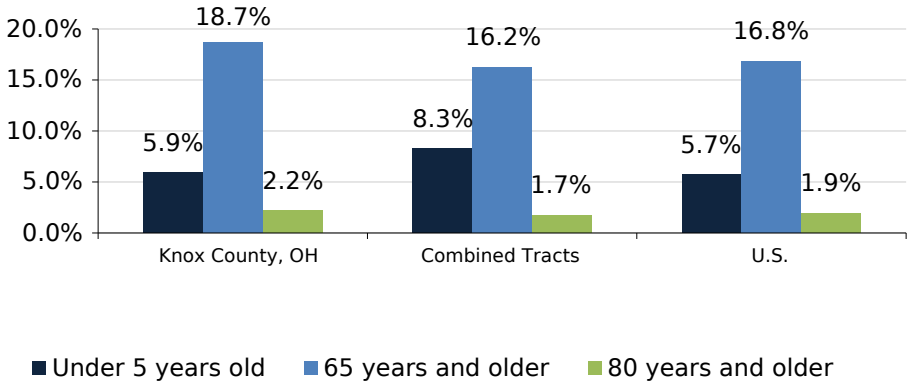
Young & Elderly Populations

	Knox County, OH	Combined Tracts	U.S.
Total Population, 2023*	62,888	22,814	332,387,540
Under 5 years old	3,725	1,898	18,939,899
65 years and older	11,750	3,699	55,970,047
80 years and older	1,409	392	6,378,567
Percent of Total, 2023*			
Under 5 years old	5.9%	8.3%	5.7%
65 years and older	18.7%	16.2%	16.8%
80 years and older	2.2%	1.7%	1.9%
Change in Percentage Points, 2010*-2023*			
For example, if the value is 3% in 2010* and 4.5% in 2023*, the reported change in percentage points is 1.5.			
Under 5 years old	-0.4	1.2	-0.9
65 years and older	4.3	3.0	4.1
80 years and older	0.2	0.5	0.2

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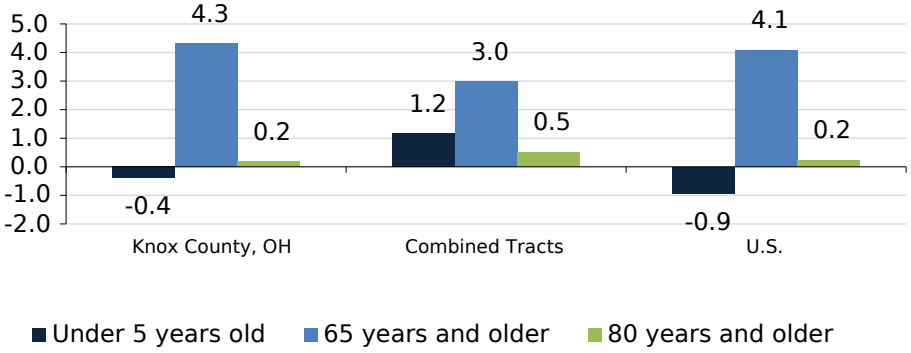
Population by Group, Percent of Total, 2023*

- Combined Tracts has the largest share of people under 5 years old (8.3%).
- Knox County, OH has the largest share of people 80 years and older (2.2%).



Population by Group, Change in Percentage Points, 2010*-2023*

- The largest change in the share of people under 5 years old occurred in Combined Tracts, which went from 7.2% to 8.3%.
- The largest change in the share of people 80 years and older occurred in Combined Tracts, which went from 1.2% to 1.7%.



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Young & Elderly Populations

What do we measure on this page?

This page describes the number of people by specific age category.

The "Under 5 years old" category includes individuals younger than 5 years old. The "65 years and older" category includes individuals age 65 and older and the "80 years and older" category includes individuals age 80 and older. The "80 years and older" category is a subset of the "65 years and older" category.

Why is it important?

Young children and older adults both are vulnerable segments of the population. Understanding the age profile of a community can help users determine the types of services likely to be needed.[1]

Children's developing bodies makes them particularly sensitive to health problems and environmental stresses.[1]

Childhood lays the foundations for lifelong health. Poor health during childhood increases the likelihood of problems throughout adulthood.[2]

Because so many factors of a child's life are determined during pregnancy, infancy, and early childhood, children in poverty are an especially vulnerable population. Lack of adequate care through the early phases of life is more prevalent in poor populations.[2]

Children spend more time outside and have a faster breathing rate than adults, so they are more at risk for respiratory problems related to ground level ozone, airborne particulates, wildfire smoke, and allergens. Allergens are associated with climate change due to changing plant communities and longer pollen seasons.[3, 4]

Because their immune systems are not fully developed, children are more sensitive to infectious diseases. Natural disasters can breach public water supplies, compromise sanitation, and spread illness. Children are more vulnerable to these hazards compared to adults.[3]

Older adults also are at increased risk of compromised health related to environmental hazards and climate change.

Age is the single greatest risk factor related to illness or death from extreme heat.[4]

The elderly are more likely to have pre-existing medical conditions or compromised mobility, which reduces their ability to respond to natural disasters.[3]

The likelihood of chronic disease increases with age.[1, 5]

Older adults are more susceptible to air pollution such as ground level ozone, particulate matter, or dust. Increased dust is associated with drought, wildfires, and high wind events.[3, 6]

CHANGES IN BOUNDARIES: Data describing change over time can be misleading when geographic boundaries have changed.
The Census provides documentation about changes in boundaries at this site: www.census.gov/geo/reference/boundary-changes.html

Neighborhoods at Risk

Selected Tracts

Educational Attainment

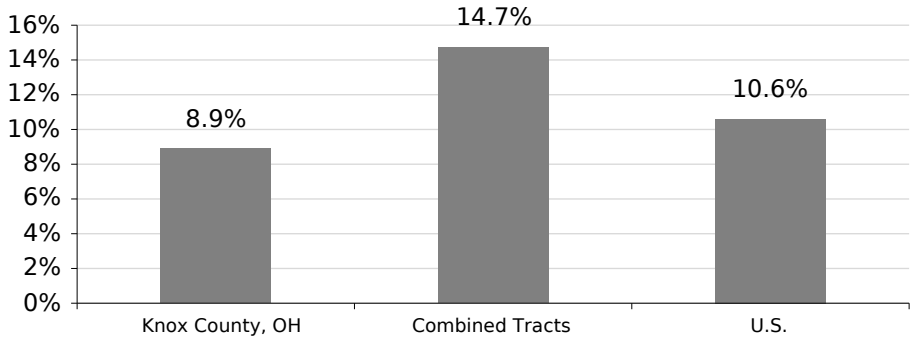
	Knox County, OH	Combined Tracts	U.S.
Total Population 25 years or older, 2023*	41,507	14,376	228,434,661
No high school degree	3,697	2,118	24,230,217
No high school degree, percent	8.9%	14.7%	10.6%
No high school degree, change in percentage points**, 2010*-2023*	-3.6	0.3	-4.4

**For example, if the value is 3% in 2010* and 4.5% in 2023*, the reported change in percentage points is 1.5.

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
Medium Reliability: Data with CVs between 12 & 40% are in orange to indicate that the values should be interpreted with caution.
Low Reliability: Data with CVs > 40% are displayed in red to indicate that the estimate is considered very unreliable.

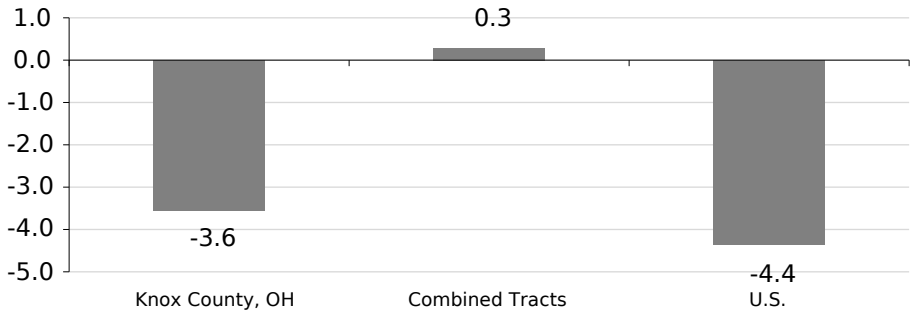
Population with Less than High School Education, Percent of Total, 2023*

- Combined Tracts has the largest share of people with less than a high school education (14.7%).



Population with Less than High School Education, Change in Percentage Points, 2010*-2023*

- The largest change in the share of people with less than a high school degree occurred in the U.S., which went from 15.0% to 10.6%.



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Educational Attainment

What do we measure on this page?

This page describes levels of educational attainment, which refers to the highest degree or level of schooling completed by people 25 years and over.

Why is it important?

High school completion is used as a proxy for overall socioeconomic circumstances. Lack of education is strongly correlated with poverty and poor health.

People without a high school degree are more than twice as likely to live in inadequate housing compared to those with some college education.[5]

A study in California found the lack of a high school degree was the factor most closely related to social vulnerability to climate change.[4]

Thirty-eight percent of Americans without a high school degree do not have health insurance, compared to 10 percent with a college degree.[7]

The rate of diabetes is much greater for those without a high school degree. Incidence of this disease is more than double the rate of those who attended education beyond high school.[5]

Binge drinking is most severe among those without a high school degree. This demographic group had the highest risk of binge drinking across all measured categories (such as income, race, ethnicity, or disability status).[5]

CHANGES IN BOUNDARIES: Data describing change over time can be misleading when geographic boundaries have changed.
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Neighborhoods at Risk

Selected Tracts

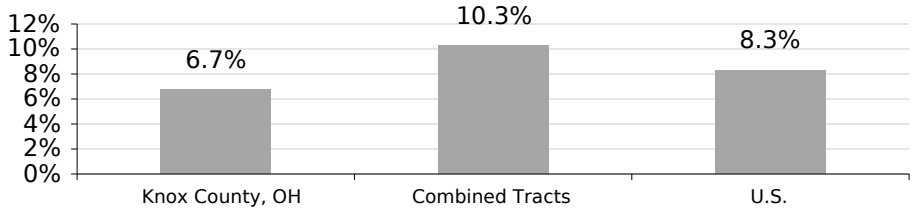
Potentially Vulnerable Households

	Knox County, OH	Combined Tracts	U.S.
Total Occupied Households, 2023*	23,435	7,955	127,482,865
People > 65 years & living alone	3,266	901	14,809,415
Single female households	1,830	513	15,592,781
with children < 18 years	1,279	366	9,459,043
Households with no car	1,577	816	10,602,826
Percent of Total, 2023*			
People > 65 years & living alone	13.9%	11.3%	11.6%
Single female households	7.8%	6.4%	12.2%
with children < 18 years	5.5%	4.6%	7.4%
Households with no car	6.7%	10.3%	8.3%
Change in Percentage Points, 2010*-2023*			
For example, if the value is 3% in 2010* and 4.5% in 2023*, the reported change in percentage points is 1.5.			
People > 65 years & living alone	10.9	9.1	-1.2
Single female households	-0.9	-0.9	-0.5
with children < 18 years	-0.6	-1.0	0.0
Households with no car	0.1	2.3	-116.0

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
Medium Reliability: Data with CVs between 12 & 40% are in orange to indicate that the values should be interpreted with caution.
Low Reliability: Data with CVs > 40% are displayed in red to indicate that the estimate is considered very unreliable.

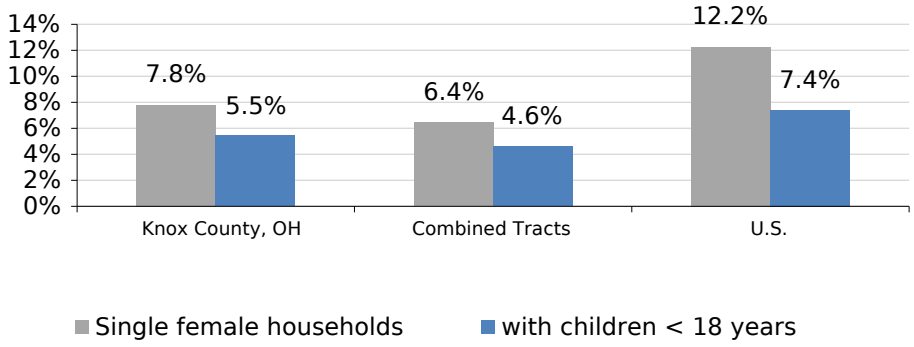
Households with No Car as a Percent of Total Households, 2023*

- Knox County, OH has the largest share of households with no car (13.9%).



Single Female Households as a Percent of Total Households, 2023*

- The U.S. has the largest share of single female households (12.2%).
- The U.S. has the largest share of single female households with children (7.4%).



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Potentially Vulnerable Households

What do we measure on this page?

This page describes household types that are associated with increased hardship, including the elderly living alone, single female households, single female households with children, and households without a car.

Why is it important?

Older adults are more likely to have compromised health and are less able to overcome disease. Living alone exacerbates health risks, and many health outcomes are worsened by social isolation.

- Social isolation is strongly linked to poor health such as premature death, smaller chances of survival after a heart attack, depression, and greater levels of disability from chronic diseases.[2]
- People 65 and older are particularly vulnerable to heat-related illness,[4] which is exacerbated by social isolation.

Households headed by women face challenges related to income, education, and food security. These factors make it more difficult to respond to health, environmental, or climate risks.

- Female-headed households are more likely to be living in poverty. This is most prevalent among black, Hispanic, and Native American households.[16]
- In 2014, 35 percent of female-headed households were food insecure, compared to 14 percent of all households.[17]
  Single mothers may be burdened by providing basic needs such as food and housing, which can make the urgency of other risks seem less important.[18]
- Single-mother families are disproportionally exposed to hazardous levels of air pollution.[4]
- Single mothers tend to be less educated and less affluent than the general population, which puts them at greater risk during natural disasters.[18]

Access to a car is linked with higher wages and more financial stability, and can help families relocate or evacuate in the event of emergencies.

- People who own cars are more likely to be employed, work longer hours, and earn more than those who do not.[19]
- Access to a car has measurable benefits for those receiving public assistance. Welfare recipients with access to a car were more likely to work more hours and get higher-paying jobs, and had a greater chance of leaving welfare.[20]
- During emergencies, natural disasters, and extreme weather events, people who do not have a car are less likely to evacuate or have access to emergency response centers.[4]
- During heat waves, people without a car are less able to go to community cooling centers or cooler areas.[4]
- Pedestrian fatalities are more than twice as likely in poor urban neighborhoods than in wealthier parts of cities.[21]

CHANGES IN BOUNDARIES: Data describing change over time can be misleading when geographic boundaries have changed.
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Neighborhoods at Risk

Selected Tracts

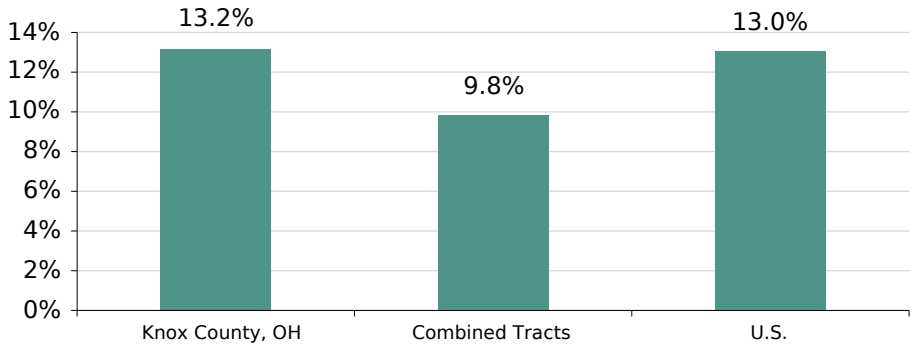
Potentially Vulnerable People

	Knox County, OH	Combined Tracts	U.S.
Total civilian noninstitutionalized population, 2023*	62,177	22,793	327,425,278
People w/ disabilities	8,193	2,238	42,703,063
People w/o health insurance	6,992	4,803	28,000,876
Percent of Total, 2023*			
Percent of people w/ disabilities	13.2%	9.8%	13.0%
Percent of people w/o health insurance	11.2%	21.1%	8.6%

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to indicate that the sampling error is relatively small.
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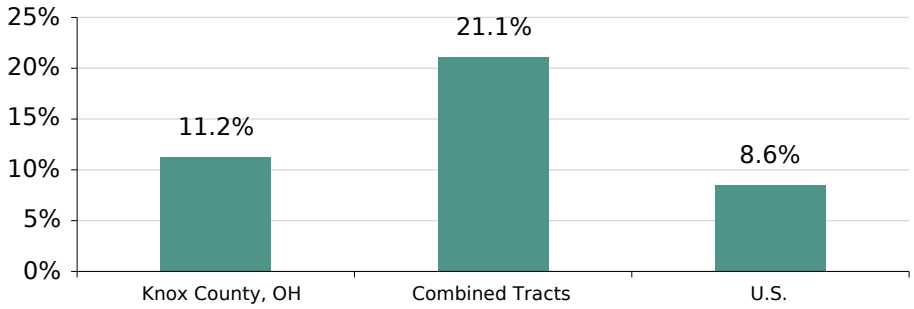
People with Disabilities, Percent of Total, 2023*

- Knox County, OH has the largest share of the noninstitutionalized population that is disabled (13.2%).



People without Health Insurance, Percent of Total, 2023*

- Combined Tracts has the largest share of the noninstitutionalized population without health insurance (21.1%).



* ACS 5-year estimates used. 2023 represents average characteristics from 2019-2023; 2010 represents 2006-2010.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/apps/neighborhoods-at-risk.

Potentially Vulnerable People

What do we measure on this page?

This page describes groups of people that are associated with increased hardship, including people with disabilities and people without health insurance.

Why is it important?

Disabled people are subject to health complications that make environmental risks more consequential.

Disabled people are less likely to have health insurance, compared to the non-disabled population.[5]

Being confined to a bed raises heat mortality.[2]

Extreme weather events or natural disasters may result in limited access to medical care. This is particularly consequential for those who already have compromised health.[3]

People who lack health insurance are disadvantaged by several different mechanisms. They may avoid or delay diagnoses, treatment, and/or medication and thus may increase their odds of poor health. They do not have a regular place of care, and they are not benefitting from the standard of care that is afforded many Americans.

Households living in poverty are more likely to be uninsured. More than one quarter of uninsured households live in poverty.[10]

People with lower educational attainment are more likely to be uninsured.[5]

People without health insurance are less likely to have a regular source of care, and less likely to receive preventive, primary, and specialty care services.[32,33] This risk is particularly evident among racial and ethnic minorities.[5]

People without health insurance are more likely to use the hospital emergency department for standard health care needs.[5]

About 25% of uninsured adults report having either delayed or gone without care in the past year because of costs.[23]

Uninsured people are more likely to skip medications due to the costs, and some providers are less likely to prescribe medications to uninsured patients.[24]

People who do not have health insurance suffer greater health consequences from air pollution compared to those with insurance.[4]

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Neighborhoods at Risk

Selected Tracts

Summary

Indicators 2023*	Combined Tracts	U.S.	Percent Difference Combined Tracts vs. U.S.
People under 5 years	8.3%	5.7%	37%
People over 65 years	16.2%	16.8%	-4%
People of color (including Hispanic)	3.0%	41.8%	-173%
People who don't speak English well	0.6%	4.2%	-150%
People without a high school degree	14.7%	10.6%	32%
Families in poverty	6.0%	8.7%	-37%
Housing units that are rentals	18.2%	35.0%	-63%
Households with no car	10.3%	8.3%	22%
People with disabilities	9.8%	13.0%	-28%
People without health insurance	21.1%	8.6%	84%

High Reliability: Data with coefficients of variation (CVs) < 12% are in black to show that the sampling error is small.
Medium Reliability: Data with CVs between 12 & 40% are in orange. These values should be interpreted with caution.
Low Reliability: Data with CVs > 40% are displayed in red to indicate that the estimate is considered very unreliable.

* ACS 5-year estimates: 2023 represents average characteristics from 2019-2023.

CITATION: U.S. Department of Commerce. 2024. Census Bureau, American Community Survey Office, Washington, D.C., reported by Headwaters Economics' Neighborhoods at Risk, headwaterseconomics.org/par.

Summary

What do we measure on this page?

This page shows a quick comparison for many of the indicators covered in this report to highlight how the selected tracts differ from the United States as a whole.

The percent, or relative, difference between the selected tracts and the U.S. is calculated by dividing the difference between the values by the arithmetic mean of the values.

Why is it important?

These indicators are all measures of a population more likely to experience adverse outcomes from disruptions due to extreme weather events, climate change, pollution, or limited health care access.

Particularly high percentages for any of these indicators may highlight populations that are at higher risk and in need of outreach from disaster planning, public health, or social service organizations.

CHANGES IN BOUNDARIES: Data describing change over time can be misleading when geographic boundaries have changed.
The Census provides documentation about changes in boundaries at this site: www.census.gov/geo/reference/boundary-changes.html

Endnotes

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Table 3-7: Gann/Brinkhaven Mitigation Strategies

GOAL 1- FLOOD: Gann will take action to reduce the effects of all types of flooding		
1-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up flooding.		
COMPLETED	CONTINUE	DELETED
1-2. Elevate structures (buildings, roadways, bridges, culverts etc.) to remove them from flood-prone areas.		
COMPLETED	CONTINUE	DELETED
1-3. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
1-4. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
COMPLETED	CONTINUE	DELETED
1-5. Manage stream flow through channelization, sedimentation removal, debris and obstruction removal, and stream ecology management practices.		
COMPLETED	CONTINUE	DELETED
1-6. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
COMPLETED	CONTINUE	DELETED
1-7. Adopt and/or enforce floodplain, zoning, and building regulations to manage development in areas without regulations or standards; and take part in revision of flood maps, monitoring the need for local construction regulation and maintaining adequate efforts to reduce vulnerability through management of development.		
COMPLETED	CONTINUE	DELETED
1-8. Join NFIP and resolve sanctions consider CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – INFRASTRUCTURE: Gann will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
2-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
2-2. Improve and repair roadways that are damaged by rapid runoff and heavy precipitation.		
COMPLETED	CONTINUE	DELETED
2-3. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
2-4. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.)		
COMPLETED	CONTINUE	DELETED
2-5. Repair, replace, retrofit, or upgrade communications equipment including towers, transmission lines, distribution lines, receivers and transmitters to provide improved or redundant capabilities to communicate at all times.		
COMPLETED	CONTINUE	DELETED
2-6. Replace roadways and streets with deteriorating pavement due to heavy drainage; replace worn bridges and culverts and increase size and span as appropriate.		
COMPLETED	CONTINUE	DELETED

GOAL 3 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Gann will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
3-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
3-2. Maintain trees and vegetation on public property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED
3-3. Develop agreements for safety shelters to be used for a variety of disaster-related purposes during severe storms and/or evacuations, including areas like stadiums and parks used for recreation, public gatherings, or other assemblies.		
COMPLETED	CONTINUE	DELETED

Table 3-3: Centerburg Mitigation Strategies

GOAL 1 – FLOOD: Centerburg will take action to reduce the effects of all types of flooding.		
1-1. Maintain water control structures (reservoirs, retention/detention ponds) in new or existing property to lessen the effects of flash and storm sewer back up flooding.		
COMPLETED	CONTINUE	DELETED
1-2. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
1-3. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
COMPLETED	CONTINUE	DELETED
1-4. Manage stream flow through channelization, sedimentation removal, debris and obstruction removal, and stream ecology management practices.		
COMPLETED	CONTINUE	DELETED
1-5. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems		
COMPLETED	CONTINUE	DELETED
1-6. Enforce floodplain, zoning, and building regulations to manage development in areas without regulations or standards; and take part in revision of flood maps, monitoring the need for local construction regulation and maintaining adequate efforts to reduce vulnerability through management of development.		
COMPLETED	CONTINUE	DELETED
1-7. Maintain membership, join, or resolve sanctions with NFIP; establish CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
1-8. Identify and implement means to collect debris in runoff water and manage it before it clogs ditches, streams, culverts, and other waterways.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – INFRASTRUCTURE: Centerburg will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
2-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
2-2. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
2-3. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
GOAL 3 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Centerburg will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
3-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
3-2. Maintain trees and vegetation on public property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED

3-3. Improve and/or maintain warning and notification systems to warn the public about impending dangers and threats.		
COMPLETED	CONTINUE	DELETED
3-4. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
COMPLETED	CONTINUE	DELETED
3-5. Educate the community about warnings and notifications and the actions they should take when a one is issued.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – WATER QUALITY: Centerburg will take action to protect the sources of water so that a safe potable water supply is available for county residents.		
4-1. Advocate for improvements to water treatment plants to include enhanced testing and monitoring, and to improve treatment capabilities.		
COMPLETED	CONTINUE	DELETED

Table 3-4: Danville Mitigation Strategies

GOAL 1 – FLOOD: Danville will take action to reduce the effects of all types of flooding.		
1-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up.		
COMPLETED	CONTINUE	DELETED NO major Factors
1-2. Elevate structures (buildings, roadways, bridges, culverts etc.) to remove them from flood-prone areas.		
COMPLETED	CONTINUE	DELETED
1-3. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding. NONE IN AREA		
COMPLETED	CONTINUE	DELETED
1-4. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
COMPLETED	CONTINUE	DELETED
1-5. Adopt and/or enforce floodplain and zoning regulations to manage development; and take part in revision of flood maps, monitoring the need for local construction regulation and maintaining adequate efforts to reduce vulnerability through management of development. NO		
COMPLETED	CONTINUE	DELETED
1-6. Maintain membership, join, or resolve sanctions with NFIP; establish CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
1-7. Add rapidly deployable signs to mark flooded roadways quickly.		
COMPLETED	CONTINUE	DELETED
1-8. Protect waterway banks and land near waterways from deterioration due to rapid or excessive flow by planting vegetation, installing dormant woody stakes and posts, planting trees, shrubs and grasses along banks and berms, or using deflectors to prevent deterioration, or other methods to accomplish the same.		
COMPLETED	CONTINUE	DELETED
1-9. Utilize biotechnical methods (placement of willow posts, hardwood tree plantings, fascines, brush layering, evergreen revetments, log revetments, tree kickers, lunker structures, or placed rocks as examples) to minimize the deterioration or destruction of stream banks due to excessive flow.		
COMPLETED	CONTINUE	DELETED
1-10. Maintain and improve soil quality through crop rotation, crop residue management, contour buffer strips, contour farming and strip-cropping, use of cover crops, installation of field borders, rotation grazing, pasture planting, establishment of grassy waterways, grade stabilization structures, water and sediment control basins, critical area planting, diversion, terracing, manure storage and runoff control, nutrient management, pest management, well abandonment, riparian buffers, wetland restoration, windbreaks, woodlot management, tree planting, and creation of upland wildlife habitat. outside Village		
COMPLETED	CONTINUE	DELETED
1-11. Adopt, support, and enforce zoning and building codes that prevent construction in flood zones, and that support construction practices that mitigate damage due to flood for structures built in vulnerable areas. No		
COMPLETED	CONTINUE	DELETED
GOAL 2 – HAZARDOUS MATERIALS: Danville will take action to prevent, manage, and reduce the consequences from spills and leaks of hazardous materials.		
2-1 Ensure that signage on highways and roadways is clear and easy to follow to decrease the likelihood of vehicle accidents due to unsure routes of travel.		
COMPLETED	CONTINUE	DELETED

Was any of this done w/ zoning updates?

Not sure how many roads

Did zoning do this?

2-2. Advocate for funding and conducting additional first responder training to cover not only highway hazardous materials incidents but also pipeline and intermodal systems.		
COMPLETED	CONTINUE	DELETED
GOAL 3 – INFRASTRUCTURE: Danville will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
3-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
3-2. Improve and repair roadways that are damaged by rapid runoff and heavy precipitation.		
COMPLETED	CONTINUE	
3-3. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
3-4. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.).		
COMPLETED	CONTINUE	DELETED
3-4. Conduct hydrology and hydraulics, storm water and sewer, inundation, and other studies to determine the root cause of flooding and water management problems as well as vulnerable populations and property.		
COMPLETED	CONTINUE	DELETED
3-5. Maintain, repair, upgrade and/or replace water treatment and distribution systems.		
COMPLETED	CONTINUE	DELETED
3-6. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
3-7. Replace roadways and streets with deteriorating pavement due to heavy drainage; replace worn bridges and culverts and increase size and span as appropriate.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – LAND SUBSIDENCE/LANDSLIDE: Danville will reduce the effects of land subsidence and landslides.		
4-1. Support and implement slope protection actions where landslides are possible and along waterways and other vulnerable areas where natural occurrences endanger property, structures, or where other geological vulnerabilities exist. No cliffs for Slides		
COMPLETED	CONTINUE	DELETED
GOAL 5 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Danville will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
5-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
5-2. Maintain trees and vegetation on public property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED
5-3. Develop agreements for safety shelters to be used for a variety of disaster-related purposes during severe storms and/or evacuations, including areas like stadiums and parks used for recreation, public gatherings, or other assemblies. Community center Fire house School		
COMPLETED	CONTINUE	DELETED
5-4. Improve and/or maintain warning and notification systems to warn the public about impending dangers and threats. New Siren @ Firehouse		

been talking about storm drain

need more funds to help

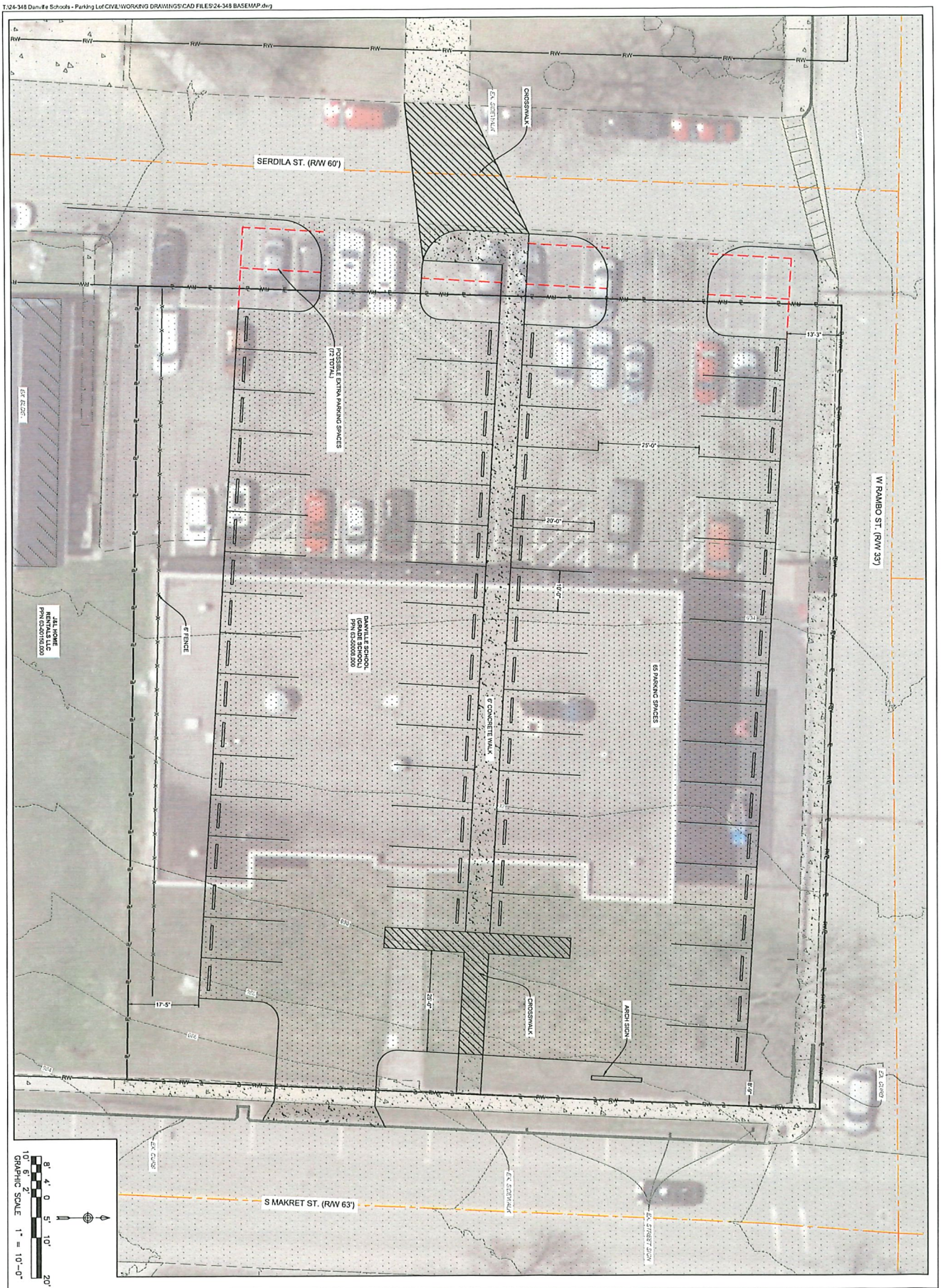
we have been doing this 4 yrs.

County fund

COMPLETED	CONTINUE	DELETED
5-5. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems. I CAll		
COMPLETED	CONTINUE	DELETED
5-6. Educate the community about warnings and notifications and the actions they should take when issued.		
COMPLETED	CONTINUE	DELETED
5-7. Educate the community about protective actions they should take when an emergency notice is issued.		
COMPLETED	CONTINUE	DELETED
5-8. Educate the public about shelter locations and the routes that should be used to access these shelters in an emergency situation.		
COMPLETED	CONTINUE	DELETED
5-9. Work to develop affordable and functional county-wide public safety communication system with the capability for multi-discipline and multi-jurisdictional communication.		
COMPLETED	CONTINUE	DELETED
GOAL 6 – WATER QUALITY: Danville will take action to protect the sources of water so that a safe potable water supply is available for residents.		
6-1. Advocate for improvements to water treatment plants to include enhanced testing and monitoring, and to improve treatment capabilities.		
COMPLETED	CONTINUE	DELETED
6-2. Advocate and support continuing research into all causes of water quality issues, including analysis of practices by industrial, personal, manufacturing, and agricultural communities.		
COMPLETED	CONTINUE	DELETED
6-3. Develop inter-connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.		
COMPLETED	CONTINUE	DELETED

Website to help

T:\24-348 Danville Schools - Parking Lot\CIVIL\WORKING DRAWINGS\CAD FILES\24-348 BASEMAP.dwg



DANVILLE SCHOOLS PARKING LOT

405 S. MARKET ST.
DANVILLE, OHIO, 43014
KNOX COUNTY

SITE PLAN

C-200

Sheet
Job: 24-348
Scale: AS NOTED
Date: 6/11/2025

CONTRACTOR :

DRAFT ONLY NOT FOR CONSTRUCTION

SEAL

TEKTON ENGINEERING
4805 E. MAIN ST, P.O. BOX 347 BERLIN, OH 44610
PHONE # 330-893-0230 WWW.TEKTON-ENG.COM

– FREDERICKTOWN –

Table 3-5: Fredericktown Mitigation Strategies

GOAL 1 – EARTHQUAKE: Fredericktown will take action to assess and mitigate the effects of potential earthquakes.		
1-1. Identify the structures and infrastructure in the county that would likely be damaged or destroyed in an earthquake of moderate to severe magnitude.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – FLOOD: Fredericktown will take action to reduce the effects of all types of flooding.		
2-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up.		
COMPLETED	CONTINUE	DELETED
22- Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
2-3 Utilize channel diversion or channel modification (deepening or widening) to re-route water or increase capacity and reduce flooding.		
COMPLETED	CONTINUE	DELETED
2-4. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
COMPLETED	CONTINUE	DELETED
2-5. Maintain participation, join, or resolve sanctions with NFIP; establish CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
2-6. Identify repetitive loss and severe repetitive loss structures in the jurisdiction, and will advocate for mitigation actions regarding these properties.		
COMPLETED	CONTINUE	DELETED
2-7. Add rapidly deployable signs to mark flooded roadways quickly.		
COMPLETED	CONTINUE	DELETED
2-8. Utilize natural habitats and/or vegetative buffers inside waterways to slow the rapid flow of floodwater and/or hold excess storm water.		
COMPLETED	CONTINUE	DELETED
GOAL 3 – HAZARDOUS MATERIALS: Fredericktown will take action to prevent, manage, and reduce the consequences from spills and leaks of hazardous materials.		
3-1. Advocate for funding and conducting additional first responder training to cover not only highway hazardous materials incidents but also pipeline and intermodal systems.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – INFRASTRUCTURE: Fredericktown will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
4-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
4-2. Ensure that high hazard and classified dams have current emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.		
COMPLETED	CONTINUE	DELETED
4-3. Maintain, repair, and replace dams and upground reservoirs that are structurally compromised or that place the public in danger during a structural failure.		
COMPLETED	CONTINUE	DELETED

4-4. Improve and repair roadways that are damaged by rapid runoff and heavy precipitation.		
COMPLETED	CONTINUE	DELETED
4-5. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
4-5. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.).		
COMPLETED	CONTINUE	DELETED
4-6. Conduct hydrology and hydraulics, storm water and sewer, inundation, and other studies to determine the root cause of flooding and water management problems as well as vulnerable populations and property.		
COMPLETED	CONTINUE	DELETED
4-7. Maintain, repair, upgrade and or replace water treatment and distribution systems.		
COMPLETED	CONTINUE	DELETED
4-8. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
4-9. Replace roadways and streets with deteriorating pavement due to heavy drainage; replace worn bridges and culverts and increase size and span as appropriate.		
COMPLETED	CONTINUE	DELETED
4-10. Develop infrastructure redundancy through the addition of generators, development of alternate power, water, and fuel supplies; and addition of alternate vendors for service and products like portable generators, fuel supplies, bottled water, etc.		
COMPLETED	CONTINUE	DELETED
GOAL 5 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Fredericktown will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
5-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
5-2. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
COMPLETED	CONTINUE	DELETED
GOAL 6 – WATER QUALITY: Fredericktown will take action to protect the sources of water so that a safe potable water supply is available for county residents.		
6-1. Develop inter-connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.		
COMPLETED	CONTINUE	DELETED

RICK LANUZZA - COUNCIL PRES
JERRY DAY - MAYOR
BRUCE SNELL - VILLAGE ADMIN

Table 3-6: Gambier Mitigation Strategies

GOAL 1 – FLOOD: Gambier will take action to reduce the effects of all types of flooding.		
1-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up flooding.		
COMPLETED	CONTINUE	DELETED
1-2. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
1-3. Utilize channel diversion or channel modification (deepening or widening) to re-route water or increase capacity and reduce flooding.		
COMPLETED	CONTINUE	DELETED
1-4. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
COMPLETED	CONTINUE	DELETED
1-5. Manage stream flow through channelization, sedimentation removal, debris and obstruction removal, and stream ecology management practices.		
COMPLETED	CONTINUE	DELETED
1-6. Develop, implement, and maintain the capability to prevent flood damages to property though use of sandbags and other wind and water proofing techniques.		
COMPLETED	CONTINUE	DELETED
1-7. Add rapidly deployable signs to mark flooded campus roadways and common-use areas quickly.		
COMPLETED	CONTINUE	DELETED
1-8. Advocate the use of green materials and practices in new college development, such as green parking policies, green roof materials, and alternate paving materials that promote absorption instead of runoff.		
COMPLETED	CONTINUE	DELETED
1-9. Maintain participation, join, or resolve sanctions with NFIP; establish CRS participation; and/or engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – INFRASTRUCTURE: Gambier will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
2-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
2-2. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.).		
COMPLETED	CONTINUE	DELETED
2-3. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
2-4. Replace roadways and streets with deteriorating pavement due to heavy drainage; replace worn bridges and culverts and increase size and span as appropriate.		
COMPLETED	CONTINUE	DELETED
2-5. Upgrade or replace communications equipment to provide adequate and timely emergency notifications to students and staff.		
COMPLETED	CONTINUE	DELETED

2-6. Acquire generators for alternate power during an extended outage and identify alternate vendors for fuel supplies, bottled water, and other critical supplies.		
COMPLETED	CONTINUE	DELETED
2-7. Develop facilities to be utilized for comfort centers when utility outages occur during periods of extreme heat.		
COMPLETED	CONTINUE	DELETED
GOAL 3 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Gambier will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
3-1. Support the construction of safe rooms for single- and multi-family homes and areas such as college residence halls, mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
3-2. Repair or retrofit public and college properties with wind-resistant materials (i.e. metal roofing, siding, wind-resistant glass, etc.) to decrease damage due to wind or other storms.		
COMPLETED	CONTINUE	DELETED
3-3. Maintain trees and vegetation on public and college property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED
3-4. Develop agreements for safety shelters to be used for a variety of disaster-related purposes during severe storms and/or evacuations, including areas like stadiums and parks used for recreation, public gatherings, or other assemblies.		
COMPLETED	CONTINUE	DELETED
3-5. Improve and maintain warning and notification systems to warn the public and college community about imminent threats and hazards.		
COMPLETED	CONTINUE	DELETED
3-6. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
COMPLETED	CONTINUE	DELETED
3-7. Educate college students and staff about warnings and the actions they should take when a one is issued.		
COMPLETED	CONTINUE	DELETED
3-8. Work to provide necessary services to populations with functional needs during disasters.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – WATER QUALITY: Gambier will take action to protect the sources of water so that a safe potable water supply is available for residents.		
4-1. Work for early and pro-active collaboration between jurisdictions regarding spills or leaks into the water supply that will eventually affect water quality in the county.		
COMPLETED	CONTINUE	DELETED
4-2. Develop inter-connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.		
COMPLETED	CONTINUE	DELETED
GOAL 5 – WINTER STORMS: Gambier will take action to protect the community from the effects of severe winter storm incidents.		
5-1. Establish procedures to notify students and staff of extreme cold and the dangers of exposure.		
COMPLETED	CONTINUE	DELETED
5-2. Establish locations to be used as warming centers during periods of extreme cold, utility outages, or other interruptions of heat.		
COMPLETED	CONTINUE	DELETED

Table 3-2: Knox County Mitigation Strategies

GOAL 1 – EARTHQUAKE: Knox County will take action to assess and mitigate the effects of earthquakes.		
1-1. Identify the structures and infrastructure in the county that would likely be damaged or destroyed in an earthquake of moderate to severe magnitude.		
Completed	Continue	Delete
1-2. Identify likely debris that would result from an earthquake of moderate magnitude and identify potential means and methods to manage that debris.		
Completed	Continue	Delete
GOAL 2 – FLOOD: Knox County will take action to reduce the effects of all types of flooding.		
2-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up flooding.		
Completed	Continue	Delete
2-2. Elevate structures (buildings, roadways, bridges, culverts etc.) to remove them from flood-prone areas.		
Completed	Continue	Delete
2-3. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
Completed	Continue	Delete
2-4. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
Completed	Continue	Delete
2-5. Develop, implement, and maintain the capability to prevent flood damages to properties though use of sandbags and other wind- and water-proofing techniques.		
Completed	Continue	Delete
2-6. Support and promote the preservation of natural habitat and wetlands, especially along waterways, and support the restoration of natural habitat and wetlands where development has encroached upon those areas.		
Completed	Continue	Delete
2-7. Identify and implement means to collect crop debris in runoff water and manage it before it clogs ditches, streams, culverts, and other waterways.		
Completed	Continue	Delete
2-8. Manage stream flow through channelization, sediment removal, debris and obstruction removal, and stream ecology management practices.		
Completed	Continue	Delete
2-9. Continue to collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
Completed	Continue	Delete
2-10. Adopt and/or enforce floodplain, zoning, and building regulations to manage development in areas without regulations or standards and take part in revision of flood maps, monitoring the need for local construction regulation and maintaining adequate efforts to reduce vulnerability through management of development.		
Completed	Continue	Delete
2-11. Maintain participation, join, or resolve sanctions with NFIP; establish CRS participation; and/or engage in federal floodplain activities to support flood prevention.		
Completed	Continue	Delete
2-12. Add rapidly deployable signs to quickly mark flooded roadways.		
Completed	Continue	Delete

2-13. Protect waterway banks and land near waterways from deterioration due to rapid or excessive flow by planting vegetation, installing dormant woody stakes and posts, planting trees, shrubs and grasses along banks and berms, or using deflectors to prevent deterioration, or other similar methods to accomplish the same.		
Completed	Continue	Delete
2-14. Utilize biotechnical methods (placement of willow posts, hardwood tree plantings, fascines, brush layering, evergreen revetments, log revetments, tree kickers, lunker structures, or placed rocks as examples) to minimize the deterioration or destruction of stream banks due to excessive flow.		
Completed	Continue	Delete
2-15. Utilize natural habitats and/or vegetative buffers inside waterways to slow the rapid flow of floodwater and/or hold excess storm water.		
Completed	Continue	Delete
2-16. Utilize stream bank protection measures such as gabion revetments, riprap revetments, crib walls, and other structural methods to protect the banks and berms as well as current use of the areas.		
Completed	Continue	Delete
2-17. Advocate the use of green materials and practices in development, such as green parking policies, green roof materials, and alternate paving materials that promote absorption instead of runoff.		
Completed	Continue	Delete
2-18. Advocate for, support, and implement slope protection actions along waterways and other vulnerable areas with the purpose of protecting not only the shoreline but also the constructed improvements to the property.		
Completed	Continue	Delete
2-19. Maintain and improve soil quality through crop rotation, crop residue management, contour buffer strips, contour farming and strip-cropping, use of cover crops, installation of field borders, rotation grazing, pasture planting, establishment of grassy waterways, grade stabilization structures, water and sediment control basins, critical area planting, diversion, terracing, manure storage and runoff control, nutrient management, pest management, well abandonment, riparian buffers, wetland restoration, windbreaks, woodlot management, tree planting, and creation of upland wildlife habitat.		
Completed	Continue	Delete
2-20. Encourage management of surface runoff and chemical residue through techniques such as installation of grassy waterways, creation of infiltration basins and trenches, porous pavement installation, filtration techniques like use of catch basin inserts, sand and organic filters, rain gardens and vegetated filter strips.		
Completed	Continue	Delete
GOAL 3 – HAZARDOUS MATERIALS: Knox County will take action to prevent, manage, and reduce the consequences from spills and leaks of hazardous materials.		
3-1. Ensure that signage on highways and roadways is clear and easy to follow to decrease the likelihood of vehicle accidents due to unsure routes of travel.		
Completed	Continue	Delete
GOAL 4 – INFRASTRUCTURE: Knox County will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
4-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; and repair or replace stormwater basins.		
Completed	Continue	Delete
4-2. Ensure that high hazard and classified dams have current emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure		
Completed	Continue	Delete
4-3. Maintain, repair, and replace dams and upground reservoirs that are structurally compromised or that place the public in danger during a structural failure.		

Completed	Continue	Delete
4-4. Improve and repair roadways and worn bridges and culverts that are damaged by rapid runoff and heavy precipitation.		
Completed	Continue	Delete
4-5. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
Completed	Continue	Delete
4-6. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.)		
Completed	Continue	Delete
4-7. Conduct hydrology and hydraulics, storm water and sewer, inundation, and other studies to determine the root cause of flooding and water management problems as well as the vulnerable populations and property.		
Completed	Continue	Delete
4-8. Maintain, repair, upgrade, and/or replace water treatment and distribution systems.		
Completed	Continue	Delete
4-9. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
Completed	Continue	Delete
4-10. Repair, replace, retrofit, or upgrade communications equipment including towers, transmission lines, distribution lines, receivers and transmitters to provide improved or redundant capabilities to communicate at all times.		
Completed	Continue	Delete
4-11. Develop infrastructure redundancy through the development of alternate vendors for services and products like portable generators, fuel supplies, bottled water, etc.		
Completed	Continue	Delete
GOAL 5 – LAND SUBSIDENCE/LANDSLIDE: Knox County will reduce the effects of land subsidence and landslides.		
5-1. Support and implement slope protection actions along waterways and other vulnerable areas where landslides are possible and natural occurrences endanger property, structures, or where other geological vulnerabilities exist.		
Completed	Continue	Delete
5-2. Develop collaborative efforts with environmental advocates to accurately identify risk to groundwater resources in the county and collaborate to prevent contamination of the groundwater.		
Completed	Continue	Delete
GOAL 6 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Knox County will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
6-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, parks and recreation areas, campgrounds, apartments, condominium neighborhoods, etc.		
Completed	Continue	Delete
6-2. Repair or retrofit public properties with wind-resistant materials (i.e. metal roofing, siding, wind-resistant glass, etc.) to decrease damage due to wind or other storms.		
Completed	Continue	Delete
6-2. Maintain trees and vegetation on public property and remove dead or diseased trees that are vulnerable to wind damage.		

Completed	Continue	Delete
6-3. Develop agreements for safety shelters to be used for a variety of disaster-related purposes during severe storms and/or evacuations, including areas like stadiums and parks used for recreation, public gatherings, or other assemblies.		
Completed	Continue	Delete
6-4. Improve and/or maintain warning and notification systems to warn the public about impending dangers and threats.		
Completed	Continue	Delete
6-4. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
Completed	Continue	Delete
6-5. Work with the community to identify resources for affordable debris disposal after storms, possibly through creation of special programs for facilities that will receive debris after storms.		
Completed	Continue	Delete
GOAL 7 – WATER QUALITY: Knox County will take action to protect the sources of water so that a safe potable water supply is available for residents.		
7-1. Advocate for improvements to water treatment plants to include enhanced testing and monitoring and to improve treatment capabilities.		
Completed	Continue	Delete
7-2. Advocate and support continuing research into all causes of water quality issues, including analysis of practices by industrial, personal, manufacturing, and agricultural communities.		
Completed	Continue	Delete
7-3. Develop inter-connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.		
Completed	Continue	Delete
7-4. Support the implementation of measures to manage distressed watershed in the county and advocate for support programs to help farmers implement nutrient management programs while maintaining agricultural economic well-being.		
Completed	Continue	Delete

Table 3-8: Martinsburg Mitigation Strategies

GOAL 1 – FLOOD: Martinsburg will take action to reduce the effects of all types of flooding.		
1-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up flooding.		
COMPLETED	CONTINUE	DELETED
1-2. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
1-3. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
COMPLETED	CONTINUE	DELETED
1-4. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
COMPLETED	CONTINUE	DELETED
1-5. Maintain participation, join, or resolve sanctions with NFIP; establish CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
1-6. Identify and implement means to collect crop debris in runoff water and manage it before it clogs ditches, streams, culverts, and other waterways.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – INFRASTRUCTURE: Martinsburg will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
2-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; and repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
2-2. Improve and repair roadways that are damaged by rapid runoff and heavy precipitation.		
COMPLETED	CONTINUE	DELETED
2-3. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
2-4. Identify alternate/back-up utility resources for use when a primary energy source is compromised (generators, redundant suppliers, etc.).		
COMPLETED	CONTINUE	DELETED
2-5. Conduct hydrology and hydraulics, storm water and sewer, inundation, and other studies to determine the root cause of flooding and water management problems as well as the vulnerable populations and property.		
COMPLETED	CONTINUE	DELETED
2-6. Maintain, repair, upgrade and or replace water treatment and distribution systems.		
COMPLETED	CONTINUE	DELETED
2-7. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
2-8. Repair, replace, retrofit, or upgrade communications equipment including towers, transmission lines, distribution lines, receivers and transmitters to provide improved or redundant capabilities to communicate at all times.		
COMPLETED	CONTINUE	

GOAL 3 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Martinsburg will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
3-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
3-2. Maintain trees and vegetation on public property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED
3-3. Develop agreements for safety shelters to be used for a variety of disaster-related purposes during severe storms and/or evacuations, including areas like stadiums and parks used for recreation, public gatherings, or other assemblies.		
COMPLETED	CONTINUE	DELETED
3-3. Improve and/or maintain warning and notification systems to warn the public about impending dangers and threats.		
COMPLETED	CONTINUE	DELETED
3-4. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
COMPLETED	CONTINUE	DELETED
3-5. Educate the community about warnings and notifications and the actions they should take when one is issued.		
COMPLETED	CONTINUE	DELETED
3-6. Educate the public about what to do in emergency situations such as tornado/severe thunderstorm/wind storm/earthquake/flood/flash flood/blizzard.		
COMPLETED	CONTINUE	DELETED
3-7. Work to develop affordable and functional county-wide public safety communication system with the capability for multi-discipline and multi-jurisdictional communication.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – WATER QUALITY: Martinsburg will take action to protect the sources of water so that a safe potable water supply is available for residents.		
4-1. Advocate for improvements to water treatment plants to include enhanced testing and monitoring, and to improve treatment capabilities.		
COMPLETED	CONTINUE	DELETED

Table 3-9: Mount Vernon Mitigation Strategies

GOAL 1 – EARTHQUAKE: Mount Vernon will take action to assess and mitigate the effects of potential earthquakes.		
1-1. Identify the structures and infrastructure in the county that would likely be damaged or destroyed in an earthquake of moderate to severe magnitude.		
COMPLETED	CONTINUE	DELETED
GOAL 2 – FLOOD: Mount Vernon will take action to reduce the effects of all types of flooding.		
2-1. Construct or maintain water control structures (reservoirs, retention/detention ponds, dams, levees, dikes, floodwalls, etc.) in new or existing property to lessen the effects of flash and storm sewer back up.		
COMPLETED	CONTINUE	DELETED
2-2. Elevate structures (buildings, roadways, bridges, culverts etc.) to remove them from flood-prone areas.		
COMPLETED	CONTINUE	DELETED
2-3. Utilize acquisition, demolition, and relocation for properties that suffer repetitive flood loss and/or experience repeated damage to structures from all types of flooding.		
COMPLETED	CONTINUE	DELETED
2-4. Utilize channel diversion or channel modification (deepening or widening) to re-route water or increase capacity and reduce flooding.		
COMPLETED	CONTINUE	DELETED
2-5. Clear debris, fallen trees, excess sediment, etc. from waterways to improve flow.		
COMPLETED	CONTINUE	DELETED
2-6. Manage stream flow through channelization, sedimentation removal, debris and obstruction removal, and stream ecology management practices.		
COMPLETED	CONTINUE	DELETED
2-7. Collaborate with watershed and conservancy districts and other counties that share an interest in common waterways to facilitate cleaning, maintaining, and correcting watershed problems.		
COMPLETED	CONTINUE	DELETED
2-8. Enforce floodplain, zoning, and building regulations to manage development in areas without regulations or standards; and take part in revision of flood maps, monitoring the need for local construction regulation and maintaining adequate efforts to reduce vulnerability through management of development.		
COMPLETED	CONTINUE	DELETED
2-9. Maintain participation in NFIP; establish CRS participation; engage in federal floodplain activities to support flood prevention.		
COMPLETED	CONTINUE	DELETED
2-10. Identify and implement means to collect crop debris in runoff water and manage it before it clogs ditches, streams, culverts, and other waterways.		
COMPLETED	CONTINUE	DELETED
2-11. Protect waterway banks and land near waterways from deterioration due to rapid or excessive flow by planting vegetation, installing dormant woody stakes and posts, planting trees, shrubs and grasses along banks and berms, or using deflectors to prevent deterioration, or other similar methods.		
COMPLETED	CONTINUE	DELETED
2-12. Utilize biotechnical methods (placement of willow posts, hardwood tree plantings, fascines, brush layering, evergreen revetments, log revetments, tree kickers, lunker structures, or placed rocks as examples) to minimize the deterioration or destruction of stream banks due to excessive flow.		
COMPLETED	CONTINUE	DELETED
2-13. Utilize natural habitats and/or vegetative buffers inside waterways to slow the rapid flow of floodwater and/or hold excess storm water.		
COMPLETED	CONTINUE	DELETED
2-14. Utilize stream bank protection measures such as gabion revetments, riprap revetments, and crib walls, and other structural methods to protect the banks and berms as well as current use of the areas.		
COMPLETED	CONTINUE	DELETED

2-15. Require developers and/or construction crews in urban development zones to use tools such as chemical stabilization, compost blankets, geotextiles to control soil deterioration, mulching of new plantings, seeding and sodding of areas highly vulnerable to rapid surface runoff, installation of grass lined channels, slope diversion for surface runoff, and other methods to reduce the damages to land and property due to heavy and rapid surface runoff or drainage from rainfall or other precipitation or draining water.		
COMPLETED	CONTINUE	DELETED
2-16. Advocate the use of green materials and practices in development, such as green parking policies, green roof materials, and alternate paving materials that promote absorption instead of runoff.		
COMPLETED	CONTINUE	DELETED
GOAL 3 – INFRASTRUCTURE: Mount Vernon will act to harden, improve, and replace various forms of infrastructure to reduce damages and consequences from storms and disasters.		
3-1. Maintain, repair, upgrade, and/or replace storm sewers and wastewater management systems; add street curbs or replace deteriorating ones; repair or replace stormwater basins.		
COMPLETED	CONTINUE	DELETED
3-2. Ensure that high hazard and classified dams have current emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.		
COMPLETED	CONTINUE	DELETED
3-3. Maintain, repair, and replace dams and up-ground reservoirs that are structurally compromised or that place the public in danger during a structural failure.		
COMPLETED	CONTINUE	DELETED
3-4. Improve and repair roadways that are damaged by rapid runoff and heavy precipitation.		
COMPLETED	CONTINUE	DELETED
3-5. Advocate and support improvements to utility systems (distribution lines, generating plants, pumps, filters, and other system components) that result in more dependable, resilient infrastructure for the purpose of maintaining lifelines during disaster response and recovery.		
COMPLETED	CONTINUE	DELETED
3-6. Conduct hydrology and hydraulics, storm water and sewer, inundation, and other studies to determine the root cause of flooding and water management problems as well as vulnerable populations and property.		
COMPLETED	CONTINUE	DELETED
3-7. Maintain, repair, upgrade and or replace water treatment and distribution systems.		
COMPLETED	CONTINUE	DELETED
3-8. Replace, improve, or create sanitary sewer systems for neighborhoods, subdivisions or jurisdictions to replace septic systems or outdated sewer systems.		
COMPLETED	CONTINUE	DELETED
3-9. Repair, replace, retrofit, or upgrade communications equipment including towers, transmission lines, telephone lines, distribution lines, receivers and transmitters to provide improved or redundant capabilities to communicate at all times.		
COMPLETED	CONTINUE	DELETED
3-10. Replace roadways and streets with deteriorating pavement due to heavy drainage; replace worn bridges and culverts and increase size and span as appropriate.		
COMPLETED	CONTINUE	DELETED
3-11. Develop infrastructure redundancy through the addition of generators, development of alternate power, water, and fuel supplies; and addition of alternate vendors for service and products like portable generators, fuel supplies, bottled water, etc.		
COMPLETED	CONTINUE	DELETED
3-12. Develop infrastructure system redundancy for operating contingencies and individual response plans for all facilities serving critical users and perform an annual review of these critical user facilities and coordination efforts.		
COMPLETED	CONTINUE	DELETED
GOAL 4 – LAND SUBSIDENCE: Mount Vernon will reduce the effects of various forms of land subsidence and landslides.		

4-1. Provide programs that reduce sedimentation along shorelines, riverbanks, ditch banks, road berms, and areas that wash away		
COMPLETED	CONTINUE	DELETED
4-2. Develop collaborative efforts with environmental advocates to prevent contamination of groundwater.		
COMPLETED	CONTINUE	DELETED
GOAL 5 – SEVERE STORMS (THUNDERSTORM, TORNADO, WIND): Mount Vernon will take action to reduce the consequences and damages from severe thunderstorms, windstorms, and other severe weather.		
5-1. Support the construction of safe rooms for single- and multi-family homes and areas such as mobile home parks, campgrounds, apartment complexes, condominium neighborhoods, etc.		
COMPLETED	CONTINUE	DELETED
5-2. Repair or retrofit public properties with wind-resistant materials (i.e. metal roofing, siding, wind-resistant glass, etc.) to decrease damage due to wind or other storms.		
COMPLETED	CONTINUE	DELETED
5-3. Maintain trees and vegetation on public property, and remove dead or diseased trees that are vulnerable to wind damage.		
COMPLETED	CONTINUE	DELETED
5-4. Support implementation of construction standards that require wind resistant building materials and roofing types for structures.		
COMPLETED	CONTINUE	DELETED
5-5. Promote warning and notification systems to warn the public about impending dangers and threats.		
COMPLETED	CONTINUE	DELETED
5-6. Enhance warning and notification systems through improvements to digital technology and other hardware and software used in the operation of warning and notification systems.		
COMPLETED	CONTINUE	DELETED
5-7. Educate the community about warnings and notifications and the actions they should take when issued.		
COMPLETED	CONTINUE	DELETED
5-8. Educate the community about the protective actions they should take when an emergency occurs.		
COMPLETED	CONTINUE	
5-9. Teach school aged children about 9-1-1 and emergency warning and notification systems, including what to do when a warning is issued.		
COMPLETED	CONTINUE	DELETED
5-10. Educate the public about what to do in emergency situations such as tornado/severe thunderstorm/wind storm/earthquake/flood/flash flood/blizzard.		
COMPLETED	CONTINUE	DELETED
5-11. Advocate for residents to carry adequate and appropriate insurances to protect them from loss.		
COMPLETED	CONTINUE	DELETED
5-12. Work to develop an affordable and functional city communication system with the capability for multi-discipline and multi-jurisdictional communication.		
COMPLETED	CONTINUE	DELETED
GOAL 6 – WATER QUALITY: Mount Vernon will take action to protect the sources of water so that a safe potable water supply is available for residents.		
6-1. Advocate for improvements to water treatment plants to include enhanced testing and monitoring, and to improve treatment capabilities.		
COMPLETED	CONTINUE	DELETED
6-2. Advocate and support continuing research into all causes of water quality issues, including analysis of old industrial sites that are now abandoned or not being used.		
COMPLETED	CONTINUE	DELETED
6-3. Develop inter-connected and redundant water systems that are able to switch over when one is contaminated to provide a safe water supply for the population.		
COMPLETED	CONTINUE	DELETED

Knox County Hazard Mitigation Plan
Map and Table List

01 THE PLANNING PROCESS

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