



**Lucas County, Ohio
Countywide All Natural
Hazard Mitigation Plan
2013 Plan Revision**

**Lucas County Emergency Management Agency
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Toledo, Ohio 43624**

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List of Acronyms

CANHMP	Countywide All Natural Hazard Mitigation Plan
CPI	Consumer Price Index
DMA2K	Disaster Mitigation Act of 2000
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSA	Farm Service Agency
LCEMA	Lucas County Emergency Management Agency
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
ODNR	Ohio Department of Natural Resources
OEMA	Ohio Emergency Management Agency
PDM Grant	Pre-Disaster Mitigation Planning Grant
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey

1.0 Executive Summary

In response to the Disaster Mitigation Act of 2000, the Lucas County Emergency Management Agency (LCEMA), prepared the initial version of this Countywide All Natural Hazard Mitigation Plan in 2004. The goal of the 2004 plan was to examine the potential natural hazards that could affect Lucas County, estimate the potential future losses that could be expected from each, and develop mitigation Action Items to protect Lucas County against such future losses.

The 2004 Countywide All Natural Hazard Mitigation Plan was adopted by all of the jurisdictions within Lucas County, except the unincorporated areas of Swanton Township. All of the other unincorporated areas within Lucas County, and all four (4) cities and six (6) villages formally adopted the 2004 Countywide All Natural Hazard Mitigation Plan. The final plan, with adoption resolutions, was submitted to OEMA/FEMA in compliance with the Disaster Mitigation Act of 2000, and subsequently approved by FEMA on May 3, 2005.

One of FEMA's mitigation planning requirements is that the Natural Hazard Mitigation Plan must be routinely revised and updated to reflect changes in natural hazard mitigation planning within the covered jurisdictions. Therefore, in 2010 the LCEMA initiated the planning process to revise and update the 2004 Countywide All Natural Hazard Mitigation Plan.

The document herein has been prepared to meet FEMA's mitigation planning requirements for Natural Hazard Mitigation Plan revision. This document shall serve as a stand-alone replacement of the 2004 Natural Hazard Mitigation Plan, and has been prepared following the specific requirements for revision, as outlined in the FEMA publication *Local Multi-Hazard Mitigation Planning Guidance*, dated July 1, 2008.

A similar planning process to the one utilized by the LCEMA during preparation of the 2004 Countywide All Natural Hazard Mitigation Plan was utilized for the 2013 plan revision. Throughout this document, pertinent information from the 2004 Countywide All Natural Hazard Mitigation Plan has remained and documentation of the information that has been removed, updated, revised, or added, is provided.

Throughout the entire planning process, the public was invited to participate. Through press releases of the planning activity, Core Group discussions at their legislative meetings, the county web page and other venues, the public was constantly advised and updated on the progress of the 2013 plan revision.

Pending federal approval, Lucas County and the participating jurisdictions in this 2013 plan revision intend to formally adopt the 2013 plan revision by resolution or ordinance.

2.0 Plan Initiation

The primary purpose of initiating the 2004 Countywide All Natural Hazard Mitigation Plan (CANHMP) process in Lucas County was to identify the community policies, actions, and tools for implementation over the long term that will result in a reduction in risk and potential for future losses from natural hazards within Lucas County. This was systematically accomplished by learning about the natural hazards that could affect Lucas County, setting goals to reduce associated risks, identifying appropriate Action Items to achieve these goals, and ensuring success with a well defined implementation strategy.

The following sub-sections will describe the activities and issues involved when the natural hazard mitigation planning process was initiated. These activities included assessing community support to determine the geographic scope of the project, building the planning team (Core Group and Key Group), and engaging the public in the entire planning process.

As previously stated, a similar planning process was utilized during preparation of the 2013 plan revision. Within each section, the pertinent information from the 2004 CANHMP remains and is supplemented with documentation of the planning process completed for the 2013 plan revision.

2.1 Geographic Scope of the CANHMP

One of the very first steps completed on the Lucas County 2004 CANHMP project was to assess the individual sources for community support for the project and the level of support that could be expected from these entities. This initial step helped Lucas County make decisions regarding which jurisdictions would be included and how large of a geographic scope the CANHMP would cover.

Preparation of the Lucas County 2004 CANHMP was in response to the Federal Disaster Mitigation Act of 2000 (DMA2K), passed by congress, and the subsequently developed rules, published in the Federal Register Notice, Part III 44 CFR Parts 201 and 206 “Hazard Mitigation Planning and Hazard Mitigation Grant Program: Interim Final Rule” dated February 26, 2002. The requirements presented in DMA2K directed States to coordinate with local governments on the formation of local natural hazard mitigation strategies. These strategies are called Local Natural Hazard Mitigation Plans. When all of the Local Natural Hazard Mitigation Plans are combined at the State level, this would form the basis for a Statewide All Natural Hazard Mitigation Plan.

In the instance of this plan, the local government is Lucas County, and the Local Natural Hazard Mitigation Plan has been prepared as a multi-jurisdictional plan referred to as the Lucas County CANHMP. Multi-jurisdictional plans, such as this Lucas County CANHMP, may be accepted as Local Natural Hazard Mitigation Plans under DMA2K as long as each included jurisdiction has participated in the planning process and has officially adopted the plan.

On November 20, 2002 representatives from the Ohio Emergency Management Agency (OEMA) facilitated a Pre-Disaster Mitigation Planning Grant (PDM Grant) Implementation meeting in the LCEMA building. The PDM Program has provided funding to states and communities for cost-effective hazard mitigation activities. In short, the Federal Emergency Management Agency (FEMA) has provided PDM Grants to the State of Ohio that, in turn, has provided sub-grants to local governments (including Lucas County) for mitigation activities such as planning and the implementation of projects identified through the evaluation of natural and man-made hazards. The LCEMA extended an invitation to all Lucas County city, village and township trustees, clerks, and administrators, as well as several local government representatives, to attend the meeting.

The meeting, which lasted approximately two (2) hours, was facilitated by the OEMA representatives and briefly described the PDM Grant implementation process and the CANHMP planning process to all those in attendance. Agenda items included a discussion of: the PDM Grant Program, the requirements of DMA2K, expected timelines and deliverables, the process in which OEMA would administer the program, and a little technical guidance for initiating the first steps of the planning process.

One of the primary outcomes of this meeting was the decision that the geographic scope of the CANHMP project, if feasible, would include all 21 jurisdictions located within Lucas County (**Figure 1 – Geographic Scope**). Those in attendance were asked to forward their contact information, and the contact information of any other groups or individuals within their jurisdiction that would likely be interested in participating on the project, to the LCEMA. LCEMA later used this information to begin formally inviting groups and individuals to join the Core Group and Key Group. A detailed explanation of the formal invitation process is described in sub-section **2.2 - Building the Planning Team**.

For the 2013 plan revision, no PDM Grant Implementation meeting was deemed necessary, as the decision to emulate the 2004 CANHMP by including all 21 jurisdictions within Lucas County had already been made by LCEMA. Additional documentation of how the planning team was formulated for the 2013 plan revision is presented in **Section 2.2 – Building the Planning Team**.

2.2 Building the Planning Team

The first step for Lucas County in fulfilling the requirement for multi-jurisdictional plans set forth by DMA2K was to formally invite all of the jurisdictions located within Lucas County to actively participate in the planning process for the 2004 CANHMP. In early fall of 2002, the LCEMA identified representatives from each of the four cities, six villages, and eleven townships within Lucas County, and sent formal participation request letters to these individuals. The formal participation request letter informed the recipient of the initiation of the CANHMP project, included some of the requirements set forth under DMA2K, and required a return signed participation agreement. Sequential participation request letters were sent to any non-responsive jurisdiction for a period of approximately three (3) months.

As a result of the formal invite, all 21 jurisdictions within Lucas County returned signed participation agreements. It would be these 21 representatives, and other interested parties from their jurisdictions, that would make up the foundation of the planning team for the 2004 CANHMP, and were referred to as the **Core Group Members** throughout that document.

Additional members were added to the Core Group throughout the entire planning process. Several methods were utilized to inform adjacent counties, neighborhood groups, non-profit organizations, state, Federal and local government representatives, businesses, development organizations, elected officials, and academic institutions of the initiation and periodic progress of the Lucas County CANHMP project. These methods are discussed in detail in sub-section **2.4 – Involving the Public**.

As part of the 2013 plan revision, LCEMA again identified representatives from each of the four cities, six villages, and eleven townships within Lucas County, and sent formal participation request letters to these individuals. Additionally, adjacent counties, neighborhood groups, non-profit organizations, state, Federal and local government representatives, businesses, development organizations, elected officials, and academic institutions were also identified and invited to participate in the planning process. For the 2013 plan revision, 18 of the 21 jurisdictions returned signed agreement forms, and thus participated in the planning process to develop this document. The jurisdictions that did not participate in the planning process include the unincorporated areas within the Townships of Jerusalem, Spencer, and Washington.

In addition to the jurisdictional participants, representatives from the Lucas County Engineer's Office, Auditor's Office, the Toledo Metro Area Council of Governments, Toledo/Lucas County Soil and Water Conservation District, Lucas County LEPC, Ohio EMA Mitigation Branch, the Hospital Council of NW Ohio, The Toledo Red Cross, the USACE Buffalo District, and the University of Toledo signed participation agreements and were included in the planning process for the 2013 plan revision.

It would be these 18 jurisdictions, and the other interested entities within Lucas County mentioned above, that would make up the planning team for the 2013 plan revision, and again are referred to as the **Core Group Members** throughout this document.

Copies of the signed jurisdictional participation forms for the 2013 plan revision are included in **Appendix A – Jurisdictional Participation Documentation**. **Table 1** lists all of the representatives from each city, village, and township, in addition to the other interested entities within Lucas County, who actively participated in the planning process.

During preparation of the 2004 CANHMP, following formation of the Core Group, LCEMA began to hold a series of Core Group meetings to facilitate the planning process. For the 2013 plan revision, similar Core Group meetings were held to facilitate the planning process. Specifically, seven (7) Core Group meetings were held at the LCEMA during the planning process for the 2013 plan revision. Further details regarding these meetings are provided in **Section 2.3 – Core Group Meetings**.

2.3 Core Group Meetings

A series of seven (7) Core Group meetings were held at LCEMA during preparation of the 2013 plan revision. These meetings were held almost on a monthly basis from November 2010 to August 2011. No meetings were held in December 2010, May 2011, or July 2011. All meetings were open to the public, and the individual members of the Core Group were encouraged to advertise the date, time, and location of the meetings in their community to ensure the general public also was provided an opportunity to participate.

A similar planning process was followed for the 2013 plan revision as that which was followed during preparation of the 2004 CANHMP. Worksheets were distributed at the initial meetings to help update the natural hazard profiles for Lucas County (**Appendix B**). Subsequent meetings discussed revisions to the vulnerability analyses and loss estimation portions of the CANHMP, as well as revising the community profile for Lucas County, including the list of Critical Facilities and the list of those that are located within mappable hazard zones.

Following the revision to the aforementioned portions of the CANHMP, the subsequent meetings focused on revising the list of problem statements, goals, objectives and mitigation Action Items for the 2013 plan revision, as well as revising the local mitigation capabilities assessment and the mitigation implementation and monitoring strategies. The agenda, sign-in sheets, and minutes from the Core Group meetings are located in **Appendix D – Meetings Documentation**.

2.4 Involving the Public

Although the establishment of the Core Group had resulted in the formation of a planning team that represented a good distribution of the stakeholders within Lucas County, it was very important to include broad public participation throughout all of the steps in the CANHMP planning process. By involving individuals and groups from the community that were not members of the Core Group, different points of view and concerns were presented about the overall needs of the community. Additionally, during all stages of the CANHMP project, the LCEMA wanted to inform and educate the general public about natural hazard mitigation, the process for preparing the 2004 CANHMP and 2013 plan revision in Lucas County, and the project schedule.

Following the January 10, 2011 Core Group meeting, a link to the 2004 CANHMP was established on the Document Center of the Lucas County Government website with a place for public comment. LCEMA did not receive any comments following this initial public involvement task.

Additionally, on January 19, 2012, after the draft of this 2013 plan revision was complete, the LCEMA again posted the document on the Lucas County Government website and provided a place for public comment. LCEMA also ran a public notice on January 25, 2012 in the Toledo Blade advertising the public review period which would last from January 25

– February 8, 2012. Copies of the notices for the second public review period are included in **Appendix C**. Following the 15 day comment period, no public comments were received by LCEMA.

Additionally, throughout the planning process, the public was made aware of the scheduled Core Group meetings by encouraging the individual members of the Core Group to advertise the date, time, and location of the meetings in their community.

3.0 Natural Hazard Risk Assessment

Conducting a natural hazard risk assessment has provided specific information on which natural hazards could potentially affect Lucas County, and what losses to Lucas County assets could be expected from future occurrences of these natural hazard events. The first step during preparation of the 2004 CANHMP was to identify all of the natural hazards that **could** potentially affect Lucas County. The next step in the natural hazard risk assessment was to profile each of the natural hazards that were identified during the natural hazard identification step, with the focus being shifted to those natural hazards that are **most likely** to affect Lucas County in the future. The natural hazard profile contains specific information about each identified natural hazard type, including definitions, a brief history of the natural hazard within Lucas County, the natural hazards probability of occurrence, affected geographic extent, and anticipated magnitude.

The information contained in each natural hazard profile was then used to prioritize each natural hazard for the subsequent steps in the planning process. Priority rankings were based on a combination of factors, including the natural hazard’s probability of occurrence, anticipated geographic extent and anticipated impact, which is described in detail in subsection **3.2 – Natural Hazard Profiles**.

The next step in conducting the natural hazard risk assessment was creating a community profile for Lucas County. The community profile contains specific information concerning those assets within Lucas County that are located within each identified natural hazard area. The final step in conducting the natural hazard risk assessment was to estimate the expected future losses from natural hazard events using the data gathered from the natural hazard and community profiling steps.

Once the natural hazard risk assessment was completed, the foundation of this plan began to take shape. This foundation includes information about the history of previous natural hazard events within Lucas County, the location and priority rankings of potential future natural hazard events, the value of existing assets located in those natural hazard areas, and an analysis of risk to life, property, and the environment that could result from a future natural hazard event.

As part of the 2013 plan revision, the natural hazard risk assessment process was re-initiated, using data collected for the 2004 CANHMP, supplemented with up-to-date data that has become available since that time. Specifically, the data sources that were researched for the 2004 CANHMP were revisited to update the hazard profiles to include

recent hazard events. Additionally, the priority rankings for each natural hazard were reviewed and revised, as appropriate, based upon the new data and any changing natural hazard mitigation priorities of the jurisdictions involved in the planning process.

Finally, the community profile for Lucas County was updated utilizing up-to-date information maintained by the Lucas County Auditor, Division of Real Estate. Parcel data was compiled to update the list of existing asset values and well as the list of critical facilities for Lucas County. This data was then used to update the estimates of expected future losses from natural hazard events during the vulnerability analysis and loss estimation component of this 2013 plan revision.

As part of the 2013 plan revision, the decision was made by the Core Group to utilize the same process for estimating future losses as was used during preparation of the 2004 CANHMP. Specifically, even though a much greater level of detail could be achieved for estimating flood related losses by using HAZUS or other flood projection software, the Core Group decided to keep the loss estimation in the 2013 plan revision consistent across all hazards. It was determined that trying to incorporate HAZUS data would skew the loss estimation and floods will be evaluated much differently than the other hazards addressed in the 2013 plan revision.

3.1 Natural Hazard Identification

This sub-section will identify all the natural hazards that **could** affect Lucas County. At this stage, specific information about each natural hazard will not be presented. The list of potential natural hazards identified in the 2004 CANHMP was obtained from four (4) primary sources:

- Historical records and accounts from each participating jurisdiction.
- The Lucas County Emergency Operations and Preparedness Plan
- Information from the National Climatic Data Center (NCDC) Database.
- Information on Federal Disasters obtained from OEMA

As part of the 2013 plan revision, the list of natural hazards that **could** affect Lucas County was revisited, by again utilizing the same four (4) primary sources.

Core Group Participants

For the 2004 CANHMP, a total of 21 individual political jurisdictions played an active role in the development of this mitigation plan. Each participating jurisdiction had a representative that attended regularly-scheduled Core Group meetings and was asked to provide specific information regarding previous natural hazard events in their respective jurisdiction. These jurisdictions are listed in **Table 1**. In addition to these people, the Key Group, consisting of representatives from the LCEMA, the County Department of Risk Management, the County Department of Economic and Workforce Development, the County Office of Information Services, the County Sanitary Engineer's Office, the County Auditor's Office – Division of Real Estate, the Toledo Metro Area Council of Governments,

the Toledo/Lucas County Office of Building Regulations, The Toledo/Lucas County Soil and Water Conservation District, the Toledo/Lucas County Plan Commissions and The Ohio State University Extension Office provided countywide information which was also very beneficial during the preliminary stages of the natural hazard identification.

As part of the 2013 plan revision, only a planning Core Group was formed in lieu of a Core Group **AND** a Key Group. The Core Group encompassed representatives from Lucas County Offices and Departments with specific statutory authority, technical abilities and support services, **AND** representatives of the local jurisdictions (cities, villages and townships) included in Lucas County.

For the 2004 CANHMP, the Core Group participants were asked to review any historical natural hazard event data available from their respective jurisdiction, and document their findings on Worksheet #1. A copy of these worksheets is included in **Appendix B**. Participants were asked to identify those natural hazards that had previously occurred in their jurisdiction, and to indicate the level of probability (large, small, or zero) that the specific natural hazard would occur again in the future. The information was reviewed and compiled, and is presented below.

As part of the 2013 plan revision, the same process for identifying hazard history was utilized. Worksheet #1 was again distributed to the Core Group for completion. A copy of these worksheets is also included in **Appendix B**.

For the 2004 CANHMP, the majority of Core Group participants indicated the following natural hazards had not previously occurred in their jurisdiction, and that there is close to **zero** probability that they would occur in the future:

- **Coastal Storm**
- **Expansive Soil**
- **Hurricane**
- **Land Subsidence**
- **Tsunami**
- **Volcano**

Similarly, as part of the 2013 plan revision, Core Group participants indicated a number of natural hazards had not previously occurred in their jurisdiction, and that there is close to **zero** probability that they would occur in the future. Below is the revised list:

- **Avalanche**
- **Coastal Erosion**
- **Coastal Storm**
- **Hurricane**
- **Land Subsidence**
- **Tsunami**
- **Volcano**

For the 2004 CANHMP, the majority of Core Group participants indicated the following natural hazards either had not previously occurred or had rarely occurred in their jurisdiction, and that there is a **small** probability that they could occur in the future:

- **Lake Surge**
- **Earthquake**
- **Landslide**
- **Temperature Extremes**
- **Wildfire**

Similarly, as part of the 2013 plan revision, Core Group participants indicated a number of natural hazards either had not previously occurred or had rarely occurred in their jurisdiction, and that there is a **small** probability that they could occur in the future. Below is the revised list:

- **Drought**
- **Earthquake**
- **Expansive Soil**
- **Extreme Heat**
- **Landslide**
- **Wildfire**

For the 2004 CANHMP, the majority of Core Group participants indicated the following natural hazards had previously occurred in their jurisdiction, and that there is a **large** probability that they could occur in the future:

- **Drought**
- **Flood (including Flash Flood)**
- **Severe Storms (including Hailstorms and Windstorms)**
- **Severe Winter Storm**
- **Tornado**

Similarly, as part of the 2013 plan revision, Core Group participants indicated a number of natural hazards had previously occurred in their jurisdiction, and that there is a **large** probability that they could occur in the future. Below is the revised list:

- **Flood (including Flash Flood)**
- **Severe Storms (including Hailstorms and Windstorms)**
- **Severe Winter Storm**
- **Tornado**

The Lucas County Emergency Operations and Preparedness Plan

The Lucas County Emergency Operations and Preparedness Plan is a document jointly prepared in 2000 by LCEMA and in cooperation with representatives from departments and

jurisdictions that have been tasked by law with emergency responsibilities. The plan provides Lucas County and its political subdivisions the basis for a functional approach to meet the needs of emergency responders, local officials and the public before, during, and after large-scale emergencies and disasters. The plan was developed pursuant to Section 5502.26 of the Ohio Revised Code and the Resolution of the Lucas County Board of Commissioners dated December 14, 1990, assigning emergency responsibilities.

The first step in the planning process to develop the Lucas County Emergency Operations and Preparedness Plan was identifying each potential hazard for Lucas County including all political subdivisions. A hazard analysis and identification study was completed that compared and ranked all potential hazards that could affect all or part of the county in order of their probability, historical record of occurrence and the vulnerability of the county to the effects of each disaster type.

For the 2004 CANHMP, twenty-five different hazards were identified in the plan that could potentially impact the Lucas County community. Of these twenty-five hazards, seven were natural hazards and are listed below:

- **Drought**
- **Earthquake**
- **Flooding**
- **Severe Storm**
- **Snow Emergency**
- **Tornado**
- **Wildfire**

Also identified as a hazard in the Lucas County Emergency Operations and Preparedness Plan is dam failure. Not technically a natural hazard, the consequences of such an event, specifically flash flooding and erosion, will be discussed under the flooding hazard profile.

As part of the 2013 plan revision, the latest revision of the Lucas County Emergency Operations and Preparedness Plan, now called the Emergency Operations Base Plan for Lucas County and the City of Toledo (January 4, 2011 – Draft) was reviewed. Nineteen different hazards were identified in the plan that could potentially impact the Lucas County community. Of these nineteen hazards, ten were natural hazards and are listed below:

- **Severe Thunderstorm**
- **Flood, Declared**
- **Snow Level 3 Emergency**
- **Ice Storm >1/4 Inch**
- **Tornado F1**
- **Tornado F2-F3**
- **Tornado F4-F5**
- **Earthquake Moderate**
- **Blizzard Conditions**

- **Temperature Extremes**

For consistency, the list can be reduced to the following:

- **Severe Storms**
- **Flood**
- **Severe Winter Storms**
- **Tornado**
- **Earthquake**
- **Temperature Extremes**

NCDC Database

The National Climatic Data Center (NCDC), an entity that falls under the umbrella of the National Oceanic and Atmospheric Administration (NOAA), maintains an on-line Storm Event Database of various weather events recorded for particular regions in the country. The database contains data about drought, dust storm, flood, fog, hail, hurricanes, tropical storm, lightning, tornadoes, wild/forest fire, ocean/lake surf, precipitation, snow and ice, thunderstorms and windstorms, and temperature extremes from the following sources:

- All weather events from 1993-1995 with no Latitude/Longitude, (except 6/93 – 7/93, which is missing).
- All weather events from 1996-current with Latitude/Longitude.
- Plus additional data from the Storm Prediction Center, including:
 - Tornadoes 1950-1992
 - Thunderstorms and High Winds 1955-1992
 - Hailstorms 1955-1992

The Storm Event Database is updated when any new data becomes available to the NCDC. The data is typically updated on a monthly basis and is usually 90-120 days behind a current month. All of the data contained in the Storm Event Database is received from the National Weather Service (NWS) and is made publicly available as soon as possible via the website, <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>.

For the 2004 CANHMP, the on-line Storm Event Database contained summary information for 326 weather events affecting Lucas County between January 1, 1950 and December 31, 2002. The data included information on location, date, time, type, number of related injuries and deaths, and reported damage amounts for the following in Lucas County:

- **Drought**
- **Flood (including Flash Flood)**
- **Freezing Rain/Ice Storm**
- **Hailstorm**
- **Lake Surge**
- **Lightning**

- **Severe Winter Storm**
- **Temperature Extremes**
- **Thunderstorm**
- **Tornado**
- **Windstorm**

As part of the 2013 plan revision, the on-line Storm Event Database was reviewed to capture any data that had been added since completion of the 2004 CANHMP. Summary information for 526 weather events affecting Lucas County between January 1, 1950 and July 31, 2011 was available. Therefore, 200 weather events have been added to the on-line Storm Event Database for the time period of December 31, 2002 through July 31, 2011.

Data for all 526 weather events, not just the events added since preparation of the 2004 CANHMP, were reviewed. Based upon that review, the following weather events have occurred within Lucas County during the approximate 60 year period maintained in the database:

- **Blizzard (only 1 event)**
- **Drought (6 events)**
- **Excessive Heat (only 1 event)**
- **Extreme Cold (8 events)**
- **Flash Flood (19 events)**
- **Flood (32 events)**
- **Funnel Cloud (only 1 event)**
- **Glaze (2 events)**
- **Hail (130 events)**
- **Heat Wave (3 events)**
- **Heavy Rain (2 events)**
- **Heavy Snow (12 events)**
- **High Winds (34 events)**
- **Ice and Snow (only 1 event)**
- **Ice Storm (6 events)**
- **Lightning (4 events)**
- **Other (only 1 event)**
- **Record Cold (only 1 event)**
- **Seiche (only 1 event)**
- **Snow (only 1 event)**
- **Storm Force Winds (only 1 event)**
- **Storm Surge (6 events)**
- **Strong Winds (6 events)**
- **Thunderstorm Wind (216 events)**
- **Tornado (8 events)**
- **Waterspouts (6 events)**
- **Winter Storm (17 events)**

Federal Disasters

OEMA maintains a database that lists all of the events that have received a “Declaration of Disaster” by the President of the United States. For the 2004 CANHMP, this database indicated that since 1964, there have been 10 instances in which natural hazard events have resulted in the Federal declaration of a disaster within Lucas County. These instances are presented below:

<u>Date</u>	<u>Disaster</u>
April 1965	Tornado and High Winds
July 1969	Heavy Storms and Flooding
November 1972	Storms and Flooding
April 1973	Storms and Flooding
May 1974	Heavy Rains and Flooding
January 1978	Severe Blizzard
March 1982	Flooding
August 1992	Tornado and Flooding
January 1996	Flooding
August 2000	Flooding

As part of the 2013 plan revision, the OEMA database was again reviewed. Since preparation of the 2004 CANHMP, two additional instances which have resulted in the Federal declaration of a disaster within Lucas County were identified. Only one of the instances is considered a natural hazard event, the July 2006 severe storms and flooding. The other instance, the August 2003 power outage, was not related to a natural hazard event.

<u>Date</u>	<u>Disaster</u>
August 2003	Power Outage
July 2006	Severe Storms and Flooding

Natural Hazard Identification Summary

For the 2004 CANHMP, by collecting information from the representatives from each jurisdiction on the Core Group, reviewing existing Lucas County plans and reports, and gathering information from the NCDC Storm Event Database and OEMA Federal Disasters database, those natural hazards that have not previously occurred, or are extremely un-likely to occur in the future in Lucas County were deleted. Additionally, the focus of the remainder of the 2004 CANHMP natural hazard risk assessment was shifted towards those natural hazards most prevalent in Lucas County.

Based on the available information, the following ten natural hazards were identified in the 2004 CANHMP as those that could potentially affect Lucas County, and future occurrences could possibly result in losses to Lucas County assets or human life:

- **Drought**
- **Earthquake**
- **Flood (including Flash Flood)**
- **Lake Surge**
- **Landslide**
- **Severe Storm (including Thunderstorm, Windstorm, and Hailstorm)**
- **Severe Winter Storm (including Freezing Rain and Ice Storm)**
- **Temperature Extremes**
- **Tornado**
- **Wildfire**

This list does not rank the natural hazards in order of probability of occurrence, number of previous events, previous damage totals, injuries, loss of life, or by any other systematic processes. The list only identifies those natural hazards that **could** potentially affect Lucas County in the future. Sub-section **3.2 - Natural Hazard Profiles** contains specific information about each identified natural hazard type, including the history of each natural hazard type within Lucas County, information pertaining to which areas of Lucas County are most susceptible to future events, and a priority ranking for each natural hazard type based upon probability of occurrence, anticipated geographic extent and anticipated magnitude.

For the 2013 plan revision, based upon the updated data and input from the Core Group, the same ten natural hazards were identified as those that could potentially affect Lucas County, and future occurrences could possibly result in losses to Lucas County assets or human life. Therefore, no natural hazards have been deleted or added to the list of those that **could** potentially affect Lucas County in the future for the 2013 plan revision.

3.2 Natural Hazard Profiles

This sub-section will profile all the natural hazards that were identified in the previous sub-section as those that **could** affect Lucas County. The profiles contain information about the different aspects of each natural hazard that demonstrates how each could affect the Lucas County community differently.

For the 2004 CANHMP, information presented included definitions, a brief history of the natural hazard within Lucas County, the natural hazard’s probability of occurrence, affected geographic extent, and anticipated magnitude. Definitions of some of the more common terms used in conjunction with discussing natural hazards are included in **Appendix F – Glossary of Terms**.

One of the products produced in 2004, during the natural hazard profiling step, in the natural hazard risk assessment, was a map depicting the hazard areas for all of Lucas County (**Figures 2 – 5**). These maps depict those areas within Lucas County that are susceptible to each mappable natural hazard type. For instance, some natural hazards will likely occur in predictable areas of Lucas County (i.e. floods), while the location of future events from other natural hazard types cannot be accurately predicted (i.e. severe storms). These non-

mappable natural hazards either occur randomly throughout any given geographic area (i.e. tornadoes), or all of Lucas County is considered vulnerable to future occurrences (i.e. hailstorms). For the 2013 plan revision, the maps have been revised to include the most recent and up-to-date information available at the time.

The information contained in each natural hazard profile was then used to prioritize each natural hazard for the subsequent steps in the planning process. For the 2004 CANHMP, a total priority score was assigned to each natural hazard type based on a combination of the natural hazard’s probability of future occurrence, anticipated geographic extent, and anticipated magnitude of that occurrence. A number ranking between one and five was assigned for each natural hazard’s probability of occurrence, anticipated geographic extent, and anticipated magnitude, then these numbers were added to calculate the final priority score. The number rankings were based upon a method supplied by Mr. Steve Ferryman, CFM – Environmental Specialist from the Ohio Department of Natural Resources (ODNR) Division of Water, Floodplain Management Program, and the 1998 OEMA publication *Ohio Hazard Analysis and Risk Assessment*, and were assigned as follows:

For the 2013 plan revision, the methodology of obtaining a total priority score for each natural hazard was amended to include additional information beyond just the natural hazards probability of occurrence, affected geographic extent, and anticipated magnitude. Specifically, priority scores were established using the same number ranking system; however, the categories that the Core Group was asked to evaluate were changed to include the average response time, average speed of onset, average magnitude, the impact on business, the impact on humans, and the impact on property (**Appendix B – Worksheet #2**). These evaluations, combined with the frequency of occurrence information obtained from **Table 2 - History of Natural Hazard Events**, were used to calculate the final priority score for each natural hazard; the number rankings used by the Core Group for each category are described below.

Frequency

A key factor in the development of a natural hazard profile is the particular frequency in which a natural hazard event occurs. The ranking score for each of the identified hazards was determined based upon the historical data that has been assembled in the CANHMP (**Table 2 - History of Natural Hazard Events**).

Frequency	
4	The historical records indicate the natural hazard has occurred ten or more times over a one-year period.
3	The historical records indicate the natural hazard has occurred at least ten times over a ten-year period.
2	The historical records indicate the natural hazard has occurred more than one but less than ten times over a ten-year period.

1	The historical records indicate the natural hazard has occurred on average one time or less over a ten-year period.
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Average Response Duration

Defined as “time on the ground” or the time period of response to a hazard or event. Storm events may last only a few hours, while a wildfire may last a few days, and a flood several weeks. The score should reflect the overall time that business, humans, or property are “affected” by the hazard or event.

Average Response Duration		
4	Excessive	1 month - 1 year
3	Long	1 week - 1 month
2	Medium	1 day – 1 week
1	Short/Minimal	Less than 1 day

Average Speed of Onset

May affect all other factors due to a lack of warning or time to prepare for impact. For instance, a real flood may develop so slowly that there is time to evacuate residents and begin flood fight measures, but a flash flood can occur with little warning.

Average Speed of Onset		
4	Short-None	Minimal to no warning
3	Short	6 – 12 hours
2	Medium	12 – 24 hours
1	Extended	Greater than 24 hours

Average Magnitude

The geographic dispersion of the hazard. For instance, a severe winter storm may affect every jurisdiction within the county, while a wildfire or landslide will affect very few at one time.

Average Magnitude		
4	Catastrophic	Multiple sites in 8 or more townships
3	Critical	Multiple sites in at least 3, but less than 8 townships
2	Limited	Individual/multiple sites in 1 or 2 townships
1	Localized	Individual site in only 1 township

Impact on Business

Refers to the enduring economic impact of the hazard on the community by an event. Special consideration should be given to those events that would impact critical facilities (hospitals, emergency responders, etc.) and those businesses that provide needed goods/services for a long duration.

Impact on Business

4	Shutdown of critical facilities and business for 30 days or more
3	Shutdown of critical facilities and business for at least 1 week
2	Shutdown of critical facilities and business for at least 1 day – 1 week
1	Shutdown of critical facilities and business for less than 24 hours

Impact on Humans

Relates to the number of lives potentially lost or severity of injuries related to a particular hazard event.

Impact on Humans		
4	High	Multiple deaths
3	Medium	Multiple severe injuries, possible deaths
2	Low	Some severe injuries, no likely deaths
1	Minimal	Only minor injuries

Impact on Property

Relates to the amount of property potentially lost to a particular hazard event. Special consideration should be given to uniquely valuable or hard to replace assets within the community.

Impact on Property		
4	High	More than 50% of properties damaged
3	Medium	25% - 50% of properties damaged
2	Low	10% - 25% of properties damaged
1	Minimal	Less than 10% of properties damaged

3.2.1 Severe Winter Storms

Definition: Winter storms vary in size and strength and are characterized by freezing temperatures accompanied by freezing rain (ice storms), snowfall (flurries, showers, or squalls), blowing and drifting snow, high winds that create sub-zero wind chill and blizzard conditions.

History: The data reviewed for the 2004 CANHMP, combined with the additional data added for the 2013 plan revision, revealed that severe winter storms have affected all of the jurisdictions within Lucas County (**Table 2 - History of Natural Hazard Events**). The data also indicated that single storms have previously been reported as affecting multiple sites within the county as well as multiple sites throughout the state.

There were 43 records for winter storms in the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 60 records for winter storms within Lucas County (**Table 2**). Of these 60 records, 9 indicated damage amounts. The total damages, in 2011 dollars, were \$1,453,421.30, or an average of

\$161,491.26 per event (**Table 3**). The year 2011 dollar figure was computed by taking the reported damage amount for each specific event, and using the Consumer Price Index (CPI) Conversion Factors provided by Robert C. Sahr, Political Science Department of Oregon State University, for the U.S. Office of Management and Budget and the Congressional Budget Office. Additionally, there were 12 injuries reported from a single event in January of 1998. Finally, there has been one instance in which a Federal disaster was declared for Lucas County because of a winter storm related event; a blizzard in 1978 (**Table 3 - Natural Hazards Ranked by Greatest Damage per Event**).

Frequency: Winter storms originate as mid-latitude depressions or cyclonic weather systems, sometimes following the meandering path of the jet stream. In the Midwestern states, Canadian and upper arctic cold fronts push ice and snow deep into the interior region, including Lucas County. These atmospheric conditions are nearly impossible to predict in the long term, however the timing of these conditions within Lucas County can be narrowed down to primarily the winter months between November and February, and in late fall or early spring in some instances in the past. However, by examining the historical record of occurrence of snowstorms, a probability relationship was established.

Additionally, on very rare occasions, Lucas County is affected by lake effect snowstorms. Lake effect snow is caused by the temperature contrast between cold air moving over warm water (in the case of Lucas County, Lake Erie). The water heats the bottom layer of air from below, causing moisture to evaporate into the air. Since warm air is lighter and less dense than cold air, the heated air rises then begins to cool, and eventually forms clouds. When enough moisture condenses out of the air, snow falls over the regions downwind of the lake. The greater the temperature contrast between the cold air and the warm water, the heavier the snow showers are. Lake effect snow usually occurs in narrow bands over limited areas in northeast Ohio, but minor shifts in wind patterns does deliver lake effect snow to limited areas in Lucas County on occasion.

The data reviewed for this CANHMP indicated that winter storms have affected Lucas County multiple times each decade for those years which data was available. There have been some winters in which multiple large winter storms affected nearly every jurisdiction within the county. However, on average, winter storms occur between five and ten times a year within Lucas County, and severe storms, such as blizzards occur at a frequency of about once every five to ten years. Therefore, Lucas County received a score of **3** for frequency for future winter storm events within the county. This score reflects the frequency of typical winter storm events occur at least ten times over a ten-year period.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, severe winter storms were assigned a score of **2** for average response duration. This indicates that a majority of the jurisdictions are “affected” by severe winter storms, or put another way are responding to the incident itself or the lasting effects of the incident itself, on average from a single day to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, severe winter storms were assigned a score of **1.5** for average speed of onset. This

indicates that a majority of the jurisdictions feel that severe winter storms provide anywhere from a few days to a full week of warning before the event arrives.

Average Magnitude: There are no topographic or other factors, natural or man-made, within Lucas County that would alter the predicted geographic location of future winter storm events, except for the rare lake effect snowstorm mentioned above. Furthermore, the data indicated that on multiple occasions, a single severe winter storm has affected multiple jurisdictions within the county. Therefore, Lucas County received a score of **3.5** for average magnitude of future severe winter storm events within the county. This score reflects the historical incidence that severe winter storms within the county often affect multiple jurisdictions simultaneously, and sometimes affect the entire county at large.

Impact on Business: Based upon the compilation of the data returned from the Core Group, severe winter storms were assigned a score of **2** for impact on business. This indicates that a majority of the jurisdictions feel that severe winter storms result in the shutdown of critical facilities and business within their jurisdiction anywhere from a single day to a full week.

Impact on Humans: Based upon the historical data and information returned from the Core Group, severe winter storms were assigned a score of **2** for impact on humans. There were 12 injuries reported from a single event in January of 1998. No other records indicated injuries or deaths; however, the Core Group data reflects that the majority of jurisdictions have experienced some severe injuries related to severe winter storms. Future deaths are not likely.

Impact on Property: Based upon the historical data and information returned from the Core Group, severe winter storms were assigned a score of **1.5** for impact on property. This indicates that on average a severe winter storm event affects somewhere between 10% and 25% of the properties within the affected area.

Priority Ranking: Severe winter storms within Lucas County received the following revised priority rankings:

Frequency:	3
Average Response Duration:	2
Average Speed of Onset:	1.5
Average Magnitude:	3.5
Impact on Business:	2
Impact on Humans:	2
Impact on Property:	<u>1.5</u>
Total Priority Score:	15.5

3.2.2 Tornadoes

Definition: A tornado is defined as a violently rotating column of air that extends from the base of cumulonimbus clouds and comes in contact with the ground. Tornadoes develop as

an outgrowth of a thunderstorm when rising air is present and begins to rotate because of strongly changing (veering) winds in the lower part of the atmosphere. Large, strong, and long-lasting tornadoes are spawned by the most serious of thunderstorms called **Super cells**. Once a thunderstorm has formed, given the right ingredients, a tornado can develop.

A **Funnel Cloud** is a similar column of air that is not in contact with the ground. A **Water Spout** is a tornado that is over water. When either a funnel cloud or a waterspout comes in contact with the ground, they become, by definition, a tornado.

The visible column of a tornado is composed of water droplets formed by condensation in the funnel. The fast-moving winds (either flowing into the tornado or in the main tornadic circulation) cause most of the damage. The **Vortex** (or multiple vortices) sucks in air from near the ground, along with dirt and debris. The dirt and debris block light, giving the tornado a dark color. A **Condensation Funnel** does not need to reach to the ground for a tornado to be present; a debris cloud beneath a thunderstorm is all that is needed to confirm the presence of a tornado, even in the total absence of a condensation funnel.

Tornadoes are classified according to the damage they cause. Through observational studies, T. Theodore Fujita created the following scale in the late 1960's to classify tornadoes. The scale correlates wind speeds with damage: F-0 is the weakest and F-5 the strongest.

Scale	MPH	Expected Damage
F-0	40-72	Light Damage
F-1	73-112	Moderate Damage
F-2	113-157	Considerable Damage
F-3	158-206	Severe Damage
F-4	207-260	Devastating Damage
F-5	261-318	Incredible Damage

F-0 and F-1 tornadoes comprise 70 percent of all tornadoes that occur in the U.S. They usually touch down briefly and cause minor damage. However, forecasting these tornadoes is less reliable than for stronger tornadoes, so less than 50 percent occur during tornado watches.

F-2 and F-3 tornadoes comprise about 28 percent of the tornadoes in the U.S. They can cause significant damage and cause injuries and deaths.

F-4 and F-5 tornadoes comprise about 2 percent of the tornadoes in the U.S. and cause 70 percent of the death and destruction. Fortunately, the NWS has identified precursor conditions for the more damaging tornadoes. Over 95 percent of these tornadoes, therefore, occur during tornado watches.

History: The data reviewed for the 2004 CANHMP, combined with the additional data that was added for the 2013 plan revision, revealed that tornadoes have specifically affected 14

jurisdictions within Lucas County. This includes all four cities, three villages, and seven townships (**Table 2**). It should be noted, however, that additional jurisdictions **may** have been previously affected by tornadoes. The conclusion that the remaining jurisdictions have not been affected resulted **only** from the fact that the data used in this CANHMP did not contain any official records or individual personal accounts with respect to tornadoes for those jurisdictions. The data also indicated that tornadoes have previously been reported as affecting multiple areas within the county on more than one individual occasion.

There were 28 records for tornadoes in the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 29 records for tornadoes within Lucas County (**Table 2**). Of these 29 records, 8 listed specific damage figures for Lucas County. The total damages, in 2011 dollars, were \$187,437,212.62, or an average of \$23,429,651.58 per event (**Table 3**). The data also indicated that tornadoes within Lucas County have resulted in 210 injuries and 16 deaths. The majority of these injuries (207) and all of the deaths occurred as a result of one particular event; an F-4 tornado which occurred in 1965 and resulted in a Federal declaration of a disaster in the county. There has been one other instance in which a tornado event has resulted in the Federal declaration of a disaster within the County. This event, of which data concerning the magnitude, injuries/deaths and damage amount is not known, occurred in 1992.

Figure 2 – Historical Tornado Events depicts the location, size, width, and length (when available) of the tornado events within the county that were listed in the NCDC database. This figure does not include the additional tornado events that appear in the data; these records did not contain any location or size specific data.

Frequency: According to OEMA, Lucas County, as well as the rest of northwest Ohio, is located in one of the medium-high risk areas for tornadoes in Ohio. The tornado reports contained within the data are from the months April, May, July and August, indicating the likelihood of a tornado event within Lucas County is greatest during the spring and summer.

Additionally, the NCDC Database reported 1,046 tornado events in the State of Ohio between 1950 and 2011, or an average of 17 per year. Based on the data reviewed during preparation of this CANHMP, of these 17 annual Ohio tornadoes, on average less than 1 touches down and affects Lucas County, however more than one, but less than ten, damaging tornado can be expected every 10 years. Based upon these data sources, Lucas County received a score of 2 for frequency of tornadoes.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, tornadoes were assigned a score of 3 for average response duration. This indicates that a majority of the jurisdictions are “affected” by tornadoes or, put another way, are responding to the incident itself or the lasting effects, on average from one week up to one month.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, tornadoes were assigned a score of 4 for average speed of onset. This indicates that

a majority of the jurisdictions feel that tornadoes provide minimal to no warning before the event arrives.

Average Magnitude: Most of the State of Ohio, including Lucas County is within Wind Zone IV, an area in the central United States considered capable of producing wind speeds up to 250 miles per hour. These speeds correlate to an F-4 magnitude tornado, only surpassed by the devastating F-5 magnitude tornado. Additionally, the data indicated that tornadoes up to F-4 magnitude have previously touched down within Lucas County, and Federal disasters have been declared for tornado events in Lucas County in 1965 and 1992. Based upon the location of Lucas County in Wind Zone IV, and the historical record of F-4 magnitude tornadoes affecting the county and resulting Federal disaster declarations, Lucas County received a score of 3 for average magnitude of future tornado events within the county.

Impact on Business: Based upon the compilation of the data returned from the Core Group, tornadoes were assigned a score of 2 for impact on business. This indicates that a majority of the jurisdictions feel that tornadoes result in the shutdown of critical facilities and business within their jurisdiction anywhere from a single day to a full week.

Impact on Humans: Based upon the historical data and information returned from the Core Group, tornadoes were assigned a score of 2.5 for impact on humans. There were 210 injuries and 16 deaths within the data for Lucas County. The majority of these injuries (207) and all of the deaths occurred as a result of one particular event; an F-4 tornado which occurred in 1965 and resulted in a Federal declaration of a disaster in the county. No other records indicated injuries or deaths; however, the Core Group data reflects that the majority of jurisdictions anticipate multiple severe injuries and possible deaths from future tornado events.

Impact on Property: Based upon the historical data and information returned from the Core Group, tornadoes were assigned a score of 3 for impact on property. This indicates that on average a tornado event affects somewhere between 25% and 50% of the properties within the affected area.

Priority Ranking: Tornadoes within Lucas County received the following revised priority rankings:

Frequency:	2
Average Response Duration:	3
Average Speed of Onset:	4
Average Magnitude:	3
Impact on Business:	2
Impact on Humans:	2.5
Impact on Property:	<u>3</u>
Total Priority Score:	19.5

3.2.3 Floods (including Flash Floods)

Definition: Floods are a naturally recurring event for a river or stream, and are caused by weather phenomena and events that deliver more precipitation to a drainage basin than can be readily absorbed or stored within the basin. Flooding is a result of heavy or continuous rainfall exceeding the absorptive capacity of soil and the flow capacity of rivers and streams. This causes a watercourse to overflow its banks onto adjacent lands.

Floodplains are, in general, those lands most subject to recurring floods, situated adjacent to rivers and streams. Floodplains are therefore "flood-prone" and are hazardous to development activities if the vulnerability of those activities exceeds an acceptable level. Topographically, floodplains are quite flat and lie adjacent to a stream; geomorphologically, floodplains are a landform composed primarily of unconsolidated depositional material derived from sediments being transported by the related stream; hydrologically, floodplains are best defined as a landform subject to periodic flooding by a parent stream.

Floods are typically described in terms of their statistical frequency. A "100-year flood" or "100-year floodplain" describes an event or an area subject to a one percent probability of a certain size flood occurring in any given year. This concept does not mean such a flood will occur only once in 100 years. Whether or not it occurs in a given year has no bearing on the fact that there is still a one percent chance of a similar occurrence in the following year. Since floodplains can be mapped, the boundary of the 100-year flood is commonly used in floodplain mitigation programs to identify areas where the risk of flooding is significant. Any other statistical frequency of a flood event may be chosen depending on the degree of risk that is selected for evaluation, (i.e. 5-year, 20-year, 50-year, 500-year floodplain).

A Flash Flood is a type of flood that follows a period of heavy rain. Flash floods usually occur within six hours of the rain event. There are several different types of storms that may produce a six-hour heavy rain event. With this many possibilities for enormous amounts of rain, the accuracy of predicting a flash flood event is difficult. Other factors that can cause a flash flood are dam or levee failure and the sudden release of water blocked by an ice jam. Flash flooding by definition can occur anywhere. The most frequent areas that are affected are those in low-lying areas, in and around rivers and streams, and in a floodplain.

Flash flooding can take place at any time. The peak times for the types of storms that produce flash floods are also peak times for most natural hazard events. The one variation that must be considered is that streams and rivers rise at different rates than the rainfall is falling. The rain may stop, but the watercourse will continue to rise for a given amount of time following the rain.

Additionally, a flash flood can occur as a result of a dam break or failure. Dam failures can occur as a result of structural failures, such as progressive erosion of an embankment, or by overtopping and breaching by a severe flood. Earthquakes may also weaken a dam's integrity and certainly have the ability to cause a dam failure all on their own. Disastrous flash floods caused by dam failures, although not in the category of natural hazards, can cause great loss of life and property damage, primarily due to their unexpected nature and

high velocity floodwater. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

Classification of dams is defined in the Ohio Administrative Code (OAC), Section 1501:21-13-01. The classification system divides dams that are under the jurisdiction of ODNR's Division of Water into four classes, Class I, II, III, and IV. This classification is governed by the height of the dam, the storage volume, and the potential downstream hazards as defined below:

Height of Dam

- Class I Greater than 60 feet.
- Class II Greater than 40 feet.
- Class III Greater than 25 feet.
- Class IV Less than or equal to 25 feet.

Storage Volume

- Class I Greater than 5,000 acre-feet.
 - Class II Greater than 500 acre-feet.
 - Class III Greater than 50 acre-feet.
 - Class IV Less than or equal to 50 acre-feet.
- (1 acre-foot equals about 326,000 gallons)

Potential Downstream Hazard

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

Based on the above criteria, there are no ODNR classified dams within Lucas County.

History: The data reviewed for the 2004 CANHMP, combined with the additional data that was added for the 2013 plan revision, indicated that flooding has affected all of the jurisdictions within Lucas County (**Table 2**). Additionally, flash flooding has also affected all of the jurisdictions within Lucas County. The data indicated that on several occasions in the past, flooding and flash flooding has affected multiple sites within the county and throughout the state.

As part of the 2013 plan revision, the decision was made by the Core Group to utilize the same process for estimating future losses as was used during preparation of the 2004 CANHMP. Specifically, even though a much greater level of detail could be achieved for estimating flood related losses by using HAZUS or other flood projection software, the Core

Group decided to keep the loss estimation in the 2013 plan revision consistent across all hazards. It was determined that trying to incorporate HAZUS data would skew the loss estimation and floods will be evaluated much differently than the other hazards addressed in the 2013 plan revision.

There were 57 records for flooding in the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 62 records for flooding within Lucas County (**Table 2**). Of these, 13 contained data reflecting damages that resulted from a flooding event (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$1,511,872.37, or \$116,297.87 per event. This figure does not include any records that expressed damage amounts for the entire state of Ohio for a single event, since an accurate figure for only those damages within Lucas County could not be extrapolated. Additionally, there were 23 records for flash flooding in the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 26 records for flash flooding within Lucas County (**Table 2**). Of these, twelve contained data reflecting damages attributed to flash flooding in the amount of \$55,926,434.35, or \$4,660,536.20 per event (**Table 3**).

The data for flooding within Lucas County also indicated no injuries or reported fatalities were attributed to either traditional or flash flooding events (**Tables 2 and 3**). Federal declarations of a disaster related to flooding has happened nine times: July 1969, November 1927, April 1973, May 1974, March 1982, August 1992, January 1996, August 2000, and most recently in June 2006.

Frequency: Flooding typically results in Lucas County from large-scale weather systems generating prolonged rainfall. Other causes of flooding include locally intense thunderstorms, snowmelt and ice jams. Flash floods, characterized by rapid on-set and high velocity waters, are typically the result of extreme amounts of rainfall in relatively short periods of time, typically only a few hours. The weather-related causes of flooding are impossible to accurately predict. There may be long extended periods of time with no flooding events caused by rainfall, and other times when over the course of one season, consecutive storm events cause repeated flooding in the same areas. Therefore, predicting weather-related flooding or flash flooding events was accomplished using the historical occurrences of these events within the county.

According to the limited data, flooding has taken place within Lucas County in every decade since the 1960's (**Table 2**). Although the majority of these records indicate flooding of the Maumee River, there are multiple tributaries and smaller watercourses within the county that regularly overflow their banks and cause flooding. The adoption of the Lucas County Flood Damage Prevention Regulations in 2001, and the updates to the regulations adopted August 16, 2011 has succeeded in reducing the annual damages to persons and property from these flooding events, however there is insufficient data at this time to determine whether these regulations have led to any net reduction in the probability of future damaging flooding events within the county.

Lucas County received a score of **2.5** for frequency of future flooding events within the county. This score reflects the historical occurrence of flooding events on a countywide scale on average more than once and up to ten times each decade. Not all flood prone areas identified within the county experience this frequency of flooding, and large scale flooding of the major water courses in the county occur much less often, however, the smaller “un-protected” tributaries to these rivers and streams often overflow their banks annually, and are highly susceptible to flash flooding events.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, flooding was assigned a score of **2** for average response duration. This indicates that a majority of the jurisdictions are “affected” by flooding or, put another way, are responding to the incident itself or the lasting effects, on average from one day up to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, flooding was assigned a score of **3** for average speed of onset. This indicates that a majority of the jurisdictions feel that flooding events, particularly flash flooding events, provide minimal warning, typically less than 12 hours, before the event arrives.

Average Magnitude: Over bank flooding of rivers and streams is the most common type of flooding event in Lucas County. Riverine floodplains range from narrow, confined channels in the steeper valleys and hills, to wide, flat areas in less steep terrain. The volume of water in the floodplain is a function of the size of the contributing watershed and topographic characteristics such as watershed shape and slope, climatic and land-use characteristics, and soil types. These factors were utilized, beginning in the 1960’s, by the United States Army Corps of Engineers (USACE) to develop the 100-year, or one percent annual chance, floodplain as the standard for floodplain management purposes.

The 100-year floodplain, depicted on **Figure 3a – Flood Hazard Areas**, is one of the components illustrated on a Flood Insurance Rate Map (FIRM). The FIRM, developed from computed water surface elevations and topographic mapping, is utilized in the National Flood Insurance Program (NFIP), which makes affordable flood insurance available to those persons located within the 100-year floodplain in return for community adoption of ordinances to regulate development in the mapped flood hazard areas. Currently, all four (4) cities and six (6) villages as well as the unincorporated townships within Lucas County participate in the NFIP program and are in compliance with its requirements. Additionally, all of the jurisdictions and the county have formally adopted the most recent revisions to the FIRM maps which went into effect on August 16, 2011.

Specifically, all four (4) cities and six (6) villages have local floodplain managers which monitor the flood hazard areas, enforce the existing regulations, and conduct community assistance activities like encouraging flood insurance payments are made by homeowners. Additionally, Lucas County has a dedicated floodplain manager and all of the unincorporated townships also have a dedicated manager. The 2011 list of floodplain administrators within Lucas County, which includes contact information, has been included as **Appendix I**.

Another important flood hazard area illustrated on FIRM maps include the floodway; the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the one percent annual chance flood without cumulatively increasing the water surface elevation by more than a designated height. The 100-year floodplain and floodway, as mapped on each communities FIRM, is used to guide future development away from flood-prone areas and to regulate development that is proposed to occur within such areas.

The flood hazard areas within Lucas County are primarily those areas within the mapped 100-year floodplain (**Figure 3a**). This figure illustrates those areas adjacent to the rivers and other watercourses in the county that are subject to flooding, anywhere between minor floods and the greatest flood likely to occur in a given area. In many cases, the 100-year flood level is less than the greatest flood of record. **Figure 3a** also illustrates the flood-prone soils within the county, typically located along watercourses and within the designated floodway. As noted on the figure, many of the smaller tributaries within the county do not have delineated 100-year floodplains or floodways, however it is these streams that often overflow their banks first after a rain event and are representative of the areas within the county where flash flooding events typically are most severe.

Nearly all areas in the county, depending on a number of variables, could experience a flash flooding event. These variables include the intensity and duration of rainfall, the steepness of the watershed, the amount of impervious surfaces within the watershed, vegetation, and size and number of artificial and natural flood storage areas. At this time, more data is required to adequately assess the specific areas within Lucas County susceptible to flash flooding.

Even with the existing Flood Damage Prevention Regulations in place, there are still several areas within the county that periodically suffer damages from floods. The Ohio Emergency Management Agency was able to provide a list of those “Repetitive Loss Properties” within the county that have all had repeated flooding involving residential homes. There are 63 properties on this list; maintained in strict confidence and not made available to the public. Of the 63 “Repetitive Loss Properties”, six (6) are commercial properties, one (1) is multi-family residential, while the remaining fifty-six (56) are residential properties. The total value of the commercial properties is \$2,364,165.00, the total value of the multi-family residential property is \$4,950,000.00, and the total value of the residential properties is \$7,470,963.00, for a total property value for the “Repetitive Loss Properties” within Lucas County of \$14,785,128.00.

Those 63 properties within the county should be addressed first with regards to future mitigation Action Items, as well as those additional properties/areas that suffer repeat losses and are not included on the list.

Based on **Figure 3a**, and the historical occurrence of flooding in the data, Lucas County received a score of **2** for average magnitude of future flooding events. This score reflects that nearly every jurisdiction has reported some extent of flooding and/or flash flooding in

the past, and on several occasions, a single rain event has affected multiple jurisdictions along the same or adjacent watercourses.

Impact on Business: Based upon the compilation of the data returned from the Core Group, flooding was assigned a score of **2** for impact on business. This indicates that a majority of the jurisdictions feel that flooding result in the shutdown of critical facilities and business within their jurisdiction anywhere from a single day to a full week.

Impact on Humans: Based upon the historical data and information returned from the Core Group, flooding was assigned a score of **1.5** for impact on humans. The data for flooding within Lucas County indicated no injuries or reported fatalities attributed to either traditional or flash flooding events. However, the Core Group data reflects that the majority of jurisdictions anticipate mostly minor injuries, with some serious injuries, and no possible deaths from future flooding events.

Impact on Property: Based upon the historical data and information returned from the Core Group, flooding was assigned a score of **2.5** for impact on property. Since the data has been reviewed and updated for the 2013 plan revision, there are now 62 records for flooding within Lucas County (**Table 2**). Of these, 13 contained data reflecting damages that resulted from a flooding event (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$1,511,872.37, or \$116,297.87 per event. Additionally, there were 26 records for flash flooding within Lucas County (**Table 2**). Of these, twelve contained data reflecting damages attributed to flash flooding in the amount of \$55,926,434.35, or \$4,660,536.20 per event. In addition to the historical data, the majority of jurisdictions indicated that on average a flooding event affects somewhere between 10% and 50% of the properties within the affected area.

Priority Ranking: Flooding within Lucas County received the following revised priority rankings:

Frequency:	2.5
Average Response Duration:	2
Average Speed of Onset:	3
Average Magnitude:	2
Impact on Business:	2
Impact on Humans:	1.5
Impact on Property:	<u>2.5</u>
Total Priority Score:	15.5

3.2.4 Earthquakes

Definition: Earthquakes refer to a trembling or shaking movement of the earth's surface caused by an abrupt release of strain that has accumulated over a long time. This strain originates through the forces of plate tectonics, the process by which the extensive plates that cover the earth's surface slowly move over, under, and past each other. Sometimes the movement of the plates is gradual, and at other times, the plates are locked together, unable

to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free and the result is an earthquake.

Only minor tremors result from the majority of earthquakes that occur in Lucas County. Larger earthquakes usually begin with minor tremors but rapidly take the form of one or more violent shocks, and end in vibrations of gradually diminishing force called aftershocks. The subterranean point of origin of an earthquake is called its **Focus**. The point on the surface directly above the focus is the **Epicenter**. The magnitude and intensity of an earthquake is determined by the use of scales, such as the Richter scale (which measures the force or amount of energy released by an earthquake) and the Mercalli scale (which measures the extent of damage attributed to an earthquake). If an earthquake occurs in a populated area, it may cause numerous deaths and injuries, and typically results in extensive property damage

History: The data reviewed for the 2004 CANHMP, combined with the additional data that was added for the 2013 plan revision, revealed that earthquakes have affected 9 jurisdictions within Lucas County. This includes all four cities, two villages, and three townships (**Table 2**). It should be noted, however, that additional jurisdictions **may** have been previously affected by earthquakes. The conclusion that the remaining jurisdictions have not been affected by earthquakes resulted **only** from the fact that the data used in this CANHMP did not contain any official records or individual personal accounts with respect to earthquakes for those jurisdictions.

Within Lucas County, there were 17 records for earthquakes within the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 15 records for earthquakes within Lucas County (**Table 2**). Of these 15 records, none listed specific damage figures for Lucas County. All of these records were obtained from the USGS and Ohio Earthquake and Information Center and the Hazard History Worksheets the Core Group members completed for the project. These sources indicated occurrences of small earthquakes in the past; however, specific data related to these events was not available. There were no reports that indicated that Lucas County was the epicenter of an earthquake.

Figure 4 depicts the historical occurrences of earthquakes within and surrounding Lucas County and the State of Ohio. As depicted, there has not been an epicentered earthquake to strike Lucas County in recent history. The figure also agrees with the majority of reports in the data that most of the earthquakes that are felt within Lucas County originate within the state to the south, or from the south and west in Virginia, Kentucky, Illinois, and Missouri along the New Madrid Seismic Zone.

None of the records contained information relative to damage amounts attributed to earthquakes. Additionally, there were no reported injuries or deaths reported within the records attributed to earthquakes (**Table 3**).

Frequency: A variety of earthquake hazard/risk maps have been issued by various organizations in the last three decades. The most useful and widely used are those produced

by the U.S. Geological Survey (USGS) in 1997 to illustrate maximum probable ground motion within periods of time ranging from 50 to 250 years. The maps depict horizontal acceleration expressed as a percent of gravity. The primary use for these maps is to aid engineers and architects in designing buildings to withstand maximum probable accelerations in a specified area. However, these maps are limited in their ability to predict future occurrences of earthquake events, and therefore, historic earthquake activity has been utilized in this CANHMP to assess the future probability of occurrence.

The data reviewed during preparation of this CANHMP indicated that there has been no instances where earthquakes have done severe damage within Lucas County, however smaller less damaging earthquakes with epicenters outside of Lucas County (some of which could be felt, most of which could not) have occurred almost on an annual basis. The origins of these earthquakes, and all other Ohio and eastern United States earthquakes, are poorly understood at this time. Those in Ohio appear to be associated with ancient zones of weakness in the earth's crust. These zones are characterized by deeply buried and poorly known faults.

The great difficulty in predicting earthquakes, especially large earthquakes in Ohio is that the recurrence interval (the time between earthquake events) is commonly very long. In the cases of very large earthquakes, this interval can be on the order of hundreds or thousands of years. According to the Ohio Seismic Network, the history of Ohio earthquakes suggests a risk of moderately damaging earthquakes in the western, northeastern, and southeastern portions of the state. Lucas County is located northeast of the western area that is described. Whether these areas, or areas within Lucas County might produce a large damaging earthquake is currently unknown, but in the future, detailed geologic mapping, subsurface investigations, and seismic monitoring will greatly help in assessing the probability of future occurrences.

Based on the data and information provided by the Core Group, Lucas County received a score of **1** for frequency for future earthquake events within the county. This score was based upon the fact that historically, on average, earthquakes with epicenters outside of Lucas County have been felt and/or caused minor damage one time or less over a 10-year period.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, earthquakes were assigned a score of **2** for average response duration. This indicates that a majority of the jurisdictions are “affected” by earthquakes, or put another way are responding to the incident itself or the lasting effects of the incident itself, on average from one day up to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, earthquakes were assigned a score of **4** for average speed of onset. This indicates that a majority of the jurisdictions feel that earthquake events happen with minimal or no warning.

Average Magnitude: Nine jurisdictions out of a total of twenty-one had reported feeling the tremors of an earthquake (**Table 2**). Additionally, there were several instances where earthquakes have been felt throughout the majority of the county. Additionally, all of Lucas County is considered at the same “risk” level for future occurrences of earthquakes, according to the Ohio Seismic Network. Specifically, the western seismic zone, of which Lucas County is located to the northeast, may be capable of producing an earthquake event in the 6.0 to 7.0 magnitude on the Richter scale, which is a large enough event for the affects to be felt in multiple sites within Lucas County.

Based on the data and predictions of large earthquake events in Ohio by the Ohio Seismic Network, Lucas County received a score of **3** for average magnitude for future occurrences of earthquakes. This score reflects that on multiple occasions, single earthquake events have been felt and/or caused minor damage to multiple sites in more than one jurisdiction.

Impact on Business: Based upon the compilation of the data returned from the Core Group, earthquakes were assigned a score of **2** for impact on business. This indicates that a majority of the jurisdictions feel that earthquakes result in the shutdown of critical facilities and business within their jurisdiction anywhere from a single day to a full week.

Impact on Humans: Based upon the historical data and information returned from the Core Group, earthquakes were assigned a score of **2** for impact on humans. The data for earthquakes within Lucas County indicated no injuries or reported fatalities. However, the Core Group data reflects that the majority of jurisdictions anticipate some severe injuries and no likely deaths from future earthquake events.

Impact on Property: Based on the data, Lucas County has never experienced an earthquake with a magnitude so great as to cause extensive property damage. Therefore, Lucas County received a score of **1.5** for impact to property from future earthquake events. This score was based upon the reasoning that even though a potentially large earthquake event could affect Lucas County in the future, most events will be localized and less than 25% of the properties within a given jurisdiction would be damaged.

Priority Ranking: Earthquakes within Lucas County received the following revised priority rankings:

Frequency:	1
Average Response Duration:	2
Average Speed of Onset:	4
Average Magnitude:	3
Impact on Business:	2
Impact on Humans:	2
Impact on Property:	<u>1.5</u>
Total Priority Score:	15.5

3.2.5 Severe Storms

Definition: Severe storms, for the purposes of this CANHMP, include weather events caused when air masses of differing temperatures and moisture levels collide. These include thunderstorms, windstorms and hailstorms. These weather events typically occur in the spring-fall months in Lucas County, but occasionally also occur during the winter.

History: The data reviewed for the 2004 CANHMP, combined with the additional data that was added for the 2013 plan revision, revealed that severe storms have affected every jurisdiction within Lucas County. The data also indicated that severe storms have previously been reported as affecting multiple sites within the county as well as multiple counties within the state.

Within Lucas County, for the years 1956 to 2002, there were 205 records for severe storms in the data reviewed for the 2004 CANHMP. Since the data has been reviewed and updated for the 2013 plan revision, there are now 306 records for severe storms within Lucas County (**Table 2**). Of these, 136 contained data reflecting damages that resulted from a severe storm event (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$5,142,420.08, or \$37,811.91 per event. Additionally, there were seven injuries and six deaths reported from eight different events. Finally, there have been six instances in which a Federal disaster was declared for Lucas County because of severe storm related events: April 1965, July 1969, November 1972, April 1973, May 1974, and July 2006.

Frequency: Severe storms are generated by atmospheric imbalance and turbulence due to three events: (1) unstable warm air rising rapidly into the atmosphere, (2) sufficient moisture to form clouds and rain, and (3) upward lift of air currents caused by colliding weather fronts. These atmospheric conditions are nearly impossible to predict in the long term, however the timing of these conditions within Lucas County can be narrowed down to primarily the spring and summer months, and in some instances in the past, the fall months. These months have historically, on an annual basis, brought numerous damaging thunderstorms, high windstorms, and hailstorms to every jurisdiction within Lucas County.

The data reviewed for this CANHMP indicated that severe storms have affected Lucas County multiple times each decade since the 1950's. Therefore, Lucas County received a score of **4** for frequency for future severe storm events within the county. This score reflects the frequency of these events is annual, at a rate that approaches or exceeds ten events per year.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, severe storms were assigned a score of **1.5** for average response duration. This indicates that a majority of the jurisdictions are "affected" by severe storms or, put another way, are responding to the incident itself or the lasting effects, on average from less than one day up to a few days.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, severe storms were assigned a score of **3** for average speed of onset. This indicates that a majority of the jurisdictions feel that severe storm events happen with a short amount of advance warning, typically less than 12 hours.

Average Magnitude: There are no topographic or other factors, natural or man-made, within Lucas County that would alter the predicted geographic location of future severe storm events. Furthermore, the data indicated that on multiple occasions, a single severe storm has affected multiple jurisdictions within the county. However, these events typically are most severe in very isolated areas at any given time, and the most severe and damaging storms very rarely affect the entire county. Therefore, Lucas County received a score of **2.5** for average magnitude of future severe storm events. This score reflects the un-predictable frequency and distribution of severe storm events, and the historical occurrence of thunderstorms, windstorms, and hailstorms within the county that have affected multiple sites, often in more than just one jurisdiction.

Impact on Business: Based upon the compilation of the data returned from the Core Group, severe storms were assigned a score of **1.5** for impact on business. This indicates that a majority of the jurisdictions feel that severe storms result in the shutdown of critical facilities and business within their jurisdiction anywhere from less than single day to a few days.

Impact on Humans: Based upon the historical data and information returned from the Core Group, severe storms were assigned a score of **3** for impact on humans. The data for severe storms within Lucas County indicated there were seven injuries and six deaths reported from eight different events. Additionally, the Core Group data reflects that the majority of jurisdictions anticipate multiple severe injuries and possible deaths from future severe storm events.

Impact on Property: Since the data has been reviewed and updated for the 2013 plan revision, there are now 306 records for severe storms within Lucas County (**Table 2**). Of these, 136 contained data reflecting damages that resulted from a severe storm event (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$5,142,420.08, or \$37,811.91 per event. Additionally, the majority of jurisdictions indicated that future severe storm events have the potential to affect somewhere between 10% and less than 25% of the properties within their jurisdiction. Therefore, Lucas County received a score of **1.5** for impact to property from future severe storm events.

Priority Ranking: Severe storms within Lucas County received the following revised priority rankings:

Frequency:	4
Average Response Duration:	1.5
Average Speed of Onset:	3
Average Magnitude:	2.5
Impact on Business:	1.5
Impact on Humans:	3
Impact on Property:	<u>1.5</u>
Total Priority Score:	17

3.2.6 Droughts

Definition: Drought refers to an extended period of deficient rainfall relative to the statistical mean for a region. There are 4 main categories of drought: (1) meteorological, (2) hydrological, (3) agricultural, and (4) socioeconomic.

During severe droughts, agricultural crop–yields are reduced, wildlife and livestock go undernourished, land values decline, and unemployment increases. Droughts can also cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may be severely impacted, and the number and severity of wildfires may increase. However, the greatest threat related to drought in Lucas County is to agricultural crops and health threats associated with extreme high temperatures.

All of these characteristics of drought have hindered the development of accurate, reliable, and timely estimates of drought severity and effects and, ultimately, the formation of a drought contingency plan. In 1994, such a plan was developed for the state of Ohio.

The plan, developed by OEMA in cooperation with state, Federal, and local governmental organizations, provides an effective and systematic means of assessing and responding to drought in all areas of the state. The foundation of the plan is based upon the notion that even though the predictability and severity of drought is at times impossible to ascertain, its effects can be minimized through local preparedness, community action, and cooperation.

History: The data reviewed for the 2004 CANHMP, combined with the additional data that was added for the 2013 plan revision, indicated that drought, in at least one of its defined categories, has affected all of the jurisdictions within Lucas County (**Table 2**). The data also indicated drought conditions for multiple areas within the county have occurred several times in the past.

Within Lucas County, there were 26 records for drought within the data reviewed for the 2004 CANHMP. The data was limited in that it only contained information back to the year 1995. Since the data has been revised and updated for the 2013 plan revision, there are now 18 records for drought within Lucas County. There were no records which revealed injuries or deaths associated with drought, however there were six incidences reported where drought led to a reduction or loss in farm crop yield (**Agricultural Drought**). There were no damage figures given for these or any other drought events in the data (**Table 3**), but it can be inferred that Sociological Drought symptoms likely accompanied these financially disastrous situations.

During preparation of the 2004 CANHMP, several attempts were made to include Lucas County-specific figures for agricultural losses attributed to drought conditions. Contact was made with the local Farm Service Agency (FSA) and the local Natural Resources Conservation Service (NRCS) office to obtain these figures. Responses indicated that the requested data is maintained by a number of different agencies at the state and Federal level, however the data is compiled to include not only drought-related loss information, but also includes data from a number of different State and Federal subsidy programs for farmers.

At that time, interpretation of this data to isolate only those losses attributed to drought conditions was impractical.

The data also contained reports of **Hydrological Drought** conditions. Specifically, low rainfall was reported and water shortages and/or low stream and river levels. Finally, drought was not reported as a contributing factor to either forest or grass fire within the county.

Frequency: Drought is the result of both lack of precipitation combined with other factors, typically high temperatures. The limited data has revealed that there have been several instances in the past within Lucas County with long periods of both high temperatures and lack of rain. Specifically, countywide and/or individual jurisdictions reported drought conditions for multiple years during the both the 1980's and the 1990's. An assumption can be made that if the data record included decades prior to the 1980's, similar trends (as have been observed throughout Ohio) would have been revealed. Furthermore, many of the representatives from each jurisdiction within Lucas County have indicated that the probability of future drought events is high for the majority of the county.

Based on the data, Lucas County received a score of 2 for frequency of drought within the county. This score reflects that assumption that drought has occurred on average more than once but less than ten times in any given ten year period.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, drought was assigned a score of 2.5 for average response duration. This indicates that a majority of the jurisdictions are "affected" by drought or, put another way, are responding to the incident itself or the lasting effects on average for somewhere between a couple of weeks up to a couple of months.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, drought was assigned a score of 1 for average speed of onset. This indicates that a majority of the jurisdictions feel that drought events provide a very long warning period as they approaching, often upwards of weeks if not months.

Average Magnitude: All of the jurisdictions, or the entire county had previous instances of drought reported in the data (**Table 2**). Specifically, there were several instances where countywide drought conditions were reported during the same time period or for the same drought event. However, these drought conditions likely only affected a small portion of the total Lucas County community, most importantly the agricultural community. Specifically, agricultural areas within Lucas County are most susceptible to losses related to socioeconomic drought.

Based on the data and information provided by the Core Group, Lucas County received a score of 2.5 for average magnitude for future occurrences of drought. This score reflects that on multiple occasions, drought conditions were reported affecting several jurisdictions within the county, however only a small proportion of the Lucas County community was affected.

Impact on Business: Based upon the compilation of the data returned from the Core Group, drought was assigned a score of **1.5** for impact on business. This indicates that a majority of the jurisdictions feel that drought seldom result in the shutdown of critical facilities and business within their jurisdiction.

Impact on Humans: Based upon the historical data and information returned from the Core Group, drought was assigned a score of **1** for impact on humans. The data for drought within Lucas County indicated no injuries or reported fatalities. However, the Core Group data reflects that the majority of jurisdictions anticipate only minor injuries and no deaths from future drought events.

Impact on Property: There were six incidences reported where drought led to a reduction or loss in farm crop yield (**Agricultural Drought**). There were no damage figures given for these or any other drought events in the data (**Table 3**), but it can be inferred that Sociological Drought symptoms likely accompanied these financially disastrous situations.

Based upon the historical data and information provided by the Core Group, Lucas County received a score of **1.5** for impact on property from future drought events. This indicates that somewhere between 10%- 25% of properties within a given jurisdiction would suffer financial losses from future drought events.

Priority Ranking: Drought within Lucas County received the following revised priority rankings:

Frequency:	2
Average Response Duration:	2.5
Average Speed of Onset:	1
Average Magnitude:	2.5
Impact on Business:	1.5
Impact on Humans:	1
Impact on Property:	<u>1.5</u>
Total Priority Score:	12

3.2.7 Lake Surges

Definition: Lake surges (also referred to as storm surges) are associated with extreme weather events and are responsible for coastal flooding and erosion (along Lake Erie within Lucas County). The storms that generate the large waves of lake surges can develop year-round, however within Lucas County, these events have typically occurred in the early spring and late fall months. Storm surges inundate coastal floodplains by dune over wash, the rise in water levels in inland bays and harbors, and backwater flooding through river mouths. Storm systems also generate large waves that run up and flood coastal beaches. The problem of lake surges and associated inland flooding is compounded by adjacent low-lying floodplains, and similarly steep terrain at coastal bluffs (not present in Lucas County)

would reduce the volume and elevation of water pushed up against the shore, preventing flooding and deflecting potentially damaging wave energy.

Coastal erosion affects every state with borders along an ocean coastline or one of the Great Lakes. Coastal erosion is measured as the rate of change in the position or horizontal displacement of a shoreline over a period of time. It is generally associated with storm surges, windstorms, and flooding hazards, and may be exacerbated by human activities such as boat wakes, shoreline hardening, and dredging. Conversely, actions to supplement natural coastal processes, such as beach nourishment, dune stabilization, and construction of shore protection structures can greatly modify and reduce erosion trends within an area.

History: The data reviewed for the 2004 CANHMP, combined with the data added for the 2013 plan revision, revealed that lake surges have affected the cities of Toledo and Oregon, the Village of Harbor View, and the un-incorporated areas of Jerusalem Township on numerous occasions in the past (**Table 2**). The data also indicated that single lake surge events have previously been reported as simultaneously affecting multiple sites within these jurisdictions.

Within Lucas County, there were ten records for lake surges in the data reviewed for the 2004 CANHMP. Since the data has been revised and updated for the 2013 plan revision, there are now eleven records for lake surges within Lucas County. Six of these eleven records indicated damage amounts attributed to lake surges within the county (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$816,213.19, or \$136,035.53 per event. Additionally, there were no records of injuries or deaths associated with lake surge events within the data reviewed. Finally, there has never been an instance in which a Federal disaster was declared for Lucas County because of a lake surge event.

Frequency: The limited data available concerning lake surges that was reviewed during preparation of the 2004 CANHMP, combined with the data that has been added for the 2013 plan revision, revealed that they have been recorded annually for those years in which data was maintained (**Table 2**). Additionally, those records indicated multiple occurrences of lake surges during the early spring and late fall months. It has been assumed that if data were available for years prior to 1997, similar occurrence trends would be apparent. Therefore, Lucas County received a score of **2** for frequency for future lake surge events within the county. This score reflects the assumed frequency of these events is greater than once but less than ten times in any given ten-year period.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, lake surges were assigned a score of **2** for average response duration. This indicates that a majority of the jurisdictions are “affected” by lake surges or, put another way, are responding to the incident itself or the lasting effects on average for somewhere between one day to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, lake surges were assigned a score of **1.5** for average speed of onset. This indicates

that a majority of the jurisdictions feel that lake surge events provide a moderate warning period as they approaching, typically between 12 and 24 hours.

Average Magnitude: All of Lucas County is not considered vulnerable to future lake surge events. **Figure 3a** depicts the Lake Erie floodplain within the cities of Toledo and Oregon, the Village of Harbor View, and within the un-incorporated areas of Jerusalem Township. Although areas beyond the mapped floodplain can experience damages during extreme lake surge events, the highlighted area is considered the most susceptible area within the county for future events. Furthermore, the data indicated that on multiple occasions, a single lake surge event has affected multiple sites within any given individual jurisdiction within the county. Therefore, Lucas County received a score of **1.5** for average magnitude of future lake surge events. This score reflects that the majority of the county is outside of the lake surge hazard area, however the historical occurrence of individual events have affected multiple sites on more than just one occasion.

Impact on Business: Based upon the compilation of the data returned from the Core Group, lake surges were assigned a score of **1.5** for impact on business. This indicates that a majority of the jurisdictions feel that lake surges seldom result in the shutdown of critical facilities and business within their jurisdiction, however, the possibility of a few days shutdown is likely.

Impact on Humans: Based upon the historical data and information returned from the Core Group, lake surges were assigned a score of **1.5** for impact on humans. The data for lake surges within Lucas County indicated no injuries or reported fatalities. However, the Core Group data reflects that the majority of jurisdictions anticipate only minor injuries and likely no deaths from future lake surge events.

Impact on Property: Since the data has been revised and updated for the 2013 plan revision, there are now eleven records for lake surges within Lucas County. Six of these eleven records indicated damage amounts attributed to lake surges within the county (**Table 3**). The total dollar figure of damages, converted to year 2011 dollars, was \$816,213.19, or \$136,035.53 per event.

Based upon the historical data and information provided by the Core Group, Lucas County received a score of **1.5** for impact on property from future lake surge events. This indicates that somewhere between 10%-20% of properties within a given jurisdiction would suffer financial losses from future lake surge events.

Priority Ranking: Lake surges within Lucas County received the following revised priority rankings:

Frequency:	2
Average Response Duration:	2
Average Speed of Onset:	1.5
Average Magnitude:	1.5
Impact on Business:	1.5

Impact on Humans:	1.5
Impact on Property:	<u>1.5</u>
Total Priority Score:	11.5

3.2.8 Wildfires

Definition: The term wildfire is defined as a highly destructive, uncontrollable fire. Thunderstorms that contain lightning typically start wildfires, or humans can cause wildfires. Naturally occurring or non-native species of trees, brush, and grasses fuel wildfires. Topography, fuel, and weather are the three principle factors that impact wildfire hazards and behavior. Other factors may trigger a wildfire, and wildfires can contribute to the occurrence of other natural hazards.

Fires that burn forest plants can be classified in three ways: **Ground Fires**, **Surface Fires**, and **Crown Fires**. Ground fires burn the humus layer of the forest floor, surface fires burn forest undergrowth and surface litter, and crown fires advance through the tops of trees. Atmospheric factors such as temperature, humidity, and rainfall are important factors in determining the combustibility of a given forest. Grasslands and shrub lands are also susceptible to wildfires originating by both lightning and human causes.

History: The data reviewed for the 2004 CANHMP, combined with the data added for the 2013 plan revision, revealed that wildfires have previously occurred in only limited areas within Lucas County. However, three cities, two villages and three townships have indicated a risk of future wildfire events within their jurisdiction (**Table 2**). It should be noted, however, that additional jurisdictions **may** have been previously affected by wildfires. The conclusion that the remaining jurisdictions have not been affected resulted **only** from the fact that the data used in this CANHMP did not contain any official records or individual personal accounts with respect to wildfires for those jurisdictions.

There were no records which revealed injuries or deaths associated with wildfires. Additionally, there were no damage figures given for any wildfire events within the data (**Table 3**). All of the records were obtained from information returned by the Core Group members (**Worksheet #1, Appendix B**) and only indicated that fires have occurred in the past, or that there was a large/small risk of future occurrences within their jurisdiction.

Frequency: Nationally accepted models have not yet been developed to make wildfire risk or vulnerability assessments. However, the United States Forest Service (USFS) has utilized computer models to predict wildfire behavior. These models have been used to develop nation-wide Observed Fire Danger Class maps. These maps, which are constantly being updated, use topographic, fuel, fuel moisture, and weather data to predict the fire danger class throughout the county.

Another important aspect with regards to predicting wildfires is the ignition source. Wildfires can be started naturally by lightning occurring when dry thunderstorms move across an area that is suffering from seasonal drought; however the USFS reports that annually, more wildfires are started by careless means (campfires, cigarettes, and trash

burning) or arson than by lightning. Both the natural and non-natural ignition sources of wildfires cannot be accurately predicted therefore the Observed Fire danger Class maps have been utilized.

According to the Observed Fire Danger Class maps, and from fuel model keys also produced by the USFS, most of the State of Ohio, including Lucas County, remains in a Low to Moderate Fire Danger Class during Ohio's wildfire seasons (March – May and October – November). During these times, and especially when weather conditions are warm, windy and with low humidity, cured vegetation is particularly susceptible to burning.

The greatest threat and potential impact is in Swanton Township and more specifically the Oak Openings Preserve Metropark. This is due to the intentional policies of the Park in the way the forested oak savanna is managed and the presence of a number of residential and commercial properties within its boundaries. The second area is the wildlife refuge to the East of Maumee Bay State Park.

Based on the data, there were no reports of annual wildfire events within the county. Reports only indicated a risk of future occurrences existed. These records, coupled with the Low to Moderate Fire Danger Class assigned by the USFS combine to give Lucas County a score of 2 for frequency for future wildfire events. This score represents that small wildfires will periodically occur within Lucas County; however large, un-controllable fires that result in wide-scale damage are unlikely.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, wildfires were assigned a score of 2 for average response duration. This indicates that a majority of the jurisdictions are “affected” by wildfires or, put another way, are responding to the incident itself or the lasting effects of on average for somewhere between one day to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, wildfires were assigned a score of 4 for average speed of onset. This indicates that a majority of the jurisdictions feel that wildfire events provide minimal or no warning prior to their onset.

Average Magnitude: Wildfires can occur throughout all of the “non-developed” areas within Lucas County. These areas specifically forested and agricultural areas are depicted on **Figure 5 – Wildfire Hazard Areas**. This figure broadly depicts the current land-use within Lucas County. The only land-use types within the county not susceptible to wildfires include urban and open water. The largest risk areas for the future occurrence of wildfires in Lucas County are those areas indicated on the figure with large expanses of forested and agricultural land-use, such as in the western and eastern portions of the county.

According to information obtained from the Exurban Change Project, in 1997 approximately 46.5 percent of the non-water land-use within Lucas County was forested or in agricultural production (cropland and pasture). This number has continued to decrease steadily over the 15 year period for which data was available for the project (1982 – 1997) This trend is likely

to remain constant in the future within the county, as each year more farms and forested areas are converted to residential, industrial, and commercial areas adjoining the incorporated municipalities (also referred to as “urban sprawl”). This trend will not necessarily reduce the risk the county faces in regards to future wildfires it only indicates that fewer acres within the county will be in land-use types that are susceptible. Additionally, as Lucas County continues to progress with development, the “safety zone” between the wildfire risk areas and human encroachment becomes ever smaller.

Based upon the fact that approximately 46.5 percent of the county is comprised of land-use considered susceptible to wildfires, Lucas County received a score of **1.5** for average magnitude for future wildfire occurrences. This score reflects that although a considerable amount of land acreage within the county is comprised of wildfire susceptible areas, if a wildfire were to occur in the future, it would likely be an isolated event and not spread to other locations or jurisdictions. This assumption is based upon the fact that to date, no recorded wildfire events have done so and one hundred percent of the fire departments within the county have entered into mutual aid agreements for assisting each other in the case of a wildfire occurrence.

Impact on Business: Based upon the compilation of the data returned from the Core Group, wildfires were assigned a score of **1.5** for impact on business. This indicates that a majority of the jurisdictions feel that wildfires, if they were to occur, would result in the shutdown of critical facilities and business within their jurisdiction anywhere from a single day to a couple of days.

Impact on Humans: Based upon the historical data and information returned from the Core Group, wildfires were assigned a score of **1.5** for impact on humans. The data for wildfires within Lucas County indicated no injuries or reported fatalities. However, the Core Group data reflects that the majority of jurisdictions anticipate some minor and possible severe injuries, but no likely deaths from future wildfire events.

Impact on Property: Based on the data, Lucas County has never experienced a large wildfire with a magnitude so great as to cause significant property damage. The majority of the fire departments are equipped with grass vehicles and all have entered into a mutual aid agreement to respond to future fire events, including wildfires. Therefore, Lucas County received a score of **1.5** for impact on property of future wildfire events within the county. This score reflects that a future wildfire event may result in localized property damage if the event were to take place near an area within the county where the un-developed/developed interface occurs. However, the magnitude of the event would likely not escalate to a level capable of doing extensive property damage because of the wide spread fire suppression coverage and mutual aid agreements in place by the Lucas County fire departments.

Priority Ranking: Wildfires within Lucas County received the following revised priority rankings:

Frequency:	2
Average Response Duration:	2

Average Speed of Onset:	4
Average Magnitude:	1.5
Impact on Business:	1.5
Impact on Humans:	1.5
Impact on Property:	<u>1.5</u>
Total Priority Score:	14

3.2.9 Temperature Extremes

Definition: Temperature extremes, for purposes of this CANHMP, include exceptionally high or low temperatures experienced during the summer or winter months, respectively. Although these temperature conditions typically occur simultaneously with two other natural hazards included in this CANHMP (drought and severe winter storms), there have been, and could be in the future, conditions where extreme temperatures alone can affect Lucas County without incidences of drought or severe winter storms. Therefore, temperature extremes will be treated as a stand-alone natural hazard within this document.

Extreme summer weather is characterized by a combination of very high temperatures and exceptionally humid conditions. When persisting over a period of time, it is called a heat wave. Extreme winter weather, as discussed in sub-section **3.2.1 – Severe Winter Storms**, is characterized by freezing temperatures accompanied by freezing rain or ice storms, snowfall (flurries, showers, or squalls), blowing and drifting snow, high winds that create sub-zero wind chill and blizzard conditions. Focus in this sub-section will be directed toward the freezing temperatures and sub-zero wind chills that can occur with or without the accompanying winter precipitation.

History: The data reviewed for the 2004 CANHMP, combined with the data that was added for the 2013 plan revision, revealed that extreme temperatures, both hot and cold, have affected every jurisdiction within Lucas County. The data also indicated that temperature extremes have previously been reported as affecting multiple sites within the county as well as multiple counties within the state.

Within Lucas County, there were 25 records for temperature extremes in the data reviewed for the 2004 CANHMP. Since the data has been updated and revised for the 2013 plan revision, there are now 20 records for temperature extremes within Lucas County. None of these 20 records indicated damage amounts attributed to extreme hot or cold temperatures within the county (**Table 3**). However, one death was reported in 1993 when a homeless man (age unknown) in Toledo was reported to have died of hypothermia (**Table 2**). Finally, there has never been an instance in which a Federal disaster was declared for Lucas County because of extreme hot or cold temperatures.

Frequency: Extreme hot or cold temperatures are restricted primarily to the summer and winter months within Lucas County. However, the data reviewed for this CANHMP indicated that extremely cold temperatures have been felt throughout the county as late as

April, and extreme heat has been reported in June, well before the “typical” summer hot period within Ohio.

Extreme cold has affected Lucas County multiple times each decade for those years which data was available. Similar trends are observed for extremely high temperatures as well. There have been some winters in which extremely cold temperatures and wind chills have affected nearly every jurisdiction within the county for several days/weeks at a time, and several summers where extremely high temperatures and humidity have stretched for time periods approaching not only weeks, but months. However, on average, extreme temperatures, specifically those that result in cases of heat/cold related injuries or deaths, occur very rarely, or on average ten times within any given ten-year period within Lucas County.

Therefore, Lucas County received a score of **3** for frequency for future extreme temperature events within the county. This score reflects the frequency of typical extreme temperature events is approximately ten times within any given ten-year period.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, extreme temperature events were assigned a score of **1.5** for average response duration. This indicates that a majority of the jurisdictions are “affected” by extreme temperature events or, put another way, are responding to the incident itself or the lasting effects on average for somewhere between one day to a couple of days.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, extreme temperature events were assigned a score of **1** for average speed of onset. This indicates that a majority of the jurisdictions feel that extreme temperature events provide a good deal of warning prior to their onset, typically greater than 24 hours.

Average Magnitude: There are no topographic or other natural or man-made factors within Lucas County that would alter the predicted geographic location of future extreme temperature events. Furthermore, the data indicated that on multiple occasions, a single extreme hot or cold streak has affected multiple jurisdictions within the county. Therefore, Lucas County received a score of **3.5** for average magnitude of future extreme temperature events. This score reflects the historical occurrence of extreme temperature events, when they occur, have affected nearly every jurisdiction simultaneously.

Impact on Business: Based upon the compilation of the data returned from the Core Group, extreme temperature events were assigned a score of **1** for impact on business. This indicates that a majority of the jurisdictions feel that extreme temperature events would not result in the shutdown of critical facilities and business within their jurisdiction.

Impact on Humans: The data for extreme temperature events within Lucas County indicated one death was reported in 1993 when a homeless man (age unknown) in Toledo was reported to have died of hypothermia no injuries or reported fatalities. Based upon the historical data and information returned from the Core Group, extreme temperature events were assigned a score of **2** for impact on humans.

Impact on Property: The data reviewed for this CANHMP indicated no property damage attributed to extreme hot or cold temperatures within the county (**Table 3**). Additionally, there have been no instances in which a Federal disaster was declared for Lucas County because of extreme hot or cold temperatures. Therefore, based upon the historical data and information provided by the Core Group, Lucas County received a score of 1 for impact on property from future extreme temperature events within the county. This score reflects the assumption that future events would likely not result in property damage.

Priority Ranking: Extreme temperature events within Lucas County received the following revised priority rankings:

Frequency:	3
Average Response Duration:	1.5
Average Speed of Onset:	1
Average Magnitude:	3.5
Impact on Business:	1
Impact on Humans:	2
Impact on Property:	<u>1</u>
Total Priority Score:	13

3.2.10 Landslides

Definition: Landslides are large masses of rock and soil that fall, slide, or flow very rapidly under the force of gravity. They can occur on any terrain given the right conditions of soil, moisture, and the angle of slope. These mixtures of debris move in a wet or dry state, or both. Landslides commonly originate as massive rockslides or avalanches, which disintegrate during movement into fragments ranging in size from small particles to enormous blocks several hundred feet across.

Also known as mud flows, debris flows, earth failures, slope failures, slips, etc., landslides can be triggered by rains, floods, earthquakes, and other natural causes as well as human-made causes, such as grading, terrain cutting and filling, excessive development, etc. Because the factors affecting landslides can be geophysical or human-made, they can occur in developed areas, undeveloped areas, or any area where the terrain was altered for roads, houses, utilities, buildings, and other types of human development.

History: The data reviewed for the 2004 CANHMP, combined with the data that was added for the 2013 plan revision, indicated that landslides are not currently a serious concern in the majority of jurisdictions within Lucas County. Only one record indicated the occurrence of damaging landslides; a slope failure that occurred in Toledo in January of 2007. Furthermore, only a few jurisdictions have indicated potential risk of future occurrences (**Table 2**). It should be noted, however, that additional jurisdictions **may** have been previously affected by landslides. The conclusion that the remaining jurisdictions have not been affected by landslides resulted **only** from the fact that the data used in this CANHMP

did not contain any official records or individual personal accounts with respect to landslides for those jurisdictions.

The data that was reviewed for the 2004 CANHMP contained very limited information regarding the history of landslides within Lucas County. Additionally, the data that was added for the 2013 plan revision also contained very limited information regarding the history of landslides within Lucas County. There were no records that contained figures corresponding to damage caused by landslide events (**Table 3**). One possible explanation for this is that the topography throughout much of the county is relatively flat, with very few steep hillsides or slopes typically associated with landslide events. However, human factors, such as grading, terrain cutting and filling, excessive development, etc. do contribute some level of landslide possibility to those areas that the flat topography has historically resulted in no risk of potential landslide occurrences. Additionally, there are a number of stream bank areas within the county where erosion has created areas that are unstable and subject to typical “fall in” from heavy rains and flash flooding events.

Frequency: Several human and natural factors may contribute to or influence the occurrence of landslides. The principle human factors are mining and construction of highways, buildings, and railroads. The principle natural factors include topography, geology, and precipitation. Within Lucas County, precipitation is the only natural factor that is variable, with topography and geology remaining stable until one of the human factors is introduced.

Mining within Lucas County has historically been much less intensive than other counties within Ohio, and there are relatively few areas within the county with the associated increased landslide probability. However, the construction of highways, buildings, and railroads, particularly within the last fifty years, has generally increased the probability of landslide occurrence within those areas previously not considered susceptible.

Based on the limited data, only a few jurisdictions within the county consider there to be a future risk associated with landslides. Therefore, Lucas County received a score of **1** for frequency of future landslide events within the county. This score reflects that landslides have not occurred in any sufficient amount within the recent past, and future occurrences would likely be very limited and wide spaced with respect to time. However, increasing development pressure within the county may potentially be increasing the probability that a future landslide event could occur in those areas.

Average Response Duration: Based upon the compilation of the data returned from the Core Group, landslide events were assigned a score of **2** for average response duration. This indicates that a majority of the jurisdictions are “affected” by landslide events or, put another way, are responding to the incident itself or the lasting effects on average for somewhere between one day to one week.

Average Speed of Onset: Based upon the compilation of the data returned from the Core Group, landslide events were assigned a score of **2.5** for average speed of onset. This

indicates that a majority of the jurisdictions feel that landslide events do not provide a large amount of warning prior to their onset, typically less than 12 hours.

Average Magnitude: A Landslide Incident Map provided by the USGS was reviewed to determine if any portion of Lucas County was within the designated Landslide Hazard – Incident High over-tint depicted on the map. This review indicated that there was an area within the county that was included in the nationwide Incident-High area. This area is along the north bank of the Maumee River in the central portion of Lucas County. There are also some soil types within Lucas County that are more susceptible to landslides, derived from information contained in the Soil Survey for Lucas County, produced by the USDA- Soil Conservation Service in 1980. The areas within the county where the landslide prone soils occur have not been delineated as part of this CANHMP, but can be considered more susceptible, based upon the human factors mentioned above, to future occurrences of landslides. Although these areas contain soil types that are subject to slippage, in most cases slopes are slight, and erosion rather than slippage and landslides would more likely occur.

Even though the USGS data indicates an area of possible landslide occurrence along the north bank of the Maumee River, and there are susceptible soil types in the county, none of the data reviewed or information provided by the Core Group members indicated any real concerns about past or future landslide events within the county. The topography of Lucas County is extremely flat and there are very few places where slopes are steep enough to generate a concern about landslides, with the possible exception of the interior slope of the northern Maumee River bank, which is void of any structures or people so actual associated risk is non-existent. For these reasons **No Figures** with the USGS Incident Landslide Areas are included in this plan.

Based on the data, Lucas County received a score of **1** for average magnitude for future occurrences of landslides. This score reflects that landslides may affect multiple jurisdictions over time, but each individual landslide event would likely impact only one site per occurrence.

Impact on Business: Based upon the compilation of the data returned from the Core Group, landslide events were assigned a score of **1.5** for impact on business. This indicates that a majority of the jurisdictions feel that landslide events would not likely result in the shutdown of critical facilities and business within their jurisdiction, however, a few day shutdown is a possibility.

Impact on Humans: The data for landslide events within Lucas County did not indicate and incidents that caused injuries or deaths. Based upon the historical data and information returned from the Core Group, landslides were assigned a score of **1.5** for impact on humans. This score reflects that the majority of jurisdictions feel that a future landslide event may result in some minor injuries; however severe injuries and deaths are not likely.

Impact on Property: The data reviewed for this CANHMP indicated no property damage attributed to landslide events within the county (**Table 3**). Additionally, there have been no instances in which a Federal disaster was declared for Lucas County because of a landslide

event. Therefore, based upon the historical data and information provided by the Core Group, Lucas County received a score of **1** for impact on property from future landslide events within the county. This score reflects the assumption that future events would likely result in very localized property damage.

Priority Ranking: Landslides within Lucas County received the following revised priority rankings:

Frequency:	1
Average Response Duration:	2
Average Speed of Onset:	2.5
Average Magnitude:	1
Impact on Business:	1.5
Impact on Humans:	1.5
Impact on Property:	<u>1</u>
Total Priority Score:	10.5

3.3 Natural Hazard Priority Ranking Summary

The following table represents the hazard priority ranking scores for each of the identified natural hazards calculated during the hazard profiling step of the 2004 CANHMP.

Natural Hazard	Probability of Occurrence	Anticipated Geographic Extent	Anticipated Magnitude	Total Priority Ranking Score
Severe Winter Storms	4	5	5	14 (High)
Tornadoes	3	4	5	12 (High)
Severe Storms	4	3	5	12 (High)
Floods	3	3	5	11 (Med.)
Earthquakes	3	4	4	11 (Med.)
Droughts	3	3	3	9 (Med.)
Lake Surges	4	2	3	9 (Med.)
Wildfires	2	3	3	8 (Low)
Temperature Extremes	3	2	3	8 (Low)
Landslides	2	1	2	5 (Low)

Based upon the above table, three classes of priority rankings were established during preparation of the 2004 CANHMP for the natural hazards that **could** affect Lucas County; High, Medium and Low Priority. Those natural hazards that received a total priority ranking score of 12 or greater were classified as “High Priority”, between 9 and 11 “Medium Priority”, and 8 or less “Low Priority” for the purpose of prioritizing future mitigation Action Items within the county and for organizing the remaining sections of the 2004 CANHMP.

The following table represents the hazard priority ranking scores for each of the identified natural hazards calculated during the hazard profiling step of the 2013 plan revision.

Hazard	Frequency	Average Response Duration	Average Speed of Onset	Average Magnitude	Impact on Business	Impact on Humans	Impact on Property	Total Priority Ranking Score
Tornado	2	3	4	3	2	2.5	3	19.5 (High)
Severe Storm	4	1.5	3	2.5	1.5	3	1.5	17 (High)
Flood	2.5	2	3	2	2	1.5	2.5	15.5 (High)
Severe Winter Storm	3	2	1.5	3.5	2	2	1.5	15.5 (High)
Earthquake	1	2	4	3	2	2	1.5	15.5 (High)
Wildfire	2	2	4	1.5	1.5	1.5	1.5	14 (Med)
Temp. Extremes	3	1.5	1	3.5	1	2	1	13 (Med)
Drought	2	2.5	1	2.5	1.5	1	1.5	12 (Low)
Lake Surge	2	2	1.5	1.5	1.5	1.5	1.5	11.5 (Low)
Landslide	1	2	2.5	1	1.5	1.5	1	10.5 (Low)

For the 2013 plan revision, three classes of priority rankings were also established for the natural hazards that **could** affect Lucas County; High, Medium and Low Priority. Those natural hazards that received a total priority ranking score of 15 or greater were classified as “High Priority”, between 13 and 14 “Medium Priority”, and 12 or less “Low Priority”.

Comparing the priority rankings from the 2004 CANHMP to the rankings in the 2013 plan revision, some similarities and some differences are observed. Severe winter storms, tornados, and severe storms have remained “High Priority” natural hazards, along with the addition of flooding and earthquake (both were “Medium Priority” natural hazards in the 2004 CANHMP). Wildfire and temperature extremes are now “Medium Priority” natural

hazards (both were “Low Priority” natural hazards in the 2004 CANHMP). Finally, landslide has remained a “Low Priority” natural hazard for Lucas County, along with the addition of lake surges and drought which were “Medium Priority” natural hazards in the 2004 CANHMP.

3.4 Community Profile

The third step in the risk assessment process answers the question: What assets in the county will be affected by the natural hazard event? Now that it is known **where** natural hazard events can affect Lucas County, an inventory of the vulnerable assets was completed that helped identify exactly **what** could be affected by the different natural hazard events.

Before it could be determined what assets are at risk, a preliminary inventory of the total assets in the county was conducted. This was done during preparation of the 2004 CANHMP using data supplied by the County Auditor’s Office – Division of Real Estate and their GIS parcel identification data. Then, knowing the extent of the hazard areas for the natural hazards that could be mapped, and the history of the other, non-mappable natural hazard events, the number and type of assets at risk for each natural hazard event was estimated (sub-section **3.5 – Vulnerability Analysis and Loss Estimation**).

During preparation of the 2004 CANHMP, the auditor’s GIS data was broken down into a large number of land uses. For the purposes of the 2004 CANHMP, those land use types were combined into five basic types. These are Agricultural, Commercial, Exempt, Industrial, and Residential. These parcel types are pretty much self-explanatory with the exception of Exempt. Exempt properties are properties owned by some level of government and are exempt from taxes. These may include parks, government offices and other property such as highway garage facilities, as well as critical facilities such as police and fire stations, shelters, etc. A detailed explanation of the critical facilities within Lucas County is presented in sub-section **3.4.1 – Critical Facilities**.

For the 2013 plan revision, updated data supplied by the County Auditor’s Office – Division of Real Estate was utilized to revise the community profile for Lucas County. As part of the 2013 plan revision, the decision was made by the Core Group to utilize the same process for estimating future losses as was used during preparation of the 2004 CANHMP. Specifically, even though a much greater level of detail could be achieved for estimating flood related losses by using HAZUS or other flood projection software, the Core Group decided to keep the loss estimation in the 2013 plan revision consistent across all hazards. It was determined that trying to incorporate HAZUS data would skew the loss estimation and floods will be evaluated much differently than the other hazards addressed in the 2013 plan revision.

Using the above-mentioned county auditor’s GIS parcel data, the total number of structures in Lucas County in 2002 was 270,217 structures. Utilizing the updated data, the total number of structures in Lucas County in 2011 is 198,527. This is shown in **Table 4a – Countywide Flood Hazard Area Structure Summary** under “Structure Count”. Utilizing the same database, the total structure value in Lucas County in 2002 dollars was

approximately \$16,350,462,980.00. Utilizing the updated data, the total structure value in Lucas County in 2011 dollars is approximately \$19,730,050,800.00.

The next step was to determine the type and value of each of the assets located within the hazard areas for each mappable natural hazard. During preparation of the 2004 CANHMP, this was accomplished by overlaying GIS maps of the hazard areas over the GIS county asset maps. This was done for the only mappable natural hazard area, i.e. flood.

For the 2013 plan revision, the same process was conducted to update the type and value of each of the assets located within the hazard areas for each mappable natural hazard. The updated information can be seen in **Figure 3b – Structures Inside Flood Hazard Areas**, which depicts the entire county, and **Figures 3c – 3p – Structures Inside Jurisdictional Flood Hazard Areas**, which depicts the individual jurisdictions within the county. Although landslides are also mappable, based on the information collected indicating no history of or concern about landslides and no structures located along the north shore of the Maumee River within the landslide incident area, **No Figures** for this hazard are included.

For the other natural hazards that are not easily mapped, the entire county may be vulnerable but the impacts are usually relatively isolated. During preparation of the 2004 CANHMP, to determine vulnerability to these natural hazards, historical data was reviewed (**Table 2**) in terms of an average cost per event in 2002 dollars. Since the historical data has been updated for this 2013 plan revision, the average cost per event has also been updated. **Table 3** indicates the average dollar cost per event in 2011 dollars for the ranked hazards in Lucas County. The 2011 dollar values were obtained by factoring the value of the loss at the time of the occurrence to current dollars using the consumer price index values previously discussed. For example, should a tornado strike somewhere in Lucas County; the damage estimate is \$23,429,651.58 per event. There were 8 tornado events upon which this average was based. Similarly, if a severe storm strikes anywhere in the county, the average damage expected in 2011 dollars is \$37,811.91. This is based on an average of some 136 severe storm events.

A complete analysis of the specific assets within Lucas County at risk for each natural hazard type is included in sub-section **3.5 – Vulnerability Analysis and Loss Estimation**.

3.4.1 Critical Facilities

Critical facilities are defined in the FEMA planning guide as those facilities that “Are essential to the health and welfare of the whole population and are especially important following hazard events”. The planning guide lists several groups of critical facilities. For the purpose of the 2004 CANHMP, the critical facilities were defined as fire stations/EMS facilities, police/law enforcement facilities, hospitals, shelters, administration buildings, airports, seaports, and nursing homes/assisted care facilities. For the 2013 plan revision, the list of critical facilities was refined from the 2004 CANHMP. The specific categories that the Core Group decided upon include fire stations/EMS facilities, police/law enforcement facilities, hospitals, nursing homes, government buildings, schools, parks, and infrastructure facilities.

Information relative to the number and location of these facilities within Lucas County was provided by the Core Group members and subsequently geo-located onto project mapping by Lucas County GIS personnel.

For security purposes, this information is being presented in **Table 5- Critical Facilities**, located in **Appendix E – Confidential Critical Facilities Information** and will only be available for viewing by LCEMA, OEMA and FEMA. The public distribution copy of this 2011 CANHMP revision will not contain this appendix. These Critical Facilities are also presented in **Figure 6 – Critical Facilities Map**, also contained in **Appendix E**. This map is subject to the same level of confidentiality as the data table noted previously.

For the 2013 plan revision, the mappable hazard areas within the county were combined with the critical facilities data to prepare **Figure 7 – Critical Facilities Inside the 100-Year Floodplain**, for the purposes of determining, which, if any, critical facilities were located within the 100-year floodplain.

Within Lucas County, with the data that was available for this 2013 plan revision, **469** total critical facilities were identified. These include **41** fire stations/EMS facilities, **24** police/law enforcement facilities, **14** hospitals, **37** nursing homes/assisted care facilities, **67** government buildings, **215** schools, **19** parks, and **52** infrastructure facilities (**Table 5**).

Of these facilities, 22 are located within the 100-year floodplain area. These 22 critical facilities are numbered 1-22 and depicted on **Figure 7**.

A discussion about these 22 critical facilities located within the flood hazard area is presented in sub-section **3.5.3 – Floods**. The remainder of the critical facilities are scattered throughout the county and are subject to the same randomness of other natural hazards as are all structures.

Although not located within Lucas County, there are two nuclear power plants in close proximity that could impact the county should a natural disaster damage or disable either of these generating facilities (**Figure 8 – Nuclear Power Plant Locations**). The first of these two nuclear plants is the Fermi II power plant, located in Monroe County, Michigan which is about 20 miles north-northeast of the closest point in Lucas County. The other nuclear power plant is the Davis-Besse plant. This plant is located in Ottawa County, within 5 miles and southeast of the eastern extremity of Lucas County.

Since these plants have been designed to withstand the worst weather that could be expected in the area, any potential damage from weather related natural events should not negatively affect the health and safety of the community. These facilities are also designed to be earthquake resistant. However, there has been no experience with a similarly designed plant exposed to any recent major earthquake events. Should such a disaster occur, the amount of damage to either or both of these plants is difficult to predict. Based on the prevailing winds, most of the radioactive materials would normally be carried away from the power plants to the east or northeast and away from Lucas County. There still would be a danger

zone within some radius of a damaged plant although this would depend on the extent of the damage and the nature of any reaction that follows.

As in previous analysis, for those hazards that can be mapped, i.e. flood, the critical facilities located within the hazard areas have been readily identified. For the remaining list of hazards, all of the critical facilities are vulnerable, however each hazard event typically occurs in a smaller area that can be anywhere within the county or covers a broad section of the county for which there is no way to distinguish where the event may occur or which critical facilities may be impacted.

3.4.2 Population Data

The population of Lucas County was 453,348, based upon the 2000 census (the latest data that was available during preparation of the 2004 CANHMP). Based upon the 2010 census, the population of Lucas County is now 441,815 (an approximate 2.9% drop). A visual representation of the population distribution, taken from the 2010 census data is provided in **Figure 9 – Population Map**.

For all of the potential natural hazard events that could occur in Lucas County, with the exception of flood, essentially the entire county population is at risk. While individual events are usually narrower in scope, there is no way to predict where the event will occur within the county or how many people might be impacted. If the event took place in one of the rural areas of the county, potentially no one could be affected. If the event took place in one of the downtowns, the potential for a large number of casualties is much higher. Utilizing the historical data is an approximation of how many people are at risk from each type of event.

Determining the population vulnerable to the various possible flood or landslide events is not an exact science. The number of structures by land use type within the hazard areas is known for flood. The number of people per dwelling unit is available from the census data and is 2.53 (the number was 2.44 during preparation of the 2004 CANHMP). The number of people home at the time of an event is dependent on when the event occurs. Similarly, the number of people at work is variable by time of day. For the purpose of this analysis it is assumed that the people are at home.

According to the 2010 census data, there are 202,630 housing units in Lucas County (compared to 196,259 reported in the 2004 CANHMP). 25.8 percent of these housing units are in multi-unit structures (compared to 27.4 percent reported in the 2004 CANHMP). Most of the population is concentrated in the urban/suburban areas of the City of Toledo and the immediately surrounding communities.

For floods there are, from **Table 4a**, 4,576 residences in the floodplain (compared to 3,477 residences reported in the 2004 CANHMP). At 2.53 persons per household there are 11,577 people living in the 100-year floodplain (compared to 8,483 people reported in the 2004 CANHMP). The percent of the population in the hazard area was then calculated as the population in the hazard area divided by the total population of the county. Based on this

analysis methodology, the population within the floodplain is 2.6 percent (compared to 1.9 percent reported in the 2004 CANHMP).

For other hazard events, the number and type of vulnerable assets depends on where in the county the natural hazard occurs. Typically tornadoes, hailstorms and flash floods are generally confined to a relatively small area. If this area is in one of the urban/suburban regions there could be extensive loss of life, numerous injuries and substantial property damage. Events such as earthquakes, winter storms etc. are more widespread and the amount of damage or injuries and deaths is dependent on the intensity of the event.

3.4.3 Future Growth

Lucas County has in place a building code that was Effective April 1, 2002 and a Flood Damage Prevention Regulation that was effective September 1, 2001 and recently updated on August 16, 2011. These documents apply to all the territory in the county not included within village or city limits.

The purpose of the Building Code is found in Section 102.1 “**Standards**” “The purpose of this code is to provide minimum standards that promote public safety, health and general welfare – through structural strength, stability, sanitation, adequate light and ventilation, and safety to life and property from fire and other hazards incident to the construction, alteration, repair, removal, demolition, use and occupancy of buildings, structures, or premises”.

Part IX of the Building Code is the National Flood Insurance Program Lucas County Flood Damage Prevention Regulations, Ohio Department of Natural Resources, Division of Water, Floodplain Management Program. This regulation was adopted pursuant to Ohio Revised Code Sections 307.37 and 307.85. Paragraph 1.3 **Statement of Purpose** is as follows:

“It is the purpose of this resolution to promote the public health, safety and general welfare, and to minimize public and private losses due to flood condition in specific areas by provisions designed to:

- (1) Protect human life and health;
- (2) Minimize expenditure of public money for costly flood control projects;
- (3) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- (4) Minimize prolonged business interruptions;
- (5) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in areas of special flood hazard;
- (6) Help maintain a stable tax base by providing for the proper use and development of areas of special flood hazard so as to protect property and minimize future flood blight areas;
- (7) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions”.

The next section is 1.4 **Methods of Reducing Flood Losses** and is as follows:

“In order to accomplish its purposes, this resolution includes methods and provisions for:

- (1) Restricting or prohibiting uses which are dangerous to health, safety and property due to water hazards, or which result in damaging increases in flood heights or velocities.
- (2) Requiring that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- (3) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
- (4) Controlling filling, grading, dredging, excavating, and other development which may increase flood damage; and
- (5) Preventing or regulating the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas”.

Lucas County clearly intends to limit development in the floodplains to minimize potential loss of life and property from flood events. They also require any modifications to existing structures in the floodplain to be made compliant with these regulations as part of the approved modifications. In looking at future development, it is apparent that since development is quite limited in the floodplain, future development should not be adversely impacted by any flood events in terms of contributing to additional deaths, injuries or serious property damage.

The authors of this document were not made aware of any other county-wide planning documents or individual community regulations or planning documents. For future updates of this plan, mitigation Action Items are included to obtain any such documents that exist and make recommendations for the development of future planning or regulations documents to provide additional resources to minimize losses due to natural disasters

For the other natural hazard events that have occurred and could occur in the future, there is no specific area within the county that has been damaged. For these events, only general requirements might be effective in reducing damage from these events. Such rules as construction methods as part of the building codes to minimize damage from wind or heavy snow on a roof, etc. could be included.

3.5 Vulnerability Analysis and Loss Estimation

The fourth part of the Hazard Assessment is to conduct a vulnerability analysis and estimate losses due to future natural hazard events. The guidance documents outline a procedure to calculate the potential loss of life and property due to various hazard events based on the value, type and design of individual structures and the number of people in the impacted area for a specific event. For example for floods, it is necessary to know not only the value of the structures, but also the type of material used in construction, whether structures have a basement and/or multiple floors, the value of contents and in the case of commercial and industrial structures, the value of lost time and temporary displacement from the facility. In

addition, the example includes determining flood levels and calculating flow and force factors to determine the potential loss to various structure types. For other hazard events, similar calculations are indicated.

To get to the level of detail outlined in the guidance documents requires much more data than is currently available in Lucas County, however preliminary vulnerability analysis and loss estimation based upon the available data has been conducted.

For the non-mappable natural hazards, all of the jurisdictions within the county are equally vulnerable, to some degree. However, for floods, specific areas within the county, and thus a specific jurisdiction's risks, do vary from the risks facing the entire county. These specific jurisdictions are discussed in the vulnerability analysis and loss estimation sub-section (**3.5.3 – Floods**).

As part of the 2013 plan revision, the decision was made by the Core Group to utilize the same process for estimating future losses as was used during preparation of the 2004 CANHMP. Specifically, even though a much greater level of detail could be achieved for estimating flood related losses by using HAZUS or other flood projection software, the Core Group decided to keep the loss estimation in the 2013 plan revision consistent across all hazards. It was determined that trying to incorporate HAZUS data would skew the loss estimation and floods will be evaluated much differently than the other hazards addressed in the 2013 plan revision.

3.5.1 Tornadoes

The tornadoes that strike Lucas County are produced by thunderstorm events. These storms usually occur during the warm weather months and during the transition from cold to warm weather and back to cold. Historically, the majority of tornadoes have occurred in the spring but in recent years, at least in Ohio, the number of tornadoes in November has approximated that of May, usually a severe tornado month.

Virtually the entire county is vulnerable to a tornado. The rotating debris usually contained within a tornado can act like missiles damaging or destroying anything they strike. The devastating winds, which can exceed 300 miles per hour, can cause incredible damage. The rotating winds have been known to move objects weighing more than 300 tons and toss homes from their foundations. If the tornado strikes open land such as agricultural fields or wooded areas, the damage to people and personal property is minimized. There is some dollar loss associated to crop loss and damage, as well as the associated cost of cleanup. If a tornado strikes a residential area, particularly modular or mobile home parks, the effects can be devastating. Mobile homes can be taken completely from their foundations and totally destroyed. People inside usually suffer severe injuries or death. Regular frame houses can be similarly destroyed but the residents typically can take shelter in either a basement or an interior hallway where there is some degree of protection, assuming they have had adequate warning. Commercial and industrial properties are usually constructed of concrete and steel and while their roofs and contents may be damaged, the rest of the building frequently remains erect.

Also potentially impacted by tornadoes are critical facilities. Nursing homes and other medical facilities, if in the path of a tornado, could suffer devastating losses to life and property. While weather prediction has made remarkable advances, the notice for a tornado warning is usually less than an hour. This short time frame limits the ability of staff to move all medical patients, or nursing or assisted living patients to a safe place prior to a storm striking a facility. If a fire or police station is struck by a tornado, it can severely impact the response time for emergency responders to a tornado event where their services are usually required and they themselves may require emergency services.

Emergency Services are usually required after a tornado event. Police and possibly National Guard troops in devastating storms, seal off an area to prevent looters and other unauthorized personnel. Fire and EMS Personnel are needed to rescue the injured, put out any fires caused by broken gas lines or other similar hazards and assist in the clean up. Utility crews will be needed to restore power, phone and other utility services. Highway crews will probably be needed to remove debris from roadways so other responders can get through to the victims and their property. Victims and their insurance agents need access to the properties so they can assess the damage and search for valuables or heirlooms.

Every tornado is unique in location, direction and severity. Predicting when and where they will strike with any degree of certainty in advance is still not technically feasible. As a result, as mentioned before, the entire county is vulnerable. If a tornado strikes open fields or woods, conceivably the only damage could be to vegetation and possibly a few structures, mostly agricultural. Should the same tornado strike one of the densely populated areas, many homes and or businesses could be damaged or destroyed along with deaths and serious injuries to occupants. The number of deaths and/or injuries could be substantially reduced if adequate warning is given and there is in place the ability to warn the public. Past history is the only predictor available to use to look at a typical tornado event and estimate the potential losses to county facilities and services.

The data available for the development of the 2004 CANHMP included 28 records for tornadoes. The data has been updated for the 2013 plan revision to now include 29 records, with 17 of those containing specific details regarding the event (**Table 2**). Of those, 8 reported damage figures. The data revealed 16 deaths, 210 injuries and an average dollar loss per recorded event, in 2011 dollars, of \$23,429,651.58 (**Table 3**). Any single event can cause substantially more damage depending on the severity of the tornado and the area struck. The data indicate that the worst recorded damage from a tornado occurred in 1965 when an F-4 tornado struck Lucas County and caused \$176,056,338.03 in damage in 2011 dollars. Since the total value of structures in Lucas County in 2011 dollars is \$19,730,050,800.00, this amounts to 0.9 percent of the structure value in the county. Making the same calculation with the average tornado loss in 2011 dollars of \$23,429,651.58 yields a figure of 0.2 percent of the structure values in the county susceptible. Similarly, the worst injury total in the 17 events with damage/injury records indicated that 207 persons were injured. For all 17 events, the average injury per event is 12. There were 16 deaths from all the recorded tornado events, all of which occurred in the

F-4 tornado of 1965. Typically in Lucas County, a tornado will result in damage to 0.2 percent of the structures, 1 person will be killed, and 12 will be injured.

3.5.2 Severe Storms

Severe storms, for the purposes of this planning document, are defined as thunderstorms and lightning, windstorms, and hailstorms. They typically occur from the spring through the fall but can occur at other times.

Again, the entire county is vulnerable to severe storms. These are usually widespread events that cover a large area of several counties or perhaps several states. The hail event within one of these storms is usually more isolated typically ranging from as little as 100 feet up to 2 miles wide and approximately 5 miles long. However, they have been known to cover interstate tracks of as long as 200 miles. Every structure, depending on wind strength and structural design is vulnerable to damage due to high winds associated with severe storms. Mobile home parks are particularly vulnerable, especially if the units are not properly anchored down. Trees can be uprooted or snapped off in straight-line winds that fall on power lines, homes, block roads and occasionally fall on a motor vehicle.

Power, telephone and other utilities can be disrupted, roads closed and homes made uninhabitable due to damages from severe storms. Hail damage can include roofs, siding, vehicles and agricultural crops, depending on the time of year. Convertibles are particularly vulnerable to hail damage, especially if the vehicle is moving very fast. Hail sizes vary and typically range from pea to golf ball size. Hail the size of softballs has been recorded in the United States. Recently, hailstorms in an area of Colorado deposited enough hail that the transportation department had to call out their winter snowplows to remove the hail from the roads.

High winds not only cause damage to structures, trees and power lines, but they can also disrupt commerce. Frequently during high wind events, high profile vehicles are urged not to travel in certain areas due to their instability in high winds. This can have an adverse impact on commerce, especially just in time deliveries, the costs of which are difficult to calculate. Again, there are many sources of the damage caused by these severe storms. It is difficult to compile all these costs from utility companies, homeowners and insurance companies, transportation agencies and others susceptible to the damage. This may be why the damage estimates are so low and there are so few records.

Critical facilities can also be impacted by severe storms. If the power is disrupted, communications with emergency responders can be limited. Electrical service for hospitals, nursing homes and other medical facilities can be disrupted with possible devastating consequences for their patients requiring living assistance by electromechanical devices. Backup generators may be available in some cases and could be considered for future mitigation Action Items if not already available. Trees or power lines may block roads so emergency responders cannot access those in need of their services. Similarly, repair crews may not be able to access and repair their damaged facilities until much of the storm damage has been removed.

Every severe storm is unique in size, intensity, wind speed and direction, hail shaft size, if any, duration and damage caused. The damage estimates in the recorded events range from a low of \$0.00 to \$842,266.46 for a storm in Toledo in 1993 (**Table 2**). The potential for damage is widespread across the county with isolated areas of devastating damage due to hail or extreme straight-line winds. Less densely populated areas could have lower dollar losses than the major urban areas; however, people could be cut off from all access with potentially serious if not fatal consequences if a medical emergency arises.

The data reviewed during preparation of the 2004 CANHMP included 205 severe storm records from the years 1956 to 2002. The data has been updated for the 2013 plan revision to now include 306 records, with 295 of those containing specific details regarding the event (**Table 2**). One-hundred and thirty six of these recorded events indicated there were some dollar amount of damage and/or deaths and injuries and six incidences of declared Federal disasters were recorded. The data indicated that in the 136 events with recorded damage amounts, the total damages, in 2011 dollars, were \$5,142,420.08. Additionally, 7 injuries and 6 deaths were reported. The average loss per severe storm event, in 2011 dollars, was \$37,811.91. Based upon this data, anticipated damages per severe storm event are \$37,811.91, approximately every 42 storms someone will be injured, and a death may result approximately every 50 storms.

3.5.3 Floods (including Flash Floods and Lake Surges)

For purposes of this CANHMP, floods, flash floods and flooding caused by lake surges will all be discussed in this sub-section of the Vulnerability Analysis and Loss Estimation. This decision was made primarily based on the fact the flood hazard area for the county (**Figure 3a**), does not distinguish between the differing floodplains associated with each type of flooding.

The guidance documents state “Water-related damage caused by flooding along rivers and coasts in the United States accounts for over 75 percent of Federal Disaster Declarations”. As previously mentioned, floods are the result of the capacity of the drainage basin being exceeded due to excessive rainfall, saturated soils, winter storm melts, or other natural events or combination of factors. Floods have been so prevalent and caused so much damage that the Federal government established a National Flood Insurance Program (NFIP) to provide some relief to those properties located in the floodplain.

The 100-year floodplain is depicted on **Figure 3a**. This map shows floodplains around the major rivers in Lucas County, their tributaries and Lake Erie. The 100-year floodplain was established as the standard or “Base Flood Standard” as a result of information obtained through hearings prior to the passage of the Flood Disaster Protection Act of 1973. The flood prone soils are also included in the data shown on the map.

The FIRM, developed from computed water surface elevations and topographic mapping, is utilized in the National Flood Insurance Program (NFIP), which makes affordable flood insurance available to those persons located within the 100-year floodplain in return for

community adoption of ordinances to regulate development in the mapped flood hazard areas. Currently, all four (4) cities and six (6) villages as well as the unincorporated townships within Lucas County participate in the NFIP program and are in compliance with its requirements. Additionally, all of the jurisdictions and the county have formally adopted the most recent revisions to the FIRM maps which went into effect on August 16, 2011.

Specifically, all four (4) cities and six (6) villages have local floodplain managers which monitor the flood hazard areas, enforce the existing regulations, and conduct community assistance activities like encouraging flood insurance payments are made by homeowners. Additionally, Lucas County has a dedicated floodplain manager and all of the unincorporated townships also have a dedicated manager. The 2011 list of floodplain administrators within Lucas County, which includes contact information, has been included as **Appendix I**.

As depicted in **Figure 3a**, all of the jurisdictions within Lucas County contain at least some of their land holdings within the 100-year floodplain. **Figure 3b**, indicates the number of structures in the entire county that are located within the floodplain. **Figures 3c – 3p**, for those jurisdictions that have structures within the floodplain, indicates the number of structures in the floodplain in each jurisdiction. The numbers represented by these figures are shown in **Tables 4a and 4b – Jurisdictional Flood Hazard Area Structure Summary**. **Table 4a** is a representation of all the structures within the floodplain on a county basis and **Table 4b** indicates a breakdown by jurisdiction of the types and values of structures within the jurisdictional floodplains. Those jurisdictions with the greatest number of structures at risk, relative to the remainder of the county, include the City of Toledo, with 2,605 structures, the unincorporated areas in the Township of Jerusalem, with 1,347 structures, and the City of Oregon, with 690 structures. Future mitigation Action Items for the county will be directed towards these jurisdictions first, as they are the ones with the greatest number of assets at risk, relative to the remainder of the county. Additionally, two jurisdictions within the county do not contain any structures within the floodplain: the Village of Harbor View and the unincorporated areas in Providence Township (**Table 4b**).

As part of the 2013 plan revision, the decision was made by the Core Group to utilize the same process for estimating future losses as was used during preparation of the 2004 CANHMP. Specifically, even though a much greater level of detail could be achieved for estimating flood related losses by using HAZUS or other flood projection software, the Core Group decided to keep the loss estimation in the 2013 plan revision consistent across all hazards. It was determined that trying to incorporate HAZUS data would skew the loss estimation and floods will be evaluated much differently than the other hazards addressed in the 2013 plan revision.

In Lucas County, based on the data that analyzed for this 2013 plan revision, the structures in the floodplain include 4,590 residential, 153 agricultural, 444 commercial, 296 exempt, and 82 industrial structures. These figures equate to approximately 2.6 percent of residential, 5.1 percent of agricultural, 3.3 percent of commercial, 7.7 percent of exempt and 2.7 percent of industrial structures are located within the floodplain. Similarly, for structure values, approximately 2.3 percent of the residential, 7.8 percent of the agricultural, 1.9 percent of the commercial, 0.3 percent of the exempt and 7.6 percent of the industrial

structures value are located within the floodplain (**Table 4a**). For individual jurisdictions, the number of structures in the floodplain and the value of those structures are found in **Table 4b**. **Figures 3c – 3p** provide graphic depictions of the structures within the floodplain on jurisdictionally based maps.

All of the 5,565 structures within the 100-year floodplain are at risk from a flood event. The amount of damage is dependent on a number of factors related to a specific flood event. These factors include the height and velocity of the floodwaters, the amount and type of debris striking the structures, and other extenuating circumstances. Losses due to flood damage not only include the damage to structures, but also include the damage or loss of contents of the structures, the cost of temporary housing for residences or temporary space for offices and/or factories, productivity losses, and damage to crops and goods stored in a way that is susceptible to flood damage such as farm equipment, car lots etc. All of these costs must be included in any assessment of the potential damage due to flood losses and in any benefit/cost calculation to determine which mitigation measures might be most effective.

With the exception of residential, which amounts to approximately 88.3 percent of the total structures, these other land use types represent a small percentage of the total structures within the county (**Table 4a**). Without specific data as to the construction of the various facilities, and knowledge of the contents, it is not possible to compile an accurate approximation of potential losses.

Repeat loss to properties from flood damage was provided by Lucas County during preparation of the 2004 CANHMP. This information is maintained within the county and is highly confidential. During preparation of the 2013 plan revision, the Ohio Emergency Management Agency provided an updated list to Lucas County. Therefore, with the updated data set, there are 63 “Repetitive Loss Properties” within Lucas County. Of the 63 “Repetitive Loss Properties”, six (6) are commercial properties, one (1) is multi-family residential, while the remaining fifty-six (56) are residential properties. The total value of the commercial properties is \$2,364,165.00, the total value of the multi-family residential property is \$4,950,000.00, and the total value of the residential properties is \$7,470,963.00, for a total property value for the “Repetitive Loss Properties” within Lucas County of \$14,785,128.00.

The records provided go back to 1978. Since that time, the total payout for structure damage to repeat loss properties has been \$733,806.94. The payout for damage to contents of those same properties has been \$138,415.42, yielding a total payout to repeat loss properties of \$872,222.36. Future mitigation Action Items have been developed to address these repetitive loss properties.

Floods can occur at any time of the year. The data available during preparation of the 2004 CANHMP included 57 records for floods. The data has been updated for the 2013 plan revision to now include 62 records, with 50 of those containing specific details regarding the event (**Table 2**). Flash flooding and lake surge flooding will be discussed later in this subsection. Of the 50 records for floods, 13 reported damage figures. The average dollar loss

per flood event in 2011 dollars for those events with reported damage amounts is \$116,297.87 (**Table 3**). Additionally, there were no reported fatalities or injuries attributed to the 3 different types of flooding events within the county (flood, flash flood and lake surge).

Figures 3b – 3p present jurisdictional maps that depict all the structures located within the 100-year floodplain. These structures were determined from the county GIS data as previously discussed. The total value of the structures in the floodplain has been calculated to be \$417,681,275.00, which is slightly over 2.1 percent of the total structure value of the county, or 5,565 total structures (**Table 4a**). The value of the structures in the floodplain for each jurisdiction can be found in **Table 4b**. With the exception of Toledo, Oregon, and Jerusalem Township, the number of structures at risk in each jurisdiction is relatively small.

With an average per event flood loss in 2011 dollars of \$116,297.87 the expected percentage of structure loss for structures within the floodplain is approximately 0.02 percent. The percentage of the value of structure loss due to flooding for structure values of the entire county is slightly over 0.001 percent. As indicated in **Table 3**, there were no deaths and no injuries in previous flood events. The structures included in the floodplain include the structures within the areas subject to flash flooding, riverine flooding and lake surge. With the data currently available, there is no way to distinguish which structures or critical facilities are located in a specific type of flood zone.

Flash floods are similar in that the floodwaters exceed the capacity of the drainage basin to handle the flow created by the source, whether it is due to rain, dam or levee failure or the sudden release of water due to the breakup of an ice jam. Flash floods are usually isolated to a single stream or river and typically the water levels return to normal as quickly as they rose. Probably the most widely discussed flash floods are those that occur in steep hillside streams that usually have little or no water in that suddenly are subject to torrents of water that carries away everything in its path. This type of flash flooding is usually associated with most of the deaths and injuries due to flash floods.

There are a number of tributaries to the rivers and streams in Lucas County that are vulnerable to such flash flood events. The data available for the development of the 2004 CANHMP included 23 records for flash floods. The data has been updated for the 2013 plan revision to now include 26 records, with 17 of those containing specific details regarding the event (**Table 2**). Of those, 12 reported damage figures for a total of \$55,926,434.35 damage in 2011 dollars (**Table 3**). Since the total value of structures in Lucas County in 2011 dollars is \$19,730,050,800.00, and the damage average for a single flash flooding event in 2011 dollars is \$4,660,536.20, this equates to approximately 0.02 percent of the structure value in the county would be damaged per flash flooding event. There were no recorded deaths in the 17 records and no injuries. Future flash flood events would be expected to be similar in nature with typical flood damage in the floodplain around the streams and tributaries. In a flash flood, it is anticipated that virtually no injuries or deaths will occur, with an estimated loss of \$4,660,536.20 in property damages.

Lucas County is also subject to coastal flooding due to Lake Erie. Fluctuations in Lake Erie water level may be dependent on weather elsewhere in the Great Lakes Region, widespread drought that increases the flow of the connecting rivers to maintain adequate shipping water levels, unseasonable precipitation or snow melt and many other factors. These situations are not necessarily caused by events that occur in the immediate vicinity of Lucas County but can be impacted by regional or higher level meteorological or climatological events.

Many properties along the Lake Erie shoreline are vulnerable to lake surge events. The data available during preparation of the 2004 CANHMP included 10 records for lake surge events. The data has been updated for the 2013 plan revision to now include 11 records, with 7 of those containing specific details regarding the event (**Table 2**). Of those records, 6 had dollar figures for damages due to lake surge events. These 6 events had a dollar value in damages of \$816,213.19 in 2011 dollars. This averaged out to be \$136,035.53 per event in 2011 dollars (**Table 3**). This calculates to be .0006 percent of the value of the total structures within the countywide floodplain and only a fractional percentage of the total value of structures in Lucas County. As mentioned, there were no injuries or deaths reported from any of the lake surge events contained within the data. Therefore, for a future lake surge event it is anticipated that no deaths or injuries would occur, and there would be approximately \$136,035.53 in damages.

The Critical Facilities within the county are included under the listing of exempt structures. These include most of the critical facilities such as police and fire stations, shelters, medical facilities, etc. As depicted on **Figure 7**, and listed on **Table 5** (located in **Appendix E**) there are 22 critical facilities within Lucas County that are located within the 100-year floodplain;

These 22 critical facilities that are located within the floodplain are subjected to disruptions of service during flood events. The staff and equipment from these facilities may simply relocate to a related facility during the flood event, so long as adequate warning time is available prior to the hazard event.

Other facilities that are impacted during a flood are transportation systems such as roads, and associated bridges and culverts, mass transit, barge and other river traffic, as well as emergency services. Even after the waters recede, repairs may be necessary before the facilities are serviceable. Roads or culverts may be washed out, bridges may be damaged due to debris, scour or moved from their supports. With Toledo being a major port and shipping facility, loss of use of the port for any length of time could be devastating to the local and regional economy.

3.5.4 Severe Winter Storms

Severe Winter Storms generally strike during the late fall, winter and early spring in various parts of the country. One of the most widely forecast severe winter storms was the Super-storm of March 1993. It was one of the most widely predicted storms on record yet devastated many parts of the eastern United States for over a week. Severe winter storms usually include high winds or blizzard conditions, freezing or sub-zero temperatures, blowing and drifting snow, and/or freezing rain and sleet. Severe winter storms can also

spawn other natural hazards such as coastal flooding and erosion, severe thunderstorms and tornadoes and extreme winds.

Due to the nature of severe winter storms, virtually the entire county is susceptible to damage. The heavy accumulations of snow, accompanied by blowing and drifting, can devastate the roadway system requiring vast amounts of overtime and snow and ice control materials on the part of the street and highway departments impacted by the need to remove the snow and ice. State, county, township, city and villages all have road responsibilities and must work hard to keep the roads open for commerce as well as emergency services access to all residents.

When level 3 snow emergencies are in effect, no one but emergency services personnel are allowed on the streets and highways so employees cannot get to their jobs and commerce is seriously impacted. Heavy accumulations of snow on rooftops can cause roofs to collapse causing deaths or injuries to anyone inside the building as well as devastating the contents. Ice storms and high winds in winter storms may cause extensive loss of overhead utility lines due to buildup either on the lines or adjacent trees that either collapse due to the weight or are blown down onto the utility lines. Services such as telephone, electric and cable TV are among those most seriously affected by severe winter storms.

Emergency services can be severely impacted by these winter storm events. If the roads are impassable, the emergency crews cannot reach those in need of their services. People outside either caught by the storm or trying to clean up their property are subject to hypothermia and other weather related illnesses as well as cardiac arrest from shoveling out their driveways and/or sidewalks. Power losses due to the storm can lead to deaths and injuries to people that require electronic medical equipment or patients who are exposed to cold temperatures due to lack of heat for long periods when their systems are weakened by other illness, unless emergency back-up systems are in place. Costs associated with the cleanup and repair as a result of these severe winter storms could and has reached into the millions.

The severe winter storm data analyzed during preparation of the 2004 CANHMP included 43 records dating back to 1978. The data has been updated for the 2013 plan revision to now include 60 total records, with 49 of those containing specific details regarding the event (**Table 2**). Nine of the sixty records reported dollar losses associated with an event, for an average dollar loss per event, in 2011 dollars, of \$161,491.26 (**Table 3**).

Since the total value of structures in Lucas County in 2011 dollars is \$19,730,050,800.00, and the average severe winter storm loss per event is \$161,491.26, a figure of 0.008 percent of the structure values in the county has been calculated as susceptible to future severe winter storm events. Similarly, one severe winter storm out of the 49 records with specific reports had all 12 reported injuries associated with that single event, making the estimated percentage that a severe winter storm event in Lucas County will result in at least one injury approximately 25%. There were no reported deaths attributed to severe winter storm events in the data that were analyzed for this 2013 plan revision.

Therefore, a single severe winter storm event in Lucas County is expected to result in approximately \$161,491.26 in damage or clean-up costs, a 25% chance of injury, and no likely deaths.

3.5.5 Earthquakes

Earthquakes have been defined as “A sudden ground motion or trembling caused by an abrupt release of accumulated strain acting on the tectonic plates that comprise the Earth’s crust”. Earthquakes generally occur along the borders where the tectonic plates have merged along known fault lines. From the literature reviewed for this document, there does not appear to be any fault lines that bisect Lucas County.

The data reviewed during preparation of the 2004 CANHMP included 17 entries from the work sheets that were completed by the jurisdictions within the county. Some of these indicated a minor earthquake had occurred in the past and there was little likelihood of any future occurrences. The data has been updated for the 2013 plan revision to now include only 15 records (**Table 2**). None of these events included any indication of dollar loss, deaths or injuries (**Table 3**).

As in many of the other hazards, virtually the entire county is at risk from damage due to an earthquake. Literature reviewed indicated that Ohio and Lucas County are located on the periphery of the New Madrid Seismic Zone, the site of the largest earthquake sequence to occur in historical times in the continental United States. Based on historical records along other seismic fault lines, future severe earthquakes could occur along this line and impact Lucas County. With today’s technology there is no way to predict when or if this will actually occur. Should such an earthquake take place on this fault line, or perhaps along another at this time unknown fault line, the damage in Lucas County could be devastating.

The degree of damage would depend on the nature of the material and the construction methods used in constructing the homes and other structures in the county. No doubt many of the newer multi-story office towers have been designed to be some degree of earthquake resistant. However, the older structures and no doubt virtually all of the homes would not be constructed to any earthquake standard. As a result, a major quake could result in devastating damage, and loss of life and injuries. Transportation systems could be affected as large cracks develop in roadway surfaces, and bridge structures suffer damage or total destruction. Underground utilities, particular petroleum transmission and distribution lines are subject to earthquake damage.

Since all areas of the county are subject to the same degree of risk, the location of the critical facilities is not of significance in assessing damage potential. Should damage occur to fire and police stations, it certainly will affect response times. Should hospitals and other medical facilities be affected, the quality and timeliness of critical care could also be impacted.

None of the records within the data indicated any dollar value of damage or deaths or injuries due to earthquakes (**Table 2**). The typical future earthquake event in Lucas County

would likely produce similar results, with property damage resulting from chimney damage, cracked walls and items falling off shelves being limited to an approximation of <\$100,000.00 per event. Should a severe earthquake greater than magnitude 7.0 on the Richter scale take place along the New Madrid Seismic Zone, devastating losses could occur in Lucas County.

3.5.6 Wildfires

Wildfires are highly destructive, difficult to control fires that can be started by lightning or human activity. The presence or absence of fuel or wind are factors in whether the fire can be controlled or spreads rapidly into a major conflagration. The USFS has classified most of Ohio, including Lucas County, as an area that has a low to moderate risk of wildfire as indicated on the Observed Fire Danger Maps prepared by the USFS. During Ohio's peak wildfire season of March to May and October to November, if weather and fuel conditions are right, wildfires can occur.

Figure 5, discussed previously, indicates the areas of the county that are susceptible to wildfires. This area comprises approximately 46.5 percent (1997) of the total non-water use land area of the county. This number has been and continues to be in a steady decline as development occurs. The land use types that are susceptible are forested, scrub/shrub and grasslands. These areas are mostly located in the north central, southern and extreme eastern regions of the county. The greatest threat and potential impact is in Swanton Township and more specifically the Oak Openings Preserve Metropark. This is due to the intentional policies of the Park in the way the forested oak savanna is managed and the presence of a number of residential and commercial properties within its boundaries. The second area is the wildlife refuge to the East of Maumee Bay State Park.

Depending on the type of crop and the time of year, certain agricultural crops are also susceptible to wildfires. Most of the agricultural areas are in the northwest, southern and eastern areas of Lucas County. As growth continues to occur in Lucas County, these land use types could be developed. These areas, and the structures and population living within them, could then be at risk for wildfire damages unless steps are taken in development rules and land use planning to limit the risk to people and property moving into these susceptible land use types.

Emergency Services are usually needed to assist in controlling wildfires. Most of the emergency responding agencies have mutual aid agreements so if additional services from outside a particular jurisdiction are needed to assist in wildfire control, they would be available. Wildfires would have very little impact on critical facilities in Lucas County other than fire and EMS with some enforcement involvement. Other critical facilities are not likely to be impacted unless there are medical needs for any of the emergency service workers or volunteers fighting the fire. Since there is little likelihood of fires starting and little likelihood of any major assistance needs, there is little impact on critical facilities in Lucas County.

The data available for wildfires during preparation of both the 2004 CANHMP and the 2013 plan revision were from the worksheets filled out by the jurisdictions (**Table 2**). No damage estimates, deaths, or injuries were cited with any of the incidents listed. Therefore, at this time, accurately predicting future losses attributed to wildfires within the county was not possible, however for purposes of this CANHMP, future damages have been estimated at less than \$50,000.00 per event, and the estimated number of injuries and deaths associated with future wildfire events are none or very few.

3.5.7 Temperature Extremes

Temperature extremes are defined as extreme heat or extreme cold. Extreme heat is usually associated with the summer months of July, August and September when the humidity is generally higher but can occur in June and October as well. Extreme heat situations can be aggravated by and are frequently associated with an ozone alert, which in and of itself is of risk to the elderly, those with pulmonary conditions as well as the very young. Extreme cold is associated with the winter months of January, February and March although December and April have been known to have extremely cold temperatures.

The major threat of extreme summer temperatures is heatstroke, a medical emergency that can be fatal. Other medical conditions attributable to extreme heat are, in descending order of severity, heat exhaustion, heat syncope and heat cramps. Extreme summer temperatures can also be devastating to livestock and agricultural crops. This can have a direct impact not only on the economy of Lucas County but also on the entire region if the damage is extensive. Extreme summer temperatures pose the greatest danger to outdoor laborers, the elderly, children, people in poor physical health and people residing in homes without air conditioning. More deaths from extreme summer heat occur in urban centers. This may be due to the mass of stone, concrete, brick and asphalt that absorb the radiant heat energy during the day and re-radiate that heat at night. Tall building structures block whatever breezes may be present, exacerbating the effects of the temperature extremes. The homeless are vulnerable to extreme heat. Those low-income neighborhoods frequently suffer the most loss of life due to not being able to afford air conditioning or to go to areas where it is available during temperature emergencies.

Extreme cold temperatures frequently occur shortly after a storm event. The north winds associated with the backside of the counterclockwise circulation of the storm low, combined with the clockwise circulation of the front of a high pressure that may follow reinforces air flow south from the arctic regions. A stationary high-pressure system located in the right place can also produce extremely cold winter temperatures, independent of a preceding low-pressure system. The major threat of extreme winter cold temperatures is frostbite and exposure. Frostbite, if untreated, can lead to loss of a limb or limbs. Exposure can lead to death due to cardiac issues associated with the constricted blood vessels due to the bodies' reaction to the extreme cold. Those who are outside working in these conditions such as highway crews and fire crews are vulnerable. The elderly are vulnerable to exposure to extreme temperatures as are the homeless and those with pulmonary conditions. If there is a

power outage associated with such an event, those without their heat sources may be vulnerable after long exposure.

While the entire county is vulnerable to extreme temperatures, those with one of the pre-existing conditions described above or those without access to air conditioning, or heat, are usually most vulnerable to these extreme temperatures. The data available during preparation of the 2004 CANHMP and the 2013 plan revision was limited. There were only 20 data records going back to 1993 (**Table 2**). There was only 1 indication of a death to a homeless person due to an extreme cold event in 1993 (**Table 3**). There were no dollar values associated with any losses due to these events. Therefore, for purposes of this CANHMP, future damages have been estimated at less than \$25,000.00 per event, and the estimated number of injuries and deaths associated with future temperature extreme events are none or very few. Frozen pipes, that break and flood structures is one example of the property damage that can occur. Temperature extreme events do occur regularly and usually cover the entire county. Everyone is vulnerable although some populations are more vulnerable than others.

3.5.8 Droughts

Drought has previously been defined as an extended period of deficient rainfall relative to the statistical mean for a region. As noted previously, there are four main categories of drought, namely meteorological, hydrological, agricultural and socioeconomic. Droughts are usually associated with the extreme heat of the summer months although drought has occurred throughout the year and in fact over several years as happened in the dust bowl years of the 1930's. Also, within the past decade, there has been an extended drought that covered most of Ohio to varying degrees for several consecutive years.

As in most of the previously discussed natural hazards, the entire county is vulnerable to drought. Droughts are usually very widespread and cover a section of the country, although there is usually a range of severity within the larger drought area. The lack of rainfall impacts virtually every sector of Lucas County, its economy and way of life. Significant crop loss can be devastating to farmers. They operate on such close margins that the slightest reduction in crop yield can be crippling. This can have a snowball effect on the economy of a region. If farmers do not make money they cannot buy other goods and services, which has a negative impact on other market sectors. With many agricultural crops shipped through the Port of Toledo, a severe drought can have a significant impact on not only the Lucas County economy but also the regional economy.

Farmers can be impacted by not only insufficient rainfall but also by insufficient stream or river flow from which they draw their irrigation water. People who live in areas where there are public water sources frequently aren't impacted by drought as soon as those in rural areas on private water supply systems.

During periods of drought rural wells, particularly shallow wells, tend to go dry first. The deep wells in the subterranean aquifers are not affected as soon but in extended periods of drought these wells can also supply much less water. On public water supplies, the wells or

reservoirs are usually supplied from sources some distance away, either surface water or underground aquifers. When these sources are impacted, such restrictions as limited or no car washing, restrictions on hours and/or days for watering lawns or flowers, and other extreme measures may be implemented. Low flows in streams or rivers can also impact those public water supplies that either get their water directly from these sources or rely on these sources to replenish their other sources.

The data reviewed during preparation of the 2004 CANHMP included 26 drought records. The data has been updated for the 2013 plan revision to now include only 18 records, with 9 of those containing specific details regarding the event (**Table 2**). None of these recorded events had any dollar amount of damages associated with the event (**Table 3**). There was some narrative describing the extent of the loss but no dollar value assigned. As mentioned, several attempts were made during the preparation of this CANHMP to include Lucas County-specific figures for agricultural losses attributed to drought conditions. Contact was made with the FSA and the local NRCS office to obtain these figures. Responses indicated that the requested data is maintained by a number of different agencies at the state and Federal level, however the data is compiled to include not only drought-related loss information, but also includes data from a number of different state and Federal subsidy programs for farmers. At this time, interpretation of this data to isolate only those losses attributed to drought conditions was impractical.

The records indicate no deaths or injuries were recorded in any drought event (**Table 2**). With today's communication, transportation and other infrastructure, it is not likely any deaths or injuries would occur in future drought, although losses could be seen in crops, livestock and wildlife and have been estimated at <\$50,000.00 per event.

3.5.9 Landslides

As stated in the landslide hazard profile, there is an area of Lucas County that is located in the USGS defined high incident landslide prone area. This area has been identified as a small strip along the northern bank of the Maumee River; an area where no people or structures are at risk. There are also some soils within the county that have been identified as landslide prone soils.

The majority of damaging landslides are naturally occurring events in areas of steep or unstable terrain. Given the extremely flat terrain and relatively stable soil of Lucas County, the probability of such a landslide, and subsequent damages, is very low. However, landslides associated with stream bank erosion can occur, and given the right conditions, landslides in areas that are not typically susceptible can occur because of human actions.

If any roadways are close to stream or riverbanks, they could be susceptible to landslide damage associated with stream bank erosion. Any structures so located could also be vulnerable. As for roadways, the vulnerable population would be the people who travel the road regularly and are forced to find a detour until repairs are made. Those who live the closest to the closure could be impacted the most depending on how far out of their way they have to go to avoid the closure. Those responsible for the repairs are also vulnerable as are

those in need of emergency services who might be delayed in responding due to the road closure and detour.

The likelihood of landslides occurring in Lucas County is low, and the risk to people and property is also low. This coincides with the fact that landslides rated very low in the overall Lucas County Natural Hazard Risk Assessment priority. The data available during preparation of the 2004 CANHMP and the 2013 plan revision was limited. There were only 5 data records, all coming from the worksheets filled out by the jurisdictions (**Table 2**). There were no dollar values, deaths or injuries associated with any landslide events (**Table 3**). Therefore, for purposes of this CANHMP, future damages have been estimated at less than \$10,000.00 per event, and the estimated number of injuries and deaths associated with future landslide events are none or very few.

3.6 Vulnerability Analysis and Loss Estimation Summary

The following table represents the estimated losses for each of the identified natural hazards, based upon the data that were updated for the 2013 plan revision and the analysis procedures described within this document. This analysis will serve as the foundation for the mitigation Action Items and implementation strategy presented in this CANHMP.

These estimated losses **do not** represent actual losses should a future disaster occur, and were **estimated** for this CANHMP based upon the data which was available at the present time.

Natural Hazard	Anticipated Frequency	Anticipated Injuries	Anticipated Loss of Life	Anticipated Damage
Tornadoes	1-10 per 10 Year Period	12 per Typical Events, Larger Event is Variable	1 per Typical Events, Larger Event is Variable	\$23,429,651.58 (0.2%)*
Severe Storms	1-10 per 1 Year Period	1 per 42 Events	1 per 50 Events	\$37,811.91 (0.0002%)*
Flash Floods	1-10 per 1 Year Period	None or Very Few	None or Very Few	\$4,660,536.20 (0.02%)*
Floods	1-10 per 10 Year Period	None or Very Few	None or Very Few	\$116,297.87 (0.0005%)*
Severe Winter Storms	10 per 10 Year Period	Very Few	None or Very Few	\$161,491.26 (0.0008%)*
Earthquakes	1 per 10 Year Period	None per Typical Event, Larger Event is Variable	None per Typical Event, Larger Event is Variable	<\$100,000.00 (0.0005%)*
Wildfires	1 per 10 Year Period	None or Very Few	None or Very Few	<\$50,000.00 (<0.0001%)*
Temperature Extremes	1-10 per 10 Year Period	None or Very Few	None or Very Few	<\$25,000.00 (<0.0001%)*

Droughts	1-10 per 10 Year Period	None or Very Few	None or Very Few	\$<50,000.00 (<0.0003%)*
Lake Surges	1-10 per 10 Year Period	None or Very Few	None or Very Few	\$136,035.53 (0.0007%)*
Landslides	1 per 10 Year Period	None or Very Few	None or Very Few	\$<10,000.00 (<0.0001%)*

* Represents percentage of total structure value in county (\$19,730,050,800.00).

4.0 Mitigation Plan

Now that each identified natural hazard that could affect Lucas County has been profiled, and an estimation of potential future losses should an event occur has been calculated, an identification of appropriate mitigation Action Items and a strategy to implement them can be presented.

Like the natural hazard risk assessment, the problem statements, goals, objectives, and alternative action items have been updated for the 2013 plan revision. Specifically, throughout the planning process, input from the Core Group was utilized to narrow down the scope of the goals and objectives for Lucas County, and likewise reduce the alternative Action Items into a more concise, feasible list. Additionally, the list of alternative Action Items was revised to remove those actions that have been completed since the 2004 CANHMP. Further information regarding the progress of the County towards the 2004 CANHMP goals and objectives is presented in **Section 4.5 – Mitigation Plan Monitoring**.

4.1 Problem Statements, Goals, Objectives and Alternative Action Items

The next task in preparing this CANHMP included developing goals and objectives that would help guide the identification of alternative mitigation Action Items to address the potential losses identified in the vulnerability analysis and loss estimation tasks. The information that was gathered during the preparation of the hazard profiles and loss estimation was used by the Core Group to develop clear mitigation goals-general guidelines that explain what Lucas County wants to achieve, and objectives-statements that detail how those goals will be achieved. Once clear mitigation goals and objectives were developed, mitigation Action Items that address them were identified, evaluated and prioritized.

The first step to creating the goals and objectives for Lucas County was converting the findings of the vulnerability assessment into problem statements. Following the methodology described below, a list of problem statements was generated for each identified natural hazard based upon the trends or patterns in the types and location of previous hazard events, and in the vulnerability of Lucas County infrastructure, buildings or people. Next, the problem statements were grouped by similar themes, and corresponding goal statements were developed. Once the mitigation goals for Lucas County were developed objectives, which are more specific and narrower in scope than goals, were developed. These objectives would provide the roadmap for developing clear and achievable mitigation Action Items for the county.

The development of the problem statements, goals, objectives and Action Items was accomplished during preparation of the 2004 CANHMP by members of the Core Group. The members of the Core Group received copies of the Hazard Assessment that had been submitted to OEMA for review, and a copy of FEMA Guidance 386-3, “Developing the Mitigation Plan, identifying mitigation actions and implementation strategies”. They were also asked to become familiar with the concept of problem statement, goals, objectives and

Action Items. An example was provided indicating the sample problem statements that had been developed by ODNR for all of the natural hazards that could affect the state of Ohio.

Additionally, members of the Core Group were directed to solicit input from the community within their respective jurisdictions and/or offices concerning the list of problem statements, goals, objectives and Action Items that had been developed. Once all comments were received, the final list of mitigation problem statements, goals, objectives and Action Items was complete for Lucas County.

For the 2013 plan revision, the Core Group was given copies of the 2004 CANHMP goals, objectives and asked to narrow down the scope for Lucas County, and likewise reduce the alternative Action Items into a more concise, feasible list. Those alternative Action Items that have been removed from the CANHMP are presented in **Table 7c**. Additionally, the list of alternative Action Items was revised to remove those actions have been completed since the 2004 CANHMP (**Table 7b**). Consequently, the revised list of problem statements, goals, objectives and alternative Action Items is presented by natural hazard type, in sub-sections **4.1.1 – 4.1.3** according to the revised priority rankings presented in sub-section **3.3 – Natural Hazard Priority Ranking Summary**. It should be noted that the goals and corresponding mitigation Action Items for each natural hazard are not listed in sub-sections **4.1.1 – 4.1.3** in order of priority. Each Action Item has been evaluated and prioritized, and will be presented in such fashion, in sub-section **4.3 – Evaluation, Selection and Prioritization of Mitigation Action Items**.

Some of the goals and objectives developed for this CANHMP were not based solely on the results of the loss estimation, but were also based upon social and environmental values, political desires, historic preservation concerns and local mitigation priorities and funding opportunities that have changed since preparation of the 2004 CANHMP. Similarly, some of the Action Items that were selected were identified by reviewing a number of publications, web sites, and other mitigation resources. This process helped the Core Group identify possible Action Items that could be proposed in Lucas County that did not specifically address a concern identified during the loss estimation, but none the less could be implemented to help reduce the risk to Lucas County infrastructure, buildings and the community from natural hazards.

4.1.1 High Priority Natural Hazards

Tornadoes

Problem Statements:

- Major economic losses possible from destroyed businesses resulting from a tornado event.
- Lack of public shelters.
- Poor public awareness of shelter locations.
- Lack of residential and commercial “Safe Rooms”
- New construction is not required to be resistant to damages from tornado force winds.

- Not all mobile homes anchored against tornado winds.
- Not enough trained weather spotters.
- Loose items become hazardous and dangerous during a tornado event.

Goal 1 – Reduce safety risk to Lucas County community during the occurrence of a future tornado event.

Objectives:

- Provide 100% Lucas County coverage with tornado warning sirens.
- Provide all Lucas County residents with suitable public shelter within 2 miles of their residence.
- Provide information and building specifications relative to tornado “Safe Rooms” to those residents in Lucas County most susceptible to injury or loss of life resulting from future tornado events.
- Provide adequate number of trained weather spotters.
- Provide resident education regarding tornado protection and preparedness.
- Minimize the number of loose items that can become hazardous and dangerous during a tornado event.

Action Items:

- Review existing warning siren coverage and recommend new locations if and where there are coverage gaps. Utilize grant funding wherever possible to purchase new warning sirens.
- Review existing public shelters and recommend new locations if and where there are coverage gaps in meeting the above stated objective.
- Develop a program to provide information and building specifications on “Safe Rooms” for communities most susceptible to injury or loss of life resulting from future tornado events.
- Develop weather spotter training courses and implement training within local fire and police departments.
- Work with local governments to coordinate public awareness campaigns on tornado safety and preparedness in their local newspapers and government newsletters.
- Keep up-to-date lists of addresses with shelters, to assist Fire departments, Emergency Services agencies and communities and to coordinate the distribution of these lists to the appropriate local government officials.
- Determine how to accommodate individuals with special needs both in the emergency plan for the shelter and in the design of the shelter, including complying with the American with Disabilities Act (ADA.)
- Educate the public to secure all loose items on decks, porches and in yards.
- Work with individual jurisdictions that have identified a need for “Safe Rooms” to secure design and funding for individual project.

Goal 2 – Reduce losses from tornado events to present and future structures in Lucas County.

Objectives:

- Ensure those existing mobile homes and older buildings throughout Lucas County that have the most potential for losses from tornado events are protected.
- Ensure all Lucas County and municipal building codes reflect best current standards for anchoring against straight line and tornado winds.

Action Items:

- Develop a program to identify those existing mobile homes and older buildings throughout Lucas County that have the most potential for anchoring against straight and tornado force winds.
- Review all Lucas County and municipal building codes and recommend revisions for future construction to reflect best current standards for anchoring against straight line and tornado winds.

Severe Storms**Problem Statements:**

- Above ground utilities are prone to damage from severe storms.
- Trees damage structures due to improper or inadequate pruning, improper tree species planted, or improper location. Tree maintenance programs, where existing, are understaffed & underfunded.
- Utility and communication lines could be down for an undetermined amount of time following a severe storm event.
- Severe weather alerts do not reach all of the population of Lucas County in a timely manner.
- Utility outages resulting from severe storm events cause damage to electronics and perishable food items and place vulnerable and disabled citizens at increased health risk.
- There aren't tree planting educational programs or tree trimming/maintenance programs for private citizens.
- There is insufficient data on location(s) of disabled and elderly citizens who could be vulnerable to health risks as a result of power outages resulting from a severe storm event.
- Damage to structures from severe storm events, especially older buildings, is magnified because structures were built with inadequate regard for optimal wind speed and prevailing wind direction.
- Mobile homes generally are not securely anchored to resist maximum winds.
- Existing flat-roofed commercial and residential buildings are prone to build up of snow, ice, hail and water, especially after a severe storm event.
- Roofing and siding systems are not designed to resist hail and ice damage.
- No formal program is in place in Lucas County for assessment of damage to structures in the aftermath of a severe storm event.
- No uniform damage reporting procedure and no recognized clearinghouse for severe storm event damage assessment data.

Goal 1- Reduce risk of damage to utility infrastructure in Lucas County in the event of a severe storm event.

Objectives:

- Ensure trees do not damage utility lines during a severe storm event.

Action Items:

- Refrain from planting trees in and around utility lines, or plant low growing species that will not interfere with the lines. Place a higher priority on tree trimming/maintenance along utility easements.

Goal 2 – Reduce the health and safety risk to the citizens of Lucas County during a severe storm event.

Objectives:

- Ensure clear and concise severe weather alerts reach 100% of the population in Lucas County.
- Ensure power and communication capabilities are adequately improved for at risk citizens. The loss of electronics and perishable food items during severe storm events is minimized for seniors and the disabled.
- Ensure property loss/damage and personal safety risk due to tree damage following a severe storm event is minimized.

Action Items:

- Implement improved severe weather forecasting and warning systems.
- Provide a secure and reliable emergency wireless communication system for use by elderly or disabled citizens to reduce chance of isolation in a severe storm event and the aftermath.
- Encourage implementation of tree trimming and maintenance programs for private property owners to protect health & safety during a severe storm event, and distribute literature to the general public educating them on proper tree planting techniques, including safe distances from structures and utility lines.

Goal 3 – Reduce losses to public and private structures in Lucas County from severe storm events.

Objectives:

- Ensure timely severe weather alerts reach 100% of the population in Lucas County.

Action Items:

- Improve severe storm detection techniques and initiate storm alerts earlier to allow citizens more time to prepare their structures for severe storm events.

Goal 4 – Broaden response capabilities of emergency forces in dealing with the aftermath of a severe storm event.

Objectives:

- Ensure there are damage assessment capabilities for emergency response forces following a severe storm event.
- Ensure that there is a recognized clearinghouse for damage assessment data following a severe storm event.

Action Items:

- Initiate damage assessment training for emergency response personnel to include building inspection personnel that encompasses structural, electrical, plumbing and heating expertise, which would be invaluable in storm damage assessment. Establish a triage-like procedure for initial evaluation of structural and mechanical damage to structures caused by severe storms.
- Establish a uniform damage reporting procedure for all jurisdictions to utilize in Lucas County with Lucas County Emergency Management Agency as the clearinghouse for damage assessment data following a severe storm event.
- Provide back-up power generators for individual jurisdictions for use in maintaining power at critical facilities during severe storm events.

Floods**Problem Statements:**

- Flood warnings do not reach all citizens.
- Residents do not know what to do in the event of a flood.
- Motorists attempt to drive through flooded roadways.
- Pedestrians attempt to walk through flooded roadways.
- Residents are not aware they are in a flood zone or of local stream locations and they need education on flood insurance as a mitigation tool.
- Lucas County contains 5,565 structures located in flood hazard areas and 22 critical facilities within the 100 year floodplain.
- Poor storm sewer drainage causes flooding in low lying areas and roadways.
- Loss of floodplains due to development/waterway modification has generated a lack of flood storage areas and there is no county-wide database of information on critical floodplain areas that need protection to retain flood storage capacity.
- Lack of comprehensive policy guide for development in flood-prone areas.
- No water management policy for Lucas County.
- Weakened levees, dams, and other control structures can be breached during storm events.
- Poor soil drainage in flood hazard areas.
- Siltation in waterways causes flow obstructions.
- Debris carried by floodwaters can significantly compromise the effectiveness of otherwise adequately designed bridges, dams, culverts, diverting structures etc.
- Increasing impervious surface area placing additional stress on storm sewers and waterways.
- Zoning variances are granted to permit floodplain development.
- Multi-jurisdictional hot spots or solution project are not identified.

- Lack of funding opportunities for mitigation projects.
- Need for flood fighting educational programs for local government.
- Citizens are uninformed about floodplain maps and regulations
- Lack of flood risk map and educational tools for real estate agents and local governments.

Goal 1 – Reduce the health and safety risk to residents during future flooding events.

Objectives:

- Ensure there is a warning system to alert citizens of flood potential and intensity.
- Ensure citizens understand flood warnings and what they should do to protect themselves.
- Ensure residents living in flood zones are informed of their location and protective measures they can take.

Action Items:

- Work with the National Weather Service and local media to provide the most effective warning system to alert citizens in flood prone areas and on low-lying roadways of the intensity.
- Streamline the planning process for citizens to receive flood fighting information and provide information and assistance.
- Develop an educational program informing citizens within the flood zone of their location and/or proximity to streams.
- Educate citizens on viable flood protection options and methods appropriate for risk level.
- Partner with insurance companies to disseminate flood insurance information to citizens in flood prone areas.

Goal 2 – Minimize the impact of flooding on existing public and private structures and infrastructure.

Objectives:

- Ensure the risk is reduced for high flooding risk properties, especially repetitive loss properties.
- Ensure storm drains effectively receive water in flood prone areas and determine the feasibility of redirecting the flow of flood waters over roads.
- Ensure adequacy of flood storage areas and identify areas that need flood storage capacity protection.

Action Items:

- Discuss formation of a policy that guides or further restricts development around flood prone areas and areas of high flood mitigation values (wetlands, floodplain corridors, upland storage, closed depressional basins and areas of high filtration potential).

Goal 3 - Improve Lucas County's ability to respond to flooding and minimize the impact when flooding does occur.

Objectives:

- Ensure local governments have adequate and updated flood response action plans.
- Ensure adequacy of flood warning communication system between the County and local government.

Action Items:

- Develop a comprehensive communication system between the County and local governments-with procedure templates describing warning systems.

Goal 4 - Minimize the potential for increasing flooding and flood related problems within Lucas County and in areas affected by Lucas County drainage.

Objectives:

- Ensure areas with potential flood mitigation values are identified and mapped.
- Ensure the development of water shed-scale-storm management plans are made and are comprehensive.
- Ensure areas that have unique flooding and storm related issues are considered.
- Ensure compliance and enforcement of Lucas County's Storm Water Management Plan and flood zoning ordinances.
- Ensure multi-jurisdictional hot spots or high priority projects are identified where watershed level solution projects could be applied.

Action Items:

- Accurately identify and map areas that have potential flood mitigation value.
- Identify areas that have unique flooding and storm related issues.
- Ensure compliance and enforcement of Lucas County's Storm Water Management Plan and flood Zoning through fines and penalties.
- Identify hot spots or high priority projects involving multiple jurisdictions and organize stakeholders, develop a governance structure, identify and prioritize projects and Implement plans as funds become available.
- Seek funding and implement stormwater improvement projects to protect existing county infrastructure.

Goal 5- Gather and disseminate information about issues and processes associated with flood management in Lucas County.

Objectives:

- Ensure an educational program for local government with important flood fighting information.
- Ensure citizens understand floodplain maps and regulations.

Action Items:

- Provide education for units of government and citizens.

Flash Floods

Problem Statements:

- Water collects in low lying areas such as some roadways, underpasses, neighborhoods and areas adjacent to creeks and streams.
- Current storm drainage system is inadequate in some jurisdictions and under revision.
- Lack of accurate map of the flash flood-prone areas.

Goal 1 - Identify all flash flood prone areas.

Objectives:

- Ensure the county has detailed mapping of flash flood-prone areas.

Action Items:

- Survey all floodplain areas currently recognized by FEMA adjacent to creeks and streams to ensure flash flood-prone areas are included.

Goal 2 – Eliminate or reduce damages resulting from flash flooding.

Objectives:

- Ensure that water collection in critical areas is minimized following flash flooding events.
- Ensure current storm drainage system can handle flash flooding events.

Action Items:

- Rebuild replace and upgrade any and all storm drainage systems deemed inadequate to handle flash flooding events.

Goal 3 – Reduce the health and safety risk to travelers in Lucas County in the event of a flash flooding event affecting the roadway.

Objectives:

- Ensure that all existing and future roadway construction complies with current standards for design year floods.

Action Items:

- Investigate current roadways located in flash flood-prone areas to ensure compliance with current standards for design year floods.
- Develop and pass roadway construction ordinances to ensure future roadway projects comply with current standards for design year floods.

Severe Winter Storms

Problem Statements:

- High winds can create zero visibility "white out" conditions.
- Heavy snowfall can reduce visibility to nearly zero, particularly in windy conditions.
- Heavy snowfall will disrupt delivery of Emergency Services when streets and walkways are closed.
- Heavy snowfall will cause damage to roofs of buildings.
- Large amounts of sleet and accumulation of ice can create problems for vehicles by inflicting havoc on roadways.
- Freezing rain poses a significant risk to power lines and trees.
- Citizenry confused about the different levels of snow winter storm warnings.
- Heavy snow and ice storms bring down trees, electrical wires, telephone poles and lines, and communication towers.
- Heavy snowfall can halt a regional transportation system.
- Strong blizzard winds knock down trees and utility poles.
- Heavy snowfall affects the local economy when people are "snowed in".
- Heavy snowfall has consequential infrastructure road repair.
- Loss of business can have economic impacts on cities.

Goal 1 - Reduce health and safety risk to Lucas County citizens in the event of future severe winter storm events.

Objectives:

- Ensure there is a comprehensive winterization assistance program for potential at-risk citizens/residences.
- Ensure citizens are educated regarding the levels of snow winter storm warnings.
- Ensure citizens are aware of alternative forms of safe heating sources.
- Reduce health and safety risk to citizens with winter storm kits.
- Encourage family/individual emergency communications plans.

Action Items:

- Coordinate with the American Red Cross to establish heating centers for at-risk citizens/residences, provide winter storm kits and design a public information campaign that includes educating citizens about snow winter storm warnings, alternative forms of heating, and family/individual emergency communications plans.

Goal 2 – Reduce the liability to and extent of Lucas County infrastructure damages from future severe winter storm events.

Objectives:

- Ensure critical facilities have emergency communications plans and emergency power backup plans.

- Reduce risk to existing above-ground utilities from trees that may be susceptible to damage during severe winter storms.

Action Items:

- Work with critical facilities to develop emergency communications plans and emergency power backup plans.
- Develop a countywide tree management program to reduce the probability of damage to existing above-ground utilities from severe winter storm events that includes provisions to encourage the planting of species that are less susceptible to damage and ensures that trees are planted sufficiently far from above-ground utility lines and buildings.

Goal 3 Reduce the economic impact of winter storms on Lucas County citizens and governmental agencies.

Objectives:

- Ensure winter maintenance costs are reduced and ensuring winter maintenance crews are efficiently utilized.

Action Items:

- Develop and adopt countywide winter maintenance procedures that include snow trapping devices, “smart salting” techniques, and applying deicing chemicals before severe winter storms happen.

Earthquakes

Problem Statements:

- Citizens are not aware of nor prepared for the impact of a moderate (Mercalli Scale: V) earthquake.
- Older masonry buildings (pre-1930’s) will experience failure of aging fascia and ornamentation and are more susceptible to complete collapse in a moderate earthquake.
- Modern large span (commercial/industrial) unsupported trusses susceptible to collapse.
- Potential soil liquefaction in downtown commercial areas along Maumee River and in unconsolidated sandy soils of Western Lucas County.
- Disruption of roadways and rail lines due to ground movement or subsidence.
- Damage to underground utilities and services, electric grid, natural gas and chemical products, water and sewer lines, and communications networks.

Goal 1 – Reduce the damage to private property and infrastructure in Lucas County in the event of an earthquake.

Objectives:

- Ensure future damage to private homes is minimized.

- Ensure that older masonry buildings are not susceptible to complete collapse.
- Address inadequacy of current building codes for large span structures.
- Ensure future damage to underground utilities and services, electric grid, natural gas and chemical products, water and sewer lines, and communications networks are minimized.

Action Items:

- Work with engineers and architects to survey existing buildings and infrastructure and develop recommendations for seismic resiliency.
- Designate pedestrian safe zones to prohibit public access in areas directly below damaged infrastructures until repairs can be made.

Goal 2 - Reduce safety risk for all the citizens of Lucas County before, during and after an earthquake event.

Objectives:

- Ensure the public is informed about the earthquake hazard risks in the county.
- Ensure planning is prioritized to provide necessary services and information to the public in the event of disruptions caused by an earthquake event.
- Ensure emergency plans for evacuation routes utilize the latest information available.
- Ensure that homeowners are informed of necessary measures to lessen the damage to their homes during an earthquake event.

Action Items:

- Provide Emergency Preparedness information and resources relative to earthquake events to the public through an active education and outreach program.
- Provide outreach to inform citizens of the need to plan and prepare for all hazards to reduce the impact of an earthquake disaster and aid the recovery.
- Develop emergency plans for evacuation of communities in the event that an earthquake occurs that are up to date and are utilizing the latest information available.

4.1.2 Medium Priority Natural Hazards

Wildfires

Problem Statements:

- Residents are skeptical of risks because of the infrequency of large scale events and are either not aware of, or do not obey all open burning laws.
- Residents are unaware of land management and landscaping options to limit fire spread.
- Rural growth has increased the number of residents in high and moderate wildfire risk areas.
- Current building codes do not require fire resistant exteriors in high hazard areas.
- Fuel load in high wildfire risk areas is not addressed.

- Builders and developers are uninformed of wildfire preventative and protective options.

Goal 1 – Reduce health and safety risk to Lucas County residents in the event of future wildfires.

Objectives:

- Ensure residents are educated on hazards of wildfires, evacuation procedures, and open burning laws and penalties.
- Ensure Fire Departments have improved capabilities for responding to and extinguishing wildfires.
- Ensure residents are aware of fire resistant materials and landscaping options.

Action Items:

- Increase media coverage of threat and evacuation procedures during peak wildfire times of the year, distribute informational packages in high and moderate wildfire risk areas, and increase enforcement of existing open burning laws.
- Enhance and expand training and awareness of fire departments in wildfire hazard areas and provide specialized equipment for controlling and extinguishing of wildfires.

Goal 2 – Reduce threat to existing and future structures from wildfires.

Objectives:

- Ensure that high and moderate wildfire risk areas are identified.
- Ensure the critical facilities and number of residential properties in high and moderate wildfire risk areas are identified.
- Reduce the amount of fuel load in moderate and high wildfire risk areas of the county.
- Ensure wildfire vulnerability assessments are done.

Action Items:

- Identify and protect high and moderate wildfire risk areas and critical facilities.
- Coordinate with all jurisdictions to develop a vulnerability assessment for wildfires, and implement a plan for completing them.
- Use controlled burns to decrease the amount of fuel load in the identified moderate and high wildfire hazard areas.

Temperature Extremes

Problem Statements:

- Public does not fully understand the impact of extreme temperatures on individuals and infrastructure and lack basic knowledge of how to cope. Senior citizens, the ill or disabled persons are the most at risk.

- Extended heat spells associated with drought conditions results in increased fire danger and loss of agricultural crops.
- Power outages or complete failures may result from demand overloading systems.
- Disruption of transportation systems due to safety constraints such as asphalt roadways softening in heat and railway equipment becoming weakened by heat or brittle in cold.
- Heat and Cold may result in damage to utilities and services, electric, water and sewer lines, and communications networks.
- Shortages of heating fuels and increases in the cost of cooling can cause sharp price fluctuations placing further stress on fixed-income households and the general economy.
- Water hydrants may be opened during heat spells and water used to fight fires will freeze quickly in extreme cold. Both conditions increase the damage that fire can do and increase risk of injury to fire fighters.
- Lack of coordinated planning to meet the need for community based “Cooling/Warming” centers during periods of extreme heat or cold.

Goal 1 – Reduce health, safety, agricultural, and communication breakdown risk to Lucas County citizens in the event of extreme temperatures.

Objectives:

- Ensure safety of the public specifically addressing Senior Citizens and Disabled persons during extended periods of extreme heat or cold.
- Ensure for the care of animals during extended periods of extreme heat or cold.
- Ensure “fire risk” is minimized during extended periods of extreme heat.
- Ensure that rapid communications between emergency services and the private sector is improved during extended periods of extreme heat or cold.
- Reduce the possibility of fires due to unsafe and inappropriate use of alternate heating devices.
- Reduce the extent of damage to agriculture during extended periods of extreme heat.
- Ensure that the public is informed of “Cooling/Warming Centers”.

Action Items:

- Provide Emergency Preparedness information and resources relative to extreme temperature events to the public through an active educational outreach program with specific plans and procedures for Senior Citizens and the Disabled.
- Develop plans for the protection and care of animals during extended periods of extreme heat or cold.
- Establish a Fire Advisory System to identify “fire risk.” during extended periods of extreme heat or cold.
- Coordinate with utilities and transportation authorities to improve rapid communications between emergency services and the private sector when basic services might be disrupted during extended periods of extreme heat or cold.
- Review fire safety ordinances for open burning and the use of liquid fuel and electric space heaters.

- Coordinate with service support groups to provide a list of “Cooling/Warming Centers” for use during extended periods of extreme heat or cold to at risk citizens.

4.1.3 Low Priority Natural Hazards

Droughts

Problem Statements:

- Water supply could be depleted during extreme drought.
- Firefighting becomes difficult if water hydrants are dry.
- Crop losses may potentially occur during extreme drought.
- Insufficient supply or high cost of water may impact livestock and poultry operations.
- Risk of forest/field crop fire increases and ability to respond decreases during extreme drought.
- Communities do not have detailed contingency plans to insure an effective program of water conservation during extreme drought.
- Agricultural loss data currently does not isolate only those losses attributed to drought conditions.

Goal 1 – Reduce health and safety and agricultural loss risk to Lucas County residents and livestock during a drought.

Objectives:

- Provide adequate supply of water for essential residential and commercial uses during drought.
- Reduce risk of fire damage during extreme drought.
- Ensure subsidy programs for agricultural losses are utilized in a manner to offer relief to farmers that specifically suffer drought-related losses.

Action Items:

- Provide guidance to jurisdictions on potential new sources of water during extreme drought.
- Reduce risk of fire damage during extreme drought with restrictions on open burning and campfires.
- Review policies on non-essential residential and commercial uses of water to maintain existing supply and integrity of systems.
- Establish water hauling programs for livestock during extreme drought.
- Establish a data management system to identify drought-related agricultural losses so subsidy programs can be utilized to their full advantage.

Goal 2 – Reduce losses to water supply facilities and delivery systems during a drought.

Objectives:

- Reduce the demand for water during a drought.
- Ensure the water supply facilities and delivery systems are properly functioning.

Action Items:

- Encourage water conservation through public outreach programs prior to a drought event.
- Establish economic incentives for private investment in water conservation.

Goal 3 – Increase public awareness of water conservation and fire prevention.

Objectives:

- Ensure ongoing public education of water conservation.
- Encourage proper disposal of flammable materials.

Action Items:

- Implement and distribute Drought Dos and Don'ts to the general public.
- Organize drought informational meeting for the public and media.
- Develop sample ordinances of water conservation.

Lake Surges

Problem Statements:

- Lake surge can cause significant flooding.
- Lake surge, in the western Lake Erie basin is the result of prolonged easterly winds, resulting in the shift of water from east Lake Erie to the west.
- No plan is in place in the event of a lake surge evacuation.
- No established warning system exists specifically for lake surges.
- Lake surge can cause health risks due to waterborne diseases.
- Extreme lake surge can flood basements and destroy homes.
- Lake surge can cause damage to infrastructure such as roads, communications facilities, natural gas facilities, water treatment facilities, power plants, et al.
- Critical facilities are at risk from lake surge events.
- Lake surge can have economic consequences, such as loss of employment, crop loss and seaport losses.
- Lake surge can be exacerbated by excessive snowmelt or excessive rain.
- High winds can push water above “normal” levels causing damage to personal property; including real property and recreational property.
- Surge can cause ecological damage to rare plant species and wetlands.
- Heavy lake surge can cause water to flow to low lying areas where it can remain for weeks.

Goal 1 - Reduce health and safety risk to Lucas County citizens in the event of future lake surge.

Objectives:

- Ensure lake levels are monitored.
- Ensure citizens within the lake surge areas are notified in a timely manner.
- Ensure that a comprehensive evacuation plan is in place in the instance of a lake surge event.
- Ensure locations exist to serve as relocation centers in case of lake surge evacuation.
- Ensure public is aware of water-borne illness related to lake surge events.

Action Items:

- Monitor lake levels to rapidly warn residents of potential surge flooding.
- Establish emergency response plans to evacuate people from lake surge areas.
- Establish a chain of command to take charge in event of lake surge evacuation.
- Identify evacuation Reception Centers stocked with necessary supplies for emergency lake surge evacuation.
- In conjunction with the Department of Health, develop a pamphlet and public information program informing the public of preventative measures to take to avoid water-borne illness related to lake surge.

Goal 2 – Reduce the liability to and extent of public and private property and infrastructure damages resulting from lake surge events.

Objectives:

- Ensure that building codes address building practices that enforce surge-resistance.
- Investigate all roads/highways below the surge floodplain for future protective measures
- Mandate building codes, in the lake surge areas, that enforce buildings to be surge-resistance.
- Investigate all housing below the surge floodplain for future protective measures.
- Enact zoning directives that limit development in surge areas.
- Ensure lake buffer zones are utilized.
- Ensure the most vulnerable infrastructure within the surge floodplain is protected.
- Ensure power at critical facilities is maintained and critical facilities are protected during lake surge events.

Action Items:

- Determine lake surge prone areas to create lake buffer zones.
- Develop building codes that address enforcement of lake surge resistance measures
- Develop system of dikes to protect most vulnerable infrastructure within lake surge floodplain and where applicable, develop lake buffer zones.
- Develop back up emergency power plan for critical facilities during lake surge events.

Goal 3 - Reduce the economic implications of lake surge events on Lucas County

Objectives:

- Ensure water is not allowed to stay in low areas for an extended period of time.

- Ensure loss due to lake surge events is limited.
- Ensure proactive prevention of lake surge damages.

Action Items:

- Employ in-lake early warning technologies to combat lake surge losses before they happen.
- Create effective milestones or warning measuring points to evaluate the possibility/probability for surge flooding.

Landslides

Problem Statements:

- There are no limits to development/construction and/or ordinances.
- There is a possibility of road slips along riverine and lakeshore properties.
- There is no way to warn people about landslides. Conditions can only be monitored.
- Slope stability could be improved.

Goal 1 – Reduce the health and safety risk to travelers in Lucas County in the event of a landslide affecting the roadway.

Objectives:

- Ensure the safety of travelers on roadways that may be affected by landslides.
- Ensure soil properties and dynamics are considered prior to new roadway construction.
- Ensure slope stability is considered prior to new roadway construction.

Action Items:

- Erect a series of warning signs along roadways where slips and slides are a possibility.
- Coordinate with Agencies involved in roadway construction to require that new lakeside/riverfront roadways be designed to hold soil in place.

4.2 State and Local Mitigation Capabilities

Now that the Core Group had identified goals, objectives and alternative mitigation Action Items to address the potential losses identified in the vulnerability analysis and loss estimation tasks, current local and state programs, policies, regulations, funding and practices were reviewed to identify how they would facilitate or hinder mitigation in general. Another outcome of this task was identifying how local and state governments are structured in terms of professional staff that would be available to directly carry out or provide technical assistance for mitigation Action Items. By completing a state and local capability assessment, a clearer understanding of whether or not Lucas County would be able to implement the recommended mitigation Action Items was achieved.

The state capability assessment, included in **Appendix H - State Capability Assessment**, was developed and supplied to the LCEMA by OEMA. The state capability assessment was taken from the State of Ohio Enhanced Hazard Mitigation Plan (revised January 2011). The state capability assessment includes a description of the State of Ohio's pre- and post-disaster hazard mitigation policies, programs, and capabilities to mitigate the hazards within the state, and includes an evaluation of the state laws, regulations, policies, and programs related to hazard mitigation as well as to development in hazard-prone areas.

The local capability assessment, summarized in **Table 6 – Local Capability Assessment**, was developed by LCEMA. This table identifies the agencies and other organizations within Lucas County that would directly be involved in loss reduction activities.

All of the proposed mitigation Action Items presented in this CANHMP must be feasible in terms of Lucas County's legal, administrative, fiscal, and technical capacities. As such, completing the local capability assessment has helped to examine these capacities in light of the type of activities that have been recommended. Basically, **Table 6** lists those Lucas County agencies with responsibility for planning, building code enforcement, mapping, managing physical assets, and others specifically responsible for emergency management functions or loss reduction activities. Finally, just like those agencies listed in the state capability assessment, many of the listed agencies in the local capability assessment have been identified as lead or support agencies for some of the recommended mitigation Action Items presented in this CANHMP.

As part of the 2013 plan revision, LCEMA made revisions to the local capability assessment by updating local points of contact as appropriate. Additionally, some of the agencies listed in the 2004 CANHMP have been removed for the 2013 plan revision based upon a better understanding of how the various agencies within Lucas County would lead or support the future mitigation Action Items.

The primary county agency in Lucas County responsible for mitigation activities is LCEMA. The LCEMA serves as the conduit for all state and federal programs and funding for mitigation activities as well as disaster response planning and execution. Many other county departments have varying degrees of responsibility for mitigation activities. Some of them include:

- Lucas County Engineer – Responsibilities include county road maintenance, serving as engineer for townships, responsibility for bridges and culverts on the local roadway system and maintain property tax maps and oversee design and construction of new subdivisions.
- Toledo Metropolitan Area Council of Governments – The Metropolitan Planning Organization for Lucas County oversees the use of federal transportation construction and planning dollars and incorporates local projects into the state transportation plan.
- Board of County Commissioners – Responsible for legislating mitigation activities as well as authorizing the use of funds for mitigation projects.

- Ohio State University Extension – Responsibilities include educating county residents on the proper use and conservation of natural resources.
- Soil and Water Conservation District – Programs and grants use for preserving natural resources within the county as well as education and technical assistance.
- Toledo-Lucas County Planning Commission – This agency is responsible for reviewing and approving development throughout the county to make sure any new developments comply with all county and local development regulations.
- County Sheriff, local Police and Fire Departments – Provides first responder response to incidents, educational programs on prevention and enforcement of laws within the county and local jurisdictions.
- Streets, Bridges and Harbors, City of Toledo – Responsibilities include operating the lift bridge and floodgates, snow and ice control, leaf collection, demolition and other general maintenance type items on the infrastructure.

There are many other agencies throughout the county responsible for specific programs or projects. The revised local capability assessment is included as **Table 6**.

4.3 Evaluation, Selection and Prioritization of Mitigation Action Items

Once the list of Action Items and the State and Local Capability Assessments had been developed, the Action Items to be included in the final plan were selected and ranked in order of preference for each hazard. The Core Group agreed to evaluate the Action Items based on the STAPLEE (Social, Technical, Administrative, Political, Legal, Economic and Environmental) criteria that is discussed in the FEMA 386-3 guidance document. For the 2013 plan revision, the decision to evaluate the Action Items again using the STAPLEE criteria was made.

The planning team utilized the STAPLEE criteria to make the initial analysis for prioritization. To accomplish this, a matrix was created as shown in the guidance document, FEMA 386-3, and each Action Item that was positive in relation to the specific criteria was given a plus one and each Action Item that produced a negative effect on those criteria was given a negative one. For those that had little or no affect, no score was given and is indicated as N/A in the table. Once all the criteria for each Action Item received a score, the total score for each Action Item was calculated. The LCEMA and their planning team then reviewed the Action Items and prepared a second matrix with the items shown in ranked order. The reasons for ranking the items in the order shown are given in the comments to the right of the matrix. The planning team chose items to rank number one based on those having the most positive benefit to the residents in terms of saving lives and property, even if the particular Action Item was quite costly or might meet significant opposition. The final prioritization of the Action Items for the 2013 plan revision is shown in **Table 7 – Evaluation of Mitigation Action Items**.

One of requirements utilized in this analysis was to make sure that there were selected Action Items that included every jurisdiction that was included in the final plan. There was floodplain in every jurisdictions but not necessarily structures within the floodplain in each jurisdiction. Action Items were included that impact more than just structures within the

floodplain such as property maintenance and watershed management. In addition, care was taken to make sure that there were prioritized Action Items for other natural hazard events that did take into account every jurisdiction included in the plan.

4.4 Mitigation Implementation Strategy

Once the selected Action Items had been evaluated as discussed in **Section 4.3 – Evaluation, Selection and Prioritization of Mitigation Action Items**, and the state and local capability assessments had been completed as indicated in **Section 4.2 – State and Local Capability Assessment**, it was then time to develop the implementation strategy for the Lucas County CANHMP. The information developed in the previous steps was utilized in the development of the implementation strategy.

The Action Items were those included from the prioritization step. The next step, utilizing the capability assessments, was to determine which agency or party was primarily responsible for the Action Items and to list their responsibilities. Along with this step was the step to identify and include those agencies and parties that might be able to provide some technical assistance in the implementation of that particular Action Item. Subsequently, possible funding sources were identified and listed with each Action Item. A summary of the tasks necessary to complete each Action Item was the next step to be included. Once an estimate of the tasks involved in each Action Item had been prepared, an estimated cost for planning purposes was developed. If it could be determined from this broad level of planning, materials lists for each Action Item were developed. After all this information had been determined, an estimated time frame for completion of the Action Item was included. All of this information was then included in the final implementation strategy.

The implementation strategy identifies who is responsible for which mitigation Action Items, what funding mechanisms might be available, other resources available, and when the actions are scheduled for completion. It describes the way the community will use its resources to achieve its goals of reducing losses from future hazard events. It also focuses on coordination between the various individuals and agencies involved in the implementation to avoid duplicating or conflicting efforts. The planning team decided that the most appropriate method to display this information was in table form. Therefore, the implementation strategy discussed in this section is shown in **Table 8 – Implementation Strategy**.

For the 2013 plan revision, development of the implementation strategy followed the same process that was used during preparation of the 2004 CANHMP. The mitigation Action Items that were already completed or that were removed since preparation of the 2004 CANHMP were also deleted from **Table 8 – Implementation Strategy**. Likewise, the mitigation Action Items that have been added for the 2013 plan revision were evaluated and an implementation strategy for each was developed.

4.5 Mitigation Plan Monitoring

Once the 2004 CANHMP was adopted, a monitoring effort was required to make sure the plan is implemented to the fullest extent possible. This monitoring effort also included the review of additional information that has become available since then, or implemented Action Items, to make the appropriate changes in the 2013 plan revision. In order to fully implement the monitoring provisions, the Director of LCEMA has established a Mitigation Plan Coordinating and Monitoring Committee. This committee includes representatives of county and local government, and plans to add representatives from the community at large have been made

This Mitigation Plan Coordinating and Monitoring Committee is responsible to see that the Action Items included in the plan are implemented on a reasonable schedule based on the funding available. Additionally, throughout the planning process, the participating jurisdictions were informed that one of the requirements for participation would be to inform their legislative bodies that the goals, objectives, and mitigation action items developed for the 2013 plan revision would need to be incorporated into any applicable existing planning mechanisms, such as comprehensive or capital improvements, when appropriate.

Many of the Action Items recommend revisions to existing regulations, such as updates to building codes, land use plans, floodplain regulations, sub-division regulations, zoning codes, etc. As these existing regulations are revised, the local legislative bodies will contact the Mitigation Plan Coordinating and Monitoring Committee to ensure that the goals, objectives, and mitigation action items developed for the 2013 plan revision are incorporated, when appropriate.

For those communities that don't have such documents, the committee will recommend that the appropriate assistance be provided to those that so request. For those communities wishing to implement the county regulations, provisions may have to be made to accommodate local governments in those regulations.

In the adoption legislation in each jurisdiction, there is a requirement for each adopting legislative body to receive an annual report from the person responsible for Risk Management in their community regarding the implementation of the plan and any issues that arise. The annual report shall also describe how the goals, objectives, and mitigation action items developed for the 2013 plan revision were incorporated into any existing planning mechanisms over the past year. This report is also to be submitted to the Director of LCEMA. The Mitigation Plan Coordinating and Monitoring Committee will use the information in these annual reports to review the plan on an annual basis. They will also make recommendations for any updates and whether the updates should be made immediately or can be included in the required 5-year plan update.

Throughout the monitoring process, the public will be invited to participate and take an active role in the process. The CANHMP will be available, not only on the county web site but also at various locations throughout the county. Implementation activities will be announced publicly and noted that they are being accomplished in accordance with the

official County All Natural Hazard Planning Process required by DMA2K to obtain certain types of disaster mitigation funds. The public will be invited to participate in the required update process as well as be given the opportunity at any time to make comments on the plan or the activities included within the plan.

Since preparation of the 2004 CANHMP, many of the mitigation Action Items have been completed or are in the process of being completed within Lucas County (**See Table 7b – Mitigation Action Items Completed Since the 2004 CANHMP**). Specifically, six flood mitigation projects, one flash flooding mitigation project, one lake surge mitigation project, one severe winter storms mitigation project, and one landslide mitigation project that were presented in the 2004 CANHMP have been completed. No mitigation assistance funding was utilized by Lucas County to complete these projects.

4.6 Mitigation Plan Adoption

Throughout the planning process during preparation of the 2013 plan revision, the Core Group members were advised to keep their legislative bodies up to speed on the planning process and the fact they would have to take formal adoption action for the community to be eligible for mitigation dollars.

Additionally, throughout the planning process, the participating jurisdictions were informed that one of the requirements for participation would be to inform their legislative bodies that the goals, objectives, and mitigation action items developed for the 2013 plan revision would need to be incorporated into any applicable existing planning mechanisms, such as comprehensive or capital improvements, when appropriate. This topic has been discussed in **Section 4.5 – Mitigation Plan Adoption**.

Pending federal approval, Lucas County and the participating jurisdictions in this 2013 plan revision intend to formally adopt the 2013 plan revision by resolution or ordinance.

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Table 1 Core Group Participants

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 1. Core Group Participants

Cities	Representative(s)
Toledo	Mr. Scott Sibley, Mr. John Walthall, Lt. Thomas Weigand, Mr. William Brennan, Mr. Frank Mortali
Maumee	Mr. Bruce Wholf
Oregon	Mr. James Gilmore
Sylvania	Mr. Jeffery Ballmer

Villages	Representative(s)
Berkey	Ms. Barb Huff
Harbor View	Mr. Curtis Champoir
Holland	Ms. Leslie Ferman
Ottawa Hills	Mr. Marc Thompson
Waterville	Chief Steve Parsons
Whitehouse	Mr. Jordan Daugherty

Townships	Representative(s)
Harding	Mr. Larry Buckenmeyer
Jerusalem	Did not participate in 2011 plan revision
Monclova	Mr. Harold Grim
Providence	Chief Brett Hite
Richfield	Mr. John Hassen
Spencer	Did not participate in 2011 plan revision
Springfield	Ms. Leslie Kohli
Swanton	Mr. Dennis Tippie, Mr. Jim Irmen
Sylvania	Mr. Gregory Huffman
Washington	Did not participate in 2011 plan revision
Waterville	Mr. Eric Gay

Countywide	Representative(s)
County Dept. of Emergency Services	Mr. Matthew Heryman, Mr. Joe Walter, Ms. Bonita Palmer, Mr. Thomas Barnhizer, Mr. Gregory Bonfiglio, Mr. Sam Wasylshyn
County Engineer's Office	Mr. Robert Neubert, Mr. Brian Miller
County Auditors Office	Ms. Leslie Rhegness, Ms. Tina Mack
Toledo Metro Area Council of Governments	Mr. Curt Erichsen
Toledo/County Soil and Water Conservation District	Ms. Laura Burkett
Lucas County LEPC	Mr. Michael Frey
Ohio EMA Mitigation Banch	Mr. Dean Ervin
Hospital Council of NW Ohio	Ms. Kathy Silvestri, Mr. Patrick Trejchel
American Red Cross, Toledo	Mr. Kenneth Robinson
USACE Buffalo	Ms. Laura Ortiz, Ms. Deborah Lewandowski
University of Toledo	Mr. Richard Becker

Table 2 History of Natural Hazard Events

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Temperature Extreme Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/26/1993	\$0.00	0	1	Temperatures averaged well below normal with high temperatures in the teens and low temperatures near zero. The morning of the 29th saw temperatures below zero over much of the area. Water main breaks occurred along with an increase in fires due to residents using additional heat sources. A homeless man (age unknown) in Toledo was reported to have died of hypothermia on the 28th.	NCDC Database
Countywide	2/11/1995	\$0.00	0	0	Arctic air spread across all of Ohio on the 11th producing low temperatures between zero and about 10 below on the morning of the 12th and close to zero on the 13th. A number of water line breaks occurred.	NCDC Database
Countywide	4/4/1995	\$0.00	0	0	Record cold dropped temperatures to between 10 and 15 in many areas except along the immediate Lake Erie shore. Little or no damage occurred to most trees since it was so early in the growing stage, but some peach trees suffered damage.	NCDC Database
Countywide	7/12/1995	\$0.00	0	0	Record or near record high temperatures in the 90s along with excessive humidity occurred with the peak of the heat and humidity occurring on the 14th when high temperatures were near or exceeded 100. Dewpoints were also unusually high averaging near 80 which produced a heat index as high as 126 F in Toledo. A number of roads and sidewalks buckled from the heat.	NCDC Database
Countywide	12/9/1995	\$0.00	0	0	Arctic air moved into the area, initially with winds that gusted to 30 and 40 mph on the 9th and 10th producing wind chill temperatures of 30 to 40 below zero. Actual temperatures were near zero at night and in the single digits and teens for afternoon maximums. A number of water lines froze and were damaged. Some frost bite cases were reported but a reliable estimate of injuries was not available.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Temperature Extreme Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	2/2/1996	\$0.00	0	0	Bitter cold arctic air was over the area with overnight low temperatures averaging between zero and 10 below and daytime high temperatures in the single digits. Wind gusts of 25 mph on the 2nd dropped wind chills as low as 40 below zero and the wind picked back up on the 5th again bringing similarly low wind chills. Record lows were set at most stations across northern Ohio for the 3rd and 4th. A number of pipes and water mains froze and/or broke.	NCDC Database
Countywide	1/10/1997	\$0.00	0	0	zero across all of Northern Ohio, causing frozen and ruptured water pipes. With wind chills of 40 to 50 below zero, many schools were forced to close. On the 19th, Toledo (Lucas) had a low temperature of minus 10 degrees.	NCDC Database
Countywide	6/6/1999	\$0.00	0	0	Temperatures across northern Ohio were much above normal. Temperatures reached the lower 90s.	NCDC Database
Countywide	7/1/1999	\$0.00	0	0	Temperatures across northern Ohio were much above normal. High temperatures reached the middle 90s several days. All major reporting stations in northern Ohio finished with average monthly temperatures among the ten warmest on record for July.	NCDC Database
Countywide	1/15/2009	\$0.00	0	0	Bitterly cold temperatures.	NCDC Database
Toledo	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	0	0	Large risk of future occurrence.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Temperature Extreme Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Whitehouse	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Springfield Twp.	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Total:		\$0.00	0	1		

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Drought Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	August 1986 through August 1988	\$0.00	0	0	All of northwestern Ohio was under a severe drought. The Village of Waterville nearly lost it's municipal water source.	Dept. of Geopgraphy and Office of State Climatologist, OSU
Countywide	1991	\$0.00	0	0	All of northwestern Ohio was under a severe drought.	Dept. of Geopgraphy and Office of State Climatologist, OSU
Countywide	9/1995	\$0.00	0	0	Dry weather which developed in August continued for the entire month as precipitation averaged less than 50% of normal in most areas and came almost entirely in the form of hit or miss showers and thunderstorms. Crops which had matured during the late summer were harvested at near normal levels but late maturing crops such as corn, vegetables, pumpkins, and the third cutting of hay suffered from the lack of rain. Estimates of late season crop losses averaged from 10 to 30 percent with the total dollar loss amount unknown.	NCDC Database
Countywide	8/1996	\$0.00	0	0	Dry weather persisted throughout the month across northern Ohio. Rainfall averaged from a few tenths of an inch in north central and northwest Ohio to one to two inches in extreme northeast Ohio. August rainfall normally averages between three and four inches. Rainfall totals were .76 inches at Toledo Airport and .71 inches at Cleveland Airport, which rank among the five driest Augusts on record. Crops that normally mature during August were affected by the dry weather and crop losses were predicted at ten to thirty percent. The actual dollar amount of crop loss was unknown.	NCDC Database
Countywide	6/1999	\$0.00	0	0	Little rain occurred from late May through much of June. Scattered rains late in June brought hope for farmers but it is likely that crop yields will be reduced even with adequate rain the remainder of the season. Losses due to the drought were unknown. Several communities instituted water use restrictions.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Drought Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	7/1999	\$0.00	0	0	Drought conditions across northern Ohio eased as thunderstorm rains became more widespread. None the less, very dry soil conditions persisted in a few areas that missed the brunt of the thunderstorm activity. Some communities instituted water use restrictions and crop yields will likely be reduced because of the lack of adequate rainfall. Losses due to the drought were unknown.	NCDC Database
Countywide	8/1999	\$0.00	0	0	Drought conditions persisted across northern Ohio as rainfall totals for the month were below normal at most locations. Only 1.40 inches of rain fell in Toledo during August with only 1.80 inches measured in Cleveland. Both of these totals are roughly half the monthly normal. Water use restrictions were instituted in many areas. The drought also greatly impacted agricultural interests. Crop yields in northern Ohio will be reduced by an average of 30 percent this growing season. Actual financial losses will not be known until after the fall harvest.	NCDC Database
Countywide	9/1999	\$0.00	0	0	Drought conditions continued across most of northern Ohio during September. Widespread heavy rain occurred on the 29th but did little to help crop conditions. Even with an inch of rain on the 29th, both Toledo and Cleveland finished with below two inches of rain for the month. Losses from reduced crop yields are estimated at \$200 million for northern Ohio alone.	NCDC Database
Toledo	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Whitehouse	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Drought Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Springfield Twp.	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Monclova Twp.	March/April 2009	\$0.00	0	0	Dry conditions.	Hazard History Worksheet
Total:		\$0.00	0	0		

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Earthquake Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	1926	\$0.00	0	0	Modified Mercalli 3	USGS and Ohio Earthquake Information Center
Sylvania	1926	\$0.00	0	0	Modified Mercalli 4	USGS and Ohio Earthquake Information Center
Toledo	1948	\$0.00	0	0	Modified Mercalli 3	USGS and Ohio Earthquake Information Center
Springfield Twp.	1953	\$0.00	0	0	Modified Mercalli 4	USGS and Ohio Earthquake Information Center
Oregon	1984	\$0.00	0	0	Modified Mercalli 3	USGS and Ohio Earthquake Information Center
Maumee	1993	\$0.00	0	0	Modified Mercalli 3	USGS and Ohio Earthquake Information Center
Toledo	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Ottawa Hills	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Whitehouse	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Total:		\$0.00	0	0		

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	March/April 1913	\$0.00	NA	0	0	Major Flood	Hazard History Worksheet
Countywide	7/15/1969	\$0.00	NA	0	0	Presidential Declaration of Disaster due to heavy storms and flooding.	OEMA
Countywide	11/24/1972	\$0.00	NA	0	0	Presidential Declaration of Disaster due to heavy storms and flooding.	OEMA
Countywide	4/27/1973	\$0.00	NA	0	0	Presidential Declaration of Disaster due to heavy storms and flooding.	OEMA
Countywide	5/31/1974	\$0.00	NA	0	0	Presidential Declaration of Disaster due to heavy storms and flooding.	OEMA
Countywide	3/26/1982	\$0.00	NA	0	0	Presidential Declaration of Disaster due to flooding.	OEMA
Countywide	8/4/1992	\$0.00	NA	0	0	Presidential Declaration of Disaster due to tornadoes and flooding.	OEMA
Waterville	1/4/1993	\$500,000.00	\$765,696.78	0	0	The Maumee River exceeded the flood stage of 9.0 feet at Waterville. Crest stage was 12.7 feet and occurred at 0600EST on January 6.	NCDC Database
Waterville	3/9/1993	\$50,000.00	\$76,569.68	0	0	The Maumee River went above the flood stage of 9 feet. Crest was 9.7 feet and occurred at 5:30 PM on the 9th.	NCDC Database
Waterville	3/26/1993	\$5,000.00	\$7,656.97	0	0	The Maumee River went above the 9 feet flood stage. Crest was 10.6 feet and occurred at 8 PM on the 24th.	NCDC Database
Toledo	9/2/1993	\$50,000.00	\$76,569.68	0	0	Flooding of streets, small streams, and basements occurred.	NCDC Database
Waterville	4/12/1994	\$5,000.00	\$7,462.69	0	0	The Maumee River at Waterville exceeded flood stage of 9.0 feet and crested at 12.1 feet at 0700 EST on the 14th. There was minor flooding.	NCDC Database
Toledo	7/29/1994	\$5,000.00	\$7,462.69	0	0	Slow moving thunderstorms produced over two inches of rain. Flooding of streets and poor drainage areas occurred.	NCDC Database
Countywide	3/8/1995	\$0.00	NA	0	0	The Maumee River exceeded flood stage of nine feet and crested at 9.2 feet. Minor flooding occurred in low lying areas.	NCDC Database
Waterville	4/10/1995	\$0.00	NA	0	0	The Maumee River exceeded flood stage of nine feet and crested at 10.9 feet on the 12th at 0700 EST. Flooding was confined to low lying areas along the river.	NCDC Database
Countywide	1/27/1996	\$0.00	NA	0	0	Presidential Declaration of Disaster due to flooding.	OEMA
Waterville	4/25/1996	\$0.00	NA	0	0	The Maumee River at Waterville went into flood at 1300 EST on 4/25 and crested at 9.1 feet at 1400 EST on 4/25. Flood stage is 9 feet. There was minor flooding of low lying areas.	NCDC Database
Countywide	5/18/1996	\$0.00	NA	0	0	The Maumee River slightly exceeded flood stage of 9 feet and crested at 9.2 feet on 18/1700 EST. Flooding was confined to a few low lying areas near the river.	NCDC Database
Waterville	2/22/1997	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of 9 feet and crested at 9.1 feet at 1900 EST on 02/22/97. There was minor flooding of low lying areas.	NCDC Database
Waterville	3/14/1997	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 10.3 feet at 2000 EST on 03/15/97. Flooding was confined to low lying areas.	NCDC Database
Waterville	5/27/1997	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of 9.0 feet and crested at 11.1 feet at 0300 EST on 05/27/97. Flooding was confined to low lying areas along the river.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	6/1/1997	\$90,000.00	\$123,966.94	0	0	Heavy thunderstorm rain that began in May continued to fall on saturated ground, causing flooding of streets, streams, homes, fields and low lying areas. Many roads were closed and berms washed out forcing the closing of some schools. Health officials throughout Northern Ohio warned residents that wells and cisterns could be contaminated from the floodwaters and should be cleaned and tested before further use. Crop losses occurred due to continued delays in planting. A number of farmers planted soybeans, a less valuable crop, instead of corn.	NCDC Database
Waterville	6/2/1997	\$75,000.00	\$103,305.79	0	0	The Maumee River at Waterville exceeded its flood stage of 9 feet and crested at 12.2 feet at 0900 EST on 06/03/97. There was flooding of Side Cut Park and other low lying areas. Basement flooding occurred in residences along the river.	NCDC Database
Toledo	6/21/1997	\$0.00	NA	0	0	Heavy thunderstorm rain caused flooding of streets, railroad tracks and low lying areas.	NCDC Database
Toledo	6/25/1997	\$0.00	NA	0	0	Heavy thunderstorm rain caused flooding of streets.	NCDC Database
Berkey	6/30/1997	\$15,000.00	\$20,661.16	0	0	Heavy thunderstorm rain caused flooding of fields, roads, and low lying areas.	NCDC Database
Waterville	1/8/1998	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 10.8 feet at 1045 EST on 01/12/98. Flooding was confined to low lying areas.	NCDC Database
Countywide	2/17/1998	\$70,000.00	\$94,979.65	0	0	Heavy thunderstorm rain caused flooding of roads, basements and low lying areas. Basement flooding was particularly prevalent in Point Place near Toledo in Lucas County.	NCDC Database
Waterville	2/18/1998	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 10.5 feet on 02/19/98 at 0700 EST. Flooding was confined to low lying areas.	NCDC Database
Waterville	3/10/1998	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 9.8 feet at 1300 EST on 03/10/98. Flooding was confined to low lying areas.	NCDC Database
Waterville	3/22/1998	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 9.4 feet at 0726 EST on 03/22/98. Flooding was confined to low lying areas.	NCDC Database
Waterville	4/10/1998	\$50,000.00	\$67,842.61	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 11.1 feet at 0700 EST on 04/11/98. Flooding was confined to low lying areas except for some basement flooding .	NCDC Database
Waterville	8/25/1998	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 9.4 feet at 0200 EST on 08/26/98. There was only minor flooding of low lying areas.	NCDC Database
Waterville	1/23/1999	\$75,000.00	\$99,601.59	0	0	Rain and snowmelt caused the Maumee River at Waterville to exceed its flood stage of nine feet. The river crested at 13.36 feet at 0700 EST on 01/25/99. Basement flooding occurred in homes along the river and also in Side Cut Park.	NCDC Database
Countywide	4/9/1999	\$0.00	NA	0	0	Gubernatorial Declaration of Disaster due to tornadoes and flooding.	OEMA

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Waterville	4/17/1999	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 9.21 feet at 1900 PM EST on 04/17/99. Flooding was confined to low lying areas.	NCDC Database
Waterville	4/23/1999	\$0.00	NA	0	0	The Maumee River at Waterville exceeded its flood stage of nine feet and crested at 9.78 feet at 0700 AM on 04/24/99. Flooding was confined to low lying areas.	NCDC Database
Countywide	8/25/2000	\$0.00	NA	0	0	Presidential Declaration of Disaster due to flooding.	OEMA
Countywide	8/5/2003	\$50,000.00	\$60,096.15	0	0	Heavy rains fell on the western portion of Lucas County. Lowland and urban flooding occurred in and around Swanton.	NCDC Database
Countywide	1/4/2005	\$0.00	NA	0	0	Heavy rain and runoff from snowmelt caused extensive flooding in Wood, Lucas and Ottawa Counties the first half of January.	NCDC Database
Toledo	6/22/2006	\$0.00	NA	0	0	>100-year storm. Flooding.	Hazard History Worksheet
Holland	March 2007	\$0.00	NA	0	0	Flooding of Drennan Ditch. Required demo. of private garage located in floodplain. Village also had to replace Wolf Creek Culvert at Holloway Road.	Hazard History Worksheet
Toledo	6/3/2007	\$0.00	NA	0	0	Flooding.	Hazard History Worksheet
Waterville	8/21/2007	\$0.00	NA	0	0	Heavy rain fell across many areas of northwestern Ohio during the first half of the week from August 19th through the 22nd. Some locations across northwest Ohio picked up between 5 and 10 inches of rain during this time.	NCDC Database
Toledo	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Toledo	7/3/2008	\$0.00	NA	0	0	Flooding (4").	Hazard History Worksheet
Toledo	7/8/2008	\$0.00	NA	0	0	Flooding (2").	Hazard History Worksheet
Toledo	2/11/2009	\$0.00	NA	0	0	Flooding (2.8").	Hazard History Worksheet
Toledo	3/10/2009	\$0.00	NA	0	0	Flooding (2.1").	Hazard History Worksheet
Monclova Twp.	May 2009	\$0.00	NA	0	0	Flooding on Kenner Road, Obee Road, and Lose Road.	Hazard History Worksheet
Toledo	4/7/2010	\$0.00	NA	0	0	Flooding. Point Place and south Toledo.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Maumee	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet
Ottawa Hills	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet
Whitehouse	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Springfield Twp.	NA	\$0.00	NA	0	0	Small risk of future occurrence.	Hazard History Worksheet
Sylvania Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet

Total: \$1,040,000.00
Per event with reported damages: \$80,000.00
13 damage events

\$1,511,872.37
\$116,297.87

0
0

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flash Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/19/1995	\$10,000.00	\$14,513.79	0	0	Rainfall of 1 to 1.5 inches on top of saturated ground caused some flooding of basemensts and poor drainage areas.	NCDC Database
Countywide	6/26/1995	\$20,000.00	\$29,027.58	0	0	Flash flood.	NCDC Database
Countywide	6/28/1995	\$0.00	NA	0	0	Thunderstorm rains produced flooding of several streets and poor drainage areas.	NCDC Database
Countywide	8/15/1995	\$4,000.00	\$5,805.52	0	0	Flash flood.	NCDC Database
Toledo	2/27/1997	\$50,000.00	\$68,870.52	0	0	Heavy thunderstorm rain caused flooding of basements and low lying areas. A local industrial firm sustained \$25,000 damage.	NCDC Database
Toledo	7/17/1999	\$0.00	NA	0	0	Thunderstorms dumped one to two inches of rain over the area in less than an hour. Street flooding was reported throughout West Toledo with the intersection of Monroe and Douglas Streets under as much as two feet of water at times. Water above curb height was also reported along Secor and Central Avenues.	NCDC Database
Countywide	4/14/1998	\$0.00	NA	0	0	Gubernatorial Declaration of a Disaster due to flash flooding.	OEMA
Toledo	4/20/2000	\$0.00	NA	0	0	Thunderstorms dumped two to locally four inches of rain on Lucas County during the afternoon and evening hours. Officially, 2.81 inches of rain was measured at Toledo Express Airport. A small creek on the west side of Toledo left its banks and flooded Cheltenham, Goddard and Ilger roads.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flash Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	7/29/2000	\$3,500,000.00	\$4,498,714.65	0	0	Rainfall amounts of up to 6.9 inches were measured in Toledo with most of that total falling between noon and 2 pm. Widespread flooding occurred in Toledo, especially on the west and north sides, and also in Sylvania. Hundreds of roads were flooded with over a dozen roads washed out. Water on many roads was in excess of six feet deep. Several dozen people were stranded in cars and had to be rescued. In Toledo, 10 homes were destroyed by flooding with 58 homes severely damaged. An additional 256 homes and apartments suffered minor damage. Hundreds of motor vehicles were also damaged by flooding including eight police cruisers. The police cruisers were damaged by a dumpster floating in three feet of water in the parking lot of the police station.	NCDC Database
Toledo	8/2/2000	\$0.00	NA	0	0	Thunderstorms dumped one to two inches of rain in a short period of time causing street flooding near Toledo Express Airport. Water two to three feet deep was reported on several roads.	NCDC Database
Sylvania	8/28/2004	\$75,000.00	\$87,822.01	0	0	Thunderstorms dumped locally heavy rains on portions of Lucas County during the early morning hours of the 28th. Up to three inches of rain was measured on the west side of Toledo and in Sylvania. Widespread lowland and street flooding occurred in these areas. Several roads had to be closed because of flooding. Water on a couple of streets was as much as two feet deep. Dozens of homes experienced basement or nuisance flooding.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flash Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	6/21/2006	\$42,000,000.00	\$46,103,183.32	0	0	Thunderstorms dumped torrential rainfall on Lucas County during the evening hours of June 21st. Rainfall rates with the stronger storms exceeded 3 inches per hour. Devastating flash flooding occurred across the county with Toledo, Maumee and Sylvania especially hard hit. Roads and streets throughout the county were turned into rivers. Hundreds of vehicles became stranded in the flood waters and emergency responders performed dozens of boat rescues. Two homes were destroyed in Lucas County during this event with 125 homes sustaining major damage and around 200 homes suffering minor damage. An additional 1,000 homes sustained damage from basement or nuisance flooding. The City of Toledo alone spent over \$250,000 responding to this event. Local officials stated that this was the worst flooding seen in the area since July 4th, 1969.	NCDC Database
Toledo	7/12/2006	\$350,000.00	\$384,193.19	0	0	An area of heavy rainfall developed over Lucas County during the morning hours of July 12th. In the western portion of Toledo, flood waters deep enough to cover the hoods of cars were reported. Rainfall estimates indicated that between two and four inches of rain fell across the area during the late morning and early afternoon hours. There was also a report of Shantee Creek flooding near Crawford Avenue.	NCDC Database
Toledo	7/14/2006	\$250,000.00	\$274,423.71	0	0	Up to two inches of rain fell on the Toledo area as thunderstorms moved across Lucas County. A spotter in Toledo measured 1.1 inches during a 25 minute period ending around 4 p.m. Many streets in the city were flooded and had to be closed. Many homes sustained damage from basement flooding.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flash Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	7/27/2006	\$750,000.00	\$823,271.13	0	0	Heavy thunderstorm rains fell on Lucas County during the late evening hours of July 27th. An automated sensor at Toledo Express Airport measured 1.68 inches of rain during a 40 minute period beginning around 9 p.m. and a storm total of 3.21 inches. Street flooding was reported at many locations in the county with the East Toledo area seeing the worst flooding. Flood waters in some locations were as much as two feet deep. The flooding quickly subsided once the rain ended. Several dozens homes in East Toledo sustained damage, mainly from basement flooding. A broken sewer line was partially responsible for this damage.	NCDC Database
Toledo	6/3/2007	\$1,000,000.00	\$1,067,235.86	0	0	Thunderstorms dumped locally heavy rainfall on portions of Lucas County during the afternoon hours of June 3rd. Rainfall rates at times exceeded two inches per hour. A total of 4.04 inches was measured near downtown Toledo. Widespread urban and lowland flooding was reported in Toledo and West Toledo. Flooding was reported on dozens of streets and highways including Interstate 475. Many roads had to be closed because of flood waters two to three deep. Many vehicles became stranded in the flood waters and several people had to be rescued. Hundreds of homes sustained damage, mainly from basement flooding.	NCDC Database
Maumee	7/2/2008	\$2,500,000.00	\$2,569,373.07	0	0	Very heavy rainfall started across Lucas County around 7:30 pm, with the heaviest rain falling between 8 pm and 9 pm, and then again between 12:30 am and 1:30 am. Rainfall totals in the area included 5.00 inches at the intersection of I-475 and US 23, 4.31 inches in Sylvania, 3.70 inches at the Toledo airport, and 3.39 inches in Point Place. Widespread flooding resulted, with many cars stranded citywide in underpasses and along flooded streets. Flooding occurred in neighborhoods along several area drainages, including Shantee Creek, Swan Creek, and Heldman Ditch. Over 100 basements were flooded from the excess runoff, and the Oregon municipal building was completely surrounded by water.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Flash Flooding Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	NA	0	0	Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	NA	0	0	Small risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	NA	0	0	Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Springfield Twp.	NA	\$0.00	NA	0	0	Small risk of future occurrence.	Hazard History Worksheet
Sylvania Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Total:		\$50,509,000.00	\$55,926,434.35	0	0		
Per event with reported damages: 12 damage events		\$4,209,083.33	\$4,660,536.20				

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Landslide Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Toledo	January 2007	\$0.00	0	0	Slope failure on Swan Creek at 1904 Nelson.	Hazard History Worksheet
Maumee	NA	\$0.00	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Waterville	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Total:		\$0.00	0	0		

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	4/3/1956	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/5/1957	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/24/1958	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/1/1961	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/30/1962	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/12/1964	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/11/1965	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	11/12/1965	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/9/1966	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	6/9/1966	\$0.00	NA	0	0	2.5-inch hail.	NCDC Database
Countywide	7/12/1966	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	7/12/1966	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	8/16/1966	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/11/1968	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/27/1969	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/4/1969	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/12/1970	\$0.00	NA	0	0	1.5-inch hail.	NCDC Database
Countywide	5/15/1970	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/2/1970	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	2/22/1971	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Countywide	8/10/1971	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/3/1972	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	5/10/1973	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	7/2/1973	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/3/1973	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/17/1974	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Countywide	1/11/1975	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/3/1975	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	3/12/1976	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	7/4/1977	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	8/16/1977	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/10/1978	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/20/1979	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/13/1980	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	8/21/1980	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/17/1981	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/28/1981	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Countywide	6/15/1982	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/2/1983	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	6/10/1983	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	3/28/1985	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	4/5/1985	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	5/27/1985	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/3/1985	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	7/5/1985	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Countywide	8/26/1985	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/6/1986	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	7/25/1986	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	9/26/1986	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/30/1987	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/25/1987	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/31/1987	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	8/2/1987	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/22/1988	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Countywide	5/9/1988	\$0.00	NA	0	0	2-inch hail.	NCDC Database
Countywide	5/15/1988	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/23/1988	\$0.00	NA	0	0	1.25-inch hail.	NCDC Database
Countywide	8/11/1988	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	8/14/1988	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/31/1989	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	9/9/1989	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/30/1990	\$0.00	NA	1	3	Thunderstorms and winds.	NCDC Database
Countywide	3/27/1991	\$0.00	NA	0	0	2-inch hail.	NCDC Database
Countywide	5/31/1991	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/15/1991	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/7/1991	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/11/1992	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	4/20/1992	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	5/17/1992	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	6/17/1992	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/14/1992	\$0.00	NA	0	0	Thunderstorms and winds.	NCDC Database
Countywide	7/20/1992	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	9/9/1992	\$0.00	NA	0	1	Thunderstorms and winds.	NCDC Database
Countywide	10/14/1992	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Toledo	9/2/1993	\$550,000.00	\$842,266.46	0	0	Large hail shattered windows at The University of Toledo and other locations. Crops were damaged and destroyed. Trees were downed in Toledo.	NCDC Database
Toledo	4/15/1994	\$0.00	NA	0	0	Large hail reported at Centennial and Hill Street at 1049 EST and at Sylvania and McCord at 1053 EST.	NCDC Database
Toledo	6/7/1994	\$5,000.00	\$7,462.69	0	0	Trees were downed, some on power lines, in several locations.	NCDC Database
Toledo	6/20/1994	\$5,000.00	\$7,462.69	0	0	Thunderstorms and winds.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	6/28/1994	\$5,000.00	\$7,462.69	0	0	Large tree limbs were downed near the Lucas-Fulton County border.	NCDC Database
Toledo	8/2/1994	\$5,000.00	\$7,462.69	0	0	Large branches were downed.	NCDC Database
Shaker Heights	11/1/1994	\$0.00	NA	0	0	Winds gusted over 60 mph at times across the northwest third of Ohio as a low pressure center passed through the northern Great Lakes. Damage, for the most part, was not significant, with scattered trees, limbs, and power lines downed. Fire departments battled a number of fires started from embers from leaf burning then regenerated from the strong winds.	NCDC Database
Countywide	11/27/1994	\$0.00	NA	0	0	Strong winds ahead of a cold front produced spotty damage, mostly from downed trees and limbs, some on power lines.	NCDC Database
Countywide	11/28/1994	\$0.00	NA	0	0	Strong winds after the passage of a cold front produced scattered downed trees and limbs, some on power lines. Some signs were downed or damaged.	NCDC Database
Toledo	4/11/1995	\$0.00	NA	0	0	Trees downed.	NCDC Database
Moncolva	6/14/1995	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Toledo	6/14/1995	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Ottawa Hills	6/14/1995	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Maumee	6/26/1995	\$3,000.00	\$4,354.14	1	0	Trees were downed near the Toledo Airport. A 38-year-old man in Maumee was treated after being struck by lightning as he pushed his car that had ran out of gas into a gas staion. The lightning first struck the canopy roof over the gas station pumps.	NCDC Database
Countywide	6/28/1995	\$5,000.00	\$7,256.89	0	0	Trees and limbs were downed, some on power lines, at several locations including Oregon. Winds were measured at 71 mph at Luckey.	NCDC Database
Countywide	7/13/1995	\$20,000.00	\$29,027.58	0	0	A line of severe thunderstorms roared south from Ontario and Michigan across Lake Erie at 50 mph. The strong winds rushed out ahead of the thunderstorms and despite the issuance of a special marine warning many boaters were caught by surprise. The Coast Guard received 152 calls for assistance and had to fish many people out of the lake as dozens of boats capsized or were destroyed on the rocks.	NCDC Database

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Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	7/16/1995	\$3,000.00	\$4,354.14	0	1	Large limbs were downed. A 28-year-old man was killed after he unknowingly touched a vehicle which was in contact with a live electric line which had been downed after tree limbs were blown down across the wires. M28VE	NCDC Database
Maumee	8/12/1995	\$0.00	NA	2	0	Lightning struck the road in a camping area and a woman entering a nearby camper was electrocuted as she touched the aluminum door. Her friend, trying to assist her, was also shocked when she touched her. Both women, in the late 20s, were hospitalized.	NCDC Database
Oregon	8/13/1995	\$2,000.00	\$2,902.76	0	0	A utility pole and transformer were downed.	NCDC Database
Oregon	8/15/1995	\$20,000.00	\$29,027.58	0	0	Trees and limbs were downed, some on power lines. Significant damage occurred at Maumee Bay State Park where a camper was flipped over and awnings were blown from several other campers. Several buildings were damaged by falling trees and a boardwalk recreational path was also damaged by falling trees.	NCDC Database
Holland	8/15/1995	\$2,000.00	\$2,902.76	0	0	Trees were downed.	NCDC Database
Countywide	10/5/1995	\$0.00	NA	0	0	The remnants of hurricane Opal passed across northeast Ohio and caused wind gusts up to 45 mph and sustained winds of 20 to 30 mph all across northern Ohio. Although not considered a high wind event by National Weather Service criteria, the prolonged period of strong winds brought down a few trees, scattered tree limbs, and some power lines. Several automobiles were damaged by falling trees or limbs. Crops were damaged from the strong winds. A number of farms reported fields of corn blown over and ripe apples and other fruit being stripped from trees. The actual crop damage estimate was unknown. Heavy rains accompanied the storm. Flooding was localized and not significant since very dry conditions preceded the storm.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	10/24/1995	\$0.00	NA	0	0	Wind gusts of 50 mph affected much of northern Ohio. While not exceeding National Weather Service criteria for a high wind event, several trees and limbs were downed along with some power lines. At least one car was damaged from a downed tree limb.	NCDC Database
Toledo	11/2/1995	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Countywide	11/11/1995	\$0.00	NA	0	0	Wind gusts of 60 mph or higher from the south occurred in many areas several hours ahead of a cold front and from west winds for an hour or two immediately following the front. Trees were downed in numerous locations, some on power lines, and some blocking roads. Flagpoles and utility poles were damaged or downed. A large wall of a new municipal building under construction in Maumee (Lucas County) was blown down.	NCDC Database
Countywide	1/27/1996	\$0.00	NA	0	0	High winds downed large limbs, trees, and power lines in a number of locations across northern Ohio. The west to southwest winds gusted to 60 mph after the passage of a cold front.	NCDC Database
Countywide	1/29/1996	\$0.00	NA	0	0	Winds gusted to 60 mph in a few spots downing tree, limbs, and power lines.	NCDC Database
Countywide	2/10/1996	\$0.00	NA	0	0	Wind gusts of 40 to 60 mph occurred for a couple of hours following the passage of a cold front. Most counties reported a few trees, limbs and/or power lines downed.	NCDC Database
Countywide	3/25/1996	\$0.00	NA	0	0	Strong south winds became southwest and gusted to 60 mph or locally higher just ahead of and with the passage of a cold front. Trees were downed, some on power lines. Power outages were extensive in some areas. Minor roof damage occurred in some areas along with downed signs. Significant damage occurred in a few locations.	NCDC Database
Countywide	4/12/1996	\$0.00	NA	0	0	Wind gusts of 60 mph were reported near Sylvania and other locations. Trees were downed, some on power lines.	NCDC Database

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Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Whitehouse	5/9/1996	\$60,000.00	\$84,626.23	0	0	Trees were downed and siding was blown from a section of a house. Roof damage occurred to several buildings. An outbuilding and an aluminum boat were blown a couple of hundred yards and destroyed. A funnel cloud was sighted but a damage survey indicated that damage was from a microburst. There was no rain at the time and a considerable amount of dust was blown by the wind.	NCDC Database
Countywide	7/7/1996	\$10,000.00	\$14,104.37	0	0	Trees and limbs were downed in several locations, particularly in the Toledo area, where wind gusts of 50 to 60 miles per hour were reported and the roof was blown off a building in the downtown area.	NCDC Database
Whitehouse	10/29/1996	\$0.00	NA	0	0	Many trees were downed.	NCDC Database
Countywide	10/30/1996	\$0.00	NA	0	0	A deep low pressure moving east across Ontario Canada brought winds of 60 to 70 miles per hour, with higher gusts, to Northern Ohio. Trees, limbs and power lines were downed, some across roads, and others on cars, and buildings causing considerable damage. A 68 mile per hour wind gust was reported at Toledo Express Airport in Lucas County.	NCDC Database
Countywide	2/27/1997	\$0.00	NA	0	0	High winds.	NCDC Database
Toledo	4/30/1997	\$5,000.00	\$6,887.05	0	0	Near Maumee Bay, winds estimated at 60 miles per hour downed power lines, blew a temporary sign off a bridge, and left a few branches lying in roads.	NCDC Database
Countywide	5/1/1997	\$0.00	NA	0	0	High winds.	NCDC Database
Whitehouse	5/18/1997	\$10,000.00	\$13,774.10	0	0	Large hail, up to one inch in diameter, fell in several locations. Thunderstorm winds downed trees, large branches, and power lines, and several buildings were damaged or destroyed.	NCDC Database
Countywide	6/25/1997	\$10,000.00	\$13,774.10	0	0	Trees and power lines were downed.	NCDC Database
Maumee	7/14/1997	\$2,000.00	\$2,754.82	0	0	Trees and limbs were downed.	NCDC Database
Holland	7/14/1997	\$2,000.00	\$2,754.82	0	0	Trees and limbs were downed.	NCDC Database
Toledo	7/17/1997	\$5,000.00	\$6,887.05	0	0	Many large branches and power lines were downed. A 60 mile per hour wind gust was reported at Point Place.	NCDC Database
Richfield Center	8/3/1997	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Maumee	8/3/1997	\$20,000.00	\$27,548.21	0	0	A tree was downed on a house.	NCDC Database
Toledo	8/3/1997	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database

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Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	8/16/1997	\$21,000.00	\$28,925.62	0	0	Large tree limbs were downed. A wind gust of 60 miles per hour was reported.	NCDC Database
Countywide	4/9/1998	\$5,000.00	\$6,784.26	0	0	A propane tank was overturned.	NCDC Database
Countywide	4/9/1998	\$30,000.00	\$40,705.56	0	0	A number of trees, limbs and power lines were downed.	NCDC Database
Waterville	6/12/1998	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Maumee	6/24/1998	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Reno Beach	6/24/1998	\$100,000.00	\$135,685.21	0	0	Thunderstorm winds downed trees in Jerusalem Township. Numerous trees were downed, many boats overturned and campers evacuated at Reno Beach and Maumee Bay State Park.	NCDC Database
Toledo	6/27/1998	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Maumee	7/21/1998	\$50,000.00	\$67,842.61	0	0	Heavy rain collected on the flat surfaced roof of a department store, causing part of it to collapse from the added weight.	NCDC Database
Countywide	7/21/1998	\$22,000.00	\$29,850.75	0	0	Trees and powerlines downed.	NCDC Database
Waterville	8/24/1998	\$10,000.00	\$13,568.52	0	0	0.75-inch hail.	NCDC Database
Countywide	8/24/1998	\$15,000.00	\$20,352.78	0	0	Trees were downed.	NCDC Database
Toledo	8/25/1998	\$25,000.00	\$33,921.30	0	0	Power poles were downed in Toledo and trees were downed in Holland.	NCDC Database
Toledo	9/9/1998	\$2,000.00	\$2,713.70	0	0	A few large branches were downed.	NCDC Database
Countywide	11/10/1998	\$25,000.00	\$33,921.30	0	0	Trees, limbs and power lines were downed.. A 63 mile per hour wind gust was recorded at Toledo Express Airport.	NCDC Database
Toledo	12/6/1998	\$25,000.00	\$33,921.30	0	0	Two tractor trailers were blown over on U.S. Route 23 at U.S. Route 20.	NCDC Database
Berkey	5/17/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Waterville	5/17/1999	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Richfield Center	5/17/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Waterville	5/17/1999	\$0.00	NA	0	0	1.75-inch hail.	NCDC Database
Richfield Center	5/17/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Neapolis	5/17/1999	\$150,000.00	\$199,203.19	0	0	Lightning struck a house on Main Street and the resulting fire destroyed the house. Seven other houses in the area were also struck by lightning, and all sustained at least minor damage.	NCDC Database
Maumee	6/12/1999	\$0.00	NA	1	0	A man of undetermined age was struck by lightning in Maumee Bay State Park while camping. The man was taken to a local hospital and treated for minor injuries.	NCDC Database
Toledo	6/13/1999	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Oregon	7/21/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Neapolis	7/23/1999	\$10,000.00	\$13,280.21	0	0	Many large trees downed.	NCDC Database
Countywide	7/24/1999	\$10,000.00	\$13,280.21	0	0	Many trees down in Providence Township in the southwest corner of the county.	NCDC Database
Toledo	7/25/1999	\$0.00	NA	0	0	A 60 mph wind gust was measured.	NCDC Database
Whitehouse	7/29/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Toledo	10/13/1999	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Toledo	10/13/1999	\$100,000.00	\$132,802.12	0	1	Thunderstorm winds estimated at 50 to 55 mph toppled a crane hoisting a 5,000 pound bucket of concrete onto the roof a building in downtown Toledo. A 50 year old male worker on the roof was crushed by the falling bucket of concrete. M50OU	NCDC Database
Countywide	5/9/2000	\$400,000.00	\$514,138.82	2	0	A 59 mph thunderstorm gust was measured at Toledo Express Airport at 806 pm EDT. Thunderstorm winds did extensive damage with trees downed throughout the county including in the cities of Toledo, Sylvania, Perrysburg and Maumee. A grocery store in Toledo sustained major damage when part of its roof was torn off and a brick wall collapsed. Debris from the wall injured two pedestrians. Both people were taken to a hospital where they were treated and released. Fallen trees damaged at least five cars including two police cruisers. A mobile home was crushed by a tree in Toledo and a pole barn was leveled outside of Sylvania.	NCDC Database
Maumee	7/14/2000	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Sylvania	7/14/2000	\$5,000.00	\$6,426.74	0	0	Thunderstorm winds downed three trees approximately two miles southwest of Sylvania.	NCDC Database
Toledo	7/28/2000	\$15,000.00	\$19,280.21	0	0	Thunderstorm winds downed three trees, many large limbs and a large advertisement sign on the south side of Toledo. One of the trees landed on a car.	NCDC Database
Sylvania	7/29/2000	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Toledo	7/29/2000	\$20,000.00	\$25,706.94	0	0	Thunderstorm winds downed several large trees and over two dozen large limbs on the west side of Toledo.	NCDC Database
Toledo	8/2/2000	\$5,000.00	\$6,426.74	0	0	0.75-inch hail.	NCDC Database
Holland	8/2/2000	\$0.00	NA	0	0	1-inch hail.	NCDC Database
Toledo	8/6/2000	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Waterville	8/6/2000	\$10,000.00	\$12,853.47	0	0	Thunderstorm winds downed several trees in Waterville and Toledo.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	9/20/2000	\$30,000.00	\$38,560.41	0	0	Thunderstorm winds downed many trees in Toledo. One of the trees landed on a moving car. The occupants of the car were unharmed. A house was also slightly damaged by a fallen tree.	NCDC Database
Countywide	2/9/2001	\$0.00	NA	0	0	A strong cold front moved across northern Ohio during the evening hours. Damaging westerly winds occurred behind the front for a period of several hours. A 63 mph wind gust was recorded in Lucas County around 9 pm. Several hundred trees were downed throughout northern Ohio.	NCDC Database
Countywide	2/25/2001	\$0.00	NA	0	0	An area of very strong low pressure moved across the Great Lakes during the day and caused damaging southwest to west winds in northern Ohio. Dozens of trees were knocked down across the area with most of the damage occurring during the middle part of the day. A few power poles and road signs were also blown down.	NCDC Database
Maumee	4/7/2001	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Oregon	4/7/2001	\$50,000.00	\$62,421.97	0	0	Golf ball size hail was reported six miles east of Oregon. Several cars were damaged.	NCDC Database
Toledo	4/7/2001	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Toledo	4/7/2001	\$25,000.00	\$31,210.99	0	0	Thunderstorm winds downed several power poles.	NCDC Database
Countywide	4/12/2001	\$0.00	NA	0	0	A strong cold front moved across northern Ohio during the morning and afternoon hours. Damaging winds occurred behind the front and caused considerable damage. Over 100, 000 homes and business were without power at some point during the event. Measured wind gusts include 58 mph at Toledo (Lucas County). Hundreds of trees and power poles were knocked down across the area. Commercial shipping traffic on Lake Erie was also interrupted by the strong winds.	NCDC Database
Countywide	6/15/2001	\$7,000.00	\$8,739.08	0	0	Thunderstorm winds downed five trees across the county.	NCDC Database
Toledo	6/19/2001	\$25,000.00	\$31,210.99	0	0	Half dollar size hail was reported just west of Toledo Express Airport. A few cars suffered minor damage.	NCDC Database

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LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Holland	6/19/2001	\$0.00	NA	0	0	0.75-inch hail.	NCDC Database
Ottawa Hills	6/19/2001	\$20,000.00	\$24,968.79	0	0	Half dollar to quarter size hail was reported three miles west of Ottawa Hills. A few cars were damaged.	NCDC Database
Countywide	6/19/2001	\$30,000.00	\$37,453.18	0	0	Thunderstorm winds downed many trees across the county.	NCDC Database
Countywide	7/29/2001	\$15,000.00	\$18,726.59	0	0	Thunderstorm winds downed a few trees across the county.	NCDC Database
Toledo	8/18/2001	\$2,000.00	\$2,496.88	0	0	Thunderstorm winds downed two large tree limbs just west of West Toledo.	NCDC Database
Toledo	9/8/2001	\$10,000.00	\$12,484.39	0	0	Thunderstorm winds downed a few trees.	NCDC Database
Pt Place	9/21/2001	\$5,000.00	\$6,242.20	0	0	Thunderstorm winds downed many large tree limbs.	NCDC Database
Toledo	10/24/2001	\$5,000.00	\$6,242.20	0	0	Thunderstorm winds downed several large tree limbs.	NCDC Database
Countywide	10/25/2001	\$0.00	NA	0	0	Damaging westerly winds occurred in northern Ohio behind a strong cold front. The strongest winds occurred during the late afternoon and evening hours. Hundreds of trees were downed across the area and scattered power outages from downed poles and power lines also occurred.	NCDC Database
Countywide	2/1/2002	\$0.00	NA	0	0	A strong cold front moved east across Ohio around daybreak. Damaging westerly winds behind this front downed dozens of trees and many power poles. Wind gusts in excess of 60 mph were measured and numerous power outages occurred. At the peak of the storm over 60,000 homes and business were without power in northeastern Ohio alone.	NCDC Database
Countywide	3/9/2002	\$0.00	NA	0	0	A strong and very fast moving cold front raced east across northern Ohio during the late afternoon and early evening hours. Damaging winds occurred along and behind this front. Thousands of trees and hundreds of power poles were downed in northern Ohio. Widespread power outages occurred with several hundred thousand people without power at the peak of the storm.	NCDC Database
Neapolis	5/25/2002	\$25,000.00	\$30,750.31	0	0	Golf ball size hail was reported.	NCDC Database
Holland	5/25/2002	\$5,000.00	\$6,150.06	0	0	Thunderstorm winds downed several large tree limbs.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	8/4/2002	\$75,000.00	\$92,250.92	0	0	Thunderstorm winds downed many large trees in Toledo. Several homes and cars were damaged by trees.	NCDC Database
Whitehouse	11/10/2002	\$10,000.00	\$12,300.12	0	0	Thunderstorm winds downed a few trees a mile south of Whitehouse.	NCDC Database
Toledo	3/20/2003	\$5,000.00	\$6,009.62	0	0	Penny size hail was observed.	NCDC Database
Maumee	3/20/2003	\$5,000.00	\$6,009.62	0	0	Quarter size hail was observed.	NCDC Database
Maumee	3/23/2003	\$2,000.00	\$2,403.85	x	x	Penny size hail was observed.	NCDC Database
Toledo	4/4/2003	\$0.00	NA	0	0	A 61 mph thunderstorm wind gust was measured at Toledo Express Airport.	NCDC Database
Toledo	4/4/2003	\$5,000.00	\$6,009.62	0	0	Dime size hail was observed. The hail completely covered the ground.	NCDC Database
Holland	4/20/2003	\$10,000.00	\$12,019.23	0	0	Thunderstorm winds downed a few trees and large limbs in Holland and Toledo.	NCDC Database
Toledo	5/10/2003	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Countywide	5/11/2003	\$0.00	NA	0	0	A strong cold front extending south from an area of low pressure over the northern Great Lakes moved into Northwest Ohio during the morning hours and as far east as Pennsylvania by late afternoon. Strong and gusty westerly winds behind this front caused scattered power outages across northern Ohio. Hundreds of trees and utility poles were downed. Fallen trees significantly damaged homes in Erie, Knox, Lucas, Portage and Seneca Counties. Many automobiles were also damaged across the area. In Toledo alone (Lucas County), 30 trees and 238 large limbs were downed by the strong winds. Peak measured wind gusts include: 52 mph at Toledo (Lucas County); 54 mph at Findlay (Hancock County); 51 mph in downtown Cleveland (Cuyahoga County); 47 mph at Elyria (Lorain County); 46 mph at Mansfield (Richland County) and 45 mph at Akron-Canton (Summit County).	NCDC Database
Sylvania	7/4/2003	\$35,000.00	\$42,067.31	0	0	Thunderstorm winds downed many trees and several power poles.	NCDC Database
Waterville	7/7/2003	\$30,000.00	\$36,057.69	0	0	Thunderstorm winds downed trees in Waterville and Toledo. A home was damaged by a tree on the east side of Toledo.	NCDC Database
Toledo	7/8/2003	\$15,000.00	\$18,028.85	0	0	Thunderstorm winds downed six trees west of Toledo.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	7/8/2003	\$250,000.00	\$300,480.77	0	0	Thunderstorm winds downed trees and large limbs across the county. Several roads were blocked by trees and scattered power outages were reported.	NCDC Database
Maumee	7/8/2003	\$75,000.00	\$90,144.23	0	0	Thunderstorm winds downed several trees and large limbs. Two homes were heavily damaged by fallen trees.	NCDC Database
Oregon	8/2/2003	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Maumee	8/3/2003	\$12,000.00	\$14,423.08	0	0	Thunderstorm winds downed several trees and large limbs.	NCDC Database
Waterville	8/26/2003	\$4,000.00	\$4,807.69	0	0	Thunderstorm winds downed several large tree limbs in Waterville.	NCDC Database
Countywide	11/12/2003	\$0.00	NA	0	0	A strong arctic cold front moved across northern Ohio on the evening of the 12th. Gusty westerly winds behind the front caused widespread damage. Most of the damage occurred during the late evening hours of the 12th and the early morning hours of the 13th. A peak wind gust of 63 mph was recorded at Toledo Express Airport (Lucas County) at 8:59 p.m. with 60 mph gusts at both Cleveland Burke Lakefront Airport (Cuyahoga County) and Waco (Stark County).	NCDC Database
Countywide	3/5/2004	\$0.00	NA	0	0	Strong low pressure passed to the north of Lake Erie. An associated occluded front stretching south from the low moved across northern Ohio during the morning of March 5th. Very strong and gusty southwesterly winds occurred behind this front during the afternoon hours.	NCDC Database
Toledo	5/7/2004	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Toledo	5/9/2004	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Whitehouse	5/17/2004	\$15,000.00	\$17,564.40			Thunderstorm winds overturned a recreational vehicle northwest of Whitehouse in Swanton Township.	NCDC Database
Countywide	5/21/2004	\$100,000.00	\$117,096.02	0	0	A line of severe thunderstorms moved across Lucas County and downed dozens of trees. Scattered power outages were also reported. A few homes and vehicles were damaged by fallen trees and flying debris.	NCDC Database
Sylvania	5/27/2004	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Berkey	5/30/2004	\$6,000.00	\$7,025.76	0	0	Thunderstorm winds downed a few trees.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	6/14/2004	\$50,000.00	\$58,548.01	0	0	Thunderstorm winds downed several trees and dozens of large limbs across the county. A garage was heavily damaged by a fallen tree in Toledo.	NCDC Database
Toledo	6/17/2004	\$10,000.00	\$11,709.60	0	0	Thunderstorm winds downed several trees.	NCDC Database
Sylvania	8/27/2004	\$35,000.00	\$40,983.61	0	0	Thunderstorm winds downed three large tree limbs. The roof of a theater in Toledo was also damaged by the winds.	NCDC Database
Countywide	10/30/2004	\$0.00	NA	0	0	An area of strong low pressure moved east across the region on October 30th. A cold front trailing the low moved across northwestern Ohio during the middle part of the day. Gusty southwest winds behind the front downed many trees and damaged several vehicles and buildings.	NCDC Database
Countywide	11/27/2004	\$0.00	NA	0	0	A strong cold front moved across northern Ohio during the evening hours of November 27th. Winds behind the front briefly gusted to more than 40 mph. A few trees and large limbs were downed by the gusty winds.	NCDC Database
Countywide	12/7/2004	\$0.00	NA	0	0	An area of strong low pressure moved northeast across Michigan and into Ontario on December 7th. Wind gusts of 40 to 50 mph occurred to the east of the low as it moved through the region. These gusts downed a few trees throughout northwestern Ohio. Scattered power outages were also reported.	NCDC Database
Toledo	5/13/2005	\$4,000.00	\$4,530.01	0	0	A few large limbs were downed in Bono.	NCDC Database
Whitehouse	6/5/2005	\$7,000.00	\$7,927.52	0	0	Winds were estimated at nearly 60 mph in western part of the county. A tree was reported down in Perrysburg and a twelve inch tree limb was down in Toledo. In Waterville, a tree was reported down due to thunderstorm winds.	NCDC Database
Berkey	6/30/2005	\$50,000.00	\$56,625.14	0	0	A 73 mph wind gust was measured, which snapped a 20 foot tall lightpost in half and knocked down a windmill. A paddle boat was lifted out of the water and numerous trees and power lines were downed. Nickel size hail was also reported with this storm.	NCDC Database
Countywide	6/30/2005	\$5,000.00	\$5,662.51	0	0	Numerous large limbs reported down across the county.	NCDC Database
Toledo	7/8/2005	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	7/21/2005	\$25,000.00	\$28,312.57	0	0	A few trees and utility poles were reported down from severe thunderstorm winds.	NCDC Database
Toledo	7/25/2005	\$25,000.00	\$28,312.57	0		A few large limbs and utility poles were downed as the northern edge of a line of severe thunderstorms moved through the area.	NCDC Database
Toledo	7/26/2005	\$10,000.00	\$11,325.03	0	0	Several trees were reported down.	NCDC Database
Toledo	11/6/2005	\$0.00	NA	0	0	A 62 mph wind gust was measured at Toledo Express Airport.	NCDC Database
Countywide	2/17/2006	\$0.00	NA	0	0	A strong area of low pressure over southern Lower Michigan during the evening hours of February 16th passed to the north of Lake Erie during the early morning hours of the 17th. A cold front trailing this low moved into Northwest Ohio around midnight on the 17th and then quickly swept east across the remainder of the state.	NCDC Database
Countywide	3/10/2006	\$0.00	NA	0	0	An area of strong low pressure over Central Indiana at midnight on March 10th moved northeast across Lower Michigan and into southeastern Ontario by daybreak. A strong cold front trailing this low swept east across northern Ohio during the predawn hours of the 10th. Winds ahead and along this front gusted in excess of 50 mph.	NCDC Database
Countywide	3/13/2006	\$7,000.00	\$7,683.86	0	0	An area of strong low pressure moved across the central Great Lakes on March 13th. A cold front extending south from this low swept east across Northwest Ohio during the late afternoon hours. Winds briefly gusted in excess of 50 mph as this front moved through. A few trees and large limbs were downed.	NCDC Database
Sylvania	4/22/2006	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Toledo	5/25/2006	\$0.00	NA	0	0	Nickel size hail was observed.	NCDC Database
Countywide	6/19/2006	\$0.00	NA	0	0	Nickel size hail was observed.	NCDC Database
Berkey	6/21/2006	\$17,000.00	\$18,660.81	0	0	Several large tree limbs were reported down.	NCDC Database
Maumee	6/21/2006	\$4,000.00	\$4,390.78	0	0	Quarter size hail was observed.	NCDC Database
Sylvania	6/21/2006	\$4,000.00	\$4,390.78	0	0	Quarter size hail was observed.	NCDC Database
Toledo	7/14/2006	\$8,000.00	\$8,781.56	0	0	A few trees and power lines were reported down.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	10/28/2006	\$100,000.00	\$109,769.48	0	0	During the early afternoon hours of the 28th, winds across the area began to increase causing power lines, utility poles, and large tree limbs to come down. Thousands of electrical customers in the area were without power by later in the afternoon. Reports indicate that Holland was especially hard hit from wind damage and power outages.	NCDC Database
Countywide	12/1/2006	\$0.00	NA	0	0	Several trees were reported down.	NCDC Database
Toledo	3/14/2007	\$0.00	NA	0	0	Nickel size hail was observed.	NCDC Database
Whitehouse	5/1/2007	\$15,000.00	\$16,008.54	0	0	Penny to half dollar size hail was observed.	NCDC Database
Holland	5/1/2007	\$50,000.00	\$53,361.79	0	0	Nickel to golf ball size hail was observed. Some vehicles were damaged.	NCDC Database
Toledo	5/1/2007	\$50,000.00	\$53,361.79	0	0	Golf ball size hail was reported. Some vehicles were damaged.	NCDC Database
Jerusalem Twp.	5/15/2007	\$15,000.00	\$16,008.54	0	0	Many trees were reported down in Jerusalem Township.	NCDC Database
Toledo	6/30/2007	\$15,000.00	\$16,008.54	0	0	Thunderstorm winds caused a tree to fall on a car.	NCDC Database
Monclova Twp.	6/8/2007	\$0.00	NA	0	0	Severe storm. Trees down on houses.	Hazard History Worksheet
Whitehouse	6/8/2007	\$40,000.00	\$42,689.43	0	0	Numerous trees were reported down from Whitehouse to Waterville, and as far north as Holland.	NCDC Database
Toledo	6/21/2007	\$1,000.00	\$1,067.24	0	0	A few large limbs were reported down.	NCDC Database
Swanton Twp.	6/27/2007	\$1,000.00	\$1,067.24	0	0	A few large limbs were reported down.	NCDC Database
Swanton Twp.	7/18/2007	\$2,000.00	\$2,134.47	0	0	A few large limbs were reported down.	NCDC Database
Oregon	7/27/2007	\$4,000.00	\$4,268.94	0	0	A few trees and large limbs were reported down.	NCDC Database
Monclova Twp.	8/9/2007	\$8,000.00	\$8,537.89	0	0	Several trees were reported down in Monclova.	NCDC Database
Toledo	8/24/2007	\$50,000.00	\$53,361.79	0	0	As severe thunderstorms moved through the area, trees, large limbs and power lines were reported down from West Toledo to Point Place. Trained spotters estimated wind gusts to be between 55 and 60 mph.	NCDC Database
Countywide	12/23/2007	\$6,000.00	\$6,403.42	0	0	Several trees were reported down across the western half of the county, including within the City of Toledo.	NCDC Database
Countywide	1/30/2008	\$0.00	NA	0	0	Numerous trees and power lines were reported down across the county.	NCDC Database
Providence Twp.	6/6/2008	\$20,000.00	\$20,554.98	0	0	Numerous trees were reported down in Providence Township.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	6/6/2008	\$5,000.00	\$5,138.75	0	0	A trained spotter estimated thunderstorm winds at approximately 60 mph. Numerous large limbs were reported down.	NCDC Database
Waterville Twp.	6/8/2008	\$13,000.00	\$13,360.74	0	0	Several large limbs were reported down.	NCDC Database
Springfield Twp.	6/9/2008	\$60,000.00	\$61,664.95	0	0	Numerous trees were reported down in Springfield Township. Several trees were reported to have fallen on houses.	NCDC Database
Toledo	6/9/2008	\$2,000.00	\$2,055.50	0	0	A few large limbs were reported down.	NCDC Database
Countywide	6/21/2008	\$0.00	NA	0	0	Penny to nickel size hail was observed.	NCDC Database
Maumee	6/25/2008	\$8,000.00	\$8,221.99	0	0	Several trees were reported down.	NCDC Database
Countywide	9/14/2008	\$0.00	NA	0	0	High winds associated with the remnants of Hurricane Ike began during the early evening hours of September 14th and continued through late evening. Wind gusts were estimated to be around 60 mph with the strongest winds occurring between 6 and 7 pm. Damage in the county was extensive with thousands of trees and many utility poles downed.	NCDC Database
Toledo	12/28/2008	\$0.00	NA	0	0	Automated weather equipment at the Toledo Express Airport measured a wind gust of 66 mph during the early morning hours as the cold front passed through.	NCDC Database
Maumee	6/26/2008	\$0.00	NA	0	0	Hail up to quarter size was observed.	NCDC Database
Toledo	6/26/2008	\$75,000.00	\$77,081.19	0	0	Severe thunderstorm wind gusts tracked from South Toledo through the east side of Toledo and continued northeast to Oregon. Along this path, trained spotters reported numerous trees, large limbs, and at least a dozen power poles were down. Also, a billboard was blown down and caused damage to a car in South Toledo.	NCDC Database
Toledo	7/2/2008	\$30,000.00	\$30,832.48	0	0	Thunderstorm winds downed several trees and large limbs throughout Toledo. At least one home was damaged by a fallen tree.	NCDC Database
Toledo	7/8/2008	\$46,000.00	\$47,276.46	0	0	Thunderstorm winds downed several trees and large limbs.	NCDC Database
Sylvania	7/8/2008	\$1,000.00	\$1,027.75	0	0	Thunderstorm winds downed a large tree.	NCDC Database
Monclova Twp.	7/8/2008	\$0.00	NA	0	0	High wind. Limbs/trees down.	Hazard History Worksheet
Maumee	8/9/2008	\$0.00	NA	0	0	Penny size hail was observed.	NCDC Database
Toledo	8/18/2008	\$0.00	NA	0	0	Nickel size hail was reported.	NCDC Database
Oregon	1/8/2009	\$0.00	NA	0	0	Trained spotters in Oregon observed penny size hail for several minutes.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Swanton Twp.	1/25/2009	\$20,000.00	\$20,618.56	0	0	Quarter size hail was observed in Swanton.	NCDC Database
Toledo	7/28/2009	\$15,000.00	\$15,463.92	0	0	Thunderstorm winds downed several small trees along Collingwood Boulevard and Cherry Street.	NCDC Database
Toledo	8/17/2009	\$4,000.00	\$4,123.71	0	0	A tree and two large limbs were reported down.	NCDC Database
Maumee	5/5/2010	\$5,000.00	\$5,070.99	0	0	A strong cold front moved east across northern Ohio during the afternoon hours of May 5th. Showers and thunderstorms developed along and ahead of this front. A few of the stronger thunderstorms became severe and produced large hail.	NCDC Database
Whitehouse	5/5/2010	\$15,000.00	\$15,212.98	0	0	Half dollar size hail was observed.	NCDC Database
Providence Twp.	5/7/2010	\$35,000.00	\$35,496.96	0	0	Thunderstorm winds estimated to be at least 60 mph downed many trees and power lines in Providence and Waterville Townships. Downed trees blocked at least one road in Waterville. A couple buildings in the area also sustained minor damage.	NCDC Database
Waterville	5/7/2010	\$25,000.00	\$25,354.97	0	0	Golf ball sized hail was observed. A few vehicles were damaged.	NCDC Database
Oregon	5/7/2010	\$1,000.00	\$1,014.20	0	0	Thunderstorm winds downed two large tree limbs.	NCDC Database
Toledo	5/7/2010	\$15,000.00	\$15,212.98	0	0	Thunderstorm winds downed a large tree in Toledo. A home was damaged by the tree.	NCDC Database
Maumee	5/31/2010	\$3,000.00	\$3,042.60	0	0	Thunderstorm winds downed a couple large tree limbs.	NCDC Database
Whitehouse	6/5/2010	\$0.00	NA	0	0	Thunderstorm wind gusts were estimated at 65 mph.	NCDC Database
Holland	6/18/2010	\$15,000.00	\$15,212.98	0	0	Thunderstorm winds downed a few trees.	NCDC Database
Sylvania	6/18/2010	\$10,000.00	\$10,141.99	0	0	Thunderstorm winds snapped an utility pole.	NCDC Database
Holland	Fall 2010	\$0.00	NA	0	0	Windstorm. Tree limb went through roof of private residence.	Hazard History Worksheet
Maumee	7/22/2010	\$5,000.00	\$5,070.99	0	0	Thunderstorm winds downed three large trees.	NCDC Database
Toledo	7/28/2010	\$10,000.00	\$10,141.99	0	0	Thunderstorm winds downed an eight inch diameter tree onto a house.	NCDC Database
Monclova Twp.	8/5/2010	\$0.00	NA	0	0	Severe storm. Trees down.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Monclova Twp.	8/15/2010	\$150,000.00	\$152,129.82	0	0	Thunderstorm downburst winds estimated to be as much as 75 mph caused considerable damage in the Monclova area. A damage path nearly three miles in length was observed. Hundreds of trees were downed along the damage path. A couple homes were also damaged.	NCDC Database
Holland	5/29/2011	\$75,000.00	\$75,000.00	0	0	Thunderstorm winds downed numerous large trees and large tree branches in the area. One garage and the contents inside, including two motorcycles, were damaged as a result of the downed trees. A home was damaged by as a large tree was downed by thunderstorm winds.	NCDC Database
Toledo	5/29/2011	\$20,000.00	\$20,000.00	0	0	Thunderstorm winds downed an 18-inch diameter tree onto a vehicle. The vehicle sustained significant damage.	NCDC Database
Toledo	6/21/2011	\$6,000.00	\$6,000.00	0	0	Thunderstorm winds downed several large tree limbs.	NCDC Database
Holland	7/11/2011	\$5,000.00	\$5,000.00	0	0	Thunderstorms produced a measured wind gust of 63mph. Other reports of downed large tree branches came in at this time.	NCDC Database
Oregon	7/22/2011	\$15,000.00	\$15,000.00	0	0	Thunderstorm winds downed several trees.	NCDC Database
Toledo	7/22/2011	\$100,000.00	\$100,000.00	0	0	Thunderstorm winds downed numerous large trees across the county. From Maumee to the Greater Toledo area, numerous reports of large downed trees came in during this thunderstorm.	NCDC Database
Maumee	7/22/2011	\$15,000.00	\$15,000.00	0	0	Thunderstorm winds downed several trees.	NCDC Database
Holland	7/23/2011	\$5,000.00	\$5,000.00	0	0	Thunderstorm winds downed a few trees.	NCDC Database
Toledo	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet
Ottawa Hills	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet

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Table 2. History of Severe Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Whitehouse	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Springfield Twp.	NA	\$0.00	NA	0	0	Small risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet

Total: \$4,159,000.00 \$5,142,420.08 7 6
Per event with reported damages: \$30,580.88 \$37,811.91
136 damage events

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/11/1978	\$0.00	NA	0	0	Statewide blizzard. 51 deaths statewide. Presidential Declaration of Disaster due to severe blizzard.	OEMA
Countywide	2/22/1993	\$0.00	NA	0	0	Snow squalls over a 36-hour period dumped up to 14 inches of snow in Lucas County.	NCDC Database
Countywide	3/4/1993	\$0.00	NA	0	0	A mixture of sleet and freezing rain moved from west to east across northern Ohio. This mixture lasted 2 to 3 hours before changing to a very wet snow. Total snow/sleet accumulations ranged from 3 to 10 inches with the higher values being in the Toledo Area. Many branches and some trees were downed due to the weight of the snow, sleet and ice.	NCDC Database
Countywide	3/10/1993	\$0.00	NA	0	0	2000EST. Heavy snow fell over Northwest, the Central Lakeshore and East Lakeshore Counties. Three to six inches fell over the northwest, three to eight inches over the Central Lakeshore and four to eight inches over the East Lakeshore area.	NCDC Database
Countywide	2/21/1994	\$0.00	NA	0	0	Heavy snow generally accumulated four to six inches. Some freezing rain mixed in and a light glaze occurred in some areas. Northeast winds gusted to 30 mph making some country roads impassible due to drifting snow.	NCDC Database
Countywide	2/25/1994	\$0.00	NA	0	0	Heavy snow moved from west to east across northern Ohio, sometimes falling at one to two inches an hour. The snow ended around midnight across northwest Ohio but lake effect snow squalls persisted across northeast Ohio through mid-morning on the 26th. Accumulations averaged four to six inches. Northwest winds averaging 20 mph with gusts to 45 mph produced significant blowing and drifting snow which made travel very difficult in exposed, open areas. Some country roads became impassible.	NCDC Database

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Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	4/6/1994	\$0.00	NA	0	0	Several inches of wet snow fell during the morning of the 6th and then again during the evening of the 6th and early on the 7th. Total accumulations averaged four to six inches with a maximum reported of 8.7 inches in North Toledo. The late season storm caused numerous traffic accidents that produced injuries and at least one fatality. A number of trees were downed under the weight of the wet snow. Snow accumulated across the remainder of northern Ohio, but in lesser amounts.	NCDC Database
Countywide	1/21/1995	\$0.00	NA	0	0	Southwest, West Central, parts of Central and parts of Northwest, An extended period of snow accumulated three to six inches, but did not officially reach the National Weather Service threshold for heavy snow (six inches within 24 hours). Northwest winds caused blowing and drifting snow and made travel on secondary roads difficult and dangerous. Several power outages were reported from downed wires due to wind and snow. A Spencer Township (Lucas 003) woman was found dead on the 21st after apparently falling and freezing to death. Numerous traffic accidents were reported.	NCDC Database
Countywide	4/10/1995	\$0.00	NA	0	0	Northwest and North-Central, Rain changed to freezing rain in many areas during a period of east winds that gusted as high as 40 mph. While the ice did not accumulate significantly, the combination of glaze and strong winds caused trees and limbs to come down in a number of locations, some on power lines, vehicles, and structures.	NCDC Database
Countywide	12/13/1995	\$0.00	NA	0	0	Snow developed and changed to freezing rain around 1400 EST. The snow accumulated a coating to two inches with the heaviest near Lake Erie. The glaze accumulated one-quarter to one-half inch and downed some power lines and caused traffic accidents. Numerous traffic accidents were reported.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	3/19/1996	\$0.00	NA	0	0	A late season snow accumulated an average of 5 to 8 inches with blowing and drifting snow. Winds of 30 to 40 mph caused white-out conditions and some rural roads were drifted shut. Power lines were downed in many areas as well as trees and tree limbs from the combination of wind and heavy snow. Numerous traffic accidents were reported, especially after dark when many roads iced over. Lighter snows lingered into the 22nd across parts of northeast Ohio where accumulations totaled as much as 10 to 12 inches in a number of locations.	NCDC Database
Countywide	3/13/1997	\$0.00	NA	0	0	Freezing rain with temperatures around 32 degrees fahrenheit caused 1/4 to 1/2 inch of ice to form on colder surfaces such as trees and power lines which were downed by the added weight. This resulted in numerous power outages. Some basements filled with water because of the lack of power to run electrical sump pumps. Many trees and branches were downed on cars. Scores of traffic accidents occurred as roadways were transformed into hockey rinks. Throughout the day on the 14th, patchy freezing rain continued, accompanied by gusty winds, resulting in a few more downed trees.	NCDC Database
Countywide	1/13/1998	\$0.00	NA	12	0	A combination of occasional rain, freezing rain, sleet and snow, particularly on Tuesday the 13th, caused icy roads, bridges, sidewalks and other exposed surfaces. Many schools were closed. Hospital emergency rooms treated numerous ice related injuries (mostly from slips and falls). Even salt trucks had trouble negotiating the icy roads - at least two of them tipped over. This event did not meet winter storm criteria.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/2/1999	\$0.00	NA	0	0	Snow changed to freezing rain and sleet, with a brief change to rain as temperatures rose slightly above freezing, and then back to snow. Temperatures dropped quickly into the teens causing the wet snow and ice to refreeze and creating significant ice on the ground, roads and sidewalks. Snow accumulations generally averaged six to eight inches with as much as 10 inches in northwest Ohio. Travel was restricted when some counties declared level two or three emergencies, including Wood, Lucas, Seneca and Hancock. Air temperatures eventually fell to near zero and the icy conditions and cold temperatures, with wind chills of around 30 degrees below zero, continued throughout the first week of January, closing schools and causing many minor car crashes and fender benders. Dozens of people were injured from falls on the ice. Many sidewalks and secondary streets remained uncleared for days due to the combination of very cold temperatures and thick ice. Salt was in such demand that most stores ran out and had difficulty restocking.	NCDC Database
Countywide	3/5/1999	\$0.00	NA	0	0	Snow mixed with rain at times, especially across north central and northwest Ohio, accumulating five to six inches. Over northeast Ohio, the precipitation was almost all snow, with a total accumulation of six to thirteen inches. North northeast winds caused considerable blowing and drifting of snow. Driving conditions were extremely hazardous and numerous traffic accidents were reported.	NCDC Database
Countywide	3/9/1999	\$0.00	NA	0	0	Snow started shortly after midnight in northwest Ohio and then spread southeast, accumulating six to eight inches. East winds to 25 mph caused considerable blowing and drifting, especially since most areas already had up to six inches of snow on the ground.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	3/11/2000	\$0.00	NA	0	0	Low pressure moved up the Ohio Valley spreading snow and some freezing precipitation across the region. The heaviest snow fell near Lake Erie with light freezing rain and snow further south. Little if any any ice accumulation was reported but six to eight inches of snow fell from the afternoon of the 11th through late morning on the 12th.	NCDC Database
Countywide	12/11/2000	\$75,000.00	\$96,401.03	0	0	A deep area of low pressure moved across Lake Erie during the evening hours. Freezing rain fell for several hours along a warm front stretching east from the low. Ice accumulations in excess of one quarter inch fell over Lucas County. Scattered power outages and numerous accidents occurred.	NCDC Database
Countywide	12/13/2000	\$0.00	NA	0	0	Low pressure moved up the Ohio Valley and across central Ohio late on the 13th. Light precipitation began during the afternoon hours and increased in intensity during the evening. The heaviest snow fell along and just south of Lake Erie. Accumulations of 7 inches were reported from Lucas County east to Huron County. Locations just south of the heavy snow band saw a mixture of freezing rain and snow. Scattered power outages resulted from the freezing rain accumulation. Numerous accidents were also reported.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/30/2002	\$0.00	NA	0	0	Low pressure passed to the northwest of Ohio. Freezing rain developed to the north of a warm front extending east from this low. Freezing rain was first reported late on the 30th and continued through the late morning hours on the 31st. Up to one-half inch of ice accumulation occurred in Lucas County. Scattered power outages resulted from downed power lines and trees. In Lucas County alone, over 400 trees and limbs were downed. Two dozen homes and 19 vehicles were damaged by these fallen trees. Scattered power outages and many downed trees were reported in the adjacent counties. A total of 106,000 customers lost power at some point during this storm.	NCDC Database
Countywide	3/24/2002	\$0.00	NA	0	0	Heavy snow developed to the north of a stationary front stretching across far southern Ohio. Snow accumulations ranged from 6 to 8 inches. The snow was very wet and heavy making conditions on untreated roadways very treacherous.	NCDC Database
Countywide	3/26/2002	\$0.00	NA	0	0	Low pressure moved northeast across Ohio causing freezing rain to develop in advance of a warm front stretching east from the low. The freezing rain first began during the early morning hours south of a line from Marion to Akron. By daybreak the freezing rain had spread north to near Lake Erie. Cold air filtering into northern Ohio behind the low caused snow to develop during the afternoon and evening hours. Nearly 5 inches of snow fell in Lucas County. Very treacherous conditions existed on untreated roadways, especially during the morning hours.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/24/2002	\$0.00	NA	0	0	An area of low pressure developed along the Gulf Coast early on December 24th and then moved rapidly northeast. This low moved across eastern Ohio and western Pennsylvania during the morning hours of the 25th. Snow developed well north of the low and spread into northern Ohio during the evening of the 24th. Snow totals at other locations include: 7.1 inches at Toledo Express Airport. Northwest winds increased to 15 to 25 mph during the storm and caused considerable blowing and drifting with whiteout conditions at times. Travel was severely hampered by this storm and dozens of accidents occurred as a result of the treacherous driving conditions caused by the snow.	NCDC Database
Countywide	2/22/2003	\$0.00	NA	0	0	Low pressure moved across southeastern Ohio spreading precipitation northward across the region. The precipitation initially began as rain but quickly changed to snow during the afternoon hours of the 22nd. Some freezing rain also fell in Seneca and Erie Counties and ice accumulations of up to a quarter of an inch occurred in these counties. Once the snow began, it quickly intensified and whiteout conditions were reported during the evening hours. The snow continued through daybreak on the 23rd and then quickly tapered to flurries. Total snow accumulations ranged from around six inches in southern Hancock and western Erie Counties to nine inches in Lucas County. Strong northerly winds with occasional gusts to 40 mph accompanied the snow and caused considerable blowing and drifting. Drifts as high as 3 to 5 feet were observed in Lucas and Wood Counties.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/4/2004	\$0.00	NA	0	0	An area of low pressure moved up the Ohio Valley spreading mixed precipitation across Northwest Ohio. The precipitation began as rain but quickly changed to freezing rain and sleet during the afternoon hours. The precipitation changed to snow during the evening hours with accumulations of 4 to 5 inches reported in Lucas and Wood counties by early morning. Snow accumulations further south and east were generally 1 to 3 inches. Some ice accumulation was also reported across the area. Many accidents and significant travel delays resulted from this storm.	NCDC Database
Countywide	1/26/04	\$0.00	NA	0	0	An area of low pressure moved across Northwest Ohio early on January 27th and moved over the west end of Lake Erie during the middle part of the morning. Freezing rain associated with the low began during the evening of the 26th and continued into the 27th. Some snow mixed with the freezing rain beginning during the early morning hours. The precipitation tapered off around midday. Ice accumulations of at least one quarter inch along with one or two inches of snow were reported across much of Lucas, Wood and Ottawa counties. Many accidents resulted from this event. There were also a few reports of downed power lines.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/22/2004	\$0.00	NA	0	0	A potent winter storm affected northwestern Ohio on December 22nd and 23rd. Low pressure developed over eastern Texas early on the 22nd and then moved quickly northeast. The low eventually tracked across eastern Ohio during the morning hours of the 23rd after dumping nearly two feet of snow on portions of Ohio. The snow began in the Findlay area around mid morning on the 22nd and spread north into the Toledo area during the evening. The snow intensified during the late evening hours with heavy snow then continuing through daybreak on the 23rd. Snowfall rates of around an inch per hour occurred during the early morning hours of the 23rd with visibilities less than one quarter mile at times.	NCDC Database
Monclova Twp.	12/23/2004	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Countywide	1/5/2005	\$0.00	NA	0	0	For the second time in just over two weeks, a devastating and historic winter storm affected Northern Ohio. Significant ice accumulations occurred over most of the area downing thousands of trees, causing widespread power outages and making travel nearly impossible.	NCDC Database
Monclova Twp.	1/5/2005	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Countywide	1/7/2005	\$100,000.00	\$113,250.28	0	0	An area of weak low pressure moved across the region early on January 8th. Heavy snow fell in association with this low over extreme northwestern Ohio. Six to eight inches of snow fell on much of Lucas County.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	1/22/2005	\$0.00	NA	0	0	An area of low pressure over the Northern Great Lakes moved southeast into northern Ohio early on January 22nd. Heavy snow associated with this low spread into northwestern Ohio just after midnight, and as far east as northeast Ohio by daybreak on the 22nd. Visibilities during the morning hours were reduced to near zero at times.	NCDC Database
Countywide	12/8/2005	\$0.00	NA	0	0	An area of low pressure quickly moved from central Indiana to north-central Ohio during the evening hours of December 8th. Snow associated with this low spread into northwest Ohio during the afternoon hours of the 8th. Heavy snow developed during the evening hours and continued into 9th. The snow tapered to flurries by daybreak. 6 to 8 inches of snow was reported across much of Lucas and Wood Counties. Travel along Interstate 75 was severely hampered by this snow. Dozens of accidents occurred.	NCDC Database
Countywide	12/9/2007	\$300,000.00	\$320,170.76	0	0	Freezing rain began to fall in Lucas County around 9 am on December 9th. Periods of freezing were then reported through the early evening hours. Up to a half inch of ice accumulation was reported at some locations.	NCDC Database
Countywide	2/13/2007	\$0.00	NA	0	0	Snow began during the early morning hours of the 13th, and continued through the day. The snow continued overnight and ended during the morning of the 14th. Throughout the day on the 13th, wind gusts of 30 to 35 mph were common, and the peak wind gust for the day was 38 mph.	NCDC Database
Monclova Twp.	2/13/2007	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/15/2007	\$0.00	NA	0	0	Snow began in Lucas County during the afternoon hours of December 15th and changed to freezing rain late in the evening. The freezing rain changed back to snow during the early morning hours of the 16th. The snow intensified during the late morning hours with visibilities of less than a half mile reported. Winds gusted to nearly 40 mph on the 16th which caused considerable blowing and drifting. The snow finally tapered off to flurries during the afternoon of the 16th. Around a quarter inch of ice accumulation and around 6 inches of snow was reported over most of the county.	NCDC Database
Monclova Twp.	3/28/2008	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Monclova Twp.	12/23/2008	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Countywide	2/25/2008	\$150,000.00	\$154,162.38	0	0	Snow began overnight late on the 25th, and continued through the overnight hours. By morning snowfall amounts ranged between 3.0 and 5.5 inches across the county. By midday on the 26th, many locations picked up between 6.0 and 8.0 inches.	NCDC Database
Countywide	3/21/2008	\$100,000.00	\$102,774.92	0	0	Snow spread into Lucas County during the early evening hours of March 21st. The snow intensified around 7 pm EDT with visibilities the remainder of the evening less than one mile. By the time the snow tapered off during the early morning hours of the 22nd, most of Lucas County had received more than six inches of snow.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/19/2008	\$30,000.00	\$30,832.48	0	0	Initially snow started across the area during the overnight hours of the 19th. Snow measurements ranged between one and two inches, but quickly transitioned over to sleet and then freezing rain prior to daybreak. Freezing rain continued for several hours through the morning, and measured about a half an inch by the time it ended across the area. There was minimal impact to major roads across the area as well as power lines as temperatures ranged from only a few degrees below freezing to slightly above freezing in some locations by mid morning. A few accidents were reported during this event.	NCDC Database
Countywide	1/9/2009	\$120,000.00	\$123,711.34	0	0	Snow began during the morning hours of the 9th, and continued through the evening hours of the 10th. The snow was heaviest during the afternoon hours of both the 9th and 10th. Snowfall amounts ranged between 8.0 and 13.0 inches across the area, with a storm total of 11.9 inches reported at Toledo Express Airport. Numerous accidents were reported across the area.	NCDC Database
Countywide	1/27/2009	\$300,000.00	\$309,278.35	0	0	Snow began during the afternoon hours of the 27th, and continued through the overnight and morning of the 28th. The snow quickly tapered off during the afternoon. Snow was moderate to heavy at times during the morning of the 28th. Snowfall amounts ranged between 6.0 and 11.0 inches across the area. At the Toledo Express Airport, 10.8 inches was measured. Other trained spotter in the area measured 7.5 inches in Maumee, and 7.0 inches in the City of Toledo.	NCDC Database
Monclova Twp.	1/10/2009	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	12/9/2010	\$200,000.00	\$202,839.76	0	0	Snow began in Lucas County a couple hours before sunrise on February 9th. The snow picked up in intensity late in the morning with periods of moderate to heavy snow then reported into early evening. The intensity of the snow lessened during the evening hours with light snow finally ending late in the morning of February 10th. Snowfall rates at the peak of the storm were around an inch per hour with visibilities less than one half mile. Total snow accumulations across Lucas County ranged from 9 to 12 inches with the higher amounts in the western end of the county.	NCDC Database
Toledo	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Ottawa Hills	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet
Whitehouse	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Winter Storm Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Springfield Twp.	NA	\$0.00	NA	0	0	Has occurred in the past.	Hazard History Worksheet
Sylvania Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Monclova Twp.	2/1/2011	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Monclova Twp.	2/24/2011	\$0.00	NA	0	0	Severe winter storm.	Hazard History Worksheet
Countywide	March 2011	\$0.00	NA	0	0	Severe winter storm. Level 3 emergency.	Hazard History Worksheet

Total: \$1,375,000.00 \$1,453,421.30 12 0
Per event with reported damages: \$152,777.78 \$161,491.26
9 damage events

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Tornado Events

LOCATION	DATE	DAMAGE	2002 Dollars	MAGNITUDE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	4/11/1965	\$25,000,000.00	\$176,056,338.03	F4	207	16	Tornado. Presidential Declaration of Disaster.	NCDC Database
Whitehouse and Waterville Twp.	1977 and 1981	\$0.00	NA	F2	0	0	Tornado	Hazard History Worksheet
Countywide	4/8/1980	\$2,500,000.00	\$6,702,412.87	F2	2	0	Tornado.	NCDC Database
Countywide	4/17/1981	25,000.00	60,827.25	F0	0	0	Tornado.	NCDC Database
Countywide	7/12/1992	\$2,500,000.00	\$3,943,217.67	F2	1	0	Tornado.	NCDC Database/ Hazard History Worksheet
Countywide	8/4/1992	\$0.00	NA	NA	0	0	Presidential Declaration of Disaster due to tornadoes and flooding.	OEMA
Countywide	4/9/1999	\$0.00	NA	NA	0	0	Gubernatorial Declaration of Disaster due to tornadoes and flooding.	OEMA
Jerusalem Twp.	Spring 1999	\$0.00	NA	NA	0	0	Tornado damage in Township.	Hazard History Worksheet
Sylvania	5/9/2000	\$150,000.00	\$192,802.06	F1	0	0	Tornado.	NCDC Database
Monclova Twp.	6/21/2006	\$0.00	NA	NA	0	0	Funnel cloud sighted. No damage.	Hazard History Worksheet
Countywide	4/11/2008	\$200,000.00	\$205,549.85	F1	0	0	A tornado touched down in eastern Lucas County about a mile north of Curtice near the intersection of North Curtice Road and State Route 2. The tornado traveled northeast for about five miles and lifted near Reno Beach. The damage path was intermittent and no more than 35 yards in width. Several camping trailers were overturned by the tornado and a large sign was blown down. Dozens of trees were toppled along the damage path.	NCDC Database
Springfield Twp.	April 2008	\$0.00	NA	F1	0	0	Tornado. Affected Dorr Street.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Tornado Events

LOCATION	DATE	DAMAGE	2002 Dollars	MAGNITUDE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Jerusalem Twp.	April 2008	\$0.00	NA	F1	0	0	Tornado.	Hazard History Worksheet
Swanton Twp.	June 2010	\$0.00	NA	F1	0	0	Tornado.	Hazard History Worksheet
Monclova Twp.	6/5/2010	\$0.00	NA	F1	0	0	Tornado.	Hazard History Worksheet
Whitehouse	6/5/2010	\$75,000.00	\$76,064.91	F1	0	0	An EF1 tornado touched down northwest of Whitehouse in far western Lucas County. The initial touchdown occurred just east of the intersection of County Road 109 and State Route 64. The tornado then continued northeast on the ground for nearly three and a half miles before lifting near the intersection of Reed and Spencer Roads. Dozens of trees were downed along the damage path which was no more than 100 yards in width. A few homes and buildings sustained minor damage, mainly from lost roofing or siding.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Tornado Events

LOCATION	DATE	DAMAGE	2002 Dollars	MAGNITUDE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Oregon	4/11/2011	\$200,000.00	\$200,000.00	F0	0	0	An EF0 tornado touched down in northern Oregon Township along Eagles Landing Drive. The tornado then moved northeast for around three quarters of a mile before lifting along Lagundovie Road to the south of James Road. The tornado appeared to have been at tree top level for much of the damage path. At least 24 homes sustained damage from the tornado. One home sustained major damage after a large tree toppled by the tornado crushed the roof and a second story bedroom. A house nearby had a porch torn off. The remainder of the homes lost roofing or siding. A large camping trailer was overturned and destroyed. One small outbuilding was also leveled. A couple dozen trees were also downed along the damage path which was no more than 25 yards in width. No injuries were reported.	NCDC Database
Toledo	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	NA	NA	NA	0	Large risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Tornado Events

LOCATION	DATE	DAMAGE	2002 Dollars	MAGNITUDE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Holland	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Ottawa Hills	NA	\$0.00	NA	NA	NA	0	Small risk of future occurrence.	Hazard History Worksheet
Whitehouse	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Springfield Twp.	NA	\$0.00	NA	NA	NA	0	Has occurred in the past.	Hazard History Worksheet
Sylvania Twp.	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	NA	NA	NA	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet
Total:		\$30,650,000.00	\$187,437,212.62		210	16		
Per event with reported damages:		\$3,831,250.00	\$23,429,651.58					
8 damage events								

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Lake Surge Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	3/13/1997	\$100,000.00	\$137,741.05	0	0	Storm surge.	NCDC Database
Countywide	6/1/1997	\$25,000.00	\$33,967.39	0	0	Storm surge.	NCDC Database
Toledo	2/4/1998	\$75,000.00	\$101,763.91	0	0	Northeast winds up to 35 miles per hour caused flooding of the immediate lakeshore and beach erosion.	NCDC Database
Toledo	2/17/1998	\$100,000.00	\$135,685.21	0	0	Northeast winds up to 40 miles per hour increased the water level at the Toledo Coast Guard Station (Lucas County) to around seven feet above low water datum. Waves of seven to ten feet caused major flooding and beach erosion along the western shoreline of Lake Erie.	NCDC Database
Toledo	3/20/1998	\$100,000.00	\$135,685.21	0	0	North to northeast gales of 35 knots, with higher gusts, produced 11 to 14 foot waves on Lake Erie. Also, the water level at Toledo (Lucas County) was seven feet above low water datum. This combination resulted in major flooding and beach erosion. Many streets were flooded around Maumee Bay (Lucas) and flooding had progressed further inland in some areas.	NCDC Database
Toledo	4/9/1998	\$200,000.00	\$271,370.42	0	0	Northeast gales of 35 knots and water levels that peaked just below 100 inches above low water datum produced 10 to 14 foot waves which caused major damage along the lakeshore. Many lakeshore roads were not only flooded , but also covered with rocks and other debris that, in some places, had to be removed by bulldozers. A State of Emergency was declared and standing flood water persisted for several days in some areas.	NCDC Database
Countywide	11/10/1998	\$0.00	NA	0	0	Southwest storm force winds gusting to 69 miles per hour pushed water away from the western end of Lake Erie towards the state of New York and Ontario Canada. As the water level fell to to four feet below normal, boats and ferries were left stranded in the mud in marinas from the Maumee River east to the lagoons in Vermilion.	NCDC Database

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Lake Surge Events

LOCATION	DATE	DAMAGE	2011 Dollars	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Toledo	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Oregon	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Harbor View	NA	\$0.00	NA	0	0	Has occurred in the past. Small risk of future occurrence.	Hazard History Worksheet
Jerusalem Twp.	NA	\$0.00	NA	0	0	Has occurred in the past. Large risk of future occurrence.	Hazard History Worksheet

Total: \$600,000.00 \$816,213.19 0 0
Per event with reported damages: \$100,000.00 \$136,035.53
6 damage events

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 2. History of Wildfire Events

LOCATION	DATE	DAMAGE	INJURIES	FATALITIES	DESCRIPTION	SOURCE
Countywide	NA	\$0.00	0	0	Major threat for wildfires exist for area metro-parks, state forests, wildlife preserves and adjacent croplands due to the large volume of vegetative matter that is subject to fire in dry years. Homes and businesses within and around these areas are at risk.	Hazard History Worksheet
Toledo	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Maumee	NA	\$0.00	0	0	Large risk of future occurrence.	Hazard History Worksheet
Sylvania	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Holland	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Whitehouse	NA	\$0.00	0	0	Small risk of future occurrence.	Hazard History Worksheet
Providence Twp.	NA	\$0.00	0	0	Has occurred in the past, small risk of future occurrence.	Hazard History Worksheet
Waterville Twp.	NA	\$0.00	0	0	Has occurred in the past, small risk of future occurrence.	Hazard History Worksheet
Total:		\$0.00	0	0		

Table 3 Natural Hazards Ranked by Greatest Damage per Event

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 3. Natural Hazards Ranked by Greatest Damage per Event

Natural Hazard	Presidential Declaration	Total # of Records	# Records with Specific Hazard Events*	# of Injuries	# of Deaths	# of Records with Damages	Total Damages (2011 Dollars)	Damages per Event
Tornado	Yes (1965, 1992)	29	17	210	16	8	\$187,437,212.62	\$23,429,651.58
Flash Flood	No	26	17	0	0	12	\$55,926,434.35	\$4,660,536.20
Severe Winter Storm	Yes (1978)	60	49	12	0	9	\$1,453,421.30	\$161,491.26
Lake Surge	No	11	7	0	0	6	\$816,213.19	\$136,035.53
Flood	Yes (1969, 1972, 1973, 1974, 1982, 1992, 1996, 2000, 2006)	62	50	0	0	13	\$1,511,872.37	\$116,297.87
Severe Storms	Yes (1965, 1969, 1972, 1973, 1974, 2006)	306	295	7	6	136	\$5,142,420.08	\$37,811.91
Earthquake	No	15	6	0	0	0	\$0.00	\$0.00
Temperature Extremes	No	20	10	0	1	0	\$0.00	\$0.00
Drought	No	18	9	0	0	0	\$0.00	\$0.00
Wildfire	No	8	0	0	0	0	\$0.00	\$0.00
Landslide	No	5	1	0	0	0	\$0.00	\$0.00

Sources: NCDC Database, OEMA records for Presidential Declarations, Hazard History Worksheet and The Lucas County Emergency Operations and Preparedness Plan

* Some of the records obtained from the Hazard History Worksheet only indicated the probability of future events. All loss estimation was completed utilizing records which reported specific historical events.

Table 4a Countywide Flood Hazard Area Structure Summary

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 4a. Countywide Flood Hazard Area Structure Summary

LANDUSE	Number of Structures				Value of Structures		
	Structure Count	Percent of County	Count in 100 Yr. Floodplain	Percent in 100 Yr. Floodplain	Value in County	Value in 100 Yr. Floodplain	Percent Value in 100 Yr. Floodplain
AGRICULTURAL	2,978	1.50%	153	5.138%	\$106,655,900	\$8,288,775	7.772%
COMMERCIAL	13,264	6.68%	444	3.347%	\$3,394,790,600	\$65,414,520	1.927%
EXEMPT	3,864	1.95%	296	7.660%	\$3,085,654,200	\$7,889,880	0.256%
INDUSTRIAL	3,009	1.52%	82	2.725%	\$569,535,300	\$43,521,500	7.642%
RESIDENTIAL	175,412	88.36%	4,590	2.617%	\$12,573,414,800	\$292,566,600	2.327%
Total	198,527	100.00%	5,565	2.803%	\$19,730,050,800	\$417,681,275	2.117%

Source: Lucas County Auditor's GIS Parcel Data

Table 4b Jurisdictional Flood Hazard Area Structure Summary

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 4b. Jurisdictional Flood Hazard Area Structure Summary

	Agricultural		Commercial		Exempt		Industrial		Residential		Total Structures in 100 Yr. Floodplain	Total Value in 100 Yr. Floodplain
	Count in 100 Yr. Floodplain	Value in 100 Yr. Floodplain	Count in 100 Yr. Floodplain	Value in 100 Yr. Floodplain	Count in 100 Yr. Floodplain	Value in 100 Yr. Floodplain	Count in 100 Yr. Floodplain	Value in 100 Yr. Floodplain	Count in 100 Yr. Floodplain	Value in 100 Yr. Floodplain		
Cities												
Toledo	0	\$0	255	\$37,569,150	123	\$3,278,565	52	\$27,599,000	2,175	\$138,634,500	2,605	\$207,081,215
Maumee	0	\$0	0	\$0	5	\$133,275	0	\$0	0	\$0	5	\$133,275
Oregon	5	\$270,875	27	\$3,977,910	8	\$213,240	21	\$11,145,750	629	\$40,092,460	690	\$55,700,235
Sylvania	0	\$0	2	\$294,660	1	\$26,655	0	\$0	20	\$1,274,800	23	\$1,596,115
Villages												
Berkey	0	\$0	0	\$0	0	\$0	0	\$0	6	\$382,440	6	\$382,440
Harbor View	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Holland	0	\$0	3	\$441,990	0	\$0	1	\$530,750	2	\$127,480	6	\$1,100,220
Ottawa Hills	0	\$0	0	\$0	3	\$79,965	0	\$0	11	\$701,140	14	\$781,105
Waterville	0	\$0	19	\$2,799,270	0	\$0	0	\$0	11	\$701,140	30	\$3,500,410
Whitehouse	0	\$0	0	\$0	10	\$266,550	1	\$530,750	73	\$4,653,020	84	\$5,450,320
Townships												
Harding	0	\$0	4	\$589,320	0	\$0	0	\$0	0	\$0	4	\$589,320
Jerusalem	119	\$6,446,825	72	\$10,607,760	82	\$2,185,710	0	\$0	1,074	\$68,456,760	1,347	\$87,697,055
Monclova	4	\$216,700	12	\$1,767,960	55	\$1,466,025	0	\$0	45	\$2,868,300	116	\$6,318,985
Providence	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Richfield	0	\$0	0	\$0	1	\$26,655	0	\$0	6	\$382,440	7	\$409,095
Spencer	3	\$162,525	0	\$0	0	\$0	0	\$0	13	\$828,620	16	\$991,145
Springfield	1	\$54,175	15	\$2,209,950	3	\$79,965	3	\$1,592,250	159	\$10,134,660	181	\$14,071,000
Swanton	3	\$162,525	4	\$589,320	0	\$0	0	\$0	3	\$191,220	10	\$943,065
Sylvania	11	\$595,925	24	\$3,535,920	1	\$26,655	4	\$2,123,000	153	\$9,752,220	193	\$16,033,720
Washington	0	\$0	7	\$1,031,310	1	\$26,655	0	\$0	187	\$11,919,380	195	\$12,977,345
Waterville	7	\$379,225	0	\$0	3	\$79,965	0	\$0	23	\$1,466,020	33	\$1,925,210
Totals	153	\$8,288,775	444	\$65,414,520	296	\$7,889,880	82	\$43,521,500	4,590	\$292,566,600	5,565	\$417,681,275

Source: Lucas County Auditor's GIS Parcel Data

*Note: does not include Toledo homes protected by a provisional levee
Toledo Residential column would increase by 1000 homes

Table 5 Critical Facilities (Located in Appendix E)

Table 6 Local Capability Assessment

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Building Regulation (To ensure the health, safety and welfare of the citizens of Lucas County)	Special Revenue Fund	Phil Klocinski, 1115 South Mc Cord Road, Holland, OH 43528-9596, (419) 213-2990,	X			Regulate new construction & renovation by enforcing established minimum requirements; to administer the issuance of contractor licenses; to provide a program of flood damage prevention teaming up with Lucas Co. Engineer; to encourage economic development by coordinating efforts with County departments and other governing agencies.
Department of Emergency Services - Emergency Management Agency (Mitigate from, prepare for, respond to and aid in the recovery from catastrophic disasters and hazardous materials accidents that threaten the community) Facilitating Agency for the Countywide All Natural Hazards Mitigation Plan - CANHMP - and any future mitigation projects)	Special Revenue Fund	Director of Emergency Services: Dennis Cole, 2144 Monroe Street, Toledo, OH 43604, (419) 213-6535, dcole@co.lucas.oh.us . Director of Emergency Management Agency: Joe Walter, 2144 Monroe Street, Toledo, OH 43604, (419) 213-6505, JOWalter@co.lucas.oh.us		X		EMA influences and coordinates federal, state and local governments' emergency preparedness policies through training, exercises and contingency planning. Also provides training and information to individuals and organizations in the public and private sectors.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
County Engineer (Perform responsibilities: Maintenance Repair; Maintain public records and surveys for County roads, bridges, drainage systems, and property tax maps; Advise and provide engineering services to the eleven townships in regard to maintenance, construction and repair of the Township Highway; Oversees the design and construction of new subdivisions in unincorporated areas; Annually inspect and evaluate the condition and load-carrying capacity of 162 bridges on the county and township roadway systems; Maintain, repair and improve the ditches that have been petitioned by affected property owners. Coordinate clean outs by the Toledo Area Sanitary District; Participate in road and bridge projects within the cities and villages of the County)	General Fund. Programs: Ohio Public Works, Green Space Conservation, Clean Ohio Revitalization Fund for Lucas County	Keith Earley, One Government Center, Suite 870, Toledo, OH 43604-2258, (419) 213-4541, kearley@co.lucas.oh.us	X	X		Converting tax maps from scanning the old mylars into GIS formats.
Auditor; Data Processing; Information System. (Responsibility to account for all money received by the County and to issue warrants in payment of all County obligations)	General fund. Plan to acquire and install a centralized computer imaging system that will be available for all county agencies.	Anita Lopez, Lucas County Auditor, Alopez@co.lucas.oh.us	X			The Auditor serves on the following Boards: Budget Commission, Board of Revision, and Data Processing.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Office of the Board of County Commissioners (The legislative authority of County government. Hold title to all County property, serves as the sole taxing authority for the County, and controls purchasing and contracting for goods and services. Is the budget and appropriating authority for County government and has the authority to issue debt)	General	Pete Gerken, President of the Board, One Government Center, Suite 800, Toledo, OH 43602-2259, (419) 213-4123, PGerken@co.lucas.oh.us	X	X		Approves most County expenditures; managing real and personal property; appointing members of various boards and commissions; and implementing state regulation pertaining to the needs of the County; approves annexations, enters into agreements with municipalities, special districts, and other counties to exercise any power, perform any function or render any service that it considers appropriate.
Ohio State University Extension (Empower Individuals and Families with Life Skills; Educate for the Greening and enhancement of Neighborhoods; Help Youth Become Positive, Productive Citizens; and Be Partners in Building Community Resources and Capacity)	FUNDING: US Dep't. Of Agriculture, Ohio State University, and Lucas County Commissioners. PROGRAMS: Sea-Grant Extension/Community Development; Expanded Food and Nutrition Education Program; Extension Family and Consumer Sciences; Horticulture Classes; Family Nutrition Pilot Program; 4-H;	Amy Stone, One Government Center, Suite 550, Toledo, OH 43604-2245, (419) 213-4254, stone.91@cfaes.osu.edu	X			
Risk Management (Control Lucas County's liability, control and reduce the cost of insurance, and maintain as high a level of benefits for Lucas County employees as possible)	Internal Service Fund	Diane Robinson, One Government Center, Suite 440, Toledo, OH 43504, (419) 213-4522	X			
Sanitary Engineer	Enterprise Fund	Jim Shaw, 1111 S. McCord Road, Holland, OH 43528, (419) 213-2916, jshaw@co.lucas.oh.us	X	X		Provides: Water Distribution, Wastewater Collection, Wastewater Treatment, Customer Services, Engineering and Inspection, for the permitting, design, plan review and inspection of public and private water and wastewater capital improvements.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Sheriff's Department (In order to insure that the citizens of Lucas County receive efficient and effective service in all areas of responsibility, the office is structured as follows: Law Enforcement, Corrections and Administrative Services)	General Fund	James Telb, Sheriff, 1622 Spielbusch Avenue, Toledo, OH 43624, (419) 213-4900, jtelb@co.lucas.oh.us	X			Provides patrols for the citizens in all unincorporated areas of the County
Soil and Water Conservation District (To promote conservation of our soil, water, and other natural resources through educational programs, information services, and technical assistance)	Part of the funding is from Lucas County and numerous other municipalities within the County. These funds are matched at a rate of 90% by the State of Ohio under the Department of Natural Resources - Division of Soil & Water Conservation. Affiliate members also make cash donations. Annual tree and fish sales plus revenue from rental equipment & profit from the harvest at Blue Creek Conservation Area supplement the tax dollars which constitute the majority of the income. Various grants make up the balance of the annual budget. PROGRAMS: EnviroScape; The Streamulator; Water Quality Assessment; The Groundwater Flow Model; various Educator Workshops.	Laura Burkett, 130-A W. Dudley Street, Maumee, OH 43537, (419) 893-1966, Lucassoil@aol.com	X	X		The purpose: focuses on natural resource problems and solutions. With assistance of many volunteers, they improve the quality of life for every resident of Lucas County.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Toledo-Lucas County Plan Commissions (Seek to create a community with high quality of life and access to economic opportunity for all of our residents. The strength and future well-being of the community as a whole is built on the collective strengths of the unique and individual jurisdictions within our community. We seek to accomplish our mission and meet our challenge through the application of research, planning services, policy development and the promotion and facilitation of activities that lead to collaboration and cooperation among our constituent jurisdictions.	Funded jointly by the City of Toledo and the Board of Lucas County Commissioners	Calvin Lawshe, Director, One Government Center, Suite 1620, Toledo, OH 43604, (419) 245-1200,	X	X		
Office of Management and Budget (Responsible for the preparation of the County Appropriation Budget and monitoring the financial condition of the County)	General Fund	Kelly Roberts, One Government Center, Suite 800, Toledo, OH 43604-2259, (419) 213-4536, KRoberts@co.lucas.oh.us	X	X	X	The analysts maintain liaison with assigned departments for budgeting and contractual issues, formulate recommendations and perform analyses for the County Administrator and Commissioners regarding operations, policy issues and financial concerns. It is also responsible for the monitoring of prevailing wages for all County public improvement projects.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Greater Toledo Area Chapter of the American Red Cross (Born of a desire to bring assistance without discrimination to the wounded on the battlefield, endeavors, in its international capacity to prevent and alleviate human suffering wherever it may be found. It's purpose is to protect life and health and to ensure respect for the human being. It promotes mutual understanding, friendship, cooperation and lasting peace amongst all peoples)	5013C Nonprofit	Tim Yenrick, Executive Director, 3100 W. Central Avenue, Toledo, OH 43606, (419) 329-2586	X			
The Salvation Army (Its objects are "the advancement of the Christian religion . . . of education, the relief of poverty, and other charitable objects beneficial to society or the community of mankind as a whole)	5013C Nonprofit	Captain Steven Lopes, 620 N. Erie Street, P.O. Box 7908, (419) 241-1138	X			
Toledo Department of Fire and Rescue Operations (To protect the community from fire and other emergencies through educational fire prevention, enforcement and the response of highly trained emergency personnel)	City of Toledo	Chief Luis Santiago, Director, 545 N. Huron Street, Toledo, OH 43604, (419) 245-1125, toledo.fire@ci.toledo.oh.us	X			

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Toledo Police (Enhance the quality of City of Toledo by working in partnership with the community to preserve the law, provide quality services, reduce the fear of crime and to promote citizen cooperation. We are committed to working with the community to solve problems as an aid in the reduction of crime. The Department's policy, practices and tactics will compliment the needs of our neighborhoods)	City of Toledo PLANS: Reduce Crime - Continue to Develop Amber Alert; Excel in Community Policing - Develop a "Citizens' Emergency Response Team"; Improve Operational Efficiency and Effectiveness; Reduce Traffic Related Injuries and Fatalities	Chief Derick Diggs, 525 N. Erie Street, Toledo, OH 43624, (419) 245-3200, toledo.police@ci.toledo.oh.us	X			
Environmental Services, City of Toledo	Programs: Ail Pollution Control, Industrial Pretreatment, High Strength Surcharge. Funding: Grants, Fees, General Fund	Tim Murphy, Commissioner, 348 S. Erie Street, Toledo, OH 43602-1633, (419) 936-3015	X			Ensure environmentally safe air & water for the Toledo Metropolitan Area.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Forestry & Open Space Planning, City of Toledo	Forestry is responsible for planting and maintaining all trees on the public right-of-way (between sidewalk and curb), on boulevards, and in City of Toledo parks. It also maintains a 13-acre tree nursery and cultivates young trees for planting city-wide. Forestry maintains a Woodlot where tree limbs and logs are recycled into landscape mulch that is used in playgrounds in City Parks, around trees and landscapes, and is available for sale to the public. Firewood is also for sale to the public at the Woodlot office at 221 Elm dale Road. Funding: General Fund, Fees, Sales	Department of Parks, Recreation & Forestry, Dennis Garvin, 2201 Ottawa Parkway, Toledo, OH 43606, (419) 936-2875	X			
Department of Public Service, City of Toledo	Operation of MLK Lift Bridge, Point Place Flood Gates, Replace & Remove Promenade Park Recreation Docks, Snow & Ice Removal, Leaf Collection, Housing Demolition, Street & Alley Cleaning. City Budget	Ed Moore, Director, 110 N Westwood Avenue, Toledo, OH 43607, (419) 936-2508	X			
The National Weather Service	Observation & Hydrologic Programs. Federally Funded.	Gary Garnet, gary.garnet@noaa.gov , (216) 265-2382 Ext. 223, National Weather Service 5301 West Hangar Rd. Cleveland, OH. 44135	X			

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Department of Natural Resources, Division of Water	Develop ground water resource & pollution potential maps; issues permits for construction of dams, dykes, levees, & erosion control structures; inspects existing dame; operates the state canal systems; administers state floodplain management program; condition water supply studies. Federal/State funding, Fees	Dick Bartz, Chief, ODNR, Division of Water, 1939 Fountain Square, Columbus, OH 43224, (614) 265-6610	X			Managing Ohio's surface & ground water resources.
The Dog Warden	Special Revenue Fund	Julie Lyle, Chief Dog Warden, 410 S. Erie Street, Toledo, OH 43602, (419) 213-2800	X			Law enforcement agency enforcing Ohio laws to protect the public from canine-relate problems. This department significantly reduces or eliminates the stray dog population & makes dog owners responsible for their pets. The Dog Warden strives to license all dogs over three month of age in the County & to insure that licensed dogs always wear their current tag. This department also strives to adopt unclaimed strays out to caring, committed, responsible families.
The Humane Society	Animal Welfare, Pet Adoption, Humane Society. Private Non-Profit	Gregory L.. Bloomfield, Executive Director, 1920 Indian Wood Circle, Maumee, OH 43537, (419) 891-0705	X			

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Toledo-Lucas County Health Department	Programs: Severe Acute Respiratory Syndrome (SARS), Monkey Pox, Immunization Schedule, Health Services, Clinical Services, Emergency/Disaster Preparedness, Smallpox Information, Bioterrorism, Environmental Health, Public Health Emergency Volunteer Registration, Food Recalls, HIV/AIDS Resource Guide, Birth & Death Certificates, Food Recalls, Foma; C;eam Omdppr Aor Regulation, West Nile Virus., Childhood Lead Poisoning Prevention Funding: Tax Revenue; Fees & Services: Gran.	David Grossman, M.D., Health Commissioner, 635 N. Erie Street, Toledo, OH 43624, (419) 213-4100	X	X		In partnership with the diverse community we serve, the Toledo-Lucas County Health Department promotes quality & years of healthy life & minimizes health disparities by preventing avoidable disease, injury, & disability, & assuring environmental health. This mission is achieved through policies & programs that assess community health status & assure needed health services.
All the Boards of Education in Lucas County	Levies	Putting them all under the umbrella of Lucas County Educational Service Center, Sandra C. Frisch, Superintendent, 2755 Collingwood Blvd. Toledo, OH 43620. 419-245-4150	X	X		
Weather Spotters	Volunteer Organization - No Funding	ARES/Skywarn/Weather Spotters, Chris Taylor, N8WGB, 2334 Oak Grove Place, Toledo, OH 43613, (419) 472-3480	X			Concerned with the safety of the citizens in Lucas County in relation to weather.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
TMACOG	Transportation Planning, Transportation & Land Use Committee, Water Quality Planning Agency, Railroad Project, Residential Energy Conservation, Air & Water Pollution, Mass Transits & Economic Development, Remedial Action Plan for the Maumee River Basin, Enhance Home Rule, Small Village Needs. Funding: Membership Fees, Grants from ODOT, USEPA, ODNR Education Fund, other competitive grants, 501C3 allowing for gifts & contributions.	Anthony Reams, President. 300 MLK Drive, Suite 300. PO Box 9508, Toledo, OH 43604.419-241-9155. reams@tmacog.org	X	X		
The Ability Center	Non-profit, Tax Exempt. Funding through Special Events, Grants & Foundations, Individual Donations & Program Fees	Timothy Harrington, Director, 5605 Monroe Street, Sylvania, OH, (419) 885-5733.	X			Develop lifetime skills for people of all ages & abilities by providing affordable sports & recreation especially in a nurturing environment.
The Area Office on Aging	Care Choice Ohio, Family Care Giver Support Program, Long Term Care Ombudsman Program Multipurpose Senior Centers, Meals & Elderly Nutrition Programs Kinship Navigator, Ohio's Seniors Health Insurance Information Program, PASSPORT, Retired Senior Volunteer Program. State & Federal Funding.	Billy Johnson, Director, The Area Office On Aging, 2155 Arlington Avenue, Toledo, OH, (419) 382-0624	X			

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 6. Local Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding or	Point of Contact (Name, Address, Phone, Email)	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Hospital Council of Northwest Ohio		Kathy Silvestri, ksilvestri@hcno.org, Northwest Ohio Regional Health Care System Coordinator, Hospital Council of Northwest Ohio, 3231 Central Park West Drive, Suite 200, Toledo, OH 43617, Phone: 419-842-0800	X			Emergency planning for regional hospitals

Table 7a Evaluation of Mitigation Action

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7a. Evaluation of Mitigation Action Items

Action Items	STAPLEE Criteria																							Total	Comments	Priority Rank
	Social		Technical			Administrative			Political			Legal			Economic				Environmental							
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws			
Tornadoes																										
Review existing warning siren coverage & recommend new locations if & where there are coverage gaps. Utilize grant funding wherever possible to purchase new warning sirens.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	-1	-1	1	n/a	n/a	n/a	1	12	Will need to seek outside funding, but high priority for County.	1
Work with local governments to coordinate public awareness campaigns on tornado safety & preparedness in their local newspapers & government newsletters.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	n/a	1	1	21		2
Develop a program to provide information and building specifications on "Safe Rooms" for communities most susceptible to injury or loss of life resulting from future tornado events.	1	2	1	1	1	-1	1	-1	1	1	1	1	1	1	1	n/a	1	n/a	n/a	n/a	n/a	1	1	15	Will need to seek outside funding. There are currently no identified "safe rooms" in Lucas County.	3
Educate the public to secure all loose items on decks, porches and in yards.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	1	1	17	Will need to seek outside funding.	4	
Review existing public shelters & recommend new locations if & where there are coverage gaps in meeting the above stated objective.	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	16	Will need to seek outside funding. There are currently no identified shelters in Lucas County.	5	
Develop weather spotters training courses & implement training within local fire & police departments.	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	14	Will need to seek outside funding. This is a very important program that could prevent loss of life.	6	
Review all Lucas County & municipal building codes & recommend revisions for future construction to reflect best current standards for anchoring against straight line & tornado winds.	2	2	2	1	2	-1	-2	2	-1	-1	1	1	-1	1	-1	1	-1	1	1	1	1	1	13	Could be an item that will be challenged due to the increased cost to builders if this action item is implemented. Outside funding would be required.	7	
Develop a program to identify those existing mobile homes & older buildings throughout Lucas County that have the most potential for anchoring against straight & tornado force winds.	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	1	-1	1	-1	1	n/a	n/a	1	1	11	Will need to seek outside funding. May meet with opposition from mobile home parks/communities. This is an area that is hit by tornadoes with great consistency. The need is great to minimize damage & destruction.	8	
Keep up-to-date lists of addresses with shelters, to assist Fire Departments, Emergency Services agencies & communities & to coordinate the distribution of these lists to the appropriate local government officials.	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	10	Will need to seek outside funding. A necessity when the shelters are established.	9	
Determine how to accommodate individuals with special needs both in the emergency plan for the shelter & in the design of the shelter including complying with the American with Disabilities Act (ADA).	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	1	-1	1	-1	1	-1	n/a	n/a	1	9	Will need to seek outside funding. If shelters are to be established/developed, these measures are a must.	10	
Springfield Township - Tornado Saferoom at Westside Montessori School	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	n/a	-1	n/a	n/a	n/a	n/a	1	8	Will need to seek outside funding. There are currently no identified "safe rooms" in Lucas County.	11	
Providence Township - Tornado Saferoom at Whispering Winds Mobile Home Park	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	n/a	-1	n/a	n/a	n/a	n/a	1	8	Will need to seek outside funding. There are currently no identified "safe rooms" in Lucas County.	12	
Providence Township - Tornado Saferoom at Country Campground LLC	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	n/a	-1	n/a	n/a	n/a	n/a	1	8	Will need to seek outside funding. There are currently no identified "safe rooms" in Lucas County.	13	
Floods																										
Improve City of Toledo Stormwater Management Plan	1	1	1	1	1	1	-1	-1	1	1	q	1	1	1	2	-1	1	-1	1	1	n/a	1	1	15	Ranked #1 because of amount of loss reduction that can occur.	1
Develop a comprehensive communication system between the County & local governments - with procedure templates describing warning systems.	1	1	1	1	1	1	-1	-1	-1	1	-1	1	1	-1	1	-1	n/a	-1	n/a	n/a	n/a	1	4	Will need to seek outside funding. Communication is usually an area of concern in most disasters, therefore, this project is rated high.	2	
Partner with insurance companies to disseminate flood insurance information to citizens in flood prone areas.	1	1	1	1	1	1	-1	1	1	1	1	1	1	-1	1	-1	1	1	1	n/a	n/a	1	1	15	Will need to seek outside funding. This is rated high because knowledge of this situation can help citizens to make the best mitigation choices.	3
Streamline the planning process for citizens to receive flood fighting information & provide information & assistance.	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	n/a	n/a	1	1	32		4

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	Social		Technical			Administrative			Political			Legal			Economic				Environmental							
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws			
Develop an educational program informing citizens within the flood zone of their location and/or proximity to streams.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23		5	
Discuss formation of a policy that guides or further restricts development around flood prone areas & areas of high flood mitigation values (wetlands, floodplain corridors, upland storage, closed depressional basins & areas of high filtration potential).	-1	-1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	1	-1	-1	-1	1	1	n/a	1	2	Will need to seek outside funding. This project is rated high because it's development will ensure fewer residences are vulnerable to flood waters.	6	
Accurately identify & map areas that have potential "flood mitigation value".	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	n/a	n/a	1	21	This project is important in mitigating planning for flood waters.	7	
Lucas County Stormwater District - Ten Mile Creek Study	1	1	1	2	1	1	-1	1	1	1	1	1	1	1	2	-1	1	-1	2	1	n/a	1	19		8	
Lucas County Stormwater District - Prairie Creek Study	1	1	1	2	1	1	-1	1	1	1	1	1	1	1	2	-1	1	-1	2	1	n/a	1	19		9	
Lucas County Stormwater District - Swan Creek Study	1	1	1	2	1	1	-1	1	1	1	1	1	1	1	2	-1	1	-1	2	1	n/a	1	19		10	
Lucas County Stormwater District - Shantee Creek Study	1	1	1	2	1	1	-1	1	1	1	1	1	1	1	2	-1	1	-1	2	1	n/a	1	19		11	
City of Oregon - Flood Relief and Erosion Control Project	1	1	1	2	1	1	-1	1	1	1	1	1	1	1	2	-1	1	-1	2	1	n/a	1	19		12	
Identify hot spots or high priority projects involving multiple jurisdictions & organize stakeholders, develop a governance structure, identify & prioritize projects and implement	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1	-1	1	1	1	1	1	19	Will need to seek outside funding. This project is rated last because it is longer term.	13	
Educate citizens on viable flood protection options & methods appropriate for risk level.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	1	1	n/a	n/a	1	17	Will need to seek outside funding. Rated high because it effectively mitigates loss of life.	14	
Provide education for units of government & citizens.	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	2	1	1	-1	1	n/a	n/a	1	16	Will need to seek outside funding.	15	
City of Toledo/Lucas County - Watershed Assessment Management Plan for the Lower Maumee River Watershed	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	2	-1	1	-1	1	1	n/a	1	15		16	
Work with the National Weather Service & local media to provide the most effective warning system to alert citizens in flood prone areas & on low-lying roadways of the intensity.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	1	15	Will need to seek outside funding. This very effectively mitigates loss of life.	17	
Ensure compliance and enforcement of Lucas County's Storm Water Management Plan and flood zoning through fines and penalties.	-1	1	1	1	1	1	1	1	1	1	-1	1	1	-1	1	1	1	1	1	n/a	n/a	1	15	This project is important in mitigating flood waters.	18	
City of Toledo - Silver Creek Phase 1 Construction - Culverts	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14	Proposed 2011 and 2012	19	
City of Toledo - Mayor Ditch, Heldman to Corp. Limits	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14	Proposed 2011	20	
City of Toledo - Eisenbraun Ditch Phase 2 Design/Acquisition	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14	Proposed 2013 and 2014	21	
City of Toledo - Silver Creek Phase 2 Construction	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14	Proposed 2013	22	
City of Toledo - Eisenbraun Ditch Phase 2 Construction - Wyndale Road to Talmadge Road	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14	Proposed 2015	23	
Lucas County Stormwater District - Ten Mile Creek Improvements (Herr to Brint)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14		24	
Lucas County Stormwater District - Prairie Creek Improvements (Bancroft to Ten Mile Creek)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14		25	
Lucas County Stormwater District - Swan Creek Improvements	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14		26	
Lucas County Stormwater District - Hill Ditch Retention Pond (Elmer at I-475)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14		27	
Lucas County Stormwater District - Heldman Ditch Retention Pond (Hill at I-475)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	14		28	

**Lucas County, Ohio
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	Social		Technical			Administrative			Political			Legal			Economic			Environmental								
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws			
Lucas County Stormwater District - Eisenbraun Ditch Retention Pond (Flanders at Alexis)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		29
Lucas County Stormwater District - Mayer Ditch Retention Pond (Nebraska at I-475)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		30
Lucas County Stormwater District - Prairie Ditch Retention Pond (Secor Park)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		31
Lucas County Stormwater District - Swan Creek Retention Pond (Keener at Lose Road)	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		32
Village of Waterville - Waterworks Park Ballfield Relocation	-1	1	1	2	1	1	-1	1	1	1	-1	1	1	1	2	-1	1	-1	1	1	n/a	1	1	14		33
City of Oregon - Big Ditch Improvements Project	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		34
Village of Ottawa Hills - Waterway Improvements 10 Mile Creek/Ottawa River from Secor Road to Central Avenue	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14		35
Identify areas that have unique flooding & storm related issues.	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	1	1	13	Will need to seek outside funding. Identification of these areas will help jurisdictions in their mitigation planning.	36
Flash Floods																										
Rebuild, replace & upgrade any & all storm drainage systems deemed inadequate to handle flash flooding events.	1	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	1	1	1	12	Will need to seek outside funding. This is rated high because it will ensure maximum efficiency of the storm drain system.	1
Survey all floodplain areas currently recognized by FEMA adjacent to creeks & streams to ensure flash flood-prone areas are included.	-1	1	1	1	1	1	-1	1	1	1	-1	1	1	1	1	1	1	1	1	n/a	n/a	1	1	15	Will need to seek outside funding. Important project because all possible areas that are impacted by flooding need to be identified.	2

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Develop & pass roadway construction ordinances to ensure future roadway projects comply with current construction ordinances to ensure future roadway projects comply with current standards for design year floods.	-1	1	1	1	1	1	1	1	1	1	-1	1	1	1	1	-1	1	-1	1	1	1	1	1	1	15	Will need to seek outside funding.	3
Investigate current roadways located in flash flood-prone areas to ensure compliance with current standards for design year floods.	-1	1	1	1	1	1	-1	1	1	1	-1	1	1	1	1	-1	1	-1	1	1	1	1	1	13	Will need to seek outside funding. Flooded roadways is a major hazard & contributor to loss of life.	4	
Lake Surges																											
Employ in-lake early warning technologies to combat lake surge losses before they happen.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	1	n/a	n/a	n/a	n/a	1	13	Will need to seek outside funding. This is rated number one because this project would minimize losses.	1	
Monitor lake levels to rapidly warn residents of potential surge flooding.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	1	1	14	Will need to seek outside funding. High potential life saving value.	2	
Develop back up emergency power plan for critical facilities during lake surge events.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	1	n/a	n/a	n/a	n/a	1	13	Will need to seek outside funding. Very important for the safety of all citizens.	3	
Develop building codes that address enforcement of lake surge resistance measures.	1	1	1	1	1	1	-1	-1	1	-1	-1	1	1	-1	1	-1	1	-1	1	n/a	n/a	1	1	7	Could be a hot issue with builders and citizens as well. Will need to seek outside funding. Rated high because of it's mitigation value.	4	
Develop system of dikes to protect most vulnerable infrastructure within lake surge floodplain and where applicable, develop lake buffer zones.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	12	Will need to seek outside funding. Rated high because of it's protection value.	5	
Create effective milestones or warning measuring points to evaluate the possibility/probability for surge flooding.	1	1	1	-1	-1	1	-1	-1	1	1	1	1	1	1	1	-1	1	1	n/a	n/a	n/a	n/a	1	9	Will need to seek outside funding. Rated high because of the warning value.	6	
Identify evacuation Reception Centers stocked with necessary supplies for emergency lake surge evacuation.	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	1	-1	n/a	-1	n/a	n/a	n/a	1	1	9	Rated high because of protection value for potentially affected citizens.	7	
Establish emergency response plans to evacuate people from lake surge areas.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	1	1	1	1	n/a	n/a	1	1	17	Will need to seek outside funding.	8	
Determine Lake surge prone areas to create lake buffer zones.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	15	Will need to seek outside funding.	9	
Establish a chain of command to take charge in event of lake surge evacuation.	1	1	1	-1	1	1	1	n/a	n/a	1	1	1	1	1	1	1	n/a	1	n/a	n/a	n/a	n/a	1	14		10	
In conjunction with the Department of Health, develop a pamphlet and public information program informing the public of preventative measures to take to avoid water-borne illness related to lake surge.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	n/a	n/a	n/a	1	1	14		11	
Severe Storms																											
Refrain from planting trees in and around utility lines, or plant low growing species that will not interfere with the lines. Place a higher priority on tree trimming/maintenance along utility easements.	1	1	1	1	1	-1	-1	-1	1	1	1	-1	1	-1	1	-1	1	-1	1	1	n/a	n/a	1	7	There will probably be some resistance to this idea because of the cost involved and the fact that it is a new/different concept. Rated high because of it's value & easy implementation.	1	
Provide a secure and reliable emergency wireless communication system for use by elderly or disabled citizens to reduce chance of isolation in a severe storm event and the aftermath.	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	n/a	n/a	n/a	n/a	1	9	Will need to seek outside funding. High value due to it's potential value to at risk population.	2	
Encourage implementation of tree trimming & maintenance programs for private property owners to protect health & safety during a severe storm event, & distribute literature to the general public educating them on proper tree planting techniques, including safe distances from structures & utility lines.	1	1	1	1	1	-1	-1	-1	-1	1	-1	1	1	-1	1	-1	1	-1	1	1	n/a	1	1	4	Will need to seek outside funding. Will probably meet with opposition from the public because of cost involved and the idea of government involvement. Political resistance is possible due to cost. Rated high because this is a project that can easily be implemented & is a high impacting mitigation project.	3	
Improve severe storm detection techniques and initiate storm alerts earlier to allow citizens more time to prepare their structures for severe storm events.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	1	-1	-1	-1	1	n/a	n/a	1	1	9	Will need to seek outside funding. Potentially life saving.	4	

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Initiate damage assessment training for emergency response personnel to include building inspection personnel that encompasses structural, electrical, plumbing and heating expertise, which would be invaluable in storm damage assessment. Establish a triage-like procedure for initial evaluation of structural and mechanical damage to structures caused by severe storms.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	1	1	15	Contractors may oppose having to take costly safety measures for the mobile homes. Will need to seek outside funding.	5
City of Sylvania - Back-Up Generator - Maple Drive	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	n/a	n/a	n/a	1	1	10	5036 Maple Dr.	6
City of Sylvania - Back-Up Generator - Sylvania Avenue	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	n/a	n/a	n/a	1	1	10	5555 Sylvania Ave.	7
Implement improved severe weather forecasting and warning systems.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	1	12	Will need to seek outside funding. Valuable tool in the safety & protection of citizens.	8
Establish a uniform damage reporting procedure for all jurisdictions to utilize in Lucas County with Lucas County Emergency Management Agency as the clearinghouse for damage assessment data following a severe storm event.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	1	12	Will need to seek outside funding. Rated low because it has little "present-time" mitigation value.	9
Severe Winter Storms																										
Work with critical facilities to develop emergency communications plans and emergency power backup plans.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	1	16	Will need to seek outside funding. Placed lower because it can expedited easier than some of the lower rated projects.	1
Develop a countywide tree management program to reduce the probability of damage to existing above-ground utilities from severe winter storm events that includes provisions to encourage the planting of species that are less susceptible to damage and ensures that trees are planted sufficiently far from above-ground utility lines and buildings.	1	1	1	1	1	-1	-1	-1	1	1	1	1	1	1	-1	-1	1	1	n/a		1	1	11	Will need to seek outside funding. Placed higher due to the possible mitigation value.	2	
Coordinate with the American Red Cross to establish heating centers for at-risk citizens/residences, provide winter storm kits and design a public information campaign that includes educating citizens about snow winter storm warnings, alternative forms of heating, and family/individual emergency communications plans.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	1	n/a	n/a	n/a		1	1	14	Will need to seek outside funding.	3
Develop and adopt countywide winter maintenance procedures that include snow trapping devices, "smart salting" techniques, and applying deicing chemicals before severe winter storms happen.	1	1	1	1	1	-1	-1	-1	-1	1	1	1	-1	-1	1	-1	1	-1	1	n/a		1	1	6	This is a proactive project and will involve cost not allocated. It is quite possible that local government will oppose it. Will need to seek outside funding.	4
Earthquakes																										
Develop emergency plans for evacuation of communities in the event that an earthquake occurs that are up to date and are utilizing the latest information available.	2	1	1	1	1	-1	1	1	1	1	1	1	1	2	1	n/a	1	n/a	n/a	n/a	1	1	19		1	
Provide outreach to inform citizens of the need to plan and prepare for all hazards to reduce the impact of an earthquake disaster and aid the recovery.	1	1	1	2	1	-1	1	1	1	1	1	1	1	1	1	n/a	1	n/a	n/a	n/a	1	1	18		2	
Work with engineers and architects to survey existing buildings and infrastructure and develop recommendations for seismic resiliency.	1	-1	1	1	1	1	1	1	1	1	1	1	-1	1	1	1	1	n/a	n/a	n/a	1	1	16		3	
Provide Emergency Preparedness information and resources relative to earthquake events to the public through an active education and outreach program.	1	1	1	1	1	-1	-1	-1	-1	1	1	1	1	-1	1	-1	1	-1	1	n/a	n/a	1	1	12	Will need to seek outside funding.	4

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7a. Evaluation of Mitigation Action Items

Action Items	STAPLEE Criteria																					Total	Comments	Priority Rank		
	Social		Technical			Administrative			Political			Legal			Economic			Environmental								
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws			
Designate pedestrian safe zones to prohibit public access in areas directly below damaged infrastructures until repairs can be made.	1	-1	1	-1	1	1	1	-1	1	1	1	1	1	-1	1	1	n/a	1	n/a	n/a	n/a	1	1	11		5
Droughts																										
Encourage water conservation through public outreach programs prior to a drought event.	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a		1	13	Will need to seek outside funding. Rated high for potential loss reduction.	1
Implement & distribute Drought Do's & Don'ts to the general public.	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a		10	Will need to seek outside funding. Rated higher because it will help citizens mitigate loss.	2	
Review policies on non-essential residential and commercial uses of water to maintain existing supply and integrity of systems.	-1	1	1	-1	1	1	1	1	1	1	1	1	1	1	2	1	n/a	1	2	n/a	n/a	1	1	18		3
Provide guidance to jurisdictions on potential new sources of water during extreme drought.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a	n/a	1	12	Will need to seek outside funding. Rated higher because it will help lessen the loss.	4
Reduce risk of fire damage during extreme drought with restrictions on open burning and campfires.	-1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	n/a	1	1	1	n/a	1	1	17		5
Develop sample ordinances of water conservation.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a		1	13	Will need to seek outside funding. This is rated lower because of its lesser mitigation value.	6
Establish economic incentives for private investment in water conservation.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a		1	11	Will need to seek outside funding.	7
Organize drought informational meeting for the public and media.	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a	1	1	11	Will need to seek outside funding.	8
Establish water hauling programs for livestock during extreme drought.	1	1	1	-1	1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a		1	11	Will need to seek outside funding.	9
Establish a data management system to identify drought-related agricultural losses so subsidy programs can be utilized to their full advantage.	1	1	1	-1	-1	1	-1	-1	1	1	1	1	1	1	-1	1	-1	1	1	n/a	n/a	n/a		8	Will need to seek outside funding.	10
Wildfires																										
Increase media coverage of threat and evacuation procedures during peak wildfire times of the year, distribute informational packages in high and moderate wildfire risk areas, and increase enforcement of existing open burning laws.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23		1
Enhance and expand training and awareness of fire departments in wildfire hazard areas and provide specialized equipment for controlling and extinguishing of wildfires.	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	1	15	Will need to seek outside funding. Higher mitigation value.	2
Use controlled burns to decrease the amount of fuel load in the identified moderate and high wildfire hazard areas.	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	n/a	n/a	n/a	1	21		3
Coordinate with all jurisdictions to develop a vulnerability assessment for wildfires, and implement a plan for completing them.	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	1	14	Will need to seek outside funding. Would be of greater assistance in determining specifics of future mitigation projects.	4
Identify and protect high and moderate wildfire risk areas and critical facilities.	1	1	1	1	1	-1	-1	1	1	1	1	1	1	1	-1	1	-1	1	1	1	1	1	1	14	Will need to seek outside funding. Of greater mitigation value to the at risk population.	5
Landslides																										
Erect a series of warning signs along roadways where slips and slides are a possibility.	1	1	1	1	1	1	-1	-1	1	1	1	1	1	-1	1	-1	-1	-1	1	n/a	n/a	1	1	9	Will need to seek outside funding. This project has a high possibility of mitigation loss/injury to citizens.	1
Coordinate with Agencies involved in roadway construction to require that new lakeside/riverfront roadways be designed to hold soil in place.	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	1	1	n/a	n/a	1	1	19		2
Temperature Extremes																										
Establish a Fire Advisory System to identify "fire risk." during extended periods of extreme heat or cold.	1	1	1	-1	1	1	-1	1	1	1	1	1	1	1	1	1	1	1	n/a	n/a	n/a	n/a	1	15	Will seek outside funding.	1

**Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7a. Evaluation of Mitigation Action Items**

Action Items	STAPLEE Criteria																							Total	Comments	Priority Rank
	Social		Technical			Administrative			Political			Legal			Economic			Environmental								
	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws			
Coordinate with utilities and transportation authorities to improve rapid communications between emergency services and the private sector when basic services might be disrupted during extended periods of extreme heat or cold.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	14	Will seek outside funding.	2
Review fire safety ordinances for open burning and the use of liquid fuel and electric space heaters.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	14		3	
Coordinate with service support groups to provide a list of "Cooling/Warming Centers" for use during extended periods of extreme heat or cold to at risk citizens.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	-1	1	-1	1	n/a	n/a	n/a	1	14	Will seek outside funding.	4	
Provide Emergency Preparedness information and resources relative to extreme temperature events to the public through an active educational outreach program with specific plans and procedures for Senior Citizens and the Disabled.	1	1	1	-1	1	1	-1	1	1	1	1	1	1	1	1	n/a	n/a	n/a	n/a	n/a	n/a	1	13	Will seek outside funding. Protection of human life is of greater value than animal life.	5	
Develop plans for the protection and care of animals during extended periods of extreme heat or cold.	1	1	1	1	1	1	-1	1	1	1	1	1	1	1	-1	n/a	-1	n/a	n/a	n/a	n/a	1	12	Will seek outside funding.	6	

Table 7b Mitigation Action Items Completed Since the 2004
CANHMP

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7b. Mitigation Action Items Completed Since the 2004 CANHMP

Action Items	Comments
Floods	
Develop a system to ensure storm drains are not blocked & are able to receive water in flood prone areas.	The County Engineer and Municipal Public Utilities have implemented programs in 2008 to assure drains are clear or cleaned on a rotating 3 year schedule.
Develop and use a flood risk map based on hydric soils, wetlands, and areas of past damage and make the information available to the public.	Updated flood risk maps and soil studies were completed in 2010. Public meetings were held in each jurisdiction.
Educate citizens & public employees on the need to keep storm drains clear of debris & use flood occurrences as an opportunity to implement upgrades.	The Storm Water Coalition developed programs in 2009 and in conjunction with Partners for Clean Streams and Keep Lucas County Beautiful support and conduct public information and outreach programs annually.
Evaluate road elevation & culvert sizing standards for construction upgrade on all County roads.	The County Engineer and Municipal Public Utilities reviewed elevations and culvert sizings for existing and new road projects through 2010.
Develop water shed-scale storm management plans.	The Lucas County Storm Water Coalition completed a review of the watersheds of several drainage systems that impact Lucas County in 2009 that was used to update storm management plans.
Review and revise the county's floodplain regulations.	Updated August 16, 2011.
Flash Floods	
Clean all ditches, streams & creeks in Lucas County to allow for the quick removal of excess water & disallow future flash flooding in low lying areas.	Ditches, streams and Creeks are routinely assessed in each jurisdiction and placed on a list for cleaning each year to assure maximum unobstructed flows.
Lake Surges	
Identify by LiDAR and other technical methods, low-lying areas where storm surge waters can/will accumulate and determine how to best purge excess lake surge waters.	A variety of survey measures have been used to determine low-lying areas to mitigate flood damage or to provide for the retention of flood waters where necessary.

Table 7c Mitigation Action Items Removed Since the 2004 CANHMP

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7c. Mitigation Action Items Removed Since the 2004 CANHMP

Action Items	Comments
Tornadoes	
Develop an educational program for contractors on ways to stabilize existing & future mobile homes against straight line & tornado winds.	This program is provided by the Board of Building Standards and local Contractor's Assn.
Identify existing culturally or socially significant structures & critical facilities within Lucas County that have the most potential for losses from tornado events & identify needed structural upgrades & perform upgrades.	Upon review any listing of significant structions and critical facilities at risk to Tornadoes would encompass the entire County. While such structures have been identified no funding was available to perform upgrades.
Floods	
Survey property owners to determine interest & assess cost. Assist local units of government to identify funding sources to acquire & remove or otherwise protect existing homes in the floodplain.	This is an action item for Local flood plain managers in each respective jurisdiction.
Implement a voluntary program of flood protection & property acquisition & relocation for high-risk residences and repetitive loss properties.	This is an action item for Local flood plain managers in each respective jurisdiction.
Evaluate areas that need a flood warning system constructed.	National Weather Service, NOAA and USGS Hydrological Survey data was used to determine likely flood zones. The areas identified were not subject to abrupt flood events negating the need for a dedicated early warning system.
Explore options for improving the ability of local units of government to report flooding, receive information, response & request assistance.	Current plans and procedures provide for the reporting, assessment and information sharing to respond and recover from a flood event.
Develop criteria for defining & evaluation "flood mitigation value".	This is a requirement of State and Federal jurisdictions.
Flash Floods	
Work with ODNR and the Local Floodplain Manager to develop detailed inundation mapping and inventory of area downstream of Class I dam.	There are no Class 1 Dams in Lucas County.
Request funds or grants to buy out residences located in identified flash flood-prone areas.	Lucas County has no identified "Flash" Flood prone areas.
Lake Surges	
Create/maintain the use of storm dikes.	This is an ongoing program monitored by local flood plain managers and the Corps of Engineers.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7c. Mitigation Action Items Removed Since the 2004 CANHMP

Establish pumping systems to allow removal of surge water.	Dedicated pumps have been provided or are in place to relieve storm water surge.
Develop a system to periodically dredge Lake Erie Western Basin to decrease force and increase surge volume capacity.	This is a responsibility of State and Federal jurisdictions.
Advise future development of critical facilities to be located outside of the lake surge areas.	The current Lake Erie Storm Surge area is presently identified as a Conservancy District in order to limit development.
Investigate feasibility of building protective wall to prevent rise of lake levels that cause surge flooding and damage roadways.	Existing dikes are in place to protect roads and other infrastructure in identified Lake Surge prone areas.
Severe Storms	
Purchase portable generators and deploy them as miniature sub-stations to rapidly assist in the reconnection of priority power and communications assets after a severe storm event.	Not practical or feasible.
Reposition as many utility lines as possible underground. Encourage, through legislation/zoning regulations, all new utility lines to be placed underground. Place deflectors on key utility lines that are more likely to accumulate ice or snow.	This is a responsibility of State Agencies and Departments and outside of local control.
Purchase portable generators and deploy them as miniature sub-stations to help rapidly restore power to at risk citizens after a severe storm event & the aftermath.	Back-up power in place at critical facilities.
Implement a research program that identifies the location, number, and specific physical assistance required during a severe storm event for disabled and senior citizens.	A joint working group led by the University of Toledo's Geography Department conducted a study in 2005 that identified potential special needs populations. Local emergency response organizations will use routine warning and notification systems as no reverse 9-1-1 systems exist in Lucas County.
Analyze all of the residential codes adopted throughout Lucas County and recommend modifications, if needed, to local jurisdictions to remove code deficiencies relating to wind loads, snow loads and electrical grounding.	This is a responsibility of State Agencies and Departments and outside of local control.
Expand distribution points of severe weather alerts to the general public.	Severe weather alert capabilities have expanded with new technologies in both the public and private sectors.
Make information available to contractors and homeowners of mobile homes on ways to anchor their structures sufficiently to minimize damage from severe storms.	Information and standards are made available by each jurisdiction.

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 7c. Mitigation Action Items Removed Since the 2004 CANHMP

Recommend discontinuing the practice of constructing flat roofed buildings in Lucas County. Design and recommend an alteration to existing flat roofs that eliminate or minimize build up of snow ice, hail, and water.	This is a responsibility of State Agencies and Departments and outside of local control.
Identify historic and architecturally significant buildings, as well as critical facilities throughout Lucas County that could suffer damage from severe storms and recommend potential structural upgrades, and then perform upgrades.	Upon review any listing of significant structures and critical facilities at risk to Tornadoes would encompass the entire County. While such structures have been identified no funding was available to perform upgrades.
Severe Winter Storms	
Develop and adopt home and business codes that include provisions for impact-resistant roofing materials.	This is a responsibility of State Agencies and Departments and outside of local control.
Develop a real-time information system for monitoring pavement and weather conditions that can be synchronized with snow removal machinery for more accurate, efficient and timely snow removal.	Automated web-based system is used for most State and Federal highways. Local jurisdictions utilize a real-time active assessment protocol to support decisionmaking.
Develop and adopt future development codes to include provisions for buried power and communication lines, especially for critical facilities.	This is a responsibility of State Agencies and Departments and outside of local control.
Work with community groups to identify potential at-risk citizens/residences and use the Reverse 9-1-1 System to contact those identified citizens/residences.	A joint working group led by the University of Toledo's Geography Department conducted a study in 2005 that identified potential special needs populations. Local emergency response organizations will use routine warning and notification systems as no reverse 9-1-1 systems exist in Lucas County.
Lessen the occurrence of power outages and associated repair costs by developing an informational program to encourage local utility companies to bury their transmission lines under ground.	This is a responsibility of State Agencies and Departments and outside of local control.
Develop and include safety strategies for severe winter storm events in driver education classes.	Current training and education programs exist within the private sector.
Earthquakes	
Inspect, remove or repair existing ornamentation on older masonry buildings, and design safe zones to prohibit public access in areas directly below aging structures.	This is a responsibility of State Agencies and Departments and outside of local control.
Upgrade existing commercial/industrial building codes for large span structures.	This is a responsibility of the State and Local Board of Building Standards.
Improve systems for isolating and rerouting utilities where possible.	This is a responsibility of State Agencies and Departments and outside of local control.
Develop countywide construction regulations preventing construction in areas with unconsolidated sandy soils.	This is a responsibility of State Agencies and Departments.

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Countywide All Natural Hazard Mitigation Plan
Table 7c. Mitigation Action Items Removed Since the 2004 CANHMP

Develop emergency plans for underground utilities and surface transportation networks in the event that an earthquake occurs that are up to date and are utilizing the latest information available.	This is a responsibility of State Agencies and Departments and outside of local control.
Develop technical assistance information programs for homeowners teaching them how to seismically strengthen their houses against earthquake damage.	Technical assistance is available through FEMA programs available to the general public.
Droughts	
Implement a water metering and leak detection program.	Municipal water systems are capable of isolating major leaks and will respond to evidence of smaller out-flows.
Provide farmers with list of livestock watering locations during extreme drought.	Not applicable due to negligible livestock operations.
Advise water suppliers on assessing vulnerability of existing supply systems.	Not applicable.
Establish a countywide drought information center.	Not applicable.
Wildfires	
Develop an educational public awareness campaign informing citizens of land management and landscaping options to limit wildfire spread.	Applicable to specific regions during extreme dry periods when the fire risk is high. Restrictions on open burning including recreational fires are in place.
Amend existing building codes to require fire resistant roofing and exterior coverings on all structures in high or moderate wildfire risk areas.	This is a responsibility of the State and Local Board of Building Standards.
Develop an educational program for builders and developers teaching them fire protection and prevention options.	This program is provided by the Board of Building Standards and local Contractor's Assn.
Landslides	
Coordinate with Agencies involved in roadway construction to require that new lakeside/riverfront roadways be designed to hold soil in place.	All roadway projects are reviewed for potential risk of soil subsidence or land slide.
Develop and adopt future roadway development regulations that include the use of grading to increase slope stability.	Not Applicable.
Develop and implement building restrictions in landslide-prone riverbank and lakeside areas that include provisions to increase soil stability through vegetative plantings.	Not Applicable.
Develop and adopt building codes to include landslide preventative regulations.	This is a responsibility of State Agencies and Departments.
Temperature Extremes	
Review plans for lessening agricultural damage and recovery during extended periods of extreme heat.	This is a responsibility of State Agencies and Departments.

Table 8 Implementation Strategy

Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 8. Implementation Strategy

Action Items	Priority	Implementation Strategy											
		Mitigation Action	Beneficiaries (Jurisdictions)	Responsible Parties (Lead and Support Agencies)	Responsibilities of Each Party	Technical Assistance Resources	Funding Sources	Task Summary	Cost Estimate	Materials List (Equipment, Vehicles, Supplies and Staff)	Start Date (Year)	End Date (Year)	Duration
Tornadoes													
Review existing warning siren coverage & recommend new locations if & where there are coverage gaps. Utilize grant funding wherever possible to purchase new warning sirens.	1	Other - Preparedness	Citizens in Lucas County where the coverage gaps occur. Includes the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and Whitehouse, and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County Department of Emergency Services, Emergency Management Agency in conjunction with City and Village Administrators, and Townships Administrators or Fiscal Officers within the county.	Make the Assessment and find the funding source.	OEMA, Federal Signal	Local Funds, Grants	1. Review the siren coverage maps for gaps. 2. Interface with communities regarding locations of future sirens. 3. Make a determination of new locations. 4. Locate the funding. 5. Send the job out to bid. 6. Choose the contractor and begin the work.	> \$1,000,000.00	To be determined during project development.	2013	2015	2 years
Work with local governments to coordinate public awareness campaigns on tornado safety & preparedness in their local newspapers & government newsletters.	2	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) in conjunction with Lucas County Department of Emergency Services (EMA).	Each jurisdiction will need to be responsible for coordination with their local media in order to promote the campaign.	County and local jurisdiction Public Information Officers coordinated by the Department of Emergency Services (EMA).	Local Funds	1. EMA coordinate with local governments on the development of tornado safety public awareness campaign. 2. EMA facilitate the distribution of the campaign throughout the jurisdictions.	<\$10,000.00	Visual aids, printed materials (articles, pamphlets, etc.)	2013	2015	2 years
Develop a program to provide information and building specifications on "Safe Rooms" for communities most susceptible to injury or loss of life resulting from future tornado events.	3	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) in conjunction with Lucas County Department of Emergency Services (EMA).	EMA coordinates the project and obtains information and building specifications. Each jurisdiction will need to be responsible for identifying communities most susceptible to injury or loss of life resulting from future tornado events	FEMA	Grants, Other - Volunteer Service and Private Sector.	1. EMA coordinate with local jurisdictions. 2. EMA obtains information and building specifications. 3. Local jurisdictions identify at risk communities. 4. EMA distributes information and building specifications to local jurisdictions.	<\$25,000.00	To be determined during project development.	2013	2015	2 years
Educate the public to secure all loose items on decks, porches and in yards.	4	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) in conjunction with Lucas County Department of Emergency Services (EMA).	EMA coordinates the project. The County PIO develops appropriate press releases and coordinates with the various news media for distribution.	FEMA, Departments of Public Safety, Risk Management, OEMA	Grants	EMA will research the subject. Once all the necessary data is obtained, develop a public service campaign with the PIO.	<\$25,000.00	To be determined during project development.	2013	2018	2 years then ongoing

**Lucas County, Ohio
Countywide All Natural Hazard Mitigation Plan
Table 8. Implementation Strategy**

Action Items	Implementation Strategy												
	Priority	Mitigation Action	Beneficiaries (Jurisdictions)	Responsible Parties (Lead and Support Agencies)	Responsibilities of Each Party	Technical Assistance Resources	Funding Sources	Task Summary	Cost Estimate	Materials List (Equipment, Vehicles, Supplies and Staff)	Start Date (Year)	End Date (Year)	Duration
Review existing public shelters & recommend new locations if & where there are coverage gaps in meeting the above stated objective.	5	Storm Shelter	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County Department of Emergency Services, Emergency Management Agency in conjunction with City and Village Administrators, and Townships Administrators or Fiscal Officers within the county.	Make the Assessment and find the funding source.	The American Red Cross, OEMA	Local Funds	1. Along with the Red Cross, review the public shelter coverage for gaps. 2. Interface with communities regarding locations of future public shelters. 3. Identify needs of special populations, including trailer and manufactured housing communities. 4. Locate the funding source. 5. Implement the project.	<\$100,000.00	To be determined during project development.	2013	2018	1 year then ongoing

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Countywide All Natural Hazard Mitigation Plan
Table 8. Implementation Strategy

Action Items	Priority	Implementation Strategy											
		Mitigation Action	Beneficiaries (Jurisdictions)	Responsible Parties (Lead and Support Agencies)	Responsibilities of Each Party	Technical Assistance Resources	Funding Sources	Task Summary	Cost Estimate	Materials List (Equipment, Vehicles, Supplies and Staff)	Start Date (Year)	End Date (Year)	Duration
Develop weather spotters training courses & implement training within local fire & police departments.	6	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Department of Emergency Services (EMA) in coordination with Amateur Radio, each local police and fire department.	Develop the training program while finding the funding sources.	Amateur Radio	Other - Fire & Police Department training budget	1. EMA and Amateur Radio develop the training courses; coordinate the training facilities and training schedule with police & fire.	<\$50,000.00	Training workbooks and visual training materials.	1990	2018	Ongoing
Review all Lucas County & municipal building codes & recommend revisions for future construction to reflect best current standards for anchoring against straight line & tornado winds.	7	Land Development Regulations	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) in conjunction with Lucas Co. EMA, Toledo-Lucas County Plan Commission, Building Regulation	All of the agencies work in cooperation with each other to do a review of all the County & municipal building codes & recommend revisions.	Office of Management & Budget	Local funds	1. EMA facilitates the review. 2. The Plan Commission is the lead for the review & recommendations. 3. Building Regulations will apply the recommendations to new & current construction.	<\$25,000.00	To be determined during project development.	2000	2018	Ongoing
Develop a program to identify those existing mobile homes & older buildings throughout Lucas County that have the most potential for anchoring against straight & tornado force winds.	8	Land Development Regulations	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County EMA. Supporting agencies: Building Regulation, the County auditor, local fire & law enforcement agencies, Builders Associations, Manufacturers of mobile homes, Risk Management, and the Department of Public Safety.		Building Regulations Departments, the County Auditor (GIS), the local fire and law enforcement agencies, Builders Associations, Manufacturers of mobile & manufactured homes, Risk Management, Department of Public Safety.	Grants	1. EMA coordinates the project. 2. Building Regulations recommend necessary requirements. 3. The County Auditor is a source for helping to locate the specific properties. Local fire and law enforcement agencies are aware of properties that may not yet be identified by the Auditor. 4. Builders Associations offer their expertise on the specifics as well as any applicable coding. 5. Risk Management and the Department of Public Safety offer their expertise on the specifics.	>\$100,000.00	To be determined during project development.	2000	2018	Ongoing
Keep up-to-date lists of addresses with shelters, to assist Fire Departments, Emergency Services agencies & communities & to coordinate the distribution of these lists to the appropriate local government officials.	9	Storm Shelter	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction's local fire departments, and communities in conjunction with the Department of Emergency Services (EMA), local fire departments, and local jurisdictions (communities).	EMA will coordinate the entire project. Local jurisdictions will compile the lists. EMA will facilitate the distribution of the lists and in coordination with the jurisdictions, ensure the lists are kept to date.	Local jurisdictions and fire departments and the Red Cross.	Local Funds, Grants	1. EMA coordinates with all the local jurisdictions & the Red Cross for the necessary information and compiles a data base. 2. Local jurisdictions meet to decide how (to whom) the lists will be distributed. 3. EMA coordinated the distribution. 4. EMA & the local jurisdictions coordinate on keeping the lists up to date.	Minimal	Primarily office products (paper, computers, printers, etc.)	2000	2018	Ongoing

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Determine how to accommodate individuals with special needs both in the emergency plan for the shelter & in the design of the shelter including complying with the American with Disabilities Act (ADA).	10	Storm Shelter	Citizens in each jurisdiction and township in Lucas County with special needs.	Department of Emergency Services (EMA) in coordination with the Area Office on Aging, the American Red Cross, and the Ability Center.	All of the agencies work in cooperation with each other to do a study of the needs of the special population for sheltering accommodations.	Area Office on Aging, the American Red Cross, EMA, the Ability Center & EMA.	Local Funds, Grants	1. The Ability Center provides their expertise on the specific needs of the special population as it relates to shelter design. 2. The Area Office on Aging provides their expertise on the specific needs of the elderly as it relates to shelter design. 3. The Red Cross provides specifications on shelters and shelter management. 4. EMA provides expertise on federal regulations, supply needs and funding sources.	To be determined during project development.	To be determined during project development.	2008	2018	Ongoing
Springfield Township - Tornado Saferoom at Westside Montessori School	11	Storm Shelter	Springfield Township	Springfield Township Administrator and Lucas County Department of Emergency Services	EMA coordinates the project and obtains information and building specifications for Springfield Township. Springfield Township responsible for implementing the project.	EMA, OEMA, FEMA	Local Funds, Grants	1. EMA obtains information and building specifications. 2. EMA distributes information and building specifications to Springfield Township. 3. Springfield Township and EMA obtain funding. 4. Saferoom is constructed.	To be determined during project development.	To be determined during project development.	2013	2017	1-4 years
Providence Township - Tornado Saferoom at Whispering Winds Mobile Home Park	12	Storm Shelter	Providence Township	Providence Township Fiscal Officer and Lucas County Department of Emergency Services	EMA coordinates the project and obtains information and building specifications for Providence Township. Providence Township responsible for implementing the project.	EMA, OEMA, FEMA	Local Funds, Grants	1. EMA obtains information and building specifications. 2. EMA distributes information and building specifications to Providence Township. 3. Providence Township and EMA obtain funding. 4. Saferoom is constructed.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
Providence Township - Tornado Saferoom at Country Campground LLC	13	Storm Shelter	Providence Township	Providence Township Fiscal Officer and Lucas County Department of Emergency Services	EMA coordinates the project and obtains information and building specifications for Providence Township. Providence Township responsible for implementing the project.	EMA, OEMA, FEMA	Local Funds, Grants	1. EMA obtains information and building specifications. 2. EMA distributes information and building specifications to Providence Township. 3. Providence Township and EMA obtain funding. 4. Saferoom is constructed.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
Floods													
Improve City of Toledo Stormwater Management Plan	1	Stormwater	City of Toledo	City of Toledo Engineer, Lucas County Engineer & Storm Water Coalition	Engineer to identify funding sources, prioritize projects, and improve the plan.	Toledo-Lucas Plan Commissions	Grants	1. Engineer to identify funding sources. 2. Prioritize projects. 3. Improve the plan.	To be determined during project development.	To be determined during project development.	2008	2018	Ongoing
Develop a comprehensive communication system between the County & local governments - with procedure templates describing warning systems.	2	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local fire, police, jurisdictional decision makers, EMA	This is a group effort with EMA coordinating & facilitating & finding any necessary funding.	OEMA, FEMA, Federal Signal, &	Grants	1. Jurisdictional decision makers review the communication needs, find the appropriate supplier, develop contracts, and procedure templates. 2. EMA coordinates & facilitates the process and finds the funding.	>\$100,000.00	To be determined during project development.	2013	2016	2-3 years

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Partner with insurance companies to disseminate flood insurance information to citizens in flood prone areas.	3	Education and Outreach	The citizens of Lucas County living within the flood prone areas.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) in conjunction with Lucas County Department of Emergency Services (EMA) and National Flood Insurance Program (NFIP).	Local government partners with the National Flood Insurance Program to disseminate flood insurance information.	National Flood Insurance Program & Building Regulation	Local Funds, Flood Mitigation Assistance Grant	1. EMA contacts the National Flood Insurance Program with idea. 2. The National Flood Insurance Program provides specifics. 3. Local jurisdictions disseminate the information.	Minimal	To be determined during project development.	2013	2014	1 year
Streamline the planning process for citizens to receive flood fighting information & provide information & assistance.	4	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), County PIO, American Red Cross, & the Salvation Army.	EMA will coordinate the planning process with the local jurisdictions identifying the specific needs.	Jurisdictions in Southern Ohio that have had repetitive flood damage and have instituted effective warning systems.	Local Funds, Flood Mitigation Assistance Grant	1. EMA & the local jurisdictions will evaluate the current planning process & streamline appropriately with advice from Southern Ohio jurisdictions. 2. The County PIO will be responsible for informing the citizens of the revised plan. 3. The American Red Cross & the Salvation Army will provide needed assistance during the flood fighting process.	To be determined during project development.	To be determined during project development.	2013	2014	1 year
Develop an educational program informing citizens within the flood zone of their location and/or proximity to streams.	5	Education and Outreach	The citizens of Lucas County living within the flood zone.	Each political jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), County EMA and PIOs	The local jurisdictions along with EMA work together to develop the program. The PIO's will ensure notification of the educational program schedules.	FEMA	Local Funds, Flood Mitigation Assistance Grant	1. Local jurisdictions & EMA will work together under the advisement of FEMA to develop the educational program. 2. The PIO's will institute ways to notify the public of the program schedules.	>\$10,000.00	To be determined during project development.	2013	2018	1 year then ongoing
Discuss formation of a policy that guides or further restricts development around flood prone areas & areas of high flood mitigation values (wetlands, floodplain corridors, upland storage, closed depressional basins & areas of high filtration potential).	6	Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Plan Commission, Engineers, Building Regulation, Soil & Water Conservation District, TMAGOG, Economic & Workforce Development, local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), Lucas County Commissioners	The entire group of agencies/departments will need to work together to form the policy & get it passed.	Builders & Contractors Associations, Building Regulation.	Local Funds	1. The entire group works together to formulate the policy. 2. Local jurisdictions & the County Commissioners pass the policy.	>\$10,000.00	To be determined during project development.	2013	2016	2 to 3 years

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Accurately identify & map areas that have potential "flood mitigation value".	7	Planning and Zoning	Citizens in and around flood zones.	The above group plus GIS staff (DES & Auditor's) & EMA.	Upon completing of the defining & evaluating, the working group will obtain GIS staff to identify & map the areas.	GIS Staff, Building Regulation	Local Funds	1. GIS identifies and maps. 2. EMA will facilitate the distribution of the maps.	>\$10,000.00	To be determined during project development.	2013	2014	Less than 1 year
Lucas County Stormwater District - Ten Mile Creek Study	8	Stormwater	Citizens within the 10-Mile Creek Watershed	County Engineer, possible consultant	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Identify qualified consultant. 3. Conduct study.	\$150,000.00	To be determined during project development.	2013	2018	3 to 5 years
Lucas County Stormwater District - Prairie Creek Study	9	Stormwater	Citizens within the Prairie Watershed	County Engineer, possible consultant	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Identify qualified consultant. 3. Conduct study.	\$75,000.00	To be determined during project development.	2013	2018	3 to 5 years
Lucas County Stormwater District - Swan Creek Study	10	Stormwater	Citizens within the Swan Creek Watershed	County Engineer, possible consultant	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Identify qualified consultant. 3. Conduct study.	\$100,000.00	To be determined during project development.	2013	2018	3 to 5 years
Lucas County Stormwater District - Shantee Creek Study	11	Stormwater	Citizens within the Shantee Creek Watershed	County Engineer, possible consultant	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Identify qualified consultant. 3. Conduct study.	\$50,000.00	To be determined during project development.	2013	2018	3 to 5 years
City of Oregon - Flood Relief and Erosion Control Project	12	Channel or Stream Modification, Structural Measures	City of Oregon	City of Oregon Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2018	1-5 years
Identify hot spots or high priority projects involving multiple jurisdictions & organize stakeholders, develop a governance structure, identify & prioritize projects and implement plans as funds become available.	13	Stormwater	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Decision making representatives from all the governmental jurisdictions in Lucas County and EMA.	Conduct a study of each jurisdiction's specific hot spots & high priority projects. Combine & prioritize projects. Implement plans.	OEMA, FEMA, Attorney General's Office, Building Regulation.	Local Funds, Grants	1. Each jurisdiction will have to conduct an independent study identifying specific hot spots Y high priority projects, paying close attention to areas that cross jurisdictional lines. 2. Bring the projects to a forum involving all the jurisdictions. 3. Identify the combined projects. 4. With Attorney General's guidance, develop a governance structure. 5. Prioritize the projects. 6. EMA assists in finding the funding.	To be determined during project development.	To be determined during project development.	2013	2018	3 to 5 years
Educate citizens on viable flood protection options & methods appropriate for risk level.	14	Education and Outreach	The citizens of Lucas County living within the flood zone.	EMA, the local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) & PIOs.	The local jurisdictions along with EMA will incorporate flood protection options & methods appropriate for risk levels into the above educational program. The PIOs will ensure notification of the educational program schedules.	FEMA	Grants	1. Local jurisdictions & EMA will work together under the advisement of FEMA to develop the educational program. 2. The PIO's will institute ways to notify the public of the program schedules.	<\$25,000.00	To be determined during project development.	2013	2014	1 year

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Provide education for units of government & citizens.	15	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	EMA, City and Village Administrators, and Townships Administrators or Fiscal Officers within the county.	Develop a flood awareness educational program.	FEMA, OEMA	Local Funds, Grants	1. Survey the knowledge level of specific group. 2. Develop an educational program covering all areas, especially those that were indicated as unknown. 3. Find the funding for the program. 4. Develop a schedule for the training program for each jurisdiction/governmental agency.	<\$50,000.00	To be determined during project development.	2013	2016	2 to 3 years
City of Toledo/Lucas County - Watershed Assessment Management Plan for the Lower Maumee River Watershed	16	Planning and Zoning	City of Toledo	City of Toledo Engineer, possible consultant.	Engineer to identify funding sources, prioritize projects, and improve the plan.	Toledo-Lucas Plan Commissions	Grants	1. Engineer to identify funding sources. 2. Identify need to hire consultant. 3. Prioritize projects. 4. Improve the plan.	To be determined during project development.	To be determined during project development.	2013	2018	3-5 years
Work with the National Weather Service & local media to provide the most effective warning system to alert citizens in flood prone areas & on low-lying roadways of the intensity.	17	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	EMA, local media	EMA to notify local media.	National Weather Service	Local Funds, Grants	1. EMA to identify funding sources. 2. EMA to revise warning systems 3. EMA to coordinate with local media.	To be determined during project development.	To be determined during project development.	2013	2018	1 year then ongoing
Ensure compliance and enforcement of Lucas County's Storm Water Management Plan and flood Zoning through fines and penalties.	18	Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County Engineer.	Ensure that sites are run-off appropriately & enforce any that are not.	County Engineer.	Grants	1. Monitoring site run-offs. 2. Some monitoring responsibility. 3. Enforcement proceeding.	To be determined during project development.	To be determined during project development.	2013	2016	2 to 3 years
City of Toledo - Silver Creek Phase 1 Construction - Culverts	19	Channel or Stream Modification, Structural Measures, Stormwater	City of Oregon	City of Oregon Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
City of Toledo - Mayor Ditch, Heldman to Corp. Limits	20	Channel or Stream Modification, Structural Measures, Stormwater	City of Oregon	City of Oregon Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
City of Toledo - Eisenbraun Ditch Phase 2 Design/Acquisition	21	Channel or Stream Modification, Structural Measures, Stormwater	City of Oregon	City of Oregon Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years

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City of Toledo - Silver Creek Phase 2 Construction	22	Channel or Stream Modification, Structural Measures, Stormwater	City of Oregon	City of Oregon Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
City of Toledo - Eisenbraum Ditch Phase 2 Construction - Wyndale Road to Talmadge Road	23	Channel or Stream Modification, Structural Measures, Stormwater	City of Toledo	City of Toledo Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$3,000,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Ten Mile Creek Improvements (Herr to Brint)	24	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Ten-Mile Creek Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$1,000,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Prairie Creek Improvements (Bancroft to Ten Mile Creek)	25	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Prairie Creek Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$250,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Swan Creek Improvements	26	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Swan Creek Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$500,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Hill Ditch Retention Pond (Elmer at I-475)	27	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Hill Ditch Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$250,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Heldman Ditch Retention Pond (Hill at I-475)	28	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Heldman Ditch Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$650,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Eisenbraum Ditch Retention Pond (Flanders at Alexis)	29	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Eisenbraum Ditch Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$500,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Mayer Ditch Retention Pond (Nebraska at I-475)	30	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Mayer Ditch Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$250,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Prairie Ditch Retention Pond (Secor Park)	31	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Prairie Ditch Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$1,000,000.00	To be determined during project development.	2013	2016	1-3 years
Lucas County Stormwater District - Swan Creek Retention Pond (Keener at Lose Road)	32	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Swan Creek Watershed	County Engineer.	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	\$1,000,000.00	To be determined during project development.	2013	2016	1-3 years
Village of Waterville - Waterworks Park Ballfield Relocation	33	Channel or Stream Modification, Structural Measures, Stormwater	Waterville	Waterville Engineer.	The entire project.	None	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop relocation plan. 4. Implement relocation.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years

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City of Oregon - Big Ditch Improvements Project	34	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the Big Ditch Watershed	Oregon Engineer	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
Village of Ottawa Hills - Waterway improvements 10 Mile Creek/Ottawa River from Secor Road to Central Avenue	35	Channel or Stream Modification, Structural Measures, Stormwater	Citizens within the 10 Mile Creek/Ottawa River Watershed	Ottawa Hills Engineer	The entire project.	ODNR, Consultant	Local Funds, Grants	1. Identify Funding. 2. Conduct preliminary studies. 3. Develop improvements. 4. Implement improvements.	To be determined during project development.	To be determined during project development.	2013	2016	1-3 years
Identify areas that have unique flooding & storm related issues.	36	Planning and Zoning	Citizens living in and around those areas.	All local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) & EMA.	Conduct a study of each jurisdiction's specific unique flooding areas & storm related issues.	OEMA, FEMA, GIS staff	Local Funds, Grants	1. Each jurisdiction will independently conduct a study of their area. 2. Upon completion, a group compilation is made. 3. Areas are clearly defined through mapping.	To be determined during project development.	To be determined during project development.	2013	2014	1 year
Flash Floods													
Rebuild, replace & upgrade any & all storm drainage systems deemed inadequate to handle flash flooding events.	1	Channel or Stream Modification, Structural Measures, Stormwater	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	County Engineer	The entire project.	Department of Public Works	Grants	1. Survey all storm drainage systems. 2. Upgrade all possible systems. 3. Replace all necessary systems.	>\$1,000,000.00	To be determined during project development.	2013	2018	3 to 5 years
Survey all floodplain areas currently recognized by FEMA adjacent to creeks & streams to ensure flash flood-prone areas are included.	2	Planning and Zoning	Citizens in flood-prone areas.	All local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county) & County Engineer.	Each jurisdiction will need to be responsible for surveying their area.	Building Regulation, FEMA, & GIS Staffing. 3. GIS maps the compiled information.	Grants	1. Building Regulation is the lead coordinating agency for the surveying. 2. Each jurisdiction conducts their survey.	<\$100,000.00	To be determined during project development.	2013	2014	1 year
Develop & pass roadway construction ordinances to ensure future roadway projects comply with current construction ordinances to ensure future roadway projects comply with current standards for design year floods.	3	Land Development Regulations	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	All local jurisdiction decision makers (City and Village Mayors, and Township Trustees) & EMA.	The entire project.	ODNR and the Attorney General's Office, County Engineer	Local Funds	1. All the jurisdictions work together in the formation of roadway construction ordinances. 2. Ensure the ordinances pass.	>\$10,000.00	To be determined during project development.	2013	2014	2 to 4 years

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Investigate current roadways located in flash flood-prone areas to ensure compliance with current standards for design year floods.	4	Land Development Regulations, Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	County Engineer	The entire project.	ODOT	Local Funds	1. Develop a plan for reviewing roadways construction for compliance. 2. Note all not in compliance. 3. Develop a plan for bringing them up to code.	>\$1,000,000.00	To be determined during project development.	2013	2016	1 to 3 years
Lake Surges													
Employ in-lake early warning technologies to combat lake surge losses before they happen.	1	Structural Measures, Other - Preparedness	Citizens and structures located in lake surge areas.	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer)	Lake surge jurisdictions with assistance from OEMA & EMA.	OEMA, EMA	Grants	1. Lake surge jurisdictions has the responsibility for determining the exact areas that need the in-lake early warning technologies. 2. OEMA offers assistance in locating the specific technology, and along with EMA could assist in locating the funding.	To be determined during project development.	To be determined during project development.	2013	2018	Ongoing
Monitor lake levels to rapidly warn residents of potential surge flooding.	2	Other - Preparedness	Citizens located in lake surge areas.	EMA	EMA is the local lead agency. EMA receives the information through "STORMS" (gaging system) determines the urgency & makes appropriate pre-decided notifications.	OEMA, ODNR, US Coast Guard	Local Funds	1. EMA works with US Coast Guard to install gauges where non currently exist. 2. EMA receives information on the levels 2. A plan is developed on use of notification to the affected jurisdictions residents (i.e. sirens, EAS, etc.).	\$25,000	To be determined during project development.	2013	2018	Ongoing
Develop back up emergency power plan for critical facilities during lake surge events.	3	Planning and Zoning	Citizens located in lake surge areas	Each jurisdiction with cooperation with the facilities (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer).	Joint effort.	EMA, OEMA, FEMA	Grants	1. Each jurisdiction would evaluate their critical facilities. 2. In coordination with the facility, they would develop back up emergency power plans. 3. OEMA, FEMA, & EMA would assist in the funding process & locating the sources of back-up power.	>\$100,000.00	To be determined during project development.	2013	2016	1-3 years
Develop building codes that address enforcement of lake surge resistance measures.	4	Land Development Regulations, Planning and Zoning	Citizens located in lake surge areas	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer), County Building Regulation	Local jurisdictions work in conjunction with Building Regulation on the development of the codes.	Toledo-Lucas Plan Commissions	Local Funds	1. Local jurisdictions take the lead on this project. 2. Building Regulation works closely with them on the development of the building codes. 3. Local jurisdictions ensure the enforcement of these codes.	Minimal	To be determined during project development.	2013	2018	3-5 years

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Develop system of dikes to protect most vulnerable infrastructure within lake surge floodplain and where applicable, develop lake buffer zones.	5	Structural Measures	Citizens and structures located in lake surge areas	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer), Corps of Engineers	Joint responsibility for this project.	FEMA, OEMA	Grants	With support from FEMA and OEMA, the lake surge jurisdictions work directly with the Corps of Engineers develop the system of dikes.	>\$1,000,000.00	To be determined during project development.	2013	2018	3-5 yrs
Create effective milestones or warning measuring points to evaluate the possibility/probability for surge flooding.	6	Other - Preparedness	Citizens located in lake surge areas	City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer	Lake surge jurisdictions with assistance from OEMA & EMA.	OEMA, EMA	Grants	This project could be combined with the above project.	To be determined during project development.	To be determined during project development.	2013	2018	3-5 years
Identify evacuation Reception Centers stocked with necessary supplies for emergency lake surge evacuation.	7	Storm Shelter, Other - Preparedness	Citizens located in lake surge areas	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer), the American Red Cross, the Health Department.	The jurisdictions find the locations. The Red Cross & the Health Department ensure standards & qualifications are met. The Red Cross advises on supplies & amounts to stock.	FEMA	Local Funds, Grants	1. Using the Red Cross guidelines, each potentially affected jurisdiction locates possible refuge locations. 2. The Health Department inspects each location & makes the final decision on whether or not it is adequate. The Red Cross advises on the specific supplies & amounts of each to stock.	>\$100,000.00	To be determined during project development.	2013	2016	1-3 years
Establish emergency response plans to evacuate people from lake surge areas.	8	Other - Preparedness	Citizens located in lake surge areas	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer), EMA.	Develop together.	OEMA, FEMA	Local Funds	1. EMA & local jurisdictions work together in the development of specific lake surge evacuation emergency plans.	Minimal	To be determined during project development.	2013	2018	Ongoing
Determine Lake surge prone areas to create lake buffer zones.	9	Planning and Zoning	Citizens located in lake surge areas	Lake surge jurisdictions (City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer), Army Corps of Engineers and EMA.	The lake surge jurisdictions determine the specific areas in order to decide where to create the lake buffer zones.	ODNR, County Engineer	Local Funds	The lake surge jurisdictions are responsible for the entire project. They determine the specific areas & decide where lake buffer zones need to be created.	To be determined during project development.	To be determined during project development.	2013	2018	3-5 yrs
Establish a chain of command to take charge in event of lake surge evacuation.	10	Other - Preparedness	Citizens located in lake surge areas	EMA, local fire & police	EMA is the lead agency.	OEMA, FEMA	Local Funds, Grants	1. EMA ensures that all local police & fire departments are trained in incident command (there is currently an ongoing effort toward that). 2. Ensure that all departments are familiar with the evacuation plan. 3. Practice the plan annually.	Operating budgets and grants.	To be determined during project development.	2013	2018	Ongoing

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In conjunction with the Department of Health, develop a pamphlet and public information program informing the public of preventative measures to take to avoid water-bourn illness related to lake surge.	11	Education and Outreach	Citizens located in lake surge areas	City of Toledo Administrator, Village of Harbor View Administrator, Jerusalem Twp. Fiscal Officer, Washington Twp. Fiscal Officer, EMA, Department of Health, Public Information Officers.	The Health Department is the lead agency. EMA supports.	Local media, Ohio Department of Health, FEMA	Local Funds, Grants	1. The Health Department lends the specific health preparedness information. 2. The Health Department develops the pamphlet format. 3. EMA assists with pamphlet development. 4. Public Information Officers develop the public information program & take the lead in getting it distributed to the public along with the local jurisdictions.	<\$25,000.00	To be determined during project development.	2013	2016	1-3 years

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Severe Storms													
Refrain from planting trees in and around utility lines, or plant low growing species that will not interfere with the lines. Place a higher priority on tree trimming /maintenance along utility easements.	1	Critical Facilities Protection	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers within the county, Environmental Services, Parks Recreation & Forestry, Utilities, Forestry & Open Space Planning, ODNR, EMA, Streets Bridges & Harbors.	Joint effort.	PUCO, FEMA	Local Funds	Combined with the Winter Storm project: Development of a countywide tree management program. In addition, Streets Bridges & Harbors place a higher priority on tree trimming/ maintenance along utility lines.	To be determined during project development.	To be determined during project development.	2013	2018	1 to 2 years & ongoing
Provide a secure and reliable emergency wireless communication system for use by elderly or disabled citizens to reduce chance of isolation in a severe storm event and the aftermath.	2	Other - Preparedness	Elderly or disabled citizens in each jurisdiction in Lucas County.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA	Joint effort.	Amateur Radio, Motorola	Grants	1. Each jurisdiction surveys their at risk population. 2. The individual jurisdiction data is compiled together to determine the need. 3. At a joint meeting it is determined how to approach the solution. 4. EMA helps to find funding & select a vendor. 5. A joint distribution & maintenance plan is developed.	>\$250,000.0	To be determined during project development.	2013	2018	1 to 2 years, Ongoing
Encourage implementation of tree trimming and maintenance programs for private property owners to protect health & safety during a severe storm event, and distribute literature to the general public educating them on proper tree planting techniques, including safe distances from structures and utility lines.	3	Education and Outreach, Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA, PIOs	Joint effort.	ODNR	Grants	1. Jointly develop tree trimming & maintenance program and the educational literature. 2. Find the funding for both the pamphlet & any possible funding to assist the public with the cost of tree trimming & maintenance. 3. The PIO's develop a plan for the dissemination of the pamphlet.	>\$25,000.00	To be determined during project development.	2013	2018	3 to 5 years, Ongoing
Improve severe storm detection techniques and initiate storm alerts earlier to allow citizens more time to prepare their structures for severe storm events.	4	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	All the jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), National Weather Service, Weather Spotters	Joint effort.	Amateur Radio	Local Funds, Grants	1. Each jurisdiction determines areas or populations that need improved severe storm detection techniques. 2. Jointly decide how to improve the current techniques. 3. National Weather Service, Amateur Radio & Weather Spotters are consulted in formulating the improved techniques.	To be determined during project development.	To be determined during project development.	2013	2016	2 to 3 years

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Initiate damage assessment training for emergency response personnel to include building inspection personnel that encompasses structural, electrical, plumbing and heating expertise, which would be invaluable in storm damage assessment. Establish a triage-like procedure for initial evaluation of structural and mechanical damage to structures caused by severe storms.	5	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA, Building Regulation, Builders/Contractors Association, all local law enforcement & fire	Each jurisdiction compiles a database. Training program is developed jointly. Development of the triage-like procedure is the responsibility of the fire departments.	OEMA, FEMA	Grants	1. Each jurisdiction has to determine who needs to be trained & compile a database. 2. Through a joint effort, a training program is developed. 3. Fire departments develop the triage-like procedure based on their existing current triage procedures.	>\$25,000.00	To be determined during project development.	2013	2018	2 to 3 years, ongoing
City of Sylvania - Back-Up Generator - Maple Drive	6	Critical Facilities Protection	Sylvania	City of Sylvania Administrator	Entire project.	FEMA, OEMA	Local Funds, Grants	1. EMA helps to find funding & select a vendor. 2. Generator is purchased and installed..	\$25,000.00	To be determined during project development.	2013	2014	1 year
City of Sylvania - Back-Up Generator - Sylvania Avenue	7	Critical Facilities Protection	Sylvania	City of Sylvania Administrator	Entire project.	FEMA, OEMA	Local Funds, Grants	1. EMA helps to find funding & select a vendor. 2. Generator is purchased and installed..	\$25,000.00	To be determined during project development.	2013	2014	1 year
Implement improved severe weather forecasting and warning systems.	8	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA	Joint effort.	National Weather Service	Local Funds	Local jurisdictions work together with EMA & the National Weather Service on the development of a plan to improve forecasting & warning systems.	To be determined during project development.	To be determined during project development.	2013	2014	1 year
Establish a uniform damage reporting procedure for all jurisdictions to utilize in Lucas County with Lucas County Emergency Management Agency as the clearinghouse for damage assessment data following a severe storm event.	9	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA	Each jurisdiction (including police & fire) designates personnel for damage assessment team. EMA compiles the team, trains them & maintains the database. Jointly a protocol notification list is established.	Fire & police departments, any other group whose job requires them to be outside every day, OEMA.	Local Funds, Grants	1. OEMA provides EMA with their current guidelines for developing a Damage Assessment Team. 2. Each jurisdiction designates members for the team. 3. EMA compiles the team, trains them & maintains the database. 4. A protocol notification list is established through group effort.	>\$10,000.00	To be determined during project development.	2013	2014	1 year

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Severe Winter Storms													
Work with critical facilities to develop emergency communications plans and emergency power backup plans.	1	Critical Facilities Protection	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Each jurisdiction (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA	With the established list of critical facilities, EMA coordinates with all the jurisdictions in Lucas County in plans development.	EMS, 9-1-10, EMA, FEMA	Local Funds, Grants	1. EMA uses the established list of critical facilities to coordinate with the jurisdictions in plan development. EMS & 9-1-1 provide the specific technical support.	Minimal	To be determined during project development.	2013	2018	1 year & ongoing
Develop a countywide tree management program to reduce the probability of damage to existing above-ground utilities from severe winter storm events that includes provisions to encourage the planting of species that are less susceptible to damage and ensures that trees are planted sufficiently far from above-ground utility lines and buildings.	2	Critical Facilities Protection	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), Environmental Services, Parks Recreation & Forestry, Utilities, Forestry & Open Space Planning, ODNR, EMA.	Joint effort.	PUCO, FEMA	Grants	1. EMA facilitates & coordinates the program development. 2. All the other agencies/organizations work in coordination with each other in plan development. 3. Local jurisdictions disseminate the information on the kinds of trees & the specific planting methods.	To be determined during project development.	To be determined during project development.	2013	2018	1 year & ongoing
Coordinate with the American Red Cross to establish heating centers for at-risk citizens/residences, provide winter storm kits and design a public information campaign that includes educating citizens about snow winter storm warnings, alternative forms of heating, and family/individual emergency communications plans.	3	Education and Outreach, Storm Shelter	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	The American Red Cross, EMA, PIOs.	The American Red Cross designates heating centers from their current list of shelters & locates new ones where gaps exist. ARC already has kits. EMA ensures that the jurisdictions in Lucas County have a list of these centers. The PIO's design the public information campaign.	Toledo-Lucas County Board of Health	Local Funds	1. Designating the heating centers & distribution of the winter storm kits is ARC's responsibility. 2. EMA coordinates the dissemination of the center locations & works directly with the PIO's to design the public information campaign.	<\$10,000.00	To be determined during project development.	2013	2018	1 year & ongoing
Develop and adopt countywide winter maintenance procedures that include snow trapping devices, "smart salting" techniques, and applying deicing chemicals before severe winter storms happen.	4	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), Streets Bridges & Harbors.	Joint effort.	FEMA	Local Funds, Grants	1. Streets, bridges and harbors coordinates the planning of the maintenance procedures in coordination with all the agencies & jurisdictions. 2. The jurisdictions adopt the procedures & ensure they are followed.	To be determined during project development.		2013	2018	1 year & ongoing

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Earthquakes Develop emergency plans for evacuation of communities in the event that an earthquake occurs that are up to date and are utilizing the latest information available.	1	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	EMA, local fire & police	EMA is the lead agency.	OEMA, FEMA	Local Funds, Grants	1. EMA ensures that all local police & fire departments are trained in incident command (there is currently an ongoing effort toward that). 2. Ensure that all departments are familiar with the evacuation plan. 3. Practice the plan annually.	<\$100,000.00	To be determined during project development.	2013	2018	Ongoing
Provide outreach to inform citizens of the need to plan and prepare for all hazards to reduce the impact of an earthquake disaster and aid the recovery.	2	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA, PIOs	EMA coordinates the development of a safety service program informing the public of the need to plan. The PIO disseminates the program to citizens in their jurisdictions.	FEMA	Grants	1. EMA coordinates the project. 2. FEMA provides the specifics. 3. All jurisdictions work together in the development of the safety service program. 4. The PIO's distribute the educational information.	<\$25,000.00	To be determined during project development.	2013	2018	1 year, Ongoing
Work with engineers and architects to survey existing buildings and infrastructure and develop recommendations for seismic resiliency.	3	Land Development Regulations, Planning and Zoning, Retrofit	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), Engineers, architects, EMA.	Ema coordinates & facilitates the engineers & architects working together to develop the best design & construction standards for seismic events.	FEMA	Local Funds, Grants	1. EMA is the coordinating agency. 2. Design & construction standards are the architects responsibility. 3. Each jurisdiction is responsible for enforcing the standards.	>\$10,000.00	To be determined during project development.	2013	2018	1-5 years
Provide Emergency Preparedness information and resources relative to earthquake events to the public through an active education and outreach program.	4	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions (City and Village Administrators, and Townships Administrators or Fiscal Officers within the county), EMA, PIOs	EMA coordinates the development of Emergency Preparedness Information & resources for earthquakes. The PIO disseminate the outreach program to citizens in their jurisdictions.	FEMA	Grants	1. EMA coordinates the project. 2. FEMA provides the specifics. 3. All jurisdictions work together in the development of the program. 4. The PIO's distribute the educational information.	<\$25,000.00	To be determined during project development.	2013	2018	Ongoing

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Designate pedestrian safe zones to prohibit public access in areas directly below damaged infrastructures until repairs can be made.	5	Structural Measures	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	EMA, local fire & police	EMA is the lead agency.	OEMA, FEMA	Local Funds, Grants	1. EMA develops a program to identify damaged infrastructures following an event. 2. Once plan is formulated, put into practice.	<\$100,000.00	To be determined during project development.	2013	2018	Ongoing

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Droughts													
Encourage water conservation through public outreach programs prior to a drought event.	1	Education and Outreach	Cities Toledo and Oregon.	Water treatment plants, City of Toledo Public Works Administrator, City of Oregon Water Superintendent, local media.	Water treatment plants coordinate with the National Weather Service to establish timely proactive public outreach programs for drought events. Local jurisdictions & local media disseminate the program information to the public.	FEMA, OEMA	Grants	1. Water treatment plants & the National Weather Service work together to establish the proactive public outreach program for drought events. 2. Local jurisdictions & local media disseminate the program information to the public.	>\$25,000.00	To be determined during project development.	2013	2018	On-going
Implement & distribute Drought Do's & Don'ts to the general public.	2	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers, Soil & Water Conservation, OSU Extension, EMA, PIOs	Joint effort.	FEMA, OEMA	Local Funds	1. Soil & Water takes the lead coordinating the agencies on the development of the Do's & Don'ts. 2. The local jurisdictions in coordination with the PIO's distributes the information.	>\$10,000.00	To be determined during project development.	2013	2018	On-going
Review policies on non-essential residential and commercial uses of water to maintain existing supply and integrity of systems.	3	Land Development Regulations, Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers, Soil & Water Conservation District, Public Works/Utilities, City of Toledo and City of Oregon water treatment facilities.	Joint effort.	FEMA, OEMA	Local Funds	1. Soil & Water takes the lead on this effort coordinating with all the water treatment facilities. 2. Individual jurisdictions develop and adopt new policies.	Minimal	To be determined during project development.	2013	2018	On-going
Provide guidance to jurisdictions on potential new sources of water during extreme drought.	4	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers within the county, Soil & Water Conservation, OSU Extension.	Joint effort.	FEMA, OEMA, EMA	Local Funds	1. Soil & Water & OSU Extension research potential new sources of water for extreme drought situations. 2. Upon completion of the research, distribute the information to the local jurisdictions.	To be determined during project development.	To be determined during project development.	2013	2018	On-going
Reduce risk of fire damage during extreme drought with restrictions on open burning and campfires.	5	Planning and Zoning	Each jurisdiction in Lucas County with possible wildfire areas.	Forestry & Open Space Planning, local fire departments, PIO's, EMA	A coordinated effort to develop restrictions.	None	Local funds	1. The local fire departments, local jurisdictions, & EMA work together to develop burning restrictions 3. Local jurisdictions adopt the burning restrictions.	Minimal	To be determined during project development.	2013	2016	1-3 years

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Develop sample ordinances of water conservation.	6	Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers, Soil & Water Conservation District, Public Works/Utilities, City of Toledo and City of Oregon water treatment facilities.	Soil & Water takes the lead on this effort coordinating with all the other agencies for the development of the ordinances. The local jurisdictions adopt & enforce the ordinances.	Sanitary Engineer	Local Funds	1. Soil & Water takes the lead on this effort coordinating with all the other agencies for the development of the ordinances. 2. The Sanitary Engineer offers consultation throughout the process. 3. The local jurisdictions adopt & enforce the ordinances.	Minimal	To be determined during project development.	2013	2018	On-going

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Establish economic incentives for private investment in water conservation.	7	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers, Soil & Water Conservation.	Joint effort.	Sanitary Engineer, TMACOG	Local Funds	1. Soil & Water works closely with the local jurisdictions in coordination with the Sanitary Engineer, TMACOG to develop possible economic incentives for private investment.	To be determined during project development.	To be determined during project development.	2013	2018	3 to 5 years
Organize drought informational meeting for the public and media.	8	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	City and Village Administrators, and Townships Administrators or Fiscal Officers, Soil & Water Conservation, OSU Extension, EMA, PIOs.	EMA along with the local jurisdictions coordinates the drought informational meeting places. Soil & Water & OSU Extension take the lead with the information. EMA, the local jurisdictions & the PIO's work together to disseminate the notices for the meetings.	The American Red Cross, OEMA	Local Funds	1. EMA along with the local jurisdictions coordinates the drought informational meeting places. 2. Soil & Water & OSU Extension take the lead with the information. 3. EMA, the local jurisdictions & the PIO's work together to disseminate the notices for the meetings. 4. The American Red Cross & OEMA provide technical support & information on the availability of cooling centers (if any).	Minimal	To be determined during project development.	2013	2014	< 1 year
Establish water hauling programs for livestock during extreme drought.	9	Structural Measures	Each jurisdiction in Lucas County with livestock populations.	Soil & Water Conservation, OSU Extension, local jurisdictions with livestock (Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Washington, and Waterville Townships, and unincorporated communities of Curtice, Neapolis, Providence).	Joint effort.	FEMA	Local Funds	Soil & Water & OSU Extension develop the program; work with local jurisdictions to establish the program with citizens owning livestock.	To be determined during project development.	To be determined during project development.	2013	2014	1 year
Establish a data management system to identify drought-related agricultural losses so subsidy programs can be utilized to their full advantage.	10	Other - Preparedness	Each jurisdiction in Lucas County with agriculture areas.	FEMA, Ohio Risk Management Agency, USDA Farm Service and local jurisdictions with agricultural areas (Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Washington, and Waterville Township Administrators and Fiscal Officers).	Farm Services and RMA work together to develop a data management system identifying drought-related agricultural losses. Local jurisdictions have bought into reporting loss information to the system. Soil & Water & OSU monitor the system to ensure the losses are subsidized appropriately & timely.	ODA	Grants	1. Soil & Water Conservation & OSU Extension develop the data management system with local jurisdiction buy-in. 2. Local jurisdictions report the loss information to the system. 3. Soil & Water & OSU monitor the system to ensure the losses are subsidized.	>\$25,000.00	To be determined during project development.	2013	2015	1 to 2 years

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Wildfires													
Increase media coverage of threat and evacuation procedures during peak wildfire times of the year, distribute informational packages in high and moderate wildfire risk areas, and increase enforcement of existing open burning laws.	1	Education and Outreach	Each jurisdiction in Lucas County with possible wildfire areas.	Local fire departments (Villages of Holland, Swanton, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, and Swanton Twps.), ODNR, MetroParks	A coordinated effort to establish threat & evacuation procedures. Once established, the PIO's in the specific jurisdictions disseminate the information during the peak wildfire times. Local jurisdictions agree to better enforce open burning laws.	National Fire Training Academy	Local Funds	1. The local fire departments, local jurisdictions, ODNR and MetroParks work together to develop and/or tweak threat & evacuation procedures. 2. PIO's disseminate the information. 3. Local jurisdictions better enforce the open burning laws especially during the peak wildfire periods.	>\$15,000.00	To be determined during project development.	2013	2014	< 1 year
Enhance and expand training and awareness of fire departments in wildfire hazard areas and provide specialized equipment for controlling and extinguishing of wildfires.	2	Education and Outreach, Other Preparedness	Each jurisdiction in Lucas County with possible wildfire areas.	All the fire departments in Lucas County (Cities of Maumee, Oregon, Toledo; Villages of Berkey, Holland, Ottawa Hills, Swanton, Waterville, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton Sylvania and Washington Twps.) since mutual aid may be necessary.	Under advisement from the National Fire Training Academy, the fire departments in Lucas County enhance & expand their wildfire hazard awareness & training.	National Fire Training Academy	Local Funds, Grants	1. All the local fire departments in Lucas County work in cooperation with each other to develop a more comprehensive wildfire hazard awareness campaign & training. The National Fire Training Academy offers specifics.	>\$250,000.00	To be determined during project development.	2013	2014	< 1 year
Use controlled burns to decrease the amount of fuel load in the identified moderate and high wildfire hazard areas.	3	Wildfire	Each jurisdiction in Lucas County with possible wildfire areas.	Local fire departments (Cities of Maumee, Oregon, Toledo; Villages of Berkey, Holland, Ottawa Hills, Swanton, Waterville, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton Sylvania and Washington Twps.), ODNR, MetroParks	Local fire departments work in coordination with ODNR/MetroParks to develop a plan for periodic controlled burns. Parks & Recreation advise on the plan. They already have established controlled burns in the parks.	Parks & Recreation, Forestry & Open Space Planning	Local Funds	1. Local fire departments work in coordination with ODNR/MetroParks to develop a plan for periodic controlled burns. 2. Parks & Recreation advise on the plan. They already have established controlled burns in the parks. 3. Forestry & Open Space Planning also offer consultation.	Minimal	To be determined during project development.	2013	2016	1-3 years
Coordinate with all jurisdictions to develop a vulnerability assessment for wildfires, and implement a plan for completing them.	4	Planning and Zoning	Each jurisdiction in Lucas County with possible wildfire areas.	Local jurisdictions fire departments (Cities of Maumee, Oregon, Toledo; Villages of Berkey, Holland, Ottawa Hills, Swanton, Waterville, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton Sylvania and Washington Twps.)	With the assistance from FEMA & OEMA, EMA & the local jurisdictions develop a a vulnerability assessment for wildfires.	FEMA, OEMA	Local Funds, Grants	1. FEMA & OEMA are consulted on how to set up a vulnerability assessment for wildfires. 2. EMA coordinates with the local jurisdictions for the development & implementation plan.	>\$100,000.00	To be determined during project development.	2013	2016	1-3 years

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Identify and protect high and moderate wildfire risk areas and critical facilities.	5	Critical Facilities Protection	Each jurisdiction in Lucas County with possible wildfire areas.	Local jurisdictions fire departments (Cities of Maumee, Oregon, Toledo; Villages of Berkey, Holland, Ottawa Hills, Swanton, Waterville, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton Sylvania and Washington Twps.), ODNR, MetroParks	EMA coordinates with local jurisdictions to identify areas with high & moderate wildfire risk & critical facilities. Upon identification, a protection plan is developed. The plan is distributed to all the jurisdictions for implementation as needed.	National Fire Training Academy	Local Funds, Grants	1. Local jurisdictions/fire departments identify areas with high & moderate wildfire risk & critical facilities. 2. ODNR/MetroParks and the fire departments develop a protection plan. 3. The completed plan is distributed to all the jurisdictions for implementation.	To be determined during project development.	To be determined during project development.	2013	2014	1 year

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Landslides														
Erect a series of warning signs along roadways where slips and slides are a possibility.	1	Structural Measures	Each jurisdiction in Lucas County with possible landslide areas.	Lucas County Engineer, Lucas County Port Authority, City of Toledo, Maumee, Oregon Public Works Dept., City of Sylvania Services Dept.; Village of Ottawa Hills Public Works Dept., Villages of Holland, Whitehouse Road Maint.; Harding, Jerusalem, Monclova, Providence, Spencer, Springfield, Swanton, Sylvania, Washington Twp. Road Maint.), ODOT,	Joint effort.	FEMA, OEMA	Grants	1. Local jurisdiction, ODOT & Streets Bridges & Harbors work together in the development of warning signs & an educational pamphlet. 2. FEMA & OEMA are the consultants on project development. 3. Local jurisdictions are responsible for the distribution of the educational pamphlet. Local PIO's inform the citizens.	>\$25,000.00	To be determined during project development.	2013	2015	1 to 2 years	
Coordinate with Agencies involved in roadway construction to require that new lakeside/riverfront roadways be designed to hold soil in place.	2	Planning and Zoning, Soil Stabilization	Each jurisdiction in Lucas County with possible landslide areas.	Lucas County Engineer, Lucas County Port Authority, City of Toledo, Maumee, Oregon Public Works Dept., City of Sylvania Services Dept.; Village of Ottawa Hills Public Works Dept., Villages of Holland, Whitehouse Road Maint.; Harding, Jerusalem, Monclova, Providence, Spencer, Springfield, Swanton, Sylvania, Washington Twp. Road Maint.), ODOT,	Joint effort.	FEMA, OEMA, ODOT	Local Funds	1. Local jurisdiction, ODOT & Streets Bridges & Harbors work together in the development of new design standards. 2. FEMA & OEMA are the consultants on project development. 3. All Agencies involved in roadway construction adopt the new standards.	>\$25,000.00	To be determined during project development.	2013	2018	Ongoing	
Temperature Extremes														
Establish a Fire Advisory System to identify "fire risk." during extended periods of extreme heat or cold.	1	Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Local jurisdictions fire departments (Cities of Maumee, Oregon, Toledo; Villages of Berkey, Holland, Ottawa Hills, Swanton, Waterville, Whitehouse; Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton Sylvania and Washington Twps.), ODNr, MetroParks	Joint effort.	National Fire Training Academy	Local Funds	1. ODNr/MetroParks coordinates with all the fire departments in Lucas County to establish a Fire Advisory System for extended periods of extreme heat or cold. 2. Local jurisdictions adopt the Fire Advisory System & incorporate them into their public safety program. 3. The local media informs the citizens of the System & how to use it.	<\$25,000.00	To be determined during project development.	2013	2014	1 year	

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Coordinate with utilities and transportation authorities to improve rapid communications between emergency services and the private sector when basic services might be disrupted during extended periods of extreme heat or cold.	2	Education and Outreach, Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington, Toledo Edison, Tricounty REA, Columbia Gas, Ohio Gas, Waterville Gas Company, AT&T Ohio, Windstream Ohio, CenturyLink, Frontier North Communications, ODOT, Lucas County Department of Emergency Services, Private Sector.	Joint effort.	PUCO, FEMA	Local Funds	1. The utilities & transportation authorities work together with the private sector to design a plan to improve rapid communications between emergency services & the private sector especially during periods of extreme heat or cold. 2. The plan is implemented by all jurisdictions.	To be determined during project development.	To be determined during project development.	2013	2014	1 year

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Review fire safety ordinances for open burning and the use of liquid fuel and electric space heaters.	3	Planning and Zoning	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington, Lucas County EMA, Toledo Fire Prevention Bureau	EMA & the Fire Prevention Bureau work together to review the fire safety ordinances. They amend, delete, change and/or add ordinances accordingly. Local jurisdictions adopt the ordinances & enforce them.	National Fire Training Academy, FEMA	Local Funds	1. EMA & the Fire Prevention Bureau review the fire safety ordinances together. 2. Amendments, deletions, and/or changes to ordinances are made accordingly. 3. Local jurisdictions adopt the ordinances & enforce them.	Minimal	To be determined during project development.	2013	2014	1 year	
Coordinate with service support groups to provide a list of "Cooling/Warming Centers" for use during extended periods of extreme heat or cold to at risk citizens.	4	Storm Shelter, Other - Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington, Lucas County EMA, the American Red Cross, the Salvation Army, Toledo-Lucas County Health Department	EMA coordinates with the American Red Cross, the Salvation Army & the Health Department to develop a list of "Cooling/Warming Centers" for at risk citizens use during extended periods of extreme heat or cold. The Health Department inspects the perspective centers to ensure they meet the basic health requirements for human occupancy.	FEMA, the Ability Center, the Area Office on Aging	Local Funds	1. EMA, the Red Cross, the Salvation Army develop a list of "Cooling/Warming Centers" in coordination with the Ability Center & the Area Office on Aging. 2. Upon completion of the list, the Health Department inspects the Centers to ensure basic requirements are met. 3. Local jurisdictions maintain the lists. They notify the public as the need arises & the centers are open.	To be determined during project development.	To be determined during project development.	2013	2014	1 year	
Provide Emergency Preparedness information and resources relative to extreme temperature events to the public through an active educational outreach program with specific plans and procedures for Senior Citizens and the Disabled.	5	Education and Outreach	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County EMA	EMA researches extreme temperature effects specifically on Senior Citizens & the Disabled with the assistance of the Area Office on Aging, the Ability Center & FEMA. Through a coordinated effort, the specific plans & procedures are developed. Local Jurisdictions adopt the plans & incorporate them into their public safety program.	The Area Office on Aging, The Ability Center, FEMA	Grants	1. EMA finds the funding; researches the specific effects with consultation from the Area Office on Aging & the Ability Center. 2. Jointly the plans & procedures are developed. 3. Local jurisdiction media & PIO's distribute the plans & procedures to the public.	>\$25,000.00	To be determined during project development.	2013	2014	1 year	

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Develop plans for the protection and care of animals during extended periods of extreme heat or cold.	6	Education and Outreach, Other Preparedness	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington.	Lucas County, the Cities of Toledo, Maumee, Oregon, Sylvania, the Villages of Berkey, Harbor View, Holland, Ottawa Hills, Swanton, Waterville and the Townships of Harding, Jerusalem, , Monclova, Providence, Richfield, Spencer, Springfield, Swanton, Sylvania, Waterville and Washington, Lucas County EMA, Lucas County Dog Warden, Lucas County Humane Society, Toledo Area Humane Society, PIOs	Joint effort.	ASPCA, FEMA, OEMA	Grants	1. EMA coordinates with the Dog Warden, the Humane Society & ASPCA to develop the plans & procedures for the protection & care of animals during extended periods of extreme heat or cold. 2. Once completed, the plans & procedures are shared with the local jurisdictions. 3. The PIO's distribute the plans & procedures to the public.	>\$10,000.00	To be determined during project development.	2013	2014	1 year