Kalamazoo County Hazard Mitigation Plan

January 2013

Created by the Participating agencies representing

Kalamazoo County Disaster

Committee for

Kalamazoo County, Michigan

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INTRODUCTION

Hazard mitigation is any action taken before, during, or after a disaster to reduce or permanently eliminate the impacts or long-term risks from hazards (natural, technological, or human-related) upon human life and property. It is an essential element of emergency management, along with preparedness, response, and recovery. There is a cyclical relationship between the four phases of emergency management. A community prepares for a disaster, and tries to prevent hazards from having a strong impact. When an incident occurs, the community then responds and begins to recover from any damages that had been caused. During the recovery process, hazard mitigation measures can again be adopted, because a new incident may soon occur again. When successful, hazard mitigation lessens the impacts to such a degree that succeeding occurrences will remain mere incidents and not become actual disasters.

Hazard mitigation strives to reduce the impact of hazards on people and property through the coordination of resources, programs, and authorities so that, at the very least, communities do not contribute to the increasing severity of the problem. If repairs and reconstruction merely restore damaged property as quickly as possible to pre-disaster conditions, then a repetition of pre-disaster conditions may simply result in a cycle of repeated damages. Instead, post-disaster repairs and reconstruction provide an opportunity to strengthen a community's resilience. Recovery projects can rebuild things in a safer manner, informed by the lessons of past disasters, so that future disasters will not have as much of an impact.

Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing a community's susceptibility to damage. Hazard mitigation provides the mechanism by which communities and individuals can break the cycle of damage, reconstruction, and damage again.

Recognizing the importance of hazard mitigation, Kalamazoo County is actively addressing the issue through the development and subsequent implementation of this plan. The many benefits to be realized from this effort include the protection of the public health and safety, preservation of essential services, prevention of property damage, and the preservation of the local economic base. These will help ensure that Kalamazoo County remains a vibrant, safe, and enjoyable place in which to live, raise a family, and conduct business.

This plan was created to protect the health, safety and economic interests of residents by reducing the impacts of hazards through hazard mitigation planning, awareness, and implementation.

This plan serves as the foundation for hazard mitigation activities within the community. Implementation of the plan's recommendations will reduce injuries, loss of life, and destruction of property due to natural and technological hazards. The plan provides a path toward continuous, proactive reduction of vulnerability to the most frequent hazards that result in repetitive and often severe social, economic and physical damage. The ideal end-state would be the total integration of hazard mitigation activities, programs, capabilities, and actions into normal, day-to-day governmental functions and management practices.

In this document, a hazard analysis section describes the nine major categories of hazards that affect Kalamazoo County (and provides some additional information about lesser hazards). The analysis of hazards is rooted in a community profile that includes a description of community organization and potential resources. The nine major hazards have been identified as severe weather, geological threats, fires, floods/drought, hazardous materials, infrastructure problems, public health emergencies, transportation incidents, and civil unrest and war. For each of the nine major hazards, the following is provided:

- Description of the hazard,
- Explanation of how it affects the County,
- Requirements/Rules affecting the County,
- Mitigation Goal(s) that that have been identified, and
- Description of the Action Item proposed.

The plan provides an explanation for why these mitigation actions are proposed.

Throughout this document, the Kalamazoo County Hazard Mitigation Plan is also referred to as the KCHMP.

This new document updates the previous Kalamazoo County Hazard Mitigation Plan. It has been re-structured so that it is easier to find and use the information contained within it. This should be helpful for stakeholders to more easily find and review the information that is most relevant for their jurisdictions and areas of expertise/interest.

Certain information which was considered confidential or too sensitive for widespread public distribution has been kept out of this document, and would only be distributed at the discretion of the Kalamazoo County Office of Emergency Management.

Some maps may be easier to view in a digital format, rather than in a printed hard-copy edition of this document.

The Kalamazoo County Hazard Mitigation Plan was created to document the process by which the County and its individual units of local government can protect the health, safety, and economic interests of the Kalamazoo County residents and businesses by reducing the impacts of natural and technological hazards through hazard mitigation planning, awareness, and implementation. The plan serves as the description of the ongoing hazard mitigation activities and actions within the Kalamazoo County. Implementation of the recommendations outlined herein will reduce loss of life, destruction of property, and economic losses due to natural and technological hazards. The plan provides a path toward continuous improvement, and the proactive reduction of vulnerability to hazards that result in repetitive and oftentimes severe social, economic and physical damage. The ideal end state is full integration of hazard mitigation concepts into day-to-day governmental and business functions and management practices.

These practices are far from new to Kalamazoo County. Many of the elements contained in this plan have been in place or planned for months or even years. The writing of this plan was possible due to these elements of the community already working in a productive and cooperative and leadership basis. Many of the individuals identified later in this document as being a “Lead Manager Assigned” to particular elements of the mitigation strategy are also listed in the Kalamazoo County Directory 2010 - 2011 as already being the lead individual for critical community functions.

Under the Disaster Mitigation Act of 2000 (PL 106-390) and related regulations appearing in the Federal Register on February 26, 2002 and October 1, 2002 (Pages 8844-8854 and 61512-61515), Congress had set aside grant money for the purpose of assisting communities in developing hazard mitigation plans for their communities. The result was the development of an initial hazard mitigation plan for Kalamazoo County, which was approved in 2006. By 2011, due to the need for regularly updating the plan, Lt. Paul Baker, Director of the Office of Emergency Management within the Kalamazoo County Sheriff's Office, undertook the role of coordinating the development of this Hazard Mitigation Plan update for the benefit of the community, with the realization that several of the smaller communities within Kalamazoo County would be unable to assemble a hazard mitigation plan on their own due to limited resources.

A major benefit of this effort is that by the successful development of a Hazard Mitigation Plan that is approved by the Federal Emergency Management Agency (FEMA), participating communities will become eligible to apply for or directly benefit from federal grants that are available for hazard mitigation projects, including (but not limited to) some of the types of projects that are described in this plan.

It is the intention of all parties—FEMA, Michigan State Police, Kalamazoo EMD, and the communities within Kalamazoo County—that this plan be regularly updated. FEMA rules require that a plan update process take place within five years of the approval date of the previous plan.

The creators of this plan intend that it will in fact be maintained as an ongoing operation in the most logical forum for the County—the Kalamazoo County Disaster Committee (KCDC), where circles of responsibility and interest intersect and are exemplified by ongoing regularly-scheduled group and ad-hoc team activities. The KCDC has long met regularly, on a monthly basis.

Using FEMA guidelines as a reference, a collaborative planning effort took place, involving the Kalamazoo County Office of Emergency Management, the Kalamazoo County Disaster Committee, representatives from participating local jurisdictions within the County, and the state-level Emergency Management and Homeland Security Division of the Michigan State Police. Interested agencies and members of the general public were able to review draft materials, attend open meetings, and provide feedback about the plan or its process. The goals and objectives outlined later in the plan serve as a touchstone that ideally is part of an established cyclical process of plan review, evaluation, implementation, and update.

This plan employs a broad perspective in examining multi-hazard mitigation activities and opportunities in Kalamazoo County. Hazards that threaten to public health, safety, and welfare, as well as the social, economic, and physical fabric of the community, have received emphasis in this plan. The plan addresses such hazards as floods, tornadoes, windstorms, winter storms, forest fires, structural fires, hazardous material incidents, and secondary technological hazards that result from natural hazard events. Hazards are analyzed from a historical perspective as well as from individual community perspectives, and are evaluated in terms of their potential chance of occurrence and their likely impacts, when being considered and prioritized for possible mitigation actions. The plan also lays out the legal basis for planning and the tools that can be used for its implementation.

This plan focuses heavily on process. The approach involves assembling the proper individuals, groups, and functions, and the use of viable teams, focusing upon the Kalamazoo County Disaster Committee and the participating communities within the County.

The following Goals had been identified as a part of the 2006 plan:

Goal 1: Provide disaster planning and mitigation resources to appropriate elements of Kalamazoo County.
Goal 2: Identify hazards affecting Kalamazoo County – COMPLETED.
Goal 3: Strengthen the effectiveness of the KCDC's ongoing processes and roles.
Goal 4: Increase public awareness of hazard mitigation methods and resources – COMPLETED.
Goal 5: Obtain Compliance w/FEMA requirements as a prerequisite for obtaining Mitigation Grant – COMPLETED.
Goal 6: Complete all hazard mitigation projects described in the Mitigation Actions Chapter.

With regard to the three goals that have been marked as COMPLETED, only the second was considered to be in need of adjustment for the plan update process that took place throughout 2012. Other changes in the wording of the goals stemmed merely from a desire for clearer and more appropriate wording. The result is the following list of new goals for the planning period that starts at the beginning of 2013:

Goal 1: Provide disaster planning and mitigation resources to appropriate elements of Kalamazoo County.
Goal 2: Expand and refine the detailed analysis of hazards affecting Kalamazoo County.
Goal 3: Strengthen the effectiveness of the KCDC's ongoing processes and roles.
Goal 4: Increase public awareness of hazard mitigation methods and resources.
Goal 5: Comply with FEMA requirements in order to obtain and use hazard mitigation grants.
Goal 6: Complete or make progress toward implementing the most viable of the hazard mitigation projects described in the Mitigation Actions section of the KCHMP.

Special emphasis was given to hazards and projects affecting personal safety and feelings of personal and business security. This emphasis formed the basis for the ultimate selection of key projects that had been prioritized, such as:

1) Warning Sirens (since 2006, five new sirens were added to Charleston Township, one to Climax, 2 to Richland)
2) "Safe Rooms"
3) Emergency Shelters, and
4) Backup Power Generation for critical facilities and infrastructure components (e.g. water systems, fire stations. A generator has been added within the City of Kalamazoo).

The selection process for hazard mitigation alternatives included the following criteria to evaluate the feasibility of potential activities (for more information, please see Chapter 5):

- Likelihood of actual opportunities for project implementation
- Potential for a large number of persons to be affected by the hazard
- Potential for a wide geographic area to be affected by the hazard
- Potential for serious harm to be inflicted by the hazard upon persons in the community
- Potential for the hazard to inflict economic hardship upon the community
- Extent to which a project's costs will be outweighed by its benefits

The Kalamazoo County Disaster Committee (KCDC)

The KCDC currently consists of the following committees and subcommittees:

- Communications
- Disaster Exercise
- Emergency Animal Care Committee
- 5th District Medical Response Coalition
- Fire Chiefs Association
- Local Emergency Planning Committee (LEPC)
- Local Hazard Mitigation
- Local Law Enforcement
- College/University Law Enforcement
- Office of Emergency Management
- Private Industry
- Public Information
- Resources
- Schools
- Transportation

Since the last edition of this plan, in 2006, two KCDC committees (Community Emergency Response Team, and Emergency Action Guidelines) stopped meeting as a part of the KCDC, with their duties instead being taken over by the OEM.

The plan highlights the affirmation by its participants, and the organizations and communities they represent, to a commitment to continue in this cooperative effort for the good of the communities and agencies of and within the County. The subsequent adoption of this plan by the county and its participating communities signifies their intention to continue the evaluation, modification, and the general evolution of both its approach and deployment. Communities served by and participating in this plan are supportive of the outcome and benefits that the plan seeks to provide by the plan, and express their support through the representation and participation of members of their community in the ongoing development and deployment of mitigation activities as part of this plan.

Kalamazoo's hazards may change, or have the character of their effects change, due to shifts in population and economic activity, land use changes, technological advances, and new or emerging threats. For this reason, Kalamazoo's ability to prepare for and respond to its hazard base must be equally dynamic and flexible. In keeping with the all-hazards approach promoted by the FEMA, Kalamazoo County has built an emergency management system that is designed to address the multitude of hazards prevalent in the County. Those hazards—natural, technological, and human-related—present a variety of challenges to Kalamazoo's governmental agencies, local communities, businesses and industries, and individual citizens. While many of the hazards may not affect our lives on a daily basis, the threat is always there from at least a few hazards, and each threat needs to be addressed through appropriate hazard mitigation and emergency preparedness efforts at the state, local, and individual levels, because failure to do so may result in needless and tragic loss of life and property, as well as significant economic and social disruptions.

Due to its community characteristics and geographic location, the principal natural hazard threats to Kalamazoo are:
1) Severe winds, lightning, and tornadoes (all of which often accompany thunderstorms),
2) Snowstorms, ice/sleet storms, and extreme temperatures that are a part of severe winter weather, and
3) Riverine flooding.

Kalamazoo County's principal technological hazard threats include:
1) Infrastructure failures,
2) Fires (including structural fires, industrial explosions, and wildfires),
3) Transportation accidents,
4) Hazardous material incidents (both fixed-site and transportation-related), and
5) Petroleum and natural gas pipeline accidents. (It should be noted that many of these threats are a direct or indirect result of Kalamazoo hosting railways, an international airport, and two major interstate highways.

It should be noted that the technological threats faced by Kalamazoo are not unlike those present in other industrialized cities of a similar size and character.

Human-related hazards, although not as prevalent in Kalamazoo as in some other areas of the country, can still cause significant public health and safety concerns. Heat waves, for example, occur frequently and yet may not even be noticed by many County residents. However, when power outages knock out air conditioning systems or when the heat wave lasts for several days or more, serious health impacts may occur among the County's most vulnerable residents, from the elderly to the young, as well as pets and livestock. These types of concerns are therefore given consideration in this updated edition of the Kalamazoo County Hazard Mitigation Plan.

CHAPTER 1: THE PLANNING PROCESS

This chapter describes the process used to update the Kalamazoo County Hazard Mitigation Plan during 2011-2012. Originally completed in 2006, the plan update process began in 2011, with a review of the plan's contents taking place within the Kalamazoo County Office of Emergency Management, which is part of the Kalamazoo County Sheriff's Office. This office is pivotal in the County's preparedness for and response to any emergency event or threat that occurs within the county, and 24 local jurisdictions within the County rely upon this County Office to coordinate, handle, and represent their needs through its activities.

One of the major tasks that had been initially faced during the plan update process was the difficulty in "unlocking" the previous document's complicated computerized format, in order to update its contents. A process of transferring relevant information from a "locked" digital format into an editable digital format took quite a bit of time and effort. In order to prevent such problems from occurring in future updates, the format of this updated Plan was thoroughly revised so as to be more accessible and straightforward for all of its users in the future.

In 2012, staff from the Emergency Management and Homeland Security Division (EMHSD), of the Michigan State Police, helped the County to further research and provide new and revised descriptions of additional and recent hazard events that had taken place in the County (or that were considered representative of what might happen within the County).

Starting in April, 2012, a draft edition of the Kalamazoo County Hazard Mitigation Plan (KCHMP) was made available for review on the website of the Kalamazoo County Office of Emergency Management (OEM), where it could be viewed by all government partners, and any stakeholders, including the general public. Contact information was provided so that any person or agency could contact OEM with suggestions about how the plan could be improved.

The draft plan was also sent to FEMA for its official review. In August of 2012, FEMA returned its review containing descriptions of the kinds of additional revisions it wanted the plan to contain. OEM and EMHSD increased their coordination to further revise the plan. All 24 of the local jurisdictions within the County were contacted to verify which of them could be officially counted as active participants in the plan.

Although the plan does involve a consideration of every area within Kalamazoo County, a local community that is counted as an active participant in the plan has contributed its own unique information, and becomes eligible, upon FEMA approval of the plan and that community's local adoption of it, to apply for and directly benefit from FEMA-funded hazard mitigation projects, such as those identified in the Mitigation Actions section of this plan (Chapter 5).

Based upon the contact with local communities, the initial response was limited, and some had specifically stated no intention to participate in this planning process. However, over time, a couple of communities did end up as participants, while a couple that had originally stated an intention to participate did not provide sufficient response in order to eventually be counted as participants. Toward the very end of the plan review process, input was received from an attendee of the November meeting of the Kalamazoo County Disaster Committee, requesting that the Village of Vicksburg be encouraged to participate in the plan.

Since the overall planning process could not be slowed by waiting excessively for communities that had not responded to the invitations and awareness mechanisms promoting participation, it was decided that a description would be added to this plan, showing how additional communities could become participants later on (after the plan's adoption in December of 2012) by creating an additional subsection to amend the

plan with their new information. Such information would then be included in the plan's appendix, which contains sections for each participating local unit of government.

Even though this plan bears a cover date of January 2013, it was actually completed and adopted by Kalamazoo County in December of 2012. It seemed more appropriate for the newly updated plan to be given a 2013 date, since its final version only became official at the very end of 2012.

Following FEMA's review of the plan in August 2012, extensive revisions took place. The earlier version of the plan was considered far too cumbersome, too rooted in the formatting of the previous 2006 plan, too difficult to make ready use of, and not having sufficient focus specifically upon hazard mitigation actions (as distinguished from preparedness activities). The plan was given a completely new organization, reposted online for public review and comment, followed by its discussion and review among the Kalamazoo County Disaster Committee (and those with whom the committee members network, throughout the area). In addition to web posting on the county and emergency management websites (with contact information where comments could be provided), other emergency management coordinators throughout the 5th District within Michigan (i.e. adjacent communities) were aware of the plan revision process, the KCDC meetings were open meetings in which public attendance was encouraged (and did indeed take place), and additional one-on-one contacts took place with representatives of the local participating communities, which necessarily entailed a "snowball" or network effect as those representatives involved additional staff and agencies within their communities when coordinating with the county process. The result is a county plan that has accommodated the individual perspectives, priorities, and needs of multiple participating sub-jurisdictions within it.

Of the 24 local jurisdictions, the following are those who have actively participated in the KCHMP as of its finalization and county adoption in December 2012:

Kalamazoo County	Total 2010 population:	250,331
The Village of Augusta (part of Charleston and Ross Townships—the vast majority of its population is in Ross Township)	population:	885
Comstock Charter Township	population:	14,854
City of Galesburg	population:	2,009
City of Kalamazoo	population:	74,262
Kalamazoo Charter Township	population:	21,918
Oshtemo Charter Township	population:	21,705
City of Portage	population:	46,292
Richland Township	population:	7,580
Village of Richland (population included in Richland Township figures)		751
Ross Township	population:	4,664
	Total covered population:	193,310 (77.2%)

These ten participating communities constitute the majority of the county's population, including its top five most populous jurisdictions. More information is provided specifically about each one of these participating communities in the appendix at the end of this plan.

The Kalamazoo County Disaster Committee (KCDC) was a major player in the plan update process in the second half of 2012. The KCDC contains 60 members (100 are listed on e-mail lists receiving minutes and notifications) and meets on the first Wednesday of each month for the purpose of developing and implementing plans in preparation for potential emergencies that can occur in Kalamazoo County. KCDC is a body that is coordinated with the Office of Emergency Management. It is composed of multiple committees, staffed by volunteers from critical agencies, citizenry, businesses, and governments within Kalamazoo County. The number of committees active at any given time is a product of the needs of the community and is under constant review and evolution.

The KCDC was already in the process of providing a forum for, and obtaining the active participation of, representatives from all elements of the community for a structured, scheduled and tested cooperative emergency services coalition. This Kalamazoo County Disaster Committee, under the leadership of Kalamazoo County's Emergency Management Director Lt. Paul Baker, was already a central place for the development of action plans designed to meet the emergency and welfare needs of the communities within Kalamazoo.

Critical to successful representation of the needs of the community was the KCDC process that provided and encouraged the participation of members of the community. It was already normal for over 100 representatives within the community to receive monthly updates. This is a two directional process. A recipient of a message can easily annotate or amplify the message and send it back to the system for redistribution to its members. This is an ongoing function of the KCDC from the Office of Emergency Management, and had been since its implementation in 2003, in the form of a monthly notification procedure.

The main functions of the KCDC for the hazard mitigation plan have been (1) to examine the community profile and hazard analysis information, (2) to provide input from numerous local and regional agencies and their additional perspectives to inform the updated plan in the unique hazard mitigation resources and concerns of those agencies, as well as their own unique emergency management considerations, and (3) to develop, refine, and evaluate the hazard mitigation strategies at the end of this plan. These primarily took place at the KCDC meetings of November and December, 2012, and with correspondence that flowed between planning participants before and between these meetings.

To facilitate the KCDC review of the KCHMP, the previous draft plan (which had been reviewed by FEMA) was extensively reorganized and its content revised to fit more neatly into distinct sections that were easier to distribute, review, and access online. After a review in August, a total of 49 hazard mitigation actions were eventually identified (by KCOEM and planning staff) that had been judged to still be active (i.e. not yet completed) for consideration during the 2012 update process.

The first half of a revised plan was distributed to members of the KCDC in advance, and then discussed at its general meeting on November 7, 2012, in the City of Kalamazoo. This meeting was an open meeting (complying with the provisions of the Open Meetings Act) and therefore provided an additional opportunity for area stakeholders and the general public to review and provide input on the revised plan. The discussion focused upon the first set of revised KCHMP sections: the Introduction, Planning Process description, Community Profile, and Hazard Analysis. These materials had already received a generally favorable review from FEMA, but needed to be supplemented with more up-to-date floodplain information and information about the county's NFIP-identified "repetitive loss properties." FEMA's August 2012 review has also commented upon the extent to which the draft plan at that time had too-closely retained a lot of unrevised content from the original 2006 plan. These identified faults had been corrected by this time, and subsequent work continued to identify and correct information and text from the original plan that was no longer up-to-date.

New information and maps were incorporated into the updated plan. Some of the content from 2006 that could no longer be verified (but was suspected of being out of date) was removed. Some materials and text from 2006 that were not explicitly connected with hazard analysis and mitigation were also removed. A new draft was posted online for further review by the KCDC.

In the meantime, direct contact was made with the local communities, and subject matter experts within their staff. Those local communities that had, whether through previous contact or new involvement in the process, agreed to be active participants in the KCHMP were further contacted by OEM and EMHSD staff,

to review and enhance the plan's content that relates to their specific communities and make sure that enough specific and hazard-mitigation oriented information was considered, obtained, and included in the final plan. Contacts between these communities and the lead planning staff (OEM and EMHSD) took place using phone calls, emails, and facsimile transmissions. Additional contact (including actual meetings) took place within those local communities to help provide and assess information for inclusion in the county plan.

(A full list of these intra-local contacts was not requested for documentation in this county-level plan, but all of the listed communities were directly in touch with county plan developers through at least one community representative for the purpose of explicit participation and review of the county plan and the development of the community subsections included in this plan's appendix.)

As a result of these contacts, revisions were made throughout the final months of the KCHMP finalization process leading up to its formal adoption by the county in December, 2012. Additional communities adopted the plan at a pace that felt natural to them, during a time frame in 2013 that could not be specified at the time of this writing in December.

Chapter 4 of this plan is rooted in FEMA's requirement that every mitigation strategy from the 2006 plan must be re-evaluated and have its current status reported in an updated plan. The OEM thus described, for each action item listed in the 2006 plan, what achievements or progress had been made toward hazard mitigation within Kalamazoo County and its communities. Refinement of this list was considered necessary for the updated plan to better focus upon higher-priority actions, and upon activities that were more clearly a kind of hazard mitigation. Flowing from this process over subsequent months was a consideration of past accomplishments and obstacles, the consideration and evaluation of mitigation alternatives, and the development of a new listing of prioritized hazard mitigation actions as well as lists specific to participating local communities' individual feedback. Revised drafts of the KCHMP were twice produced and distributed to local communities and KCDC agencies in advance of the next meeting (including clearly labeled internet postings that enabled the general public and other stakeholders to access the newer versions of the plan during this revision process), at which it was then discussed and further refined.

A December 5, 2012 meeting of the KCDC took place in the City of Kalamazoo. KCDC gave their assent to the revisions made to the first half of the KCHMP. KCDC members then evaluated and discussed the new revisions made to the KCHMP, and suggestions were incorporated into final edits that were made to the plan.

At the December 5 KCDC meeting, all 49 of the actions in a new list were handed out, reviewed, and amended by the committee and associated staff working on the plan. (This draft of Chapter 5 was also posted online for review by the general public, other agencies and communities.) It was agreed that specific actions for hazard mitigation were likely to get lost in the middle of long lists that included a lot of "preparedness" strategies, and that the list could still be considerably pared down for purposes of this hazard mitigation plan, while not underestimating the value and emphasis placed upon preparedness and educational activities. The result is the Action Plan that now appears in Chapter 5.

Local Community subsections were typed up from the information received and obtained through personal interviews and discussions with KCHMP planning staff. These discussions focused upon the communities that has responded to a one-page survey questionnaire that had been distributed in November 2012 to verify that the communities were active participants with specific community information they wanted to contribute to the plan and build into hazard mitigation action sub-lists that were specifically tailored to their communities' resources, authorities, priorities, and hazard vulnerabilities. The results of the local community survey questionnaire are included in the appendix of this plan. In that appendix, hazard mitigation strategies and other information that had been obtained from direct participation in the KCHMP

process have been included. Draft write ups of the results of these numerous contacts had been written up by KCHMP staff and sent to community representatives, to verify that the content of these subsections was sufficiently accurate and acceptable to that community. Final versions of the participating local community subsections were added to the final KCHMP edition that was adopted by the county in December.

The plan had been finalized with the inclusion of a chapter describing the process for future implementation, monitoring, update, and public involvement in the newly revised KCHMP. As local adoptions take place and documentation of these adoptions is sent in to the Michigan State Police Emergency Management and Homeland Security Division for processing, participating communities will, like the county, thus be made eligible to apply for or directly benefit from FEMA hazard mitigation project grant funds. (An application process is still required for each project that is proposed for such funding.) At the time of this writing in December, 2012, it is not known on what specific dates such local adoptions will take place. (It is also being assumed as of this writing that the December 2012 edition of the KCHMP, dated January 213 on its cover, will pass review by FEMA.)

The Emergency Management Director, Lt. Paul Baker, leads the KCDC. The current KCDC chairman is the Texas Township Fire Chief, Mike Corfman. The list of KCDC subcommittees is listed on page 4. KCDC activities represent county animal interests, community representatives, environmental health safety and relief services, federal interests/agencies, local fire/police, area media, area medical (first response, facilities, support), military, parks and recreation, shelter, State agencies, transportation, and utilities.

The fire chiefs are the single most important and knowledgeable experts with respect to the understanding of and the responsibility for dealing with local hazards. The Fire Chiefs Association, a long-established organization within Kalamazoo County, meets in the evening on the same day of the month that the KCDC meets.

In updating the KCHMP and discussing potential solutions for solving the identified problems, a variety of sources were used to obtain information about the various hazards and communities addressed in this plan. In addition to information personally provided by community and agency representatives and other planning participants, the following official sources of (published or posted) information were among those most extensively used in this update (with additional sources of information specified as appropriate throughout the text): The 2006 KCHMP, the Michigan Hazard Analysis (2012 edition), the National Climatic Data Center's Storm Events online database, the National Flood Insurance Program's official Flood Insurance Rate Maps (including images obtained from FEMA's online Map Service Center), information from the 2010 United States Census, FEMA and MSP guidance documents about hazard mitigation planning and hazard analysis processes, and the 2007 Flood Mitigation Plan for the City of Kalamazoo. Additional citations are given as needed in the main text of this plan.

Having an updated and formalized hazard mitigation plan involving ongoing participation by many agencies and communities within the County enables the County, and local communities that participate in and formally adopt the KCHMP, to be eligible to apply for, receive, and/or directly benefit from FEMA funding for hazard mitigation projects. These federal funding sources include (1) the Hazard Mitigation Grant Program, which makes hazard mitigation funding available after a federally declared disaster takes place somewhere within the State of Michigan, (2) the Pre-Disaster Mitigation Program, which is an annual source for federal hazard mitigation project funds, (3) the Flood Mitigation Assistance Program, which has funding each year that is targeted specifically for flood mitigation activities, (4) the Severe Repetitive Loss program, which addresses qualifying flood-prone areas within qualifying communities, and (5) the Repetitive Flood Claims program, which addresses specific properties that have been identified as having strong flood problems within NFIP-participating communities.

The current KCHMP is organized to immediately lead to the implementation of a specific, federally subsidized flood mitigation project within the City of Kalamazoo, through the use of funds obtained from a Pre-Disaster Mitigation Program grant. This had successfully been applied for, under fiscal year 2011 funding, and requires the timely update of the KCHMP by the end of 2012 in order to take place. Future projects within Kalamazoo County are also expected to use federal funds as a result of the successful completion of this KCHMP update.

The updated plan will remain posted online in the future, to provide a continuous opportunity for all agencies, communities, and members of the public to review and provide comments, suggestions, ideas, and information on a 24-hour basis, via the web and email.

Revised drafts of the KCHMP had been posted on the KCEM website since April, 2012. Text was added to this web site to encourage the public and local jurisdictions to review the document and offer comments. By early November, 2012, the plan was also posted on the county's general website, with a request for public review and feedback. One email was received from an attendee at the November KCDC meeting, providing feedback on the plan. Other feedback was obtained through direct solicitation of involved officials, subject matter experts, and community representatives, as well as the KCDC itself.

OEM contact information was provided next to that web site, for comments/feedback to be sent to. The County OEM website has heavy traffic, because of other posted information including employment opportunities. However, specific notice was sent to all local units of government, and was announced that their local meetings, to help build awareness of this convenient source of plan availability and help allow the area's population to be involved in and better covered by the KCHMP.

The KCDC membership, as well as local community representatives, is the best, and therefore the primary, method for knowledge flow to and from the Kalamazoo-area community and its agencies and local units of government. As an already well-oiled machine, the KCDC has an established history of community representation, interest, capability, availability and experience in dealing with emergencies—from both a historical as well as procedural basis. The KCDC electronic notification to all local government agencies and its different members/agencies is one means of involving a huge array of agencies, governments, and their citizens about the plan and its opportunities for comment.

Even though the 2012 planning process has come to a close, the public is encouraged to speak with their local officials about the plan's contents, or to directly submit project suggestions and comments directly to the County OEM. It was considered that the available open comment period from April to December, 2012, the involvement of the KCDC from October through December, and the involvement of numerous local community experts and representatives during November and December, together provided effective representation of the needs and views of the residents, businesses, institutions, academia, public services, etc. Combined with the early review by FEMA and the active involvement of MSP/EMHSD, this updated edition of the KCHMP is considered to be a fine document of a successful planning process.

The following are sign-in sheets from the November and December meetings of the KCDC.

Kalamazoo County Disaster Committee
11/7/12

#	Name	Representing	Phone	Email
1	Lt. PAUL BAKER	EMER. MGMT	387-8712	PBAKE@KALCOUNTY.COM
2	GARRY BLASKIE	Michigan Nat'l Defense Force	353-3145	garry.blaskie@mingle.org
3	JEFF Hoppler	Augusta PD	731-4338	Augusta PD@TDS.NET
4	MIKE WEIDEMANN	KALAMAZOO TOWNSHIP F.D.	343-1811	DEPCHIEF34@KTWP.ORG
5	Cindy Faulk	EMA	385-6444	cfaulk@kalcounty.com
6	MIKE CONFMAN	TEXAS FP	375-4610	MICONFMAN@TEXASTOWNSHIP.ORG
7	MIKE SOBOCINSKI	MSP EMHSD	(517) 336-2053	SOBOCINSKIM@michigan.gov
8	DOUG THOMPSON	RED CROSS		
9	MIKE SEALS	KCC	744-4220	MIKAS1023@AOL.COM
10	RANDY LAWTON	OEM/LEPC		
11	DAVE SCHNEIDER	OEM	383-8744	DSCHN@Kalcounty.Com
12	Connie Ferguson	Emergency Mgt	375-0954	cfergie2@gmail.com
13	Pat Wright	OEM	385-6137	PEWRIE@Kalcounty.com
14	Andy Ives	KVCC	488-4341	AIves@kvcc.edu
15	PAUL EDWARDS	OEM	383-8795	PEDWA@Kalcounty.com
16	DAN MILLS	Portage Public Safety Dir.	3294562	millsd@portagemi.gov
17	Pat Crowley			
18	Cindy Cleveland	New Friends	330-1552	cleveland@newfriendsmemorycare.com
19	Brandy Skelton	Heritage Comm		
20	Katie Bradford	HCK	488-5886	Kbradford@heritagecommunity.com
21	Mitch Graham	MSP EMHSD	517-333-5022	grahamm5@Michigan.gov
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Kalamazoo County Disaster Committee
12/5/12

#	Name	Representing	Phone	Email
1	Dave Schneider	Kalamazoo Co OEM	269-383-8744	DLSCHN@KALCOUNTY.COM
2	Bob Wirick	" "	385-6137	BWIRICK@KALCOUNTY.COM
3	Mike Coffman	Texas Twp.	375-4620	MICOFFMAN@TEXASTOWNSHIP.ORG
4	Gary R. Blaskie	Mich Vol. Defense Force	388-3145	Gary.blaskie@mivdf.org
5	Ken Greschak	Friendship Village	381-7155	greschakk@fvkwet.com
6	Jaanna Byrne	Kal Co HCS	373-5025	jkbyrn@kalcounty.com
7	Brian Scribner	Life EMS	686 6908	
8	Paul Edwards	Kalamazoo OEM	383-8795	PLEDWA@KALCOUNTY.COM
9	Randy Lawton	Kalamazoo OEM		
10	Rich Mahaney	Borgess Medical Center	226-6898	RICH.MAHANEY@BORGESS.COM
11	Matt Beauchamp	Comstock FD	217-3954	mbeauchamp@comstockmi.com
12	Mike Wetzel	City of Kalamazoo	337-8667	wetzelm@kalamazoocity.org
13	Don Schrot	Reeds	998-8798	
14	Linda Bunting	Airport	346.3008	lsbunt@kalcounty.com
15	Mitch Graham	MSP/EMHSD	517-333-5022	grahamm5@michigan.gov
16	Doug Thomson	Red Cross		
17	Robert Butkiewicz	KCMHSAS	269-720-6842	
18	Mike Sobocinski	MSP EMHSD	517 336-2053	sobocinskim@michigan.gov
19	Jeff Heppler	August PD.	269-731-4338	AUGUSTPD@TDS.NET
20	Pat Crowley	KCDC	26	
21	Bill Callander	KAL. SCHOOLS	269 337 0161	
22	Cindy Cleveland	New Friends	269 372 6100	ccleveland@newfriendsmemorycare.com
23	John Hagar	KRESA	269 350 9229	
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CHAPTER 2: COMMUNITY PROFILE

SECTION 1: NATURAL FEATURES OF KALAMAZOO COUNTY

Kalamazoo County is located between Van Buren and Calhoun Counties in the southwest corner of Michigan, approximately 140 miles equidistant from both Chicago and Detroit. This connection is made possible by Interstate 94, which bisects the County east and west. Another major highway, US-131, passes through the County and provides access to urban-suburban areas, both north and south of the County. These two highways intersect near the heart of Kalamazoo County.

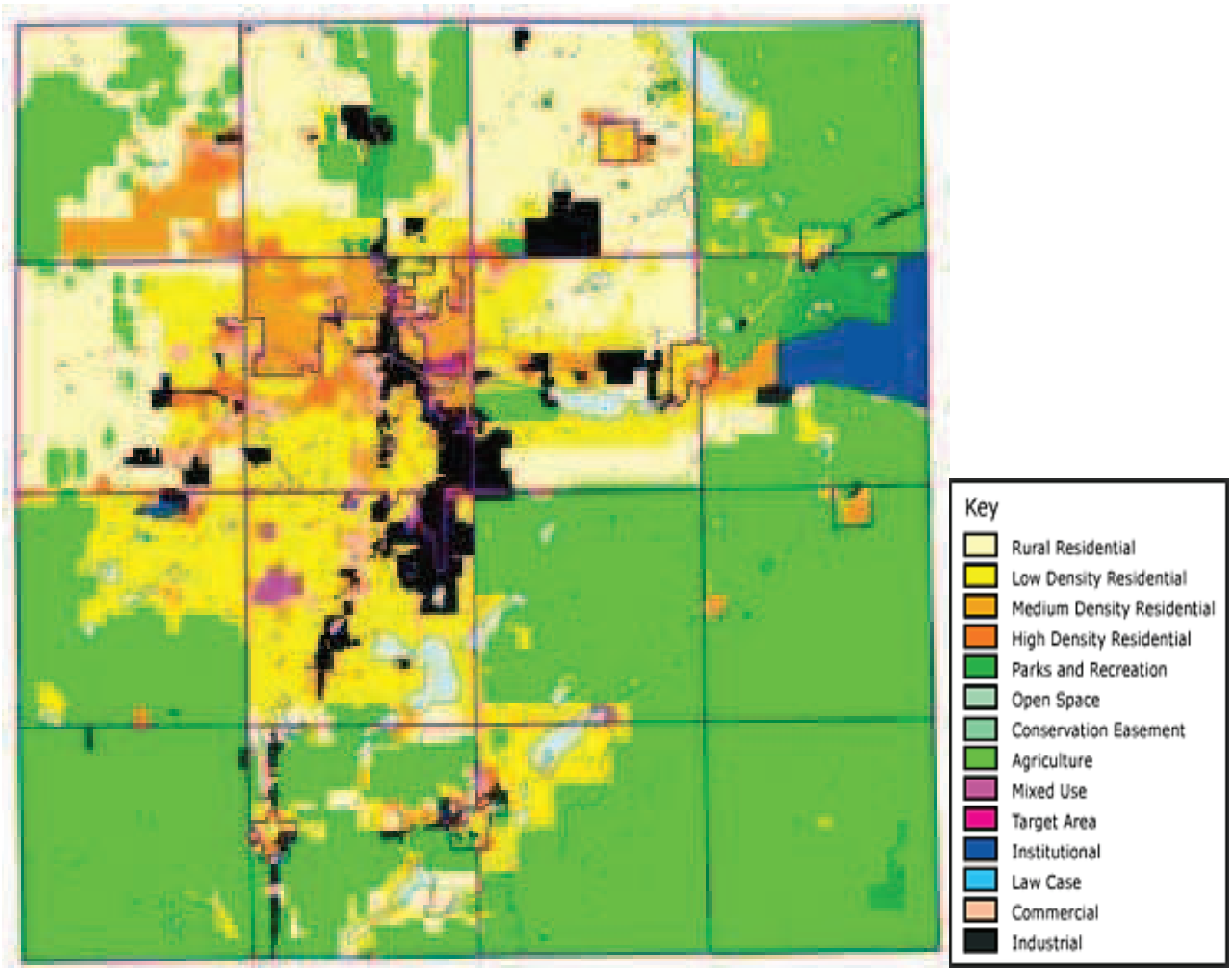
Kalamazoo County is composed of 368,640 acres or 576 square miles of land. Over 50,000 acres, or more than 15% of the land is considered "developed." The largest single land use category in the County is agriculture. It accounts for over 138,000 acres, or more than 40% of the land area in the County. In contrast, commercial and industrial lands each occupy less than 4% of the total land area.

Kalamazoo County contains 24 local units of government, including 15 townships, 5 villages and 4 cities. The City of Kalamazoo is the County seat. These communities are represented by 17 Kalamazoo County Board of Commissioners, covering as many districts. The following table lists all 24 of the local units of government with their population data and trends from the United States decennial census.

Minor Civil Division	2010 population	2000 population	Change in population
Alamo Township	3,762	3,820	-1.5%
Augusta Village*	885	901	-1.8%
Brady Township	4,248	4,263	-0.4%
Charleston Township	1,975	1,813	+8.9%
Climax Township	2,463	2,412	+2.1%
Climax Village*	767	791	-3.0%
Comstock Charter Township	14,854	13,851	+7.3%
Cooper Charter Township	10,111	8,754	+15.5%
Galesburg City	2,009	1,988	+1.1%
Kalamazoo City	74,262	77,145	-3.7%
Kalamazoo Charter Township	21,918	21,675	+1.1%
Oshtemo Charter Township	21,705	17,003	+27.7%
Parchment City	1,804	1,936	-6.8%
Pavilion Township	6,222	5,829	+6.7%
Portage City	46,292	44,897	+3.1%
Prairie Ronde Township	2,250	2,086	+7.9%
Richland Township	7,580	6,491	+16.7%
Richland Village*	751	593	+26.6%
Ross Township	4,664	5,047	-7.6%
Schoolcraft Township	8,214	7,260	+13.1%
Schoolcraft Village*	1,525	1,587	-3.9%
Texas Charter Township	14,697	10,919	+34.6%
Vicksburg Village*	2,906	2,320	+25.3%
Wakeshma Township	1,301	1,414	-8.0%
KALAMAZOO COUNTY TOTAL	250,331	238,603	+4.9%

* NOTE: Village populations are included within the townships of which they are a part. Augusta is part of Charleston and Ross Townships, Climax is part of Climax Township, Richland is part of Richland Township, Schoolcraft is part of Schoolcraft Township, and Vicksburg is part of Brady and Schoolcraft Townships.

Kalamazoo County Current Land Use Map

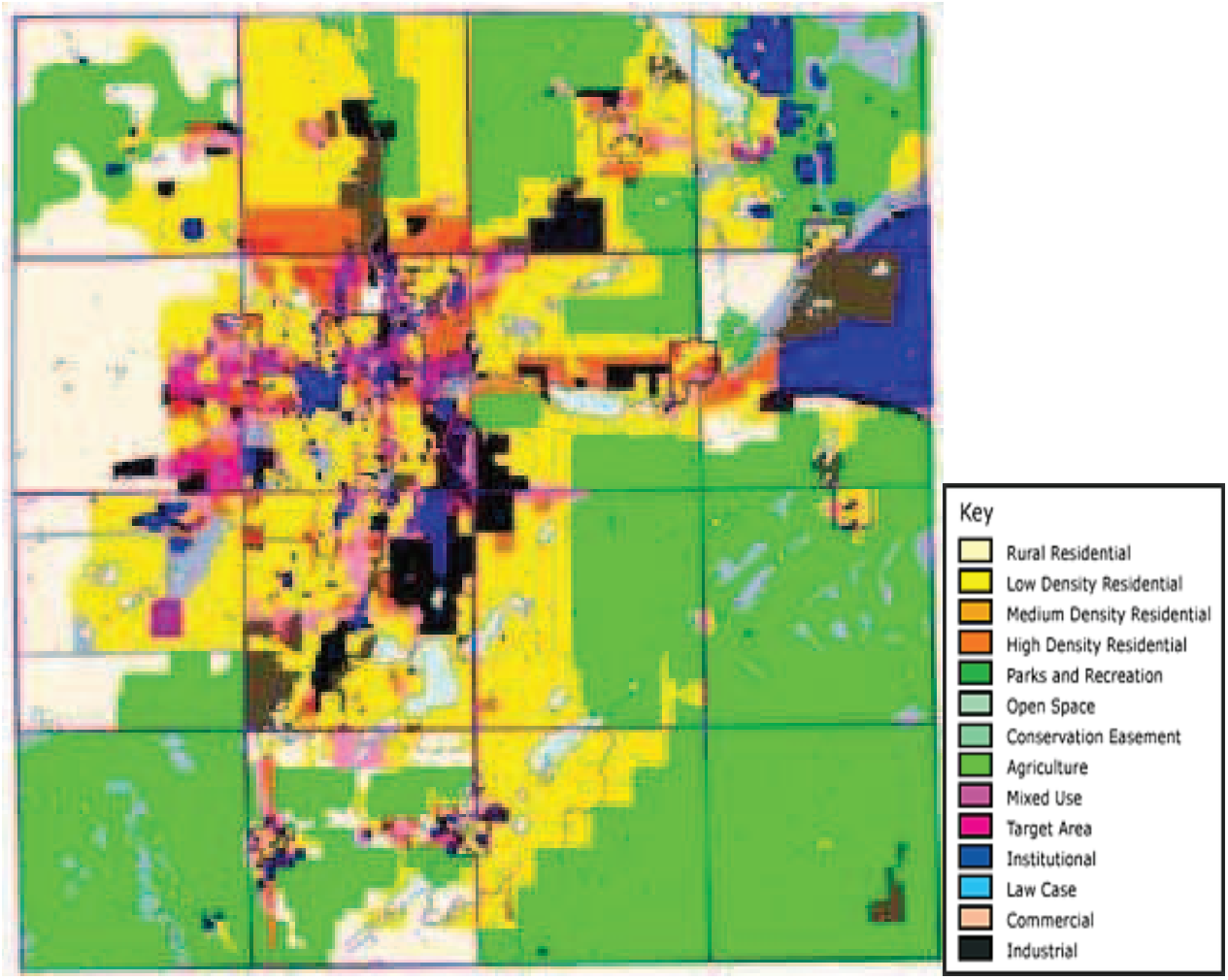


This map is the current land use map for Kalamazoo County.

TABLE: **Existing Land Uses in Kalamazoo County**

Developed Land Use Categories	Percent of County (%)
Residential	8
Commercial	3
Industrial	2
Institutional	1
Transportation	3
(Total Developed Area)	(17)
Agriculture	40
Wooded Land	23
Open Land	12
Water and Marsh	8
TOTAL	100

Kalamazoo County Future Land Use Map



This map is the Future Land Use Map for Kalamazoo County.

The County contains a few fast-growing communities, all of which are townships. As seen in the map above, the land use trends in these communities stems from the development of new suburban and exurban (i.e. commuter-oriented) residential areas, and the local commercial outlets that serve them. The land use development trends in the County remain consistent from the previous plan revision.

Kalamazoo's population trends over recent have been as follows:

1960	1970	1980	1990	2000	2010
169,712	201,550	212,378	223,411	238,603	250,331

The County offers a quality standard of living, a wide range of resources, a diversified economy, several institutions of higher education, affordable housing, excellent medical facilities, a variety of retail and service establishments, valuable agricultural land, and many water bodies, woodland and open space.

SECTION 2: TOPOGRAPHY

The County is quite diverse from a topographic standpoint. With few minor exceptions, the entire County lies within a highly habitable zone of 700 to 1,000 feet above sea level. The largest portion of the

County lies between 850 and 900 feet of elevation. Most of this area is in the form of an extensive plain in the south-central part of the County, south of the Kalamazoo River. The major lowland in the County is the trough of the Kalamazoo River and its tributary extensions. The majority of the upland occurs in the western and northern portions of the County. In essence, most of Kalamazoo County is characterized by gently rolling to quite level landforms.

SECTION 3: LAND FORMS

In the County, there are several basic landforms that were created by the ice sheet thousands of years ago: till plains, moraines, outwash plains and channel/lake bed deposits. Till plains are typically undulating land forms, with depressed areas that are frequently poorly drained and swampy, and occupy only about 13% of the County's land area. A special feature of till plains occurs in Wakeshma Township, called drumlins, with teardrop-shaped hills that are relatively uncommon and provide a scenic resource.

Moraines are typically between one and five miles wide and are characterized by hills and depressions in close proximity, with the moraine's ridges often rising 100 feet or more above adjoining out-wash, glacial lake, or spillway deposits. The highest point in the County is a moraine hill in Oshtemo Township, which has an altitude of 1,040 feet, 275 feet above the bed of the Kalamazoo River.

Outwash plains are low-relief plains with topographic changes of only a few feet per mile. The outwash plain is the predominant landform in Kalamazoo County, constituting about 47% of its land area. Except in the rougher or depressed areas, outwash plains are generally suitable for most forms of development. Less variation exists between the drainage channels (now occupied by small streams) and the adjoining outwash or till plains. These courses now tend to be occupied by swamps and muck. This substantial area amounts to about 21% of the County's total area.

The County's soils reflect strong glacial influences. The till plains are un-stratified and contain more clay than other areas. The moraines are more stratified and contain primarily sand and gravel. Outwash plains are generally stratified and composed of loams, sandy loams, and gravelly soils. These four landforms constitute the entire landscape of the area.

The soil characteristics impose few significant constraints on development. Excessive slopes occur in only small, isolated areas. Inadequate percolation is characteristic of only a small percentage of the soils. The sandy composition of most of the soils provides strength and stability for structural foundations. About half of the area is considered to have good agricultural soils. Soil types and associations are widely varied throughout the County.

SECTION 4: CLIMATE

Lake Michigan, which is about 43 miles west of Kalamazoo, exerts a significant influence on the climate in the area. The lake temperature, together with the prevailing westerly winds, moderates early seasonal temperature extremes. In the early spring, the cool lake water tends to keep air temperatures lower, thus retarding early plant growth until the likelihood of frost is diminished. In the autumn, the warmed lake water delays the onslaught of cold weather. The growing season in the area averages about 153 days.

The frequent and sometimes rapid changes caused by storms sweeping across the lakes from the west and southwest are typical of a humid continental climate. Seasonal temperature variations and precipitation patterns are typical of this climate type. Weather hazards can generally be split into those pertaining to two parts of the year: winter and non-winter. A "season" of primary risk for winter weather hazards tends to run from late November to early April, while a "season" of primary risk for non-winter weather hazards tends to run from early May to late September. Recent evidence of climate change may be connected with a greater chance of the non-winter risk season expanding over time, and according to the Michigan Hazard Analysis (July 2012 edition page 45), even though people usually think of climate change primarily in

terms of warming trends, the likely effects upon Michigan's winters will tend to involve an increase in severe snowfall events, even though the length of the winter season in Michigan may shrink. In other words, during the winter season, snowfall will probably more likely over time to be clustered into distinct, heavy snowstorm events rather than a large number of light snow dustings.

The average annual temperature is 50.25 degrees Fahrenheit (F), with monthly averages varying between 18.0 degrees F in January to 86.0 degrees F in July. Historic temperature records at the nearby weather station in Bloomingdale (Van Buren County) show a record low temperature of -23 degrees, and a record high temperature of 105 degrees.

Precipitation averages 33.99 inches annually. Monthly averages vary between 1.70 inches in February to 3.68 inches in June. The annual snowfall averages 69.7 inches. Historic records at the nearby weather station in Bloomingdale record a record precipitation event of 9.78 inches and a record snowfall event of 20.0 inches. Kalamazoo experiences about 36 to 38 thunderstorm days per year.

SECTION 5: WATER

The County has an unusually large number of bodies of water, including ponds, lakes, and rivers. Perhaps the most significant body of water is the Kalamazoo River. It extends from northern Hillsdale County to Lake Michigan and is approximately 185 miles in length. Lakes and ponds are so plentiful in Kalamazoo County that it is difficult to obtain a completely accurate count of their numbers, or an accurate measure of their total surface area. According to the an inventory of Michigan Lakes, however, there are approximately 418 lakes and ponds in the County, and approximately 3.2 percent of its area is occupied by surface water, including rivers and streams. The sizes of lakes and ponds range from under one to over 1,000 acres. The majority of the surface water bodies are relatively small and generally less than 100 acres in size. The larger lakes throughout the County are generally well populated with residential development.

Although lakes and ponds are plentiful in all areas of the County, their distribution is not uniform. Major concentrations occur in Comstock, Richland, Ross, Pavilion, Schoolcraft and Brady Townships, as well as the City of Portage. Lesser concentrations are found in moraine depressions in Charleston, Oshtemo and Texas Townships and in the glacial lake flats of Alamo and Kalamazoo Townships. In contrast, the till plain areas of Wakeshma, Cooper and Prairie Ronde Townships are virtually lake-free.

One of the largest and deepest lakes in the area is Gull Lake, which is located in both Ross and Richland Townships, in the northeast corner of the County. The area around Gull Lake is primarily residential in character, with a majority of its 20 or so miles of shoreline developed into single-family lots. Recreational opportunities are enhanced by the two public accesses to the lake.

Some other large lakes worth noting are: Austin Lake and West Lake, located in Portage; Long Lake, shared by Pavilion Township and the City of Portage; and Indian Lake, shared by Pavilion Township and Brady Township. One large impoundment associated with the Kalamazoo River is Morrow Lake, which was created to supply County residents with hydroelectric power. Morrow Lake is located in Comstock Township, just north of Interstate 94. River Oaks County Park is located on the north shore of the Morrow Lake.

SECTION 6: VEGETATION

Settlers in Kalamazoo County came upon vegetation that is typical of the northern hardwood forest: rich, thick stands of Maple, Elm, Hickory, Sycamore and scattered stands of Walnut, Beech and Cherry. Most of these species still dominate the more rural areas of the County however the size of the stands has diminished.

Approximately 60,637 acres, or 18.35%, of the County is woodland. The woodlands occupy both the slope lands and depressed areas of the County, providing ground cover, maintaining water tables, retarding run-off, influencing the microclimate of nearby areas and occasionally yielding a forest crop. They are also a scenic resource benefiting the value of property and beautifying the landscape for the enjoyment of County residents. There also exist scattered stands of coniferous-forested lands.

Various areas of the County that had historically been characterized by tall grasses and scattered Burr Oak trees have been replaced by major cash crops, such as corn, soybeans, wheat and oats. However, Burr Oak trees still line many of the County's rural roads and are found standing isolated in many fields.

SECTION 7: ADDITIONAL CENSUS DATA

1. Population and Housing Units

Kalamazoo County	2010	2000	Difference
Total population	250,331	238,603	+11,728 (+4.7%)
Male	122,569 (49.0%)	115,376 (48.4%)	+7,193 (+6.2%)
Female	127,762 (51.0%)	123,777 (51.9%)	+4,535 (+3.2%)
Home value <$50K	5,178 (8.1%)	3,919 (7.7%)	
$50K-$99K	12,659 (19.9%)	18,818 (36.8%)	
$100K-$149K	16,132 (25.3%)	15,272 (29.8%)	
$150K-$199K	12,931 (20.3%)	7,046 (13.8%)	
$200K-$299K	9,178 (14.4%)	4,102 (8.0%)	
$300K and above	7,567 (11.9%)	2,037 (4.0%)	
Median housing value	$143,800	$108,000	

2. Employment by Industry

Industry	**2010**	**2000**
Agriculture, Forestry, Fishing	1,497 (1.3%)	1,303 (1.1%)
Construction	3,825 (3.3%)	6,747 (5.7%)
Manufacturing	20,035 (17.5%)	24,648 (20.8%)
Wholesale Trade	3,336 (2.9%)	3,740 (3.2%)
Retail Trade	14,024 (12.3%)	14,169 (12.0%)
Transportation, Warehousing	3,581 (3.1%)	3,814 (3.2%)
Information	1,019 (0.9%)	2,453 (2.1%)
Finance, Insurance, Real Estate	6,904 (6.0%)	6,948 (5.9%)
Professional	9,616 (8.4%)	8,501 (7.2%)
Educational, Health, Social Services	30,520 (26.7%)	29,148 (24.7%)
Arts, Entertainment, Recreation	12,717 (11.1%)	10,446 (8.8%)
Other Services (exc. Pub. Admin.)	4,782 (4.2%)	5,667 (4.8%)
Public Administration	2,353 (2.1%)	3,156 (2.7%)
Total Workers Age 16+	114,209	118,220

NOTE: The sources used are predominantly the 2000 and 2010 U.S. Censuses

COMMUNITY ORGANIZATION AND RESOURCES FOR HAZARD MITIGATION

COUNTY AND LOCAL COMMUNITY AGENCIES, DEPARTMENTS, AND ORGANIZATIONS POTENTIALLY RELEVANT FOR HAZARD MITIGATION:

In addition to the Kalamazoo County Disaster Committee, already described in this plan, there are additional agencies within the county that have roles and resources that are relevant for hazard mitigation activities. The following is a list of some of these, with a brief description and contact information.

Kalamazoo County (2010 population: 250,331)

Office of the Kalamazoo County Drain Commissioner
201 West Kalamazoo Avenue, Kalamazoo, Michigan 49007
Phone: (269) 384-8117 - Fax: (269) 383-8920
The mission of this office is to provide for the health, safety and welfare of Kalamazoo County citizens, the protection of surface waters and the environment, and to promote the long-term environmental sustainability of Kalamazoo County by providing storm water management, flood control, soil erosion controls and education. The office is particularly relevant for hydrological hazards.

Office of Emergency Management (Kalamazoo County Sheriff's Office)
1500 Lamont Ave., Kalamazoo, MI 49048
(269) 383-8743
This office was established under the provisions of the Michigan Emergency Management Act, PA 390 of 1976, as amended, and the county's 1993 emergency management resolution, to ensure a coordinated public response in the event of a natural or man-made disaster. Emergency management in Kalamazoo County is a comprehensive approach involving a range of public and private agencies including local police, fire and EMS agencies, the Michigan State Police Emergency Management and Homeland Security Division, the Michigan Department of Environmental Quality, the 5th District Homeland Security Board and the National Weather Service. Other agencies coordinated with emergency management include the American Red Cross, local and state health departments, educators and amateur radio operators. This office tends to be central for all major threats and incidents within the county.

Health and Community Services Department
3299 Gull Road, Kalamazoo, MI 49048
269-373-5200
This Department exists to improve the overall health of the community through coordinated planning, resource development, and service delivery. The human impacts of hazards may require their involvement. Public health emergencies threatening the area would certainly involve this department.

Michigan State University Extension – Kalamazoo Office
3299 Gull Rd., Wing 2
4th Floor, Rm. 410
Kalamazoo, Michigan 49048
Phone: 269-383-8830
The office is involved in various educational and outreach activities involving agriculture and health. They should be valuable in events concerning such matters, such as droughts, pandemics, etc.

Department of Planning & Community Development
201 West Kalamazoo Avenue, Kalamazoo, Michigan 49007
Telephone: (269) 384-8112, Fax: (269) 383-8862
The Kalamazoo Metropolitan County Planning Commission provides recommendations on zoning amendments at or near municipal boundaries, farmland agreements, preliminary plats, and future land use plans, and should include hazard assessment and mitigation concepts in these recommendations and zoning patterns. The Department helps to coordinate developmental activities (physical or socio-economic) affecting more than one unit of government (i.e., land use plans and zoning along borders, utility extensions, infrastructure changes) and provides a forum for the discussion of plans and community development activities affecting neighboring counties (i.e., solid waste management plan, economic development). They can act as liaison between County and other levels of government, public and quasi-public agencies in matters related to community development (i.e., Southwest Michigan First, Kalamazoo Area Transportation Study). Certain kinds of hazard mitigation tend to require coordination between multiple jurisdictions, and thus can benefit from the involvement of the planning department.

Kalamazoo County Road Commission
3801 East Kilgore Road, Kalamazoo, Michigan 49001
Phone: (269) 381-3171
The Board of County Road Commissioners of Kalamazoo County uses their expertise, energy, and funds to provide the safest and most convenient road system possible, and contributes to economic development and the high quality of life throughout the county. Their goal is to maintain a county road system that is safe and convenient for public travel and to manage the roadside environment, with a view toward preservation. The Kalamazoo County Road Commission (KCRC) maintains 1,264.81 miles of road throughout the 576 square mile county. The primary road system consists of 449.28 miles; the remaining 814.53 miles constitute the local system. Along with maintenance operations, they maintain 61 bridges, over 19,300 signs, 46 traffic signals, and 41 flashing lights at intersections. They should be involved in long-term hazard mitigation or short-term emergency adjustments involving the county transportation network.

Kalamazoo County Sheriff's Office
1500 Lamont, Kalamazoo, MI 49048
(269) 383-8821
The Sheriff's Office provides law enforcement and services to protect the lives and property of Kalamazoo County citizens—enforcing State laws and local ordinances, investigating crimes, and detaining prisoners remanded to the county jail. This is accomplished in a manner that maintains the highest degree of professional excellence, integrity, and courtesy. Sheriff's Office personnel would be involved in protective actions during a serious community emergency.

Kalamazoo County Transportation Authority (KCTA)
530 N. Rose Street
Kalamazoo, MI 49007
(269) 337-8087
The purpose of the Kalamazoo County Transportation Authority is to plan, promote, finance, acquire, improve, enlarge, extend, own, construct, operate, maintain, replace, and contract for public transportation service by means of one or more public transportation systems and public transportation facilities within the jurisdictional boundaries of the County of Kalamazoo. They may have resources useful for the transportation or evacuation of residents during emergency situations.

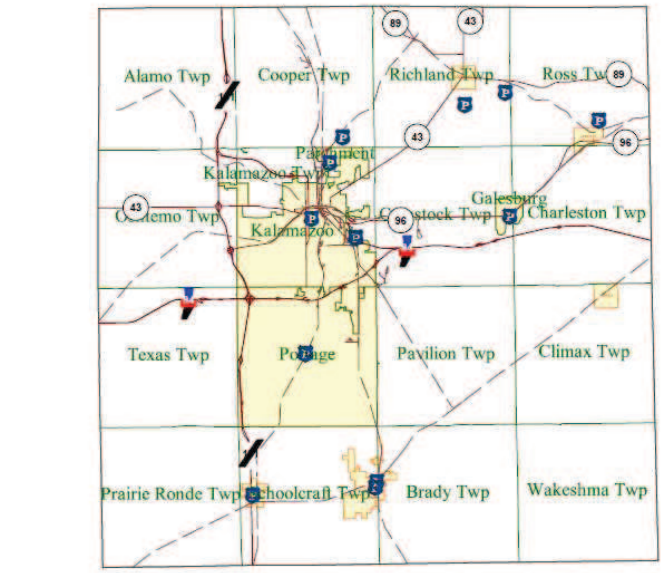
City of Kalamazoo (2010 population: 74,262)
Founded in the 19th Century, the city provides a diverse mixture of old and new. The city is the main population center, transportation node, and urban focus within the county. The following city departments are most relevant to emergency management and hazard mitigation considerations.

Department of Community Planning and Development
Planning Division
415 Stockbridge Ave.
Kalamazoo, MI 49001
269-337-8044 (269) 337-8044
The mission of the Community Planning & Development Department is to assist with the creation of a healthy, safe and sustainable community of choice, through leadership, education, partnerships and stewardship of resources and assets. The Community Planning & Development Department includes three primary areas of focus: Planning, Code Administration (Housing, Building & Trades, Zoning), and Community Development. The City's Economic Development Division is housed along with the Community Planning & Development Department and works collaboratively with both internal and external partners to achieve local development goals. The Planning Division works with current land use planning, future land use planning and historic preservation. Using the 2010 Master Plan and the

city's Code of Ordinances, Planning staff directs future growth, redevelopment and historic preservation to help create a better, more sustainable community. The Planning Division supports the work of the Planning Commission, Historic District Commission and Historic Preservation Commission. The City's 2010 Master Plan, "Plan Kalamazoo," includes floodplain considerations and can be found here: http://www.kalamazoocity.org/portal/government.php?page_id=826. Ideally, other types of hazards would also be included in a future edition of this plan.

Department of Public Safety
Emergency:911; Non-Emergency: (269) 337-8994
The Kalamazoo Department of Public Safety combines law enforcement and fire services into a unified organization with a goal of providing the highest level of professional public service to our community. Their diverse force has more than 300 persons and incorporates modern technology and comprehensive training techniques to enhance the organization's overall effectiveness, while continually striving to meet the challenges of the future. They have resources that would be vital for emergency response activities in any incident/threat that involves the City.

Police Stations



Department of Public Services?
241 W South St
Kalamazoo, MI 49001
(269) 337-8808
The department oversees the provision of city services such as waste disposal, fresh water supply, and storm drainage systems. They would have important resources to help deal with disasters or emergencies involving debris, water, and drainage systems.

City of Portage (2010 population: 46,292)
Portage is the second largest community in the county, and it has been a city since the 1960s. Its current city departments include the following.

Community Development – The Department of Community Development has responsibility for planning and growth, and for private development projects, in order to maintain and improve the safety and overall quality of life in the community. The Department includes the Planning, Development, and Community Services Division, which oversees land development regulations, provides professional services to support the activities of the Planning Commission. 7900 South Westnedge Avenue, Portage, Michigan 49002. Phone: 329 4474. The city's latest comprehensive community plan was completed in 2008.

Public Safety – The Department of Public Safety is responsible for the overall management of departmental activity including community relations, resource allocation, labor relations, research and planning, contracts and many other administrative functions. Phone: (269) 329-4567.

Streets Maintenance Division – The division handles things like snow removal and household hazardous waste disposal. 7719 South Westnedge Avenue. Phone: (269) 329-4444.

Transportation & Utilities – The Transportation & Utilities Department is responsible for the transportation (traffic signals, signing, and streetlighting) and utility (public water, storm sewer, and wastewater) systems. 7719 South Westnedge Avenue. Phone: (269) 329-4422.

Kalamazoo Charter Township (2010 population: 21,918)
The township offices are located at 1720 Riverview Drive, and the most relevant township departments for emergency situations and planning are the Police, Fire, and Building Departments. The Building Department handles zoning and land use regulations within the township (in addition to various types of inspections). (Part of KABA now??) The township's law enforcement personnel also provide coverage to the City of Parchment.

Oshtemo Charter Township (2010 population: 21,705)
The township offices are located at 7275 West Main Street, and the general phone number is (269) 375-4260. The departments most relevant to emergency issues are the Fire Department, the Building and Safety Department, and the Planning and Zoning Department, with that last department actually merging in with the Kalamazoo Area Building Authority (KABA) to together cover three additional townships (Comstock, Cooper, and Kalamazoo). The Fire Department is located at 7275 West Main Street, Kalamazoo, MI 49009, phone number (269) 375-0487. The Township's new Master Plan was just completed within in 2011-2012. The Planning and Zoning Department is located at 7275 West Main Street, and its phone number is (269) 216-5223.

Comstock Charter Township (2010 population: 14,854)
The township offices are located at 6138 King Highway, and the general phone number is (269) 381-2360. The departments most relevant to emergency issues are the Fire and Rescue Department, the Building Department, the Township Boards and Commissions Department, and the Ordinance Department. The Township Boards and Commissions Department includes the Planning Commission, the Zoning Board of Appeals, and the Building Board of Appeals. The Fire and Rescue Department is located at 8700 East Michigan Avenue, Galesburg, MI 49053, phone number (269) 381-0804.

City of Parchment (2010 population: 1,804)
The city offices are located at 650 South Riverview Drive, and the general phone number is (269) 349-3785. The departments most relevant to emergency issues are the Kalamazoo Township Police Department, the city Public Works Superintendent, and the Parchment City Commission. The City of

Parchment entered into a cooperative services agreement with the Charter Township of Kalamazoo for the provision of police services. The Kalamazoo Charter Township Police Department is located at 1720 Riverview Drive, Kalamazoo, MI 49004, phone number (269) 343-0551. The Public Works Superintendent phone number is (269) 344-6400.

Village of Augusta (2010 population: 885)
The city offices are located at 109 West Clinton Street, P.O. Box 216, and the general phone number is (269) 731-5517. The departments most relevant to emergency issues are the Police Department and the Department of Public Works. The Police Department phone number is (269) 731-4338 and the Public Works phone number is (269) 731-4717.

AUTHORITIES, CENTERS, PROGRAMS, ETC. THAT ADDRESS VARIOUS HAZARDS:

Sabotage/Terrorism/Weapons of Mass Destruction (WMD)
The federal Office of Homeland Security coordinates the many counter-terrorism functions scattered across numerous federal agencies and organizations, and works closely with state and local police and fire agencies, emergency response teams, and emergency management agencies in formulating and carrying out the National Homeland Security Strategy.

Metropolitan Medical Response System:
One of the key features of the federal response element is the formation of highly skilled and mobile Metropolitan Medical Response Systems (MMRS) to provide medical care in incidents involving nuclear, chemical or biological terrorism. The nearest MMRS facility is in Grand Rapids. In case of an incident that may involve nuclear, chemical or biological weapons, this MMRS would be mobilized to provide initial, on-site response, in addition to providing for patient transportation to hospital emergency rooms. The MMRS are self-contained and capable of providing both medical and mental health care to victims. Should local health care resources be overrun, they will assist in preparing to move victims to other regions. The U.S. Department of Health and Human Services (HHS) coordinates the MMRS program. The West Michigan Metropolitan Medical Response System in Grand Rapids has a goal of coordinating the efforts of local law enforcement, fire, HAZMAT, EMS, hospital, public health and other personnel to improve response capabilities in case of a terrorist attack.

51st WMD Civil Support Team:
The Michigan National Guard, 51st WMD/Civil Support Team, provides additional support for the RRTN. Stationed at Fort Custer (Battle Creek), the 51st WMD/Civil Support Team deploys to a WMD or suspected WMD incident in support of the local incident commander to: assess a suspected nuclear, chemical, biological or radiological event; advise the Incident Commander on appropriate courses of action to protect the local population; assist with appropriate requests for state additional support. They also provide informational briefings, exercises, and cross training activities with state and local first responders.

SNS – The Strategic National Stockpile Program:
Presidential Decision Directive 62, issued by President Clinton in May 1998 ordered federal agencies to take significantly expanded and better-coordinated steps to protect against the consequences of biological and other unconventional attacks, especially potential bio-terrorism directed at civilian populations. One of the major bio- terrorism initiatives of the U.S. Department of Health and Human Services (HHS) in response to this PDD is the development of the Strategic National Stockpile – a national repository of lifesaving pharmaceuticals and medical materials that will be delivered to the site of a major medical emergency in order to reduce morbidity and mortality in civilian populations. The decision to send the SNS is a collaborative effort between local, state, and federal officials in a process whereby local health departments and emergency management officials contact the Michigan State police Emergency Management Division, and state health officials who recommend to the Governor that a formal request for the SNS is made to the CDC.

The stockpile is activated to support a local and or state response to an emergency within the US or its territories. The two major components of the stockpile are the 12 Hour Push Pack and the Vendor Managed Inventory (VMI). Push Packs contain 50 tons of medical materiel that will treat a variety of illnesses. The VMI will re-supply the Push Pack or supplies will be sent immediately to the emergency site if the biological agent is known.

School Safety Information Act: 102 P.A. 1999:
In response to the rash of school shootings that occurred in the late 1990s, the Michigan Legislature passed Act 102 in July 1999 – The Michigan School Safety Information Act – which requires local school districts to meet with law enforcement officials to develop emergency plans to handle violent situations. School superintendents are then required to educate local communities about the plans. The plans spell out, among other things, how to evacuate schools, bring first aid and emergency resources to the scene, and handle parents that want to pick up their children. The law also requires the development and implementation of a statewide school safety information policy, the reporting and compiling of certain school safety information, and the expulsion of pupils for certain assaults.

Michigan Office of Safe Schools:
In 1998 the Michigan Legislature established the Michigan Office of Safe Schools within the Michigan Department of Education. The Office of Safe Schools began operating in October of 1999. Its mission is to collect and distribute information about school safety. The Office of Safe Schools maintains a web site that serves as a one-stop clearinghouse for information on school safety, school bus safety, food safety and current and proposed school safety legislation.

In March 2001, the Michigan Office of Safe Schools established a toll-free School Violence Hotline to provide a means for students to anonymously report specific threats of imminent school violence or other suspicious or criminal conduct. The toll-free hotline is operational 24-hours per day, 365 days a year, at 1-800-815-TIPS.

Michigan State Agencies:
Sabotage / terrorism are being addressed on a variety of other fronts within Michigan State Government. The Michigan Department of State Police oversees and coordinates state agency actions related to homeland security and terrorism response – including the investigation of suspected or potential criminal enterprises and activities that might involve sabotage or terrorism. In addition, the State Police (in conjunction with other state agencies as well as federal and local counterparts) continuously prepares for terrorist incidents through emergency planning, training, information sharing and exercising efforts.

Nuclear Attack

Kalamazoo is not in an area known to be a specific nuclear attack target. However, mitigation of a Nuclear Attack on the local level is limited to preparation for personal, community, and infrastructure preparations. Ongoing participation by the community in general preparative activities, such as those of the KCDC, Red Cross, Fire Drills, Scouting, 4-H, Private Industry, Homeland Security, Advisory Bulletins from the MSU Extension Office, and personal storm protection by citizenry contribute to a general personal readiness that would be extremely useful should threat of a nuclear attack occur.

Earthquakes

In January 1990, Executive Order (EO) 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, was signed into law. This EO requires that appropriate seismic design and construction standards and practices be adopted for any new construction or replacement of a federal building or federally building during or after an earthquake.

Weather Hazards (General)

National Weather Service Doppler Radar:

The National Weather Service (NWS) has completed a major modernization program designed to improve the quality and reliability of weather forecasting. The keystone of this improvement is Doppler Weather Surveillance Radar, which can more easily detect severe weather events that threaten life and property. The lead-time and specificity of warnings for severe weather have improved significantly. Doppler technology calculates both the speed and the direction of motion of severe storms. By providing data on the wind patterns within developing storms, the new system allows forecasters to better identify the conditions leading to severe weather such as tornadoes, severe straight-line winds, lightning and damaging hail. This means early detection of the precursors to severe storms, as well as information on the direction and speed of storms once they form.

National Weather Service Watches/Warnings:

The National Weather Service issues severe thunderstorm watches for areas when the meteorological conditions are conducive to the development of severe thunderstorms. People in the watch area are instructed to stay tuned to National Oceanic and Atmospheric Administration (NOAA) weather radio and local radio or television stations for weather updates, and watch for developing storms. Once radar or a trained Skywarn spotter detects the existence of a severe thunderstorm, the National Weather Service will issue a severe thunderstorm warning. The warning will identify where the storm is located, the direction in which it is moving and the time frame during which the storm is expected to be in the area. Persons in the warning area are instructed to seek shelter immediately. The State and local government agencies are warned via the Law Enforcement Information Network (LEIN), NOAA weather radio and the Emergency Managers Weather Information Network (EMWIN). Public warning is provided through the Emergency Alert System (EAS). The National Weather Service stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The National Weather Service also provides detailed warning information on the Internet through the Interactive Weather Information Network (IWIN).

National Weather Service Education:

The National Weather Service issues severe thunderstorm watches and warnings when there is a threat of severe thunderstorms. However, lightning, by itself, is not sufficient criteria for the issuance of a watch or warning (every storm would require a watch or warning). The National Weather Service has an extensive public information program aimed at educating citizens about the dangers of lightning and ways to prevent lightning-related deaths and injuries.

Severe Weather Awareness Week:

Each spring, the Emergency Management Division, Michigan Department of State Police, in conjunction with the Michigan Committee for Severe Weather Awareness, sponsors Severe Weather Awareness Week. This annual public information and education campaign focuses on such severe weather events as tornadoes, thunderstorms, hail, high winds, flooding and lightning. Informational materials on lightning hazards are disseminated to schools, hospitals, nursing homes, other interested community groups, facilities, and the public.

Tornado National Weather Service Watches/Warnings:

The National Weather Service issues tornado watches for areas when the meteorological conditions are conducive to the development of a tornado. People in the watch area are instructed to stay tuned to NOAA weather radio and local radio or television stations for weather updates, and watch for developing storms. Once a tornado has been sighted and its existence is confirmed and reported, or Doppler Radar shows strong probability of the development or occurrence of a tornado, the National Weather Service will issue a tornado warning. The warning will identify where the tornado was sighted, the direction in which it is moving and the time frame during which the tornado is expected to be in the area. Persons in the

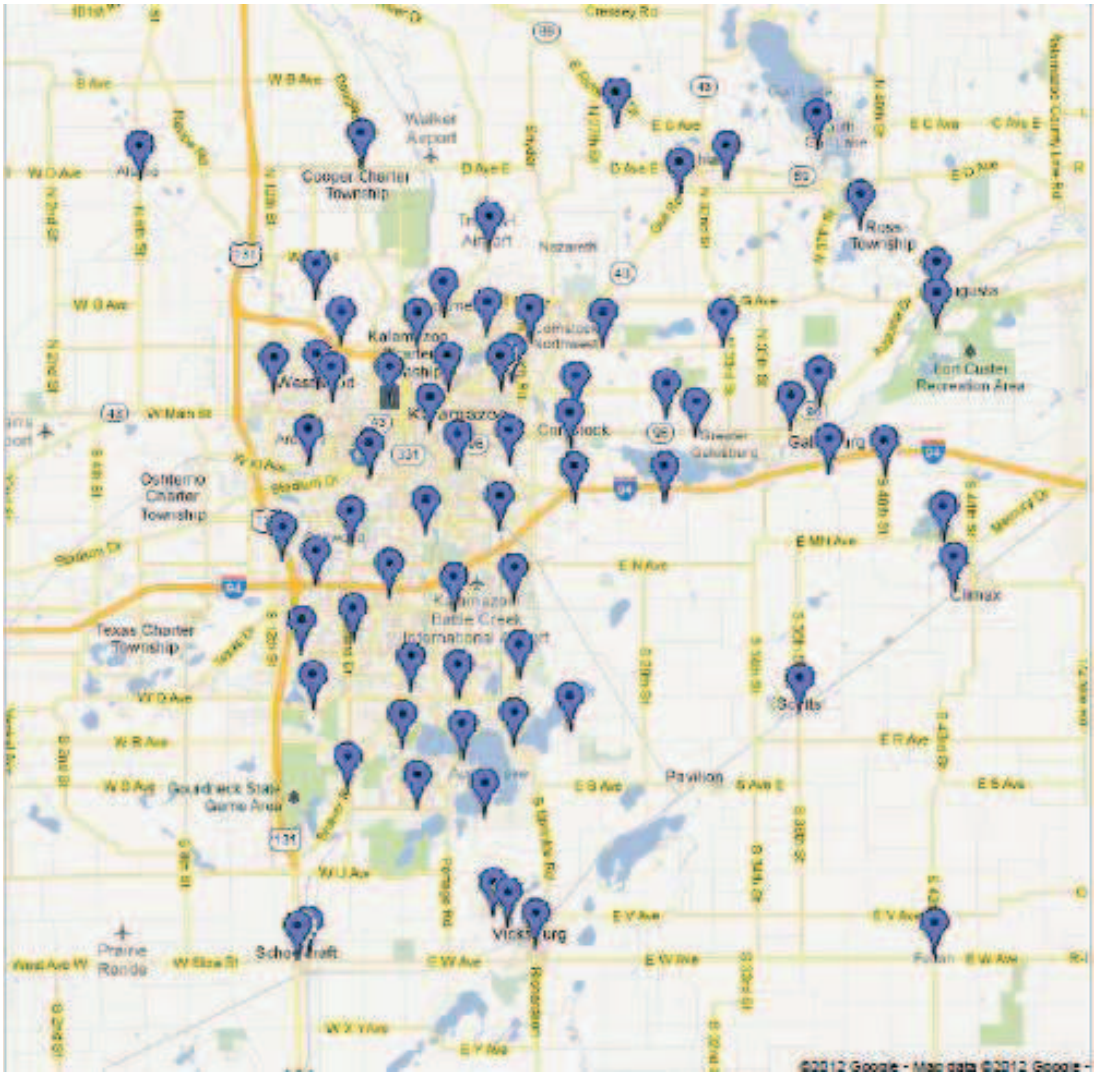
warning area are instructed to seek shelter immediately.

The State and local government agencies are warned via the Law Enforcement Information Network (LEIN), National Oceanic and Atmospheric Administration (NOAA) weather radio and the Emergency Managers Weather Information Network (EMWIN). Public warning is provided through the Emergency Alert System (EAS). The National Weather Service stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The National Weather Service also provides detailed warning information on the Internet, through the Interactive Weather Information Network (IWIN).

Tornado Warning Systems:

Outdoor warning siren systems warn the public about impending tornadoes and other hazards. Most of these systems were originally purchased to warn residents of a nuclear attack, but that purpose was expanded to include severe weather hazards as well. These systems can be very effective at saving lives in densely populated areas where the siren warning tone is most audible. In more sparsely populated areas where warning sirens are not as effective, communities are turning to NOAA weather alert warning systems to supplement or supplant outdoor warning siren systems. Unfortunately, several of the communities within Kalamazoo County do not have adequate public warning systems in place to warn their residents of severe weather or other hazards.

Kalamazoo County Sirens



This is a map showing the warning siren locations in the county as of April 2012. This map shows the siren locations, but the actual area affected for each siren varies with topography and weather conditions. As a rough estimate, each siren covers approximately a one mile radius around its location. Also in the table below includes a written list of siren locations in the county.

Galesburg - Norm's Place	Portage - 2926 Woodhams	K-Twp - 2829 Maple Ave.
G-A High School	Portage - Osterhout at Marylynn Ct.	K-Twp - Fire Station #3
W. Gull Lake at CD Ave	Portage - Shaver at Beethoven	K-Twp - Fire Sta #4
Ft. Custer Rec Area Ranger Station	Portage - South Westnedge Park	K-Twp - Fire Sta #2
Alamo Twp. Fire Station	Portage - Lakeview Park	K-Twp - Fire Sta #1
Cold Brook Park	Portage - Tiffany at Autumn	K-Twp - 5100 N. 14th St.
Climax - ON Ave.	Portage - Portage Dist. Library	K-Twp - 1417 Baker Dr.
Charleston Twp. Hall	Portage - 3412 W. Centre	KDPS - 3700 S. Burdick
Charleston Twp. - Eaton Corp.	Portage - Haverhill St.	KCSD - 828 Woodward St.

Yorktown - Gull Lake Schools	Portage - Milham east of KRESA	KDS - Riverview at Paterson
Richland - 533 Gull Rd, A. Campbell Residence	Portage - Sprinkle south of Winthrop	KDPS - Eldridge at W. Michigan
Richland - 8973 28th St. at C Ave.	Portage - E. Centre at Oakside	KDPS - Stockbridge at James
Ross - Sherman Lake Dr. at 38th St.	Portage - Sprinkle at Wells	KDPS - Mt. Olivet at Random St.
Augusta Fire Station	Portage - Romence at Angling	KDPS - Oakland Dr. at Edgewood Dr.
Cooper Twp Fire Station #2	Portage - Alngling Elementary School	KDPS - Station #6
Cooper Twp. Fire Station #1	Portage - Outer Dr. at Idaho	KDPS - Croyden Ave. at 12th St.
Comstock - Comstock Ave. at River St.	South County Fire Sta #3	KDPS - Pfizer, 333 Portage Rd.
Comstock - N 26th St. at Dawes Ave.	South County Fire Sta #1	KDPS - 4401 Siesta at Moonlite
Comstock - 713 N. 30th St.	South County - V Ave at 22nd	K Twp - 2525 Althea St.
Comstock - East Fire Sta.	South County - Kalamazoo at Washington	K Twp - Barney Rd at Old Farm Rd.
Comstock - East H Ave. at Hunters Run	South County - Schoolcraft Public Works	KDPS - 2500 E. Cork
Comstock - 9300 East H Ave.	South County - North Boulevard behind EMS	Behind Consumers Energy
Comstock - East ML at E. Glen Eagle	Pavilion - Scotts Fire Station	Pavilion - Greenfield Shores Fire Station
Comstock - 5937 East ML at 26th St.	Parchment - Robert at Wilson	

Structural Fires

Michigan Office of Fire Safety:
The Michigan Department of Licensing and Regulatory Affairs' Office of Fire Safety is responsible for conducting fire safety and prevention inspections in state-regulated facilities and certain other facilities. Specific services provided include: 1) fire safety inspections of adult foster care, correctional and health care facilities, and hotels/motels; 2) plan review and construction inspections of the regulated facilities in item (1), as well as schools, colleges, universities, and school dormitories; 3) coordination of fire inspector training programs; and 4) coordination of fire alarm and fire suppression system installation in regulated facilities. These activities are important mitigation activities designed to save lives and protect property from structural fire hazards. The State Fire Safety Board, also housed within the Michigan Department of Licensing and Regulatory Affairs, Bureau of Construction Codes and Fire Safety, promulgates rules covering the construction, operation and maintenance of schools, dormitories, health care facilities, and correctional facilities. These rules are designed to protect life and property at these facilities from fire, smoke, hazardous materials and fire-related panic.

Fire Safety Rules for Michigan Dormitories:
Even before the Seton Hall University dormitory fire in January, 2000, the State Fire Safety Board took action to enhance the fire and life safety protection of Michigan's college and university dormitories. On December 21, 1999 two new sets of rules took effect governing the construction, operation, and maintenance of school, college and university instructional facilities and dormitories. These sets of rules were updated to meet the most current nationally recognized standards from the National Fire Protection Association. The new rules adopted the 1997 edition of NFPA 101, Life Safety Code. NFPA standards provide the minimum

requirements necessary to establish a reasonable level of fire and life safety and property protection from hazards created by fire and explosion.

The new rules require, among other things, that fire sprinklers be installed in newly constructed dormitories or those undergoing major renovations. However, existing dormitories don't fall under the new rules and therefore do not have to be retrofitted unless they are being renovated.

Wild Fires

Because the vast majority of wildfires are caused by human activity, the Michigan Department of Natural Resources established, in 1981, the Michigan Interagency Wildfire Prevention Group. It was the first such group in the nation (promoting wildfire prevention and awareness) that had the full involvement of the state's fire agencies. In 1993, the Michigan Interagency Wildfire Prevention Group was expanded to form the Michigan Interagency Wildland Fire Protection Association (MIWFPA). The MIWFPA promotes interagency cooperation in fire prevention, training, fire technology, and firefighting operations. Members of the MIWFPA include the: 1) MDNR Forest Management Division; 2) USDA Forest Service - Huron-Manistee, Hiawatha, and Ottawa National Forests; 3) USDI National Park Service - Pictured Rocks and Sleeping Bear Dunes National Lakeshores; 4) USDI Fish and Wildlife Service – Seney National Wildlife Refuge; 5) USDI Bureau of Indian Affairs; 6) Michigan Department of State Police – fire investigation; 7) Michigan State Firemen's Association; and the 8) Michigan Fire Chief's Association. While the risk of wildfires is low, Kalamazoo can reduce its vulnerability to wildfires by: 1) participating in multi-state and interagency mitigation efforts.

Scrap Tire Fires

The Scrap Tire Regulatory Program is implemented by the Waste Management Division of the Michigan Department of Environmental Quality, under the authority of Part 169 of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. Policies and regulations established under this law provide the basis for the MDEQ to implement and administer an effective scrap tire management program per the following initiatives: 1) a compliance and enforcement program was implemented; 2) a scrap tire policy recycling hierarchy was established; 3) special uses of scrap tires were approved; and 4) a grant program was established to address abandoned tires.

Riverine and Urban Flooding

National Flood Insurance Program

For many years, the response to reducing flood damages followed a structural approach of building dams, levees and making channel modifications. However, this approach did not slow the rising cost of flood damage, plus individuals could not purchase insurance to protect themselves from flood damage. It became apparent that a different approach was needed. The National Flood Insurance Program (NFIP) was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100-year floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); and 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed. In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain.

The following communities within Kalamazoo County are recognized by FEMA as participants in the National Flood Insurance Program: the cities of Kalamazoo and Portage, the townships of Charleston, Comstock, Cooper, Kalamazoo, Oshtemo, Richland, Ross, Schoolcraft, and Texas, and the villages of Augusta and Vicksburg. These communities have all had their floodplain areas officially mapped and are in compliance with the NFIP. There are five communities in the county, however, that are listed by FEMA as non-participants in the NFIP, even though they have already been mapped as having special flood hazard areas. The five communities are Brady Township, Climax Township, the City of Galesburg, the City of Parchment, and Prairie Ronde Township.

Michigan Flood Hazard Regulatory Authorities:

Land Division Act, 591 P.A. 1996, as amended by 87 P.A. 1997:

The Land Division Act governs the subdivision of land in Michigan. The Act requires review at the local, County and state levels to ensure the land being subdivided is suitable for development. From a flood hazards viewpoint, a proposed subdivision is reviewed by the County Drain Commissioner for proper drainage, and for floodplain impacts by the Department of Environmental Quality, Land and Water Management Division.

Provisions of the Act and its Administrative Rules require that the floodplain limits be defined and prescribe minimum standards for developments for residential purposes and occupancy, within or affected by the floodplain. Restrictive deed covenants are filed with the final plat which stipulates that any building used, or capable of being used, for residential purposes and occupancy within or affected by the floodplain shall meet the following conditions:

Be located on a lot having a buildable site of 3,000 square feet of area at its natural grade above the floodplain limit. (Lots with less than 3,000 square feet of buildable area may be filled to achieve that area.) Be served by streets within the proposed subdivision having surfaces not lower than one foot below the elevation defining the floodplain limits. Have lower floors, excluding basements, not lower than the elevation defining the floodplain limits. Have openings into the basement not lower than the elevation defining the floodplain limits.

Have basement walls and floors below the elevation defining the floodplain limits, watertight and designed to withstand hydrostatic pressures. Be equipped with a positive means of preventing sewer backup from sewer lines and drains serving the building. Be properly anchored to prevent flotation. Floodplain Regulatory Authority, found in Water Resources, Part 31 of the Natural Resources and Environmental Act, 451 P.A. 1994, as amended.

The floodplain regulatory portion of Act 451 restricts residential occupation of high-risk flood hazard areas and ensures that other occupations do not obstruct flood flows. A permit is required from the Department of Environmental Quality for any occupation or alteration of the 100-year floodplain. In general, construction and fill may be permitted in the portions of the floodplain that are not floodway, provided local ordinances and building standards are met. (Floodways are the channel of a river or stream and those portions of the floodplain adjoining the channel which are reasonably required to carry and discharge the 100-year flood. These are areas of moving water during floods.) New residential construction is specifically prohibited in the floodway. Non-residential construction may be permitted in the floodway, although a hydraulic analysis may be required to demonstrate that the proposed construction will not harmfully affect the stage-discharge characteristics of the watercourse. The Act does not apply to watersheds that have a drainage area of less than two square miles. Those small watersheds are considered to be local drainage systems, and do not fall under the Floodplain Regulatory Authority.

Soil Erosion and Sedimentation Control, Part 91 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:

This portion of the Act seeks to control soil erosion and protect the waters of the state from sedimentation.

A permit is required for all earth changes that disturb one or more acres of land, as well as those earth changes that are within 500 feet of a lake or stream. The Act itself does not address flood hazards, per se. However, if sedimentation is not controlled, it can clog streams, block culverts, and result in continual flooding and drain maintenance problems.

Inland Lakes and Streams, Part 301 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:

This portion of the Act regulates all construction, excavation and commercial marina operations on the State's inland waters. It ensures that proposed actions do not adversely affect inland lakes, streams, connecting waters and the uses of all such waters. Structures are prohibited that interfere with the navigation and/or natural flow of an inland lake or stream. Though reduction of flooding is not a specific goal of this Act, minimizing restrictions on a stream can help to reduce flooding conditions.

Wetlands Protection, Part 303 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:

This portion of the Act requires a permit from the Department of Environmental Quality for any dredging, filling, draining or alteration of a wetland. This permitting process helps preserve, manages, and protect wetlands and the public functions they provide – including flood and storm water runoff control. The hydrologic absorption and storage capacity of the wetland allows wetlands to serve as natural floodwater and sedimentation storage areas. The Act recognizes that the elimination of wetland areas can result in increased downstream flood discharges and an increase in flood damage. Permits for wetland alterations are generally not issued unless there is no feasible alternative and the applicant can demonstrate that the proposal would not have a detrimental impact upon the wetland functions.

Natural Rivers Program, Part 305 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:

The Natural Rivers Act was originally passed in 1970, and has been incorporated as Part 305 of the Natural Resources and Environmental Protection Act. The purpose of this program is to establish and maintain a system of outstanding rivers in Michigan, and to preserve, protect, and enhance their multi-faceted values. Through the natural rivers designation process, a Natural River District is established (typically 400 feet either side of the riverbank) and a zoning ordinance is adopted. Within the Natural River District, permits are required for building construction, land alteration, platting of lots, cutting of vegetation, and bridge construction. Not all of the zoning ordinances on the natural rivers have the same requirements, but they all have building setback and vegetative strip requirements. Although the purpose is not specifically to reduce flood losses, by requiring building setbacks (in many cases prohibiting construction in the 100-year floodplain), flood hazard mitigation benefits can be realized.

Dam Safety, Part 315 of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended:

The Dam Safety Unit within the Land and Water Management Division, Department of Environmental Quality, has the primary responsibility to ensure dam safety within the state. Following the September, 1986 flood in central Lower Michigan, the current Dam Safety Act was passed to ensure that dams are built and maintained with necessary engineering and inspections for safety of the public and the environment. The Department of Environmental Quality is required to review applications involving construction, reconstruction, enlargement, alteration, abandonment and removal for dams that impound more than five acres of water and have a height of six feet or more.

Manufactured Housing Commission Act, 96 P.A. 1987, as amended:

The Michigan Manufactured Housing Commission Act and its implementing Administrative Rules provide regulation on the placement of manufactured homes and establishes construction criteria. Manufactured homes are prohibited from being placed within a floodway, as determined by the Department of Environmental Quality. In addition, manufactured homes sited within a floodplain must install an approved anchoring system to prevent the home from being moved from the site by floodwaters

(or high winds), and be elevated above the 100 year flood elevation.

Local River Management Act, 253 P.A. 1964:
Enacted in 1964, the Local River Management Act provides for the coordination of planning between local units of government in order to carry out a coordinated water management program. Implementation of the water management program occurs via the establishment of watershed councils. These councils conduct studies on watershed problems, water quality and the types of land uses occurring within the watershed. Watershed councils have the authority to develop River Management Districts for the purpose of acquisition, construction, operation and the financing of water storage and other river control facilities necessary for river management. The provision to allow acquisition of land adjacent to the river for the purpose of management aids in regulating development of land prone to flooding.

Floodplain Service Program:
The need to identify a flood hazard area before construction is essential to the goal of flood hazard mitigation. The Department of Environmental Quality regularly provides floodplain information to public and private interests as part of its Floodplain Service Program under the Land and Water Management Division. The goal of the program is to provide 100-year floodplain information to interested parties so that informed purchase or development decisions can be made. In addition to providing floodplain information, the MDEQ will provide information on land and water "interface" permit requirements and on building requirements relating to construction in flood hazard areas.

Dam Failures

Both the MDEQ and the Federal Energy Regulatory Commission (FERC) classify and regulate dams in Michigan. Under state and federal legislation, certain dam owners are required to develop a survey of the downriver area, develop flood-prone area maps and develop emergency action plans (EAPs). Furthermore, the FERC requires the owners of such dams to exercise these plans; the MDEQ has initiated an effort to encourage owners of state-regulated dams to voluntarily perform exercises of their EAPs. In Michigan, well over 100 dams are covered by Emergency Action Plans. Dams in Michigan are regulated by Part 315 of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Part 315, Dam Safety provides for the inspection of dams. This statute requires the MDEQ to rate each dam as either "high," "significant," or "low" hazard potential, according to the potential downstream impact if the dam were to fail (not according to the physical condition of the dam). The MDEQ has identified and rated over 2,400 dams. Dams over 6 feet in height that create an impoundment with a surface area of 5 acres or more are regulated by this statute. Dam owners are required to maintain an EAP for "high" and "significant" hazard potential dams. Owners are also required to coordinate with local emergency management officials to assure consistency with local emergency operations plans. Dams regulated by FERC, such as hydroelectric power dams, are generally exempt from this statute. The FERC licenses water power projects (including dams) that are developed by non-federal entities, including individuals, private firms, states and municipalities. Under provisions of the Federal Power Act and federal regulations, the licensee of the project must prepare an EAP. This plan must include a description of actions to be taken by the licensee in case of an emergency. Inundation maps showing approximate expected inundation areas must also be prepared. Licensees must conduct a functional exercise at certain projects, in cooperation with local emergency management officials.

Shoreline Flooding and Erosion

Not Applicable to Kalamazoo - No Great Lakes Boundaries.

Drought

U.S. Geological Survey:

The U.S. Geological Survey (USGS) is the primary federal agency that collects and analyzes stream flow data, another good index of the relative severity of drought. The agency provides a handy "Drought Watch" web site at http://waterwatch.usgs.gov/. The site presents a map that is continually updated through an automated analysis of USGS stream gaging stations. Additional drought-related links can be accessed from the Michigan-specific web page (http://waterwatch.usgs.gov/new/index.php?m=dryw&r=mi) by clicking on the map (or proceeding directly to the specific web page at http://mi.water.usgs.gov/midroughtwatch.php).

Fixed Site Hazardous Material Incidents (including explosions and industrial accidents)

Resource Conservation and Recovery Act - 42 U.S.C. s/s 6901 et seq. (1976)

RCRA (pronounced "rick-rah") gave EPA the authority to control hazardous waste from the "cradle-to-grave". This includes the generation, transportation, treatment, storage and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. RCRA focuses only on active and future. The Federal Hazardous and Solid Waste Amendments are the 1984 amendments to RCRA that required phasing out land disposal of hazardous waste. Some of the other mandates of this strict law include increased enforcement authority for EPA, more stringent hazardous waste management standards and a comprehensive underground storage tank program.

Within Kalamazoo County, efforts are ongoing to enhance general awareness and specialized training for HAZMAT emergencies. The city of Kalamazoo has established a HAZMAT jump team; the Pfizer Corporation has its own HAZMAT team; the KCDC has obtained personal protection kits for every first responder (police/fire/ambulance) in the County -- with training and team building an ongoing activity; and the NWS has implemented a wind forecast process for the purpose of assisting in dispersion analysis
The Fire Act 207, commonly known as the "Polluter-Pay Law" lays financial cleanup responsibility on the entity that caused the spill/hazard. Railroads and trucking companies provide their own emergency response and cleanup teams -- and the MDOT and KCRC are able to assist where necessary.

Hazardous Material Transportation Incidents

Superfund Amendments and Reauthorization Act (SARA), Title III:
As explained earlier, the Bhopal, India tragedy initiated a chain of events aimed at enhancing preparedness activities to minimize the potential for a similar event to occur in the United States. On October 17, 1986 the Superfund Amendments and Reauthorization Act (SARA) was signed into law. A major SARA provision is Title III (the Emergency Planning and Community Right-To-Know Act, also known as SARA Title III), which establishes hazardous material emergency planning, reporting, and training requirements for federal, state and local governments, and private industry. In Michigan, the SARA Title III program is jointly administered and implemented by two state departments—the Michigan State Police and the Michigan Department of Environmental Quality.

Local Emergency Planning Committees:
One of the major provisions of SARA Title III is the establishment of Local Emergency Planning Committees (LEPCs) for designated planning districts. The LEPCs are responsible for developing emergency response plans for communities that have facilities in their jurisdiction subject to SARA Title III emergency planning requirements. The LEPC is the primary mechanism through which local SARA Title III planning, training and exercising activities are implemented. Michigan has 88 designated LEPCs – one for each of the 83 counties and 5 in major cities. Nearly 2,800 facilities across the state have been identified as being subject to Title III emergency planning provisions. A facility is subject to SARA Title III provisions if extremely hazardous substances (as determined by the U.S. Environmental Protection Agency) are present at

the facility in quantities at or above the minimum threshold quantities established in Section 302 of the Act. The map at the end of this section provides a breakdown of Title III (Section 302) sites by county.

Note: Many of the programs and initiatives designed to mitigate, prepare for, respond to, and recover from fixed- site hazardous material incidents have the dual purpose of also protecting against hazardous material transportation incidents.

Federal Hazardous Material Transportation Regulations:

The transportation, manufacturing, storage and disposal processes for hazardous materials are highly regulated by federal and state agencies in order to reduce risk to the public. At the federal level, the U.S. Department of Transportation, Office of Hazardous Materials Safety (USDOT/OHMS), is the regulating agency for all modes of hazardous material transportation. In addition to enforcing federal hazardous material transportation regulations, the USDOT/OHMS is also involved in a number of other areas aimed at improving the safety of hazardous material shipping. Those areas include: 1) research and development of improved containment/packaging and other technological aspects of hazardous material shipping; 2) interagency coordination efforts in hazardous material transportation planning and standards setting; 3) management of data information systems pertaining to hazardous material transportation; and 4) development of hazardous material safety training policies and programs.

In Michigan, the Motor Carrier Division, Department of State Police, oversees, coordinates and implements the commercial truck safety aspects of the USDOT regulations. The Michigan Department of Transportation oversees programs aimed at enhancing railroad safety and improving the rail infrastructure (which helps reduce the likelihood of a hazardous material rail transportation accident).

Hazardous Materials Transportation Uniform Safety Act:

The federal Hazardous Materials Transportation Uniform Safety Act (HMTUSA), enacted in 1990, provides funding for the training of emergency responders and the development of emergency response plans for both fixed site facilities and transportation-related incidents. (This funding mechanism under the HMTUSA is referred to as Hazardous Material Emergency Preparedness [HMEP] grants.) In Michigan, the HMTUSA/HMEP program is coordinated and implemented by the Emergency Management Division, Department of State Police. Since the program's inception, over $326,000 in grants have been allocated to 80 Michigan communities for hazardous material planning and training activities.

Federal/State Hazardous Material Response Resources:

There are numerous groups at the federal, state and local levels and in private industry that are trained to deal with hazardous material fixed-site and transportation incidents. These groups include the National Response Team (NRT), Regional Response Teams (RRTs), and state and local hazardous material response teams. The Chemical Manufacturers Association established the Chemical Transportation Emergency Center (CHEMTREC) to provide 24-hour technical advice to emergency responders. The National Response Center (NRC), which operates much like CHEMTREC, was established to provide technical advice and coordinate federal response to a hazardous material incident.

In Michigan, a 24-hour statewide notification system called the Pollution Emergency Alerting System (PEAS) was established for reporting chemical spills to the Department of Environmental Quality. As a companion to the PEAS, the Michigan Department of Agriculture (MDA) has established a 24-hour Agriculture Pollution Emergency Hotline for use by agrichemical users to report fertilizer and pesticide spills. Callers to the MDA hotline gain immediate access to appropriate technical assistance, regulatory guidance for remediation, and common sense approaches for addressing the problem.

Oil and Natural Gas Well Accidents

Local Emergency Capability:

Communities that may be affected by oil or natural gas well accidents should have adequate procedures in their Emergency Operations Plans to address the unique types of problems associated with this hazard, including rescue and evacuation. Affected communities must work closely with company officials and surrounding jurisdictions to ensure compatibility of procedures for a fast, coordinated response. Mitigation possibilities include the use of community zoning regulations to provide suitable open, unoccupied "buffer" areas around refineries and compressor stations. Michigan Department of Environmental Quality regulations provide for buffer zones around wells and treatment and storage facilities.

Pipeline Accidents (Petroleum and Natural Gas)

MPSC Pipeline Safety Inspections:

Safety engineers from the MPSC are certified by the USDOT/OPS to conduct inspections on natural gas pipelines to ensure structural and operational integrity of the systems. If violations are found, the pipeline company can be ordered to take corrective actions; in addition, the pipeline operator may be fined. The MPSC safety engineers also respond to accidents involving natural gas pipelines (to ensure compliance with federal and state law and to offer technical assistance to emergency responders).

Protection of Underground Facilities Act / MISS DIG Program:

Michigan's first line of defense against pipeline and other utility line breaks from construction excavation is The "MISS DIG" Program established with the passage of Act 53 in 1974 – The Protection of Underground Facilities. MISS DIG System, Inc., is a 24-hour utility communications system that helps contractors comply with the state law (Act 53) which requires notification of utilities at least three working (but not more than 21 calendar) days before commencing excavation, tunneling, demolishing, drilling or boring procedures, or discharging explosives for a project. When properly administered and followed, the MISS DIG safety system does an excellent job of minimizing pipeline and utility line accidents.

Programs and Initiatives:

Pipeline jurisdiction and oversight in Michigan is complex, determined primarily by the type and function of a pipeline and its location. Agencies involved include 1) the MPSC Gas Safety Office; 2) the USDOT/OPS in Kansas City, Missouri; and 3) the Michigan Department of Environmental Quality, Geological Survey Division (MDEQ/GSD). The table below is a breakdown of jurisdictional and inspection responsibilities for the various types of pipelines present in Michigan:

Pipeline Safety Regulation in Michigan

Pipeline Type	Jurisdiction	Applicable Code	Inspected By
Inter-state Natural Gas	USDOT/OPS	49 CFR Part 192	MPSC Gas Safety Intra-state
Inter-state Natural Gas	State of Michigan/MPSC	Michigan Gas Safety Standards	MPSC Gas Safety
Liquid Petroleum Gathering Lines*	USDOT/OPS MDEQ/GSD	49 CFR Parts 193/195 Oil/Gas Administrative Rules under Part 615, 1994 P.A. 451	USDOT/OPS

*Note: Gathering lines run from a production facility (i.e., well) to a pre-processing plant (i.e., dehydration facility, separator, compression station). Source: Michigan Public Service Commission, Gas Safety Office

Local Emergency Capability:

Procedures in the Emergency Operations Plans address the unique types of problems associated with this

hazard, including specific functions such as rescue and evacuation. Communities work closely with company officials and surrounding jurisdictions to ensure a fast, coordinated response. Mitigation possibilities include the use of community zoning regulations to provide suitable open, unoccupied "buffer" areas around pipelines, storage fields, refineries and compressor stations.

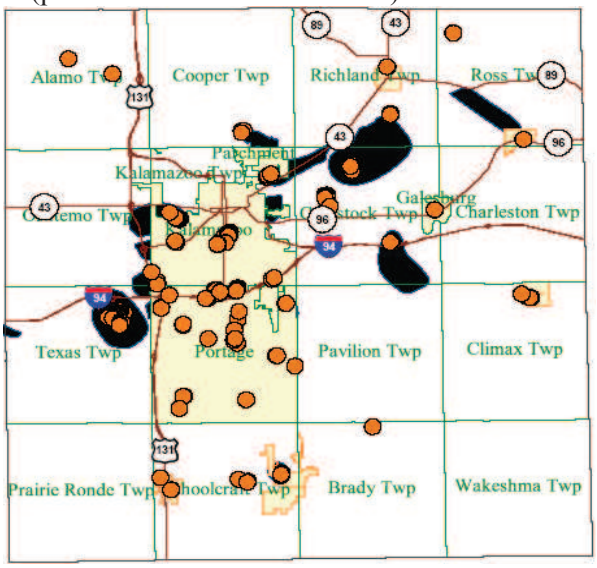
Nuclear Power Plant Accidents

Mitigation of nuclear power plant hazards on the local County level is primarily limited to the detection of radiation, alerting the public, and providing directions for evacuation and/or housing – the latter three issues are addressed in other sections of this mitigation action item section of the mitigation plan.

Infrastructure Failures

Kalamazoo has the largest groundwater pumping area of any community east of the Mississippi -- with 13 pumping centers for freshwater - serving 150,000 customers. There are four types of water wells, identified as Type I (Municipal, serving 25 or more people 24 hours per day for 60 or more days), Type II (serve 25 or more people for 60 days -- example: Township Halls), Type III (duplex or small businesses with less than 25 employees, and Type IV (private individual water wells).

There are 399 wells of Types I (show as orange circles in the map at right) and II in the County -- and each must be tested regularly. Including the Kalamazoo well fields, there are 17 Type I water suppliers. Mobile home parks in the rural areas have their own type I water supply systems and wells. The DEQ, located on D. Avenue, regulates public water; and the Kalamazoo County Human Services Department -- Environmental Health & Laboratory Services conducts water well sampling and tracking on a regular basis -- and meets with the operators of municipal water systems on a three- month basis.



Of concern is the ability of water well suppliers Type I, II (shown as purple circles in the map below), and III to supply water in the event of a failure of their existing water system -- for example, hospitals and other key facilities should have a contingency plan for ensuring the continuation of water service in the event of loss of water or sewage.

Water systems serving populations between 50,000 and 100,000 persons are required to complete an Emergency Response Plan (ERP). The vulnerability assessment process requires systems to identify critical assets and single points of failure, and then analyzed threats.

The Federal Clean Water Act regulates the discharge from community wastewater collection and treatment systems. The regulatory aspects of the Act that pertain to municipalities have been delegated to the MDEQ Surface Water Quality Division for surface water discharge facilities, and the MDEQ Waste Management Division for groundwater discharge facilities. Authority for the oversight of planning, facility design review, and construction permitting of sewerage systems collection, transportation and treatment facilities, is derived from Part 41 of the Michigan Natural Resources and Environmental

Protection Act (451 P.A. 1994) and Administrative Rules promulgated under authority of Part 41. The two MDEQ divisions assist communities with the development and maintenance of their wastewater collection and treatment systems. In addition, they monitor and regulate these systems to ensure pollution abatement and health conditions are met. Although the regulatory authority vested in the MDEQ is primarily aimed at preventing pollution of waters of the state, there are requirements in place under 451 P.A. 1994 regarding the design, construction, and operational integrity and reliability of wastewater collection and treatment systems.

The major electrical power grid encircles the metropolitan Kalamazoo area. In preparation for Y2K, Kalamazoo arranged for power to service the water treatment and pumping plants from two directions (formerly served by one) -- expecting that in any emergency one of the two would provide electricity to these critical infrastructure elements.

All sewer systems within Kalamazoo County flow to one central processing plant in the city of Kalamazoo. Under the requirements of the Public Hazard and Security and Bioterrorism Preparedness Act of 2002, a Process Safety Management Plan, and an Emergency Response Plan was reinforced and is updated and monitored under the direction of the Wastewater Superintendent.

Surface Drainage Systems:
Michigan's first drain laws appeared on the books as Territorial laws – years before Michigan achieved statehood. After attaining statehood in 1837, the State passed its first drain law in 1839. Since that time, there have been 45 separate acts passed regarding drainage, up to the most recent re-codification of drain law in 1956. Since 1956, the present drain code has been amended over 200 times – an indication of how important and dynamic the issue of drainage continues to be in Michigan. The Michigan Drain Code provides for the maintenance and improvement of the vast system of intra-County (County) and inter-County drainage facilities. Each drain has a corresponding special assessment district (watershed), a defined route and course, an established length, and is conferred the status of a public corporation with powers of taxation, condemnation, ability to contract, hold, manage and dispose of property, and to sue and be sued. Drainage districts and drains are established by petition of the affected landowners and/or municipalities. County drains, with a special assessment district entirely within the County, are administered by the locally elected County Drain Commissioner. Inter-County drains, with a special assessment district in more than one County, are administered by a drainage board that consists of the drain commissioners of the affected counties, and is chaired by the Director of the Michigan Department of Agriculture (MDA) or an MDA Deputy Director.

Water Distribution Systems:
Michigan's public water supplies are regulated under the Federal Safe Drinking Water Act. The Michigan Department of Environmental Quality (MDEQ), as a primary agency for the Federal government, provides supervision and control of Michigan's public water supplies (including their operation and physical improvements) under the Michigan Safe Drinking Water Act (399 P.A. 1976).

The MDEQ Drinking Water and Radiological Protection Division regulates, through a permit process, the design, construction and alteration of public water supply systems. Water supply construction must be conducted within the framework of the Michigan Safe Drinking Water Act, as well as the Architecture, Professional Engineering and Land Surveying Act (240 P.A. 1937, which requires professional engineering preparation of construction documents for water works construction costing over $15,000). Most communities in Michigan, including Kalamazoo have, in conjunction with the MDEQ, developed water system master plans that conform to the requirements of the Michigan Safe Drinking Water Act. From a hazard mitigation standpoint, that is important because it helps ensure that all new water system construction and alterations to existing systems will conform to the minimum standards set

in the Act. While not making water infrastructure "disaster-proof", the standards provide at least a basic level of design, structural and operational integrity to new or renovated portions of a community's water supply system.

Kalamazoo has the largest groundwater pumping area of any community east of the Mississippi -- with 13 pumping centers for freshwater - serving 150,000 customers. There are four types of water wells, identified as Type I (Municipal, serving 25 or more people 24 hours per day for 60 or more days), Type II (serve 25 or more people for 60 days -- example: Township Halls), Type III (duplex or small businesses with less than 25 employees, and Type IV (private individual water wells)

Public Health Emergencies

Michigan Department of Community Health:
The Director of the Department of Community Health, and local public health officers, have the authority (under the Michigan Public Health Code—1978 PA 368, as amended) to take those steps determined necessary and prudent to prevent epidemics and the spread of hazardous communicable diseases, or to effectively mitigate other conditions or practices that constitute a menace to public health. The Director and local public health officers can issue written orders to implement the required preventive steps and/or responses, and those orders can be enforced through the imposition of civil and criminal penalties for failure to comply. State and local health departments have detailed, written emergency operations plans that address public health emergencies.

U.S. Centers for Disease Control and Prevention:
At the national level, the U.S. Centers for Disease Control and Prevention (CDC), a branch of the Department of Health and Human Services, has the responsibility and authority to investigate public health emergencies to determine their cause, probable extent of impact, and appropriate mitigation measures. The CDC can also assist state and local public health officials in establishing health surveillance and monitoring systems/programs, and in disseminating information on prevention and treatment to the general public. The CDC announced dedicated funding for bioterrorism response, and Michigan has been strengthening its surveillance and intervention infrastructures with these funds. Since 2001, the CDC has also provided dedicated funding for public health emergency preparedness programs. In 2002, the MDCH Office of Public Health Preparedness was established to oversee these cooperative agreements. In the 2009 Influenza A (H1N1) event, CDC coordinated with numerous health departments across the country, tracked influenza cases, and provided information about outbreak trends. Tests were also performed, to verify whether flu cases were indeed of the correct type.

Michigan Pandemic Influenza Plan:
In October 2009, the Michigan Department of Community Health updated the "Michigan Pandemic Influenza Plan," to provide response guidelines for an influenza pandemic affecting Michigan. Although the plan cannot eliminate the disease, it will aid in reducing the impact by enabling state and local agencies to anticipate, prepare for, and respond efficiently and effectively to the disease. The plan, which is divided into pre-pandemic, pandemic, and post-pandemic phases, details necessary activities at the state and local level related to:

- command and management,
- crisis communications,
- surveillance,
- laboratory testing,
- community containment,
- infection control in health care facilities,
- vaccines and antivirals/medical management,
- data management,

- border/travel issues
- recovery

The Michigan Pandemic Influenza Plan is available for review and downloading at www.michigan.gov/flu.

Transportation Accidents

Air Transportation:

The Michigan Aeronautics Commission of the MDOT administers several programs aimed at improving aviation safety and promoting airport development. The Commission's safety programs include: 1) registering aircraft dealers, aircraft, and engine manufacturers; 2) licensing airports and flight schools; 3) inspecting surfaces and markings on airport runways; and 4) assisting in removal of airspace hazards at airports. The Commission's airport development program includes providing state funds for airport development and airport capital improvements – many of which contribute to overall air transportation safety. The Federal Aviation Administration (FAA) contracts with the MDOT for the inspection of the state's 238 public- use airports on an annual basis. The FAA has regulatory jurisdiction over operational safety and aircraft worthiness. The National Transportation Safety Board (NTSB) investigates all aircraft crashes that involve a fatality and publishes reports on its findings (see the NTSB section below).

Bus Safety:

School bus safety programs and initiatives generally fall into two categories: 1) driver skill enhancement, competency training and 2) physical inspections of bus mechanical and safety equipment. The Motor Carrier Division, Michigan Department of State Police, inspects all school buses and other school transportation vehicles (21,000 units) on an annual basis. In addition, all school bus drivers in Michigan must take and pass a bus driver education and training program, and then take regular refresher courses to maintain their certification to operate a school bus. School bus drivers must also pass an annual medical examination.

CHAPTER 3: HAZARD ANALYSIS

Category 1: Civil Unrest and War

Civil Disturbances

Hazard Description - A public demonstration or gathering, or a prison uprising, that results in a disruption of essential functions, rioting, looting, arson or other unlawful behavior.

Large-scale civil disturbances rarely occur, but when they do they are usually an offshoot or result of one or more of the following events: 1) labor disputes where there is a high degree of animosity between the participating parties; 2) high profile/controversial judicial proceedings; 3) the implementation of controversial laws or other governmental actions; 4) resource shortages caused by a catastrophic event; 5) disagreements between special interest groups over a particular issue or cause; 6) a perceived unjust death or injury to a person held in high esteem or regard by a particular segment of society; or 7) a "celebration" of an important victory by a sports team.

In 1967, two separate incidents of civil disobedience regarding African-American racial unrest turned to rioting and hostility. In Kalamazoo's North side and Downtown areas violence broke out into a riot, as well as at Central High School which housed the majority of the school district's black students compared to the predominately white Loy Norrix facility.

In the early morning hours of September 9, 2001, a riot broke out at a block party near the Western Michigan University and Kalamazoo College campuses in Kalamazoo. The crowd, which police estimated at 2,500, pelted officers with bottles and rocks, tore down street signs, broke windows, and set fires. Three police cars were heavily damaged and two police officers were injured in the melee. Twenty-one people were arrested – many charged with felonies – and nearly 50 were ticketed for underage drinking and other misdemeanors.

On the night of March 17, 2002, a spring break party around a bonfire near Western Michigan University got out of hand as the people clashed with police in riot gear trying to disperse them. A car was set on fire and several other parked cars were damaged. Rioters climbed telephone poles, pulled down traffic signs and set several dumpsters on fire. About 30 officers moved in when someone threw a bottle through the windshield of a passing car. Three people were charged with unlawful assembly and a fourth was accused of assault.

A party that occurred near Western Michigan University's campus on March 13, 2010 may have drawn upwards of 1,000 people and resulted in several arrests. About 10 Kalamazoo Department of Public Safety officers responded to complaints of noise and large crowds but called for assistance after rocks and bottles were tossed at them. Eventually, about two dozen officers from KDPS, the Kalamazoo County Sheriff's Office, Kalamazoo Township Police Department and WMU Department of Public Safety spent about two hours dispersing the crowd. Public safety officers used mace and pepper spray to help disperse the crowd. Seven people were arrested on 10 separate charges that included assaulting a police officer and resisting and obstructing police. Police encountered a similar party around St. Patrick's Day the last couple years but the 2010 incident was the largest one yet.

Prison uprisings are normally the result of perceived injustice by inmates regarding facility rules, operating policies and/or living conditions, or insurrections started by rival groups or gangs within the facility. (Prison or institutional rebellions, disruptive political gatherings, violent labor disputes, urban protests, riots or large-scale uncontrolled festivities)

Summary: There is a significant civil disturbance event about once per decade, in the City of Kalamazoo. These involve significant property damage and risks of harm to persons in the area.

Sabotage/Terrorism/Weapons of Mass Destruction (WMD)

Hazard Description - An intentional, unlawful use of force, violence or subversion against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political, social, or religious objectives.

Sabotage / terrorism take's on many forms, although civilian bombings, assassination and extortion are probably the methods with which we are most familiar. Internationally, such acts have become quite commonplace, as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political and social agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social and economic infrastructure of individual businesses, units of government, or nations. The Middle East and European continent, in particular, have been hard hit by acts of sabotage and terrorism over the past several decades. Parts of Asia and South America have also experienced a high level of activity.

Just as the methods and potential instigators have increased, so too have the potential targets of sabotage / terrorism. As recent events across the country have shown, virtually any public facility, infrastructure, or place of public assembly can be considered a target of sabotage. In addition, certain types of businesses engaged in controversial activities are also potential targets. With the advent of the information age and growth in the number of computer "hackers", computer systems (especially those of government agencies, large businesses, financial institutions, health care facilities, and colleges / universities) are potential targets as well. Kalamazoo County has experienced other pre-meditated acts of workplace violence that resulted in deaths and injuries: On November 30, 2000 a man shot to death a co-worker in the parking lot outside their place of employment in Kalamazoo. The man apparently had been having personal problems with the victim. Witnesses indicated the suspect waited until employees were being dismissed from work and then targeted his victim.

In response to the September 11, 2001 terrorist attacks on New York City, Washington, D.C., and Shanksville, Pennsylvania, President Bush created the U.S. Office of Homeland Security – a Cabinet-level office that coordinates and reports directly to the President on all issues related to domestic terrorism preparedness. The mission of the Office of Homeland Security is to oversee and coordinate a comprehensive national strategy to safeguard the country against terrorism and respond to any attacks that may occur. The Office of Homeland Security coordinates the many counter-terrorism functions scattered across numerous federal agencies and organizations, including the Central Intelligence Agency (CIA), the Federal Bureau of Investigation (FBI), the Coast Guard, Customs Service and Border Patrol, the Federal Emergency Management Agency (FEMA), and the Critical Infrastructure Assurance Office (CIAO), to name just a few. The Office works closely with state and local police and fire agencies, emergency response teams, and emergency management agencies in formulating and carrying out the national strategy.

Summary: Kalamazoo has mainly been affected by terrorist threats in the same way that most cities have, dealing with security issues and threats but not tending to suffer regular damages from successful attacks.

Nuclear Attack

Hazard Description - Any large-scale hostile action taken against the United States which involves nuclear weapons and results in destruction of military and/or civilian targets.

The United States is vulnerable to a number of national security threats from external, hostile forces. National security threats include nuclear attack, chemical and biological warfare, and terrorism. The potential for damage resulting from a national security emergency ranges from the relatively localized damage caused by a terrorist attack using weapons of mass destruction, to the catastrophic devastation that could be expected following a full-scale nuclear attack.

World events in recent years have greatly changed the nature of the nuclear attack threat against the United States. The breakup of and establishment of democratic forms of government in the former Soviet Union and other Soviet- Bloc nations in Eastern Europe has essentially ended the "Cold War" that shaped and influenced world politics since the late 1940s. That tremendous turn of events has, for all intents and purposes, reduced the need for the United States and former Soviet states to maintain huge stockpiles of nuclear weapons. The reduction in nuclear weapons stockpiles that has occurred over the past few years in both countries has diminished the threat of a full-scale, massive nuclear attack that would threaten the very existence of the world as we know it.

Kalamazoo is not in an area designated as a potential nuclear attack target; however it is up-wind from Battle Creek, which is a potential nuclear attack target. Mitigation for Nuclear Attack on the local level is limited to preparation for personal, community, and infrastructure preparations outlined in other parts of this Plan. Ongoing participation by the community in general preparative activities, such as those of the KCDC, Red Cross, Fire Drills, Scouting, 4- H, Private Industry, Homeland Security, Advisory Bulletins from the MSU Extension Office, and personal storm protection by citizenry contribute to a general personal readiness that would be extremely useful should threat of a nuclear attack occur.

Summary: This hazard is mainly handled at higher levels of government. Although no events have yet occurred, vigilance is essential.

Category 2: Geological Hazards

Earthquakes

Hazard Description: A shaking or trembling of the crust of the earth caused by the breaking and shifting of rock beneath the surface.

Earthquakes range in intensity from slight tremors to great shocks. They may last from a few seconds to several minutes, or come as a series of tremors over a period of several days. The energy of an earthquake is released in seismic waves. Earthquakes usually occur without warning. In some instances, advance warnings of unusual geophysical events may be issued. However, scientists cannot yet predict exactly when or where an earthquake will occur. Earthquakes tend to strike repeatedly along fault lines, which are formed where large plates of the earth's crust below the surface constantly push and move against one another. Risk maps have been produced which show areas where an earthquake is more likely to occur. Earthquake monitoring is conducted by the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and universities throughout the country.

The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Most casualties result from falling objects and debris. Disruption of communications systems, electric power lines, gas, sewer and water mains can be expected. Water supplies can become contaminated by seepage around water mains. Damage to roadways and other transportation systems may create food and other resource shortages if transportation is interrupted. In addition, earthquakes may trigger other emergencies such as fires and hazardous material spills, thereby compounding the situation. Significant Earthquakes No severely destructive earthquake has ever been documented in Michigan. However, several mildly damaging earthquakes have been felt since the early 1800s. The exact number is difficult to determine, as scientific opinion on the matter varies. With most of these earthquakes, damage (if any) was limited to cracked plaster, broken dishes, damaged chimneys, and broken windows.

(Biggest Michigan threats would be to pipelines, buildings that are poorly designed and constructed, and shelving, furniture, mirrors, gas cylinders, etc. within structures that could fall and cause injury or personal property damage)

The greatest impact on Kalamazoo County would probably come from damage to natural gas and petroleum pipelines. If the earthquake occurs in the winter, areas of the state could be severely impacted by fuel shortages - which could translate into temporary shortages in Kalamazoo. Being on the I-94 and US-131 corridors, Kalamazoo is in a good position to receive shipments from major suppliers to the West and South.

Damage would probably be negligible in well-designed and constructed buildings. However, poorly designed and constructed buildings could suffer considerable damage under the right circumstances.

In January 1990, Executive Order (EO) 12699, Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction, was signed into law. This EO requires that appropriate seismic design and construction standards and practices be adopted for any new construction or replacement of a federal building or federally building during or after an earthquake.

Kalamazoo County is not in an area designated as high risk to ground movement; yet by encouraging awareness of the hazards of poor construction practices and/or routine evaluations of existing structures for deficiencies, vulnerabilities can be identified and repaired before loss is sustained.

There is some chance of a moderate earthquake over the next few decades, which might be strong enough

to damage some property and underground infrastructure.

Subsidence

Hazard Description - The lowering or collapse of the land surface caused by natural or human-induced activities that erode or remove subsurface support.

Subsidence is the lowering or collapse of the land surface due to loss of subsurface support. It can be caused by a variety of natural or human-induced activities. Natural subsidence occurs when the ground collapses into underground cavities produced by the solution of limestone or other soluble materials by groundwater. Human- induced subsidence is caused principally by groundwater withdrawal, drainage of organic soils, and underground mining. In the United States, these activities have caused nearly 17,000 square miles of surface subsidence, with groundwater withdrawal (10,000 square miles of subsidence) being the primary culprit. In addition, approximately 18% of the United States land surface is underlain by cavernous limestone, gypsum, salt, or marble, making the surface of these areas susceptible to collapse into sinkholes.

Generally, subsidence poses a greater risk to property than to life. Nationally, the average annual damage from all types of subsidence is conservatively estimated to be at least $125 million. The National Research Council estimates of annual damage from various types of subsidence are outlined in the table below:

While Kalamazoo County is not in an area of high risk, damage resulting from shifting ground -- either rapidly, or over time -- is not totally unheard of. For example, on December 15, 1998 - a natural gas explosion rocked downtown Galesburg in the early morning hours destroying two businesses and damaging a third. The cause of the leak is suspected to be the result of disturbed ground causing a break in an old gas pipe. One person in an automobile sitting at a nearby red light was slightly injured when a Christmas tree and other debris flew through his windshield. Fortunately, the downtown area was not crowded when the explosion occurred. An eight square block area was evacuated as a precaution against further explosions, but utility workers were able to shut off the gas supply to avert further damage.

Category 3: Weather

Thunderstorm Hazards (General)

Hazard Description - Weather systems accompanied by strong winds, lightning, heavy rain, and possibly hail and tornadoes.

Severe thunderstorms can occur at any time in Michigan, although they are most frequent during the warm spring and summer months from May through September. The potential thunderstorm threat is often measured by the number of "thunderstorm days" – defined as days in which thunderstorms are observed. As the map below indicates, Michigan is subject to 20-60 thunderstorm days per year.

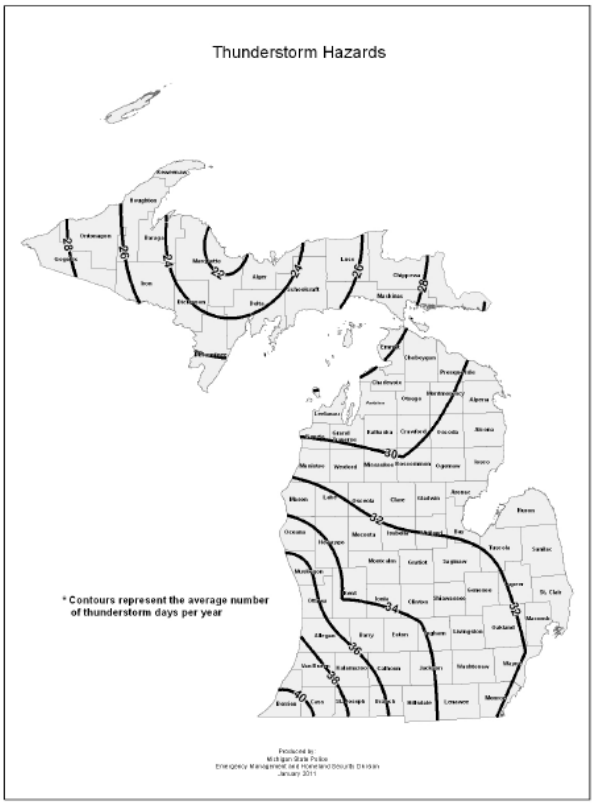
According to the National Weather Service (NWS) in White Lake, Michigan, the southern two tiers of counties of the Lower Peninsula (roughly the area south of Interstate 94) is subject to 40-60 thunderstorm days per year. The Lower Peninsula, in general, is subject to approximately 30-40 thunderstorm days per year, while the Upper Peninsula average is closer to 20-30 thunderstorm days per year.

Thunderstorms form when a deeper layer of cool overruns a shallow layer of warm, moist air, dry air. Cumulonimbus clouds, frequently called "thunderheads", are formed in these conditions. These clouds are often enormous (up to six miles or more across and 40,000 to 50,000 feet high) and may contain tremendous amounts of water and energy. That energy is often released in the form of high winds, excessive rains, lightning, and possibly hail and tornadoes.

Thunderstorms are typically short-lived (often lasting no more than 30-40 minutes) and fast moving (30-50 miles per hour). Strong frontal systems, however, may spawn one squall line after another composed of many individual thunderstorm cells.

The following sections address in detail these specific thunderstorm hazards: 1) hail; 2) lightning; 3) severe winds; and 4) Tornadoes. 152 major thunderstorm & high wind event(s) were reported in Kalamazoo County, Michigan between 01/01/1950 and 12/31/2011 -- which amounts to at least two per year -- resulting in at least 2 deaths directly attributed to the storms -- with property damage (unadjusted for inflation) of nearly $8 Million. Kalamazoo County averages between 30 and 40 "Thunderstorm Days" per year.

Summary: There is an average of about 36 to 38 thunderstorm days per year in Kalamazoo County, and each year, one or more of these storms tends to cause a power failure or some other damage. (More information appears in the subsections about related hazards, such as hail, lightning, and severe winds.)



Hail

Hazard Description - Conditions where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth.

Hail is a product of the strong thunderstorms that frequently move across the state. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Sometimes, strong winds occurring at high altitudes in the thunderstorm can blow the hailstones away from the storm center, causing an unexpected hazard at places that otherwise might not appear threatened.

Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have occurred with the most severe thunderstorms. Hail is formed when strong updrafts within the storm carry water droplets above the freezing level, where they remain suspended and continue to grow larger until their weight can no longer be supported by the winds. They finally fall to the ground, battering crops, denting autos and injuring wildlife and people. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

76 hail events were reported by the NWS for Kalamazoo County between 01/01/1950 and 12/31/2011. These account for over $30 million in property damage and $165,000 in damage to crops.

On March 27, 1991 severe thunderstorms and accompanying high winds and hail caused considerable damage across a large portion of Kalamazoo County, damaging homes, businesses, farms and some public facilities. In Kalamazoo and Portage in Kalamazoo County, softball size hail, up to 4.5” in diameter, did extensive damage to automobiles, windows and trees.

On April 5, 2010 severe thunderstorms produced large hail and winds greater than 80 mph in Kalamazoo County. The most significant damage occurred in the southern portions of the county, with damages estimated at $125 million. To the west-southwest of Schoolcraft, the siding of many homes was destroyed on the homes' western sides, where it was battered by large hail of about 1.75 inches in diameter. The estimated damages from this storm event include strong wind effects, not just hail impacts.

On April 26, 2011 severe thunderstorms developed during the afternoon hours and produced numerous reports of large hail up to around two inches in diameter. The large hail from the thunderstorm occurred from just southwest of Oshtemo to east northwest across northern Kalamazoo to Richland. The event resulted in $4 million in property damage.

Summary: An average of more than one hail event per year affects the county, averaging about $500,000 in property damage.

Lightning

Hazard Description - The discharge of electricity from within a thunderstorm.

Lightning is a random and unpredictable product of a thunderstorm's tremendous energy. The energy in the storm produces an intense electrical field like a giant battery, with the positive charge concentrated at the top and the negative charge concentrated at the bottom. Lightning strikes when a thunderstorm's electrical potential (the difference between its positive and negative charges) becomes great enough to overcome the resistance of the surrounding air. Bridging that difference, lightning can jump from cloud to cloud, cloud to ground, ground to cloud, or even from the cloud to the air surrounding the thunderstorm. Lightning strikes can generate current levels of 30,000 to 40,000 amperes, with air temperatures often superheated to higher than 50,000 degrees Fahrenheit (hotter than the surface of the sun) and speeds approaching one-third the speed of light.

Globally, there are about 2,000 thunderstorms occurring at any given time, and those thunderstorms cause approximately 100 lightning strikes to earth each second. In the United States, approximately 100,000 thunderstorms occur each year, and every one of those storms generates lightning. It is commonplace for a single thunderstorm to produce hundreds or even thousands of lightning strikes. However, to the majority of the public, lightning is perceived as a minor hazard. That perception lingers despite the fact that lightning damages many structures and kills and injures more people in the United States per year, on average, than tornadoes or hurricanes. Many lightning deaths and injuries could be avoided if people would have more respect for the threat lightning presents to their safety.

Lightning deaths are usually caused by the electrical force shocking the heart into cardiac arrest or throwing the heartbeat out of its usual rhythm. Lightning can also cut off breathing by paralyzing the chest muscles or damaging the respiratory center in the brain stem. It takes only about one-hundredth of an ampere of electric current to stop the human heartbeat or send it into ventricular fibrillation. Lightning can also cause severe skin burns that can lead to death if complications from infection set in.

Statistics compiled by the National Oceanic and Atmospheric Administration (NOAA) and the National Lightning Safety Institute (NLSI) for the period 1959-1994 revealed the following about lightning fatalities, injuries and damage in the United States:

Location of Lightning Strikes:

- 40% are at unspecified locations
- 27% occur in open fields and recreation areas (not golf courses)

- 14% occur to someone under a tree (not on golf course)
- 8% are water-related (boating, fishing, swimming, etc.)
- 5% are golf related
- 3% are related to heavy equipment and machinery
- 2.4% are telephone-related
- 0.7% are radio, transmitter and antenna-related

The NLSI estimates that 85% of lightning victims are children and young men (ages 10-35) engaged in recreation or work-related activities. Approximately 20% of lightning strike victims die, and 70% of survivors suffer serious long-term after-effects such as memory and attention deficits, sleep disturbance, fatigue, dizziness and numbness.

Three people were struck by lightning on August 30, 1993 in Kalamazoo. One suffered cardiac arrest but was not killed. The other two were treated for minor burns. The lightning strike occurred while two stranded motorists were huddled under an umbrella, watching the wrecker operator connect their vehicle. The lightning struck the umbrella, knocked the motorists under the umbrella over and then struck the wrecker operator, jolting him to the ground.

A 33-year-old man was walking through his campsite in Coldbrook Park when he was struck and killed by lightning on August 14, 1995.

Nine people were injured when lightning struck a soccer field in Portage at Westfield Park on April 26, 2011. The injured were a mix of adults and students who ranged in age from 12 to 41. Seven people were transported to area hospitals and two sought treatment on their own.

Lightning is such a common occurrence that records of specific events are not generally kept. The value for those events is only $20,000 in property damage, and the database is admittedly incomplete.

Lightning-Related Property Losses:

In terms of property losses from lightning, statistics vary widely according to source. The Insurance Information Institute (a national clearinghouse of insurance industry information) estimates that lightning-caused damage amounts to nearly five percent of all paid insurance claims, with residential claims alone exceeding $1 billion. Information from insurance companies shows one homeowner's damage claim for every 57 lightning strikes. The NLSI estimates that lightning causes more than 26,000 fires annually, with damage to property exceeding $5-6 billion. Electric utility companies across the country estimate as much as $1 billion per year in damaged equipment and lost revenue from lightning. The Federal Aviation Administration (FAA) reports approximately $2 billion per year in airline industry operating costs and passenger delays from lightning. Because lightning-related damage information is compiled by so many different sources, using widely varying collection methods and criteria, it is difficult to determine a collective damage figure for the U.S. from lightning. However, suffice it to say that annual lightning-related property damages are conservatively estimated at several billion dollars per year, and those losses are expected to continue to grow as the use of computers and other lightning-sensitive electronic components becomes more prevalent.

Summary: About once or twice per decade there is a damaging lightning strike directly affecting people. Other impacts result in power failures throughout the county.

Severe Winds and Tornadoes

Tornado

Hazard Description - An intense rotating column of wind that extends from the base of a severe thunderstorm to the ground.

Tornadoes in Michigan are most frequent in the spring and early summer when warm, moist air from the Gulf of Mexico collides with cold air from the Polar Regions to generate severe thunderstorms. These thunderstorms often produce the violently rotating columns of wind that are called tornadoes. Michigan lies at the northeastern edge of the nation's primary tornado belt, which extends from Texas and Oklahoma through Missouri, Illinois, Indiana and Ohio. Most of a tornado's destructive force is exerted by the powerful winds that knock down walls and lift roofs from buildings in the storm's path. The violently rotating winds then carry debris aloft that can be blown through the air as dangerous missiles.

A tornado may have winds up to 300+ miles per hour and an interior air pressure that is 10-20 percent below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles, but tracks much longer than that – even up to 200 miles – have been reported. Tornado path widths are generally less than one-quarter mile wide. Typically, tornadoes last only a few minutes on the ground, but those few minutes can result in tremendous damage and devastation. Historically, tornadoes have resulted in tremendous loss of life, with the mean national annual death toll being 87 persons. Property damage from tornadoes is in the hundreds of millions of dollars every year.

Tornado intensity is measured on the Fujita Scale, which examines the damage caused by a tornado on homes, commercial buildings and other man-made structures. The Fujita Scale rates the intensity of a tornado based on damaged caused, not by its size. It is important to remember that the size of a tornado is not necessarily an indication of its intensity. Large tornadoes can be weak, and small tornadoes can be extremely strong, and vice versa. It is very difficult to judge the intensity and power of a tornado while it is occurring. Generally, that can only be done after the tornado has passed, using the Fujita Scale as the measuring stick.

The Enhanced Fujita Scale of Tornado Intensity is presented in the following table:

EF-Scale Number	Intensity Descriptor	Wind Speed (MPH)	Type/Intensity of Damage
EF0	Gale tornado	65-85	Light damage. Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
EF1	Weak tornado	86-110	Moderate damage. The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
EF2	Strong tornado	111-135	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
EF3	Severe tornado	136-165	Severe damage. Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off ground and thrown.

EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	Incredible tornado	Over 200	Incredible damage. Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged; incredible phenomena will occur.

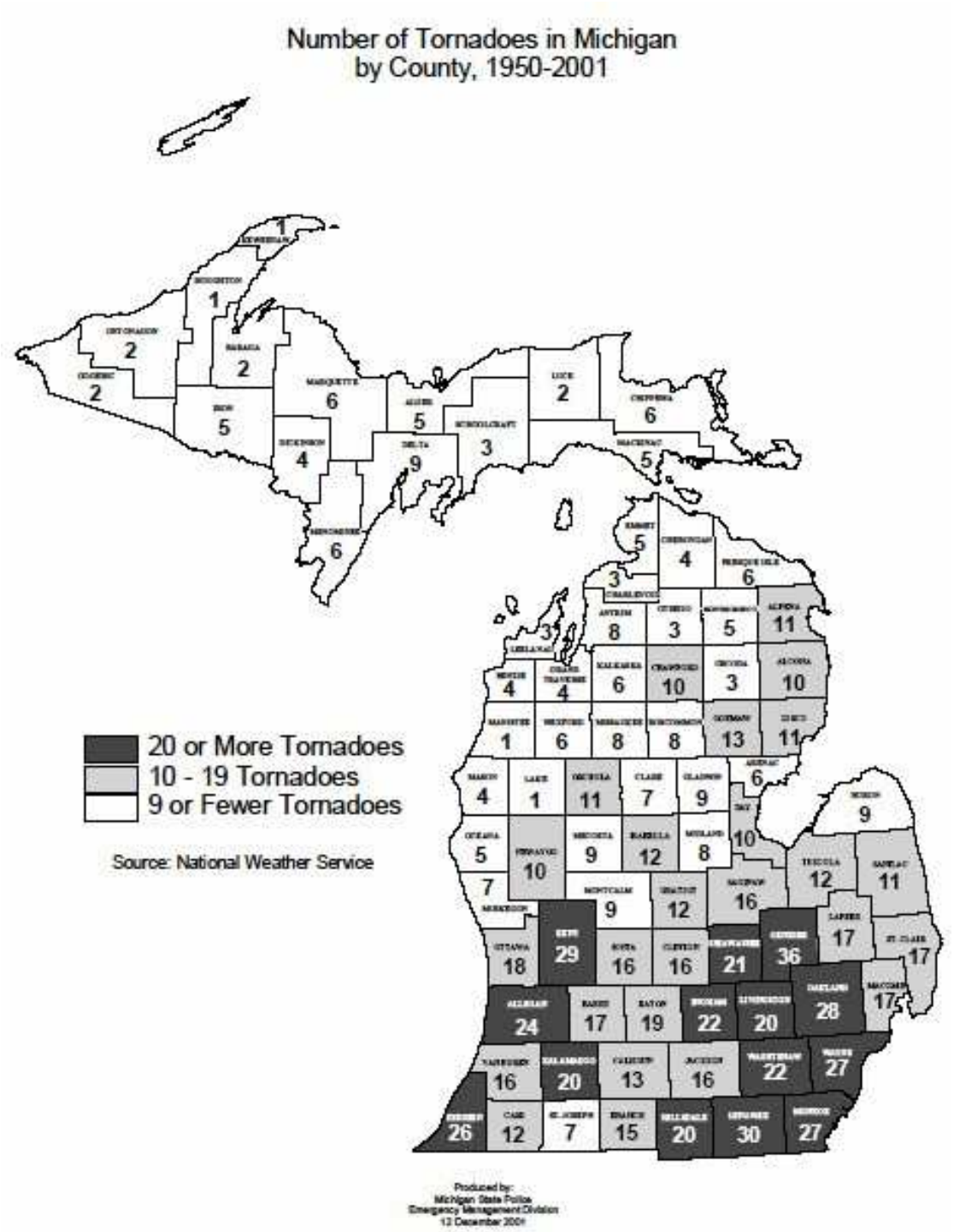
NOTE: When describing tornadoes, meteorologists often classify the storms as follows: F0 and F1 - weak tornado; F2 and F3 - strong tornado; F4 and F5 - violent tornado (Source: The Tornado Project; Storm Data, National Climatic Data Center)

According to the National Weather Service (NWS), since 1950 the vast majority of tornadoes that occurred in the United States (approximately 74%) were classified as weak tornadoes (F0 or F1 intensity). Approximately 25% were classified as strong tornadoes (F2 or F3 intensity), and only 1% was classified as violent tornadoes (F4 or F5 intensity). Those violent tornadoes, while few in number, caused 67% of all tornado-related deaths nationally. Strong tornadoes accounted for another 29% of tornado-related deaths, while weak tornadoes caused only 4% of tornado-related deaths.

Michigan's Tornado Experience:

National Weather Service data indicates that Michigan has experienced 923 tornadoes and 242 related deaths during the period from 1950 through 2009, an average of 15 tornadoes and 4 tornado-related deaths per year. The greatest number of tornadoes per year during that period occurred in 1974 with 39 tornadoes. The least number occurred in 1959 with only 2 tornadoes. From 1950 to March 2005, Michigan experienced 508 "tornado days" (defined as days in which tornadoes are observed), an average of nearly 9 days per year. Between 1950 and 2011, Kalamazoo experienced 25 tornadoes.

Kalamazoo's Tornado Experience



Kalamazoo County Tornadoes – 1954 – 2011:

Location or County	Date	Time	Mag	Dead	Injured	Property Damage
1 Kalamazoo	04/07/1954	1800	F1	0	0	25K
2 Kalamazoo	05/28/1955	0800	F2	0	0	250K
3 Kalamazoo	05/28/1955	1700	F0	0	0	3K
4 Kalamazoo	08/03/1960	1351	F1	0	0	25K
5 Kalamazoo	04/11/1965	1830	F3	0	17	250K
6 Kalamazoo	05/19/1966	2015	F1	0	0	3K
7 Kalamazoo	08/08/1968	1415	F0	0	0	0K
8 Kalamazoo	09/17/1972	1925	F0	0	0	0K
9 Kalamazoo	07/27/1973	2005	F0	0	1	250K
10 Kalamazoo	04/12/1974	1920	F1	0	0	0K
11 Kalamazoo	06/15/1975	1115	F0	0	0	0K
12 Kalamazoo	08/21/1975	1415	F0	0	0	0K
13 Kalamazoo	03/12/1976	1550	F1	0	0	25K
14 Kalamazoo	04/02/1977	1332	F4	0	10	2.5M
15 Kalamazoo	08/16/1978	0030	F	0	1	250K
16 Kalamazoo	05/13/1980	1358	F3	5	79	25.0M
17 Kalamazoo	08/26/1986	1540	F1	0	0	3K
18 Kalamazoo	06/22/1990	1725	F0	0	0	0K
19 Richland	01/18/1996	1701	F0	0	0	1K
20 Richland	05/21/2001	1320	F2	0	0	500K
21 Augusta	07/27/2002	2125	F1	0	0	100K
22 Schoolcraft	05/10/2006	1440	F0	0	0	0K
23 Miller Corner	09/13/2008	1540	F0	0	0	0K
24 Alamo	06/19/2009	2053	F1	0	0	50K
25 Richland Jct	06/19/2009	2108	F2	0	0	40K
	TOTALS:			5	108	29.274k

Tornado Events:

On June 6, 1917 a deadly tornado struck the Climax and Cass Lake areas very hard, resulting in 4 deaths and 50 injuries.

The April 11, 1965 Palm Sunday tornado outbreak, which affected many other states in the Midwest, had a particularly devastating impact on Michigan. A total of 23 tornadoes touched down in 14 Michigan counties, resulting in 53 fatalities, 798 injuries, and $51 million in damage to public and private property. Many of the tornadoes were rated F3 and F4 in intensity (strong and violent tornadoes), which undoubtedly contributed to the high death and injury tolls. One F3 tornado occurred in Kalamazoo County resulting in 17 injuries.

On April 2, 1977 ten people were injured in Kalamazoo from an F4 intensity tornado.

On May 13, 1980 a tornado occurred in Kalamazoo. The tornado damaged over 1,200 homes and caused five fatalities and 79 injuries. Damage was so severe that a Presidential Major Disaster Declaration was granted to provide supplemental federal disaster assistance to those communities and individuals significantly affected by the storms.

On May 21, 2001 a F2 tornado produced maximum estimated wind speeds of 120 to 130 m.p.h. and caused extensive damage 4 miles west of Richland. Extensive tree damage occurred along the tornado's path, and there was structural damage to several homes. One home along the tornado's path was completely destroyed, while several others sustained significant roof and shingle damage. The home that

was destroyed lost its roof, which was carried roughly 75 yards north of the home, and it also lost most of its interior and exterior walls. The tornado's path length was one mile long with a width of 150 yards. Total damage was $500,000 and there was also $100,000 in crop damage.

A F1 tornado touched down about one mile east of Augusta on July 27, 2002. The tornado passed through Ft. Custer (Calhoun County) and continued to move through western Calhoun County, ending about one mile northwest of the Battle Creek airport. The damage path was approximately 800 yards wide and path length was 3 miles long. Extensive tree damage occurred in the Fort Custer area and the roof was blown off a firing range shelter. A parked tractor trailer was blown over and some minor roof damage occurred northwest of Battle Creek.

On June 19, 2009 several trees and large branches were knocked down near Richland due to a F2 tornado touchdown. One house was destroyed with pieces of truss carried one-half mile. There were also several hours of intense heavy rainfall. Another F1 tornado occurred in Alamo on the same day resulting in minor damage.

Summary: A few times per decade there is a significant tornado event in the county. Property damaged and human impacts have been extensive.

Severe Winds

Hazard Description - Non-tornadic winds of 58 miles per hour or greater.

Severe winds spawned by thunderstorms or other storm events have had devastating effects on Michigan, resulting in 115 deaths, over 660 injuries, and hundreds of millions of dollars in damage to public and private property and agricultural crops since 1970. Severe wind events are characterized by wind velocities of 58 miles per hour or greater with gusts sometimes exceeding 74 miles per hour (hurricane velocity), but do not include tornadoes. (Refer to the Tornado section for more information on that hazard.)

Severe Winds:
On May 18, 1997 a severe thunderstorm hit a mobile home park in western Kalamazoo. One person was injured, and about a dozen mobile homes were pushed off foundations or received major roof damage. Two homes were completely destroyed, one of which was tied down.

Approximately 20 trees were snapped off, 12 trees uprooted, power lines downed, and minor structural damage occurred in an area near the village of Schoolcraft due to a thunderstorm on June 12, 1998. No injuries were reported.

On October 24, 2001, much of Michigan began experiencing severe weather as the result of a strong cold front colliding with warm, moist air. The result was widespread strong winds (in excess of 50 miles per hour) and severe weather throughout the state, but particularly so in southern Lower Michigan where severe thunderstorm warnings were issued for 13 counties. The vast majority of the damage produced by this storm system was from straight-line winds.

Region-wide, the storms killed two persons and injured at least 20 others, caused extensive flooding of roads and streets, downed thousands of trees and power lines (leaving 195,000 electrical customers without power), closed schools and businesses, and damaged hundreds of cars, homes and businesses, and public buildings. Kalamazoo County was one of the most heavily impacted by this storm system. A Governor’s Disaster Declaration was issued for Kalamazoo County to provide supplemental state assistance for debris removal and cleanup.

Severe thunderstorms produced very high wind gusts of up to 75 to 85 m.p.h. and also large hail across southern Kalamazoo County On May 15, 2007. Within this area a roof on a pole barn was partially blown off. A garage door was blown in and some roofing and siding material was stripped off of several homes. Many large healthy trees were uprooted or snapped off. Some trees were lying on houses and all damage was lying to the northeast indicating straight line winds.

A severe weather outbreak on July 2, 2008 resulted in numerous reports of wind damage and large hail. The strong to severe thunderstorms also produced very heavy rain, flooding, and even flash flooding across portions of Kalamazoo County. In northwest Kalamazoo County, the winds also blew the roof off a home.

Severe thunderstorms brought damaging wind gusts to the city of Vicksburg on April 25, 2009. The wind damage was rated EF-0 on the Enhanced Fujita Scale with wind gusts estimated between 65 and 85 mph. Primary damage was to trees with scattered large limbs and several large trees were uprooted in downtown Vicksburg. The trees knocked down several wires on residential streets.

Severe thunderstorms developed during the afternoon hours of May 29, 2011 from Vicksburg east northeast to Battle Creek and Charlotte. A NWS storm survey found significant damage resulting from straight line wind damage due to severe thunderstorm winds of up to 85 to 100 mph. A state of emergency was declared for Calhoun County due to widespread wind damage. The NWS Grand Rapids storm survey teams found no conclusive evidence of any tornadoes from southern Kalamazoo County to east northeast through Calhoun County. The area's most impacted by the line echo wave pattern fell within Brady and Wakeshma Townships. Hundreds of trees were either uprooted or snapped, with some snapped 15-20 feet above the ground. Additionally, some structures were damaged with this storm. A grain silo collapsed, and nearly a dozen farm buildings sustained significant roof damage.

On July 11, 2011 a bow echo raced east across Kalamazoo County during the late morning hours, bringing down numerous trees and power lines. There was a measured wind gust of 71 mph in Schoolcraft. The most significant tree damage was in and near Portage due to the wind.

Summary: Severe winds occurred at least once per year and have limited impacts across a wide area, including power system disruptions.

Take Cover Shelters:
One study of tornado related deaths concluded that during the period of between 1985-1995 there have been 191 mobile home deaths and 130 in other kinds of residences.

1985	Single 7	Multiple 2	Unknown 31	Total Permanent 40	Mobile 28	Total Residence 68
1986	2	1	0	3	7	10
1987	1	0	6	7	24	31
1988	4	0	2	6	21	27
1989	4	4	0	8	12	20
1990	17	8	0	25	7	32
1991	2	1	0	3	23	26
1992	12	0	0	12	21	33
1993	6	0	0	6	13	19
1994	12	0	0	12	24	36
1995	8	0	0	8	11	19
Total	75	16	39	130	191	321
%	23.4	5	12.1	40.5	59.5	100

The table above illustrates locations of U.S. tornado fatalities in residences from 1985-1995. "Single", "Multiple", and "Unknown" all refer to fatalities in permanent (i.e., non-mobile) dwellings. "Total permanent" is sum of all permanent residence fatalities.

Since (according to the US Census Bureau) only 6.1% of the United States population lives in mobile homes, this represents a much greater risk than for residents of "permanent" housing. During that time period, the average number of annual deaths per 10 million mobile home residents was approximately 11.4, while it was only 0.5 in other housing, implying that mobile home residents die at a rate 22.6 times greater than non-mobile home residents. Even assuming that tornadoes primarily occur in areas where the percentage of the population living in mobile homes is greater (say, double it to 12.2%, the approximate value for Butler County, Kansas, where Andover is located), the death rate is 10.6 times greater in mobile homes. As far as the statements about risks in apartments compared to mobile homes, assuming that all of the "unknown" permanent housing deaths occurred in multiple family dwellings, and using the percentage of US residents living in multiple family dwellings (28.5%, according to the US Census Bureau), the annual death rate per 10 million multiple family dwelling residents was 0.7.

In Kalamazoo County, 31 manufactured home communities account for approximately 6.3% of the residents, in line with the ratio cited above.

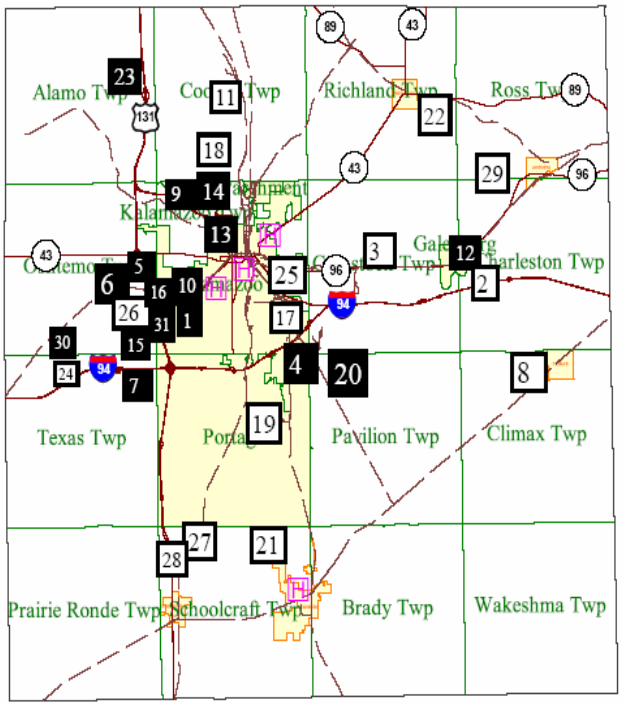
The following table illustrates the location of each of the manufactured (mobile) home communities, the number of lots, the relative share of the total number of lots for the county that the location represents (Share), an estimated number of people at each location and the amount of Kalamazoo's residents (Share of AZO) represented by that location.

For estimating risks and losses involving people, an economic measure of value on the death of a person can be $2.7 Million, and serious injuries $15,600 per person. The table that follows includes columns representing the exposure to residents in the event of the death of every person at the location (Death Exposure $Billion) and for a major injury to each of those same residents (Major Injury $Million).
There are 4,995 lots represented by the table below. An estimated three people per lot translates to 14,985 residents – 6 percent of the 250,000 residents in the county.

The first column in the table represents a location shown on the map titled Manufactured Home Communities shown below.

Manufactured Home Communities
The first 16 of the 31 entries in the table represent 80% of the residents of manufactured home communities. They are represented with black boxes with white numbering in the map at right. The remaining locations are shown in normal emphasis in the table; and are shown with black numbering inside black boxes on the map.

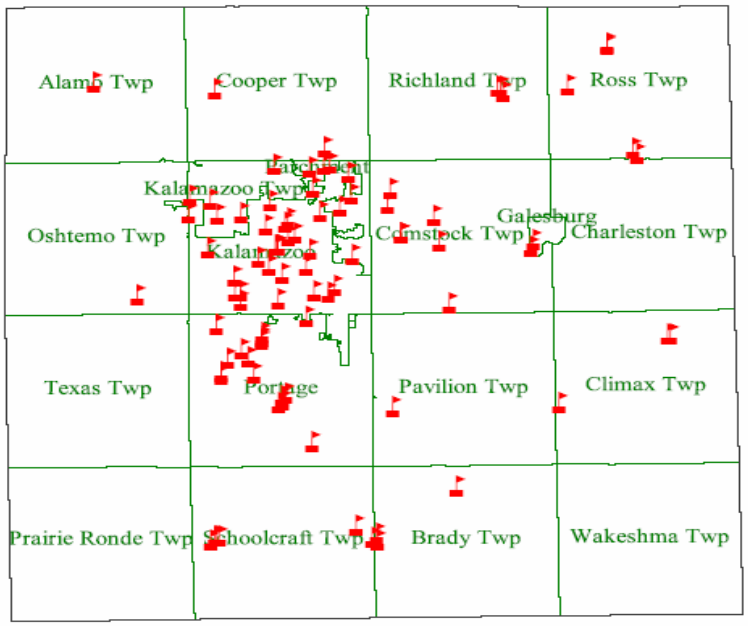
Priority should be given to the 16 communities which represent the 80% of the residents which reside in Kalamazoo County's manufactured home communities. The following page represents the Manufactured Home Communities within Kalamazoo County as described above.



Map No.	Parcel No.	Community Name	Address / Details	Lots	Share	People	Share of Kalamazoo Co	Death Exposure ($Billion)	Major Injury Exposure ($Million)
20	11-05-226-022	Pavilion Estates	6830 East Kilgore	531	10.6%	1,593	0.67%	$ 4.301	$ 24.851
31	10-00001-035-	Château Acres	5374 Deadwood	387	7.7%	1,161	0.49%	$ 3.135	$ 18.112
30	05-33-315-010	Wildwood MH	4797 4th St	347	6.9%	1,041	0.44%	$ 2.811	$ 16.240
7	09-02-401-052	Wyngate Farms	5560 AL Sabo Dr.	333	6.7%	999	0.42%	$ 2.697	$ 15.584
9	06-05-330-010	Country Acres	2300 Barney Rd.	309	6.2%	927	0.39%	$ 2.503	$ 14.461
6	05-23-355-011	Clayton Estates	5500 West K. L.	290	5.8%	870	0.37%	$ 2.349	$ 13.572
4	00-10-01-187-	Château Acres	5374 Deadwood	225	4.5%	675	0.28%	$ 1.823	$ 10.530
12	17-08-18-376-	Gale Valley Estates	353 E. Michigan	208	4.2%	624	0.26%	$ 1.685	$ 9.734
5	05-24-330-040	Château Manner	5500 West K. L.	193	3.9%	579	0.24%	$ 1.563	$ 9.032
13	06-09-105-040	Hyland Hills MHP	2425 Douglas Ave.	187	3.7%	561	0.24%	$ 1.515	$ 8.752
16	00-06-30-208-	Meadowview Village	3614 Stadium Dr.	185	3.7%	555	0.23%	$ 1.499	$ 8.658
23	01-14-401-010	Royal Estates MHP	8300 Ravine Rd.	181	3.6%	543	0.23%	$ 1.466	$ 8.471
15	05-35-230-012	Huntington Run	6255 Cranbrook	175	3.5%	525	0.22%	$ 1.418	$ 8.190
10	00-06-30-231-	Rancho Estates	3600 Stadium Dr.	169	3.4%	507	0.21%	$ 1.369	$ 7.909
1	00-06-30-131-	Americana Estates	1802 Tray Ln.	162	3.2%	486	0.20%	$ 1.312	$ 7.582
14	06-04-305-010	Hillcrest Acres	3205 Douglas Ave.	150	3.0%	450	0.19%	$ 1.215	$ 7.020
19	10-08340-001	Oakbrook Estates	7200 Lovers Ln.	123	2.5%	369	0.16%	$ 0.996	$ 5.756
24	09-04-101-011	Saddlebrook FMS	5053 South 4th St.	85	1.7%	255	0.11%	$ 0.689	$ 3.978
21	14-02-155-010	Portage Terrace	11247 Portage Rd.	81	1.6%	243	0.10%	$ 0.656	$ 3.791
26	05-25-285-010	Stadium Drive West	5101 Stadium Dr.	77	1.5%	231	0.10%	$ 0.624	$ 3.604
11	02-22-101-022	Evergreen Park	182 E. D Ave.	76	1.5%	228	0.10%	$ 0.616	$ 3.557
17	00-06-25-367-	Millwood Mobile	2515 E. Cork St.	76	1.5%	228	0.10%	$ 0.616	$ 3.557
8	12-03-180-010	Climax Mobile Home	3-3-9 W1/2 SE	75	1.5%	225	0.09%	$ 0.608	$ 3.510
2	08-20-151-010	Andrews Estates	12034 East	71	1.4%	213	0.09%	$ 0.575	$ 3.323
25	06-24-470-010	Sherwood Forest	1519 Olmstead	62	1.2%	186	0.08%	$ 0.502	$ 2.902
3	07-15-355-011	Boerman Mobile	102 N. 30th St.	60	1.2%	180	0.08%	$ 0.486	$ 2.808
27	14-05-155-010	Sugarloaf Mobile	11607 Shaver Rd.	57	1.1%	171	0.07%	$ 0.462	$ 2.668
28	06-04-215-011	Oakbrook Mobile	4002 Douglas	48	1.0%	144	0.06%	$ 0.389	$ 2.246
22	03-23-201-040	Richland Mobile	9604 East M-89	45	0.9%	135	0.06%	$ 0.365	$ 2.106
29	03-31-351-011	Weatherstone	5210 Marsh	27	0.5%		0.03%	$ 0.219	$ 1.264
		Lots & Residents in Mfd Home Communities***		4,995		14,985	6.30%	$ 40.46	$ 233.766

Schools around Kalamazoo

The following illustrates the dispersion of schools about the county.



There are over 35,000 students enrolled in 105 elementary, grade and high schools in the county. A mitigation project in this plan addresses the concerns for adequate shelter with a priority to schools.

Extreme Temperatures

Hazard Description - Prolonged periods of very high or very low temperatures, often accompanied by other extreme meteorological conditions.

Prolonged periods of extreme temperatures, whether extreme summer heat or extreme winter cold, can pose severe and often life-threatening problems for Michigan's citizens. Although they are radically different in terms of initiating conditions, the two hazards share a commonality in that they both primarily affect the most vulnerable segments of the population – the elderly, children, impoverished individuals, and people in poor health. Due to their unique characteristics, extreme summer heat and extreme winter cold hazards will be discussed individually.

Extreme Summer Heat

Extreme summer weather is characterized by a combination of very high temperatures and exceptionally humid conditions. When persisting over a long period, this phenomenon is commonly called a heat wave. The major threats of extreme summer heat are heatstroke (a major medical emergency), and heat exhaustion. Because the combined effects of high temperatures and high humidity are more intense in urban centers, heatstroke and heat exhaustion are a greater problem in cities than in suburban or rural areas. Nationwide, approximately 200 deaths a year are directly attributable to extreme heat. Extreme summer heat is also hazardous to livestock and agricultural crops, and it can cause water shortages, exacerbate fire hazards and prompt excessive demands for energy. Roads, bridges, railroad tracks and other infrastructure are susceptible to damage from extreme heat.

Air conditioning is probably the most effective measure for mitigating the effects of extreme summer heat on people. Unfortunately, many of those most vulnerable to this hazard do not live or work in air-conditioned environments, especially in major urban centers where the vulnerability is highest. The use of fans to move air may help some, but recent research indicates that increased air movement may actually exacerbate heat stress in many individuals.

Extreme Temperature Events: During the second week of July 1936, a terrible heat wave struck the Midwest (including Kalamazoo), with temperatures exceeding 100 degrees for up to seven days in a row (this varied by location). The extreme heat was an "equal opportunity" killer, causing many healthy adults to succumb to the heat at work or in the streets. Also, because most people relied on iceboxes to keep their food fresh, many heat-related deaths and illnesses occurred when the ice melted, causing the food to spoil.

The summer of 1953 included eleven days in a row with temperatures of 90 degrees or higher in Southern Michigan, nine of which were 95 degrees or hotter, and also including two days that each hit 100 degrees. A July 1964 heat wave lasted for twelve days, with temperatures all exceeding 90 degrees in Southern Michigan.

The highest such temperature was 95 degrees.

The 1988 summer drought/heat wave in the Central and Eastern U.S. also greatly impacted Kalamazoo. Nationwide, the drought caused an estimated $40 billion in damages from agricultural losses, disruption of river transportation, water supply shortages, wildfires, and related economic impacts. The heat wave that accompanied the drought conditions was particularly long in Michigan – 39 days with 90 degree or better heat – eclipsing the previous record of 36 days recorded in the "dust bowl" days of 1934. Nationwide, the 1988 drought/heat wave caused an estimated 5,000 to 10,000 deaths.

Extreme heat and humidity in the Midwest and Central Plains during parts of June, July and August of 2001 sent heat stress index readings soaring well above 100 degrees Fahrenheit on many days. On August 1 and August 8, heat advisories were issued for many counties in the southern Lower Peninsula, with heat indices at 105 degrees for some jurisdictions on the former date, and 110 degrees for some jurisdictions on the latter date.

Summary: Approximately once or twice per decade, extreme heat waves tend to cause human and infrastructure impacts across the county (including power failures). Their frequency may be increasing, due to climate change.

Extreme Winter Cold

Cold weather can result in a significant number of temperature-related deaths. Each year in the United States, approximately 700 people die because of severe cold temperature-related causes. This is substantially higher than the average of 200 heat-related deaths each year. It should be noted that a significant number of cold-related deaths are not the direct result of "freezing conditions. Rather, many deaths are the result of illnesses and diseases that are negatively impacted by severe cold weather, such as stroke, heart disease and pneumonia. It could convincingly be argued that, were it not for the extreme cold temperatures, death in many cases would not have occurred at the time it did from the illness or disease alone.

Severe winter weather hazards include snowstorms, blizzards, and extreme cold, ice and sleet storms. As a northern state, Michigan is vulnerable to all of these winter hazards. Most of the severe winter weather

events that occur in Michigan have their origin as Canadian and Arctic cold fronts that move across the state from the west or northwest.

The NWS Database list is incomplete at this time; and contains only 1 extreme cold temperature event for Kalamazoo County, Michigan between 01/01/1950 and 12/31/2011.

Begin Date: 09 Dec 1995, 0400 EST; Begin Location: All of S.E. Lower: End Date: 10 Dec 1995, 1000 EST; End Location: Not Known; Magnitude: 0; Fatalities: 3; Injuries: 0; Property Damage: $ 0.0 Crop Damage: $0.0

Description:
A cold wave resulted in three deaths by hypothermia in the city of Detroit during the period from the early morning on the 9th through the morning on the 10th. Two of the deaths occurred on the street, and the third occurred in a van. Low temperatures during that period ranged from three above zero at Detroit, to one above zero at Flint, to one below zero at WSFO White Lake. On the 9th, winds averaging 20 to 25 mph combined with afternoon temperatures in the single digits to produce wind chills of 30 to 35 below zero.

Summary: It is known that every winter season, the Kalamazoo area is exposed to prolonged periods of below-freezing temperatures that may cause frostbite, hypothermia, and other health effects. Kalamazoo County temperatures even go below 0 degrees F several times per year (on average). Frozen pipes, broken pipes, and other freeze damages are counted among the physical impacts of this hazard.

Ice and Sleet Storms

Hazard Description - A storm that generates sufficient quantities of ice or sleet to result in hazardous conditions and/or property damage.

Ice storms are sometimes incorrectly referred to as sleet storms. Sleet is similar to hail only smaller and can be easily identified as frozen rain drops (ice pellets) which bounce when hitting the ground or other objects. Sleet does not stick to trees and wires, but sleet in sufficient depth does cause hazardous driving conditions. Ice storms are the result of cold rain that freezes on contact with the surface, coating the ground, trees, buildings, overhead wires and other exposed objects with ice, sometimes causing extensive damage. When electric lines are downed, households may be without power for several days, resulting in significant economic loss and disruption of essential services in affected communities.

January 1, 1985 On January 1, 1985 a severe ice storm struck a 13 county area (including Kalamazoo County) in the southern Lower Peninsula. Freezing rain accumulating up to one inch in thickness downed tree limbs, trees and power lines, blocked roads, and caused widespread power outages. There were three deaths and eight injuries directly related to the ice storm. Approximately 13,000 homes and 260 businesses sustained damage or were destroyed, with losses estimated at nearly $25 million. Over 430,000 electrical customers were without power, some for as long as 10 days. Total public and private damage from this ice storm was estimated at nearly $50 million. A Governor's Disaster Declaration was issued for Kalamazoo County to mobilize state resources to assist in the storm response and recovery.

March 13, 1997 In the late evening hours of March 13, 1997 an ice storm struck the central and southeastern Lower Peninsula, causing widespread power outages, icy roads, downed trees and numerous school closings. Many of the counties in the southern- third of Michigan were impacted by the storm. In the storm’s aftermath, 514,000 Detroit Edison and Consumers Energy electrical customers were without power. Major outages occurred in Jackson, Kalamazoo, Cass, Branch, St. Joseph and Calhoun counties, as well as in Lansing. Many local communities opened shelters to accommodate

residents unable to remain in their homes due to the loss of power. Response efforts were severely hampered by snow and windy conditions the following day.

Summary: About once per decade, a severe ice/sleet storm affects the area, making driving treacherous and causing infrastructure problems.

Snowstorms

Hazard Description - A period of rapid accumulation of snow often accompanied by high winds, cold temperatures, and low visibility.

Because of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in relatively short distances. The average annual snowfall accumulation ranges from 30 to 200 inches of snow. The highest accumulations are in the northern and western parts of the Upper Peninsula. In Lower Michigan, the highest snowfall accumulations occur near Lake Michigan and in the higher elevations of northern Lower Michigan.

Blizzards are the most dramatic and perilous of all snowstorms, characterized by low temperatures and strong winds (35+ miles per hour) bearing enormous amounts of snow. Most of the snow accompanying a blizzard is in the form of fine, powdery particles that are wind-blown in such great quantities that, at times, visibility is reduced to only a few feet. Blizzards have the potential to result in property damage and loss of life. Just the cost of clearing the snow can be enormous.

66 SNOW & ICE events were reported in the NWS storm database for Kalamazoo County between 01/01/1950 and 12/31/2011. Over $63 Million in damages have been reported. This is a common event in Kalamazoo County.

From February 25-26, 1965 an overnight snow storm brought 10.5 inches to Kalamazoo. This was the largest amount of snow from a single incident in the month of February until it was broken in 2011.

Beginning on January 26, 1977, a significant snowstorm occurred that affected vast portions of southern Michigan. Winds of blizzard proportion resulted in extensive drifting of snow, blocking many roads. Many residents were isolated in rural residences or stranded in public shelters. This storm also resulted in a Presidential Emergency Declaration for 15 counties in the southern part of the state, including Kalamazoo County.

On January 26-27, 1978 a severe snowstorm struck the Midwest, and Michigan was at the center of the storm. Dubbed a “white hurricane” by some meteorologists, the storm measured 2,000 miles by 800 miles and produced winds with the same strength of a small hurricane and tremendous amounts of snow. In Michigan, up to 34 inches of snow fell in some areas, and winds of 50-70 miles per hour piled the snow into huge drifts. At the height of the storm, it was estimated that over 50,000 miles of roadway were blocked, 104,000 vehicles were abandoned on the highways, 15,000 people were being cared for in mass care shelters, and over 390,000 homes were without electric power. In addition, 38 buildings suffered partial or total roof collapse. Two days after the storm, over 90% of the state's road system was still blocked with snow, 8,000 people were still being cared for in shelters, 70,000 vehicles were stranded, and 52,000 homes were still without electricity. This storm resulted in a Presidential Emergency Declaration for the entire state to provide assistance with snow clearance and removal operations.

From November 10-11, 1996 lake effect snow occurred in Kalamazoo County. Accumulation amounts ranged from 8 to 14 inches with the heaviest reports in western Kalamazoo County. Main roads were not affected but some secondary roads were blocked for a 4 to 6 hour period on the 10th. Some schools were

also closed. A lake effect snow storm occurred from January 10-12, 1997 in Kalamazoo County. Numerous shift workers were told not to report for 2nd and 3rd shifts on the 10th. Heavy snow continued through 11th and tapered off to flurries on the 12th. All areas reported new snowfall of 12 inches or more. In central Allegan County the snow was measured at 28 inches on the 10th and 40 inches by the 11th. Schools were used as emergency shelters for stranded motorists throughout the affected area. Secondary roads across all of Central Lower and Southwest Lower Michigan were blocked from the 10th into the 11th and interstates were also closed for a few hours. Accidents occurred at the rate of 50 to 100 per county per day from the 10th through the 12th.

In the early morning hours of January 2, 1999 a severe winter storm moved across the western and southern portions of Michigan. The storm grew in intensity and size, producing record or near-record snowfall that affected much of the southern two-thirds of the Lower Peninsula by the late evening hours of January 3. High winds and frigid temperatures created blizzard conditions that lasted until late in the day on January 4 in some areas. Subsequent storms over the next several days dumped an additional foot of snow in many areas of the state, resulting in snowfall of historic proportions in several Michigan communities. Kalamazoo received 24 inches of snow. Combined, these winter storms produced the worst winter conditions to hit Michigan since the statewide blizzard that occurred in January 1978. A Presidential Emergency Declaration was granted for the 31 Michigan counties that received record or near-record snowfall (including Kalamazoo County), making available Federal snow removal assistance under the Federal Emergency Management Agency's (FEMA) Public Assistance Grant Program.
The first snow storm of the season for southern Michigan from November 19-21, 2000 was a combination event, featuring snow with the storm itself, followed by lake effect snow as much colder air moved in behind the system. Most of this snow fell along a line from (roughly) Muskegon to Paw Paw, Kalamazoo, and Battle Creek. Overall one to two feet of snow fell across parts of Ottawa, Allegan, Van Buren, Kalamazoo and Barry counties. More specifically for Kalamazoo County, 19 inches fell in Oshtemo and 14 inches fell in Kalamazoo.

In the early morning hours of December 11, 2000 a severe winter storm moved through the state, inflicting its heaviest effects on the southern two-thirds of the Lower Peninsula before moving out of the state on the morning of December 12. That storm produced record or near-record 24-hour snowfall levels in 31 counties, paralyzing the entire region. Kalamazoo received approximately 14 inches. The storm produced great hardships for many Michigan communities. Schools across much of southern Lower Michigan were closed for several days, idling hundreds of thousands of school children. Another series of winter storms the following week dumped an additional foot or more of snow across southern Lower Michigan, increasing snow depths in many counties to two feet or more. The snow fell at such a steady rate in many areas that public works crews worked at maximum capacity – often around the clock – for two weeks just to keep pace. The cumulative effects of the heavy snowfall, high winds, and severe cold temperatures that began on December 11 caused problems across the region for the next several weeks. The sheer volume of snow made it difficult to handle, and the process of clearing it out of the way became difficult and expensive, as there was almost no place to put it. Many communities used the majority of their annual snow-removal budget and their road salt supply to combat these storms. The winter storms of December 2000 produced the worst winter conditions to hit Michigan since the statewide blizzards that occurred in January 1978 and January 1999. A Presidential Emergency Declaration was granted for the 39 Michigan counties that received record or near-record snowfall or incurred significant cumulative effects, making available Federal snow removal assistance under the Federal Emergency Management Agency's (FEMA) Public Assistance Grant Program.

In between December 23-29, 2001 heavy snow fell across southwestern Michigan. The axis of the heaviest snow set up south of Grand Rapids, mainly from Battle Creek west to the shore of Lake Michigan. 12 to 18 inches of snow was common across the Kalamazoo County area. Storm total snowfalls broke all previous records for snowfall in one week in several locations across southwest

Michigan. Grandville (Kent county) ended up with 70 inches of snow for the week, which was the greatest reported snowfall total across the area. Bloomingdale (Van Buren County) ended up with a total of 60 inches of snowfall for the week. The National Weather Service Forecast Office in Grand Rapids (Kent County) had a storm total snowfall of 50 inches for the week. Generally speaking, the heaviest snow accumulations for the week occurred along the US-131 corridor from Grand Rapids down through Allegan County, where two to four feet of snow fell.

Heavy snow fell in Kalamazoo County on December 30, 2002, where 12 to 13 inches of snow was reported. Heavy snow fell in southwestern Lower Michigan from March 21-22, 2008. The heaviest snow fell during the afternoon and early evening hours of the 21st, when snowfall rates of two inches per hour were reported at some locations. The highest snowfall totals were received from Allegan, Van Buren and Kalamazoo counties, where over a foot of snow was reported at some locations.

From December 8-9, 2005 a snow event resulted in total snow accumulations of 8 to 10 inches throughout much of southern lower Michigan, including Kalamazoo County.

Up to 12 inches of snow fell in conjunction with wind gusts to 40 mph created near blizzard conditions from December 9-11, 2009 across areas from Grand Rapids to Kalamazoo. Numerous accidents were reported due to slippery roads and reduced visibility in blowing snow to near whiteout conditions.

On February 2, 2011 the “Ground Hog Day Blizzard” brought 12 to 15 inches of snow to much of Kalamazoo County, the most Kalamazoo has seen from a single storm in the month of February, eclipsing the 10.5 inch storm in February 1965. Most school districts were closed, including Kalamazoo College, Western Michigan University, and Kalamazoo Valley Community College. Most offices for government agencies were also closed as well. There were 356 service calls in the area, mostly pulling stranded and stuck motorists out of snow banks and ditches.

Summary: Every year produces snow storms, and especially severe events happen several times per decade. Their impacts include widespread school closures, blocked roads from drifting and deep snow, infrastructural failures, and human/economic hardship.

Category 4: Fire Hazards

Structural Fires

Hazard Description - A fire, of any origin, that ignites one or more structures, causing loss of life and/or property.

In terms of average annual loss of life and property, structural fires – often referred to as the "universal hazard" because they occur in virtually every community – are by far the biggest hazard facing most communities in Michigan and across the country. Each year in the United States, fires result in approximately 5,000 deaths and 25,000 injuries requiring medical treatment. According to some sources, structural fires cause more loss of life and property damage than all types of natural disasters combined. Direct property losses due to fire exceed $9 billion per year – and much of that figure is the result of structural fire.

On a positive note, Kalamazoo County's record of 3.37 fires per 1,000 populations is more than 29% better than the statewide average of 4.36 fires per 1,000 populations.

According to the Federal Emergency Management Agency's National Fire Data Center, residential fires represent 74% of all structural fires and cause 80% of all fire fatalities. Approximately 85% of those fatalities occur in single- family homes and duplexes. Perhaps the most tragic statistic of all is that over 40% of residential fires and 60% of residential fatalities occur in homes with no smoke alarms.

According to statistics compiled by the Fire Marshal Division, Michigan Department of State Police for 2003 (the last year for which statewide statistics are available), nearly 19,000 structural fires occurred in Michigan, resulting in 161 deaths and 624 injuries. Dollar losses for structural fires were estimated at nearly $230 million. The Fire Marshal Division estimated that a structural fire occurred in Michigan every 28 minutes in 2003. Nationally, Michigan's fire death rates in 2007 of 15.4 persons per million (population) puts it in the upper third of all states in the nation. On March 16, an early morning fire at a Western Michigan University dormitory in Kalamazoo destroyed a first-floor room and forced the evacuation of more than 400 students. No one was injured in that fire.

A major challenge facing the Michigan fire service is the lack of a state-mandated fire safety code and code enforcement program for all occupancies.

According to the Red Cross, Single-Family House Fires account for the greatest number of people affected, and the highest dollar amount of support provided by the Kalamazoo Red Cross. More than 50% of the single-family structures in Kalamazoo Census Tracts 1-14 are over 50 years old -- and renters -- who do not have renters insurance, occupy many of them.

Historical Structural Fires:

On June 28, 1893 nearly the entire village of Augusta in Kalamazoo County, a population of 600+ was destroyed.

Perhaps the worst fire in Kalamazoo's history occurred on February 26, 1898 at a chemical company. Ten people were killed, including four firemen, and twenty-seven seriously injured. As large amounts of chemicals stored in the building mixed with the fire, explosions shook the building.

On December 8, 1909 several buildings (primarily a large hotel) were destroyed in Kalamazoo in a fire resulting in about $1,000,000 in damages (1909 dollars).

An unsolved string of arson fires in the winter of 1925-26 destroyed three major downtown churches: First Congregational, First Presbyterian, and First Methodist, in the latter of which two firemen were killed and several others injured when part of the roof collapsed.

A blaze on February 5, 1945 destroyed a downtown Kalamazoo landmark building, resulting in over $300,000 in damages (1945 dollars).

Recent Structural Fire Events:

On March 22, 2008 a fire in Oshtemo Township destroyed all 11 units in the building.

On August 25, 2008 a fire in a Kalamazoo Apartment complex displaced 22 residents.

On October 3, 2008 a fire in Kalamazoo destroyed 12 of the 16 apartment units, displacing 30 residents.

On October 26, 2008 a large fire in Kalamazoo heavily damaged a 54-unit apartment building. It took 90 firefighters from the city of Kalamazoo, Kalamazoo, Oshtemo and Texas townships about four hours to bring the fire under control as they battled with strong winds that pushed the flames through the building.

On February 3, 2009 one apartment complex was destroyed (all 36 units) in Kalamazoo.

On March 12, 2009 a fire in Kalamazoo destroyed 12 units in a mostly college student apartment complex and damaged another 12 units.

On April 25, 2009 a fire at a house in Texas Township, Kalamazoo County killed four young children, and critically injured one other child and one adult.

On June 30, 2009 a fire displaced 29 families and heavily damaged 15 apartments in a 30-unit building in Kalamazoo. The cause of the fire was two men attempting a one pot method to manufacture methamphetamine in a lab that failed, and then ignited an uncontrollable blaze.

On November 4, 2010 a fire in Kalamazoo at an apartment complex destroyed all eight units and left 15 residents homeless.

On January 12, 2011 over 100 pigs were killed and more were burned in a barn fire in Fulton in southeastern Kalamazoo County. The barn damaged during the mid-afternoon fire held about 1,000 pigs. The initial estimate was around 300 dead pigs, but some of the animals that lived were badly burned. Since power heaters and a well that supplied both barns were knocked out by the fire, workers moved pigs not only out of the charred barn, but also moved another 1,000 out of the adjacent barn.

On November 18, 2012 a fire in Kalamazoo destroyed an apartment complex and displaced all 125 residents. No one was seriously injured but seven residents were sent to the hospital for smoke inhalation. The biggest challenge for the fire fighters was the high number of residents in wheelchairs that required assistance due to the amount of senior citizens in the building.

Summary: Major impacts occur every year, beyond the ordinary single-home fires that happen in every community. Since historic areas are less well-fireproofed and tend to have greater densities, the risk of major fire impacts seems to be higher there.

Wild Fires

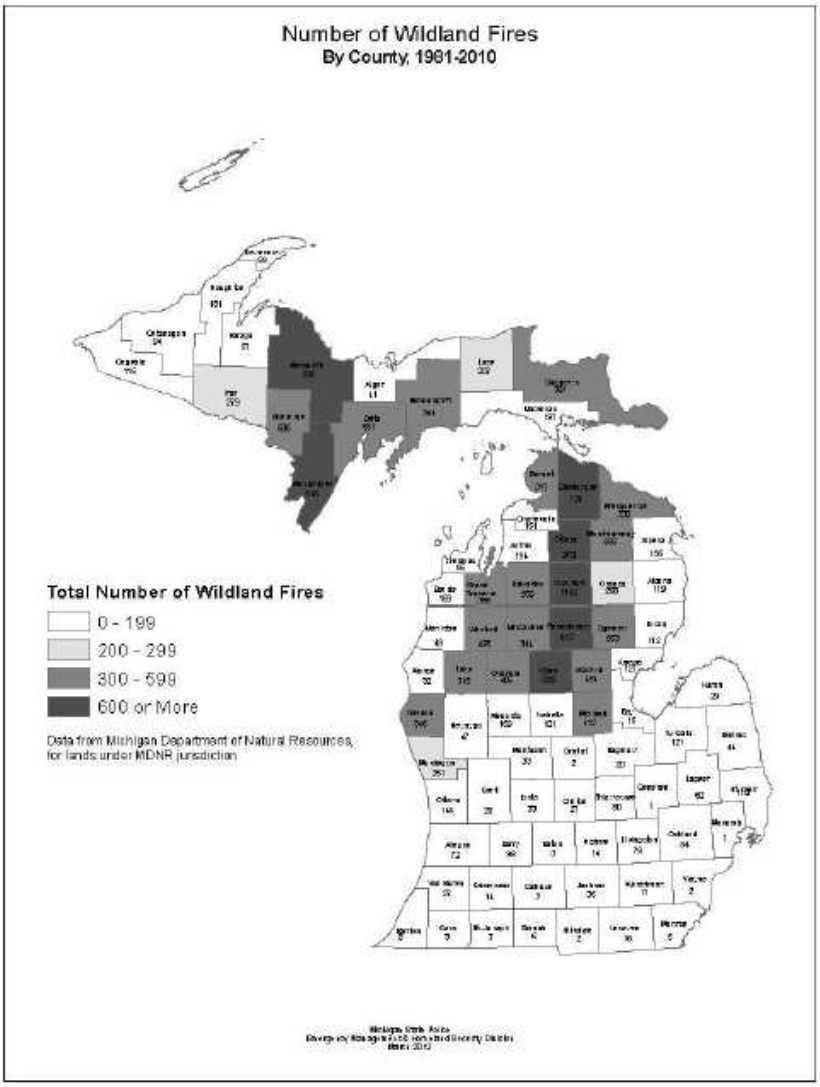
Hazard Description - An uncontrolled fire in grasslands, brush lands or forested areas.

Forest cover amounts to 49% (18.2 million acres) for Michigan in total. Some 33.6% (195 Sq. MI) of Kalamazoo County's land (579.9 Sq. Miles) is either Rangeland or Forestland. 22.1% (81,911 Acres) is Forestland alone; while some (32.858 acres) is Shrub Rangeland. Kalamazoo County is classed as a "Low" (scale: Low, Medium, and High) area of concern for Forest Fire with only 14 reports of wildfires. The largest concentration of Forestland is in Charleston and Ross Townships.

While the risk of wildfires is fairly low, Kalamazoo can reduce its vulnerability to wildfires by: 1) participating in multi-state and interagency mitigation efforts.

The MDNR is conducting a detailed statewide wildfire assessment using Geographic Information System (GIS) technology. This assessment, which is expected to take several years to complete, will identify the areas of greatest concern for wildfires based on existing and projected land uses and population concentrations, as well as topography, hydrology, soils, vegetative cover, and other natural features.

Number of Wildfires, by County
(MDNR jurisdiction only)



Spot Weather Forecasts:

The National Weather Service provides weather forecasts for the purposes of input to fire weather behavior and hazardous materials dispersion models. These spot forecasts are produced based on elevation and latitude and longitude, the local observation (input provided by a local observer), the NWS weather forecast and the parameters selected from selections found on a NWS web site. Upon receiving a request via the web site, the forecaster at the NWS references all observation and model data and submits the form back to the web site where it is then available for local review.

Summary: MDNR lands report an average of one wildfire every two years, and although the county does have many wooded areas, there are no recent known cases of a fire that got out of control and caused widespread damages.

Scrap Tire Fires

Hazard Description - A large fire that burns scrap tires being stored for recycling/re-use.

Michigan generates some 7.5 to 9 million scrap tires each year. Although responsible means of disposal have become more common, tire dumps of the last forty years present environmental and safety hazards that will last into the foreseeable future. By 2001, the State of Michigan had identified a total in excess of 24 million scrap tires in disposal sites scattered around the state; with some 15,000 (0.06%) having been identified as located in Kalamazoo County. By 2010, these were all reported as removed from the county.

The Scrap Tire Regulatory Program is implemented by the Waste Management Division of the Michigan Department of Environmental Quality, under the authority of Part 169 of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. Policies and regulations established under this law provide the basis for the MDEQ to implement and administer an effective scrap tire management program per the following initiatives: 1) a compliance and enforcement program was implemented; 2) a scrap tire policy recycling hierarchy was established; 3) special uses of scrap tires were approved; and 4) a grant program was established to address abandoned tires.

In 1997, Part 169 was amended to require that a statewide emergency response plan be put into place to address response to fires at collection sites.

Summary: Kalamazoo has not had a significant tire fire in recent memory, and the estimated 15,000 scrap tires that were identified in 2001 have since been removed from the County.

Category 5: Flooding and Drought Hazards

Riverine and Urban Flooding

Hazard Description - The overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt or ice.

Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of history. If these floodplain areas were left in their natural state, floods would not cause significant damage. Development has increased the potential for serious flooding because rainfall that used to soak into the ground or take several days to reach a river or stream via a natural drainage basin now quickly runs off streets, parking lots, and rooftops, and through man-made channels and pipes.

Floods can damage or destroy public and private property, disable utilities, make roads and bridges impassable, destroy crops and agricultural lands, cause disruption to emergency services, and result in fatalities. People may be stranded in their homes for several days without power or heat, or they may be unable to reach their homes at all. Long- term collateral dangers include the outbreak of disease, widespread animal death, broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

The primary flooding sources include the Great Lakes and connecting waters (Detroit River, St. Clair River and St. Mary's River), thousands of miles of rivers and streams, and hundreds of inland lakes. Michigan is divided into 63 major watersheds. All of these watersheds experience flooding, although the following watersheds have experienced the most extensive flooding problems or have significant damage potential: 1) Clinton River; 2) Ecorse River; 3) Grand River; 4) Huron River; 5) Kalamazoo River; 6) Muskegon River; 7) Saginaw River; 8) Rifle River; 9) River Raisin; 10) Rouge River; 11) St. Joseph River; and 12) Whitefish River. The flooding is not restricted to the main branches of these rivers.

Most riverine flooding occurs in early spring and is the result of excessive rainfall and/or the combination of rainfall and snowmelt. Ice jams also cause flooding in winter and early spring. Severe thunderstorms may cause flooding during the summer or fall, although these are normally localized and have more impact on watercourses with smaller drainage areas. Oftentimes, flooding may not necessarily be directly attributable to a river, stream or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. That type of flooding is becoming increasingly prevalent in Michigan, as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the tremendous flow of water that often accompanies storm events. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns.

Flood Events in Kalamazoo County:

One of the most disastrous and extensive floods ever to occur in Michigan struck the central and southern Lower Peninsula during March 24-27, 1904. The flooding was caused by runoff resulting from intense rainfall, compounded by heavy snow pack and frozen soils. The flooding was most prevalent in the Grand, Kalamazoo, Saginaw and River Raisin basins and to a lesser extent in the Huron and St. Joseph River basins. (The flood peaks from this flood are still the highest associated with spring flooding in the southern Lower Peninsula since record keeping began.) Damage was widespread and severe. In Kalamazoo, a two square mile area was inundated, with damages estimated at $50,000.

A flood on April 4-11, 1947 was caused by a combination of snow and rainfall that began in late March of that year. Two frontal systems in early April dumped several inches of rain in many localities across central and eastern Lower Michigan. The areas primarily affected by the April, 1947 flood included the Clinton, Detroit, Grand, Kalamazoo, Saginaw and St. Clair Rivers, and the River Rouge.

A series of intense thunderstorms struck southern Lower Michigan in the last two weeks of April 1975, spawning several tornadoes and causing widespread flooding over a 21 county area. Total public and private damage was nearly $58 million dollars. A Presidential Major Disaster Declaration was granted for the 21 affected counties, including Kalamazoo County.

Heavy rainfall from May 31 to June 4, 1989 caused widespread flooding in Branch, St. Joseph and Kalamazoo counties. Over 400 homes incurred flood damage and many local roads washed out. A Governor's Disaster Declaration was granted to provide assistance to the counties. In addition, SBA low-interest disaster loans were made available to home and business owners in the affected counties to help repair flood and wind-related damages.

On May 10, 1995 one to three inches of rain fell over the Kalamazoo area in less than an hour, flooding streets and stranding motorists. Water stood as much as three feet deep under one viaduct.

Flooded roads were reported as widespread by law enforcement in Comstock on May 18, 2000, where two to as much as five inches of rain fell.

On May 26, 2000 severe thunderstorms produced flooding in several areas of Kalamazoo County. Roads were flooded in Vicksburg and across most of the southern part of the county.

Extensive flooding began on February 9, 2001 as a result of the combination of heavy rain and melting snow. Numerous roads were closed across all of southwestern and south central lower Michigan. Generally speaking, anywhere from one or two to as many as a dozen roads were partially washed out or closed in Kalamazoo County. There were also many reports of standing water in low lying areas and poor drainage areas. The event transitioned into a river flood event across the area. However, no lives were lost, and only minor property damage occurred.

Flooding became a problem during the late morning and afternoon hours across mainly eastern Van Buren and Kalamazoo counties on August 22, 2001. Doppler radar estimates indicated that 3 to 5 inches of rain fell across that area in less than 6 hours. Trained weather spotters reported that widespread street flooding occurred in Oshtemo and Kalamazoo. Several streets were blocked off and several underpasses were flooded. There were also a few reports of cars stuck in flooded underpasses and businesses having to pump water out of their stores in Kalamazoo during the height of the storms.

Several inches of rain in only two to three hours caused flash flooding in Kalamazoo, where two homes and two businesses sustained extensive damage on August 23, 2002. Waldo Stadium, on the campus of Western Michigan University, also had major flooding problems. At one point, three feet of standing water covered the entire football field. The heavy rain also caused several accidents and also several cars to stall in Kalamazoo. The event resulted in $200,000 in property damage.

In May 2004, a stationary front over Iowa, Wisconsin, and Michigan brought severe thunderstorms and heavy rains, which caused widespread flooding over Southern Lower Michigan. Much of the rainfall occurred in saturated areas that had experienced well-above average precipitation for the month of May. Backyards were submerged under several feet of water. Total rainfall over the Grand River basin from May 20th through June 3rd varied from four to as much as seven inches. It was the biggest and longest duration flooding event in the past ten to twenty years across southwestern and south central Lower

Michigan. It was the wettest May on record in Lansing and Muskegon and the third wettest May on record in Grand Rapids. A Presidential Major Disaster Declaration was granted to 23 counties in Southern Lower Michigan, however despite the flood severity Kalamazoo County was not granted a declaration.

A severe weather outbreak on July 2, 2008 resulted in numerous reports of wind damage (with gusts up to 60 mph) and large hail in Kalamazoo. The strong to severe thunderstorms also produced very heavy rain, flooding, and even flash flooding across portions of Kalamazoo County. In northwest Kalamazoo County, the winds blew the roof off a home. Flash flooding in Kalamazoo caused water to reach the windows and windshields of cars, several of which became submerged underwater on roads.

A slow moving front and the remnants of Hurricane Ike brought heavy rain to Southwest Lower Michigan in September 2008. The rain started on the twelfth and persisted through the thirteenth and fourteenth. Rainfall totals were impressive and in excess of ten inches across portions of Kalamazoo County, including a report of 10.5 inches at Augusta. The heaviest rain occurred along and just north of the Interstate 94 corridor across northern and central Kalamazoo County. A local state of emergency was declared for Kalamazoo County and moderate river flooding occurred on the Kalamazoo river at Comstock. Damage to public infrastructure (mostly road and bridge washouts) and to homes from flooding was estimated to exceed 11 million dollars. The worst flooding occurred near Comstock, where the river rose to 10.43 feet, the third highest crest on record. Many homes and businesses downstream were flooded. Many roads in the city of Kalamazoo were closed for several days due to high water. In fact, in the city of Kalamazoo, ten businesses were flooded, 466 homes were flooded, and ten major street intersections in downtown Kalamazoo were flooded.

A large area of thunderstorms produced heavy rain and flash flooding on June 5, 2010 in Kalamazoo County. Local law enforcement reported significant street flooding in downtown Kalamazoo, which required patrol cars to block off streets to keep people from driving into the flood waters. The Kalamazoo road commission also reported 10 gravel roads washed out in Oshtemo and Texas Townships located in western Kalamazoo County.

National Flood Insurance Program

For many years, the response to reducing flood damages followed a structural approach of building dams, levees and making channel modifications. However, this approach did not slow the rising cost of flood damage, plus individuals could not purchase insurance to protect themselves from flood damage. It became apparent that a different approach was needed.

The National Flood Insurance Program (NFIP) was instituted in 1968 to make flood insurance available in those communities agreeing to regulate future floodplain development. As a participant in the NFIP, a community must adopt regulations that: 1) require any new residential construction within the 100-year floodplain to have the lowest floor, including the basement, elevated above the 100-year flood elevation; 2) allow non-residential structures to be elevated or dry flood proofed (the flood proofing must be certified by a registered professional engineer or architect); and 3) require anchoring of manufactured homes in flood prone areas. The community must also maintain a record of all lowest floor elevations or the elevations to which buildings in flood hazard areas have been flood proofed. In return for adopting floodplain management regulations, the federal government makes flood insurance available to the citizens of the community. In 1973, the NFIP was amended to mandate the purchase of flood insurance as a condition of any federally regulated, supervised or insured loan on any construction or building within the 100-year floodplain.

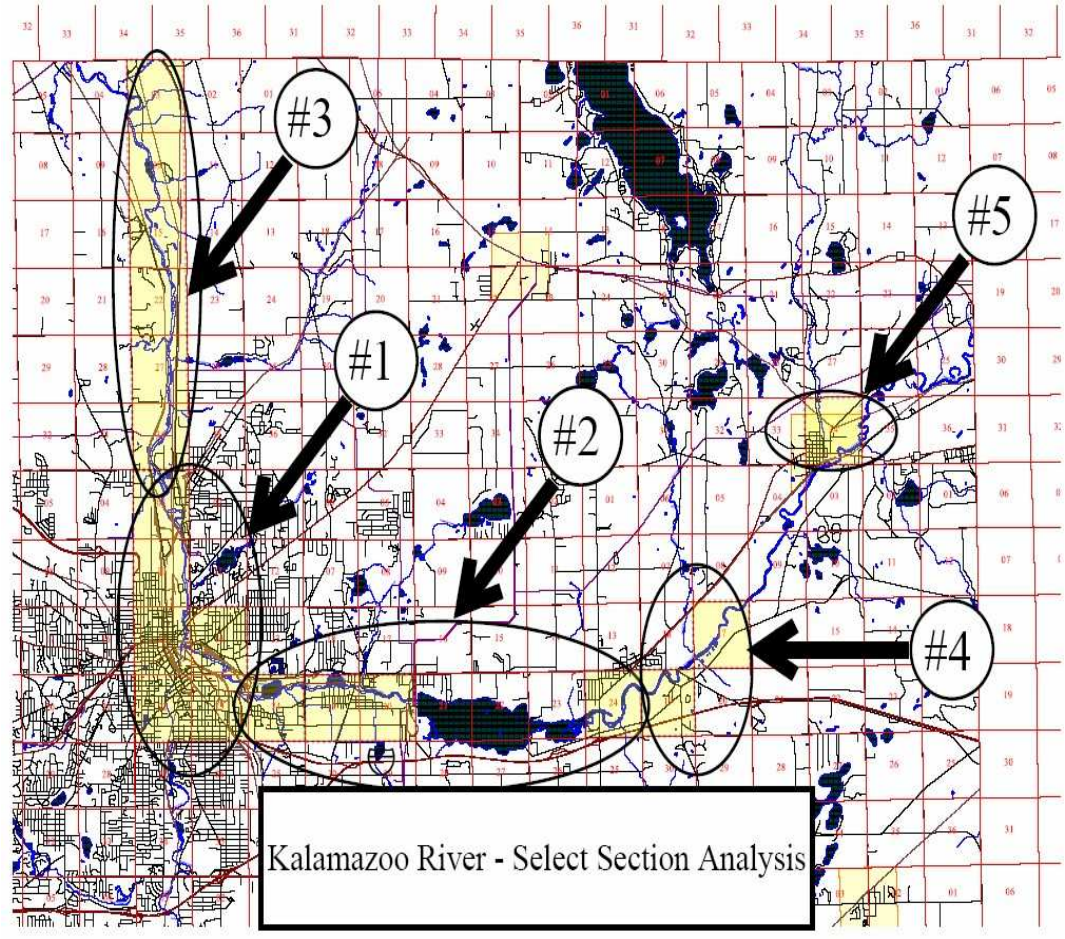
Currently, there are about 25,956 flood insurance policies in force in Michigan, which amounts to approximately $2.5 billion worth of coverage. About 18,621 (71.1%) of these policies are within an identified flood hazard area, and the remainder are for properties located outside flood hazard areas.

Officials from FEMA and the MDEQ estimate that only 15% of all flood prone structures in Michigan eligible to purchase flood insurance actually have flood insurance. Furthermore, since only about 40% of the communities in Michigan participate in the NFIP, there are thousands of structures that are flood prone, but are not eligible to purchase flood insurance.

The Cities of: Kalamazoo, Galesburg and Portage, Townships of: Charleston, Comstock, Cooper, Kalamazoo Oshtemo, Richland, Ross, Schoolcraft and Texas, and Villages of Augusta and Vicksburg have been studied to investigate the existence and severity of flood hazards in order to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The studies were used to convert the communities to the regular program of flood insurance by the Federal Insurance Administration (FIA). The studies were completed in the 1980's; and the Cities of: Kalamazoo, Galesburg and Portage, Townships of: Charleston, Comstock, Cooper, Kalamazoo Oshtemo, Richland, Ross, Schoolcraft and Texas, and Villages of Augusta and Vicksburg currently participate in the Flood Insurance Plan -- which provides for flood insurance at government-subsidized rates.

There are 5 areas of interest for flooding in Kalamazoo County.
1) The downtown area
2) Comstock – either side of Morrow Pond
3) The north side
4) Galesburg
5) Augusta

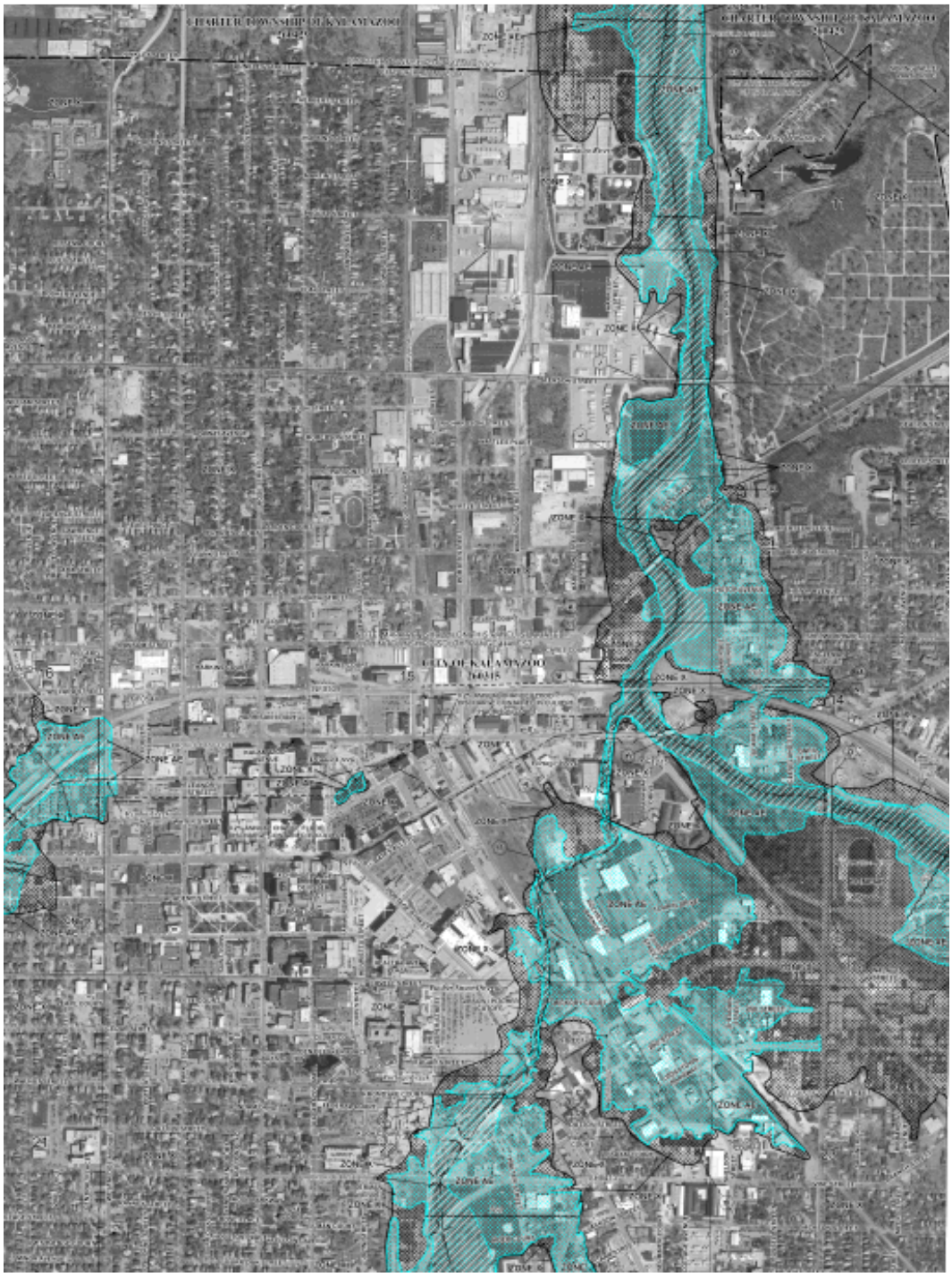
The following map identifies those areas.



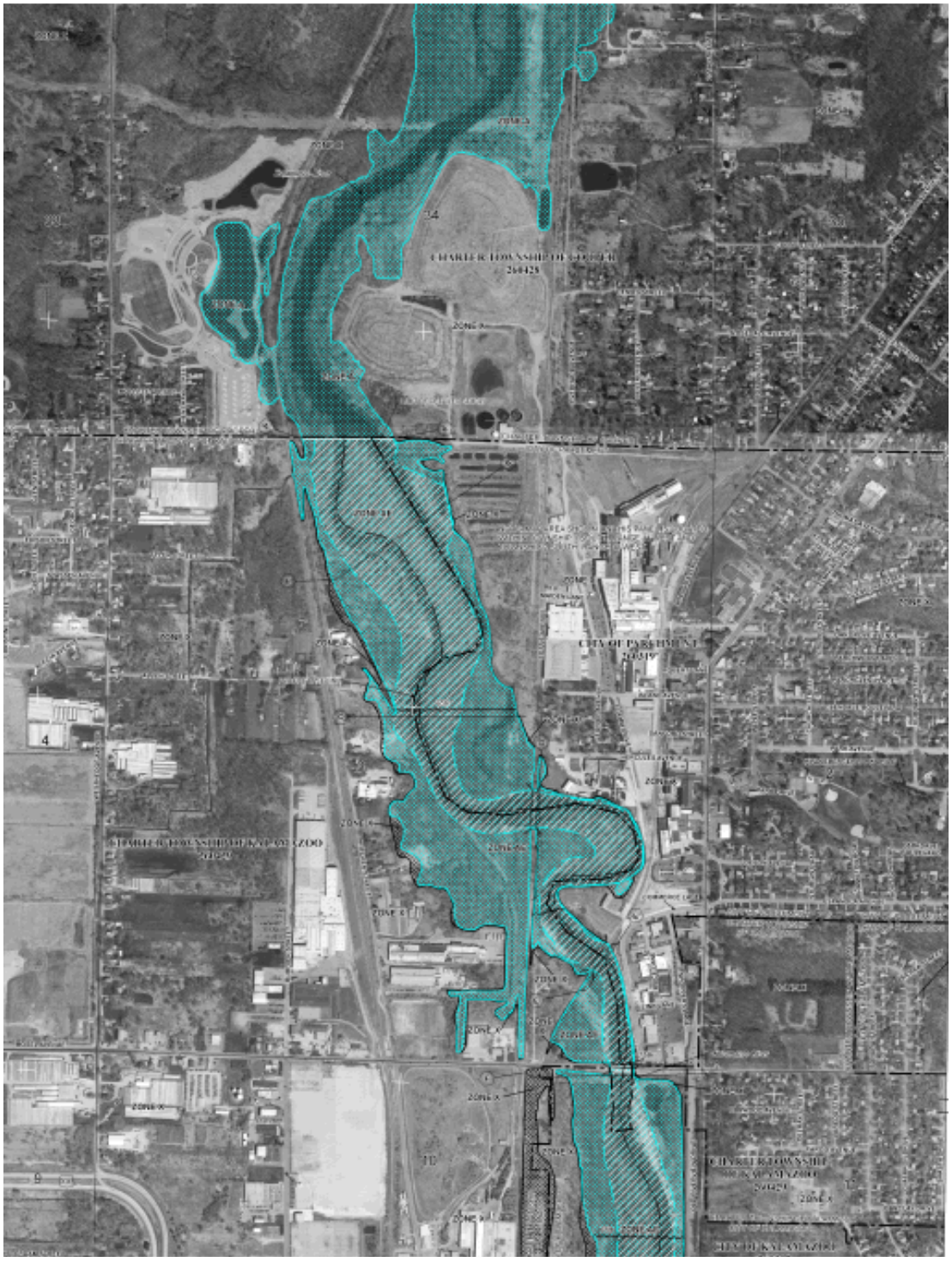
Area #1

Area #1 runs through central Kalamazoo County, the City of Kalamazoo and the Township of Kalamazoo. The general makeup of the area sections highlighted in yellow on the map above are represented by:

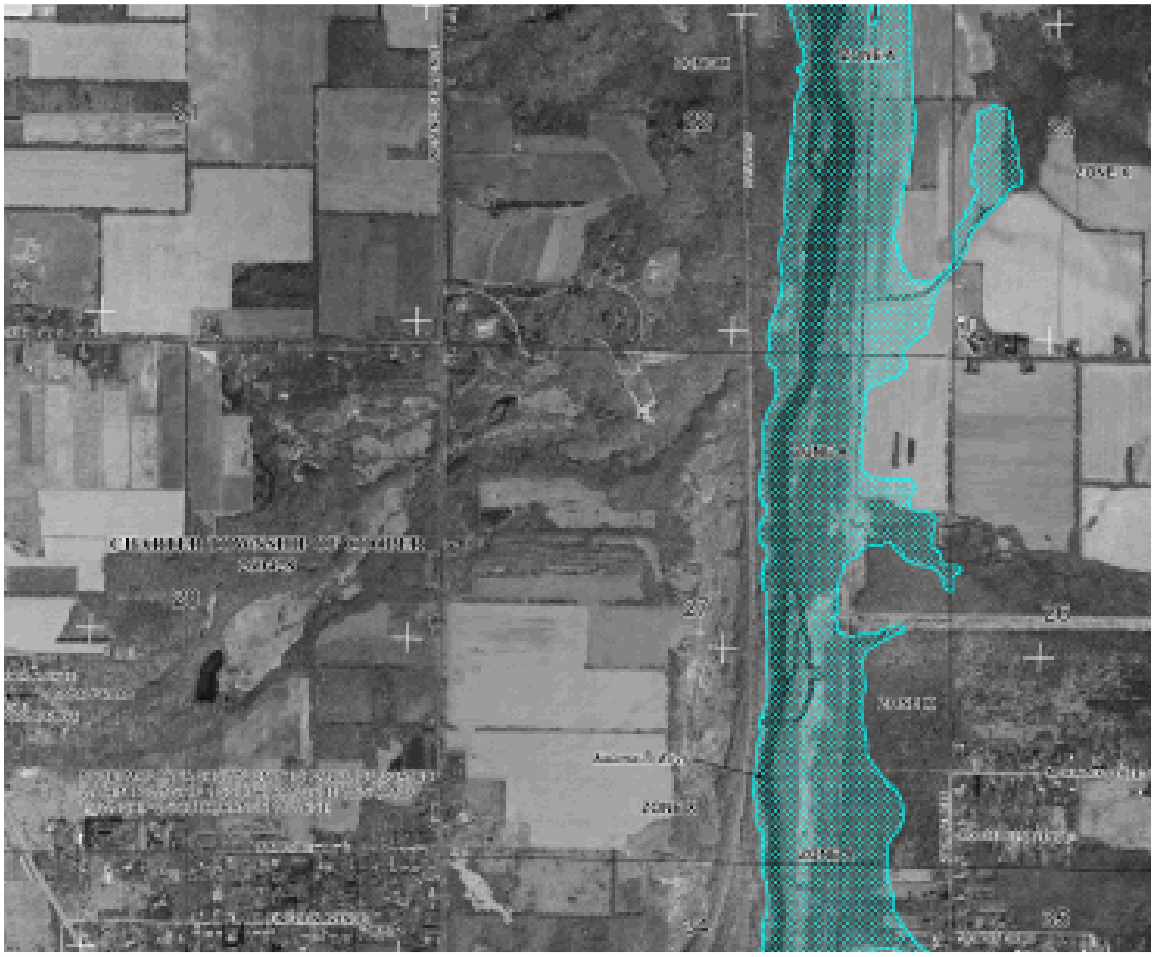
The approximate 100 year floodplain for Area #1 is shown in the following maps:



Kalamazoo Twp - Kalamazoo River 100 Yr @ 762'

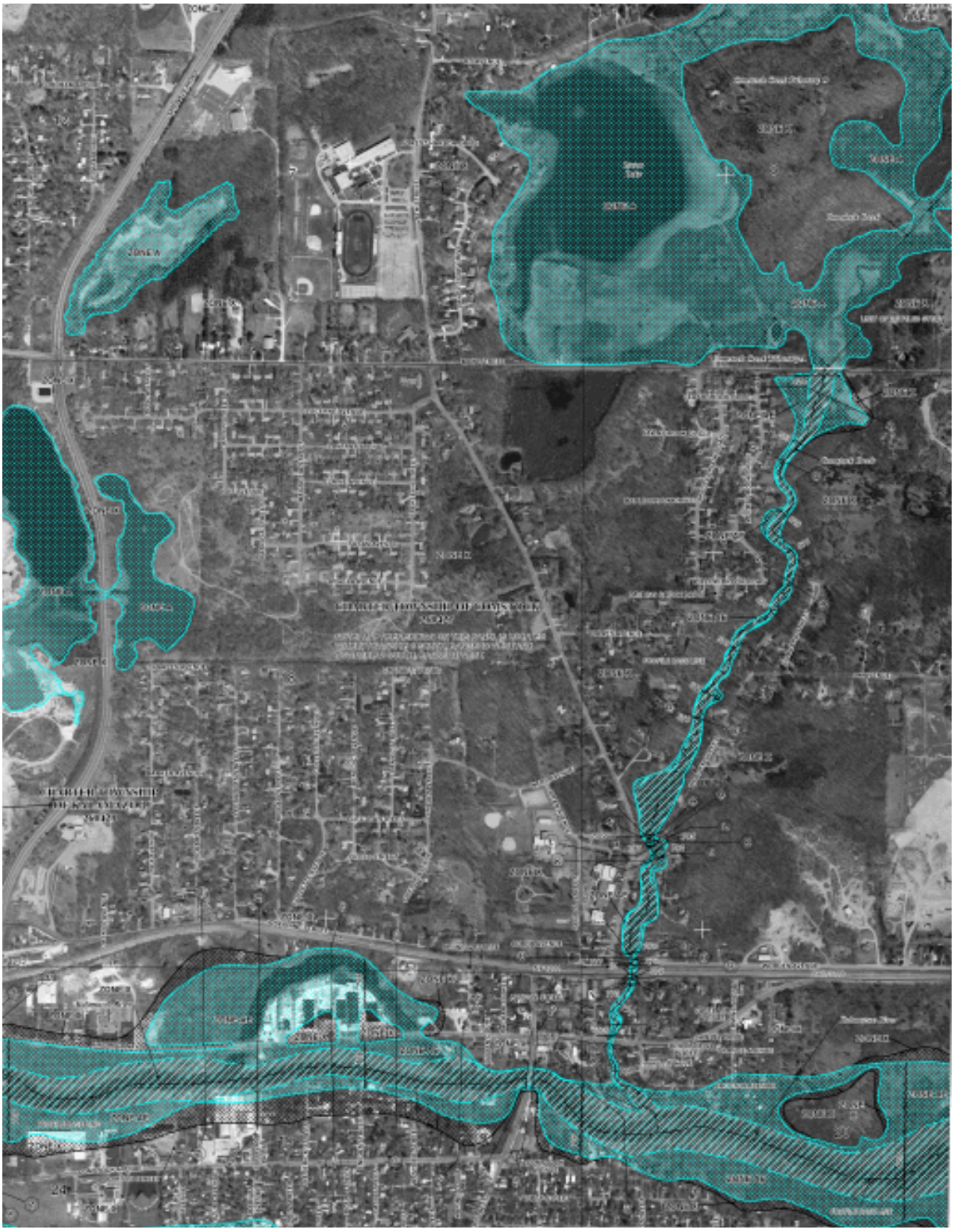


Kalamazoo Twp - Kalamazoo River



Kalamazoo Twp

Kalamazoo Twp



The yellow highlighted Sections identified as Area #1 are composed of the following:

Kalamazoo Area #1

Class of Property	Parcel Count		True Cash Value	
Agricultural	1	0%	$79,800	0%
Commercial	1,355	19%	$321,329,200	39%
Industrial	461	6%	$241,834,600	30%
Residential	5,506	75%	$254,141,600	31%
Total	7,323		$817,385,200	

Each of the floodplain maps shown (one above, and 4 more below) are part of a three-part map which includes a) a topographic map, b) a topographic map with the 100 year floodplain (as illustrated in the above map) and c) a satellite view of the same area with the same 100 year floodplain superimposed on the image.

The top 10 owners by taxable value within Area #1 are:

1) Pharmacia & Upjohn Co 89,560,069 taxable value in 11
2) Greenleaf Holdings, LLC 11,883,572 taxable value in 4
3) Bronson Methodist Hospital 9,992,162 taxable value in 10
4) Recycles Paperboard Mill, Inc 4,226,121 taxable value in 15
5) First of America Bank Corp 3,532,979 taxable value in 1 parcel
6) First of America 3,446,794 taxable value in 6
7) Kalamazoo Acquisition, LLC 2,954,526 taxable value in 1 parcel
8) Continental Corp 2,817,026 taxable value in 3
9) Fifth Third Bank 2,737,807 taxable value in 8
10) Kalamazoo Non-Profit 2,370,239 taxable value in 1 parcel

The top 10 owners by acreage within Area #1 are:

1) City of Kalamazoo 256.03 acres in 113
2) Recycled paperboard Mill, Inc 51.94 acres in 5 parcels
3) CMC Kalamazoo, Inc 50.66 acres in 1 parcel
4) Borroughs Corporation 34.04 acres in 9 parcels
5) Pharmacia & Upjohn Co 33.74 acres in 11 parcels
6) Consumers Energy 30.51 acres in 24 parcels
7) The Trinity Group Ltd 26.84 acres in 11 parcels
8) Kalamazoo Paper Co 23.64 acres in 6 parcels
9) City of Kalamazoo Brownfield 21.74 acres in 41 parcels
10) Dore, Arthur P 21.11 acres in 12 parcels

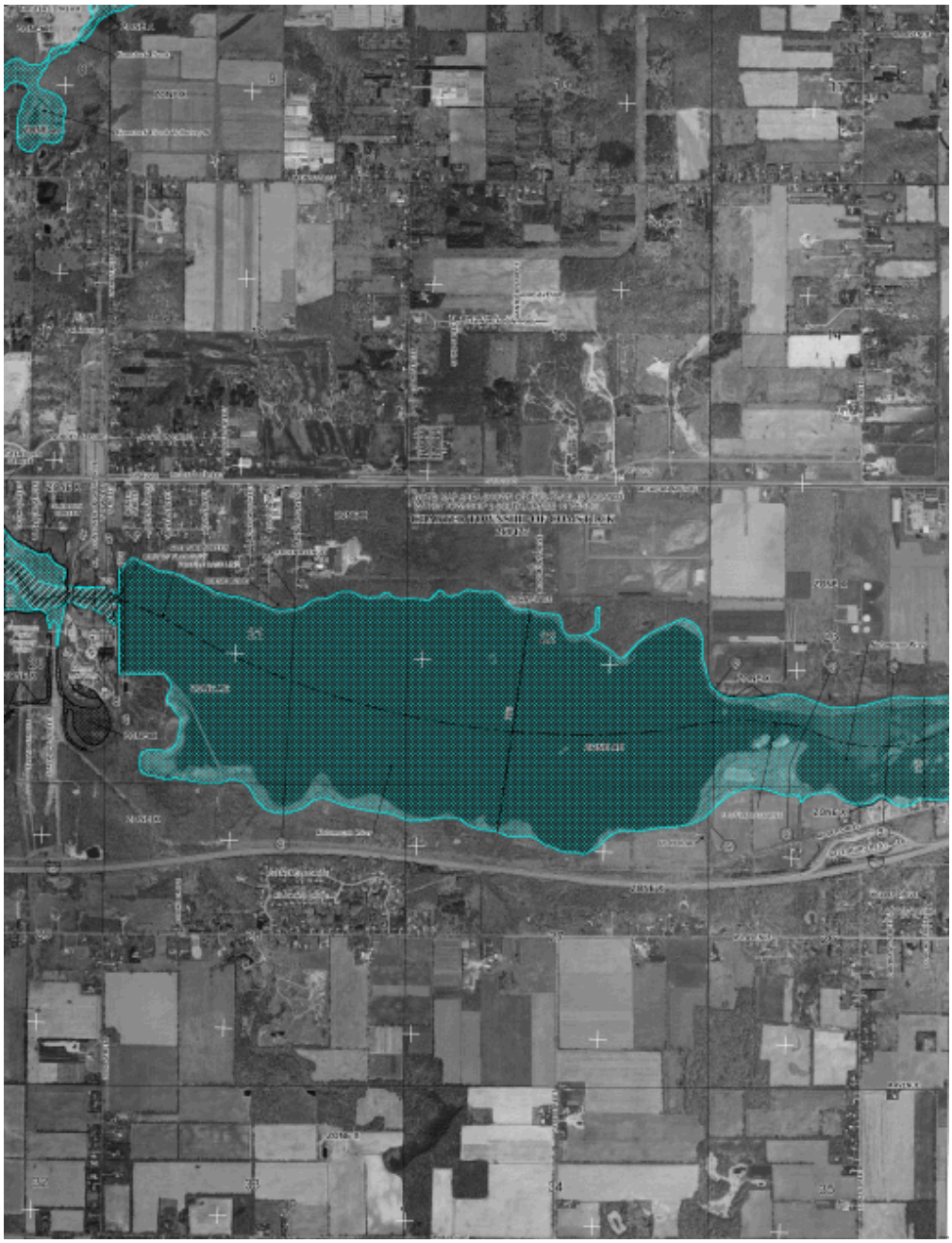
Area #2

The City of Comstock is just downstream of Morrow Pond, which is height regulated by Morrow Dam. The makeup of Area 2 is:

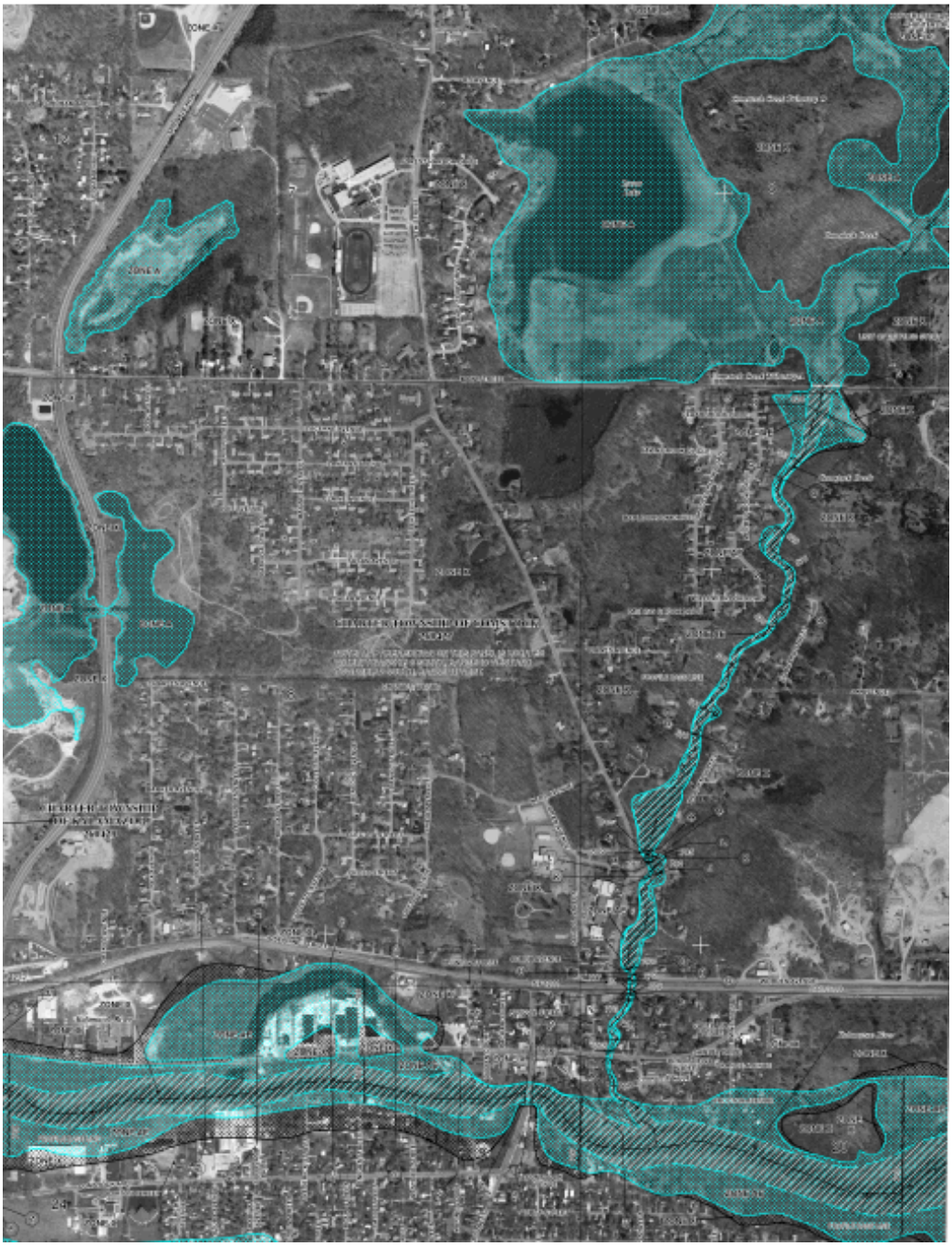
Comstock #2

Class of Property	Parcel Count	% Parcel Count	2004 True Cash Value	% True Cash Value
Agricultural	2	0%	$12,000	0%
Commercial	115	10%	$41,140,400	33%
Industrial	17	1%	$9,990,800	8%
Residential	1031	88%	$71,821,800	58%
			$122,965,000	

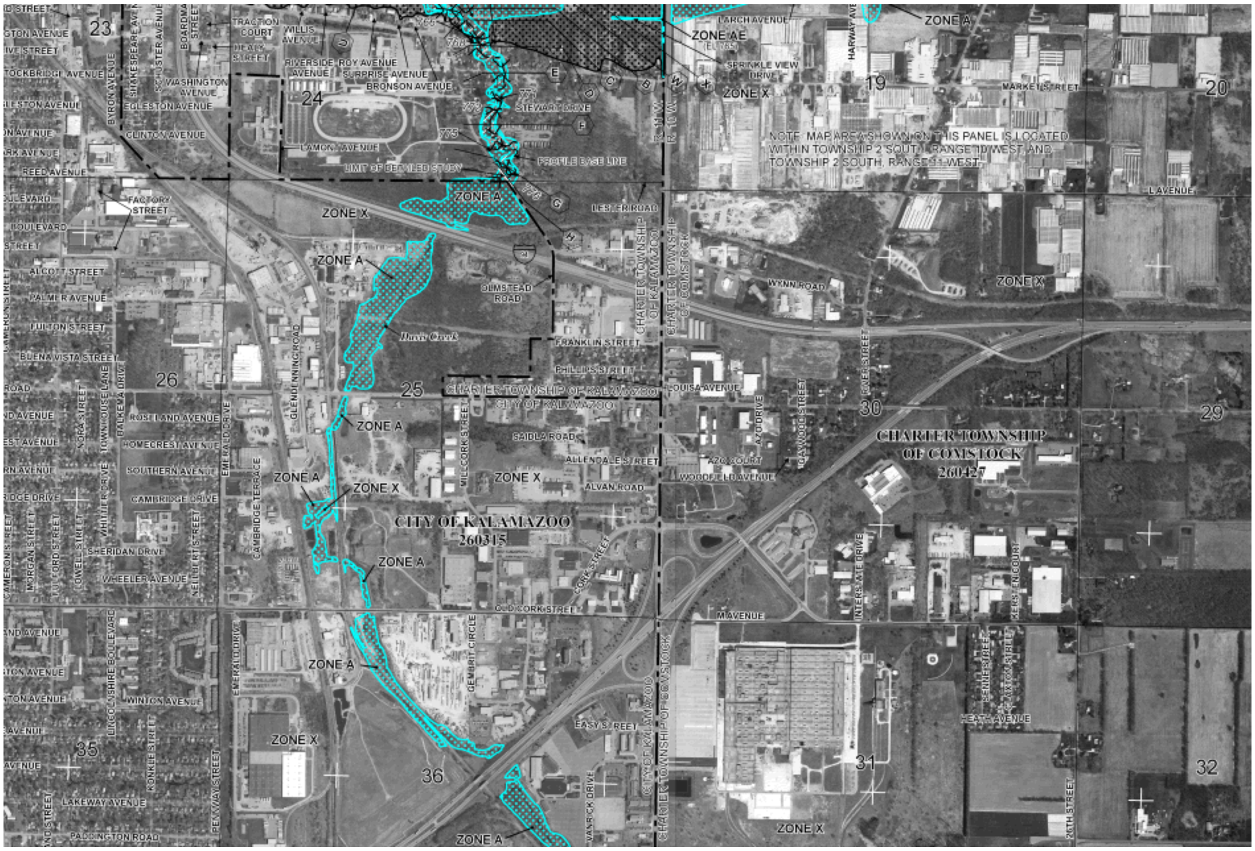
The approximate 100 year floodplain for Area #2 is shown in the following maps:



Comstock - Kalamazoo River



Comstock


CHARTER TOWNSHIP
OF COMSTOCK
260427
CITY OF KALAMAZOO
260315
ZONE A
ZONE X
ZONE AE
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 SOUTH, RANGE 10 WEST AND TOWNSHIP 2 SOUTH, RANGE 11 WEST.
LIMIT OF DETAILED STUDY
PROFILE BASE LINE

Comstock

The top 10 owners by taxable value within Area #2 are:

1)	ARJO LLC	1,515,998	taxable value in 1 parcel
2)	Krum J C Co, Inc	730,431	taxable value in 6 parcels
3)	Kal Valley Plant Growers Co-Op	680,800	taxable value in 1 parcel
4)	Walters-Demmick Petroleum Inc	610,100	taxable value in 1 parcel
5)	CMS Generation Co	607,800	taxable value in 1 parcel
6)	W Soule & Company	561,631	taxable value in 1 parcel
7)	Smit Donald J Trustee	514,534	taxable value in 2 parcels
8)	Comstock Senior Citizens Housing	504,556	taxable value in 1 parcel
9)	KSP LLC	469,036	taxable value in 5 parcel
10)	Kodiak Properties, Inc+	455,171	taxable value in 1 parcel

The top 10 owners by acreage within Area #2 are:

1)	Kalamazoo Co Road Commission	141,177 acres in 1 parcel
2)	STS Hydropower Ltd	285 acres in 3 parcels
3)	Charter Township of Comstock	47 acres in 14 parcels
4)	Hendrick William & Jeannette	36.52 acres in 1 parcel
5)	B&B Enterprises & environmental	26.26 acres in 3 parcels
6)	Consumers Energy	23.63 acres in 3 parcels
7)	Smit Donald J Trustee	20.56 acres in 2 parcels
8)	KSP LLC	19.67 acres in 5 parcels
9)	CMS Generation Co	18.89 acres in 1 parcel
10)	Triemstra Daniel J & Marcia	18.47 acres in 1 parcel

Area #3

Area # 3 is the area downstream of the City of Kalamazoo as it runs through Kalamazoo Township, the City of Parchment and Cooper Township.

Cooper Area #3

Class of Property	Parcel Count		True Cash Value	
Agricultural	20	8%	$1,550,020	9%
Commercial	1	0%	$373,926	2%
Industrial	25	10%	$1,977,732	11%
Residential	194	81%	$13,837,980	78%
Total	240		$17,739,658	

The Cooper area was not studied by the NFIP therefore, flood elevation data was not readily available from which a map could be generated.

The top 10 owners by taxable value within Area #3 are:

1)	Coggan Farms	384,896 taxable value in 13
2)	Gregersen Leslie Mervin	302,972 taxable value in 2
3)	Evergreen Park Kalamazoo	226,616 taxable value in 3
4)	Klein Daniel G & Deborah K	179.446 taxable value in 1
5)	Acme Printing Inc Co	163,176 taxable value in 1
6)	Dalrymple, Paul& Thelma	146,962 taxable value in 3
7)	Chippewa Development Inc	136,198 taxable value in 1
8)	Walker Wm & Lula	114,776 taxable value in 4
9)	Block Thomas A & Amy L	92,937 taxable value in 2 parcels
10)	Faas James W & Christine A	88,688 taxable value in 1 parcel

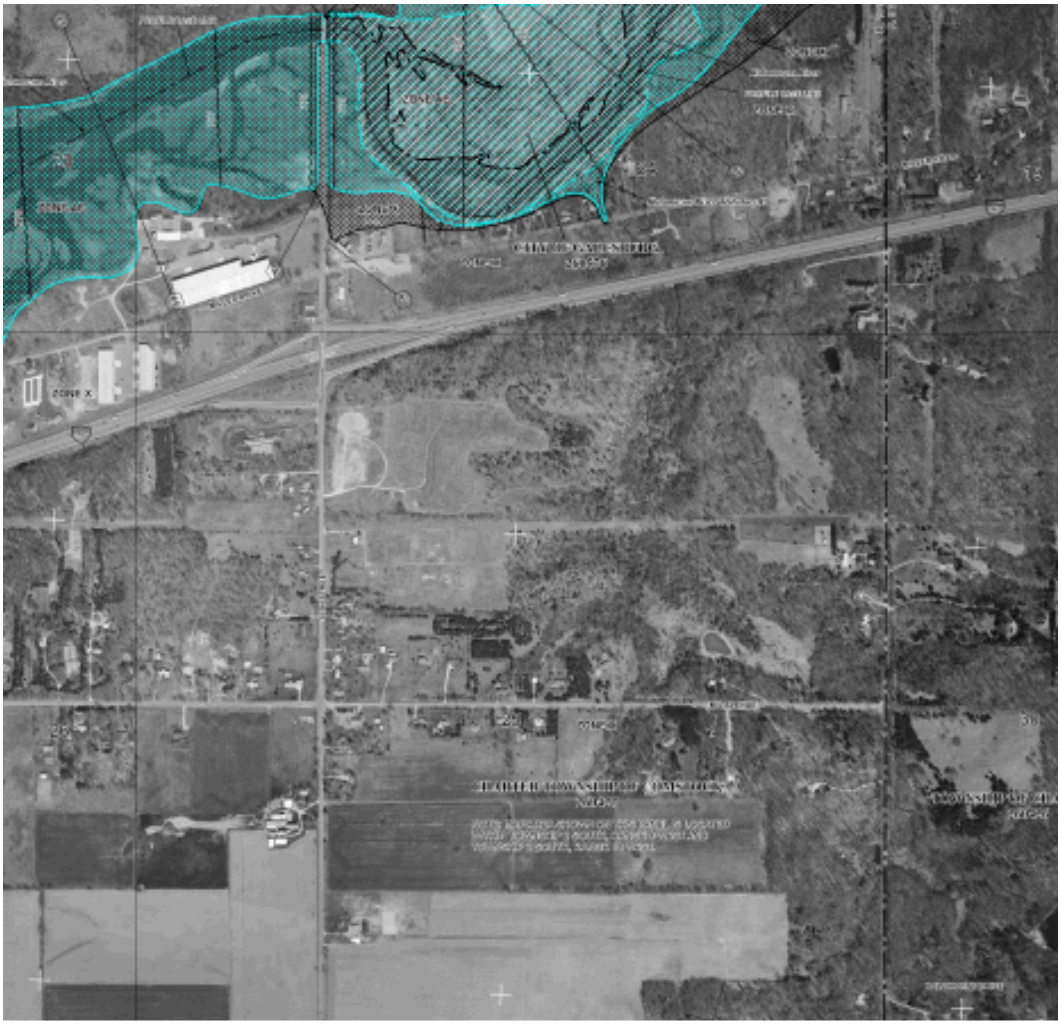
The top 10 owners by acreage in Area #3 are:

1)	Coggan Farms Inc	676.60 acres in 13 parcels
2)	Kal Nature Center Inc	461.66 acres in 12 parcels
3)	Consumers Energy	193.96 acres in 13 parcels
4)	Schmitt Richard C & Karen L	171.1 2 acres in parcels
5)	Walker Wm & Lula Rae/Lehman	134.78 acres in 4 parcels
6)	Dalrymple Paul & Thelma	117.05 acres in 3 parcels
7)	Nagel Henry & Catherine	116.14 acres in 2 parcels
8)	Dekruyter James J Trustee	101.56 acres in 3 parcels
9)	Crown Paper Co	90.00 acres in 1 parcel
10)	Whyment G Aaron & Lyons Brent	79.79 acres in 2 parcels

Area #4

The City of Galesburg is located on the western boundary of Charleston Township along the Kalamazoo River. While generally known as the Galesburg area, the river is actually in Charleston Township.

The approximate 100 year floodplain for Area #4 is shown in the following maps:



Galesburg

The general description of property within the sections identified in Area 4 are shown in the following table:

Charleston Area #4

Class of Property	Parcel Count		True Cash Value	
Agricultural	9	5%	$1,737,000	8%
Commercial	4	2%	$799,000	4%
Industrial	2	1%	$72,800	0%
Residential	170	92%	$18,681,600	88%
Total	185		$21,290,400	

The top 10 owners by taxable value within Area #4 are:

1) Graham William 172,767 taxable value in 4
2) Combs Larry J 169,080 taxable value in 4
3) Bloomfield James & Sandra 149,503 taxable value in 1 parcel
4) Weaver Paul A & Howard Carol A 142,458 taxable value in 4
5) Bloomershine Roger & Yuvon 137,946 taxable value in 1 parcel
6) Waldorf Terry & Debbie 122,263 taxable value in 1 parcel
7) Ruecker Robert & Barbara 119,680 taxable value in 2
8) Chenery mark & Julie 118,982 taxable value in 1 parcel
9) ARR Rental Inc 104,155 taxable value in 2
10) Salada Michael & Judith 97,414 taxable value in 2 parcels

The top 10 owners by acreage in Area #4 are:

1) Troff Marjorie Trust 198.19 total acres in 1 parcel
2) Combs Larry J 95.51 total acres in 1 4 parcels
3) Weaver Paul A & Howard Carol A 63.52 total acres in 1 4 parcels
4) Howard Christopher & Debra 59.65 total acres in 1 2 parcels
5) Blakeslee Richard & Jillyne 50.00 total acres in 1 1 parcel
6) Osterhouse Angeline et al 42.05 total acres in 1 2 parcels
7) Vaughn Charles & Julie 41.20 total acres in 1 2 parcels
8) Emmons Robert & Rosalie 27.97 total acres in 1 1 parcel
9) STS Hydropower Ltd 23.80 total acres in 1 1 parcel
10) Bloomfield James & Sandra 21.98 total acres in 1 1 parcel

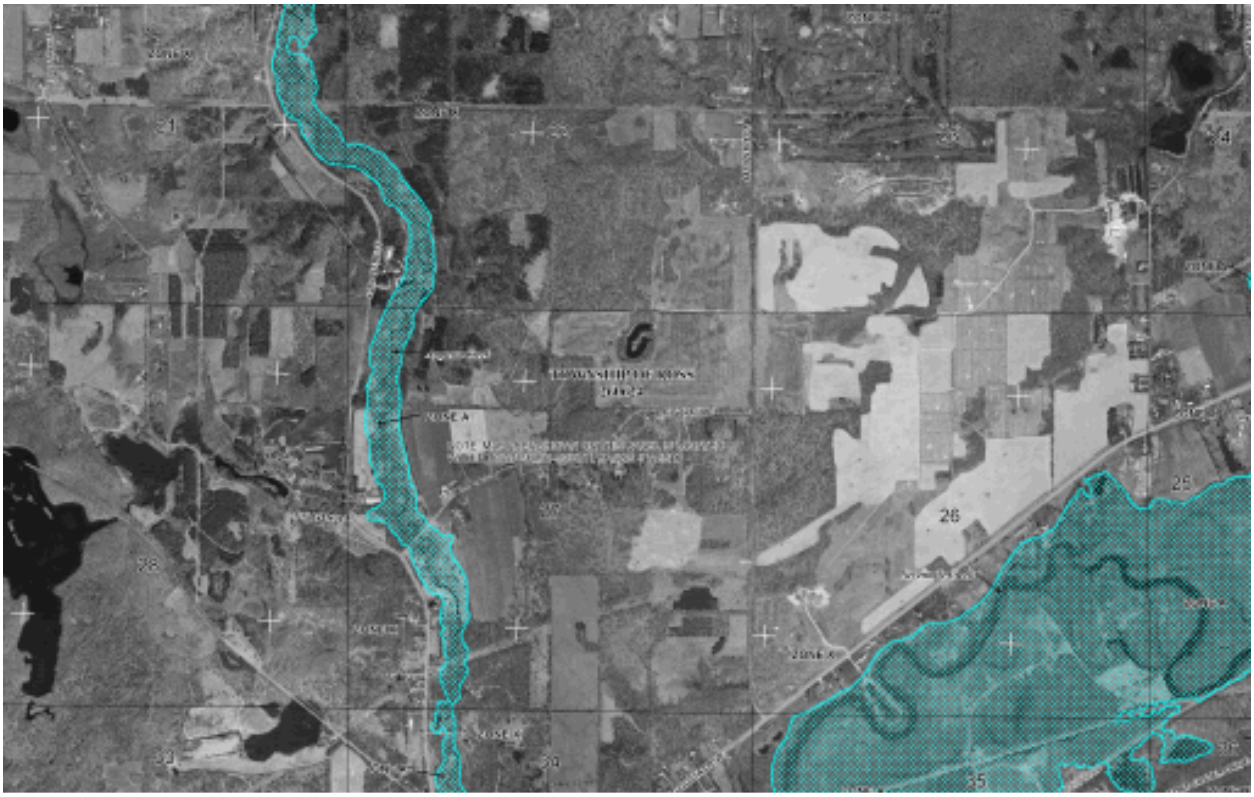
Area #5

The Village of Augusta lies on the western boundary of the Ft. Custer Military/Recreational Area. The makeup of Area #5 is as follows:

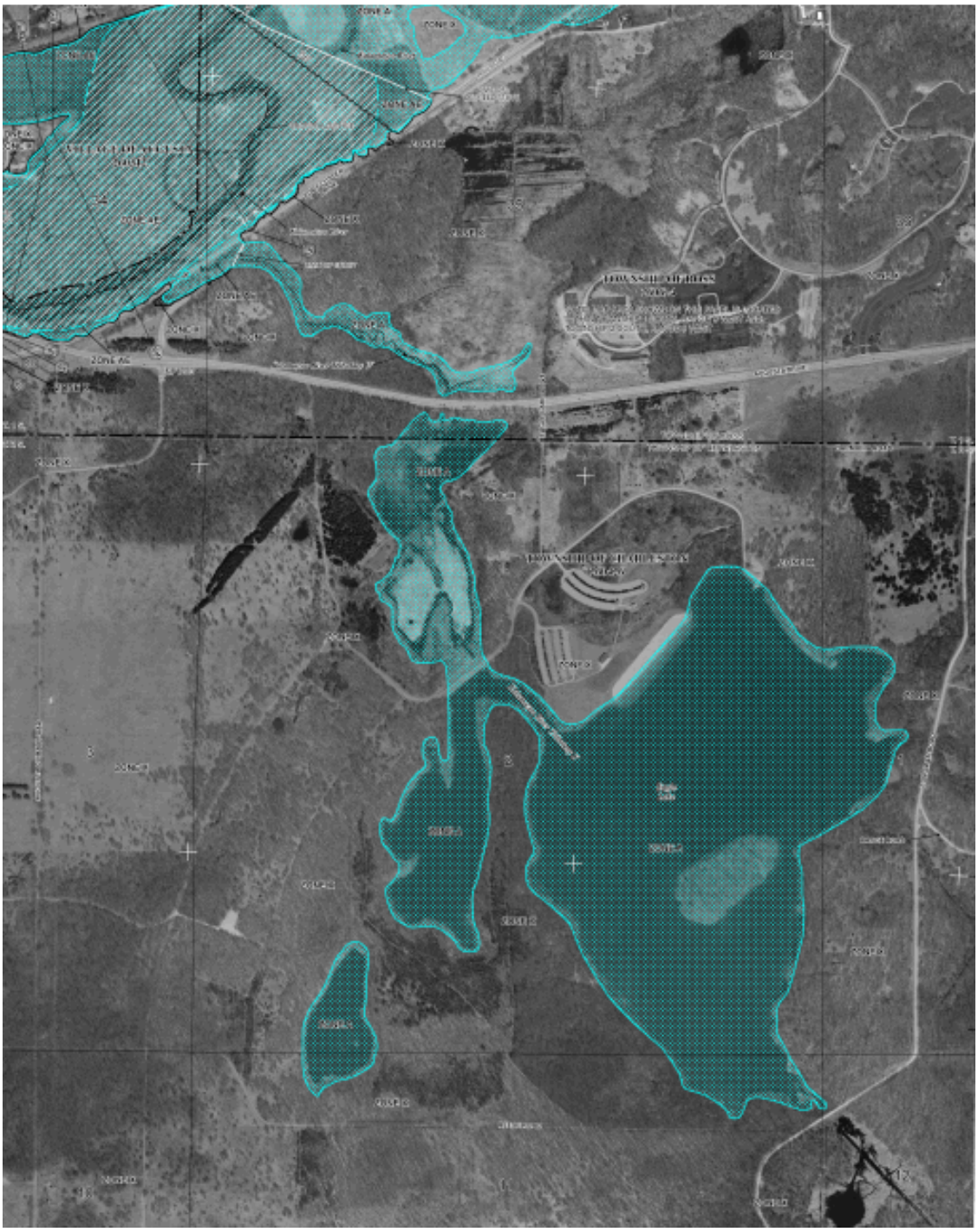
Augusta Village #5

Class of Property	Parcel Count		True Cash Value	
Agricultural	3	1%	$541,600	1%
Commercial	36	8%	$4,286,600	11%
Industrial	17	4%	$3,080,800	8%
Residential	381	87%	$29,913,532	79%
Total	437		$37,822,532	

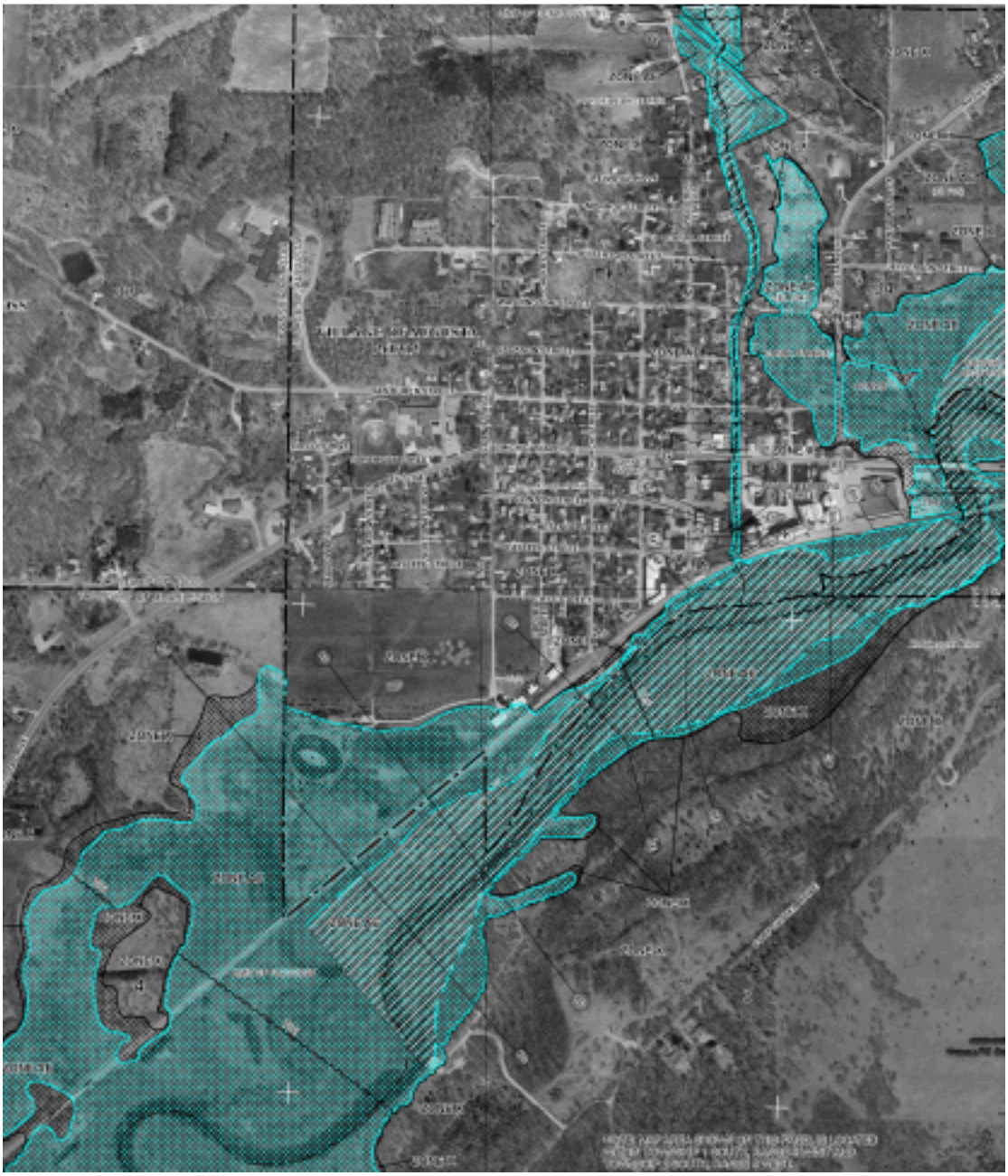
The approximate 100 year flood area for Area #5 is represented below:



Augusta



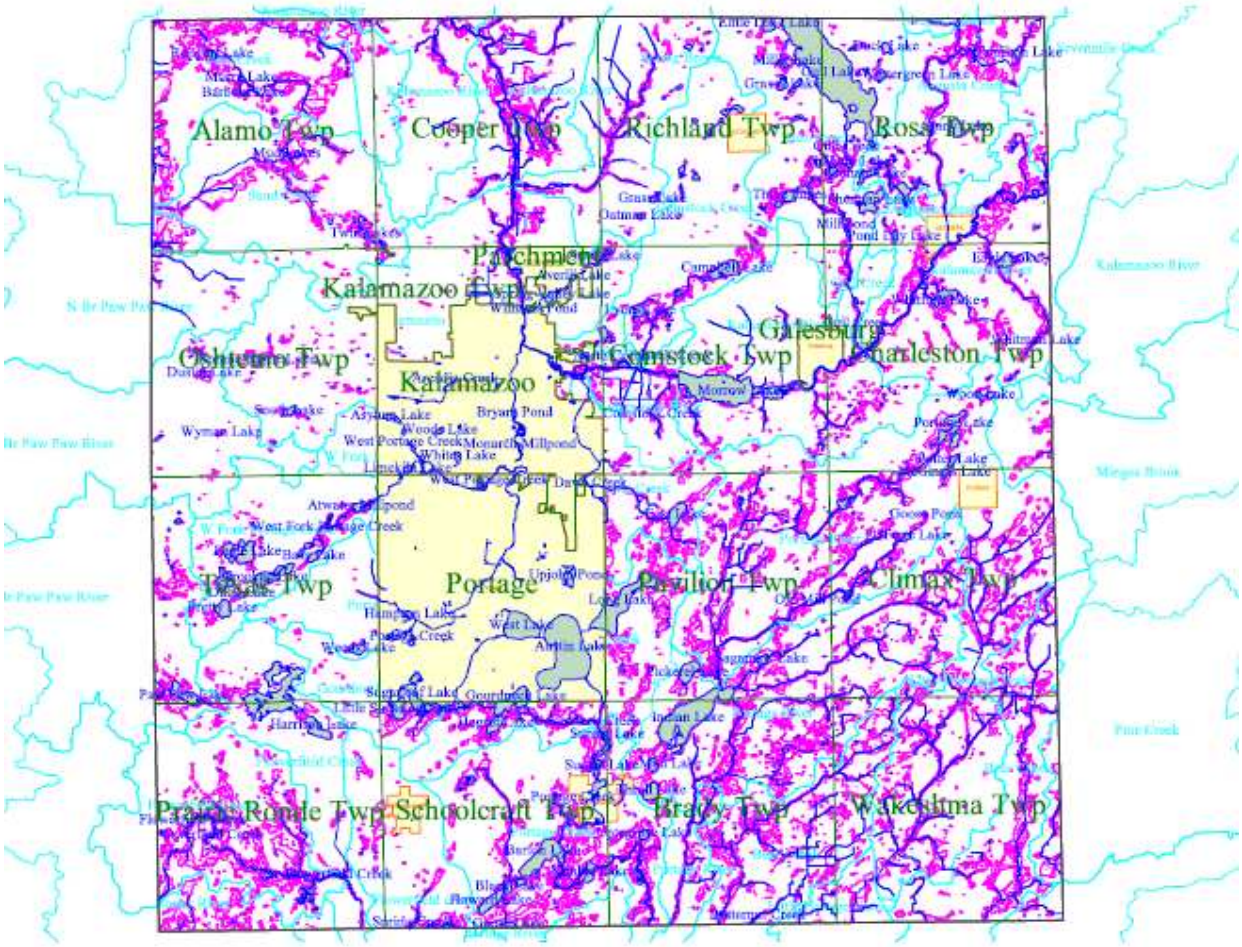
Augusta - Kalamazoo River @ 787' 100 Yr Flood



Additional background:

The Kalamazoo County Road Commission commissioned a study of water flow along the roadside in the south part of the County. The goal was to determine action items for increasing water flow and/or reducing roadway flooding.

Lakes, Rivers, Drains, Watershed and Wetlands



- Drains
- Drain
- River
- County
- Minor Civil Division
- Lake
- Village
- City
- Watershed
- Wetland

The final recommendations of the KCRC study were to essentially not disturb the existing flow of water; else the longtime balance of the current situation would be adversely affected.

Summary: The County has multiple communities participating in the National Flood Insurance Program, with various zones identified as having properties at risk. Although these are mapped in 1% annual flood risk areas, a major flood event would be expected to cause millions of dollars of damage and to involve hundreds of structures.

Repetitive Loss Property Information in Kalamazoo County

The National Flood Insurance Program (NFIP) compiles information about properties that have suffered repeated significant damages from flood events. FEMA keeps lists of this confidential information and requires a local hazard mitigation plan to provide a general summary of this vulnerability. Specific information needs to be kept confidential, since it is derived from insurance industry records. For this plan update, information about repetitive loss properties was obtained from the Michigan State Police, Emergency Management and Homeland Security Division. According to the official list of repetitive loss properties, dated September 30, 2012, the following jurisdictions within Kalamazoo County have been identified as containing this type of vulnerability. From the confidential information, summaries of the number and types of repetitive loss properties for each community were assembled, and are presented in the following table.

Summary Table of Repetitive Loss Properties in Communities Covered by This Plan

Jurisdiction	Number of properties	Property type(s)	Average total damage per event	# Events
Comstock Charter Township	1	Single-family residential	$7,036	2
Kalamazoo City	8(7)	2(1) single-family, 1 multi-family, 5 nonresidential	$23,487	28
Kalamazoo Charter Township	4	Single-family residential	$13,720	13
COUNTY TOTAL	13 (12)		$19,769	43

NOTE: Some properties are classified as “mitigated” and have been subtracted to produce new numbers in parentheses.

The largest concentrated problem according to these records had been the City of Kalamazoo, where seven properties are at substantial risk of flooding. Ranked next in the listings is Kalamazoo Charter Township, which has four repetitively damaged structures. Comstock Charter Township was the only other jurisdiction listed, with one property. (It should be noted that flood risks go beyond just these listed properties, but the repetitive loss list identifies areas that have had repeated claims of substantial flood damages, and thus indicate which of the NFIP-participating communities have been worst-affected.)

Dam Failures

Hazard Description - The collapse or failure of an impoundment that results in downstream flooding. A dam failure can result in loss of life and extensive property or natural resource damage for miles downstream from the dam. Dam failures occur not only during flood events, which may cause

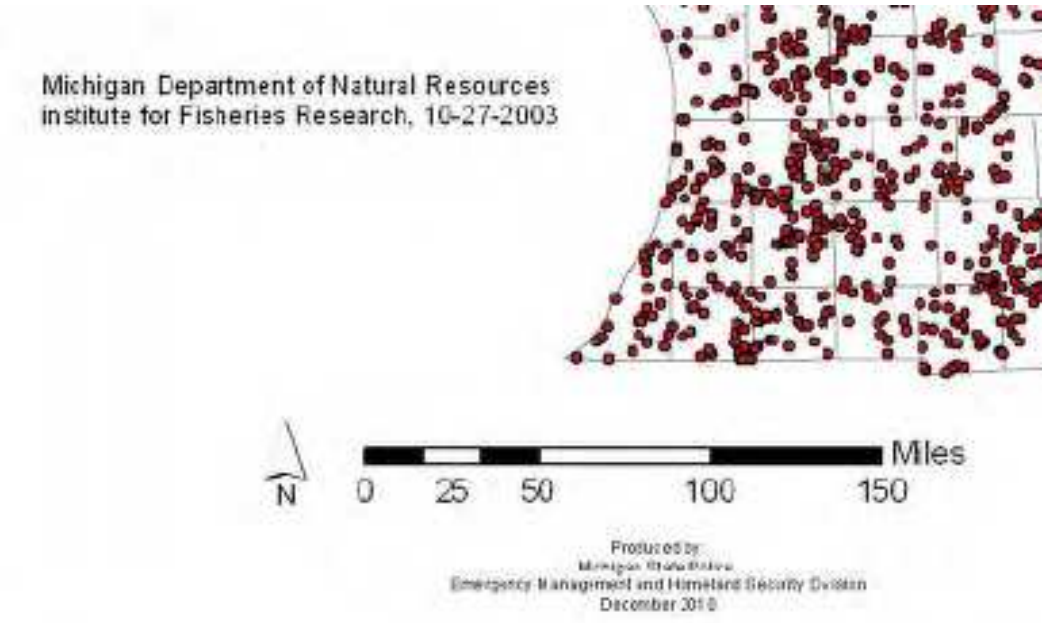
overtopping of a dam, but also because of poor operation, lack of maintenance and repair, and vandalism. Such failures can be catastrophic because they occur unexpectedly, with no time for evacuation. The Michigan Department of Environmental Quality (MDEQ) has documented approximately 278 dam failures in Michigan.

The MSP lists 3 of Kalamazoo's dams as a "High Hazard", and 3 of the dams listed as a "Significant Hazard".

The definition for these rating by Michigan law (Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act) is as follows:

“High hazard potential dam” means a dam located in an area where a failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways, or class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life.

“Significant hazard potential dam” means a dam located in an area where its failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where danger to individuals exists.



The table below identifies the major dams within Kalamazoo County:

	POND NAME	LATITUDE	LONGITUDE	HAZARD
Bryant Mill Dam	Bryant Pond	42.270000	-85.578333	High
Howlandsburg Dam	Mill Pond	42.336667	-85.403333	Significant
Lee Paper Company Dam	Sunset Lake	42.118333	-85.536667	High
Morrow Dam	Morrow Lake	42.283333	-85.491667	High
Scotts Mill Dam	Scotts Mill Pond	42.193333	-85.421667	Significant
Spring Valley Park Dam	Spring Valley Lake	42.308333	-85.561667	Significant

Summary: There are several dams whose failure would potentially harm area property and residents with flash flooding, but there is no history of this occurring at any recent time within the county.

Drought

Hazard Description - A water shortage caused by a deficiency of rainfall, generally lasting for an extended period.

Drought is a normal part of the climate of Michigan and of virtually all other climates around the world – including areas with high and low average rainfall. Drought differs from normal arid conditions found in low rainfall areas in that aridity is a permanent characteristic of that type of climate. Drought is the consequence of a natural reduction in the amount of precipitation expected over an extended period, usually a season or more in length. The severity of a drought depends not only on its location, duration and geographical extent, but also on the water supply demands made by human activities and vegetation. This multi-faceted nature of the hazard makes it difficult to define a drought and assess when and where one is likely to occur.

Drought differs from other natural hazards in several ways. First, it is difficult to determine the exact beginning and end of a drought, since its effects may accumulate slowly and linger even after the event is generally thought of as being over. Second, the lack of a clear-cut definition of drought often makes it difficult to determine whether one actually exists, and if it does, its degree of severity. Third, drought impacts are often less obvious than other natural hazards, and they are typically spread over a much larger geographic area. Fourth, due primarily to the aforementioned reasons, most communities do not have in place any contingency plans for addressing drought. This lack of pre-planning can greatly hinder a community's response capability when a drought does occur.

Droughts can cause many severe impacts on communities and regions, including: 1) water shortages for human consumption, industrial, business and agricultural uses, power generation, recreation and navigation; 2) a drop in the quantity and quality of agricultural crops; 3) decline of water quality in lakes, streams and other natural bodies of water; 4) malnourishment of wildlife and livestock; 5) increase in wildfires and wildfire-related losses to timber, homes and other property; 6) declines in tourism in areas dependent on water-related activities; 7) declines in land values due to physical damage from the drought conditions and/or decreased economic or functional use of the property; 8) reduced tax revenue due to income losses in agriculture, retail, tourism and other economic sectors; 9) increases in insect infestations, plant disease, and wind erosion; and 10) possible loss of human life due to food shortages, extreme heat, fire, and other health-related problems such as diminished sewage flows and increased pollutant concentrations in surface water.

Drought Events in Kalamazoo County:

The available NCDC drought records (those that use the Palmer drought index) began with a period of extreme drought throughout Michigan (including Kalamazoo County). Every one of Michigan's climate divisions registered drought conditions for at least 8 months—some as long as 17 months—during this period from 1895-1986. Recovery was spotty and temporary over the following few years, and it is probable that numerous areas felt little distinction between this drought event and the only that followed closely afterward.

Without a doubt, the "Dust Bowl" drought of the 1930s was the most famous drought ever to occur in the U.S. It was caused by misuse of the land combined with years with lack of rainfall. As the land dried up, great clouds of dust and sand, carried by the wind, covered everything and the term "Dust Bowl" was coined. As a result of this drought, millions of acres of farmland became useless, forcing hundreds of

thousands of people to leave their farms and seek an existence elsewhere. Although exact figures were not kept, some researchers estimate that nearly $1 billion (in 1930s dollars) was provided in assistance to victims of the Dust Bowl drought. That event also ushered in a new era or farming and conservation programs and practices aimed at preventing a recurrence of a drought of the magnitude and impact of the Dust Bowl drought. In Michigan, this "dust bowl" period took the form of a most severe statewide drought condition from 1929 to 1932, followed by a less severe period from 1933 to 1937 in which the general pattern involved the south and western areas seeing the hardest conditions. The most extreme conditions ever seen in Michigan occurred in the period from 1929 to 1932. Nine out of Michigan's ten climatic divisions (including Kalamazoo County) set their all-time drought records during the beginning of 1931. Between 1930 and 1931, all nine of Michigan's most heavily affected climate divisions experienced this most unusual level of drought for at least 6 straight months. Unfortunately, those areas that experienced the more prolonged conditions of extreme drought were also the most heavily agricultural areas of the state, in the southern Lower Peninsula. Climate area 8, where Kalamazoo is located, had 29 consecutive months of drought between July 1930 and November of 1932.

From 1946-1947 climate divisions 7, 8 (Kalamazoo County's area), and 9 all experienced about 8 continuous months of drought, peaking at the severe D2 level of intensity.

From 1962-1965 was the only clear and serious statewide drought event to take place since the 1930s, which partially demonstrates a general trend of lessening drought problems in Michigan during the second half of the 20th Century when compared with the first half. Nevertheless, this was definitely the worst drought event to strike Michigan since the 1930s. The entire Southern Lower Peninsula had to endure at least 30 consecutive drought months, many of which were at the D2 level, or worse. The middle years of 1963-1964 were the worst phase of this event.

The drought / heat wave that struck Michigan during the summer of 2001 damaged or destroyed approximately one-third of the state's fruit, vegetable and field crops, resulting in a U.S. Department of Agriculture Disaster Declaration for 82 of the state's counties. In 2002, moderate to extreme drought affected more than 45 percent of the country during the months of June, July and August. Nationwide, the summer was the third hottest on record, following only 1936 and 1934. The summer of 2002 was also very hot and dry in Michigan. During the first half of the month, hundreds of communities across the area were under water restrictions. Hardest hit from the drought was the agricultural industry. The severely dry weather was classified as a drought until mid 2003.

Kalamazoo County is located within "Division 8" of Michigan's ten climate divisions, used for monitoring drought conditions. Within Division 8, the most extreme drought was in February 1931, when the Palmer index hit a record low of -6.57. Lengthy drought incidents took place in 1895-1896 (8 months), 1901-1902 (10 months), 1914-1915 (8 months), 1925-1926 (11 months), 1930-1932 (29 months), 1934-1935 (9 months), 1946-1947 (9 months), 1953-1954 (8 months), 1956-1957 (9 months), 1962-1964 (31 months), 1999-2000 (10 months), and 2005-2006 (10 months).

Drought Years in Michigan, by Climate Division
(covering the 116 years from 1895 to 2010)

Climate Division	Years without any drought months	With drought ≤ - 2.0 Palmer	With drought ≤ - 3.0 Palmer	With drought ≤ - 4.0 Palmer	With drought ≤ - 5.0 Palmer	With drought ≤ - 6.0 Palmer	With drought ≤ - 7.0 Palmer
1	50%	50%	28%	13%	9%	2%	0
2	41%	59%	39%	21%	**10%**	2%	1%
3	40%	60%	35%	20%	9%	2%	**2%**
4	**37%**	**63%**	39%	**23%**	**10%**	**3%**	**2%**
5	43%	57%	29%	12%	2%	2%	1%
6	39%	61%	31%	18%	3%	2%	**2%**
7	38%	62%	**40%**	20%	4%	2%	1%
8	44%	56%	30%	9%	2%	1%	0
9	43%	57%	29%	16%	4%	1%	0
10	46%	54%	34%	20%	6%	**3%**	0

An analysis by year tends to overstate Michigan's drought-susceptibility, because the presence of a single drought month may be counted the same as an entire year of sustained drought (although longer drought periods often will be distinguished by having more severe Palmer Index values). A single month's drought will not necessarily cause severe agricultural impacts, because the timing of the drought with regard to the crop cycle is also important for the extent of drought impact. Therefore, an analysis of the percentage of drought months is also provided here, as a different indicator of drought frequency. This table also suggests that Climate Division 4 is the most drought-prone area in Michigan. The listing (on the previous page) of lengthy drought incidents (lasting 8 months or longer) can also give a kind of indicator regarding the frequency of droughts that likely had a significant agricultural impact, although these are all summary indicators by climate division and may vary considerably from the actual performance of individual farms within a particular area. The differences between Michigan's climate divisions may be significant, but are not enormous. One reason for this is that drought is defined with respect to an area's precipitation norms. It may be noteworthy that Climate Division 4 was also the location of Michigan's highest and lowest recorded temperature extremes.

Drought Months in Michigan, by Climate Division
(covering the 1,392 months from January 1895 to December 2010)

Climate Division	Months without any drought (Palmer >-2)	With drought ≤ - 2.0 Palmer	With drought ≤ - 3.0 Palmer	With drought ≤ - 4.0 Palmer	With drought ≤ - 5.0 Palmer	With drought ≤ - 6.0 Palmer	With drought ≤ - 7.0 Palmer
1	79.1%	20.8%	9.4%	3.8%	1.3%	0.2%	0
2	73.3%	26.7%	13.7%	4.7%	1.5%	0.3%	0.1%
3	71.9%	28.1%	12.1%	5.2%	1.7%	0.7%	**0.4%**
4	**69.8%**	**30.2%**	**15.7%**	**6.8%**	1.9%	**0.8%**	**0.4%**
5	77.9%	22.1%	8.2%	2.5%	0.7%	0.4%	0.1%
6	73.7%	26.3%	10.8%	4.4%	1.1%	0.6%	**0.4%**
7	70.9%	29.1%	14.5%	5.6%	1.7%	0.6%	0.3%
8	79.7%	20.3%	8.0%	2.0%	0.8%	0.3%	0
9	79.2%	20.8%	8.6%	4.1%	1.3%	0.4%	0
10	75.6%	24.4%	12.1%	5.5%	**2.4%**	**0.8%**	0

Summary: About 56% of the time, each year in Kalamazoo County will experience some level of at least temporary drought. Many of these events will only have limited impacts, but some may have great severity or unfortunate timing that causes large impacts upon the area's agricultural productivity.

Category 6: Hazardous Material Incidents

Fixed Site Hazardous Material Incidents (including explosions and industrial accidents)

Hazard Description - An uncontrolled release of hazardous materials from a fixed site capable of posing a risk to life, health, safety, property or the environment.

Hazardous materials are highly regulated by federal and state agencies to reduce risk to the public and the environment. Despite precautions taken to ensure careful handling during the manufacture, transport, storage, use and disposal of these materials, accidental releases do occur. Often, these releases can cause severe harm to people or the environment if proper mitigation action is not immediately taken. Most releases are the result of human error. Occasionally, releases can be attributed to natural causes, such as a flood that washes away barrels of chemicals stored at a site. However, those situations are the exception rather than the rule.

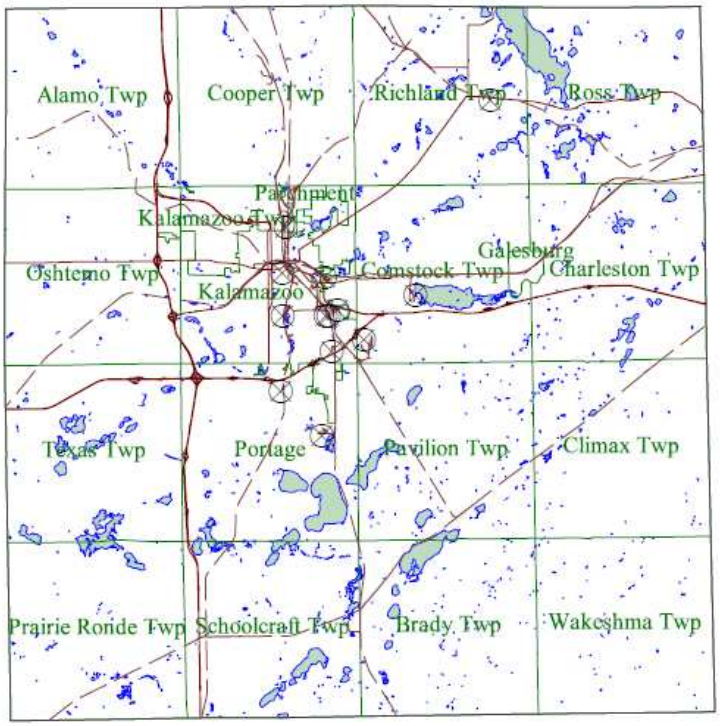
Hazardous materials are materials or substances which, because of their chemical, physical, or biological nature, pose a potential risk to life, health, property, or the environment if they are released. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers and dangerous gasses.

Industrial Accident: A fire, explosion, or other severe accident involving hazardous materials at an industrial facility that results in serious property damage, injury, or loss of life.

Industrial accidents differ from hazardous material incidents in the scope and magnitude of offsite impacts. Whereas hazardous material incidents typically involve an uncontrolled release of material into the surrounding community and environment that may necessitate evacuations or in-place sheltering of the affected population, the impacts from industrial accidents are often confined to the site or facility itself, with minimal physical outside impacts. Nonetheless, industrial accidents such as fires, explosions and excessive exposure to hazardous materials, may cause injury or loss of life to the workers at the facility, and often significant property damage. In addition, industrial accidents can cause severe economic disruption to the facility and surrounding community, as well as significant, long-term impacts on the families of the workers injured or killed.

Summary: There are no known disastrous hazardous material incidents in the county in recent years, although some small-scale spills have taken place (and handled routinely). There is, however, a chance that some future incident may cause some level of localized harm, and that related types of events (such as the Enbridge pipeline break) may cause an impact within the county.

SEC Hazardous Sites



SARA Title III Sites in Kalamazoo County	
FACILITY	FACILITY
AGA Gas, Inc.	Kalamazoo Water Div/Sta #16
Aluminum Finishing Corp	Kalamazoo Water Div/Sta #17
Ameritech (1)	Kalamazoo Water Div/Sta #18
Ameritech (2)	Kalamazoo Water Div/Sta #22
Ameritech (3)	Kalamazoo Water Div/Sta #26
Burroughs Corporation	Kalamazoo Water Div/Sta #31 (1)
City of Kalamazoo Water	Kalamazoo Water Div/Sta #31 (2)
Cytec Industries	Kalamazoo, Michigan Pop
General Chemical Corp-Kalamazoo	Kalsec, Inc.
Graphic Packaging Corporation	Kellogg Farm-MSU/Farm
Havilland Products Company	Level 3 Communications Inc
Hercules Incorporated	Parker Abex Nil
K Mart Corp (1)	Pharmacia and Upjohn R&D
K Mart Corp (2)	Portage, City of Creek Site
Kal Blue Reprographics	Portage, City of Garden Lane #1
Kalamazoo Beverage Packaging	Portage, City of Pershing Site
Kalamazoo Metal Finishers	Portage, City of Westfield Site

Kalamazoo Stripping & Derusting	Prairie Farms Dairy
Kalamazoo Water Div Sta #1	Precision Heat Treating Company
Kalamazoo Water Div Sta #3	Quala Systems, Inc. Kalamazoo
Kalamazoo Water Div/Sta #4	Richard-Allan Scientific
Kalamazoo Water Div/Sta #11	Sun Chemical Corporation
Kalamazoo Water Div/Sta #12	TLC Warehousing Svcs Inc. MDC1

Hazardous Material Transportation Incidents

Hazard Description - An uncontrolled release of hazardous materials during transport capable of posing a risk to life, health, safety, property or the environment. (Note: Pipeline transportation accident issues are addressed in the Petroleum and Natural Gas Pipeline Accidents section of this document. Refer to that section for information on that particular hazard.)

Because of the extensive use of chemicals in our society, all modes of transportation – highway, rail, air, marine and pipeline – are carrying thousands of hazardous materials shipments on a daily basis through local communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people.

Note: Many of the programs and initiatives designed to mitigate, prepare for, respond to, and recover from fixed- site hazardous material incidents have the dual purpose of also protecting against hazardous material transportation incidents. Consequently, there is some overlap in the narrative programs and initiatives descriptions for each respective hazard.

Events in Kalamazoo County:
On June 3, 2009 a tractor pulling a 3,000 gallon tank of liquid manure overturned east of Vicksburg, spilling some of its load. The spill caused an odor, and diesel fuel and hydraulic oil also needed to be cleaned. Fortunately no one was injured.

On August 26, 2011 a semi truck rolled over spilling hazardous materials and forced the closure of a Kalamazoo County interchange for several hours. Many cylinders of argon and carbon dioxide gas spilled out of the truck's trailer; fortunately nobody was hurt in the crash.

Summary: Occasional events do happen in the county every few years, and require some expensive resources to respond to, even though the situations can usually be resolved within a few days.

Oil and Natural Gas Well Accidents

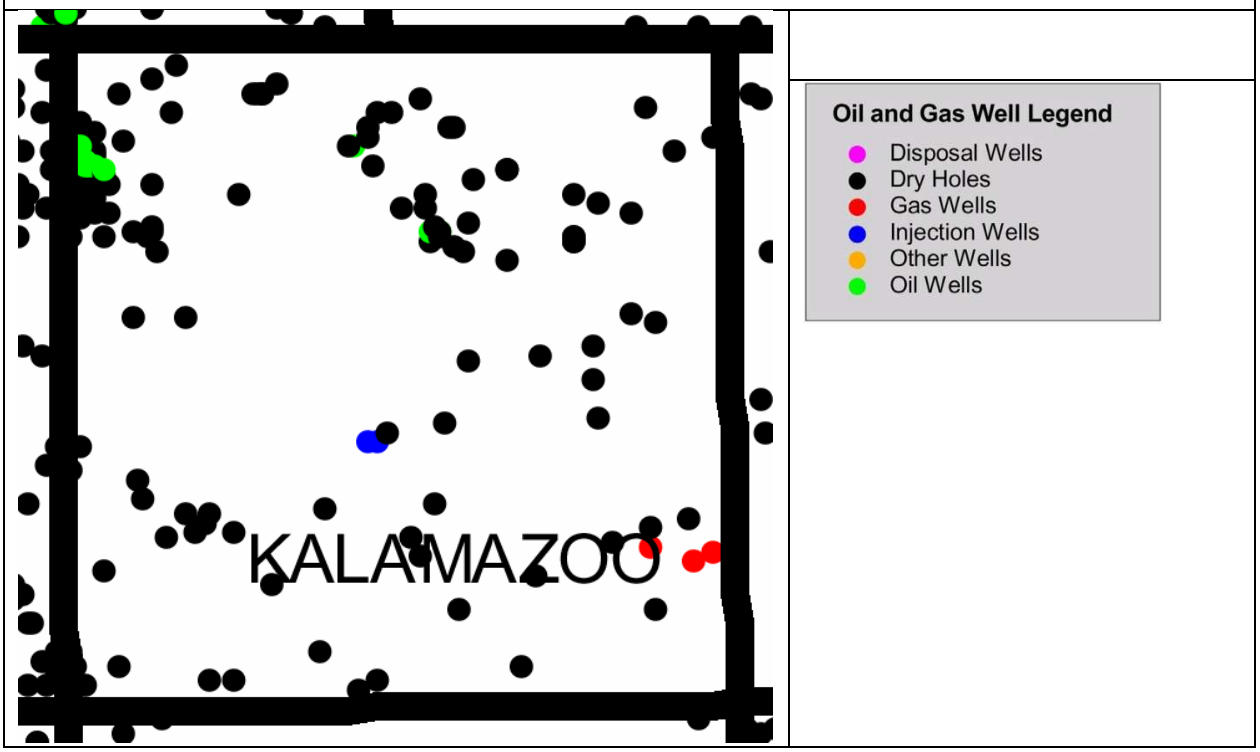
Hazard Description - An uncontrolled release of oil or natural gas, or the poisonous by-product hydrogen sulfide, from production wells. Oil and natural gas are produced from fields scattered across 63 counties in the Lower Peninsula. Since 1925, over 44,000 oil and natural gas wells have been drilled in Michigan, of which roughly half have produced oil and gas. To date, Michigan wells have produced approximately 1.4 billion barrels of crude oil and 4 trillion cubic feet of gas.

Local Emergency Capability:
Communities that may be affected by oil or natural gas well accidents should have adequate procedures in their Emergency Operations Plans to address the unique types of problems associated with this hazard, including rescue and evacuation. Affected communities must work closely with company officials and surrounding jurisdictions to ensure compatibility of procedures for a fast, coordinated response. Mitigation possibilities include the use of community zoning regulations to provide suitable

open, unoccupied "buffer" areas around refineries and compressor stations. Michigan Department of Environmental Quality regulations provide for buffer zones around wells and treatment and storage facilities.

There are some 162 of the state's 55,669 wells in Kalamazoo County -- with the concentration of oil wells primarily in Alamo Township; with the gas wells located within Wakeshma Township.

Oil and Gas Wells in Kalamazoo County



Many of Michigan's oil and gas wells contain extremely poisonous hydrogen sulfide (H2S) gas. Hydrogen sulfide is a naturally occurring gas mixed with natural gas or dissolved in the oil or brine and released upon exposure to atmospheric conditions. Over 1,300 wells in Michigan have been identified as having H2S levels exceeding 300 parts per million (ppm).

As the table below indicates, at concentrations of 700 ppm, as little as one breath of hydrogen sulfide can kill. Although hydrogen sulfide can be detected by a "rotten egg" odor in concentrations from .03 ppm to 150 ppm, larger concentrations paralyze a person's olfactory nerves so that odor is no longer an indicator of the hazard. Within humans, small concentrations can cause coughing, nausea, severe headaches, irritation of mucous membranes, vertigo, and loss of consciousness. Hydrogen sulfide forms explosive mixtures with air at temperatures of 500 degrees Fahrenheit or above, and is dangerously reactive with powerful oxidizing materials. Hydrogen sulfide can also cause the failure of high-strength steels and other metals. This requires that all company and government responders be familiar not only with emergency procedures for the well site, but also with the kinds of materials that are safe for use in sour gas well response.

Physiological Response to H2S	
10 ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1 hour exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours of exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour of exposure.
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to 1 hour.
700-1000 ppm	Rapid unconsciousness, cessation of respiration and death.
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if the individual is removed to fresh air at once.
Source: American National Standards Institute, Standard: 237.2-1972	

Summary: Although the county does have more than 100 permitted wells, there are no records of recent disaster-level incidents having an off-site impact. Such incidents are very rare.

Pipeline Accidents (Petroleum and Natural Gas)

Hazard Description - An uncontrolled release of petroleum or natural gas, or the poisonous by-product hydrogen sulfide, from a pipeline.

Though often overlooked, petroleum and natural gas pipelines pose a real threat in many Michigan communities. Petroleum and natural gas pipelines can leak or fracture and cause property damage, environmental contamination, injuries and even loss of life. The vast majority of pipeline accidents that occur in Michigan are caused by third party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations.

Michigan is both a major consumer and producer of natural gas and petroleum products. According to the Michigan Public Service Commission (MPSC), approximately 25% of the natural gas consumed in Michigan is produced within the state. Five interstate pipeline companies that have access to the major natural gas producing regions in North America import the remaining 75%. Michigan cycles more natural gas through its storage system than any other state. As of 2009, Michigan ranks 13th in the nation in production of natural gas, and ranks 7th in consumption at 847.8 billion cubic feet. Michigan's petroleum product consumption in 1997 was 189 million barrels, ranking it 10th nationally. These figures underscore the fact that vast quantities of petroleum and natural gas are extracted from, transported through and stored in the state, making many areas vulnerable to petroleum and natural gas emergencies.

Local Experience:
December 15, 1998 - A natural gas leak caused an explosion in downtown Galesburg in the early morning hours of December 15, 1998, destroying two businesses and damaging a third. One person in an automobile sitting at a nearby red light was slightly injured when a Christmas tree and other debris flew through his windshield. Fortunately, the downtown area was not crowded when the explosion occurred. An eight square block area was evacuated as a precaution against further explosions, but utility workers were able to shut off the gas supply to avert further damage.

March 7, 1999 - On March 7, 1999 a ruptured natural gas transmission line near Plainwell caused an explosion and fire that could be seen for 20 miles away. The explosion and fire occurred in a primarily rural area two miles southeast of Plainwell and about 10 miles north of Kalamazoo. Fortunately, there

were no structures nearby, and the explosion and fire did not cause any injuries. The fire, which spread to over 400 feet wide and 100 feet high, burned for nearly two hours before utility workers were able to shut down the gas supply to the line.

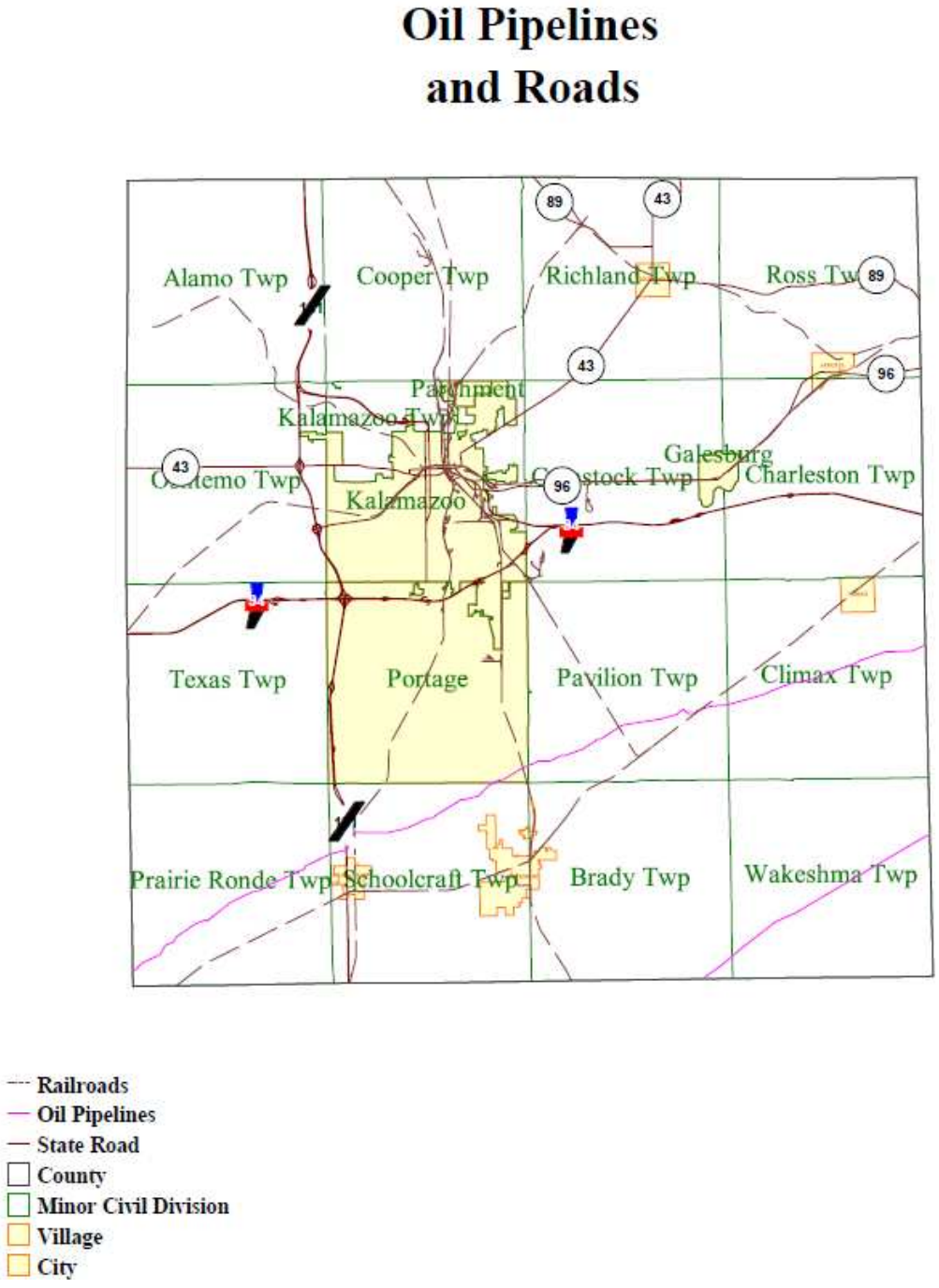
On June 21, 2010 a natural gas leak caused an explosion that destroyed a house in Oshtemo. No injuries were reported since nobody was home at the time.

On July 26, 2010, an oil spill was reported by Calhoun County officials. The spill was discovered by the owners of an oil pipeline, Enbridge Energy Partners L.P., during a maintenance activity at a pumping station along the pipeline located on the south edge of the City of Marshall. The 30-inch pipeline normally transported 190,000 barrels per day of light synthetic, heavy crude oil, and medium crude oil from Griffith, Indiana, to Sarnia, Ontario, and passes through Calhoun County and several other Michigan counties. Oil from the pipeline leaked into the Talmadge Creek and then into the Kalamazoo River and began to flow downstream toward Lake Michigan. Enbridge Energy officials shut down the pipeline pumps and closed valves located upstream and downstream from the leak site to stem the flow of additional oil and try to contain the spill. Based on company estimates, up to 19,500 barrels of crude oil had leaked from the pipeline (approximately 800,000 gallons).

Soon after the leak was discovered, Calhoun County declared a local "state of emergency" under the Michigan Emergency Management Act (1976 PA 390, as amended) and activated its Emergency Operations Center. Several downstream communities, including Kalamazoo County, also took emergency response actions in coordination with Calhoun County. The State Emergency Operations Center in Lansing was activated and a number of state departments and support organizations convened there to monitor the incident and coordinate state response activities with involved governmental agencies and company officials. Representatives of the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Transportation Safety Board, U.S. Department of Transportation and other federal agencies quickly convened at the incident site and began working with company, local and state officials (under a Unified Command structure) to develop and implement a spill containment, recovery and cleanup plan and protection strategy for the environment and affected local residents.

A coordination facility was established in the City of Marshall to serve as a unified command center for onsite operations. The center was staffed by representatives from involved federal, state, and local agencies, company officials, and contractors brought in for environmental restoration and product recovery. Environmental monitoring and sampling operations were instituted to address health concerns related to oil odors, benzene levels, and water contamination. In addition, responders were outfitted with appropriate protective gear to ensure worker safety and health. Aggressive product recovery efforts were instituted to expedite oil containment and environmental cleanup. Wildlife rescue and rehabilitation operations were also implemented to aid in protecting animals and aquatic life from harm, and saving wildlife that had been adversely impacted by the spill. Health advisories were issued to protect the public from harm, and some of the nearby residents were evacuated for a time until the air quality improved within the area. A number of contracted cleanup crews were brought in to perform clean-up and product recovery work. On September 27, the repaired oil pipeline was restarted by company officials, with the approval of the U.S. Department of Transportation. New oil again flowed through the pipeline, initially at a reduced pressure level but then at full capacity again. The unified command center remained operational for an extended period of time, due to the long-term nature of product recovery and environmental clean-up operations.

Map of major pipelines within Kalamazoo County:



Summary: An accident involving oil or gas leaks tends to happen at least a few times per decade. Resulting explosions and fires have damaged structures, threatened lives, and caused environmental impacts.

Nuclear Power Plant Accidents

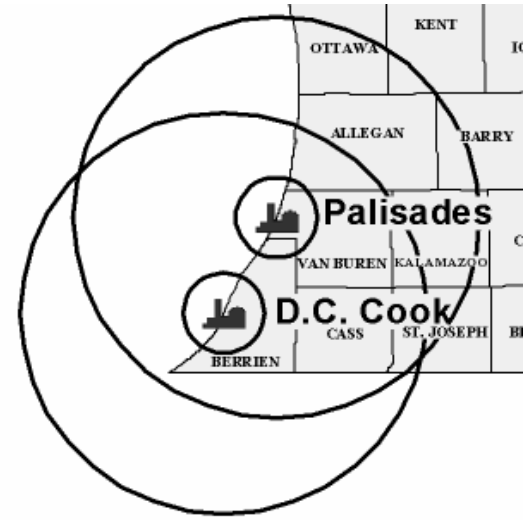
Hazard Description - An actual or potential release of radioactive material at a commercial nuclear power plant or other nuclear facility, in sufficient quantity to constitute a threat to the health and safety of the off-site population.

Though the construction and operation of nuclear power plants are closely monitored and regulated by the Nuclear Regulatory Commission (NRC), accidents at these plants are considered a possibility and appropriate on- site and off-site emergency planning is conducted. An accident could result in the release of potentially dangerous levels of radioactive materials into the environment that could affect the health and safety of the public living near the nuclear power plant. A nuclear power plant accident might involve both a release of air borne radioactive materials and radioactive contamination of the environment around the plant. The degree and area of environmental contamination could vary greatly depending on the type and amount of radioactivity and weather conditions. Response to a nuclear power plant accident requires specialized personnel who have been trained to handle radioactive materials safely, who have specialized equipment to detect and monitor radiation, and who are trained in personal radiation exposure control.

Since the Three Mile Island accident in 1979, federal, state and local governments have developed detailed radiological emergency response plans for each nuclear power plant based on NUREG 0654 and subsequent federal regulations and guidance. These plans are exercised on a biennial basis and are reviewed by the Federal Emergency Management Agency (FEMA) and the Nuclear Regulatory Commission.

More than 2/3 of Kalamazoo County is within the 50-mile radius of the Palisades nuclear power plant, and about 1/3 of Kalamazoo County is within 50 miles of D.C. Cook.

Mitigation of nuclear power plant hazards on the local County level is primarily limited to the detection of radiation, alerting the public, and providing directions for evacuation and/or housing – the latter three issues are addressed in other sections of this mitigation action item section of the mitigation plan.



Summary: Kalamazoo County is distant enough that only the most severe nuclear accident would be prone to cause any impact. Such a scale of event would be completely unprecedented and is not likely to occur. However, plans and exercises still take place to prepare for such a possibility.

Category 7: Infrastructure Failures

Energy Emergencies

Hazard Description - An actual or potential shortage of gasoline, electrical power, natural gas, fuel oil, or propane of sufficient magnitude and duration to potentially threaten public health and safety, and economic and social stabilization.

There are three types of energy emergencies: 1) The physical destruction to energy production or distribution facilities caused by severe storms, tornadoes, floods, earthquakes, or sabotage, 2) A sudden escalation in energy prices, usually resulting from a curtailment of oil supplies, and 3) A sudden surge in energy demand caused by a national security emergency involving mobilization of U.S. defense forces. This section will not focus on the second or third types, as they are unlikely to result in the need for emergency services of an instantaneous and urgent nature.

National Level Energy Emergency Events Affecting Kalamazoo County:
In October 1973 the Organization of Petroleum Exporting Countries (OPEC) – a Middle East oil cartel composed of most of the world's major oil producing countries – halted the flow of oil to the United States in retaliation for U.S. support of Israel in the 1973 Arab-Israeli War. From October 1973 to March 1974, OPEC maintained an embargo on oil imports to the United States and other Western nations that supported Israel, causing gasoline shortages and inflated oil prices. The embargo had a particularly negative effect on the U.S. economy and was one of the primary causative factors of the economic recession that plagued the country from 1973 to 1975. The OPEC embargo put the term "energy crisis" in the forefront of the news for months and forced the United States to seriously reevaluate its reliance on foreign oil imports and overall use of energy.

A natural gas shortage during the bitter winter of 1976-77 forced President Carter to proclaim a national energy emergency on February 2, 1977. President Carter did not mince words in his address to the nation on April 18, 1977 when he declared that combating the energy shortage was the "moral equivalent to war." Carter went on to urge the country to learn to prudently manage its shrinking energy supplies or be faced with potential future disaster. Carter proposed a plan that included strict conservation of fuel supplies, higher prices for oil and natural gas to reduce consumption, penalties for wasteful use of energy, and tax credits for the installation of solar energy devices. Carter also suggested that expansion of nuclear power should be the nation's last resort in seeking solutions to its energy problems. (Fortunately, Michigan was not as seriously affected by this emergency as many other states.)

The revolt in Iran against the rule of the Shah (dubbed the "Iranian Revolution") reduced world oil production and the OPEC nations announced a 14.5% increase in oil prices. By June 1979, OPEC again raised the average price of a barrel of oil by more than 50%, forcing the price of gasoline and fuel oil for American consumers to skyrocket, creating panic conditions in many parts of the country and causing a nationwide strike by independent truckers. The energy price increases resulted in long lines at gasoline stations, higher inflation, and signaled a reaffirmation of America's energy vulnerability. During this time, federal price and allocation controls moderated the price increases and caused oil companies to allocate supply. For a period of several months, customers were only able to purchase 70 to 80% of their historical amounts. Under the federal allocation program, states had the authority to direct up to 3% of the monthly gasoline supply to meet the needs of priority users such as police, fire and emergency medical services, in addition to other emergency hardship needs. The State of Michigan redirected over 100 million gallons of gasoline, heating oil, and diesel fuel. The peak of the supply shortfall occurred in May 1979. Longer lasting, and ultimately more serious, was its role in the "double dip" economic recession of 1980 and 1981-1982, in which many lost jobs and manufacturing output was seriously depressed.

In response to the situation, President Carter proposed a plan, which was delayed by Congress for almost a year, which included conservation of existing fuel supplies, a long-range decrease in foreign oil imports, and the development of new sources of energy. Carter further proposed the deregulation of domestic oil prices in order to stimulate domestic oil production. However, Carter's deregulation plan didn't work as planned and instead resulted in American oil companies significantly raising gasoline prices. The combination of the higher price levels set by OPEC and the American oil companies caused gasoline and fuel oil prices to nearly double. The start of war between Iran and Iraq in 1980 further boosted oil prices. By the end of 1980, the price of crude oil stood at 19 times what it had been just ten years earlier.

Going into the Winter of 2000 - 2001, propane supplies were very tight and inventories were low. In the Midwest, propane inventories in mid-October 2000 were 44% below levels of one year earlier. In December 2000, the state experienced record cold weather. Heating degree-days showed temperatures were 27 degrees colder than normal, the second coldest December on record and the snowiest on record. The propane industry found it increasingly difficult to maintain deliveries in light of the high levels of demand. In response to industry requests and in view of the heavy snows and very cold weather, the Chair of the Michigan Public Service Commission, in consultation with the Emergency Management and Homeland Security Division of the Michigan State Police, requested a 10-day waiver of limits on driver hour restrictions from the Regional Administrator of the Federal Motor Carrier Safety Administration. Waivers were granted for Michigan. The extremely tight supply coupled with additional demand to use propane as a substitute for natural gas (which also had a sharp run up in prices) caused residential propane prices to reach a record high in Michigan of $1.76 per gallon in January 2001 before declining to $1.00 per gallon by the end of the heating season. A significant warming trend in January allowed the industry time to replace seriously depleted supplies. Had this not occurred, the situation could have become much more serious.

During the winter of 2005-2006, Michigan saw record-high natural gas prices. 80% of Michigan homes rely on natural gas as the primary heating source, and Michigan's average monthly residential heating bill from November to March increased from $128 a month the previous winter to $180 during 2005 and 2006. The reason for the high prices was largely due to both the lingering effects of Hurricane Ivan in 2004 and 2005's Hurricanes Katrina and Rita. Substantial disruption of natural gas production in the Gulf of Mexico had reduced supply, driving up prices. There was further uncertainty on the prospect for even higher prices, depending on how long it might take to return natural gas production from the Gulf of Mexico to normal levels following Hurricanes Katrina and Rita. Fortunately, prices did go down, averaging $152 a month for the 2006-2007 winter, and the 2007-2008 winter.

Crude oil prices reached an all-time high in Michigan in July-September 2008. During 2003, the price rose above $30 a barrel in the peak summer months, and reached $60 a barrel by August 2005 nationally. The dramatic rise in oil prices began in March of 2007 with a steady increase that included little break during the 2007-2008 winter's traditional low point. March of 2008 started the very large increase in oil prices, starting at just over $80 a barrel, eclipsing $100 a barrel in May 2008, and finally peaking at $147 a barrel in July 2008. Following the July 2008 peak, oil prices then took a dramatic dive, and by November 2008 returned to just under $40 a barrel, the lowest level since March 2005. The increase in prices led to gasoline prices of over $4 a gallon during the summer of 2008. Commentators attributed these price increases to many factors, including reports from the United States Department of Energy, such as the decline in petroleum reserves, concern about high demand for oil, Middle East tension, and oil price speculation. An unusual number of fires and other outages among refineries in the summer of 2007 disrupted supplies. A reduction in routine refinery maintenance was made necessary by the need to operate near full capacity to make up for a loss in refinery capacity from the 2005 Atlantic hurricane season; and deferred maintenance on refineries that escaped hurricane damage led to an increase in fires and accidents in 2007. Hurricane Ike in 2008 played a role in the price spike. Also, rising demand from U.S. consumers stretched refinery capacity to the limit and made the system vulnerable to disruptions.

During the winter of 2008 and 2009, Michigan saw nearly record high natural gas prices similar to that of the 2005-2006 winter. State regulators attributed higher heating costs to the increased price of crude oil. Regulators said Michigan fared better than other states because Michigan stores some natural gas in underground tanks. The economic recession's higher unemployment rate, combined with higher heating costs, caused utility companies to shut off more power or natural gas because of unpaid bills. The number of gas shutoffs were up 39 percent in Michigan.

Summary: The County's vulnerability to energy emergencies is comparable in many ways to the vulnerability of the state and nation. Energy emergencies tend to occur a couple times per decade, with limited and temporary impacts so far.

Infrastructure Failures

Hazard Description - An actual or potential shortage of electrical power, gasoline, natural gas, fuel oil, or propane of sufficient magnitude and duration to potentially threaten public health and safety, and economic and social stabilization.

Electrical Distribution Systems:
Michigan has had numerous widespread and severe electrical power outages, caused mostly by severe weather such as windstorms or ice and sleet storms. (Note: Refer to those sections for more information on specific events.) Michigan has had several power outages in recent years that left upwards of 500,000 people (roughly 5% of the State's population) without power for several hours to several days at a time. Fortunately, most of those occurred in months where severe cold temperatures were not a problem. If they had occurred during the cold winter months, there certainly would have been a potential for loss of life – especially among the elderly and other more vulnerable members of society.

An adequate energy supply is critical to Kalamazoo's economic and social well being. Our economy and lifestyle are dependent on a non-interrupted, reliable, and relatively inexpensive supply of energy that includes gasoline to fuel our vehicles, and electricity, natural gas, fuel oil and propane to operate our homes, businesses and public buildings. Energy emergencies became a serious national issue in the 1970s when two major "energy crises" exposed America's increasing vulnerability to long term energy disruptions.

To date, we have always dealt with short term energy disruptions caused by severe weather damage (i.e., downed power lines and poles), broken natural gas and fuel pipelines, and shortages caused by the inability of the energy market to adequately respond to consumer demand and meet required production. However, the Oil Embargo of 1973-74, the natural gas shortage of 1976-77, and the 1979 major price increases in oil resulting from the Iranian Revolution rendered the County highly vulnerable to energy disruptions. That vulnerability was again exposed during the Gulf War in 1991 (after Iraq invaded Kuwait and destroyed many of its oil fields) and in the aftermath of the September 11, 2001 terrorist attacks in the U.S.

The power outage of August 14, 2003 started affecting Michigan at 4:09 p.m. when power surges affected southern Ohio, west to Indiana, north to western Michigan, east to the Detroit area, and south to northern Ohio.

By 4:15 p.m., the power outage was essentially complete, with 2.3 million customers of Consumers Energy, Lansing BWL, and Detroit Edison without power. The area affected in Michigan was all of the Detroit Edison service territory, Consumers Energy customers located near the Detroit Edison service

territory, and the cities of Lansing and East Lansing and other areas served by the Lansing BWL.

At 10:00 p.m., Consumers Energy reported that 118,400 customers were without power.

Kalamazoo was minimally affected, with Bronson Hospital, the Dean Boiler Company, Geniac Electric and Western Michigan University reporting losses.

The briefness of the power disruption that Kalamazoo County experienced masked the severity of the effects that would have quickly escalated within hours or even minutes, should the loss of electrical services have continued.

The situation with the most immediate and dramatic effects upon Kalamazoo is the loss of power to the wastewater treatment plant.

There is one Kalamazoo County sewer system serving two hundred thousand customers located in eighteen different Villages, Townships, or Municipalities. Approximately thirty thousand of the customers served are commercial, with the remaining comprised of residential. All county sewers flow to one central processing facility in Kalamazoo City. The water reclamation plant receives about twenty eight million gallons of raw sewage per day via over eight hundred miles of sewer mains and fifty-one remote lift stations.

The wastewater processing system is vulnerable to loss of electrical power because it lacks the capability to elevate that sewage once it arrives on the plant site. When it is not able to elevate the raw sewage from the receiving tanks, it is also unable to divert raw sewage should such a need be necessary in order to avoid sewage back up along the routes to the plant.

In preparation for the possibility of power interruption at the millennium change, electrical power feed was increased to two segregated power feeds into the plant (North and South). Despite having two feeds, the unprecedented loss of power on the regional power grid during the August 14, 2003 caused a loss of power to both of the power feeds – which are on the same regional power grid.

The power outage was only minutes long – and the system was within 30 minutes of causing backup of raw sewage to basements of served customers.

Within eight hours of a loss of power at the plant lift stations the following scenarios are forecast:

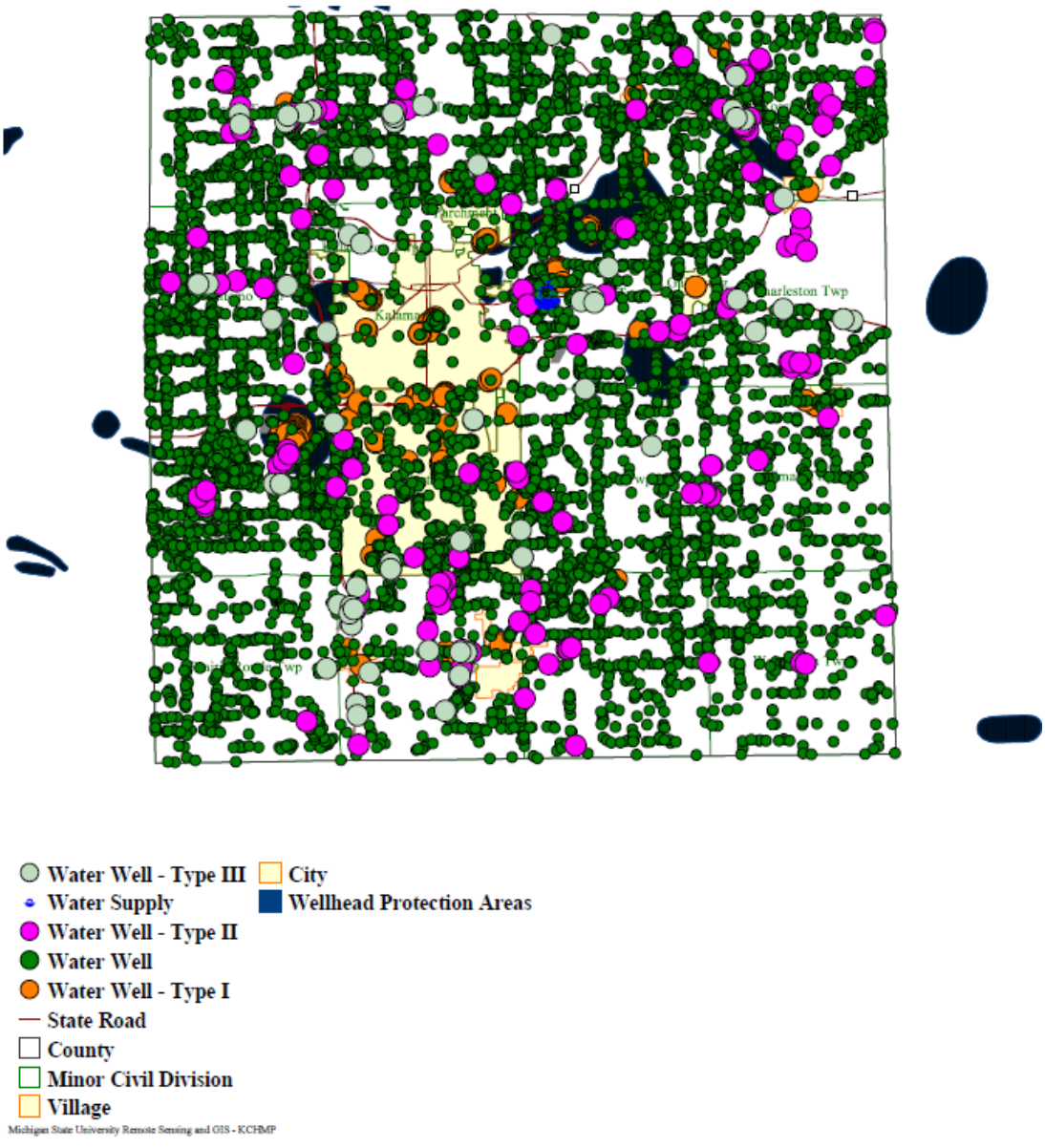
1) By eight hours, approximately seventeen thousand homes would experience raw sewage backup. With simple cleanup costs at a conservative average of two thousand dollars (excluding replacement of contents) the cost would quickly exceed thirty four million dollars.
2) After twenty hours of power outage, one quarter of the residential customers would experience damage. This would easily reach eighty five million dollars for simple dry and disinfect.

Recent Infrastructure Events Kalamazoo County:
On February 23, 2011 a water main leak sent an estimated one million gallons of water flowing into a residential area on the west side of Kalamazoo causing damage to homes and prompting police to close parts of West Main Street for about four hours. An estimated 40 homes had flooding damage to varying degrees.

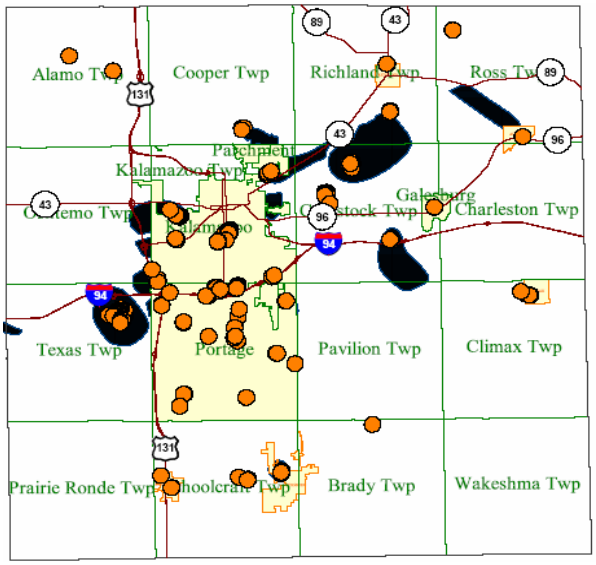
Kalamazoo has the largest groundwater pumping area of any community east of the Mississippi -- with

13 pumping centers for freshwater - serving 150,000 customers. There are four types of water wells, identified as Type I (Municipal, serving 25 or more people 24 hours per day for 60 or more days), Type II (serve 25 or more people for 60 days -- example: Township Halls), Type III (duplex or small businesses with less than 25 employees, and Type IV (private individual water wells).

Water Supply



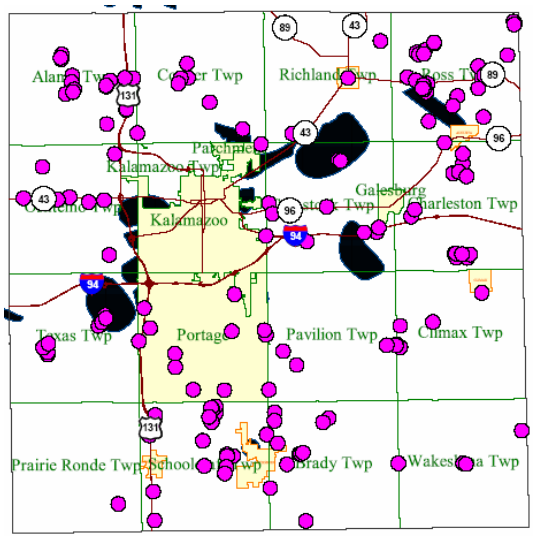
There are 399 wells of Types I (show as orange circles in the map at right) and II in the County -- and each must be tested regularly. Including the Kalamazoo well fields, there are 17 Type I water suppliers. Mobile home parks in the rural areas have their own type I water supply systems and wells. The DEQ, located on D. Avenue, regulates public water; and the Kalamazoo County Human Services Department -- Environmental Health & Laboratory Services conducts water well sampling and tracking on a regular basis -- and meets with the operators of municipal water systems on a three- month basis.



Of concern is the ability of water well suppliers Type I, II (shown as purple circles in the map below), and III to supply water in the event of a failure of their existing water system -- for example, hospitals and other key facilities should have a contingency plan for ensuring the continuation of water service in the event of loss of water or sewage.

Regulatory Requirements: Water systems serving populations between 50,000 and 100,000 persons are required to complete an Emergency Response Plan (ERP) by June 30, 2004. The vulnerability assessment process requires systems to identify critical assets and single points of failure, and then analyzed threats.

Developing and implementing an ERP that meets the requirements of section 1433 (b) of the public health and security bioterrorism preparedness and response act of 2002 requires significant organizational resources, including leadership investment in plan development upkeep and exercise. This act requires each community water system to certify completion of a plan that incorporates the results of the VA and includes: 1) Plans, procedures, and identification of equipment that can be implemented or utilized in the event of a terrorist or other intentional attack; and 2) Actions, procedures, and identification of equipment that can obviate or significantly lessen the impact of terrorist attacks or other intentional actions on the public and the safety of drinking water provided to communities and individuals.



Another tangential concern is whether the 800 licensed food service agencies in Kalamazoo County can continue operations in case of the interruption of their primary source of water.

Even the most robust facilities and procedures fall short if and when simple things like a lack of washroom facilities rendering the facility unsafe or uninhabitable.

Summary: Several times per decade, the County suffers from widespread power failures—often due to severe weather events, but sometimes due to utility overloads. During large events, power failures may leave thousands of residents vulnerable to extreme temperatures and medically urgent situations.

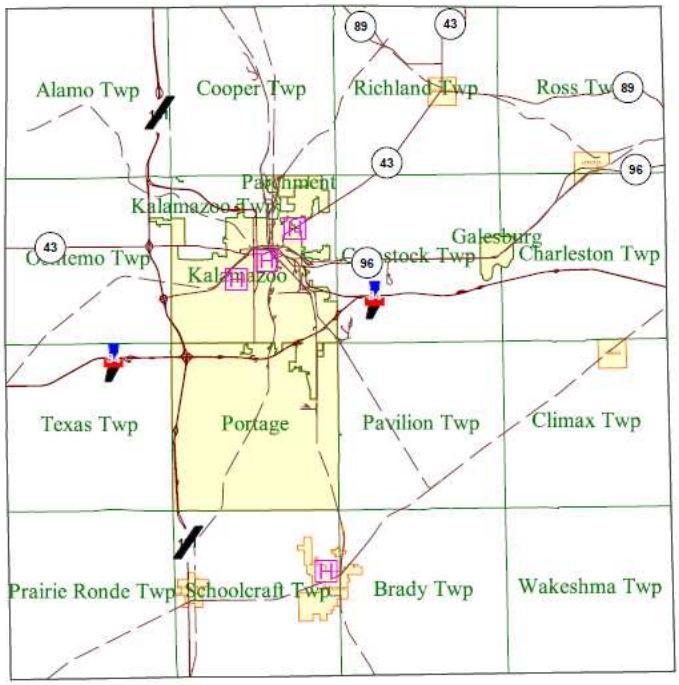
Category 8: Public Health Emergencies

Public Health Emergencies

Hazard Description - A widespread and/or severe epidemic, incident of contamination, or other situation that presents a danger to or otherwise negatively impacts the general health and well being of the public.

Public health emergencies can take many forms – disease epidemics, large-scale incidents of food or water contamination, extended periods without adequate water and sewer services, harmful exposure to chemical, radiological or biological agents, and large-scale infestations of disease-carrying insects or rodents – to name just a few. Public health emergencies can occur as primary events by themselves, or they may be secondary events to another disaster or emergency such as a flood, tornado or hazardous material incident. The common characteristic of most public health emergencies is that they adversely impact, or have the potential to adversely impact, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude.

Hospitals



- Hospitals
- Railroads
- State Road
- County
- Minor Civil Division
- Village
- City

One of Michigan's most serious emergencies to hit Michigan -- and Kalamazoo County -- occurred in 1973 when a local farmer fed PBB laced feed to his dairy herd. Michigan Chemical Corporation had accidentally supplied the Michigan Farm Bureau Services with sacks of fire-proofing chemical PBB, which is known to cause cancer, genetic mutation, and birth defects -- and the PBB was inadvertently substituted for magnesium oxide (commonly used in antacid tablets used for human consumption) in a custom dairy feed # 402. During the crucial eight-month period between the farmer's first observations and the discovery of the accident, serious contamination had already occurred.

The world's worst influenza pandemic – the "Spanish flu" of 1918-19 – resulted in 500,000-675,000 deaths in the United States and 20 to 40 million worldwide. More than 25 million Americans – nearly one quarter of the population at the time – fell ill. Scientists speculate that the virus that caused that pandemic may have percolated for several years within humans, or possibly pigs, until it grew strong enough to kill millions worldwide. The virus spread rapidly – moving around the world in a matter of a few months – in a time period in which there was much less movement of people than there is today. The virus reached Michigan in the fall of 1918. Over 8,000 of the 2.8 million state residents fell ill and half of those eventually succumbed to the disease. In retrospect, the spread of the illness was felt to be exacerbated by behavior of important officials who had misguided concerns that the effects of "panic" might be more harmful than the disease itself—a notion that proved disastrous. The pandemic had an unusual aspect, however, in that many of those who died were persons who had been young and healthy, whereas the normal pattern for influenza deaths is to take a higher toll among those who are elderly or have compromised immune systems.

By 1975 the state had quarantined more than 500 farms. Condemned for slaughter were more than 17,000 cattle; 3,415 hogs; 1.5 million chickens and 4.8 million eggs.

In the 1980s, the state health department confirmed that 95 percent of Michigan's population had PBB in their bodies from eating beef, drinking milk or consuming other products from contaminated farms. A cancer epidemic was feared. Although one has not occurred -- so far, anyway -- studies do show the most exposed families have increased breast and digestive cancer, and lymphoma. Among the effects observed in the exposed populations the daughters of the most highly exposed women began menstruation, on average, before they reached their twelfth birthdays.

The December, 2003 reports that Bovine spongiform encephalopathy, or BSE, or "Mad Cow Disease" was reported to have struck the United States. BSE is linked to a similar form of the incurable and fatal brain-wasting disease in humans, called variant Creutzfeldt-Jakob Disease, or VCJD. There have been a small number of cases of VCJD reported worldwide, primarily in the United Kingdom, in people who ate BSE-contaminated meat.

Within hours of the announcement, an official with Japan's agriculture ministry told CNN that his country would ban imports of U.S. beef. South Korea, Taiwan, Malaysia and Singapore, Mexico and others followed suit within hours of the announcement. News of an outbreak in Kalamazoo County would likely cause fear and panic and affect dairy farmers and milk producers serving the County. News of an outbreak in Kalamazoo County would likely cause fear and panic and hours of the announcement

SARS:
At least 144 adult patients were admitted to 10 academic and community hospitals in the greater Toronto, Ontario, area between March 7 and April 10, 2003. 1,700 students and staff at Father Michael McGivney Catholic Academy in Markham, a northern suburb of Toronto, were quarantined, where a student showed symptoms of SARS while going to classes for three days last week. Health officials closed the school until June 3. The majority of cases in the SARS outbreak in the greater Toronto area were related

to hospital exposure.

The December, 2003 reports that in 2001, Michigan health officials were introduced to the emerging health threats posed by foot-and-mouth disease and the West Nile encephalitis virus. Although foot-and-mouth disease is a highly contagious disease that only affects animals, a widespread outbreak such as occurred in parts of the United Kingdom in the spring of 2001 could have significant public health implications for humans as well due to the potentially large numbers of dead animal carcasses that would have to be disposed of to prevent disease outbreaks.

The West Nile encephalitis virus, which arrived in Michigan in August 2001, presents an equally challenging scenario for public health officials. Transmitted to humans by the bite of an infected mosquito, the West Nile virus is commonly found in Africa, West and Central Asia, and the Middle East. Health officials do not know how the virus was introduced to the United States. However, in 1999 and 2000, it caused an outbreak of human encephalitis in and around New York City that created a national stir and raised fears across the country that it would cause a full-blown public health emergency. Fortunately that has not occurred, although the New York City outbreak did cause 62 persons to fall ill and resulted in 7 deaths. Real or perceived outbreaks of communicable diseases in or around the Kalamazoo area would adversely affect trade, tourism, travel (e.g.: College/University students), and health.

Summary: Enough potential threats exist that some type of public health emergency tends to affect the county every couple of years (although some threats, such as influenza, occur annually) throughout the whole area. Medical impacts upon the county's population are usually significant, but in a serious pandemic event, could become catastrophic.

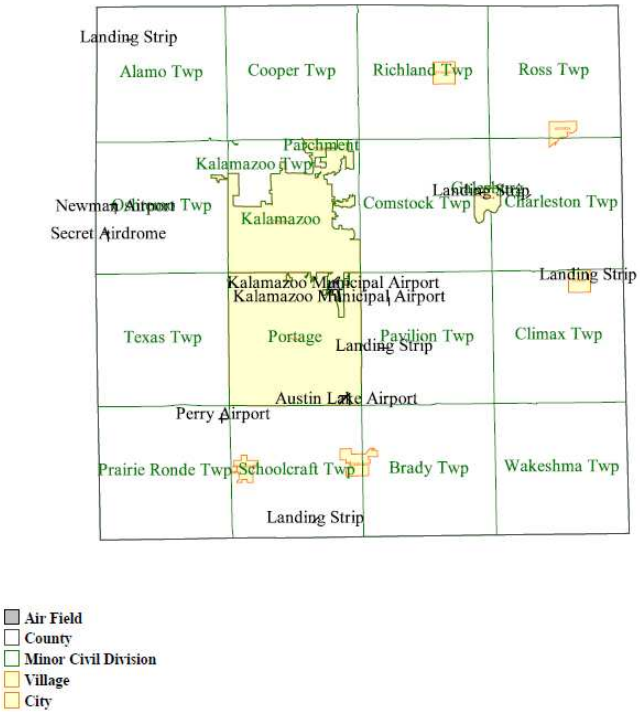
Category 9: Transportation Accidents

Transportation Accidents

Hazard Description - A crash or accident involving an air, land or water-based commercial passenger carrier.

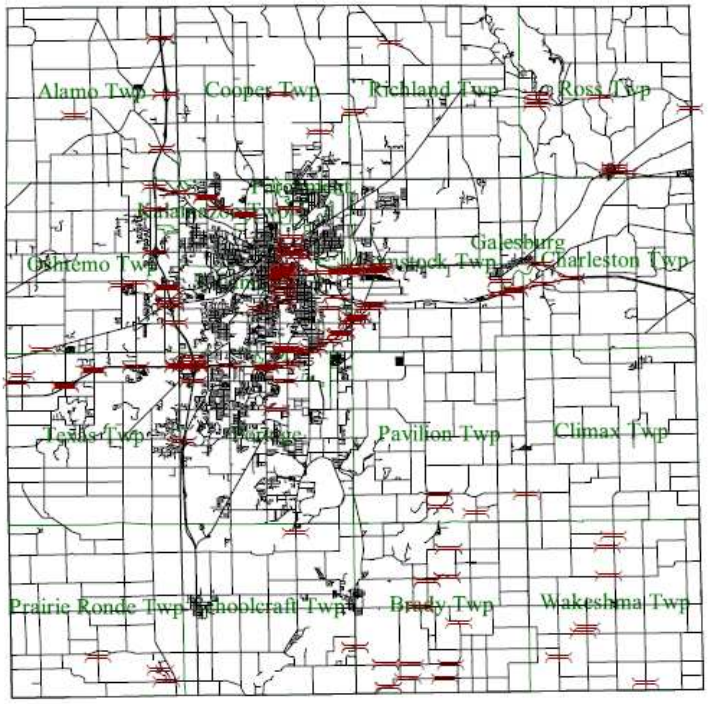
There are four circumstances that can result in an air transportation accident: 1) an airliner colliding with another aircraft in the air; 2) an airliner crashing while in the cruise phase of a flight due to mechanical problems, sabotage, or other cause; 3) an airliner crashing while in the takeoff or landing phases of a flight; or 4) two or more airliners colliding with one another on the ground during staging or taxi operations. When responding to any of these types of air transportation accidents, emergency personnel may be confronted with a number of problems, including: 1) suppressing fires; 2) rescuing and providing emergency first aid for survivors; 3) establishing mortuary facilities for victims; 4) detecting the presence of explosive or radioactive materials; and 5) providing crash site security, crowd and traffic control, and protection of evidence.

Public and private airports and landing strips are provided in the image below.



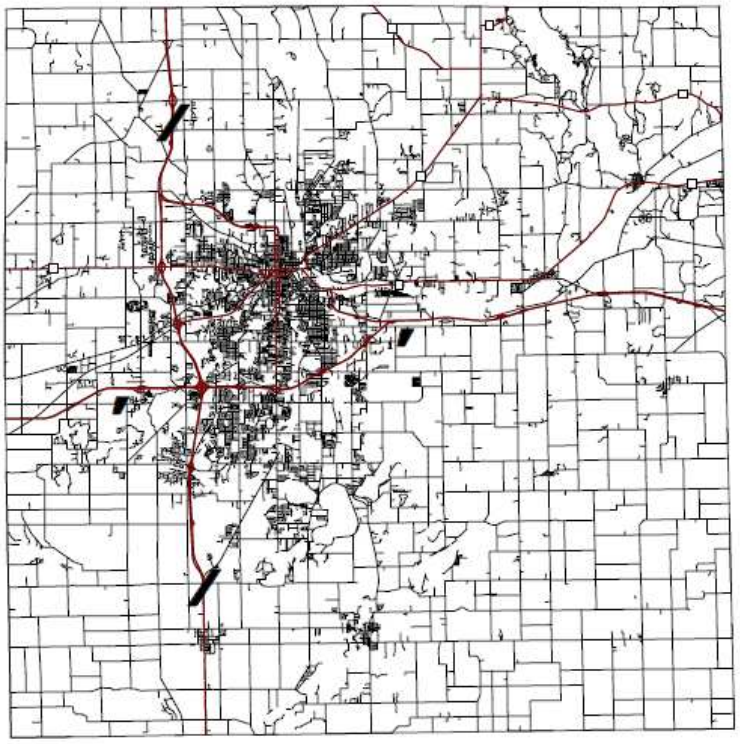
A land transportation accident in Michigan could involve a commercial intercity passenger bus, a local public transit bus, a school bus or an intercity passenger train. Although these modes of land transportation have a good safety record, accidents do occur. Typically, bus accidents are caused by the bus slipping off a roadway in inclement weather, or colliding with another vehicle. Intercity passenger train accidents usually involve a collision with a vehicle attempting to cross the railroad tracks before the train arrives at the crossing. Unless the train accident results in a major derailment, serious injuries are usually kept to a minimum. Bus accidents, on the other hand, can be quite serious – especially if the bus has tipped over. Numerous injuries are a very real possibility in those types of situations.

Major and Minor Bridges



- Bridges
- MDOT Road
- County
- Minor Civil Division

County and State Roads



State Road
Road
County

Past Events:

On March 10, 1993 an Amtrak passenger train with 45 passengers on board collided with a liquid propane tanker truck in Comstock Township, Kalamazoo County, killing the driver of the truck and injuring the train engineer. The truck was exiting a private drive when it slid into the path of the train, which was traveling eastbound at approximately 62 miles per hour. On impact, the liquid propane tank exploded with a large fireball. The train engine received considerable damage in the impact and explosion. The windows were blown out, causing the train engineer to receive second degree burns from the fireball. One passenger was transported to a nearby hospital for treatment of injuries received in the accident. The private crossing at which this accident occurred, as well as 11 other private crossings and a public highway-railroad at-grade crossing in this area, were all eliminated in 1996.

Summary: Transportation accidents that constitute a community-level emergency are fairly rare, estimated to occur about every couple of decades, usually with the loss of multiple lives.

Mitigation Action Items

Category 1

Action Items Completed					Work in Progress		Ongoing	
1a1	1a2	1a3	1a4	1a5	1a6	1b2	1c3	1c4
1a7	1b1	1b4	1b5	1b6	1b3	1b9		
1b7	1b8	1b10	1b11	1b13	1b12	1b15		
1b14	1b17	1b19	1c2	1c5	1b16	1b18		
1c6					1b20	1b21		
					1c1			

Civil Disturbances

Goal: Reduce the effects of Civil Disturbances on People and Property.

1(a)1: Action Item Description:
Ensure that Law Enforcement Training is Current.

- Deliverables: Conduct Review of Training Records and Schedule Proper Remedial Training.
- Lead Manager Assigned: Community Police Chief; Sheriff; Jail Administrator; Fire Chief
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: Department Procedures Manual
- Potential Sources of Financial Assistance: None Necessary
- Priority: Medium LR/HF
- 2012 Status Update: Completed - Reviewed records.

1(a)2: Action Item Description:
Investigate the use of video recording equipment at incident scenes to aid in identification and follow-up.

- Deliverables: Conduct a study and make recommendations regarding the practicality of using and/or improving the use of video recording equipment at incident scenes.
- Lead Manager Assigned: Police Chiefs and Sheriff
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: Police or Fire Chiefs Associations; Video Equipment Vendors
- Potential Sources of Financial Assistance: DHS; Local Grant
- Priority: Medium LR/HF
- 2012 Status Update: Completed - This is currently in place.

1(a)3: Action Item Description:
Promote participation in the Michigan Citizen Corps Council (MCCC) for the purpose of providing informed observers and links to law enforcement.

- Deliverables: Develop and Initiate a plan to coordinate the cooperative efforts of the MCCC and the KCDC.

- Lead Manager Assigned: Chairman - Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: MCCC, USA Freedom Corps
- Potential Sources of Financial Assistance: Homeland Security Grant
- Priority: Medium LR/HF
- 2012 Status Update: Completed - We have done this at the regional level for all Regional partners.

1(a)4: Action Item Description:

Enhance mutual aid resources through MEMAC.

- Deliverables: Evaluate and make recommendations for the effective use of and participation in the MI.
- Emergency Management Assistance Compact.
- Lead Manager Assigned: Kalamazoo County Emergency Coordinator; Department Police Chiefs
- Schedule
- Potential Sources of Technical Assistance: N/A
- Potential Sources of Financial Assistance: N/A
- Priority: High HRDT/LF
- 2012 Status Update: Kalamazoo County has 23 of the 24 governments signed onto MEMAC. One doesn't wish to.

1(a)5: Action Item Description:

Encourage Structure/Property Insurance in Risky Areas.

- Deliverable: Public Awareness message to property owners and renters in areas with a history of trouble. Establish a repository of reports of risky events -- to establish a method to promote analysis (times of day, season, event, etc) to identify patterns of vulnerability. 2) Centralize reporting and database of events, personnel and patterns.
- Lead Manager Assigned: Public Information Officer - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: KCDC; EMPG; Office of Homeland Security; Insurance Industry
- Potential Sources of Financial Assistance: FEMA; Office of Homeland Security
- Priority: Medium HTDT/HF
- 2012 Status Update: Completed - OEM currently monitors all activities and their vulnerabilities. Major events normally have an incident action plan.

1(a)6: Action Item Description:

Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: Establish a consortium of public citizenry (MCCC, KCDC, etc) to obtain, review, and report best practices relating to emergency plans, mitigation activities, and success stories.
- Lead Manager Assigned: Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security; Insurance Industry

- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further details at this time.

1(a)7: Action Item Description:

Review and Establish Design requirements for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, etc. that take into consideration emergency and security needs.

- Deliverables: Establishment of Best Practices for Building Emergency and Security Needs.
- Lead Manager Assigned: Kalamazoo County Emergency Coordinator
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: WMU; KCDC; Building Inspectors; Planning Departments; Industry
- Potential Sources of Financial Assistance: FEMA; Office of Homeland Security; Kellogg Foundation
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – We have done this when requested by creating an All Hazard Plan.

1(a)8: Action Item Description:

Enhance awareness and participation in civil disturbance emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High LR/HF
- 2012 Status Update: Open – Work in Progress – No further details at this time.

Sabotage/Terrorism/Weapons of Mass Destruction (WMD)

Goal: Reduce the risks associated with Sabotage/Terrorism/Weapons of Mass Destruction (WMD)

1(b)1: Action Item Description:

Promote Awareness and Participation in the Programs of the U.S. Office of Homeland Security

- Deliverables: Public Information Articles, News Items, Pamphlets and Presentations.
- Lead Manager Assigned: Public Information Officer - KCDC; MSU Extension Office
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: Office of Homeland Security; MSU Extension Office; KCDC
- Potential Sources of Financial Assistance: Office of Homeland Security; Kellogg Foundation

- Priority: Medium LR/HF
- 2012 Status Update: Completed – This is done on a regular basis.

1(b)2: Action Item Description:

Investigate Best Practices for Protecting Critical Infrastructures

- Deliverables: Analysis and recommendations for protecting Critical Infrastructures within Kalamazoo County
- Lead Manager Assigned: TBD Subcommittee within the KCDC
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: Michigan Quality Council; KCDC; WMU; CIAO; NIPC
- Potential Sources of Financial Assistance: Kalamazoo County Governments
- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further details at this time.

1(b)3: Action Item Description:

Establish and Maintain a Weapons of Mass Destruction Subcommittee within the KCDC for the purpose of ongoing analysis and strategic planning.

- Deliverables: Regularly Scheduled Analysis and Recommendations for of ongoing WMD related activity
- Lead Manager Assigned: EMS Medical Director, KCMCA (KCDC)
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; MSP; MIARNG
- Potential Sources of Financial Assistance: Kalamazoo County Governments
- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further details at this time.

1(b)4: Action Item Description:

Investigate the MMRS and make recommendations to KCDC

- Deliverables: Analysis and recommendations for or against participating in a similar program
- Lead Manager Assigned: Ops Mgr., Life EMS
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: WMMMRS - GRR
- Potential Sources of Financial Assistance: Kalamazoo County Governments
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – The Kalamazoo Center for Medical Studies monitors this program.

Goal: Reduce the effects of Terrorism on the Residents, Visitors, and Businesses within Michigan Terrorism Task Force.

1(b)5: Action Item Description:

Include the 51st WMD/Civil Support Team in Annual Disaster Training Exercises

- Deliverables: Active participation in the annual KALEX Training Exercise by the 51st
- Lead Manager Assigned: Deputy Director, 911 & Emergency Management, KCSD
- Schedule to Initiate Action: Ongoing - Participated in KALEX 2002/2003
- Potential Sources of Technical Assistance: 51st WMD/Civil Support Team - Battle Creek; KCDC

Potential Sources of Financial Assistance: N/A

- Priority: High HRDT/LF
- 2012 Status Update: Completed – This group is notified annually of our County-wide full-scale exercise.

1(b)6: Action Item Description:

Provide the benefits and security of the Strategic National Stockpile (SNS) Plan to residents and visitors of Kalamazoo County.

- Deliverables: Integrate the SNS Plan into local Emergency Action Guidelines (e.g.: Health, Public Safety, Red
- Cross, etc.). Demonstrate readiness and participation in KCDC
- Lead Manager Assigned: Region 5 Strategic National Stockpile Planner, MPH
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Michigan Department of Community Health – Office of Public Health
- Preparedness (Lansing); CDC; Region 5 planning team; KCDC
- Potential Sources of Financial Assistance: U.S. Department of Health and Human Services (HHS)
- Priority: High HRDT/LF
- **2012 Status Update:** Completed – The SNS is a resource for the local Emergency Action Guidelines.

1(b)7: Action Item Description:

Develop/Update Emergency Response Procedures at all Public Schools within Kalamazoo Co.

- Deliverables: Emergency Response Action
- Plan Lead Manager Assigned: School
- Principals Schedule to Initiate Action: 2Q04
- Potential Sources of Technical Assistance: KCDC; Sheriff; Local Police/Fire
- Potential Sources of Financial Assistance: Federal Grant
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – All schools in Kalamazoo Co. have their own ERAP and OEM monitors the changes annually.

1(b)8: Action Item Description:

Ensure Awareness/Encourage Participation in the activities of the Office of Safe Schools.

- Deliverables: Develop and Implement Best Practices for Maintaining Safe Schools.
- Lead Manager Assigned: School Boards and Private School Principals; Public Awareness by PIO - KCDC/MSU Extension Office
- Schedule to Initiate Action: 4Q04
- Potential Sources of Technical Assistance: KCDC; Michigan Quality Council; Local/County Police/Sheriff
- Potential Sources of Financial Assistance:
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Kalamazoo County follows the state and national recommendations.

1(b)9: Action Item Description:

Development of a thorough community risk and threat assessment that identifies potential

vulnerabilities and targets for a sabotage/terrorism/WMD attack.

- Deliverables: Provide comprehensive identification, documentation, recommendation, of risks/vulnerability for the purpose of identification of options. 1) Annual update of Risk Assessment (OEM KCDC) committee within KCDC 2) Provide review and analysis of vulnerable facilities -- ranking priority, vulnerability, visibility, etc. Continue to participate in annual MSP review.
- Lead Manager Assigned: Kalamazoo County EC
- Schedule to Initiate Action: 4Q04
- Potential Sources of Technical Assistance: KCDC
- Potential Sources of Financial Assistance:
- N/A Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further details at this time.

1(b)10: Action Item Description:

Maintain awareness, and monitoring of organizations and activities that may threaten the community.

- Deliverables: Circulate the daily MSP bulletins via OEM.
- Lead Manager Assigned: Kalamazoo County EC
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: MSP
- Potential Sources of Financial Assistance: N/A
- Priority: High HRDT/HF
- 2012 Status Update: Completed – These are viewed daily by our Regional Intel Planner located in Kalamazoo and St. Joseph Counties' Emergency Management Offices.

1(b)11: Action Item Description:

Investigate and Implement school safety and violence prevention programs.

- Deliverables: Develop best practice recommendation for school safety and violence prevention programs.
- Lead Manager Assigned: Kalamazoo County EC
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: MSP; KCDC
- Potential Sources of Financial Assistance: PTA; Local Police/Sheriff departments
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Kalamazoo County follows the state and national recommendations.

1(b)12: Action Item Description:

Generate greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings.

- Deliverables: Recommendation for how to raise awareness, e.g.: Public Information Release; Media coverage; develop or utilize existing programs for public awareness and building
- Lead Manager Assigned: PIO - MSU Extension
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: MSU extension in cooperation with hospitals, doctors (part of KCDC)
- Potential Sources of Financial Assistance: N/A

- Priority: High HR/HF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(b)13: Action Item Description:

Terrorist/sabotage/WMD planning & preparedness training for First Responders.

- Deliverables: Investigation and recommendation of best practices; e.g.: CERT Program.
- Lead Manager Assigned: Chairman, WMD/NBC Subcommittee - KCDC
- Schedule to Initiate Action: Ongoing - part of KCDC
- Potential Sources of Technical Assistance: KCDC; MSP; Office of Homeland Security; Medical
- Potential Sources of Financial Assistance: FEMA Grant; Office of Homeland Security
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – We have no local CERT program. This does not apply.

1(b)14: Action Item Description:

Develop and test internal emergency plans and procedures by businesses and organizations.

- Deliverables: Investigation and Recommendation of best practices for the development and testing of emergency plans
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: MSU extension in cooperation with hospitals, doctors; MSP; Office of Homeland Security
- Potential Sources of Financial Assistance: FEMA
- Priority: Medium LR/HF
- 2012 Status Update: Completed – Our annual county-wide full-scale exercise does this.

1(b)15: Action Item Description:

Promote Awareness for Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: Develop and distribute awareness pamphlets at County Fair; Invitation to businesses to participate in the annual KALEX training exercise.
- Lead Manager Assigned: PIO - MSU Extension Office
- Schedule to Initiate Action: County Fair - 2003
- Potential Sources of Technical Assistance: KCDC; MSP
- Potential Sources of Financial Assistance: N/A
- Priority: Medium HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(b)16: Action Item Description:

Establishing avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.

- Deliverables: Recommendation for promotion and/or implementation of anonymous reporting system (may include www discussion group, email, and mail or telephone process.
- Lead Manager Assigned: Kalamazoo County Emergency Management Director
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: KCDC; MSU Extension; Office of Homeland Security

- Potential Sources of Financial Assistance: MSU Extension; Local Governments
- Priority: Medium HR/HF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(b)17: Action Item Description:

Routine dissemination of recommendations for computer data back-up systems and virus awareness.

- Deliverables: Monthly update of virus activity to KCDC members; as-needed email broadcast (Disaster Committee Email) of recommendations for mitigation; recommendation for dissemination to the general public; Establish a medium for discussion and dissemination.
- Lead Manager: KCDC - WMU Computer Department
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: WMU
- Potential Sources of Financial Assistance: N/A
- Priority: Medium HR/HF
- 2012 Status Update: Completed – This is discussed monthly at the KCDC meeting.

1(b)18: Action Item Description:

Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

- Deliverables: Help disseminate the Homeland Security messages for it. Establish a presence for it on the County Web. Establish discussion group -- with process to monitor and evaluate by some member of the KCDC for encouraging discussion and obtaining information.
- Lead Manager: PIO - KCDC (MSU Extension)
- Scheduled to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: Office of Homeland Security
- Potential Sources of Financial Assistance: Office of Homeland Security; FEMA
- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(b)19: Action Item Description:

Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, etc. that would get in the way or be left over following an attack or incident. The area may simultaneously need to be treated as a crime scene, site of urban search and rescue, area of hazardous materials, and/or a public health threat.)

- Deliverables: 1) Development of best practice recommendations for rapid deployment of heavy equipment for clearing roads etc. for quick mobility of public. 2) Establish cooperative effort with business/fire department/public service.
- Lead Manager: TBD Subcommittee within KCDC Scheduled to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: EMPG; County
- Priority: Medium HRNDT/LF
- 2012 Status Update: Completed – This is part of our County Resource manual and activity.

1(b)20: Action Item Description:

Maintain a Board of Public Works

- Deliverables: 1) Provide regular infrastructure review 2) Recommend development

opportunities 3) Provide representation in the KCDC planning, training, and evaluation activities.

- Lead Manager: Assistant Administrator for Economic and Community Development
- Scheduled to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: County
- Priority: High HRDT/HF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(b)21: Action Item Description:

Enhance Awareness and Participation in Sabotage/Terrorism/WMD Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

Nuclear Attack

Goal: Improve the preparedness for a major evacuation.

1(c)1: Action Item Description:

Community awareness of designated fallout shelters and attack warning systems.

- Deliverables: 1) Conduct a survey of, and rating for potential effectiveness, for existing and obsolete shelters for the purpose of enabling rapid refurbishment in case of threat or emergency. 2) Publish/Distribute a list of facilities to the 24 units of governments' emergency responders (via the KCDC).
- Lead Manager Assigned: Red Cross ESS Director
- Scheduled to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: KCDC; FEMA; Red Cross
- Potential Sources of Financial Assistance: County
- Priority: Medium HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

1(c)2: Action Item Description:

Develop and promote workable population protection plans (evacuation and in-place sheltering plans, as appropriate).

- Deliverables: Investigate and Recommend a process to develop or enhance and publicize advance plans and criteria for rapid evacuation of sections of each community -- for example: 1)

a formula (e.g.: marking on road signs) for designated streets to become one-way for the purpose of rapid traffic movement. 2) Publicize (WMU Extension, KCDC) the formula, criteria, and method. 3) Develop team to assemble a database of facilities and locations that would be utilized as destinations for people in case of evacuation. 3) Establish/enhance the method of communication (e.g.: Red Cross) from/to people outside of the community in the event that evacuation is required.

- Lead Manager Assigned: TBD Subcommittee within the KCDC Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: Red Cross; KC Road Commission; MSP; FEMA; Office of Homeland Security.
- Potential Sources of Financial Assistance: EMPG; County; Local Governmental Units
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – This is solely handled by our local Chapter of the Red Cross.

1(c)3: Action Item Description:

Make available safe rooms (or shelters) in houses, manufactured home communities, community facilities and business districts.

- Deliverables: 1) Conduct a survey and create a database of existing shelters in, at, near, or available to vulnerable areas/communities. 2) Develop a method for identification and dissemination of best practices for such shelters. 3) Develop a process (KCDC) for update and sharing of such information to potentially affected communities, residents and a method for dissemination of such information to visitors. 4) Develop and/or enhance a method for using low-power AM radio broadcasts (e.g.: using the assigned frequencies now used by realtors, road awareness broadcasts, etc.) for the purpose of localized information. 5) Coordinate the testing and public awareness to coincide with the weekly testing of the weather/fire emergency siren broadcasts. 6) Coordinate the dissemination of information (develop a plan) to residents (MSU Extension, etc).
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Schedule to Initiate Action: 2Q05
- Potential Sources of Technical Assistance: FEMA; KCDC; Office of Homeland Security; County Planning Department and Building Inspectors.
- Potential Sources of Financial Assistance: FEMA; County; Local Governments.
- Priority: High HRNDT/LF
- 2012 Status Update: Ongoing – This is part of our ongoing preparedness campaign to educate the public. We do this through presentations and handout materials.

1(c)4: Action Item Description:

Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: 1) Public awareness campaign to promote a day of testing in-place procedures by home, business, school, etc. -- perhaps coincident with the annual KALEX training exercise. 2) Raise awareness for facilities/homes that do not have a working emergency plan.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: MSU Extension; KALEX Planning Committee
- Potential Sources of Financial Assistance: FEMA

- Priority: Medium HRNDT/LF
- 2012 Status Update: Ongoing – This has been discussed, but at this time has not covered communities. There isn't a measurable way to complete this type of action.

1(c)5: Action Item Description:

Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including enemy attack).

- Deliverable: 1) Provide WWF34 NOAA weather radio coverage to the entire County 2) provide the ability to use the local Weather Radio transmitter for emergency broadcasts 3) develop a program/policy for dissemination of instructions and public awareness of the existence and use of/for the WWF34 NOAA broadcasting of weather data.
- Scheduling to invite Action: 3Q05
- Potential Sources of Technical Assistance: Kalamazoo Amateur Radio Club (providers of WWF34); Red Cross;
- MSU Extension; KCDC
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: High HRDT/HF
- 2012 Status Update: Completed - In 2008, the 5th District Regional Planning Board and the National Weather Service moved one of our public notification systems from Oshtemo Township in Kalamazoo County to a MPSCS Tower in Gun Plain Township in Allegan County.

1(c)6: Action Item Description:

Enhance Awareness and Participation in Nuclear Attack Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – For this function, Kalamazoo County only trains the Emergency First Responder Group as we are not a large Nuclear Plant county.

Category 2

Action Items Completed					Work in Progress		Ongoing	
2a1	2a3	2a4		2b1	X	X	2a2	2a5
							2b2	2a6

Earthquakes

Goal: Reduce the likelihood of damage to structures and property from adverse seismic activity.

2(a)1: Action Item Description:
Enforce appropriate building codes.

- Deliverable: 1) 2-year inspection of multiple-family dwellings 2) use Building Safety Awareness Week to promote Building Safety
- Lead Manager Assigned: PIO - KCDC (MSU Extension)
- Schedule to Initiate Action: 1Q04
- Potential Sources of Technical Assistance: International Code Council; Fire Chiefs Association; KCDC; Office of Homeland Security; FEMA; local building codes; insurance industry
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: High HR/HF
- 2012 Status Update: Completed – Building Inspectors do all of the code enforcement and education.

2(a)2: Action Item Description:
Use of safe interior designs and furniture arrangements to reduce chances of damage/injury.

- Deliverable: 1) Develop a team to evaluate and/or develop best practices 2) Disseminate them to the public 3) Develop a means for evaluate the effectiveness of interior designs after an event.
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: International Code Council; Building Associations; MSP; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: Medium LR/HF
- 2012 Status Update: Ongoing – This is part of our ongoing preparedness campaign to educate the public. We do this through presentations and handout materials.

2(a)3: Action Item Description:
Promote awareness for obtaining building and/or renters insurance.

- Deliverables: 1) Conduct an awareness program for the need and availability of such insurance. 2) Provide a list of agencies that are willing/able to provide insurance, evaluate the availability of such insurance, and evaluate the effectiveness of the dissemination of the message/recommendation.
- Lead Manager Assigned: PIO Officer - KCDC
- Schedule to Initiate Action: 1Q05

- Potential Sources of Technical Assistance: Insurance Industry; FEMA; KCDC
- Potential Sources of Financial Assistance: Red Cross; FEMA
- Priority: Medium LR/HF
- 2012 Status Update: Completed – In 2008, Kalamazoo County partnered with the Red Cross to meet with Property Owners and discussed having renter insurance built into rental costs. In 2009, Kalamazoo County Fire Departments had 9 multi-family dwellings burn in a six month period.

2(a)4: Action Item Description:

"Harden" critical infrastructure systems to meet seismic design standards for "lifelines."

- Deliverables: KCDC to establish a working committee to evaluate the need/advisability for design standards, vulnerability of existing structures and a forecast of potential costs.
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Schedule o Initiate Action: 4Q95
- Potential Sources of Technical Assistance: FEMA; International Code Council
- Potential Sources of Financial Assistance: FEMA/Office of Homeland Security
- Priority: Medium LR/LF
- 2012 Status Update: Completed – Building codes require special construction for special use and location facilities. This is adopted, updated and enforced by local jurisdictions.

2(a)5: Action Item Description:

Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

This is the same suggestion as for the WMD/Civil Emergency recommendation for adhering to (adopting the idea of) individual family disaster plans; coordinate the broadcast of such recommendations with already-established timing (such as the annual tornado awareness week, County Fair, etc.)

- Lead Manager Assigned: KCDC
- 2012 Status Update: Ongoing – This occurs all the time through media releases, public speaking, handout materials, etc…

2(a)6: Action Item Description:

Enhance Awareness & Participation in Earthquake Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Medium LR/LF
- 2012 Status Update: Ongoing

Subsidence

Goal: Improve Subsidence Awareness.

2(b)1: Action Item Description:

Partner with "Miss Dig" to provide Subsidence Awareness brochure along with digging recommendations.

- Lead Manager Assigned: TBD Subcommittee within KCDC Schedule to Initiate Action: 1Q95
- Potential Sources of Technical Assistance: Gas Company; Electric Company; Phone Company
- Potential Sources of Financial Assistance: MSU Extension
- Priority: Medium LR/HF
- 2012 Status Update: Completed – Miss Dig has their own program for advertising, notifications with Energy Companies, and markings.

2(b)2: Action Item Description:

Enhance Awareness and Participation in Subsidence Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Medium LR/LF
- 2012 Status Update: Ongoing – This is something that we do on a regular basis by promoting mitigation issues. The changing of the mitigation projects is accomplished by updating the plan every five years.

Category 3

Action Items Completed					Work in Progress		Ongoing	
3a1	3a2	3a3	3a4	3a5	3d3	3d6	3d4	3f4
3a6	3a7	3b1	3b2	3b3	3i1	3i4	3g2	3g3
3c1	3c2	3c3	3c4	3d1	3i6		3g5	
3d2	3d5	3d7	3d8	3d9				
3d10	3d11	3e1	3e2	3e3				
3e4	3f1	3f2	3f3	3g1				
3g4	3h1	3h2	3h3	3i2				
3i3	3i5							

Thunderstorm Hazards (General)

Goal: Reduce the effects of thunderstorm hazards.

3(a)1: Action Item Description:
Increased Coverage and Use of NOAA Weather Radio.

- Deliverable: 1) Provide WWF34 NOAA weather radio coverage to the entire County 2) provide the ability to use the local Weather Radio transmitter for emergency broadcasts 3) develop a program/policy for dissemination of instructions and public awareness of the existence and use of/for the WWF34 NOAA broadcasting of weather data.
- Lead Manager Assigned: Local Radio Amateur Radio Civil Emergency Service (RACES) Coordinator
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Kalamazoo Amateur Radio Club (providers of WWF34); Red Cross; MSU Extension; KCDC
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: High HR/HF
- 2012 Status Update: Completed – Back in 2008, the 5th District Regional Planning Board and the National Weather Service moved one of our public notification systems from Oshtemo Township in Kalamazoo County to a MPSCS Tower in Gun Plain Township in Allegan County.

3(a)2: Action Item Description:
Producing and Distributing Family Emergency Preparedness Information Relating to Thunderstorm Hazards.
Already-identified recommendation -- involves adoption of resolution/recommendation by participating community governments/agencies for family units to establish such an emergency preparedness plans.

3(a)3: Action Item Description:
Promote Public Education and Awareness of Thunderstorm Dangers.

- Deliverables: 1) Continue the annual storm week announcements by MSU Extension -- 2) KCDC/RACES to develop process for annual resolution by County Government to declare

weather awareness week (coincident with tornado season, etc).

- Lead Manager Assigned: Local Radio Amateur Radio Civil Emergency Service (RACES) Coordinator
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KARC; KCDC; NWS; FEMA
- Potential Sources for Financial Assistance: KCDC; KARC; MSU Extension
- Priority: High HR/HF
- 2012 Status Update: Completed – This is a continuous event for Kalamazoo County as we provide an annual weather spotter program and promote awareness to the public, as well as provide information to give out at our public libraries.

3(a)4: Action Item Description:

Training and Increased Use of Weather Spotters.

- Deliverables: Conduct annual weather spotter training.
- Lead Manager Assigned: RACES Coordinator
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: NWS, GRR; KARC
- Potential Sources of Financial Assistance: KARC; FEMA; NWS
- Priority: High HR/HF
- 2012 Status Update: Completed – NWS & OEM provide an annual weather spotter program.

3(a)5: Action Item Description:

Public Early Warning Systems and Networks

See Project P.A.W.N. in C4 Severe Winds and Tornado Section.

3(a)6: Action Item Description:

Tree Trimming and Maintenance to Prevent Limb Breakage and Safeguard nearby Utility Lines.

- Deliverables: 1) Organized effort of Road Commission and electric power companies to trim back trees, 2) develop a community awareness team (KCDC) to systematize the evaluation of and/or inspection of vulnerabilities of trees/power lines as a preventative measure. 3) Establish a system for the coordination of reports of vulnerabilities following storms and/or accidents. 4) MSU Extension PIO to develop plan for dissemination of such information/recommendations to the public -- likely coinciding with other annual awareness activities (such as Tornado Week).
- Lead Manager Assigned: KCDC / General Superintendent, KCRC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: N/R
- Potential Sources of Financial Assistance: FEMA
- Priority: High HR/HF
- 2012 Status Update: Completed – Local utility companies have a regular maintenance program to make utility areas safe and clear of debris.

3(a)7: Action Item Description:

Enhance Awareness and Participation in General Thunderstorm Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3)

Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.

- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – This connects with our annual spotter training and exercising.

Hail

Goal: Reduce the effects of Hail on property and life.

3(b)1: Action Item Description:

Promote the use of structural bracing, window shutters, laminated glass in window panes, and hail-resistant roof shingles to minimize damage to public and private structures.

- Deliverables: Partner with Building Material Vendors to provide illustration at public events (such as the County Fair) and/or by advisory publications (such as by MSU Extension) of the benefits of using state-of-the-art building structure techniques.
- Lead Manager Assigned: KCDC / General Superintendent, KCRC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: Building Codes; FEMA
- Potential Sources of Financial Assistance: FEMA
- Priority: Medium HRNDT/LF
- 2012 Status Update: Completed – This is done in the Michigan Building Code.

3(b)2: Action Item Description:

Pre-planning for debris management staging and storage areas.

(Debris Is Usually Vegetation Such As Tree Branches That Have Fallen Under the Impact of Hail, or Broken Power or Phone Lines That Had Frozen or Been Weighted Down By Ice or Fallen Branches.)

- Deliverables: Investigate Best Practices for dealing with rapid discovery and disposal of damaged trees, structures, poles, etc. that pose hazards to motorists, pedestrians, and occupants of buildings.
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: KCRC; MSU Extension; Business Partners; FEMA; NWS; Red Cross
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: Medium LR/HF
- 2012 Status Update: Completed – We have adopted the "State of Michigan Plan" for debris removal, will work with local public works, and contract to remove debris as necessary, depending on the disaster.

3(b)3: Action Item Description:

Enhance awareness and participation in hailstorm emergency planning activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items

from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.

- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – NWS & OEM provide an annual weather spotter program.

Lightning

Goal: Reduce the effects of Lightning on life and property.

3(c)1: Action Item Description:

Installing lightning protection devices on the community's communications infrastructure.

- Deliverable: 1) Conduct a survey of operators of communications towers that transmit or receive emergency communications (Fire/Police/Ambulance, etc) for the purpose of determining and improving the level of lightning protection on communications equipment.
- Lead Manager Assigned: Communications Subcommittee of KCDC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: Radio industry; Communications Vendors
- Potential Sources of Financial Assistance: FEMA
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – All our area tower systems have lightning protection as standard equipment.

3(c)2: Action Item Description:

Provide early warning of lightning at public gathering places through the use of NWS Weather Radios.

- Deliverable: Awareness campaign targeted at Golf Courses, Fairs, State and Local Parks, Nursing Facilities, etc.
- Lead Manager Assigned: (part of P.A.W.N. program outlined in Tornado section)
- 2012 Status Update; Completed – Part of the P.A.W.N. project.

3(c)3: Action Item Description:

Provide lightning awareness instruction to elementary school students.

- Deliverable: Presentation material distributed to all public and private middle schools - timed for spring break - start of storm weather. Material to be suitable for delivery by homeroom teachers.
- Lead Manager Assigned: Local Hazard Mitigation Subcommittee of KCDC
- Scheduled to Initiate: 1Q04
- Potential Sources of Technical Assistance: MSU Extension; KCDC; Radio industry; NWS; FEMA
- Potential Sources of Financial Assistance: FEMA
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – We do this by giving materials and awards such as book

markers, etc from time to time. Also, local media stations do awareness programs that provide the children with information.

3(c)4: Action Item Description:

Enhance awareness and participation in lightning emergency planning activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc,) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Schedule to initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed - This is part of the "weather" chapter of our All Hazard Planning materials. We have a standard weather template that we use for public and private planning.

Severe Winds / Tornado

Goal: Provide specialized prevention and awareness of severe weather.

3(d)1: Action Item Description:

PAWN - Supply educational materials to prevent, planning for & react to emergency and disaster situations.

PROJECT PAWN - Specialized Prevention and Awareness – Magnets, cards, and pamphlets utilized to aid in life safety and pre-planning for severe weather for target groups in the County.

Target Audience: Non-English Speaking Residents/Visitors, Disabled / Impaired, Seniors, College Students, Apartment Dwellers, Manufactured Home Residents, Adult Foster Homes, Day Care Centers, etc.

- Deliverables: Magnets, pamphlets, posters, stickers and training seminars.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: MSU Extension; KCDC; NWS; FEMA; KARC
- Potential Sources of Financial Assistance: FEMA, Office of Homeland Security
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – The KCDC had completed the original distribution of materials. OEM has continued to do this as often as possible, but at least once a year.

Goal: Visitor Awareness of Emergency Conditions.

3(d)2: Action Item Description:

KNIGHT - provide simple, basic education to visitors to our county on awareness of severe weather situations.

Target Audience: Hotel and Motel Customers; Students at Local Colleges and Universities

- Deliverables: Personalized 2-sided informational business card available at the front desk of

hotels/motels and at universities and colleges orientation classes.

- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Scheduled to Initiate: 2Q04
- Estimated Costs: $1,576.95:
  38 Hotel/Motel Locations * $5.00/Business Card Holder = $190
  10,000 Business Cards (2-sided) for hotels = $320.63
  37,733 Business Cards – one for every college student in the County = $845.63
- Potential Sources of Technical Assistance: MSU Extension; KCDC; NWS; FEMA; KARC
- Potential Sources of Financial Assistance: FEMA, Office of Homeland Security, Local donations
- Priority: High HRNDT/LF
- 2012 Status Update: Completed in the original projects distribution of materials.

Goal: Warning and Notification – Radio and Television.

3(d)3: Action Item Description:

BISHOP - Provide emergency information to residents and guests who speak English as a second language.

- Deliverables: Advertising/Educating of its availability, Partnering with selected radio and TV stations, Interpretation services for partnering stations, Procedures on how to broadcast such messages.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC .
- Scheduled to Initiate: Ongoing.
- Estimated Costs: Costs of producing tapes for radio stations estimated at $5,000.
- Potential Sources of Financial Assistance: Office of Homeland Security, Local donations
- Priority: High HRNDT/LF.
- 2012 Status Update: Open – Work in Progress – No further information at this time.

Goal: Improve Awareness of Weather / Emergency Events

PROJECT ROOK -- Weather Monitors

Weather Monitors - The option of Emergency Weather Monitors is an alternative or complement to sirens, due to cost and the ability to receive specific information related to the situation. Additionally, this project would be aimed at ensuring that the deaf population has adequate means of emergency notification.

3(d)4: Action Item Description:

ROOK - provide NWS weather monitors to select agencies.

- Deliverables: Supply Programmable Weather Monitors for reduced or no costs to areas of the County not covered by current, radio activated siren warning systems. Distribute and Program Monitors, Training on Monitor Use.
- Target Audience: Adult Foster Homes (116), Day Care Facilities (143 private outside of current siren areas – 414 total locations), Apartments (200 locations, 19,168 units), Manufactured Homes (29 locations, 5,020 units), Schools (110), Hotels, Motels (38), Hearing-Impaired (500).
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Scheduled to Initiate: Ongoing
- Estimated Costs: Costs of producing tapes for radio stations estimated at $5,000. ($54.00 per

monitor, $128.00 for monitor and accessories for the hearing impaired). Based on listed quantities, cost estimates range from $98,344 (one unit per location listed) to $1,365,562 (one unit for each location and every apartment and manufactured home).

- Proposed Sources of Technical Assistance: KCDC; KARC; Broadcast Media; WMU; MSU Extension
- Potential Sources of Financial Assistance: FEMA, Office of Homeland Security, Local donations
- Priority: High HR/HF
- 2012 Status Update: Ongoing – Region 5 has again purchased an additional 100 monitors for each EM program in the region. They are being given to the places listed above. This will be ongoing for a long period of time before completed.

Goal: Provide Siren Warning Systems

3(d)5: Action Item Description:

QUEEN - Supply automated siren warning systems to areas throughout the County not covered by the current automated siren warning systems.

- Target Audience: High-Density populations, Apartments, Manufactured Home Neighborhoods, Adult Foster Homes, and Day Care Centers.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee – KCDC
- Scheduled to Initiate: Ongoing
- 2012 Status Update: Completed – This is solely handled by the individual government jurisdiction. Since the last development of this manual there has been a few additional sirens installed by the local government jurisdictions.

3(d)6: Action Item Description:

KING - Provide take-cover locations for manufactured housing communities.

- Deliverables: 1) Basements underneath community centers for take cover in case of a tornado. 2) Tornado Shelters
- 3) Building a community center which would include a basement for take cover. 4) Adding a basement to a future community center for take cover purposes - location: manufactured home community.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Scheduled to Initiate: Ongoing
- Costs: Varies by project for basements. Pre-fabricated shelters cost approximately $6,000 for a 12-person shelter, installed. Costs are projected to range between $174,000 (one pre-fabricated unit per park) and $7,530,000 (assumes on average 3 people per mobile home times 5,020 units in the County)
- Proposed Sources of Technical Assistance: KCDC; KARC; WMU; MSU Extension
- Proposed Sources for Financial Assistance: FEMA; Office of Homeland Security; Local In-Kind contributions
- Priority: High HRNDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

Goal: Reduce Damage to Mobile Homes

3(d)7: Action Item Description:

Promote awareness for the need to anchor mobile homes through an information campaign and voluntary compliance with recommended practices.

- Deliverables: Investigate and recommend best practices for obtaining compliance with recommended practices for mobile home anchoring.
- Lead Manager Assigned: TBD Subcommittee within KCDC Scheduled to Initiate: 1Q05
- Proposed Sources of Technical Assistance: Mobile Home Industry; Local Building Codes; Michigan State anchoring system standards.
- Proposed Sources for Financial Assistance: Local Municipalities; FEMA
- Priority: Medium HR/HF
- 2012 Status Update: Completed – This is done using local and state building codes. Already in place.

Goal: Ensure Electrical Infrastructure Reliability:

One of the major problems associated with the severe winds from tornadoes and thunderstorms is the loss of electric power caused by trees falling on power lines. Michigan has had numerous widespread and severe electrical power outages caused by severe wind and other weather events. Several of those outages have resulted in upwards of 500,000 electrical customers (roughly 5% of the State's population) being without power for several hours to several days at a time.

Wind-related damage to electric power facilities and systems is a concern that is being actively addressed by utility companies across the state. Detroit Edison, Consumers Energy and other major electric utility companies have active, ongoing programs to improve system reliability and protect facilities from damage by tornadoes, severe straight-line winds and other hazards. Typically, these programs focus on trimming trees to prevent encroachment of overhead lines, strengthening vulnerable system components, protecting equipment from lightning strikes, and placing new distribution lines underground. The Michigan Public Service Commission (MPSC) monitors power system reliability to help minimize the scope and duration of power outages.

3(d)8: Action Item Description:

Reduce electrical infrastructure vulnerabilities through partnering with the electrical industry.

- Deliverables: Develop Best Practices Recommendations for ensuring uninterrupted electrical service to Kalamazoo County.
- Lead Manager Assigned: Kalamazoo County Emergency Management Director
- Scheduled to Initiate: 3Q05
- Proposed Sources of Technical Assistance: Power Industry; MSU Extension; WSU; FEMA.
- Proposed Sources for Financial Assistance: Local Municipalities
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – Utility Companies were contacted, but because of security issues we are not allowed to see the plans. We are insured thought their company that they are covered.

Goal: Reduce damage to structures sustained during extreme storms and/or tornados:

One of the best ways to protect buildings from damage from severe winds associated with thunderstorms, tornadoes, or other high wind events is to install structural bracing and metal connectors (commonly called hurricane clips) at critical points of connection in the frame of the structure. Typically, this

involves adding extra gable end bracing at each end of the structure, anchoring the roof rafters to the walls with metal connector straps, and properly anchoring the walls and sill plate to the foundation. This extra bracing helps ensure that the roof stays on the structure, and the structure stays anchored on its foundation. Experience in tornadoes and other high wind events has shown that once the roof begins to peel away from the walls, or the building begins to move off its foundation due to extreme lateral wind forces, major structural damage occurs. If the damage continues unabated, the building can end up being a total loss.

3(d)9: Action Item Description:

Promote the use of structural bracing / wind engineering in new and/or existing structures.

- Deliverables: Best Practices Recommendations for evaluating, building and/or improving new and/or existing structures.
- Lead Manager Assigned: Kalamazoo County Emergency Coordinator - KCDC
- Scheduled to Initiate: 3Q05
- Proposed Sources of Technical Assistance: Building Industry; MSU Extension; WSU; FEMA.
- Proposed Sources for Financial Assistance: Local Municipalities; FEMA
- Priority: Medium
- 2012 Status Update: Completed – This is covered in the building codes adopted by the local government jurisdiction.

Goal: Reduce storm damage to trees – to reduce damage to life and property caused by storm damage.

3(d)10: Action Item Description:

Ensure that tree maintenance programs are identified and accomplished for vulnerable areas.

- Lead Manager Assigned: TBD Subcommittee within KCDC
- Scheduled to Initiate: 2Q05
- Proposed Sources of Technical Assistance: KCRC; Power Companies; MSU Extension; FEMA
- Proposed Sources of Financial Assistance: Local Governments; Power Companies
- Priority: High HR/HF
- 2012 Status Update: Completed – Public Works Departments around the county are making adjustments because of budget cuts. They have to make adjustments to their operations and normal maintenance items such as this. This will create further issues in the future.

3(d)11: Action Item Description:

Enhance awareness and participation in severe wind and tornado emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing

- Priority: High HR/HF
- 2012 Status Update: Completed – This is part of our spring and winter weather training.

Extreme Temperatures

Goal: Mitigate the effects of heat on visitors and residents of Kalamazoo County.
The major elements of plans to mitigate the effects of severe heat include: 1) enhanced weather monitoring to better predict periods of extreme heat; 2) increased outreach to the elderly and other vulnerable individuals; 3) establishment of "cooling centers" for those most affected by the heat; and 4) enhanced public information campaigns to inform people of the perils of extreme summer heat and the resources available to them. Federal funding through the Low Income Home Energy Assistance Program exists to help low-income residents cope with the intense summer heat.

3(e)1: Action Item Description:
Increase coverage and use of NOAA Weather Radio

- Deliverables: (See Project P.A.W.N. in section C1) Thunderstorm Hazards (General)
- Priority: High HR/HF
- 2012 Status Update: Completed – In 2008, the 5th District Regional Planning Board and the National Weather Service moved one of our public notification systems from Oshtemo Township in Kalamazoo County to a MPSCS Tower in Gun Plain Township in Allegan County.

3(e)2: Action Item Description:
Organize outreach to vulnerable populations during periods of extreme temperatures.

- Deliverables: Disseminate public information (news, radio, etc). Establish and build awareness of heating and/or cooling centers in the community, and other public information campaigns about this hazard.
- Lead Manager Assigned: TBD Subcommittee within the KCDC
- Scheduled to Initiate: 2Q05
- Proposed Sources of Technical Assistance: MSU Extension; FEMA; Red Cross; Hospitals; KCDC
- Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/HF
- 2012 Status Update: Completed – This is done through our media coverage when special shelters are set up.

3(e)3: Action Item Description:
Establishment of "cooling centers" for those most affected by the heat.

- Deliverables: Identification of locations that can be used as cooling centers. Establishing and building awareness of accessible heating and/or cooling centers in the community by way of bulletins, pamphlets, and/or newsprint. Identification of new sources and locations for use as cooling centers.
- Lead Manager Assigned: TBD Subcommittee within the KCDC
- Scheduled to Initiate: 2Q05
- Proposed Sources of Technical Assistance: MSU Extension; FEMA; Red Cross; Hospitals; KCDC Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/HF

- 2012 Status Update: Completed – This is a seasonal occurrence. Special cooling shelters are used because of the need. This is a partnership with Red Cross as they are the experts in all types of sheltering.

3(e)4: Action Item Description:

Provide public information campaigns to inform people of the perils of extreme summer heat and the resources available to them.

- Deliverables: Establish and utilize best practices for disseminating information to residents and visitors. Lead Manager Assigned: PIO - KCDC
- Scheduled to Initiate: 2Q05
- Proposed Sources of Technical Assistance: MSU Extension; EMPG; Red Cross; Hospitals; KCDC Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/HF
- 2012 Status Update: Completed – During this type of operation we open "cooling Shelters" with the assistance of Red Cross. County OEM & Human Services puts out media information to assist the public. Metro transit also helps transport those in need to the cooling shelters.

Goal: Reduce suffering due to extreme cold.

3(f)1: Action Item Description:

Ensure renter awareness of housing/landlord codes enforcing heating requirements.

- Deliverables: Develop and disseminate materials to advise renters of landlord codes protecting renters
- Lead Manager Assigned: PIO - KCDC
- Scheduled to Initiate: 4Q04
- Proposed Sources of Technical Assistance: MSU Extension; FEMA; Red Cross; Hospitals; KCDC
- Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/HF
- 2012 Status Update: Completed – This section is totally handled by utility companies. In this area, local utilities advertise to assist persons with this issue.

3(f)2: Action Item Description:

Implement best practices for ways to deal with the effects of extreme cold.

- Deliverables: Investigate and make recommendations for effective methods for mitigating the effects of extreme cold on Kalamazoo's residents, visitors and businesses.
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Scheduled to Initiate: 4Q05
- Proposed Sources of Technical Assistance: MSU Extension; FEMA; Red Cross; Hospitals; KCDC
- Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/LF
- 2012 Status Update: Completed – We use local Media to get the messages out to the public. In the event of an emergency we would activate our Emergency Alert System (EAS) to broadcast to the public.

3(f)3: Action Item Description:

Enhance special arrangements for payment of heating bills.

- Deliverables: 1) Investigate the need for special arrangements for payment of heating bills, 2) develop recommendations 3) Implement recommendations
- Lead Manager Assigned: Chairman - Local Hazard Mitigation Subcommittee -- KCDC
- Scheduled to Initiate: 4Q04
- Proposed Sources of Technical Assistance: MSU Extension; FEMA; Red Cross; Hospitals; KCDC
- Proposed Sources of Financial Assistance: Local Governments
- Priority: Medium LR/LF
- 2012 Status Update: This section is totally handled by utility companies.

3(f)4: Action Item Description:

Enhance awareness and participation in extreme temperature emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Schedule to Initiate Action: Ongoing
- Priority: High LR/HF
- 2012 Status Update: Ongoing – This occurs every time an event happens, but the public's momentum for getting projects moving has been short-term.

General Winter Weather Hazards

3(g)1: Action Item Description:

Produce and distribute family emergency preparedness information relating to severe winter weather hazards.

- Deliverables: Winter Weather Preparation Tips (TV/News, Newsprint)
- Lead Manager Assigned: PIO - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: MSU Extension; KCDC; News Media
- Potential Sources of Financial Assistance: Red Cross
- Priority: High HR/HF
- 2012 Status Update: Completed – This is being done at our annual Winter Weather Training. Handouts, etc are available to the public during this event.

3(g)2: Action Item Description:

Establish heating centers/shelters for vulnerable populations.

- Deliverables: Establish and publish a list of available shelters.
- Lead Manager Assigned: Red Cross representative - KCDC

- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: MSU Extension; FEMA; Red Cross
- Potential Sources of Financial Assistance: Red Cross; Local Governments
- Priority: High HR/HF
- 2012 Status Update: Ongoing – We have done this the last two years during periods when temperatures are high or cold. This is a combined effort with the Red Cross.

3(g)3: Action Item Description:

Organize outreach to isolated, vulnerable, or special-needs populations.

- Deliverables: Investigation and tabulation of priority needs populations; recommendations for action.
- Lead Manager Assigned: Red Cross representative - KCDC
- Scheduled to Initiate: 2Q05
- Potential Sources of Technical Assistance: MSU Extension; FEMA; Red Cross
- Potential Sources of Financial Assistance: FEMA; Red Cross; Local Governments
- Priority: High HR/HF
- 2012 Status Update: Ongoing – As this has become a Michigan Region 5 project and all nine counties are working together to develop a regional plan, a local plan will be created from that. Local data from each of the nine counties are being collected.

3(g)4: Action Item Description:

Encourage residents to develop a family disaster plan which includes the preparation of a disaster supplies kit.

- Deliverables: (see "Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit" in Section: A2) Sabotage/Terrorism/Weapons of Mass Destruction (WMD))

3(g)5: Action Item Description:

Enhance awareness and participation in general winter weather emergency planning activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High LR/HF
- 2012 Status Updates: Ongoing – We do this on our part by hosting annual or biannual Winter Weather Training open to the public. This is a shared project with the City of Portage Department of Public Safety.

Goal: Reduce the effects of Ice Storms on Kalamazoo Residents/Businesses/Visitors

3(h)1: Action Item Description:

Home and public building maintenance to prevent roof and wall damage from "Ice Dams".

- Deliverables: Develop strategy for structure evaluation and dissemination of recommended practices to building owners.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation - KCDC
- Scheduled to Initiate: 2Q05
- Potential Sources of Technical Assistance: MSU Extension; FEMA; Building Construction Industry
- Potential Sources of Financial Assistance: Red Cross; Local Governments
- Priority: Medium LR/HF
- 2012 Status Update: Completed – Local contractors and specialty stores deliver this information, along with products and installations. OEM only is involved during a disaster / emergency.

3(h)2: Action Item Description:

Maintain a list of emergency services sources (AKA the KC Resource Manual)

- Deliverables: Develop and publish an annual database of emergency services suppliers/resources.
- Lead Manager Assigned: Chairman88, KC Resource Manual - KCDC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCDC
- Potential Sources of Financial
- Assistance: N/A
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – OEM annually updates the KC Resource Manual and its placement in the E-Team Program.

3(h)3: Action Item Description:

Enhance awareness and participation in ice and sleet storm emergency planning activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High LR/HF
- 2012 Status Update: Completed – This is part of the "weather" chapter of our All Hazard Planning materials. We have a standard weather template that we use for public and private planning.

Goal: Reduce the effects of Snowstorms on Kalamazoo County

3(i)1: Action Item Description:

Enhance awareness livestock and pet needs/problems.

- Deliverables: 1) Outline of best practices for animal/pet housing, emergency procedures, shelter, and care during storms, and rescue. 2) Coordinate with KC Animal Control Advisory Board 3) Dissemination to community.
- Lead Manager Assigned: Chairperson - Animal Disaster Subcommittee - KCDC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: KC Animal Control Advisory Board, 4H; FEMA; Laboratory Animal
- Medicine and Science - Worldwide Safety Sciences, Pfizer; Veterinary House Calls of Grand Rapids92; Red Cross
- Potential Sources of Financial Assistance: N/A
- Priority: High HRDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

3(i)2: Action Item Description:

Pre-arrange for shelters for stranded motorists/travelers, and others.

- Deliverables: 1) Inventory of Shelters. 2) Dissemination of Shelters (hotels, rest areas, etc).
- Lead Manager Assigned: Red Cross - KCDC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: Red Cross; KCDC; Hospitals
- Potential Sources of Financial Assistance: N/A
- Priority: High HRDT/LF
- 2012 Status Update: Completed – American Red Cross handles all sheltering operations, supplies and staffing.

3(i)3: Action Item Description:

Maintain adequate road and debris-clearing capabilities.

- Deliverables: Equipment and Personnel to clear County Roads.
- Lead Manager Assigned: KCRC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: N/A
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: High HR/HF
- 2012 Status Update: Completed – Kalamazoo County has the County Road Commission, Local Public Works and numerous local Excavating Companies ready and entered into our local Resource Manual.

3(i) 4: Action Item Description:

Promote the use of snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.

- Deliverables: Procedures, Guidelines, Application of appropriate snow fencing.
- Lead Manager Assigned: KCRC
- Scheduled to Initiate: 3Q04 Potential Sources of Technical Assistance: N/A
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: Medium LR/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

3(i)5: Action Item Description:

Plan debris-management staging and storage areas.

Debris is usually the sleet and ice itself being cleared from roads and roofs, or vegetation such as tree branches that have fallen under the impact of winds or the weight of ice. Broken power or phone lines that had frozen or been weighted down by ice or other fallen branches. Roofs may collapse under the weight.

- Deliverables: Storage areas for snow removal during blizzards.
- Lead Manager Assigned: KCRC
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: N/A
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: Medium LR/HF
- 2012 Status Update: Completed – This is arranged by the public work departments, as they have these locations already. Private contractors have the same.

3(i)6: Action Item Description:

Enhance awareness and participation in snowstorm emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

Category 4

Action Items Completed					Work in Progress		Ongoing	
4a1	4a2	4a3	4a4	4a5	X	X	X	X
4a6	4a7	4a8	4b1	4b2				
4b3	4b4	4b5	4b6	4c1				
4c2								

Structural Fires:

Goal: Implement effective measures to reduce the vulnerability to fire.

4(a)1: Action Item Description:
Implement best practices for Fire Safety.

- Deliverables: Develop a process for the identification, documentation, implementation, review and improvement of best practices for addressing fire-related vulnerabilities within Kalamazoo County.
- Lead Manager Assigned: President - KC Fire Chiefs Association
- Scheduled to Initiate: 1Q05
- Potential Sources of Technical Assistance: Public Act 207a; MSP; Fire Associations; Michigan Quality Council
- Potential Sources of Financial Assistance: County; State
- Priority: High HRDT/LF
- 2012 Status Updates: Completed – This is accomplished annually during fire prevention week by local fire departments.

4(a)2: Action Item Description:
Promote fire code enforcement.

- Deliverables: Develop and/or implement existing methods for establishing and promoting code compliance and verification by municipalities represented by the Kalamazoo Fire Chiefs Association.
- Lead Manager Assigned: President - KC Fire Chiefs Association
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: N/A
- Potential Sources of Financial Assistance: County; State
- Priority: High HR/HF
- 2012 Status Update: Completed – This is accomplished by local fire departments, the government board, and sub-committees to that board.

4(a)3: Action Item Description:
Ensure that new designs include the use of firewalls and sprinkler systems.

- Deliverables: Develop and/or implement existing methods for establishing and promoting the use of firewalls and sprinkler systems (especially in tall buildings, dormitories, attached structures and special facilities).
- Lead Manager Assigned: KC Planning Department Senior Planner

- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: Fire Chiefs; Building Inspectors
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: High HR/HF
- 2012 Status Update: Completed – This is accomplished by local fire departments, fire inspections, and local building code permits and inspections.

4(a)4: Action Item Description:

Provide public awareness program for fire safety.

- Deliverables: Develop and/or implement existing methods for establishing and fire safety for:
- The use of stoves, heaters, fireworks, matches/lighters, etc
- Smoke detectors and fire extinguishers
- Proper installation and maintenance of heating systems (especially those requiring regular cleaning, those using hand-loaded fuels such as wood, or using concentrated fuels such as liquid propane)
- Safe and responsible use of electric and "space" heaters
- Safe use and maintenance/cleaning of fireplaces and chimneys
- With the use of spark arresters and proper storage of flammable items
- Inspect chimneys
- Posting of fire emergency telephone numbers in accessible places
- Safe installation, maintenance, and use of electrical outlets and wiring
- Education and practice of safe cigarette handling and disposal (also candles, fireworks, campfires, holiday lights)
- Pre-planned escape routes and fire alert responses
- Obtaining insurance
- Lead Manager Assigned: President, Fire Chiefs Association
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: Fire Chiefs; Building Inspectors; MSU Extension
- Potential Sources of Financial Assistance: County; State
- Priority: High HR/HF
- 2012 Status Update: Completed – This is accomplished annually during fire prevention week by local fire departments.

4(a)5: Action Item Description:

Integrate Fire Safety into community planning.

- Deliverables: Add an agenda item for Fire Safety to community meetings -- to include the following organizations:
- Kalamazoo County Government bi-weekly meetings,
- KCDC monthly meeting,
- Township Supervisors Monthly Meetings,
- City Government monthly meetings, Village Government Meetings
- Parks and Recreation monthly meetings.
- Lead Manager Assigned: President, Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: Fire Chiefs Association, Homeland Security,

Insurance industry
- Potential Sources of Financial Assistance: County; Local
- Priority: High HR/HF
- 2012 Status Updates: Completed – This is accomplished by local fire departments. Now other areas as listed explain the areas to guest/visitors to their locations when they arrive and are staying for any period of time.

4(a)6: Action Item Description:

Distribute fire safety & renter's insurance awareness literature to building owners/occupants.

- Deliverables: 1) Produce pass-out materials to address Fire Safety and Renters Insurance targeted to building occupants/owners. 2) Partner with Building Inspectors -- who conduct building inspections on multiple-family dwellings every two years -- to disseminate fire safety/insurance information.
- Lead Manager Assigned: President, Fire Chiefs Association
- Scheduled to Initiate: 3Q05
- Potential Sources of Technical Assistance: Fire Chiefs Association, Office of Homeland Security, Insurance Industry, MSU Extension
- Potential Sources of Financial Assistance: County; Insurance Industry
- Priority: High HR/HF
- 2012 Status Update: Completed – In 2009, when the Kalamazoo area had 9+ local apartment complex fires, OEM and Red Cross met with apartment complex managers/owners and stressed the importance of this.

4(a)7: Action Item Description:

Provide renters insurance assistance to needy families.

- Deliverables: 1) Investigate means for providing low cost, or subsidized fire insurance to renters 2) Provide assistance in obtaining or funding renters insurance for Fire to needy renters.
- Lead Manager Assigned: Red Cross ESS Director
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: Fire Chiefs Association, Office of Homeland Security, Insurance Industry
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – This is something that individual households need to contact their local Red Cross Chapter to apply for.

4(a)8: Action Item Description:

Enhance awareness and participation in structural fire emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.

- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – This being accomplished by local fire departments.

Wild Fires

Goal: Reduce Vulnerability to Wildfires in Kalamazoo County

4(b)1: Action Item Description:

Participate in multi-state and interagency wildfire mitigation efforts.

- Deliverables: 1) Identification of, and implementation of best practices for preventing and/or mitigating the vulnerability to wildfires. 2) Identification of areas within Kalamazoo County which are more likely to be vulnerable. Likely areas of investigation include:
- Proper maintenance of property in or near wild land areas;
- Use of fire resistant roofing and building materials;
- Use of functional shutters on windows;
- Keeping flammables such as curtains securely away from windows or using heavy fire-resistant drapes;
- Creating and maintaining a buffer zone (defensible space) between structures and adjacent wild lands;
- Use of the fire department's home safety inspections;
- Sweeping/cleaning dead or dry leaves, needles, twigs, and combustibles from roofs, decks, eaves, porches, and yards;
- Keeping woodpiles and other combustibles away from structures;
- Use of boxed or enclosed eaves on house;
- Thorough cleaning-up of spilled flammable fluids;
- Keeping garage areas protected from blowing embers);
- Safe disposal of yard and house waste;
- Use of fire spotters, towers, planes;
- Keep handy household items that can be used as fire tools;
- Post fire emergency telephone numbers;
- Organizing neighborhood wildfire safety coalitions;
- Residents should plan several escape routes away from their homes - by car and by foot;
- Use of structural fire mitigation systems such as interior and exterior sprinklers, smoke detectors, and fire extinguishers;
- Arson prevention activities, including reduction of blight;
- Public education on smoking hazards and recreational fires;
- Proper maintenance and separation of power lines;
- Efficient response to fallen power lines;
- Training and exercises for response personnel;
- GIS mapping of vegetative coverage, for use in planning decisions and analyses through comparison with topography, zoning, developments, infrastructure, etc.
- Media broadcasts of fire weather and fire warnings;
- The creation of fuel breaks (areas where the spread of wildfires will be slowed or stopped due to removal of fuels, or the use of fire-retardant materials/vegetation) in high-risk forest or other areas;

- Keeping roads and driveways accessible to vehicles and fire equipment—driveways should be relatively straight and flat, with at least some open spaces to turn, bridges that can support emergency vehicles, and clearance wide and high enough for two-way traffic and emergency vehicle access (spare keys to gates around property should be provided to the local fire department, and an address should be visible from the road so homes can be located quickly);
- Enclosing the foundations of homes and buildings rather than leaving them open and the underside exposed to blown embers or materials;
- Safe use and maintenance/cleaning of fireplaces and chimneys (with the use of spark arresters and emphasis on proper storage of flammable items). Residents should be encouraged to inspect chimneys at least twice a year and clean them at least once a year;
- Proper maintenance and storage of motorized equipment that could catch on fire;
- Proper storage and use of flammables, including the use of flammable substances (such as when fueling machinery). Store gasoline, oily rags and other flammable materials in approved safety cans.
- Stack firewood at least 100 feet away and uphill from homes;
- Avoid building structures on hilltop locations, where they will be at greater risk from wildfires (in addition, hillsides facing south or west are more vulnerable to increased dryness and heat from sun exposure) and use of proper setbacks from slopes (outside of the "convection cone" of intense heat which would be projected up the slope of the hill as a wildfire "climbs" it);
- Have adequate water supplies for emergency fire fighting (in accordance with NFPA standards);
- Obtaining insurance;
- Including wildfire safety information in materials provided by insurance companies to area residents.
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; Office of Homeland Security; U.S. Forestry
- Potential Sources of Financial Assistance: County; Insurance Industry
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – This is handled primarily by the Michigan Department of Natural Resources. We are a Metro Resident/Commercial Community.

4(b)2: Action Item Description:

Address wildfire vulnerabilities through ordinance study zoning recommendations.

- Deliverables: 1) Identification of, and implementation of best zoning & ordinance practices for preventing and/or mitigating the vulnerability to wildfires. 2) Identification of areas within Kalamazoo County which are more likely to be vulnerable.
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; Office of Homeland Security; U.S. Forestry; County Planning Department
- Potential Sources of Financial Assistance: County; State
- Priority: Medium LR/H
- 2012 Status Update: Completed – This is accomplished by the local jurisdictional Fire Department and Township Boards. In areas that have State Forest, the MDNR handles this.

4(b)3: Action Item Description:

Regulate the time and amount of permits that are given for prescribed burns.
(For woodland maintenance activities.)

- Deliverables: 1) Investigate whether a need exists for the Identification of, and implementation of recommendations for burn permits. 2) Recommend actions
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; Homeland Security; U.S. Forestry
- Potential Sources of Financial Assistance: County
- Priority: Medium LR/HF
- 2012 Status Update: Completed – This is accomplished by the local jurisdictional Fire Departments. In areas that have State Forest, the MDNR handles this.

4(b)4: Action Item Description:

Implement wildfire prevention, containment and suppression activities.

- Deliverables: 1) Develop benchmark wildfire prevention, containment and suppression activities 2) Implement necessary actions.
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; Office of Homeland Security; U.S. Forestry
- Potential Sources of Financial Assistance: County
- Priority: Medium LR/LF
- 2012 Status Update: Completed – This is accomplished by the local jurisdictional Fire Departments. Primarily with outdoor signs in key locations and during fire prevention classes.

4(b)5: Action Item Description:

Provide wildfire hazard assessments to community and property owners.

- Deliverables: 1) Assess the need for providing wildfire hazard assessments 2) Develop recommendations, and 3) Implement recommendations.
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; FEMA; U.S. Forestry
- Potential Sources of Financial Assistance: County; Insurance Industry
- Priority: Medium LR/LF
- 2012 Status Update: Completed – The local Fire Department typically follows what the MDNR has ordered. This can change daily depending on the weather and other factors.

4(b)6: Action Item Description:

Enhance Awareness and Participation in Wildfire Emergency Planning Activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or

Mitigation Strategies developed or disseminated by participating representatives of the KCDC.

- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – This is accomplished by the local jurisdictional Fire Departments and the MDNR.

Scrap Tire Fires

Goal: Reduce or eliminate the opportunity for vulnerability due to tire fires.

4(c)1: Action Item Description:

Ensure compliance with the MDEQ and/or statewide emergency response plan(s).

- Deliverables: 1) Investigation into applicable laws and recommended practices, 2) Develop recommendations for compliance, and 3) Implementation of recommended practice(s)
- Lead Manager Assigned: President - Fire Chiefs Association
- Scheduled to Initiate: 3Q04
- Potential Sources of Technical Assistance: MDNR; Fire Chiefs Association; FEMA; U.S. Forestry
- Potential Sources of Financial Assistance: County; State
- Priority: Medium LR/LF
- 2012 Status Update: Completed – Emergency Management has no jurisdiction in this type of issue, solely handled by the MDEQ. Local site hazards are determined normally by the local Fire Department in that jurisdiction.

4(c)2: Action Item Description:

Enhance Awareness and Participation in Scrap Tire Fire Emergency Planning Activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High LR/HF
- 2012 Status Update: Completed – This occurs as needed, depending on the site.

Category 5

Action Items Completed					Work in Progress		Ongoing	
5a1	5a2	5a3	5a5	5a7	X	X	5a4	5a6
5b1	5b2	5b3	5d1	5d2			5a8	5a9
5d3	5d4							

Riverine and Urban Flooding

Goal: Institute and/or continue programs to reduce riverine vulnerabilities

5(a)1: Action Item Description:

Develop a Model using 73 surface-water, 111 ground water, and 16 lakes as test sites.

- Deliverables: 1) Evaluate the effects of natural (climate) stresses 2) Evaluate the effects of human activity 3) Predict effects of development options 4) Provide insight into appropriate management strategies. 5) Supplement Water Resources Management (Wellhead Protection, Well field/Source Development and Total Maximum Daily Load) Programs 6) Develop Watershed Management Plan for Kalamazoo River Watershed 7) Landsat Image of Study Area, and 8) Land use change.
- Lead Manager Assigned: Kalamazoo County Planning Department (in partnership with City of Kalamazoo, City of
- Portage, Michigan Department of Environmental Quality (Upjohn-Pharmacia-Pfizer) and U.S. Geological Survey
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: MDNR; Kalamazoo County Planning City of Kalamazoo, City of
- Portage, Michigan Department of Environmental Quality (Upjohn-Pharmacia-Pfizer) and U.S. Geological Survey
- Potential Sources of Financial Assistance: County
- Priority: High HR/LF
- 2012 Status Update: Completed – We have completed table top exercises using a similar event with our City of Kalamazoo Water Department.

5(a)2: Action Item Description:

Provide accurate identification and mapping of flood-prone areas.

- Deliverables: Countywide topographic mapping with resolution sufficient to identify flood prone areas.
- Lead Manager Assigned: Senior Planner - KC Planning and Community Development (member of KCDC)
- Scheduled to Initiate: 1Q95
- Potential Sources of Financial Assistance: County
- Potential Sources of Technical Assistance: MDNR
- Priority: High HR/LF
- 2012 Status Update: Completed – Kalamazoo GIS Department has the most current mapping for 100-year flood plain area.

5(a)3: Action Item Description:

Flood plain management – planning acceptable uses for areas prone to flooding.

- Deliverables: Comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning.
- Lead Manager Assigned: Planning Departments:
- Townships: Charleston, Cooper, Kalamazoo, Oshtemo, Richland, Ross, Schoolcraft, Texas
- Cities: Kalamazoo, and Portage.
- Villages: Augusta and Vicksburg.
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: NFIP
- Potential Sources of Financial Assistance: County; Local Priority: High HR/HF
- 2012 Status Update: Completed – This is done by local government communities as part of their master planning. Permits for any building or development of land in these areas are handled locally.

5(a)4: Action Item Description:

Promote basic building code requirements related to flood mitigation.

- Deliverables: 1) Develop benchmark building code requirements 2) Develop recommendations for comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning.
- Lead Manager Assigned: KCDC Chairman - in partnership with City, Township, Village and County Planning
- Departments
- Scheduled to Initiate: 2H05
- Potential Sources of Technical Assistance: NFIP
- Potential Sources of Financial Assistance: County
- Priority: High HR/HF
- 2012 Status Update: Ongoing – We continually support our local officials in this area and offer assessments of structures that need them. This is an "on-request" activity.

5(a)5: Action Item Description:

Maintain a Watershed Council.

- Deliverables: Continuation and promotion of the council whose purpose is to consider and recommend mitigation strategies for watershed management concerning:
- Participating in the Community Rating System (CRS).
- Land Division Act, 591 P.A. 1996
- Natural Resources and Environmental Act, 451 (Floodplain Regulatory Authority; Soil Erosion and Sedimentation Control; Inland Lakes and Streams; Wetlands Protection, Part 303; Natural Rivers Program, Part 305; and Dam Safety, Part 315
- Manufactured Housing Commission Act, 96
- Local River Management Act, 253 P.A. 1964.
- Floodplain Service Program
- National Flood Insurance Program
- Lead Manager Assigned: KCDC Chairman - in partnership w/ City, Township, Village & County Planning Dept
- Scheduled to Initiate: 2Q05

- Potential Sources of Technical Assistance: NFIP
- Potential Sources of Financial Assistance: County
- Priority: High HR/HF
- 2012 Status Update: Completed – The Kalamazoo River Watershed Council is a group of citizens dedicated to protecting, preserving, and restoring our shared water resources. Website: **www.kalamazooriver.org**

5(a)6: Action Item Description:

Promote awareness for obtaining flood insurance.

- Deliverables: Establishment or promotion of a council whose purpose is to find ways of providing flood insurance under the National Flood Insurance Program to residents in flood prone areas or areas with a history of flooding.
- Lead Manager Assigned: KCDC Chairman
- Scheduled to Initiate: 2Q05
- Potential Sources of Technical Assistance: NFIP
- Potential Sources of Financial Assistance: County
- Priority: High HRDT/LF
- 2012 Status Update: Ongoing – We continually support our local officials in this area and offer assistance to those who are considering it. This is a local community issue more than a county one.

5(a)7: Action Item Description:

Continue monitoring water levels using stream gauges and trained monitors.

- Deliverables: Investigation and recommendations for/against participation with the NWS in its Advanced
- Hydrologic Prediction Service (AHPS) for improved river and flood forecasting and water information. Lead Manager Assigned: KCDC Emergency Coordinator
- Scheduled to Initiate: 2Q04
- Potential Sources of Technical Assistance: NFIP
- Potential Sources of Financial Assistance: County; NWS
- Priority: High HRDT/LF
- 2012 Status Update: Completed – This is done on a regular basis by the National Weather Service office in Grand Rapids, MI.

5(a)8: Action Item Description:

Increase awareness, coverage and use of NOAA Weather Radio.
(which can provide notification to the community during any period of emergency, including enemy attack)

- Deliverable: 1) Provide WWF34 NOAA weather radio coverage to the entire County 2) provide the ability to use the local Weather Radio transmitter for emergency broadcasts 3) develop a program/policy for dissemination of instructions and public awareness of the existence and use of/for the WWF34 NOAA broadcasting of weather data.
- Lead Manager Assigned: Local Radio Amateur Radio Civil Emergency Service (RACES) Coordinator
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Kalamazoo Amateur Radio Club (providers of

WWF34); Red Cross; MSU Extension; KCDC
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: High HR/HF
- 2012 Status Update: The 5th District Homeland Security Planning Board in 2008 moved to a new location and increased the height of a State of Michigan Public Safety Communications Tower in Gun Plain Township, Allegan County.

5(a)9: Action Item Description:
Enhance awareness and participation in riverine and urban flooding emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRDT/LF
- 2012 Status Update: Ongoing – This is primarily done by the local Township / City governmental unit. Once funding is available then we assist them in putting everything together to apply.

Dam Failures

Goal: Reduce Vulnerability to the Effects of Dam Failures

5(b)1:Action Item Description:
Conduct an annual review of dams to ensure consistency of EAP82 with EOP83.

- Deliverables: 1) Participate in Dam Safety FERC Project 9000; 2) Identify "Sunny Day" and "Rainy Day" failure modes; 3) Identify down-river hazard zones; 4) conduct annual review of Key Dams; 5) Develop, monitor, and revise plans for Key Dams (Bryand Mill, Spring Valley, Scotts Mill, Lake Doster (Silver Creek, Cooper Twp), Howlandsburg Dam, Monarch Mill, and Morrow Pond
- Lead Manager Assigned: KC Emergency Coordinator
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: FEMA; DEQ
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: High HRDT/LF
- 2012 Status Update: Completed –Dam plans are reviewed and updated annually by OEM.

5(b)2: Action Item Description:
Promote flood insurance via NFIP.
See Action Item: Promote awareness of, and the obtaining of flood insurance in Riverine and Urban Flooding section.

5(b)3: Action Item Description:

Enhance awareness and participation in dam failure emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or mitigation strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Schedule to Initiate Action: Ongoing
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Dam plans are reviewed and table top exercised each year.

Shoreline Flooding and Erosion

5(c)1: Not Applicable to Kalamazoo - No Great Lakes Boundaries.

Drought

Goal: Minimize the Effects of Drought for Kalamazoo County

5(d)1: Action Item Description:

Encourage Water-saving Measures by Consumers. (Especially during irrigation and farming).

- Deliverables: Establishment of, and/or participation in a committee whose purpose is to 1) Investigate the need for, and 2) recommend actions for water-conservation 3) distribute any resultant recommendations.
- Lead Manager Assigned: KC Emergency Coordinator - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: FEMA; DEQ; KCDC; Red Cross; MSU Extension
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: Medium LR/LF
- 2012 Status Update: Completed – This would only occur to a limited number of citizens in Kalamazoo County. The local government units that oversee the municipal water supply do this when need of because of weather. Public safety information instructions will be broadcast when needed.

5(d)2: Action Item Description:

Promote Agricultural Insurance.

- Deliverables: Establishment of, and/or participation in a committee whose purpose is to 1) Investigate the need for, and 2) recommend actions for obtaining Agriculture Insurance by/for affected farmers, and 3) distribute any resultant recommendations.
- Lead Manager Assigned: KC Emergency Coordinator - KCDC
- Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: FEMA; DEQ; KCDC; Red Cross; MSU Extension
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: Medium LR/LF

- 2012 Status Update: Completed – This is done using local insurance agencies.

5(d)3: Action Item Description:

Develop early warning of potential drought conditions, and prepare drought contingency plans.

- Deliverables: Establishment of, and/or participation in a committee whose purpose is to 1) Investigate the need for, and 2) recommend actions for the anticipation of potential drought conditions, preparation of drought contingency plans, and 3) distribute any resultant recommendations.
- Lead Manager Assigned: KC Emergency Coordinator - KCDC Schedule to Initiate Action: 3Q04
- Potential Sources of Technical Assistance: FEMA; DEQ; KCDC; Red Cross; MSU Extension
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – This is ongoing though out the year as weather is our #1 disaster and how it affects people and their life styles.

5(d)4: Action Item Description:

Enhance awareness and participation in drought emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Schedule to Initiate Action: Ongoing
- Priority: High LR/LF
- 2012 Status Update: Closed – Drought in this community has not been a major issue.

Category 6

Action Items Completed					Work in Progress		Ongoing	
6a1	6a2	6a3	6a4	6a5	X	X	6b4	6b5
6a6	6a8	6a9	6b1	6b2			6b8	X
6b3	6b6	6b7	6b9	6b10				
6c1	6c2	6c3	6c4	6d1				
6d2	6e1	6e2						

Fixed Site Hazardous Material Incidents (including explosions and industrial accidents)

Goal: Reduce Exposure to Hazardous Materials

6(a)1: Action Item Description:

Maintaining an Active and Viable Local Emergency Planning Committee (LEPC).

- Deliverables: Establishment of, and/or participation in a Local Emergency Planning Committee whose purpose is to:
- Develop and maintain a working knowledge of applicable Hazardous Materials regulations and practices.
- Develop Risk Management Plans for sites that manufacture, store, or handle hazardous materials (a.k.a. Hazardous Material Tier I Sites).
- Identify & monitor sites containing flammable materials (a.k.a. Tier II Sites)
- Conduct an annual report to the MSP.
- Establish and/or conduct training in and compliance with safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.
- Involve & inform Private and Public Officials, i.e., and e.g.: Police, Fire, Red Cross, Human Services, Park Services, Industry, etc.
- Establish recommended safety practices.
- Recommend actions for the anticipation of potential disaster conditions.
- Distributing resultant recommendations.
- Lead Manager Assigned: Chairman91 - L.E.P.C. - KCDC
- Schedule to Initiate Action: Ongoing - This is part of the KCDC
- Potential Sources of Technical Assistance: FEMA; DEQ; KCDC; Red Cross; MSU Extension, etc.
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: High HR/HF
- 2012 Status Update: Completed – Our County Disaster Committee handles this task and is made up of all disciplines.

6(a)2: Action Item Description:

Establish and maintain trained, equipped, and prepared site and local hazardous material emergency response teams.

- Deliverables: Recruitment of and/or development of local expertise, recommended practices, the acquisition of necessary materials for, and the conduction of training exercises for the purpose of maintaining a rapid deployment force for the purpose of responding to hazardous materials

incidents.

- Lead Manager Assigned: Emergency Coordinator - KCDC
- Schedule to Initiate Action: Ongoing - This is part of the KCDC
- Potential Sources of Technical Assistance: DEQ; KCDC; Red Cross; MSU Extension, etc.
- Potential Sources of Financial Assistance: Local Governments
- Priority: High HR/HF
- 2012 Status Update: Completed – Our County-wide Hazardous Materials Team does this task monthly at their training meetings. The Executive Committee meets monthly for management operations.

6(a)3: Action Item Description:

Establish/Maintain Compliance with/enforcement of Resource Conservation and Recovery Act (RCRA) standards.

- Deliverables: 1) Development of coverage map for existing sirens 2) Develop and deliver recommendations for enhancing the effectiveness of public warning systems 3) Investigate the possibility of using NOAA weather transmitter WWF-34 for the purpose of warning the public of hazardous material releases. 4) Make recommendations
- Lead Manager Assigned: Chairman - Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: Ongoing -- This is part of project P.A.W.N.
- Potential Sources of Technical Assistance: FEMA; NWS; KCDC; Red Cross
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: High LR/HF
- 2012 Status Update: Completed – This is a split project: #1 the outside warning siren system is operated by the local government body of that community. #2 is an emergency alert system – we can use that to notify people.

6(a)4: Action Item Description:

Develop hazardous material public awareness and worker education programs.

- Deliverables: 1) Development and initiation of an awareness plan 2) Development and initiation of a system for evaluating public awareness of hazardous materials procedures and resources, 3) Develop an improvement plan.
- Lead Manager Assigned: Chairman - Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: 3Q05
- Potential Sources of Technical Assistance: EPA; Fire Chiefs Association; KCDC; MSU Extension
- Potential Sources of Financial Assistance: Local Governments
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – This is done on a request basis only because of staffing levels. Local companies with hazardous waste know to educate their employees.

6(a)5: Action Item Description:

Facilitate community training and exercise programs.

- Deliverables: 1) Conduct regularly scheduled hazardous materials training and evaluation 2) Develop expertise and leadership in HAZMAT first-response 3) Develop HAZMAT kits for First Responders 4) Investigate/Develop best practices for community training 5) Make recommendations

- Lead Manager Assigned: KCDC
- Schedule to Initiate Action: Ongoing HAZMAT Training and HAZMAT Kits already in place.
- Potential Sources of Technical Assistance: FEMA; NWS; KCDC KALEX Planning Committee; Red Cross
- Potential Sources of Financial Assistance: FEMA; Local Governments
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – Each year we put out a CD with all the 302 sites, Tier I and II sites. This is given to all first responder organizations.

6(a)6: Action Item Description:

Identify and perform Brownfield cleanup activities.

- Deliverables: 1) Identify sites 2) Maintain Database 3) Conduct regularly scheduled inspection/follow-up 4) Make recommendations
- Lead Manager Assigned: Director - Environmental Health & Laboratory Services; Human Services Department
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: EPA; Local Governments
- Priority: High HR/HF
- 2012 Status Update: Completed – No further action in this action plan.

6(a)7: Action Item Description:

Develop & enhance community awareness of evacuation plans.

- Deliverables: 1) County-wide response plan 2) Regular participation in table-top and/or on-site training exercises by KCDC participants (includes for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites 3) Development of best practices recommendations 3) Dissemination of best practices recommendations
- Lead Manager Assigned: Emergency Coordinator - Kalamazoo County
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: EPA; Local Governments
- Priority: High HRDT/LF
- 2012 Status Update: Work in Progress – Much discussion is occurring with this item and some on-site training is still occurring.

6(a)8: Action Item Description:

Provide a forum to develop and implement fixed-site hazardous material mitigation strategies.

- Deliverables: 1) Establish and maintain a Disaster Planning Committee of representatives from all appropriate public and private businesses, government, and citizenry cooperative to evaluate the needs of, and the development of action plans for, County-wide mitigation and response to hazardous material spill/contamination within Kalamazoo County.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Railroads; Hospitals; Local

businesses
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- 2012 Status Update: Completed – We have had a Disaster / LEPC Committee for the past 15 plus years. Committee has about 100 people on its roster with approx 30 to 50 attendees each month.

6(a)9: Action Item Description:

Enhance awareness and participation in fixed site hazardous material emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – Our LEPC develops plans on all required sites. These plans are registered with the State EMD Office and sends copies to all First Responding Agencies within our County.

Hazardous Material Transportation Incidents

Goal: Reduce Vulnerability to Hazards Due to Hazardous Material Transportation Incidents.

6(b)1: Action Item Description:

Improve the design, routing, and traffic control at problem roadway areas.

- Deliverables: 1) Identification of problem roadway areas 2) Development of a long-term plan for addressing problem areas 3) Initiation of remedial steps 4) Initiation of permanent improvements 5) Development of best practices for design, routing, and traffic control 6) Develop policies to deal with issues such as a) the acceptance of new roads into the County public road system, b) encroachment or obstruction, c) Issuance of transportation permits for loads that exceed legal limits, d) work in or near public right of ways, e) and miscellaneous or general practices, etc.
- Lead Manager Assigned: Director, Kalamazoo County Road Commission
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCRC; MSP; KCDC; Fire Chiefs Association; KCDEH; EPA
- Potential Sources of Financial Assistance: Kalamazoo County; State and Federal taxes
- Priority: High HR/HF
- 2012 Status Update: Completed – Kalamazoo County Road Commission Traffic Engineer is assigned to this task and the need for change is reviewed annually. Changes occur as funding becomes available.

6(b)2: Action Item Description:

Reduce road congestion through long-term evaluation and planning for more connector roads.

- Deliverables: 1) Long-term plan 2) Communication of plan 3) Obtain funding 4) Initiate and complete plan steps 5) Review and recommend improvements
- Lead Manager Assigned: Director, Kalamazoo County Road Commission
- Schedule to Initiate Actions: Ongoing
- Potential Sources of Technical Assistance: EPA; Federal; State Highway
- Potential Sources of Financial Assistance: MDOT, Federal, State and Local taxes
- Priority: High HR/HF
- 2012 Status Update: Completed – County Roads are the responsibility of the Kalamazoo County Road Commission and State Roads by Michigan Department of Transportation. There are some combined projects as needed and the most recent is the I-94 project at Westnedge.

6(b)3: Action Item Description:

Conduct railroad inspections at problem railway/roadway intersections (At Grade Crossings, Rural Signs/Signals for RR crossing).

- Deliverables: 1) Identification of problem RR crossings 2) Develop a plan for inspection and improvement 3) Initiate inspections 4) Develop recommended practices 5) Implement recommended practices
- Lead Manager Assigned: Director, Kalamazoo County Road Commission
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCRC; Local Railroads
- Potential Sources of Financial Assistance: MDOT, USDOT
- Priority: High HR/HF
- 2012 Status Update: Completed – Kalamazoo County has very active railroads with freight and passenger transportation. This is the responsibility of the local railroad.

6(b)4: Action Item Description:

Enhance truck traffic weight, travel, and usage restriction awareness.

- Deliverables: 1) Develop methodology for increased identification of hazardous material trafficking throughout the County 2) Integrate and/or improve integration with existing (MDOT, Local Police Patrol, MSP, KCRC, etc) programs of usage/enforcement 3) Develop community awareness and action plans for public participation.4) Develop a plan for inspection and improvement 5) Develop recommended practices 6) Implement recommended practices
- Lead Manager Assigned: TBD Subcommittee within the KCDC
- Schedule to Initiate Action: 2Q05
- Potential Sources of Technical Assistance: KCRC; MSP; Local Railroads; MDOT; EPA; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: FEMA; MDOT, USDOT
- Priority: High HRNDT/LF
- 2012 Status Update: Ongoing – This is handled by two agencies on a regular daily basis. Locally the Kalamazoo County Road Commission has a Weigh Master and State Roads are handled by Michigan Department of State Police Motor Carrier Division.

6(b)5: Action Item Description:

Reduce roadway/railway hazardous material incidents through training, planning, and increased

preparedness. (in addition to fixed site emergencies)

- Deliverables: 1) Develop alternate and/or adjunct to Young's Environmental for faster and/or local HAZMAT expertise 2) Institute recruitment, training and improvement
- Lead Manager Assigned: President - Fire Chiefs Association
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; FEMA; DOT; Young's Environmental, KCDEH
- Potential Sources of Financial Assistance: Grants; EPA
- Priority: High HRNDT/LF
- 2012 Status Update: Ongoing – This is handled using Law Enforcement to enforce laws and provide education. Also involved are the Railroads, who provide educational materials and safety videos.

6(b)6: Action Item Description:

Enhance public warning systems & networks for HAZMAT incident evacuations.

- Deliverables: 1) Investigate and recommend methods of rapid dissemination of emergency instructions 2) Integrate into existing and/or planned alert systems 3) Integrate into evacuation plans 4) Develop and implement public awareness methodologies.
- Lead Manager Assigned: Kalamazoo County Emergency Coordinator
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; FEMA; Local Municipalities; Office of Homeland Security
- Potential Sources of Financial Assistance: Grants; FEMA; County and Local Governments; Office of Homeland Security
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – Kalamazoo County has different methods of notification, and one primary emergency notification system is our Emergency Alert System that broadcasts information over TV and Radio.

6(b)7: Action Item Description:

Develop and maintain wellhead protection monitoring and programs.

- Deliverables: 1) Monitor, map, and manage awareness and of proper groundwater use 2) Develop and administer programs for ensuring safe drinking water sources (Type I, II, III etc wells) 3) Actively participate in the Kalamazoo County Disaster Committee planning activities.
- Lead Manager Assigned: Director - Environmental Health & Laboratory Services, Kalamazoo County
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; KCDC
- Potential Sources of Financial Assistance: County and local governments; EPA
- 2012 Status Update: Completed – This is handled through our County Health and Community Services Environmental Department and local Water Departments (responsible for their own wells).

6(b)8: Action Item Description:

Ensure integration of hazardous spill planning into KCDC activities.

- Deliverables: 1) Recruitment and involvement of appropriate (Railroad, Highway, HAZMAT Team, First Responders, etc) representation into Countywide regularly scheduled planning,

training, and evaluation activities. 2) Develop and communicate best practices

- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Railroads; Hospitals
- Potential Sources of Financial Assistance: County and local governments; EPA; MSP
- Priority: High HR/HF
- 2012 Status Update: Ongoing – This occurs monthly with a County-wide Hazard Materials Team and its Executive Board, which is a sub-committee of the Kalamazoo County Fire Chief's Association.

6(b)9: Action Item Description:

Provide a forum for development and institution of hazardous material transportation mitigation strategies

- Deliverables: 1) Establish and maintain a Disaster Planning Committee of representatives from all appropriate public and private businesses, government, and citizenry for the purpose of cooperative evaluation of needs, and the development of action plans for the purpose of mitigation and response to hazardous material spill/contamination within Kalamazoo County.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Railroads; Hospitals; Local Businesses
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HR/HF
- 2012 Status Update: Completed – In place is the Kalamazoo County Hazardous Materials Team – Executive Board as well as the KCDC. These two groups cover this area well and information is exchanged both ways.

6(b)10: Action Item Description:

Enhance awareness and participation in hazardous material transportation emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Completed – In place is the Kalamazoo County Hazardous Materials Team – Executive Board as well as the KCDC. These two groups cover this area well and information is exchanged both ways.

Oil and Natural Gas Well Accidents

Goal: Reduce the Vulnerability to Oil and Gas Well Hazards

6(c)1: Action Item Description:

Ensure Community and Operator Compliance with Industry Safety Regulations and Standards.

- Deliverables: 1) Develop an inventory of oil and natural gas wells within Kalamazoo County 2) Develop an awareness plan for residents and businesses in close proximity to oil/natural gas wells 3) Establish, implement, and maintain a plan to ensure safety and compliance with recommended practices and/or rules/regulations for operation of oil/natural gas wells. 4) Develop best practices and recommendations.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Gas/Well Associations; Fire Chiefs Association
- Potential Sources of Financial Assistance: County and local governments; EPA; Industry
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – The Companies for each of these sites have their own education awareness programs, safety and compliance from the government and response needs and responsibilities.

6(c)2: Action Item Description:

Provide Community Awareness of Hydrogen Sulfide Gas Dangers (personal protection actions for these dangers)

- Deliverables: 1) Develop an awareness plan for residents and businesses in close proximity to oil/natural gas wells 2) Provide training to first responders 3) Develop best practices and recommendations.
- Lead Manager Assigned: President - Fire Chiefs Association
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Gas/Well Associations; Fire Chiefs; Red Cross
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA
- Priority: Medium HRNDT/LF
- 2012 Status Update: Completed – The Companies for each of these sites have their own education awareness programs, training programs for first responders, safety and compliance from the government and response needs and responsibilities.

6(c)3: Action Item Description:

Provide a Forum for Development and Institution of Oil and Natural Gas Hazard Mitigation Strategies

- Deliverables: 1) Establish and maintain a Disaster Planning Committee of representatives from all appropriate public and private businesses, government, and citizenry for the purpose of cooperative evaluation of needs, and the development of action plans for the purpose of mitigation and response to oil/natural gas hazards within Kalamazoo County 2) Include the communities of Alamo and Wakeshma Townships (hosts of the majority of oil and gas wells) as

co-leaders 3) Disseminate recommendations.

- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Railroads; Hospitals; Michigan Gas Association
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed – We have gone through this situation with the recent Enbridge oil spill. Our procedures are going to an Incident Command System and proceed as needed, based on the incident. Lessons learned have made us more aware and prepared to deal with such an emergency/disaster.

6(c)4: Action Item Description:

Enhance Awareness and Participation in Oil and Natural Gas Well Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Under the direction of regulations, the companies handling these activities conduct annual awareness programs and provide a strong information source to first responders and citizens.

Pipeline Accidents (Petroleum and Natural Gas)

Goal: Reducing Vulnerability to Pipeline Hazards

6(d)1: Action Item Description:

Develop/maintain awareness and adherence to pipeline regulations.

- Deliverables: 1) Establish and maintain a Disaster Planning Committee of representatives from all appropriate public and private businesses, government (i.e., and e.g.: the MPSC Gas Safety Office; the USDOT/OPS in Kansas City, Missouri; and the Michigan Department of Environmental Quality, Geological Survey Division (MDEQ/GSD, etc), and citizenry for the purpose of cooperative evaluation of needs, compliance with regulations, and the development of action plans for the purpose of mitigation and response to pipeline hazards within Kalamazoo County 3) Disseminate recommendations.
- Lead Manager Assigned: Emergency Management Director – Kalamazoo County OEM.
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; USDOT/OPS; State of Michigan/MPSC; MDEQ/GSD
- Potential Sources of Financial Assistance: County and local governments; EPA; MSP

- Priority: High HRDT/LF
- 2012 Status Update: Completed – Under the direction of regulations, the companies handling these activities conduct annual awareness programs and provide a strong information source to first responders and citizens.

6(d)2: Action Item Description:

Enhance awareness and participation in pipeline accident emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – Under the direction of regulations, the companies handling these activities conduct annual awareness programs and provide a strong information source to first responders and citizens.

Nuclear Power Plant Accidents

Goal: Reduce Vulnerability to Nuclear Power Plant Hazards

6(e)1: Action Item Description:

Provide the Forum for Developing Strategies and Training

- Deliverables: 1) Establish and maintain a Disaster Planning Committee of representatives from all appropriate public and private businesses, and government for the purpose of cooperative evaluation of needs, compliance with regulations, and the development of action plans to mitigation and respond to nuclear power plant hazards affecting Kalamazoo County 3) Disseminate recommendations.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; Nuclear Regulatory Commission; MSP; FEMA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – OEM has worked hard to enhance the Disaster Committee program and obtain input from all agencies. Many times this becomes a briefing to the partners of this group as to what's occurring in the communities.

6(e)2: Action Item Description:

Enhance Awareness and Participation in Nuclear Power Plant Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High LR/LF
- 2012 Status Update: Complete – OEM does not have any responsibilities that are related to the nuclear plants (Palisades & Cook) in the region. However we do work with the County-wide Haz Mat team to make sure they are trained and have proper equipment to handle any issues.

Category 7

Action Items Completed					Work in Progress		Ongoing	
7a1	7b1	7b2	7b3	7b4	X	X	7b15	X
7b5	7b6	7b7	7b8	7b9				
7b10	7b11	7b12	7b13	7b14				

Energy Emergencies

Goal: Lessen the Effect of Energy Emergencies

7(a)1: Action Item Description:

Enhance awareness and participation in energy emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC. 4) Obtain participation by Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Priority: High HRNDT/lf
- 2012 Status Update: Completed – OEM has worked with Consumers Energy in Kalamazoo during storms, and other events as well, to promote utility safety and preparedness.

Infrastructure Failures

Goal: Provide Interrupted Sources of Drinking Water to Kalamazoo Residents.

7(b)1: Action Item Description:

Establish Backup Sources of Water for Key or Critical Facilities.

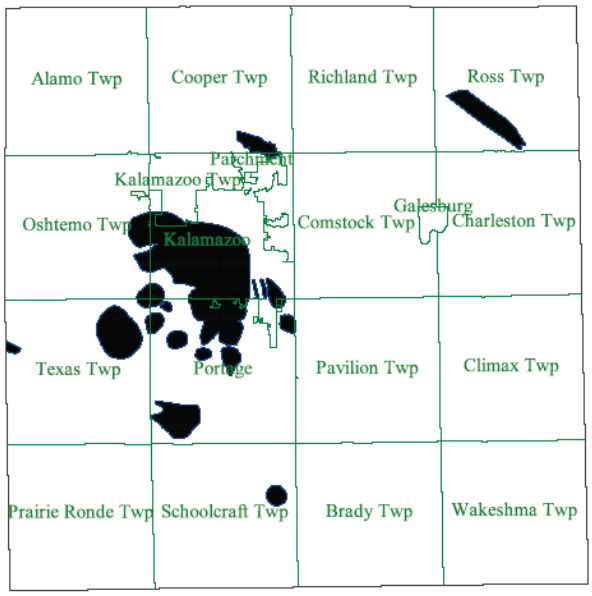
- Deliverables: 1) Survey of Type I and II water well operators to establish whether they have contingency plans for ensuring the continuation of water in the event of foreseeable hazards 2) Survey licensed food service agencies to establish whether they have contingency plans for ensuring the continuation of water in the event of foreseeable hazards 3) Establish and/or participate in a working committee within the KCDC to promote drinking water contingency planning 4) Develop best practices for drinking water contingency planning.
- Key Manager Assigned: Director - Human Services Department, Environmental Health & Laboratory Services
- Schedule to Initiate Action: 1Q05
- Potential Sources of Technical Assistance: DEQ; EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP

- Priority: High HRDT/LF
- 2012 Status Update: Completed – Depending upon the type of emergency or disaster, we have resources for different volumes of water needs. An immediate assessment is done on this issue, and proper response is activated.

7(b)2: Action Item Description:

Ensure Wellhead Protection for Groundwater Sources.

- Deliverables: 1) Establish/maintain surveillance of essential sources of groundwater (wellhead protection areas shown at right) 2) Meet federal, state, and/or local government requirements for the protection of groundwater sources 3) Establish and communicate contingency plans for ensuring protection of groundwater sources from foreseeable hazards 4) Establish and/or provide leadership in a working committee within the KCDC to promote groundwater contingency planning 5) Develop best practices for drinking water contingency planning.
- Key Manager Assigned: Water Resources Manager – City of Kalamazoo Department of Public Services Water Division.
- Schedule to initiate Action: Ongoing
- 2012 Status Update: Completed. This is managed by local government water departments such as the City of Kalamazoo Water Department. They also complete our LEPC requirements annually.



7(b)3: Action Item Description:

Implement the Kalamazoo Water Pumping and Distribution System Emergency Response Plan.

- Deliverables: 1) Determine Vulnerability 2) Determine Countermeasure and Cost 3) Develop Emergency Planning Scenario Models, 4) Develop best practices, 5) Communicate recommendations and/or procedures to the County via established communication media (such as the KCDC).
- Key Manager Assigned: Water Resources Manager - City of Kalamazoo Department of Public Services Water Division
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: DEQ; EPA

- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Our LEPC annual location review tracks the chemical and site storage of these sites and operations. We have on our KCDC a senior representative from the City of Kalamazoo Water Department.

7(b)4: Action Item Description:

Implement a Title III Site Plan for Water Treatment Operations.

- Deliverables: 1) Establish/maintain the Site Plan consisting of a) Off-Site Response, b) Standard Operating
- Procedures, and c) a Contingency Plan designed to meet the requirements of the Title III Emergency Response Plan 2) Develop best practices and 3) Communicate recommendations and/or procedures to the County via established communication media (to include the KCDC)
- Key Manager Assigned: Water Resources Manager - City of Kalamazoo Department of Public Services Water Division
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: DEQ; EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRDT/LF
- 2012 Status Update: Completed – Our LEPC annual location review tracks the chemical and site storage of these sites and operations. We have on our KCDC a senior representative from the City of Kalamazoo Water Dept.

7(b)5: Action Item Description:

Implement and Maintain a Risk Management Program

- Deliverables: 1) Establish/maintain the Risk Management Program 2) Standard Operating Procedures, and c) a Contingency Plan 4) Develop best practices and 5) Communicate recommendations and/or procedures to the County via established communication media (to include the KCDC)
- Key Manager Assigned: Water Resources Manager - City of Kalamazoo Department of Public Services Water Division
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: DEQ; EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRDT/LF
- 2012 Status Update: Completed – City of Kalamazoo Water Department maintains this risk program as part of their action response in case of an emergency and/or disaster.

7(b)6: Action Item Description:

Provide coordinated HAZMAT response for water treatment operations.

- Deliverables: 1) Establish policies and procedures for the identification of, and response to, chemical hazards associated with the water treatment process 2) Establish best practices 3) Coordinate efforts with existing and planned HAZMAT operations (e.g.: Kalamazoo City; KCDC; Fire Chiefs Association, etc)
- Key Manager Assigned: Wastewater Systems Manager- City of Kalamazoo Department of Public Services Water Division

- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: DEQ; EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – This is all part of our current site plans with the LEPC. This information is reviewed annually and submitted to State Police for review.

7(b)7: Action Item Description:

Establish and maintain accurate location of water and sewer mains.

- Deliverables: 1) Establishment of policies and procedures for the identification and recording of accurate locations using Geographic Information Service (GIS) technology 2) Integrate the map database into City and County GIS database(s) 3) Establish best practices
- Key Manager Assigned: Wastewater Systems Manager- City of Kalamazoo Department of Public Services Water Division
- Schedule to initiate action ongoing potential sources of technical assistance: DEQ, EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA;
- MSP Priority: High HR/HF
- 2012 Status Updates: Completed – These sites are already site on record at City of Kalamazoo Water Department.

7(b)8: Action Item Description:

Provide backup power source to the wastewater processing facility.

- Deliverables: 1) Establishment of policies and procedures for the procurement of stand-by and/or backup emergency power sufficient to power the water treatment facility 2) Install alternate power system(s) 3) Conduct routing testing of emergency power capability Key Manager Assigned: Wastewater Superintendent - City of Kalamazoo Department of Public Services Water Division
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: DEQ; EPA
- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – City of Kalamazoo has assessed their power needs and time period to operate without power. There are procedures and devices in place to cover this type of emergency/ disaster.

7(b)9: Action Item Description:

Maintain functioning and capacity of sewage lift stations.

- Deliverables: 1) Establishment of policies and procedures for the procurement of stand-by and/or backup emergency power sufficient to power the lift stations of transmission (sewer) lines that carry waste water to the main Kalamazoo treatment facility 2) Identify weaknesses in the system's ability to remain functional in the event of loss of commercial power 3) establish and communicate best practices to affected providers/communities.
- Key Manager Assigned: Chairman of TBD Subcommittee within the KCDC
- Schedule to Initiate Action: 2Q05
- Potential Sources of Technical Assistance: DEQ; EPA

- Potential Sources of Financial Assistance: County and local governments; EPA; FEMA; MSP
- Priority: High HR / HF
- 2012 Status Update: Completed – City of Kalamazoo has assessed their needs and operational procedures needs for such an emergency.

7(b)10: Action Item Description:

Provide redundancies in electrical utility systems serving "Lifeline" systems.

- Deliverables: 1) Establish and maintain a list of critical "Lifeline" systems 2) Prioritize needs 3) Develop and plans to mediate highest priority issues and 4) Participate in the activities of the KCDC.
- Lead Manager Assigned: Emergency Management Director – Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments; FEMA; Block Grants
- Priority: High HR/LF
- 2012 Status Update: Completed – This is a function of the Utility. Customers are listed as to what their mission is, and assigned a priority of service. As of September 11, 2001 the terrorist attacks have made the Utilities close access to records and information to all persons outside their company because of security. Therefore local unit of Emergency Management and first responders do not have a say in this detail, and this project is closed.

7(b)11: Action Item Description:

Provide a soil erosion and sediment control program - Public Act 504.

- Deliverables: 1) Enforce the Michigan Drain Code of 1956, 2) oversee drainage in most new construction sites, 3) participate as statutory member of lake boards which maintain lake levels, 4) Identify public health hazards within the scope of responsibility and 5) Participate in the activities of the KCDC
- Lead Manager Assigned: Drain Commissioner
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – This is managed by the Kalamazoo County Drain Commission Office. This activity follows state and federal guidelines. The Kalamazoo County Drain Commissioner is part of the KCDC group and attends and reports often.

7(b)12: Action Item Description:

Maintain a County Road Commission – KCRC

- Deliverables: 1) construct and maintain an effective county road system 2) Participate in the planning, training and evaluation activities of the KCDC
- Lead Manager Assigned: KCRC Managing Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and Local Governments
- Priority: High HR/HF

- 2012 Status Update: Completed – This is the action of the Kalamazoo County Road Commission and the local public works departments. KCRC is very active with the local governments within Kalamazoo County each year and is planning what roads to repair, replace, etc., depending on funding availability.

7(b)13: Action Item Description:

Maintain a Metropolitan County Planning Commission – KMCPC

- Deliverables: 1) Develop zoning and planning actions that assure the continuation of essential infrastructure services 2) Participate in the planning, exercise, and evaluation activities of the KCDC
- Lead Manager Assigned: KC Senior Planner
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and Local Governments
- Priority: High HR/HF
- 2012 Status Update: Completed – Each unit of government has its own "planning commission" that oversees their own needs. These departments do interact with each other as needed.

7(b)14: Action Item Description:

Maintain a Transportation Advisory Council – TAC

- Deliverables: 1) Maintain an effective Public Transit and Care-A-Van services 2) Advise the KC Board of Commissioners on public transit issues and recommendations 3) Participate in the planning, exercise, and evaluation activities of the KCDC
- Lead Manager Assigned: Metro Transportation Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: NHTSA; MSP; MDOT
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Updates: Completed – These two services are now becoming one and are moving forward with our community transportation needs.

7(b)15: Action Item Description:

Enhance awareness and participation in infrastructure emergency planning activities of the SEOC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HRDT/LF
- 2012 Status Updates: Ongoing – The 5th District Region of Counties is working on this project and are in the process of identifying critical infrastructure with our County and Region. These

sites once identified will be assessed and all information will be collected and entered into a secure data base which will store all CI information within the State of Michigan. A regional plan as already been adopted by the 5th District Homeland Security Planning Board.

Category 8

Action Items Completed					Work in Progress		Ongoing	
8a1	8a2	8a3	8a4	8a5	X	X	8a8	8a15
8a6	8a7	8a9	8a10	8a11				
8a12	8a13	8a14						

Public Health Emergencies

Goal: Eliminate Real or Perceived Public Health Threats

8(a)1: Action Item Description:

Provide an Emergency Management service to the County.

- Deliverables: 1) Prepare, respond, mitigate, and recover from nuclear, natural and manmade disasters 2) Develop and lead a Kalamazoo County Disaster Planning Committee -- KCDC -- comprised of volunteer representatives from all interested and/or relevant public, private, and governmental agencies within or affecting Kalamazoo County 3) Establish and disseminate resources, policies, procedures and best practices for issues affecting or related to Emergency Management 4) Provide liaison between appropriate agencies, individuals, and businesses for the purpose of providing a cooperative response to hazards and emergencies 5) Provide recommendation and counsel to County and local governments with respect to Emergency Planning and Operations.
- Lead Manager Assigned: Director – Office of Emergency Management
- Schedule: Ongoing
- Potential Sources of Technical Assistance: All federal state and local emergency planning and recovery operations
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – The Kalamazoo County Office of Emergency Management is the agency that develops the County-wide Emergency Plan. This was last completed in 2009 in a Emergency Action Guideline format. Since the Emergency Operation Center staff has trained on this plan is has been used for many different situations.

8(a)2: Action Item Description:

Encourage residents to receive immunizations against communicable diseases.

- Deliverables: 1) Prepare and disseminate immunization awareness bulletins timed with the flu/cold season. 2) Coordinate announcement(s) with the KCDC and local health department personnel.
- Lead Manager Assigned: Director, MSU Extension
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Red Cross; Department of Health
- Potential Sources of Financial Assistance: County and local governments;
- Priority: High HRDT/LF

- 2012 Status Update: Completed – The Kalamazoo County Health and Community Services department has been doing this for many years. They have prepared and exercised mass dispensing for this type of action.

8(a)3: Action Item Description:

Increasing public awareness of radon dangers and the prevention efforts that can be taken.
(to reduce concentrations of radon in homes and buildings).

- Deliverables: 1) Develop information and recommendations 2) Disseminate to residents 3) Initiate a follow-up plan.
- Lead Manager Assigned: Director, MSU Extension
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Red Cross, Department of Health
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HRDT/LF
- 2012 Status Update: Completed – This is monitored either by the individual citizen through a service of their local utility, or (in an Emergency) our County-wide Hazardous Materials Team has monitoring equipment to identify any level of danger that may occur.

8(a)4: Action Item Description:

Coordinate planning, resource development, and delivery of public health services.

- Deliverables: Provide: 1) Adult-Senior Services 2) Clinics 3) Data & Reports, 4) Emergency Assistance, 5) Environmental Health Information, 6) Housing Services, 7) Infant-Child Services 8) Permits - Licenses 9) Pregnant women assistance 10) Transportation, and 11) General health and welfare information to the citizenry of Kalamazoo County 12) Participate in the activities of the KCDC
- Lead Manager Assigned: Director, Human Services
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Bronson & Borgess hospital staff; Red Cross; State and Federal health services
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – This is primarily handled and operated under the Kalamazoo County Health & Community Services Department.

8(a)5: Action Item Description:

Maintain community water and sewer infrastructure at acceptable operating standards

- Deliverables: 1) Provide standards, policies, procedures, and operation of water and sewage operations 2) Establish and provide leadership to a cooperative alliance of Type I and II water well operators within the County 3) Provide representation and participation in disaster planning activities of the KCDC.
- Lead Manager Assigned: Superintendent – Water Reclamation Plant
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF

- 2012 Status Update: Completed – This is handled completely by the individual city water departments, who either have generator back-up or a secondary plan of operation.

8(a)6: Action Item Description:
Provide back-up generators for water and wastewater treatment facilities.
(to maintain acceptable operating levels during power failures)

- Schedule to Initiate Action: Ongoing -- See "Provide backup power source…" in Infrastructure section
- Priority: High HRNDT/LF
- 2012 Status Update: Completed – This is handled completely by the individual city water departments, who either have generator back-up or a secondary plan of operation.

8(a)7: Action Item Description:
Provide an Environmental Health Advisory Council – EHAC

- Deliverables: 1) Regular meetings 2) provide advocacy body and sounding board for matters of policy that affect citizens in need of environmental health services 3) Identify environmental health hazards affecting the County 4) Provide advise the County Board of Commissioners with respect to environmental health matters 5) Participate in the KCDC activities
- Lead Manager Assigned: Environmental Health Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – This is solely handled and operated under the Kalamazoo County Health & Community Services Department.

8(a)8: Action Item Description:
Provide an Educational Process and Resources for Addressing Agricultural Issues

- Deliverables: 1) Identify County agricultural needs and opportunities 2) Develop and deliver training and/or informational materials/programs 3) Identify hazards affecting agriculture 4) Provide leadership and influence in healthy agriculture, Natural Resource, Economic Development, Children and Youth programs (such as County Fair, 4-H, home economics, etc) 5) Identify and develop best practices for related activities 6) Participate in preparedness activities of the KCDC.
- Lead Manager Assigned: Extension Director - MSU Extension
- Schedule to Initiate Action: Ongoing
- Initial Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HRDT/LF
- 2012 Status Update: Ongoing – Kalamazoo County, in conjunction with Barry County, have been working on an agricultural plan that identified and takes care of this project.

8(a)9: Action Item Description:
Provide an Older Adult Services Advisory Council

- Deliverables: 1) Develop action plans that provide and assure the continuation of services to the senior population of the Kalamazoo community 2) Ensure representation by a nutrition provider, social service provider, elected official, and senior citizen 3) Develop and disseminate best

practices 4) Participate in preparedness activities of the KCDC

- Lead Manager Assigned: Older Adult Services Advisory Council Contact
- Schedule to initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA, Hospitals, Health organizations, federal health agencies
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Updates: Completed – This task is an operational task for the Red Cross and Kalamazoo County Health & Community Service Department.

8(a)10: Action Item Description:

- Deliverables: 1) Provide an informed advocacy body and sounding board for matters of policy that affect the lives of citizens who need environmental health services 2) Advise the County Board of Commissioners on environmental matters 3) Identify best practices for community health issues 4) Provide representation and participation in preparedness activities of the KCDC
- Lead Manager Assigned: Environmental Health Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; Hospitals; Health organizations; Federal health agencies
- Potential Sources of Financial Assistance: County and local governments
- 2012 Status Updates: Completed – This is solely handled and operated under the Kalamazoo County Health & Community Services Department.

8(a)11: Action Item Description:

Maintain a Homeless Advisory Council

- Deliverables: 1) Study the causes of homelessness within the County 2) Determine alternatives for managing the problem 3) Advise the KC Board of Commissioners of best practices 4) Provide representation and participation in preparedness activities of the KCDC.
- Lead Manager Assigned: Human Services Department Deputy Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; Hospitals; Health organizations; Federal health agencies
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Updates: Completed – This has already been completed by the local Homeless Missions and Churches. This is continuously being reported to the County Board of Commissioners. Recently there was a local item on the ballot to fund care for the homeless and it failed.

8(a)12: Action Item Description:

Maintain a Parks and Recreation Commission

- Deliverables: 1) Review health and safety aspects affecting public use of the parks within the County 2) Develop and advise the KC Board of Commissioners of best practices for ensuring public safety 4) Provide representation and participation in preparedness activities of the KCDC.
- Lead Manager Assigned: Parks Director
- Schedule to Initiate Action: Ongoing

- Potential Sources of Technical Assistance: EPA; Hospitals; Health organizations; Federal health agencies
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – This is an operation of the Kalamazoo County Parks and Recreation Department, as they have a Commission Board and a full-time Director with staff that handles all issues.

8(a)13: Action Item Description:

Maintain a Public Health Advisory Council

- Deliverables: 1) Determine issues affecting public health services needs of Kalamazoo County Citizens 2) Develop and advise the Kalamazoo County Board of Commissioners of best practices for on matters of policy that affect the lives of Kalamazoo County Citizens in need of public health services 3) Provide representation and participation in preparedness activities of the KCDC.
- Lead Manager Assigned: Human Services Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; Hospitals; Health organizations; Federal health agencies
- Potential Sources of Financial Assistance: County and local governments
- Priority: High HR/HF
- 2012 Status Update: Completed – This is solely handled and operated under the Kalamazoo County Health & Community Services Department.

8(a)14: Action Item Description:

Maintain a Solid Waste Management Planning Committee - SWMPC

- Deliverables: 1) Develop and recommend solid waste and resource recovery best practices 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Provide representation and participation in the planning, training, and evaluation activities of the KCDC.
- Lead Manager Assigned: Assistant Administrator for Economic and Community Development
- Schedule to initiate Action: Ongoing
- Potential Source of Technical Assistance: EPA; FCDC
- Potential Source of Financial Assistance: EPA; County Government
- Priority: High HR/HF
- 2012 Status Update: Completed – This is not in the circle of OEM's duties and its status is not available.

8(a)15: Action Item Description:

Enhance Awareness and Participation in Public Health Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations,

and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.

- Lead Manager Assigned: Signatory Agent President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Ongoing – Continue working relations between Emergency Management and Public Health, planning and conducting exercises together.

Category: 9

Completed					Work in Progress		Ongoing	
9a5	9a6	9a8	9a9		X	X	9a1	9a4
							9a2	9a7
							9a3	9a10

Transportation Accidents

Goal: Reduce the Effects of Air Transportation Accidents

Goal: Reduce the effects of Land Transportation Accidents

Goal: Reduce the risks presented by Michigan's High Speed Rail Program

9(a)1: Action Item Description:
Install video cameras at select rail crossings to encourage voluntary compliance with traffic laws.

- Deliverables: 1) Investigate opportunities for crossing cameras 2) Identify costs 3) Identify liabilities 4) Recommend options
- Lead Manager Assigned: TBD Subcommittee Chairperson - KCDC
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: Ongoing – Consideration as funding is available. This function is mostly connected to Law Enforcement.

9(a)2: Action Item Description:
Improve design, routing, and traffic control at problem roadway areas.

- Deliverables: 1) Investigate opportunities for improved traffic control 2) Identify costs 3) Identify liabilities 4) Recommend options (Related to "Maintain a County Road Commission in 7(b) Infrastructure Failures)
- Lead Manager Assigned: TBD Subcommittee Chairperson - KCDC
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: Ongoing – By all services.

9(a)3: Action Item Description:
Conduct Railroad Inspections and Improve Designs at Problem Railway/Roadway Intersections
(At Grade Crossings, Rural Signs/Signals for RR Crossing).

- Deliverables: 1) Investigate opportunities for improving inspections 2) Identify costs 3)

Identify liabilities 4) Recommend options (Related to "Maintain a County Road Commission in 7(b) Infrastructure Failures).

- Lead Manager Assigned: TBD Subcommittee Chairperson - KCDC
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRNDT/LF
- 2012 Status Update: Ongoing – This is conducted as needed by the Local Railroad user and the Road Commission. Changes are as needed or as funding allows.

9(a)4: Action Item Description:

Long-Term Planning That Provides More Connector Roads for Reduced Congestion of Arterial Roads.

- Deliverables: 1) Investigate opportunities for crossing cameras 2) Identify costs 3) Identify liabilities 4) Recommend options 5) Implement Options 6) Participate in KCDC planning, drills, and evaluation
- Lead Manager Assigned: KC Board of Commissioners Liaison to KCRC Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: Ongoing - This is conducted as needed by the Local government and the Road Commission. Changes are as needed or as funding allows.

9(a)5: Action Item Description:

Provide Designated Truck Routes.

- Deliverables: 1) Investigate opportunities for crossing cameras 2) Identify costs 3) Identify liabilities 4) Recommend options 5) Implement Options 6) Participate in KCDC planning, drills, and evaluation
- Lead Manager Assigned: KC Board of Commissioners Liaison to KCRC
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HR/HF
- 2012 Status Update: Completed – Both County and State have designated Truck Routes in place. When a problem occurs then normally a study is completed and actions are taken.

9(a)6: Action Item Description:

Ensure Enforcement of Weight and Travel Restrictions.

- Deliverables: 1) Investigate opportunities for improving cooperative effort amongst County, State, and Local road use enforcement 2) Identify costs 3) Identify liabilities 4) Recommend options 5) Implement Options 6) Participate In KCDC planning, drills and evaluation.
- Lead Manager Assigned: TBD Subcommittee within KCDC

- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: Completed - This is covered by both the Department of State Police Motor Carrier Division and the County Road Commission (Weight Master).

9(a)7: Action Item Description:

Use ITS (Intelligent Transportation Systems) Technology.

- Deliverables: 1) Investigate opportunities for installing ITS 2) Identify costs 3) Identify liabilities 4) Recommend options 5) Implement Options 6) Participate in KCDC planning, drills, and evaluation
- Lead Manager Assigned: TBD Subcommittee within KCDC
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium HRDT/LF
- 2012 Status Update: On-Going – Currently Michigan Department of Transportation is installing camera systems that will allow us to monitor I-94 traffic and road conditions.

9(a)8: Action Item Description:

Airport Maintenance, Security, And Safety Programs.

- Deliverables: 1) Investigate opportunities for improving maintenance, Security and Safety 2) Identify costs 3) Identify liabilities 4) Recommend options 5) Participate in KCDC planning, drills, and evaluation
- Lead Manager Assigned: TBD KC Airport Advisory Board Liaison
- Schedule to Initiate Action: 3Q05
- Potential Sources for Technical Information: NTSB; FAA
- Potential Sources of Financial Assistance: FAA; MSP; KC
- Priority: Medium HRNDT/LF
- 2012 Status Update: Completed – In 2010 & 2011, Kalamazoo County built a new Airport Terminal which is operational. Currently a new 10 story FAA Tower is being built and in 2013 a new Crash/Fire Station and Maintenance Building will be built.

9(a)9: Action Item Description:

Provide Training, Planning and Preparedness for Mass-Casualty Incidents Involving All Modes of Public Transportation.

This is Part of regularly scheduled KCDC Table-top and annual Kalamazoo (Training) Exercises - KalEx200x:

- Priority: High HRNDT/LF
- 2012 Status Update: Completed – Each year, Kalamazoo County conducts a full-scale exercise of some kind, and in that exercise is a transportation element. In 2011 the transportation part involved the Airport, as every three years they have to re-certify their emergency plan and action.

9(a)10: Action Item Description:

Enhance Awareness and Participation in Transportation Accident Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: High HR/HF
- 2012 Status Update: Ongoing – This is done by multiple agencies in different fashions. Local governments receive grant funding for additional Law Enforcement, etc., to get the word out.

Category: 10

Completed					Work in Progress		Ongoing	
10a1	10c1	10d1	10d2	10d3	10b1	10b2	X	X
					10d4	10d5		

Cross Hazard Issues

Goal: Meet FEMA-1346-DR-MI Grant Agreement requirements

Achieve compliance with the most recently revised Michigan Hazard Mitigation Plan, developed as a requirement of Section 409 of the Stafford Act, 42 U. S. C. 5172.

10(a)1: Action Item Description:
Establish a Hazard Mitigation Planning Subcommittee within the KCDC.

- Deliverables: 1) Establish a Kalamazoo County Hazard Mitigation Planning Core (KCHMPC) Committee team to lead the development of the KCHMP. 2) Provide ongoing leadership through active participation of the KCHMPC.
- 3) Maintain effective staffing of the State Hazard Mitigation Planning Subcommittee.
- Lead Manager Assigned: Emergency Management Director – Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MSP; FEMA; KCDC
- Potential Sources of Financial Assistance: FEMA; MSP; Local Government; Volunteers
- Priority: High HRDT/LF
- 2012 Status Update: Completed – In 2004, when the original HM Plan was going to be developed, a consultant was hired and came in to develop the plan. At that time, a Hazard Mitigation Planning Sub-committee was developed. In 2012 that committee no longer exists. Today, we use the **whole** Disaster Committee as a group to work through and develop much needed ideas and plans.

Establish conformance with 44 CFR Part 9 (Floodplain Management and Protection of Wetlands)…and 44 CFR Part 10 (Environmental Considerations).

10(b)1: Action Item Description:
Implement a plan to meet the requirements of Floodplain Management and Protection of wetlands.

- Deliverables: 1) Determine the requirements of 44 CFR Part 9 (Floodplain Management and Protection of Wetlands) 2) Develop recommendations for establishing compliance.
- Lead Manager Assigned: Chairman – Local Hazard Mitigation Planning Subcommittee, KCDC
- Schedule to Initiate: 4Q2004
- Potential Sources of Technical Support: KCDC; FEMA; MSP; Local Municipalities
- Potential Sources of Financial Assistance: KCDC; FEMA; MSP; Volunteers
- Priority: High HRDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

10(b)2: Action Item Description:

Implement a plan to meet the requirements of 44 CFR Part 10 (Environmental Considerations)

- Deliverables: 1) Determine the requirements of 44 CFR Part 10, 2) Develop recommendations for establishing compliance.
- Lead Manager Assigned: Chairman – Local Hazard Mitigation Planning Subcommittee, KCDC Schedule to Initiate: 4Q04
- Potential Sources of Technical Support: KCDC; FEMA; MSP; Local Municipalities Potential Sources of Financial Assistance: KCDC; FEMA; MSP; Volunteers
- Priority: High HRDT/LF
- 2012 Status Update: Open – Work in Progress – No further information at this time.

Meet the local planning requirements of the Disaster Mitigation Act of 2000 (PL 106-390) and the Interim Final Rule of 44 CFR parts 201 and 206 on Hazard Mitigation Planning and Hazard Mitigation Grant Program (Federal Register Vol. 67, No. 38, pages 8844 to 8854).

10(c)1: Action Item Description:

Include the Local Hazard Mitigation Specialist – MSP EMD – on the KCHMPC.

- Deliverables: 1) Review ongoing activities of the KCHMP 2) Provide reference material. 3) Provide counsel and offer recommendations for meeting the requirements of PL 106-390 and appropriate references.
- Lead Manager Assigned: Emergency Management Director – Kalamazoo County OEM
- Schedule to Initiate: Ongoing
- Potential Sources for Technical Assistance: MSP EMD; FEMA; County Legal Department
- Potential Sources for Financial Assistance: MSP; FEMA; County and Local Government; Office of Homeland
- Security, Volunteers
- Priority: High HRDT/LF
- 2012 Status Update: Completed – During the original development of this initial Hazard Mitigation Plan EMHSD/MSP played a strong part in making the original plan a completed project. Currently the same is occurring, where MSP EMHSD is working to review the draft and complete the update so that FEMA will approve it.

Ensure that the HCHMP is intended to substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster.

10(d)1: Action Item Description:

Document that the KCHMP addresses a problem that has been repetitive……or a problem that poses a significant risk if left unsolved.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMD; FEMA; County and Local governments.

- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP – EMD
- Priority: High HRDT/LF
- 2012 Status Update: Completed – In the update of 2012 each entry has been carefully reviewed to reflect the status of the project or its completion.

10(d)2: Action Item Description:

Document that the KCHMP attempts to identify the most practical, effective, and environmentally sound mitigation alternatives……after consideration of a range of options.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMD; FEMA; County and Local governments. Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP – EMD
- Priority: High HRDT/LF
- 2012 Status Update: Completed – All our projects are accomplished this way, as funding and efforts are hard to come by. Without using these elements we would not be able to have the success we've had. Work in Progress – Much discussion is occurring on this item and some on-site training is still occurring.

10(d)3: Action Item Description:

Document that the KCHMP contributes, to the extent practicable, to a long-term solution to the problem it is intended to address.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMD; FEMA; County and Local governments.
- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP – EMD
- Priority: High HRDT/LF
- 2012 Status Update: Completed – After incident debriefings we follow-up by reviewing parts of this plan to see if any part has been achieved, or for future enhancement.

10(d)4: Action Item Description:

Document that the KCHMP considers long-term changes to the areas and entities it protects.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMD; FEMA; County and Local governments.
- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP – EMD
- Priority: High HRDT/LF

- 2012 Status Update: Open – Work in Progress – No further information at this time.

10(d)5: Action Item Description:

Document that the KCHMP provide manageable future maintenance modification requirements.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMD; FEMA; County and Local governments.
- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP – EMD
- 2012 Status Update: Open – Work in Progress – No further information at this time.

CHAPTER 5: ACTION PLAN (2013 to 2017)

The following actions have been adapted from those that had not been considered complete from the original 2006 edition of the KCHMP. (Those that are considered complete only appear in Chapter 4 of this document.)

Based upon the discussion of the KCHMP at its December, 2012 meeting, highest priority has been given to the actions that are specifically considered to be hazard mitigation actions. Although various education and preparedness programs are still recognized as important, it was considered vital that they not unduly distract from the main point of this plan—advance actions taken to physically reduce the impacts of hazards and threats in the long term.

Priority has been given to actions that are considered likely to be most cost-effective, fundable under federal hazard mitigation grant programs, politically acceptable, environmentally sound, not already fully covered under other types of programs, and most likely to accomplish their intended hazard mitigation purposes. The action items have thus been prioritized into smaller lists of 11 high priority items, 22 medium priority items, and 17 moderate priority items. These have not been more finely ranked within these three categories, because of the difficulty in trying to compare things that are very different from each other. Many of these items are scheduled for simultaneous implementation, or implementation that is contingent upon external funding sources, which further complicates scheduling and prioritization estimates. Schedules are given in terms of an estimated initiation point, rather than an attempt to describe unpredictable contingencies. By its nature, emergency management deals with the unexpected (i.e. disasters), tending to make scheduling predictions more of a statement of intended prioritization rather than a clear-cut activity, since sudden, overt disastrous events necessarily have to be given higher priority within emergency management than long-term activities that are subtler, smaller-scale, and less impactful.

Various actions have been re-worded to allow for more general, multi-hazard, coordinated activities, rather than the hazard-by-hazard approach taken in 2006. Chapter 4 partially indicates the range of hazard mitigation activities that were considered, but discussion included many other ideas, based upon the MSP publication 207 ("Local Hazard Mitigation Planning Workbook," February 2003 edition) and its lists of hazard mitigation strategies (on pages 74 to 83). Rather than reprinting all these pages here, this document can be found online at
http://www.michigan.gov/msp/0,4643,7-123-1593_3507-14743--,00.html.
(A newer edition of that document will reportedly be posted in the Spring of 2013, which may cause these page numbers to change.)

Several new hazard mitigation actions have been added to this updated plan, as a result of KCDC discussions and local community input into the plan. In the list below, they have been specifically labeled as "NEW." All of these additional hazard mitigation actions appear in the high priority action list.

NOTE: In addition to these lists, please refer to the hazard mitigation strategies described by participating local communities, in Appendix A.

HIGH PRIORITY HAZARD MITIGATION ACTIONS FOR KALAMAZOO COUNTY

1. NEW Action Item Description:
Add new warning systems (e.g. outdoor sirens) where needed to fill gaps in Kalamazoo County's current coverage.

- Deliverables: New outdoor warning sirens (or alternative emergency notification systems, as determined by local/county officials)
- Lead Manager Assigned: OEM and participating local governments
- Schedule to Initiate Action: Spring 2013

- Potential Sources for Technical Information: MDOT; Fire Departments; MSP; FEMA, KCDC
- Potential Sources of Financial Assistance: MSP, FEMA
- Priority: High

2. Action Item Description:

Make available safe rooms (or shelters) in houses, manufactured home communities, community facilities and business districts.

- Identified needs include the downtown Kalamazoo area (e.g. Arcadia Festival and other events) and mobile home parks. Additional areas for further investigation include the identification of any remaining needs within local schools, and identifying special needs populations who may require safe rooms (e.g. adult foster care, etc.)
- Deliverables: 1) Conduct a survey and create a database of existing shelters in, at, near, or available to vulnerable areas/communities. 2) Develop a method for identification and dissemination of best practices for such shelters. 3) Develop a process (KCDC) for updating and sharing such information with potentially affected communities and their residents, and a method for disseminating information to visitors. 4) Coordinate testing and public education to coincide with the weekly testing of the weather/fire emergency siren broadcasts. 5) Coordinate the dissemination of information (develop a plan) to residents (MSU Extension, etc).
- Lead Manager Assigned: Local governments, OEM
- Schedule to Initiate Action: Spring 2013
- Potential Sources of Technical Assistance: FEMA; KCDC; Office of Homeland Security; County Planning Department; County Building Inspectors, Western Michigan University.
- Potential Sources of Financial Assistance: FEMA; Kalamazoo County; Local Governments.
- Priority: High

3. NEW Action Item Description

Encourage and implement the anchoring of vulnerable mobile homes to a secure foundation (to lessen damages from winds, tornadoes, and floods).

- Deliverables: The successful anchoring of mobile homes, and/or the promotion of the concept to encourage relevant owners, inhabitants, and managers to engage in anchoring activities, possibly including the distribution of materials about the topic. The internet contains various web sites about the topic, easily found through keyword searches such as "anchoring mobile homes."
- Target Audience: Code officials, building officials, building inspectors, mobile home residents, mobile home park owners/operators, the insurance industry, etc.
- Lead Manager Assigned: Local governments, OEM
- Scheduled to Initiate: Winter 2013
- Estimated Costs: Probably less than $100 per unit, not counting the labor involved.
- Proposed Sources of Technical Assistance: KCDC; Broadcast Media; WMU; OEM
- Potential Sources of Financial Assistance: FEMA, Local and private funds
- Priority: High

4. NEW Action Item Description:

Develop and/or enhance a method for using low-power AM radio broadcasts (e.g. "Highway Advisory Radios") for the purpose of transmitting localized emergency management information.

- Deliverables: The establishment of a local low-frequency radio station that broadcasts relevant information to the public. Also, the provision of local signs that inform residents and travelers of the availability of such information on the new radio station.
- Target Audience: All local residents, businesses, travelers, and visitors.
- Lead Manager Assigned: OEM
- Scheduled to Initiate: Summer 2013

- Estimated Costs: Costs of producing tapes for radio stations estimated at $5,000. Not counting the building space needed for a broadcasting station, or for transmission devices, or for operating costs and wages, a basic radio station could probably be set up with a few thousand dollars of equipment.
- Proposed Sources of Technical Assistance: KCDC; KARC; Broadcast Media; WMU; MSU Extension
- Potential Sources of Financial Assistance: FEMA, Office of Homeland Security, Local donations
- Priority: High

5. Action Item Description:

Provide NWS weather monitors to selected agencies.

- Deliverables: Supply Programmable Weather Monitors for reduced or no cost to areas of the County not covered by current, radio activated siren warning systems. Distribute and Program Monitors, Training on Monitor Use. NOTE: Smart phone warnings may be able to serve as an alternate means of accomplishing this action.
- Target Audience: Adult Foster Homes (116), Day Care Facilities (143 private outside of current siren areas – 414 total locations), Apartments (200 locations, 19,168 units), Manufactured Homes (29 locations, 5,020 units), Hotels, Motels (38), Hearing-Impaired (500). (Schools, libraries, and local government offices are covered.)
- Lead Manager Assigned: OEM, Local governments
- Scheduled to Initiate: Ongoing
- Estimated Costs: Costs of producing tapes for radio stations estimated at $5,000. ($54.00 per monitor, $128.00 for monitor and accessories for the hearing impaired). Based on listed quantities, cost estimates range from $98,344 (one unit per location listed) to $1,365,562 (one unit for each location and every apartment and manufactured home).
- Proposed Sources of Technical Assistance: KCDC; KARC; Broadcast Media; WMU; MSU Extension
- Potential Sources of Financial Assistance: FEMA, Office of Homeland Security, Local donations
- Priority: High

6. Action Item Description:

Provide take-cover locations for manufactured housing communities.

- Deliverables: 1) Basements underneath community centers for take cover in case of a tornado. 2) Tornado Shelters. 3) Building a community center which would include a basement for take cover. 4) Adding a basement to a future community center for take cover purposes - location: manufactured home community.
- Lead Manager Assigned: Chairman of Local Hazard Mitigation Subcommittee of KCDC
- Scheduled to Initiate: Ongoing
- Costs: Varies by project for basements. Pre-fabricated shelters cost approximately $6,000 for a 12-person shelter, installed. Costs are projected to range between $174,000 (one pre-fabricated unit per park) and $7,530,000 (assumes on average 3 persons per mobile home times about 5,000 units in the County)
- Proposed Sources of Technical Assistance: KCDC; KARC; WMU; MSU Extension
- Proposed Sources for Financial Assistance: FEMA; Office of Homeland Security; Local In-Kind contributions
- Priority: High

7. Action Item Description:

Establish heating centers/shelters for vulnerable populations.

- Deliverables: Establish and publish a list of available shelters. NOTE: This task ties in with the need for backup power generators at the shelter facilities.
- Lead Manager Assigned: Red Cross representative - KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: MSU Extension; FEMA; Red Cross
- Potential Sources of Financial Assistance: Red Cross; Local Governments
- Priority: High

8. Action Item Description:

Promote the use of snow fences or "living snow fences" (rows of trees or vegetation) to limit the blowing and drifting of snow over critical roadway segments.

- Deliverables: Procedures, guidelines, and actual installation of appropriate snow fencing. Likely sites identified at the county level include M-43 from G Avenue into Richland, U.S.-131 south of Schoolcraft, and I-96 between Galesburg and Augusta. (Participating local governments have identified their own locations for local prioritization—please refer to the Appendix for this information.)
- Lead Manager Assigned: KCRC, local governments
- Scheduled to Initiate: Winter 2012-2013
- Potential Sources of Technical Assistance: Online guidance, MDOT, KCRC.
- Potential Sources of Financial Assistance: County; Federal; State
- Priority: High

9. Action Item Description:

Investigate Best Practices for Protecting Critical Infrastructures

- Deliverables: 1) Analysis and recommendations for protecting Critical Infrastructures within Kalamazoo County; 2) new and amended continuity of operations plans; 3) greater inclusion of the financial and utility sectors; 3) improved security surveillance.
- Lead Manager Assigned: KCDC (plus OEM, involved public and private agencies)
- Schedule to Initiate Action: ongoing
- Potential Sources of Technical Assistance: Michigan Quality Council; KCDC; WMU; CIAO; NIPC
- Potential Sources of Financial Assistance: Kalamazoo County Governments
- Priority: High (The importance of this issue has only increased over recent years.)

10. Action Item Description:

Investigate the Use of ITS (Intelligent Transportation Systems) Technology for public warning and emergency information purposes.

- Deliverables: 1) Investigate opportunities for coordination with MDOT, 2) Installation of actual ITS devices, 3) Identify all involved costs and potential liabilities 4) Evaluate, select, and implement options, as coordination and resources allow, 5) Participate in KCDC planning, drills, and evaluation
- Lead Manager Assigned: KCDC, OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: High

11. NEW Action Item Description:

Obtain and install backup power generators at key facilities within Kalamazoo County and its local communities.

- Deliverables: 1) Investigate opportunities for installing generators at key facilities such as water pumping stations, lift stations, cell phone facilities, medical care facilities, and American Red Cross shelters (4 currently have backup generators). Current hospital generators may be undersized. 2) Identify costs involved. 3) Obtain funding, as needed and available. 4) Install generators at key selected locations, when possible. 5) Some generators may be able to be shared between more than one facility when these are located near each other.
- Lead Manager Assigned: OEM, Local governments
- Schedule to Initiate Action: Spring 2013
- Potential Sources for Technical Information: Fire Departments; KARC; KCDC; MSP
- Potential Sources of Financial Assistance: FEMA; MSP
- Priority: High

MEDIUM PRIORITY HAZARD-RELATED ACTIONS FOR KALAMAZOO COUNTY

The following were judged not to be purely hazard mitigation actions, and thus are classified as medium-priority for this plan, even though some are more generally considered high-priority for the county as a whole (outside of a specific hazard mitigation planning context). Some closely-related ideas have been merged together in this updated 2012 list of hazard-related activities for 2013-2017

1. Action Item Description:

Promote Completion of Site Emergency Plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: Establish a consortium of public citizenry (MCCC, KCDC, etc.) to obtain, review, and report best practices relating to emergency plans, mitigation activities, and success stories.
- Lead Manager Assigned: Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security; Insurance Industry
- Priority: Medium (Ongoing. These are response plans and thus not prioritized within this hazard mitigation plan.)

2. Action Item Description:

Enhance awareness and participation in emergency planning activities of the KCDC, including civil disturbance, WMD-related, and threat/risk assessment, planning, and analysis activities.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC. 4) Regular analysis and recommendations regarding WMD-related threats/activity. 5) Inclusion of risk and threat assessment information within continuity of operations plan. 6) Continue to participate in annual MSP reviews. 7) Include in COOP plans.
- Lead Manager Assigned: Local governments (Fire Services, EMS, KCDC members, 5th District Medical Resource Coalition)
- Priority: Medium (ongoing; periodic for specific public events and general WMD awareness)

3. Action Item Description:

Promote Awareness for Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: Develop and distribute awareness pamphlets at events such as the County Fair; Invitation to businesses to participate in the annual KALEX training exercise.
- Lead Manager Assigned: PIO - MSU Extension Office
- Schedule to Initiate Action: County Fair - 2013
- Potential Sources of Technical Assistance: KCDC; MSP
- Potential Sources of Financial Assistance: N/A
- Priority: Medium (ongoing, periodic)

4. Action Item Description:

Establish avenues of reporting (and rewards) for information preventing terrorist incidents and sabotage.

- Deliverables: Recommendation for promotion and/or implementation of anonymous reporting system (may include www discussion group, email, and mail or telephone process).
- Lead Manager Assigned: Kalamazoo County Emergency Management Director
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; MSU Extension; Office of Homeland Security
- Potential Sources of Financial Assistance: MSU Extension; Local Governments
- Priority: Medium (ongoing; the "See Something, Say Something" campaign is one of the recent forms that this action involves)

5. Action Item Description:

Encourage residents to develop a Family Disaster Plan that includes the preparation of a Disaster Supplies Kit.

- Deliverables: Help disseminate the Homeland Security messages for it. Establish a presence for it on the County Web. Establish discussion group -- with process to monitor and evaluate by some member of the KCDC for encouraging discussion and obtaining information.
- Lead Manager: PIO - KCDC (MSU Extension)
- Scheduled to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Office of Homeland Security
- Potential Sources of Financial Assistance: Office of Homeland Security; FEMA
- Priority: Medium (ongoing)

6. Action Item Description:

Promote community awareness of shelters and warning systems.

- Deliverables: 1) Conduct a survey of existing and undersized shelters for the possibility of refurbishment, expansion, or supplementation. 2) Publish/Distribute a list of facilities to the 24 units of governments' emergency responders (via the KCDC).
- Lead Manager Assigned: Red Cross ESS Director
- Scheduled to Initiate Action: Summer 2013
- Potential Sources of Technical Assistance: KCDC; FEMA; Red Cross
- Potential Sources of Financial Assistance: County
- Priority: Medium (ongoing)

CHAPTER 5: ACTION PLAN (2013 to 2017)

7. Action Item Description:

Use safe interior designs and furniture arrangements to reduce the chances of damage/injury from earthquakes, wildfires, and tornado/wind hazards.

- Deliverable: 1) Develop a team to evaluate and/or develop best practices 2) Disseminate them to the public 3) Develop a means for evaluate the effectiveness of interior designs after an event.
- Lead Manager Assigned: KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: International Code Council; Building Associations; MSP; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: Medium (ongoing)

8. Action Item Description:

Provide emergency information to residents and guests who speak English as a second language.

- Deliverables: Advertising/Educating of its availability, Partnering with selected radio and TV stations, Interpretation services for partnering stations, Procedures on how to broadcast such messages.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC.
- Scheduled to Initiate: Ongoing
- Estimated Costs: Costs of producing tapes for radio stations estimated at $5,000.
- Potential Sources of Financial Assistance: Office of Homeland Security, Local donations
- Priority: Medium (ongoing)

9. Action Item Description:

Organize outreach to isolated, vulnerable, or special-needs populations.

- Deliverables: Investigation and tabulation of priority needs populations; recommendations for action.
- Lead Manager Assigned: Red Cross representative - KCDC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: MSU Extension; FEMA; Red Cross
- Potential Sources of Financial Assistance: FEMA; Red Cross; Local Governments
- Priority: Medium (ongoing, uses a regularly changing list of licensed facilities)

10. Action Item Description:

Enhance awareness livestock and pet needs/problems during severe weather.

- Deliverables: 1) Obtain best practices for animal/pet housing, emergency procedures, shelter, and care during storms, and rescue. 2) Coordinate with KC Animal Control Advisory Board 3) Dissemination of information to the community.
- Lead Manager Assigned: Chairperson – Emergency Animal Care Subcommittee of the KCDC
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: KC Animal Control Advisory Board, 4H; FEMA; Laboratory Animal
- Medicine and Science - Worldwide Safety Sciences, Pfizer; Veterinary House Calls of Grand Rapids92; Red Cross
- Potential Sources of Financial Assistance: N/A
- Priority: Medium (ongoing)

CHAPTER 5: ACTION PLAN (2013 to 2017)

11. Action Item Description:

Implement plans for Floodplain Management and Protection of wetlands.

- Deliverables: 1) Determine the requirements of 44 CFR Part 9 (Floodplain Management and Protection of Wetlands) and 44 CFR Part 10 (Environmental Considerations), 2) Develop recommendations for establishing compliance.
- Lead Manager Assigned: Chairman – Local Hazard Mitigation Planning Subcommittee, KCDC
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Support: KCDC; FEMA; MSP; Local Municipalities
- Potential Sources of Financial Assistance: KCDC; FEMA; MSP; Volunteers
- Priority: Medium (ongoing, City of Kalamazoo Flood Plan, separate Floodplain Mgmt.)

12. Action Item Description:

Promote basic building code requirements related to flood mitigation.

- Deliverables: 1) Develop benchmark building code requirements 2) Develop recommendations for comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning.
- Lead Manager Assigned: KCDC Chairman - in partnership with City, Township, Village and County Planning agencies
- Departments
- Scheduled to Initiate: 2013
- Potential Sources of Technical Assistance: NFIP, MDEQ
- Potential Sources of Financial Assistance: County
- Priority: Medium (ongoing)

13. Action Item Description:

Promote awareness of the benefits of obtaining flood insurance.

- Deliverables: Established mechanisms to promote the use of flood insurance under the National Flood Insurance Program to residents in flood prone areas or areas with a history of flooding. Possible measurable: An increased the number of policies and participating communities.
- Lead Manager Assigned: KCDC Chairman
- Scheduled to Initiate: Ongoing
- Potential Sources of Technical Assistance: NFIP, MDEQ, FEMA
- Potential Sources of Financial Assistance: County
- Priority: Medium (ongoing)

14. Action Item Description:

Increase awareness, coverage and use of NOAA Weather Radio (which can also provide notification to the community during any period of emergency, including enemy attack)

- Deliverable: 1) Provide WWF34 NOAA weather radio coverage to the entire County, 2) provide the ability to use the local Weather Radio transmitter for emergency broadcasts, 3) develop a program/policy for dissemination of instructions and public awareness of the existence and use of/for the WWF34 NOAA broadcasting of weather data, 4) include Smart Phone access.
- Lead Manager Assigned: Local Radio Amateur Radio Civil Emergency Service (RACES) Coordinator
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: Kalamazoo Amateur Radio Club (providers of WWF34); Red Cross; MSU Extension; KCDC
- Potential Sources of Financial Assistance: FEMA; Red Cross
- Priority: Medium (ongoing)

15. Action Item Description:

Develop & enhance community awareness of evacuation plans addressing hazardous material risks.

- Deliverables: 1) County-wide response plan 2) Regular participation in table-top and/or on-site training exercises by KCDC participants (includes for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites 3) Development of best practices recommendations 3) Dissemination of best practices recommendations
- Lead Manager Assigned: Emergency Coordinator - Kalamazoo County
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: FEMA; EPA
- Potential Sources of Financial Assistance: EPA; Local Governments
- Priority: Medium (ongoing)

16. Action Item Description:

Enhance truck traffic weight, travel, and usage restriction awareness to reduce the chances of hazardous material transportation accidents.

- Deliverables: 1) Develop methodology for increased identification of hazardous material trafficking throughout the County, 2) Integrate and/or improve integration with existing (MDOT, Local Police Patrol, MSP, KCRC, etc.) programs of usage/enforcement, 3) Develop community awareness and action plans for public participation, 4) Develop a plan for inspection and improvement, 5) Develop recommended practices, 6) Implement recommended practices.
- Lead Manager Assigned: KCRC, Local governments
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCRC; MSP; Local Railroads; MDOT; EPA; FEMA; Office of Homeland Security, Southcentral Michigan Planning Council
- Potential Sources of Financial Assistance: FEMA; MDOT, USDOT
- Priority: Medium (ongoing)

17. Action Item Description:

Reduce roadway/railway hazardous material incidents through training, planning, and increased preparedness (in addition to fixed site emergencies).

- Deliverables: 1) Develop alternate and/or adjunct to Young's Environmental for faster and/or local HAZMAT expertise 2) Institute recruitment, training and improvement
- Lead Manager Assigned: President - Fire Chiefs Association
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: EPA; FEMA; DOT; Young's Environmental, KCDEH
- Potential Sources of Financial Assistance: Grants; EPA; Railroads
- Priority: Medium (ongoing)

18. Action Item Description:

Ensure integration of hazardous spill planning into KCDC activities.

- Deliverables: 1) Involve appropriate (Railroad, Highway, HAZMAT Team, First Responders, etc.) representatives in Countywide planning/training activities. 2) Develop best practices.
- Lead Manager Assigned: Emergency Management Director - Kalamazoo County OEM
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; EPA; MDOT; Railroads; Hospitals
- Potential Sources of Financial Assistance: County and local governments; EPA; MSP
- Priority: Medium (ongoing)

19. Action Item Description:

Install video cameras at select rail crossings to encourage voluntary compliance with traffic laws and reduce major transportation accidents.

- Deliverables: 1) Investigate opportunities for crossing cameras, 2) Identify costs, 3) Identify liabilities, 4) Recommend options.
- Lead Manager Assigned: KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP; Railroads
- Priority: Medium

20. Action Item Description:

Improve design, routing, and traffic control at problem roadway areas.

- Deliverables: 1) Investigate opportunities for improved traffic control 2) Identify costs 3) Identify liabilities 4) Recommend options (Related to "Maintain a County Road Commission in 7(b) Infrastructure Failures)
- Lead Manager Assigned: KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium (ongoing; especially for surface highways, and when I-96 clogs)

21. Action Item Description:

Conduct Railroad Inspections and Improve Designs at Problem Railway/Roadway Intersections (At-Grade Crossings, Rural Signs/Signals for RR Crossing).

- Deliverables: 1) Investigate opportunities for improving inspections 2) Identify costs 3) Identify liabilities 4) Recommend options (Related to "Maintain a County Road Commission in 7(b) Infrastructure Failures).
- Lead Manager Assigned: KCDC Transportation Subcommittee
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Medium (ongoing)

MODERATE PRIORITY HAZARD-RELATED ACTIVITIES FOR KALAMAZOO COUNTY

The following activities, although important for the long-term safety and preparedness of Kalamazoo County's residents, businesses, and quality of life, are less directly related to the hazard mitigation activities that are officially recognized by FEMA, since they tend to include "intangibles" such as the promotion of awareness among the public and relevant agencies. Their continued inclusion in this plan means that they are still valued by the county, but may best be promoted and implemented through other types of plans and programs, besides hazard mitigation planning.

1. Action Item Description:

Generate greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings.

- Deliverables: Recommendation for how to raise awareness, e.g.: Public Information Release;

Media coverage; develop or utilize existing programs for public awareness and building
- Lead Manager Assigned: PIO - MSU Extension
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: MSU extension in cooperation with hospitals, doctors (part of KCDC)
- Potential Sources of Financial Assistance: N/A
- Priority: Moderate (ongoing)

2. Action Item Description:

Maintain a Board of Public Works

- Deliverables: 1) Provide regular infrastructure review, 2) Recommend development opportunities, 3) Provide representation in the KCDC planning, training, and evaluation activities.
- Lead Manager: Assistant Administrator for Economic and Community Development
- Scheduled to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: KCDC; FEMA; Office of Homeland Security
- Potential Sources of Financial Assistance: County
- Priority: Moderate (ongoing)

3. Action Item Description:

Enhance Awareness and Participation in Sabotage/Terrorism/WMD Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

4. Action Item Description:

Promote an annual "Emergency Evacuation Day" for testing/evaluating site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.

- Deliverables: 1) Public awareness campaign to promote a day of testing in-place procedures by home, business, school, etc. -- perhaps coincident with the annual KALEX training exercise. 2) Raise awareness for facilities/homes that do not have a working emergency plan.
- Lead Manager Assigned: Chairman, Local Hazard Mitigation Subcommittee - KCDC
- Schedule to Initiate Action: Ongoing
- Potential Sources of Technical Assistance: MSU Extension; KALEX Planning Committee
- Potential Sources of Financial Assistance: FEMA
- Priority: Moderate (ongoing)

5. Action Item Description:

Enhance Awareness & Participation in Earthquake Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items

from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.

- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

6. Action Item Description:

Enhance Awareness and Participation in Subsidence Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

7. Action Item Description:

Enhance awareness and participation in extreme temperature emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP.
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

8. Action Item Description:

Enhance awareness and participation in general winter weather emergency planning activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing

- Priority: Moderate (ongoing)

9. Action Item Description:

Enhance awareness and participation in snowstorm emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

10. Action Item Description:

Enhance awareness and participation in riverine and urban flooding emergency planning activities of the KCDC.

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

11. Action Item Description:

Enhance awareness and participation in infrastructure emergency planning activities of the SEOC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent (President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

12. Action Item Description:

Provide an Educational Process and Resources for Addressing Agricultural Issues

- Deliverables: 1) Identify County agricultural needs and opportunities, 2) Develop and deliver training and/or informational materials/programs, 3) Identify hazards affecting agriculture, 4) Provide leadership and influence in healthy agriculture, Natural Resource, Economic Development, Children and Youth programs (such as County Fair, 4-H, home economics, etc.), 5) Identify and develop best practices for related activities, 6) Participate in preparedness

activities of the KCDC.

- Lead Manager Assigned: Extension Director - MSU Extension
- Schedule to Initiate Action: Ongoing
- Initial Sources of Technical Assistance: EPA
- Potential Sources of Financial Assistance: County and local governments
- Priority: Moderate (ongoing)

13. Action Item Description:

Enhance Awareness and Participation in Public Health Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Signatory Agent President, Manager, Supervisor, Secretary, etc.) representing the governmental unit (City/Township/Village/County Board) affirming and/or adopting this KCHMP
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

14. Action Item Description:

Long-Term Planning That Provides More Connector Roads for Reduced Congestion of Arterial Roads.

- Deliverables: 1) Investigate opportunities for crossing cameras, 2) Identify costs, 3) Identify liabilities, 4) Recommend options, 5) Implement Options, 6) Participate in KCDC planning, drills, and evaluation.
- Lead Manager Assigned: KC Board of Commissioners Liaison to KCRC
- Schedule to Initiate Action: Ongoing
- Potential Sources for Technical Information: MDOT; KCRC; Police Departments; MSP; KCDC
- Potential Sources of Financial Assistance: MDOT; MSP
- Priority: Moderate (ongoing)

15. Action Item Description:

Enhance Awareness and Participation in Transportation Accident Emergency Planning Activities of the KCDC

- Deliverables: 1) Support and/or participate in cooperative efforts towards the identification of hazards related to this action item. 2) On an ongoing basis, add, change, and/or delete items from the list of hazards and mitigation strategies identified under this action item. 3) Implement and/or support, where applicable and/or appropriate, best practices, recommendations, and/or Mitigation Strategies developed or disseminated by participating representatives of the KCDC.
- Lead Manager Assigned: Participating local governments
- Schedule to Initiate Action: Ongoing
- Priority: Moderate (ongoing)

16. Action Item Description:

Document that the KCHMP considers long-term changes to the areas and entities it protects.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: KCDC
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; MSP EMHSD; FEMA; County and Local governments.
- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP EMHSD
- Priority: Moderate (ongoing)

17. Action Item Description:

Document that the KCHMP provide manageable future maintenance modification requirements.

- Deliverables: Referenced entries in the KCHMP
- Lead Manager Assigned: Chairman – Kalamazoo County Hazard Mitigation Planning Committee
- Schedule to Initiate: Ongoing
- Potential Sources of Technical Assistance: KCHMPC; KCDC; MSP EMHSD; FEMA; County and Local governments.
- Potential Sources of Financial Assistance: FEMA; County and Local Governments, MSP EMHSD
- Priority: Moderate (ongoing)

CHAPTER 6: FOLLOW-UP

The follow up for Kalamazoo County is an important part of the planning process. Plan maintenance is the process in which the plan will be monitored, evaluated, and updated within a five-year cycle. When updated, the plan will be reviewed, revised, and resubmitted to the Michigan State Police, Emergency Management and Homeland Security Division within five years of the plan for approval by FEMA Region V. As appropriate, the plan will also be evaluated after a disaster, or after unexpected changes in land use or demographics in or near hazard areas. The Kalamazoo County Disaster Committee also will be kept apprised of a change in federal regulations, programs and policies, such as a change in the allocation of FEMA's funding for mitigation grant programs. These evaluations will be addressed in the plan and may affect the action items for mitigation goals and activities. The hazard mitigation plan should be considered by community planners at all levels, when future updates of their comprehensive plans are taking place.

The Kalamazoo County Disaster Committee will continue to monitor the status and track the progress of the plan elements on an annual basis. The KCDC will oversee the progress made on the implementation of the identified action items and update the plan as needed to reflect changing conditions. Representatives will also meet annually to evaluate plan progress and recommend updates. The Kalamazoo County Emergency Management Coordinator will facilitate the annual meetings.

Evaluation of the plan will not only include checking the implementation status of mitigation action items, but also assessing their degree of effectiveness and assessing whether other natural hazards need to be addressed and added to the plan. This will be accomplished by reviewing the benefits (or avoided losses) of the mitigation activities that were in place within each jurisdiction and county. These will be compared to the goals the Plan has set to achieve. The KCDC will also evaluate whether mitigation action items need to be discontinued or modified in light of new developments or changes within the community. Public comment on the plan and achievement of goals and objectives will also be solicited during the evaluation by the KCDC. The process will be documented by the Stakeholders and submitted to the Kalamazoo County Emergency Management Coordinator for review who will then update the Kalamazoo County website with any review updates.

As required by the Local Hazard Mitigation Plan Review Crosswalk, this plan will be updated within five (5) years of the date of the Federal Emergency Management Agency's (FEMA) approval of the plan. The plan may be updated earlier, at the discretion of the KCDC and its jurisdictions. Also, the Stakeholder's ability to update the mitigation process by adding new data and incorporating it into the mitigation plan, will allow for the efficient use of available resources, staff, and programs. The participants will meet with the KCDC to discuss the plan and document data collected including hazard events, completed mitigation activities, new mitigation activities, and FEMA grant application efforts. The information will be used for the five (5) year update. The Kalamazoo County Emergency Management Coordinator will coordinate the annual meeting and keep records of the participants and information received.

In order to have continued public support of the mitigation process, it is important that the public be involved not only in the preparation of the initial plan, but also in any modifications or updates to the plan. The public are invited for the annual meetings, in compliance with the Public Meetings Act.
To ensure that public support is maintained, the following actions may be taken by KCDC:

- Updates to the plan.
- The Kalamazoo plan has been web posted along with contact information that allows any citizen to read it and provide feedback.
- Develop informational mailings to be distributed to the public about mitigation efforts in the county and updates made to the plan.

- Develop mitigation flyers or mailings that contain mitigation activities and action items that promote reducing damages and risks of natural hazards.

Appendix – Local Community Subsections

NOTE: Land use and zoning information for local communities within Kalamazoo County can be found online at http://www.kzoo.edu/convene/cfa/maps.htm. Since the maps are finely detailed and rendered in full color, they have not been included here, since they would be too hard to interpret in this plan's (black and white) printed form. Land use information was part of the considerations that local communities and the county had used in evaluating their hazards, and potential hazard mitigation projects.

The following local community representatives are some of those who had directly contributed information and worked with KCHMP planning staff for the plan update process during 2012. This is in addition to those listed in the main text of the KCHMP as working on the overall county plan, but the list is not a comprehensive list of all community representatives who were involved—only those who had direct contact in the production of these community subsections (i.e. as representatives of their communities' hazard mitigation concerns and needs). Additional discussions and meetings took place between local officials and the persons listed below, but the planning staff did not attempt to document all of the network effects of the planning process among local officials throughout the county.

Augusta Village: Police Chief Jeff Heppler
Comstock Charter Township: Township Supervisor Ann Nieuwenhuis, Fire Department Acting Deputy Chief Matt Beauchamp, Wally Culver
Galesburg City: Sgt. Jeff Heppler
City of Kalamazoo: Planning Director Andrea Augustine
Kalamazoo Charter Township: Planning and Zoning Administrator Greg Milliken
Oshtemo Charter Township: Oshtemo Fire Chief, Planning Director Greg Milliken
City of Portage: Director of Public Safety Richard White, Director of Community Development Victoria Georgeau
Richland Township: Treasurer Marsha Drouin, Jeff Heppler
Village of Richland: Kalamazoo County Commissioner for District 14 Jeff Heppler
Ross Township: Township Supervisor Jeff Bither, Jeff Heppler

It should be noted that the language within this Appendix was shaped by KCHMP planning staff, in order to better reflect FEMA planning requirements, and thus was not exclusively provided by these local representatives. Inquiries about this may be directed to the Kalamazoo OEM as well as local community representatives.

1. Village of Augusta

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	Every year, 4 or 5	Moderate, Casualties, Property
Severe Winds	Every year, 1 or 2	Strong, Casualties, Property
Tornadoes	Every year, 1 or 2	Extreme, casualties, Property
Extreme Heat	Often	Moderate, Casualties
Severe Winter Weather (snow)	Every year, 2 or 3	Strong, Casualties, Property
Ice/Sleet storms	Every year, 1	Strong, Property, Casualties
Extreme Cold & Freezes	Every year, 1 or 2	Moderate property
Fog	Every year, 3 or 4	Strong, Casualties, Property
River Flooding	Every year, 1	Moderate, Property Damage
Other (Non-river) Flooding	Often	Moderate, Property Damage
Dam Failures	Not very often	Strong, Casualties, Property
Drought	Not very often	Mild, Property Damage
Wildfires	Every year	Moderate, Property Damage
Damaging Invasive Species	Not very often	Moderate, Property
Earthquakes	Not very often	Moderate, Property, Casualties
Ground subsidence	Not very often	Mild, Property
Major Structural Fires	Every year	Strong, Property, expensive
Fixed Site Hazardous Materials	Not very often	Strong, Property, expensive
Hazardous Mat'l Transport Accidents	Not very often	Moderate, Property, expensive
Nuclear Plant Incidents	Not very often	Extreme, Expensive, Property
Petroleum or Natural Gas Pipeline Spills	Not very often	Moderate, Expensive, Property
Oil and Gas Well Accidents	Not very often	Strong, Expensive
Infrastructure Failures	Every few years	Strong, Expensive
Major Transportation Accidents	Every year	Strong, Expensive
Civil Disturbances	Not very often	Moderate, Expensive, Property
Public Health Emergencies	Not very often	Strong, Expensive
Terrorism and Similar Criminal Incidents	Not very often	Strong, Casualties, Property
Nuclear Attack or other WMD	Not very often	Strong, Casualties, Property, Expensive
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Village and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for the Village of Augusta: Severe winds and tornadoes
2. Second tier of most significant hazards: Severe winter weather (snow, ice, sleet), fog, major structural fires, and major transportation accidents
3. Third tier of most significant hazards: Infrastructure failures

The severe wind and tornado hazards lead to the following top priority hazard mitigation actions for the Village:

- Arrange for storm shelters to serve community members—probably in the Augusta Middle School, which may need some physical upgrading for use as a community safe area.
- Supply the Augusta Middle School with an emergency power generator.

The winter weather hazards lead to the following high priority hazard mitigation actions for the Village:

- Install an emergency power generator at the Village Hall.

The transportation accident and fog hazards are seen in the risks from heavy traffic that flows between Fort Custer (in Battle Creek) and Interstate 94. Highway M-96 is served by a main bridge that goes over the Kalamazoo River. A new bridge was needed, due to heavy wear from truck and vehicle traffic. Potential hazardous materials risks stem from some of this traffic. The fog hazard is widespread throughout the county, and exacerbates traffic risks when it freezes on road surfaces and causes ice. High priority mitigation actions may include:

- Rerouting traffic, or providing additional routes/bridges to cross over the Kalamazoo River and nearby canal. If the bridge goes out in Augusta, there is an 18 mile detour for the shortest alternative route.

The major structural fires hazard tends to have its highest risks along the Village's main street, Michigan Avenue.

The infrastructure failures threat has the following mitigation action proposed, with a Medium priority level:

- Install an emergency power generator at the water system's pumping facility.

Implementation of hazard mitigation actions would generally involve authorized Village officials, the Village's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. For example, Augusta has the river on its southern border, but further work would need to be done to prepare for that type of hazard mitigation project. The Village will continue to promote floodplain management and the local use of flood insurance coverage through the NFIP.

2. Comstock Township

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	3 times a year	Moderate – Property
Severe Winds	2 times a year	Moderate – Property
Tornadoes	Once a decade	Extreme – Casualties, Property
Extreme Heat	Every 3rd year	Moderate – Casualties
Severe Winter Weather (snow)	Once a year	Mild
Ice/Sleet storms	Every other year	Moderate – Property
Extreme Cold & Freezes	Every other year	Moderate – Property
Fog	2-3 times a year	Strong – Casualties
River Flooding	Once a decade	Moderate – Property
Other (Non-river) Flooding	Every other decade	Mild
Dam Failures	Rare – once a century	Extreme – Casualties/Property
Drought	Once a decade	Mild
Wildfires (significant/large)	Every 3rd year	Mild – Property
Damaging Invasive Species	Once a decade	Mild
Earthquakes	Unlikely	
Ground subsidence	Unlikely	
Major Structural Fires	Every 5 years	Strong – Casualties/Property
Fixed Site Hazardous Materials	Once a decade	Strong – Casualties
Hazardous Mat'l Transport Accidents	Every 5 years	Strong – Casualties
Nuclear Plant Incidents (Residual effect)	Unlikely	-
Petroleum or Natural Gas Pipeline Spills	Every other decade	Mild
Oil and Gas Well Accidents	Unlikely	-
Infrastructure Failures	Once a century	Strong – Casualties/Property
Major Transportation Accidents	Every other decade	Strong – Casualties
Civil Disturbances	Once a century/ unlikely	Moderate – Casualties
Public Health Emergencies	Once a decade	Strong – Casualties
Terrorism and Similar Criminal Incidents	Unlikely	-
Nuclear Attack or other WMD	Unlikely	-
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Township and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for Comstock Township: Tornadoes, winter weather hazards, fog, and dam failures
2. Second tier of most significant hazards: Fixed site hazardous material incidents, major transportation accidents, and public health emergencies
3. Third tier of most significant hazards: Thunderstorm hazards and severe winds, major structural fires, hazardous material transportation accidents

The tornado hazard leads to the following top priority hazard mitigation actions for the Township:

- Investigate and promote ways that more mobile homes can be anchored to a foundation.

Disaster experience nation-wide has shown that mobile homes are generally not designed to hold up well if they are tipped by strong winds, and that this accounts for much of the severe damage that tornadoes have tended to cause to these types of structures in the past. Mobile homes and mobile home parks can better withstand the effects of less-severe tornado incidents by anchoring all units to resist being tipped by the wind. Homes that stay anchored and upright during an event are more likely to stay intact and to limit the amount of damage incurred during the event.

- Investigate and enhance the sheltering capacity for potentially at-risk places in the township that have higher population densities.

The township has a small trailer park and multi-family apartment buildings. There may be a need for shelters to be installed in the area of Sprinkle and Gull, at the trailer park, the large 3-story senior apartment building, subsidized housing complex, etc. These areas and their residents may not have the same amount of choice in home design that is available to owner-occupied single-family units, and the capacity to add shelter space or structural reinforcement against severe winds may be something that government support could help to accomplish.

The Comstock Public School system should identify whether any shelter spaces, structural reinforcement, reinforced glass, or other hazard mitigation actions might be useful for any of the three elementary schools, the Middle School, or the High School, possibly through hazard mitigation project funding from FEMA.

The dam failure hazard primarily involves the Morrow dam—the Comstock business district lies downstream from the structure. The fog hazard primarily leads to transportation accidents—especially freezing fog that ices the area's roadways.

- Investigate whether freeze prevention mechanisms may be available for use on I-94.

Finally, there is a top-priority hazard mitigation action to address some of the winter weather vulnerabilities of Comstock Township.

- Snow fences or similar tree lines should be installed/planted at road locations that are vulnerable to obstructive drifting snow. Likely identified locations include South 26th Street near MN Avenue, South 31st Street, South 33rd Street, and South 35th Street.
- Investigate and implement (if possible) a roof adjustment or re-design project to prevent winter ice dam damage at the Central Fire Station.

Medium-priority hazard mitigation activities relate to transportation accidents:

- The township supports a consideration of the widening of I-94 in order to reduce the wind tunnel effect currently experienced by drivers (between expressway walls, large trucks). This should have a dual effect of reducing accidents as well as the traffic densities per lane.
- Improve and add lighting around key roadway curves and intersections. Darkness currently causes transportation risks because of visibility limitations. Roadway segments that might benefit from this lighting improvement, or from improvements in design, include (1) the Interstate's curve near exit 81, (2) I-94 exit 85, and (3) the 35th Street interchange.

Moderate-priority hazard mitigation activities relate primarily to thunderstorm hazards:

- Research what lightning mitigation activities might be available to protect critical response activities and infrastructure. Vulnerabilities have included radio system failures, multiple fire

stations struck by lightning, electrical fire at the North Station (H Avenue) which has experienced repeated problems, and impacts upon cell phone systems.

Implementation of hazard mitigation actions would generally involve authorized Township officials, its relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds, where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. For example, fixed site hazardous materials incidents may pose a risk for some residential areas, although recent economic trends have involved a conversion from heavy industry to other uses (light industrial, warehousing, offices), thus lowering the risks over time.

- Hazard mitigation will be considered in future updates of the Comstock's comprehensive plan, and the township will encourage residents in need to make use of flood insurance available through the NFIP.

3. City of Galesburg

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	Happens every year, 4	Moderate, Property, Casualties
Severe Winds	Happens every year, 2	Strong, Property, Casualties
Tornadoes	Happens every year, 2 or 3	Extreme, Property, Casualties
Extreme Heat	Happens often	Moderate, casualties
Severe Winter Weather (snow)	Happens every year, 3	Strong, expensive, Property
Ice/Sleet storms	Happens every year, 1 or 2	Strong, Property, expensive
Extreme Cold & Freezes	Happens every year, 1 or 2	Moderate, Property
Fog	Happens every year, 4	Mild, Property
River Flooding	Every other year	Moderate; Property Damage
Other (Non-river) Flooding	Every few years	Mild; Property Damage
Dam Failures	Not very	Strong, Casualties, Property
Drought	Not very	Mild; Property Damage
Wildfires	Every few years	Moderate; Property
Damaging Invasive Species	Not very	Mild, Property Damage
Earthquakes	Every few years	Strong, Property, Casualties
Ground subsidence	Not very	Moderate, Property
Major Structural Fires	Every few years	Moderate, Property
Fixed Site Hazardous Materials	Not very often	Moderate, Property, casualties
Hazardous Mat'l Transport Accidents	Not very often	Strong, Casualties, Property
Nuclear Plant Incidents	Not very often	Strong, Casualties, Property
Petroleum or Natural Gas Pipeline Spills	Not very often	Strong, expensive, Property
Oil and Gas Well Accidents	Not very often	Moderate, expensive, Property
Infrastructure Failures	Every few years	Moderate, expensive, Property
Major Transportation Accidents	Every year, 3	Strong, expensive, Property
Civil Disturbances	Not very often	Moderate, Property, expensive
Public Health Emergencies	Not very often	Strong, expensive, casualties
Terrorism and Similar Criminal Incidents	Not very often	Moderate, expensive, Property
Nuclear Attack or other WMD	Not very often	Strong, casualties, Property
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the City and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. The most significant hazard for the City of Galesburg: Major transportation accidents
2. Second tier of most significant hazards: tornadoes and severe winds
3. Third tier of most significant hazards: Severe winter weather (snow, ice, sleet)

The Major transportation accident hazard leads to the following top priority hazard mitigation actions for the City

- Investigate the feasibility of re-routing some traffic away from the center of town. Secondary roads may be usable for the purpose, with some upgrading.

- Support the expansion of I-94 with an added third lane, to reduce accidents and alleviate risky congestion.

The City's main thoroughfare, Michigan Avenue, is one of the key points of risk for transportation hazards, especially since the center of town is focused upon a 5-way intersection that may puzzle or overwhelm visitors who experience it. The traffic from I-94, when the interstate has a problem or back-up, can be excessive. Thousands of cars get re-routed from I-94 when there are problems. Recent events have included 2 semi-trucks jackknifed across the highway, and a vehicle fire causing death on I-94. It appears to be only a matter of time until serious accidents occur in the center of town, like they have on the interstate, because of the massive traffic diversions that take place on a regular basis. Key areas to note include Michigan and 35th Street, and the merging of Michigan surface highway 96 with other main routes. Investigate other mitigation options that may be available for traffic calming and re-routing.

- Seek a solution for drifting snow on routes between Augusta and Galesburg. Snow fences or "living snow fences" (special lines of trees) may be a viable solution, once their specific locations and implementation mechanisms can be worked out.

The city's medium-priority hazard mitigation action proposals include:

- Arrange for enhanced storm shelter capacity for community members who may be in need during severe weather events. Some upgrading may be needed for local schools to be used as shelters.
- Supply local schools with emergency power generators. (This would also support the buildings' use as shelters, as described in the previous action proposal.) The Galesburg High School is half-located in Charleston Township, and so some coordination with the townhip on this issue may be beneficial to both communities and their residents.

Flood risks seem to be moderate in terms of the community as a whole, but do result in property damage and occur about every other year. The following moderate-priority hazard-related action is proposed for the city's flood hazard:

- Evaluate the benefits of joining the National Flood Insurance Program, and do so if it is determined to have a net benefit for the community, its residents in need, or for important properties located in floodplain areas.

Implementation of these local hazard mitigation actions would generally involve authorized City officials, the City's relevant departments, some coordination with Kalamazoo County OEM, and state or federal funds, where possible, for hazard mitigation or transportation improvements. Coordination between local jurisdictions and these other agencies may also take place to support mutually beneficial hazard mitigation and related coordination.

Other hazards noted in the table may be significant, but have not at this time been selected for higher hazard mitigation priority under the hazards listed above. For example, Galesburg could use an electric power generator at its city public works department facility, to support the water system throughout a period of power failure.

4. City of Kalamazoo

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	5 events per year	Mild, minor property damage
Severe Winds	1 event per year	Mild, minor property damage
Tornadoes	1 event per decade	Moderate to Strong, major property damage
Extreme Heat	1 event every 2 years	Mild
Severe Winter Weather (snow)	1 event per year	Mild, power outages
Ice/Sleet storms	1 event per year	Mild, power outages
Extreme Cold & Freezes	1 event every 2 years	Moderate, rare casualties, property damage
Fog	10 events per year	Mild
River Flooding	1 event per year	Moderate to Strong, property damage possible depending on level of flooding
Other (Non-river) Flooding	1 event every 2 years	Mild to Strong, property damage possible depending on level of flooding
Dam Failures	1 event every 50 years	Moderate to Strong, property damage possible depending on level of failure
Drought	1 event every 10 years	Mild, water shortages or rationing
Wildfires	1 event per century	Mild to Moderate
Damaging Invasive Species	1 event per 10 years	Mild to Moderate, death of trees or native species
Earthquakes	1 event per 50 years	Mild, distance from fault lines means that earthquakes are rare and imperceptible
Ground subsidence	1 event per century or more	Unknown, rare event
Major Structural Fires	10 events per year	Moderate to Severe, major property damage
Fixed Site Hazardous Materials	1 event per year	Mild to moderate, generally contained onsite
Hazardous Mat'l Transport Accidents	1 event per 5 years	Mild to moderate, depending on type of hazardous material, can include evacuations, hazardous materials cleanup
Nuclear Plant Incidents	N/A	No nuclear plants in this area
Petroleum or Natural Gas Pipeline Spills	1 event per 20 years	Moderate to Severe, major property and natural resource damage
Oil and Gas Well Accidents	N/A	No known oil/gas wells in the area
Infrastructure Failures	1 event per year	Mild to moderate, with minor damage to infrastructure, and minor loss in productivity
Major Transportation Accidents	5 events per year	Moderate, property damage, minor to major injuries, occasional limited loss of life
Civil Disturbances	1 event per 10 years	Mild, loss in productivity or resources required for maintenance of public safety
Public Health Emergencies	1 event every 5 years	Mild to moderate, loss of productivity related to work hours lost
Terrorism and Similar Criminal Incidents	1 event per 20 years	Mild to Severe, depending on nature of attack
Nuclear Attack or other WMD	Unknown	No record of attack in area
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the City and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. The most significant hazard for the City of Kalamazoo: Major structural fires
2. Second tier of most significant hazards: Flood hazards
3. Third tier of most significant hazards: Tornadoes, dam failures, and fixed site hazardous materials incidents

The structural fire hazard leads to the following top priority hazard mitigation action for the City:

- Investigate and promote/implement the installation of sprinkler systems to important and at-risk buildings in the city. These should be full sprinkler systems, not just hallway sprinklers.
- Acquire funds to demolish/remove vacant structures that are deteriorated and may contribute to blight. An anti-blight program might be used to apply this strategy carefully to a list of abandoned structures.

The City has many large apartment buildings built before 1980, including quite a few for seniors and persons with disabilities. A recent tragic fire took place in the Northwind Apartment Complex (see the description in the structural fire section of the main plan for Kalamazoo County earlier in this document). There are many vacant units within the city that are subject to deterioration and that may contribute to a blight problem. Removing units that are no longer suitable for housing would help to prevent fire events—particularly those in more densely developed area of the city in which a fire is more likely to spread from one unit to another.

The city's high/medium-priority flood hazards lead to the following mitigation actions:

- Planning, zoning, and regulation policies should continue to be used to modify the city's susceptibility to flood damages and disruptions. (This includes land acquisition, building code regulations, floodplain regulation enforcement, stormwater management activities, and drainage system maintenance actions.)
- Parcel by parcel and building by building property protection actions should be implemented (including retrofitting, floodproofing, insurance, relocation, and acquisition strategies).
- Where appropriate, modify flood impacts through structural projects (designed by engineers and managed by the City's DPS staff) to control flood waters. This may include dams and reservoirs, levees and floodwalls, high-flow diversions, detention measures, channel modifications, and storm sewer system improvements.
- Restore and preserve the natural functions of floodplain areas by maintaining and re-establishing floodplain environments and selected watershed areas in their natural state. (Specific actions include floodplain and wetlands protection ordinances and restoration projects, land acquisition and open space preservation, soil erosion and sedimentation control practices.)
- The City's current grant application will use FEMA funds to subsidize flood mitigation projects in which houses had basements flooded, and floodwaters going up even higher than that upon the structure, resulting in substantial damages. (See the information on flood hazards and vulnerable areas/properties within the main text of this Kalamazoo County plan.)

The city's medium-priority tornado and dam failure hazards lead to the following mitigation actions:

- Investigate the sheltering capabilities in downtown areas/structures. (Often done only at the level of an individual building, rather than for the overall downtown.) This would especially be useful for major events and to serve downtown visitors and guests.
- Consider ways to further channelize water flows upstream and down from the Morrow Dam in Comstock. Removing structures from the floodplain, allocation of permanent open space, and other activities of that kind, may be helpful.

If a catastrophic failure of, serious overtopping of, or pressure release from the Morrow Dam were to take place, flooding tends to occur downstream. Kalamazoo hospitals are affected by this problem—the Bronson hospital had its floor under water in 2008. The city is located in a valley, with downtown constituting the bowl of that valley. All major rain events cause flooding to take place in certain areas. Flood depths regularly range from an inch up to 2 or 3 feet of standing water.

The city's moderate-priority hazardous materials transportation risks suggest the following strategy:

- Investigate/Support the expansion of I-94, or the locations and designation of alternate routes. Similar activities should be investigated for U.S. 131.

Implementation of hazard mitigation actions would generally involve authorized City officials, the City's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. The city has been an active participant in the NFIP, promoting floodplain management practices and overseeing the production of a FEMA-approved flood mitigation plan for the city in 2007. (The current all-hazards plan expands into areas beyond that previous flood plan, but it still provided useful information for the city.)

- Hazard mitigation concepts should be considered during the development of the city's next comprehensive plan update, to help prevent future risks from multiple types of hazards.

5. Kalamazoo Township

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	6 per year	mild
Severe Winds	3 per year	mild
Tornadoes	1 per decade	Strong
Extreme Heat	4 per decade	mild
Severe Winter Weather (snow)	2 per year	moderate
Ice/Sleet storms	2 per year	moderate
Extreme Cold & Freezes	2 per year	moderate
Fog	10 per year	mild
River Flooding	2 per year	strong
Other (Non-river) Flooding	-	
Dam Failures	-	
Drought	1 per decade	moderate
Wildfires	-	
Damaging Invasive Species	1 per decade	moderate
Earthquakes	-	
Ground subsidence	-	
Major Structural Fires	2 per year	Strong
Fixed Site Hazardous Materials	2 per decade	moderate
Hazardous Mat'l Transport Accidents	1 per century	extreme
Nuclear Plant Incidents	-	
Petroleum or Natural Gas Pipeline Spills	1 per decade	extreme
Oil and Gas Well Accidents	-	
Infrastructure Failures	2 per decade	moderate
Major Transportation Accidents	1 per decade	strong
Civil Disturbances	2 per century	extreme
Public Health Emergencies	2 per century	extreme
Terrorism and Similar Criminal Incidents	-	
Nuclear Attack or other WMD	-	
Other (please specify)	-	

After the initial questionnaire was filled out, follow-up between the Township and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. The most significant hazard for Kalamazoo Township: River flooding
2. Second tier of most significant hazards: Major structural fires, and oil/gas pipeline accidents
3. Third tier of most significant hazards: Major transportation accidents and tornadoes

The river flooding hazard in the Township involves an identified floodplain area in its southeastern portion (i.e. the north Lakewood neighborhood). This usually leads to basement flooding but it can get higher during bad events (basements completely full of water). Road closures have been a recurring part of the township's flood problems. These include Lake Street and the Holmstead area. Flood mitigation activities merit highest priority for the Township, within this plan.

- Seek to obtain FEMA funding for flood control projects, upgraded drainage capacity, or property-specific measures to address these risks.
- Identify ways to improve infrastructure, water storage capacity to protect flood-prone areas, provide relief, or at least keep problems from worsening.

The major structural fire issue doesn't have specific actions proposed at this time. The concern with pipeline incidents stems from the Enbridge event of 2010. The Kalamazoo River runs through the township and therefore exposed the township to contamination as a result of that spill.

The following medium-level hazard mitigation actions relate to the township's identified tornado and transportation accident hazards:

- Investigate school safety and shelter provision potential. Some of the township's housing is older and schools might be able to serve the community as storm/tornado shelter areas—possibly as a result of structural amendments or reinforcements potentially fundable through FEMA grants.
- Seek requirements for new mobile homes to be anchored to a foundation. Investigate the potential for older mobile home parks to encourage or require such anchoring. Mobile home units are far more resistant to wind damages if they are anchored to discourage them from being tipped by strong winds and tornadoes.
- Improved signage is needed on the freeway. There are also some areas in the township that have odd road curvature and odd intersections that caused an increased risk of traffic accidents. Examples are found on Business Route 131 as it proceeds south from U.S. 131 through the township.

Implementation of hazard mitigation actions would generally involve authorized Township officials, the Township's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. Kalamazoo Township's next comprehensive plan update will include hazard mitigation concepts in its evaluations.

6. Oshtemo Township

Initial community feedback from hazard questionnaire is shown. Note: two different local opinions were combined here:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	6/year	mild to strong
Severe Winds	6/year	mild to strong
Tornadoes	3/decade	moderate to Strong
Extreme Heat	2/year	mild to moderate
Severe Winter Weather (snow)	2/year	moderate to strong
Ice/Sleet storms	2/year	moderate to strong
Extreme Cold & Freezes	2/year	moderate to strong
Fog	8/year	mild to moderate
River Flooding	1/century	moderate
Other (Non-river) Flooding	1/century	mild to moderate
Dam Failures	-	
Drought	2/decade	moderate
Wildfires	1/decade	moderate to strong
Damaging Invasive Species	1/decade	mild to moderate
Earthquakes	-	
Ground subsidence	-	
Major Structural Fires	2/year	Strong
Fixed Site Hazardous Materials	2/decade	strong
Hazardous Mat'l Transport Accidents	2/decade	Strong to extreme
Nuclear Plant Incidents	-	Mild
Petroleum or Natural Gas Pipeline Spills	1/century	moderate
Oil and Gas Well Accidents	-	
Infrastructure Failures	1/decade	moderate
Major Transportation Accidents	2/year	Strong to extreme
Civil Disturbances	1/decade	Moderate to Strong
Public Health Emergencies	1/century	Strong
Terrorism and Similar Criminal Incidents	-	Moderate
Nuclear Attack or other WMD	-	
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Township and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for Oshtemo Township: Major transportation accidents, and hazardous materials transportation incidents
2. Second tier of most significant hazards: Severe winter weather (snow, ice, sleet, freezes/cold), severe summer weather (thunderstorms, severe winds, tornadoes), and major structural fires
3. Third tier of most significant hazards: Civil disturbances and fixed site hazardous materials incidents

Additional notes upon the selected significant hazards in Oshtemo:
Historically, heavy summer weather patterns have cut a path through western Oshtemo on a regular basis. Winter weather and fog exacerbate the township's concerns with major transportation

incidents—particularly along M-43 and U.S. 131. Amtrak train lines also pass through the area. I-94 is nearby. These are close enough to some neighborhoods and mobile home parks to cause a higher level of risk, especially in cases involving hazardous material spills during transport. Such incidents would involve considerable expense. Highways in suburban settings create circumstances in which it is difficult to evacuate residents quickly. Hazardous materials are used by businesses within the township, but their sites are separated from other land uses through zoning. Train tracks and truck routes are a bigger source of concern. (Of all the local participant communities in this plan, Oshtemo Township was the fastest-growing community, but its suburban development and zoning pattern tends to keep new neighborhoods and developments out of known hazard areas. Some limited exposure to certain types of uncommon risks probably cannot be avoided, however.)

Floodplain areas are identified on the western edge of the township. Drought may have an agricultural impact (corn fields in the area). Major structural fires can cause loss of tax base and jobs. The township fire department is also a small one, causing the hazard to be a serious concern. Although there are nuclear power plants along the Lake Michigan shore, the township is pretty far away and it would take a completely unprecedented level of event to cause serious problems. There are abundant student housing complexes in the township and thus a moderate concern of civil disturbance events in the long-term. Terrorist concerns include WMU as a possible target, as well as a younger average population age—terrorism here is counted as including criminal activities that may have a similar effect (cyberattack, shootings, etc.)

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These considerations have led to the following top priority hazard mitigation actions for the Township:

- Consider a code local to require sprinker systems in multi-unit buildings. No specific locations are given here—there are a lot of apartment buildings in the township, and many of those built recently are probably okay.
- Seek additional fire hydrants, which would also involve extended water lines. Currently, the hydrants have been provided to the eastern third of the township, but not really the western two-thirds. Fire suppression would benefit from additional hydrants.
- Investigate the purchase and use of back-up power generators in the township (water and sewer is run by the city).
- Investigate potential locations for warning sirens in the western parts of the township. For viable sites, obtain and install sirens, which may be fundable with FEMA hazard mitigation project grants.
- Hazard mitigation concepts shall be considered in development decisions within the township, as well as the next update of its comprehensive plan.

Implementation of hazard mitigation actions would generally involve authorized Township officials, the Township's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. The township encourages floodplain management as well as the use of flood insurance from the NFIP, for those residents who have need.

7. City of Portage

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	4 a year	Strong rare casualties
Severe Winds	4 a year	Strong rare casualties
Tornadoes	1 a decade	Extreme probable casualties
Extreme Heat	5 days yearly	Mild
Severe Winter Weather (snow)	3 a year	Moderate
Ice/Sleet storms	1 every 5 years	Moderate
Extreme Cold & Freezes	5 days yearly	Mild
Fog	6 days a year	Mild
River Flooding	1 every 20 years	Moderate
Other (Non-river) Flooding	1 every 20 years	Moderate
Dam Failures	N/A	-
Drought	Once ever 25 years	Moderate
Wildfires	N/A	-
Damaging Invasive Species	N/A	-
Earthquakes	Once a century	Extreme probable casualties
Ground subsidence	N/A	-
Major Structural Fires	3 a year	Moderate
Fixed Site Hazardous Materials	Once a decade	Mild
Hazardous Mat'l Transport Accidents	1 every 2 years	Mild
Nuclear Plant Incidents	N/A	-
Petroleum or Natural Gas Pipeline Spills	(High pressure gas lines)	(Strong)
Oil and Gas Well Accidents	N/A	-
Infrastructure Failures	Once every 20 years	Moderate
Major Transportation Accidents	Once every 20 years	Strong
Civil Disturbances	Once every 30 years	Moderate
Public Health Emergencies	Once every 30 years	Moderate
Terrorism and Similar Criminal Incidents	Once every 25 years	Strong
Nuclear Attack or other WMD	Once a century	Extreme
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the City and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for the City of Portage: Thunderstorms and severe winds
2. Second tier of most significant hazards: Tornadoes, and also major transportation accidents
3. Third tier of most significant hazards: oil/gas pipeline incidents, terrorism/weapons of mass destruction

Although thunderstorm hazards are the city's top priority, it has already taken action to prepare for such hazards. Portage has received the National Weather Service designation as a "storm ready" city. It has a good warning system in place with state-of-the-art sirens. It has NOAA weather radio operating in all major buildings, schools, the city hall, senior centers, etc.
The top priority projects proposed for thunderstorm and tornado hazards are:

- Investigate ways to encourage and increase the anchoring of mobile homes to a secure foundation, to make the units more resistant to wind and tornado effects. The city has two mobile home parks that could benefit greatly from this activity.
- Investigate the possible shelter needs for those attending football games or other outdoor events at Portage High School. If a storm blows in or a tornado warning occurs, attendees can cross the street to take shelter in schools, but it is worth checking to see whether improvements are needed to meet the sheltering needs at these events.
- Investigate the viability of renovations that would make city structures more storm-resistant. One known site is Fire Station #2 (on Oakland), which could benefit from roof adjustments to reduce its vulnerability to ice dams, and possibly include structural bracing or other wind-resistance engineering techniques.

Transportation issues include the presence of U.S. 131 on the city border (and its potential for hazardous material spills), plus having the interstate and railroad lines travel across the area. Five to six recent train-vehicle collisions render this issue a serious concern. Westnedge, mainly on its south end, and at the lumber company driveway, may benefit from some roadway enhancements or redesign effort.

The pipeline issue would mainly be addressed through education efforts, such as the use of the MISS-DIG phone line to ensure that no pipeline hazard will be caused by projects that disturb the ground. Emergency preparedness is an important part of the city's efforts. Portage is a sub-component of the county's emergency plan, and the city participates with the county in drills, plans, equipment, etc. Additional training will continue to be of benefit.

The following high-priority action is proposed for multiple hazards, such as terrorism, that have the potential to create a community-wide emergency event:

- Seek and promote interoperability of radio systems across the county. Western Michigan University and Portage are on different radio systems. Three different systems are in use across the county.

Implementation of hazard mitigation actions would generally involve authorized City officials, the City's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority.

- Hazard mitigation concepts will be considered during the next update of the city's master plan.
- The city encourages residents to make use of NFIP flood insurance, if they have need, and supports floodplain management concepts.

8. Richland Township

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence (X = occurrence)	Severity of hazard impacts
Thunderstorms (hail, lightning)	6 X	Strong
Severe Winds	4 X	Strong
Tornadoes	2 X	Moderate
Extreme Heat	2 X	Mild
Severe Winter Weather (snow)	2 X	Moderate
Ice/Sleet storms	2 X	Strong
Extreme Cold & Freezes	2 X	Moderate
Fog	3 X	Strong
River Flooding	N/A	-
Other (Non-river) Flooding	N/A	-
Dam Failures	N/A	-
Drought	likely	Strong
Wildfires	2 X	Strong
Damaging Invasive Species	1 X	Moderate
Earthquakes	- 1 X	Moderate
Ground subsidence	- 1 X	Moderate
Major Structural Fires	2 X	Strong
Fixed Site Hazardous Materials	1 X	Moderate
Hazardous Mat'l Transport Accidents	1 X	Strong
Nuclear Plant Incidents	N/A	-
Petroleum or Natural Gas Pipeline Spills	N/A	-
Oil and Gas Well Accidents	N/A	-
Infrastructure Failures	1 X	Moderate
Major Transportation Accidents	N/A	-
Civil Disturbances	1 X	Moderate
Public Health Emergencies	2 X	Strong
Terrorism and Similar Criminal Incidents	2 X	Moderate
Nuclear Attack or other WMD	- 2 X	Moderate
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Township and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for Richland Township: Thunderstorms and severe winds
2. Second tier of most significant hazards: ice/sleet storms, fog, drought, wildfires, public health emergencies, and major structural fires
3. Third tier of most significant hazards: hazardous materials transportation incidents

The thunderstorm and severe wind hazards lead into the following top priority hazard mitigation actions for the Township:

- About 4 additional sirens are needed to better cover the township's population with warning systems. There are currently 3 in place and 2 being added shortly, but additional coverage should be added in the future. These would probably be installed on the west side of Gull

Lake (2 sirens), and in the southwest of the township (2 sirens) at M-43 and G Avenue, where there is a huge apartment complex, houses, and a golf course.
- Investigate current needs involving the use of township schools as shelters.
- Install emergency power generators in the township schools. A trailer park in Richland is next door and could benefit from schools equipped to act as shelter areas.

Pandemic flu concerns are probably the main concern in terms of public health emergencies in the township. The fog hazard has strong effects upon transportation, with freezing fog icing road and creating large safety issues. The wildfire risks are exacerbated by some homes being located far off the roads in areas that are difficult for first responders' trucks to access. The following medium-high priority action is a way to address this:

- Promote the FIREWISE strategies to the citizens of the township. This website http://firewise.org/ contains information that may mean the difference between saving or losing a home that is at risk from wildfire hazards.

Major structural fire concerns include some factories that are major employers in the township, located mostly along main roads (especially just outside of the Village of Richland). No particular recommendation is identified by the community at this time. Richland Township is one of the healthy growing areas in the county, primarily with residential land uses.

- Hazard mitigation concepts shall be considered in development decisions within the township.

Implementation of hazard mitigation actions would generally involve authorized Township officials, the Township's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority. For years, the township has been an NFIP participant, and supports flood protection initiatives and the use of flood insurance by residents who have need for it.

9. Village of Richland

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	every year, 4 or 5	Moderate, Property
Severe Winds	every year, 1 or 2	Strong, Property
Tornadoes	every year, 1 or 2	Extreme, Casualties, Property
Extreme Heat	often	Moderate, Casualties
Severe Winter Weather (snow)	every year, 2 or 3	Strong, Property, Expensive
Ice/Sleet storms	every year, 1 or 2	Strong, Property, Expensive
Extreme Cold & Freezes	every year	Moderate
Fog	every year, 3 or 4	Strong, Property
River Flooding	NA	
Other (Non-river) Flooding	occurrences time to time	Mild, Property
Dam Failures	NA	
Drought	Not often	Mild
Wildfires	every year	Moderate, Property, Expensive
Damaging Invasive Species	Not often	Mild, Property
Earthquakes	Not often	Strong, Property
Ground subsidence	Not often	Moderate, Property, Expensive
Major Structural Fires	every year	Strong, Property, Expensive
Fixed Site Hazardous Materials	Not often	Strong, Expensive, Property
Hazardous Mat'l Transport Accidents	Not often	Moderate, Expensive
Nuclear Plant Incidents	Not often	Strong, Expensive
Petroleum or Natural Gas Pipeline Spills	Not often	Moderate, Property
Oil and Gas Well Accidents	Not often	Moderate, Property
Infrastructure Failures	Not often	Mild
Major Transportation Accidents	every year, 2 or 3	Moderate, Property, Casualties
Civil Disturbances	Not often	Moderate Expensive, Property
Public Health Emergencies	Not often	Mild, Expensive
Terrorism and Similar Criminal Incidents	Not often	Strong,
Nuclear Attack or other WMD		
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Village and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for the Village of Richland: Severe winds and tornadoes
2. Second tier of most significant hazards: Fog and major transportation accidents
3. Third tier of most significant hazards: Severe winter weather (snow, ice, sleet), major structural fires

In 2001, severe winds shut things down across the entire town. A tornado struck nearby Augusta in 1978 and did extensive damage. The following top-priority hazard mitigation strategy is proposed:

- Investigate and arrange for community shelters, which can also serve as warming centers during periods of extreme winter cold, to protect people against severe weather within the village.

Fog presents problems community-wide, especially freezing fog, which ices roadway surfaces and contributes to the transportation accident problems. Traffic has been increasing by about 2% per year, for decades. Road capacities have become maxed out. There is a large amount of truck traffic, due to the Village's proximity to I-94. There is also very heavy traffic along M-43 from Kalamazoo, and along M-89 from the East.

Severe winter weather and sheltering needs prompt the following high-priority mitigation strategy:

- Obtain an emergency power generator for use in the Village Hall.

Another Village concern is the risk of major structural fires. Facilities in town, along the main traffic corridor, and in the business district, could suffer devastating losses from such a hazard. A major fire downtown would also cause strong traffic problems. Key locations for this include D Avenue, M-43 and M-89.

A moderate-priority proposal is also offered for flood hazard considerations:

- The Village should give consideration to joining the National Flood Insurance Program, allowing residents the option of having access to flood insurance.

Implementation of hazard mitigation actions would generally involve authorized Village officials, the Village's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority.

10. Ross Township

Initial community feedback from hazard questionnaire:

Hazard	Frequency or likelihood of occurrence	Severity of hazard impacts
Thunderstorms (hail, lightning)	5 /yr	MODERATE
Severe Winds	3/yr	MODERATE
Tornadoes	1/DECADE	STRONG
Extreme Heat	2/yr	MODERATE
Severe Winter Weather (snow)	4/yr	MODERATE
Ice/Sleet storms	1/yr	STRONG
Extreme Cold & Freezes	2/yr	MODERATE
Fog	10/yr	MILD
River Flooding	0	
Other (Non-river) Flooding	0	
Dam Failures	1/CENTURY	STRONG
Drought	1/CENTURY	
Wildfires	0	
Damaging Invasive Species	2/DECADE	MODERATE
Earthquakes	1/CENTURY	
Ground subsidence	0	
Major Structural Fires	1/DECADE	STRONG
Fixed Site Hazardous Materials	0	
Hazardous Mat'l Transport Accidents	0	
Nuclear Plant Incidents	0	
Petroleum or Natural Gas Pipeline Spills	1/DECADE	STRONG
Oil and Gas Well Accidents	0	
Infrastructure Failures	0	
Major Transportation Accidents	0	
Civil Disturbances	0	
Public Health Emergencies	1/DECADE	MODERATE
Terrorism and Similar Criminal Incidents	0	
Nuclear Attack or other WMD	0	
Other (please specify)		

After the initial questionnaire was filled out, follow-up between the Township and the KCHMP planning staff resulting in a general prioritization of hazards, as follows:

1. Most significant hazards for Ross Township: Thunderstorms (including hail and lightning), severe winter weather (snow, ice, sleet)
2. Second tier of most significant hazards: Severe winds and tornadoes, major structural fires, oil/gas pipeline accidents
3. Third tier of most significant hazards: Dam failures

Severe winter weather and thunderstorms are persistent forces in the township. Sirens were added recently for emergency notification of residents. Top-priority hazard mitigation projects for these hazards are:

- Additional sirens are needed to fill in gaps in township coverage. About 4 more should address many of the current population's needs: two on the east side of Gull Lake, one northeast of Augusta, and one toward the northeast corner of the township (and county) near Yarrow Golf Resort.
- Two emergency power generators are needed: One at the Township Hall (which is attached to a fire station and could serve both), and one at the fire station which is near the Augusta Village Hall.

Medium-level concerns include pipeline breaks, since the recent Enbridge oil spill had affected the Kalamazoo River which runs through the Township. There are also gas pipelines running through the area. Major structural fires are also of concern. There are many homes near Gull Lake that are situated very close together, increasing the possibilities for a fire to affect multiple structures. A nearly Bible Conference facility serves large groups of people throughout the year. On average, there are hundreds of persons at the facility, and hundreds of residents living near Gull Lake. The safety of both residents and visitors is of great importance. The following high-priority mitigation strategy is offered:

- Investigate the installation/use of a lake hydrant to facilitate fire suppression in the Gull Lake area.

A moderate-level priority is assigned to the dam failures hazard in the township. These stem from Calhoun County sites. A cascade effect could occur. Ceresco dams are the main concern. A medium-level strategy to address this is:

- Arrange for improvements in down-river communications from Calhoun County, regarding notification in the event that any identified problem with upstream dams could rapidly allow precautionary measures and protective responses to occur in Ross Township.

Implementation of hazard mitigation actions would generally involve authorized Township officials, the Township's relevant departments, some coordination with Kalamazoo County OEM, and federal hazard mitigation funds where possible.

Other listed hazards may be significant, but have not at this time been selected for hazard mitigation priority.

PROCESS FOR NEW COMMUNITIES TO PARTICIPATE

Due to the need for the KCHMP to be completed within a specific time frame by the end of 2012, some communities may have found that a longer time was needed for sufficient interest to be generated, and momentum built, to allow their community to become fully engaged with hazard mitigation concepts and planning/project benefits.

As a result of input received during the planning process that recommended the inclusion of new communities (the Village of Vicksburg), as well as discussion during the December KCDC meeting, it was agreed that this final element of the plan would be added to provide instructions to any communities that wish to be added to this plan during 2013 and thus become eligible (for at least four years) to apply for or directly benefit from hazard mitigation project funds from FEMA.

The general process for a community to be included within this plan as a new participant is:

1. Community representatives should contact the County OEM to state their intention of being added to this plan as a new participant.
2. The community should review the content of this plan, to become familiar with the types and historical occurrences of hazards in the Kalamazoo County area.
3. The community should fill out a "hazard questionnaire" (as seen in the previous pages) that represents their community's own estimates of the frequency/probability and extent of hazards that threaten the community.
4. Additional description should be added (after the questionnaire is completed) that provides more detail about specific locations and types of impacts that the community has experienced.
5. These descriptions should lead to a list of hazard mitigation strategies that the participating community would like to see implemented within its jurisdiction.
6. Opportunities need to be provided for stakeholders and members of the general public to review the information and provide feedback about it before it is considered to be finalized.
7. This information will be presented in a "community subsection" (such as those on the preceding pages of this plan) and presented to (A) Kalamazoo County Office of Emergency Management, (B) planning staff at the Michigan State Police, Emergency Management and Homeland Security Division, and (C) plan reviewers at FEMA's Region V office in Chicago.
8. When the subsection is considered acceptable to the three agencies listed in step 7, the Kalamazoo County Hazard Mitigation Plan will be amended to include the new participating community (and its subsection) within the plan.
9. The new participant will need to officially adopt the amended Kalamazoo County Hazard Mitigation Plan.
10. Documentation of the local community's adoption (e.g. a signed and dated copy of the resolution, or a signed and dated copy of the minutes of the meeting at which the adoption took place) needs to then be sent to the planning staff at the Michigan State Police Emergency Management and Homeland Security Division, for processing.
11. As a result of that administrative processing, a FEMA letter of approval would later be sent out, certifying that the community has met all the requirements to be included as a participant in the plan, and thus eligible to apply for or directly benefit from hazard mitigation project funds from FEMA sources (its Hazard Mitigation Assistance umbrella program that includes three funding sources for flood mitigation, plus funding sources for the general mitigation of all types of hazards http://www.fema.gov/hazard-mitigation-assistance).