2016
Ogemaw County
Hazard Mitigation Plan

Plan Adopted: _____

ACKNOWLEDGEMENTS

Funded with assistance of FEMA through the Pre-Disaster Mitigation Grant Program

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Chapter 1 *Introduction*

Ogemaw County is in the mid-section of the lower peninsula of Michigan. The County is bordered on the north by Oscoda County, on the west by Roscommon County, on the south by Gladwin and Arenac Counties, and on the east by Iosco County. The County covers an area of 367,749 acres or about 574 square miles. Using the 2010 US Census population figures, the population density of the county is roughly 38.5 people per square mile. The County consists of 14 townships, one village, and two cities. The county seat in located in the City of West Branch.

The main river in the county is the Rifle River which flows through the middle of the county, north to south, eventually emptying into Lake Huron. Other major waterways are the West Branch Rifle River and Au Gres River. Many lakes are located in Ogemaw County and a few of the larger ones are located in Hill Twp., Logan Twp., Richland Twp., and Mills Twp. Forests, inland waters, and wetlands comprise over 65% of the County's surface area. Agricultural uses account for approximately 18.5% of the area. There are residential areas around the City of West Branch, Skidway Lake area in Mills Township, and around many lakes.

North-south road access is provided by M-33 in the middle of the county, M-30 in the southwest quarter, and Interstate 75 in the southwest quarter of the county. East-West access is provided by M-55 through the middle of the county. Business Loop 75 spurs off I-75 though the City of West Branch, and meets M-55, then re-joins I-75 west of town.

What is Hazard Mitigation Planning

The National Preparedness Goal for the security of the Unites States was released in September of 2011, defining what it means for the nation and all its communities to be prepared for all types of disasters and emergencies.

"A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk."

These risks include events such as natural disasters, disease pandemics, chemical spills and other manmade hazards, terrorist attacks, and cyber-attacks. The core capabilities of mitigation planning laid out with this goal are:

- Community resilience

- Long-term vulnerability reduction
- Risk and disaster resilience assessment
- Threats and hazard identification.

Hazard Mitigation is any action taken before, during, or after a disaster to eliminate or to reduce permanently the long term risk to human life and property from natural and technological hazards. 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 disaster, and then responds when it occurs. Following the response, there is a transition into the recovery process, during which mitigation measures are evaluated and adopted. This in turn, improves the preparedness posture of the community for the next incident, and so on. When successful, mitigation will lessen the impacts to such a degree that most succeeding incidents will remain incidents and not become 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 by allowing repairs and reconstruction to be completed in such a way as simply to restore damaged property as quickly as possible to pre-disaster conditions. Such efforts expedite a return to "normalcy"; however, replication of pre-disaster conditions, result in a cycle of damage, reconstruction, and damage again.

Hazard mitigation is needed to ensure that such cycles are broken, that post-disaster repairs and reconstruction take place after damages are analyzed, and that sounder, less vulnerable conditions are produced. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. Hazard mitigation provides the mechanisms by which communities and individuals can break the cycle of damage, reconstruction, and damage again.

Recognizing the importance of reducing community vulnerability to natural and technological hazards, Ogemaw County is actively addressing the issues through the development and subsequent implementation of this plan. The many benefits to be realized from this effort – protection of the public health and safety, preservation of essential services, prevention of property damage, and preservation of the local economic base, to mention just a few – will help ensure that Ogemaw County remains a vibrant, safe, and enjoyable place in which to live, raise families, and to conduct business.

Ogemaw County worked with Lapham Associates and the Michigan Department of State Police, Emergency Management Division to develop this Hazard Mitigation Plan. The intent of the plan is to work with those familiar with Ogemaw County to describe the County and to identify clear processes for minimizing or eliminating natural disasters (weather, forest fires, etc.) or emergencies related to the County's built environment (transportation, infrastructure, buildings, etc.)

The intent of a hazard mitigation plan is to inventory possible hazards, to assess the hazards to which the community is vulnerable, and to provide possible mitigation activities for those hazards. The focus of the hazard mitigation plan is the development of projects and policies that can be implemented to reduce or prevent losses from future disasters. The **Ogemaw County Hazard Mitigation Plan** includes text, tables, charts and maps necessary to describe and discuss the following: 1) a hazard analysis based on a current community profile, hazard identification, risk assessment, and vulnerability assessment; 2) a listing of the communities' goals and objectives; 3) a discussion of the alternatives for solving problems; 4) evaluation and prioritization of alternatives; 5) selection of feasible mitigation strategies; and 6) recommended mitigation strategies. The plan contains hazard mitigation elements that can be easily integrated into the county and township comprehensive plans.

The process of Hazard Mitigation Planning consists of the following steps:

1) Develop community profile and identify community hazards and risks
2) Identification and definition of goals and objectives
3) Identification of alternatives for solving problems
4) Selection of evaluation criteria
5) Selection of alternatives
6) Preparation of final plan
7) Implementation of plan
8) Monitoring and periodic revision of the plan.

Ogemaw County through its County Emergency Management Coordinator and Local Planning Team has worked to prepare the Hazard Mitigation Plan. Considerable effort has been made to gain input from stakeholders in the county. This has included meetings with townships, local officials, community leaders and the general public.

The Disaster Mitigation Act (DMA) of 2000 included new requirements for hazard mitigation planning. In order to become eligible for hazard mitigation grant program funds in the future, counties must prepare and adopt hazard mitigation plans. These local hazard mitigation plans must meet the requirements of the act adopted by the communities. Recertification of the Hazard Mitigation Plan shall take place at least once every five (5) years.

This plan is the culmination of our interdisciplinary and interagency planning effort that required the assistance and expertise of numerous agencies, organizations, and individuals. Without the technical assistance and contributions of time and ideas of these agencies, organizations and individuals, this plan could not have been completed. In addition to the agencies and individuals listed on page 17, the Ogemaw County units of government listed below participated in the plan.

Local Units of Government

Cities
West Branch, Rose City

Village
Prescott

Townships
Churchill, Cumming, Edwards, Foster, Goodar, Hill, Horton, Klacking, Logan, Mills, Ogemaw, Richland, Rose, West Branch

Executive Summary

The Ogemaw County Hazard Mitigation Plan was created to protect the health, safety, and economic interests of the Ogemaw County residents and businesses by reducing the impacts of natural, human, and technological hazards through hazard mitigation planning, awareness, and implementation. The plan serves as the foundation for hazard mitigation activities and actions within Ogemaw County. Implementation of recommendations will reduce loss of life, destruction of property, and economic losses due to natural and technological hazards. The plan provides a path toward continuous, proactive reduction of vulnerability to hazards which result in repetitive and often, 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.

This plan employs a broad perspective in examining multi-hazard mitigation activities and opportunities in Ogemaw County. Emphasis is placed on hazards which have resulted in threats to the public health, safety and welfare, as well as the social, economic and physical fabric of the community. This plan addresses such hazards as floods, tornadoes, windstorms, winter storms, forest fires, structural fires, hazardous material incidents and secondary technological hazards which result from natural hazard events. It also addresses the potential of civil disturbances, sabotage, terrorism, and possible effects of "climate change." Each hazard is analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigative action. The plan also lays out the legal basis for planning and the tools to be used for its implementation.

Information Collection
The Hazard Mitigation Planning Committee with assistance from its consultants has reviewed relevant plans, maps, studies and reports. Federal, State, regional and local government sources were reviewed to develop a current community profile. Information sources include: U.S. Census, zoning ordinances, master plans, recreation plans, capital improvement plans, parcel maps, aerial photography, MIRIS land use/land cover, USGS topographic maps, U.S Weather Service data, NRCS soils maps, Michigan Department of

Transportation information, Michigan Hazard Analysis and data, local hazard analysis, emergency management plans, and Section 302 Sites from the Local Emergency Planning Committee.

Geographic Information System Support
Existing data sets were incorporated and new data sets were created in order to analyze existing conditions and study potential future scenarios. Specialized maps showing community hazards, land cover use, infrastructure, topography, national wetlands inventory, forest cover, gas and oil wells, zoning, future land use and community facilities were prepared as part of the plan. Maps have aided to identify community characteristics, vulnerable populations, and hazard areas. GIS data and maps will be retained by the community for future use to help implement and monitor hazard mitigation activities.

Increased Community Awareness of Hazards and Hazard Mitigation
Information was disseminated to the communities and public through the use of public meetings, presentations, news releases, websites, and individual contacts. A benefit of the planning process is the education of community leaders and citizens of the community regarding potential hazards. This education supported the decision making process and will assist communities in making better, more informed decisions in the future. In addition, the process strengthened partnerships between local units of government, planning commissions, emergency services, public agencies and private interests to pool resources and helped to foster communication and understanding between various entities. By creating lines of communication and increasing awareness of the cross jurisdictional impacts of disasters and land use and policy decisions, better and more informed decisions will be made in the future.

Community Involvement

The planning process provided several opportunities for public, community and agency input and comments. Presentations of the draft plan were made to the County Board of Commissioners for commissioners' review and approval. The Consultants and staff met with the Hazard Mitigation Planning Committee numerous times during plan development. This group has representatives from local communities, state and federal agencies, and county citizens. The group was instrumental in guiding the plan development. Notices of the public meetings were sent to Hazard Mitigation Planning Committee members, newspapers, and the local communities by Ogemaw County Emergency Management. Newspaper articles were published in the local newspaper. All local communities participated in the process through surveys, meetings, and by reviewing the draft plan.

<u>Meetings</u>
Ogemaw County Board of Commissioners: Discuss Hazard Mitigation process during public comment portion of the meeting.

Ogemaw County Growth Management Committee: Emergency Management Coordinator spoke at the meeting to inform on the process and how members of the committee vote on mitigation projects.

Ogemaw County Emergency Management: Discussed the planning process, discussed hazards and vulnerability; discussed the hazard rankings along with reviewing the process for setting goals & objectives and choosing mitigation strategies with Emergency Management Coordinator present.

Ogemaw County Hazard Mitigation Committee Meetings: Discussed the planning process, discussed hazards and vulnerability; Established evaluation criteria for hazard rankings, discussed hazards in the community; Finalized Goals & Objectives along with evaluating mitigation strategies.

Community Surveys:

Early in the planning process, a local officials' survey was sent to all township supervisors and to city and village officials. The nine question survey was used to gather information about seasonal population characteristics, major community events and festivals, natural and technological hazards, community preparedness for hazard events, and ideas for hazard mitigation. The results were used to guide the planning effort and to compare hazard information gathered from the various sources and local officials understanding of hazard issues. A summary of the survey and community responses can be found in the Appendix. The Emergency Management Coordinator and the consultants made presentations to the township association meetings and the consultants met with each municipality during their board meetings to discuss the plan and to receive input regarding needed mitigation strategies and actions.

Other Public Outreach

Ogemaw County sent out newsletters informing every jurisdiction in the region, including Ogemaw County jurisdictions & surrounding counties, about the Hazard Mitigation Plan. Contact information was made available in the newsletter. Feedback, questions, suggestions, and comments were invited from these jurisdictions and the public.

Public Input of Draft Plan

A copy of the draft plan on CD was sent to local communities and any agencies requesting a copy for review. All communities had an opportunity to review and to provide input on the plan. In addition, copies of the plan were available for review by the public at the County Clerk's office and the West Branch District Library. The plan was posted on Ogemaw County's web site. Notices were put in the local newspapers to inform the public that the draft plan was available for review. Feedback, comments, suggestions, and additions were invited from the public. Neighboring counties were also sent a draft plan for their review, feedback, comments, and suggestions.

Summary of Review and Approval of Plan

A draft plan was reviewed by the steering committee, stakeholders and the public. Comments and suggestions obtained in the review process were incorporated into the final plan. The final plan contains mitigation strategies and an action plan that assigns priorities for specific hazards and mitigation measures; defines roles and responsibilities; and identifies the process for reviewing and updating the plan. The hazard mitigation plan was approved by Ogemaw County Board of Commissioners on _____ and distributed to the various municipalities for review and adoption.

The Ogemaw County Hazard Mitigation Plan represents Ogemaw County and all of the local jurisdictions which include: the Townships of Churchill, Cumming, Edwards, Foster, Goodar, Hill, Horton, Klacking, Logan, Mills, Ogemaw, Richland, Rose, West Branch; Rose City, the City of West Branch; and the Village of Prescott. All of the communities were asked to adopt the plan. It is anticipated that in the future communities may identify projects, present them to the Hazard Mitigation Committee, and request to have the plan amended to include the projects.

Summary of Recommended Plan Implementation Process

The primary entities responsible for implementing the Hazard Mitigation Plan are the Ogemaw County Board of Commissioners and the Ogemaw County Emergency Management Coordinator. The Local Emergency Management Committee (LEPC) and the Local Planning Team (LPT) are organized under Michigan SARA Title III Program and meet on a regular basis to carry out their duties. The committee expanded its role to function as the County Hazard Mitigation Committee to create and oversee implementation of the plan. The Ogemaw County Emergency Management Coordinator will function as the staff person to provide program administration and project oversight. The meeting participants developed a five year action list of projects from the mitigation strategies in the Ogemaw County Hazard Mitigation Plan. The Hazard Mitigation Committee should review the hazard mitigation plan each year at its annual meeting to determine what projects have been accomplished and to add new projects to the five year action list if appropriate.

The Hazard Mitigation Committee should identify steps needed to complete a chosen project, such as funding sources, staff and agencies required to complete the project, timelines and overall project costs.

The Hazard Mitigation Planning Committee is a subcommittee of the Ogemaw County LPT. It will function, as does the LPT, under Ogemaw County Board of Commissioners. Members of the Hazard Mitigation Planning Committee must be members of the LPT, who in turn are appointed by the County Board of Commissioners. Staff support will be provided by the Ogemaw County Emergency Management office.

Local units of government, county departments, and local, state and federal agencies will have the ability to propose and support projects from the hazard mitigation plan. Coordinating with the Hazard Mitigation Planning Committee will support plan implementation and allow the committee to monitor progress and determine the timing and scope of plan revisions.

Process to Incorporate into Local Planning Activities

Ogemaw County cities, villages, and its townships, as well as, local and state agencies should integrate information from the Hazard Mitigation Plan into their respective comprehensive and operations plans. Land use planning and zoning is administered at the county, city, village and township levels. As a part of the education and outreach of the hazard mitigation effort, communities are encouraged to incorporate hazard mitigation planning into their respective comprehensive planning and capital improvements planning and to adopt zoning regulations that will prevent the occurrence and will mitigate effects of disasters.

Planning Process

Ogemaw County and the Emergency Management Division (EMD) of the Michigan Department of State Police have developed a Hazard Mitigation Plan to identify and address issues related to hazard mitigation in the County. Ogemaw County performed the following actions to develop the plan.

Action #1 – Establish Planning Committee

Ogemaw County established a Hazard Mitigation Planning Committee from the Local Emergency Planning Committee. The purpose of this committee was to assist in developing the plan, review draft materials, review potential actions, and establish evaluation criteria. The committee included representatives from:

1. Ogemaw County Emergency Management Coordinator's Office
2. Ogemaw County Board of Commissioners
3. Ogemaw County Sheriff Department
4. District #2 Health & Human Services
5. Ogemaw County MSU Extension
6. Local EMS
7. Local Fire Department
8. Municipal Representatives
9. Red Cross
10. State Police
11. Public Works
12. City of West Branch Police Department
13. Hospital Safety & Emergency
14. Radio Amateur Civil Emergency Service
15. Department of Corrections
16. Community Emergency Response Team
17. Emergency Management Systems

Once the committee was formed it met during scheduled and special meetings to complete the new Hazard Mitigation Plan.

Action #2 – Prepare Community Profile

This action describes the County's physical and social attributes.

Physical Profile – The physical attributes of Ogemaw County are described using maps, tables and text. Existing mapped digital information and other information are used to describe the County's land uses (including industrial areas), climate, water features, soils, flood plains, transportation network, public facilities (fire stations, police, schools, community offices), hospitals, landfills, known hazards, and other natural and built features.

The committee reviewed both the maps and the text to describe the County's current situation.

Social Profile – Ogemaw County's population, population trends and projections are included for each community within Ogemaw County. Countywide information, taken from the 2010 Census and other sources, describes residents' ages, gender, housing, household composition, race, physical disabilities, income, employment, poverty status, and other social and economic circumstances.

Action #3 – Community Input/Hazard Identification

Throughout the planning process units of government and other organizations have identified issues that influence their communities.

Key Person Interaction – At meeting of the committee, communities, and organizations Hazard Mitigation questions were posed and key themes and issues were recorded. The results are incorporated into this document. A survey of potential hazards and possible ways to prevent or mitigate disasters was sent to each local community. Specific mitigation actions were solicited of each municipality and results were tabulated and used in the analysis of risks and formulation of methods to mitigate hazards.

Action #4 – Risk Assessment

The list of potential hazards compiled by Ogemaw County, the individual communities, and organizations in Action #3 were reviewed by the Hazard Mitigation Planning Committee. The risk of each submitted hazard was assessed based on various criteria such as the frequency of such hazards in Michigan, occurrence trends, levels of impact, and other pertinent information.

Action #5 – Vulnerability Assessment

The Hazard Mitigation Planning Committee measured the vulnerability of Ogemaw County to the identified potential hazards. When the potential hazards were compared to the Action #2 – Community Profile, the potential for harm was clear. When hazards are combined with people, property, and other resources, serious consequences can occur. Hazard Mitigation Planning intends to make hazards less damaging to people, property and resources.

The Committee looked at population concentrations, age-specific populations, development pressures, types of housing (older homes, mobile homes), presence of agriculture, and other situations that could make Ogemaw County more vulnerable to specific hazards.

Action #6 – Issues and Goals

The County developed a list of issues identified during Actions 2-5. These issues include those identified through existing information and through community input, risk assessment, and vulnerability assessment. Once a complete list of issues was developed, the County worked with the committee to establish a set of goals and objectives to address the County's issues related to Hazard Mitigation.

Action #7 – Identify Alternatives

The Committee developed mitigation strategies for hazards in the county. This process flowed from Action #6 when the Committee developed goals and objectives – this action lists strategies for addressing the County's goals. Some issues have many alternatives while others have only one potential solution.

Action #8 – Establish Evaluation Criteria

Committee discussed and agreed upon criteria to establish priorities for projects. This step actually started much earlier in the planning process to limit developing criteria for projects identified during the planning process, but was modified after the committee identified the strategies. The Committee developed, with the assistance of Emergency Management Coordinator and the Consultant, a "weighted" list of criteria to allow ranking of each potential hazard.

Action #9 – Develop Mitigation Actions

The evaluation criteria was used to scrutinize all of the projects submitted by County agencies, communities, school districts, and other organizations. Each project has a priority, responsible parties, timeline, and potential funding sources.

Action #10 – Plan Approval

The County prepared copies of a Draft Hazard Mitigation Plan for public review. A copy of the Draft Hazard Mitigation Plan was forwarded to the Emergency Management Division of the Michigan State Police and FEMA for their review and recommendations. The County held a public hearing to receive comments on the Plan. After the public hearing the County and the Emergency Management Division made necessary changes and recommended approval of the Plan by the Ogemaw County Board of Commissioners. The Ogemaw County Board of Commissioners approved the plan on _____.

Action #11 – Plan Implementation

The Ogemaw County Emergency Management Coordinator will use the plan to coordinate Hazard Mitigation programs across Ogemaw County and the region. The Plan focuses on

the period between 2016 and 2021. The Ogemaw County Emergency Management Coordinator will report annual progress of the plan to members of the Hazard Mitigation Planning Committee. Additionally, if amendments to the plan are necessary during the five-year planning period, the Hazard Mitigation Planning Committee will reconvene to prepare them.

Action #12 – Incorporate Hazard Mitigation in Other Plans

As a part of the education and outreach aspect of the hazard mitigation effort, communities will be encouraged to incorporate hazard mitigation planning into their respective comprehensive planning and capital improvements planning and adopt zoning regulations that will minimize effects of hazards. The Ogemaw County Hazard Mitigation Plan will be considered and analyzed by local officials when updating local plans and reviewing events and development proposals put forth in their communities.

Chapter 2 *Community Profile*

The following section describes the area's natural and built environments. The purpose is to provide users of the Plan with an overview of the County since hazards are often closely related to the physical features of an area.

Planning Area

This Plan serves the County of Ogemaw. In some instances, information is provided for the individual communities within the County, for the entire County, or for the State of Michigan to provide a better understanding of the area.

Community Characteristics

Location

Ogemaw County is located in north-central Lower Peninsula of Michigan. The County is bordered on the north by Oscoda County, on the west by Roscommon County, on the south by Gladwin and Arenac Counties, and on the east by Iosco County. The County covers an area of 367,749 acres or about 574 square miles. Using current 2010 US Census figures, the population density of the county is roughly 38.5 people per square mile. The County consists of fourteen townships, one village and two cities. The county seat in located in the City of West Branch.

1790 – part of Knox County
1803 – part of Wayne County, Indiana Territory
1810 – part of Michigan Territory
1818 – part of Michimackinac Territory
1819 – part of Oakland County
1852 – part of Mackinac County
1856 – part of Cheboygan County
1860 – part of Midland County
1867 – part of Iosco County
1875 – Ogemaw County established

History

Ogemaw County was set off in 1840 as a county, but it did not become an organized county until 1875. It had 16 townships in 1889. Starting in the Northeast corner going from east to west they were: Goodar, Rose, Damon, Foster, Hill, Cumming, Klacking, Beaver Lake, Logan, Churchill, West Branch, Ogemaw, Richland, Mills, Horton, and Edwards. Presently, the townships are Goodar, Rose, Foster, Hill, Cumming, Klacking, Logan, Churchill, West Branch, Ogemaw, Richland, Mills, Horton and Edwards.

The first courthouse was built in 1880 at the cost of $10,000. The wood building basement contained the jail, the ground floor had offices and the living quarters of the sheriff, the second floor was the courtroom and committee rooms. In 1887 the Courthouse was

completely destroyed by a fire. The fire occurred mid-day and all of the county records were saved.

A new courthouse was built in 1888 at the cost of $18,000 including the furnishings. This one was brick with furnaces in the basement. The ground floor contained offices for the County Clerk, Judges of Probate, Register of Deeds, and the County Treasurer. Large fireproof vaults were attached to each of the offices. The second floor had the Courtroom, two jury rooms, a judge's room, and the stenographer's room. The jail and sheriff's quarters were in a separate brick building. The jail had ten cells. A cage in the attic was for the female inmates.

Climate and Weather

CLIMATE		
MONTH	**AVG. MIN TEMP**	**AVG. MAX TEMP.**
January	9°F./-13°C.	26°F./-3°C.
July	55°F./13°C.	81°F./27°C
PRECIPITATION	**RAINFALL**	**SNOWFALL**
Average Annual	29in./74cm.	57in./145cm.
GROWING SEASON	**DAYS ABOVE 90°F/32°C**	**DAYS BELOW 0°F/-18°C**
126	6	21
Source: NOAA Climate Summary, 1995		

Land Use

Ogemaw County covers 574 square miles, or approximately 367,749 acres. The major land cover in the county is forest -- 59.2% of the county. Approximately 18.8% of the county is devoted to agricultural production.

The majority of the built environment in Ogemaw County is located near the City of West Branch, City of Rose City, Village of Prescott, and the Skidway Lake area. Urbanized areas take up approximately 2.7% of the County's land area. Most of the development in non-urbanized areas involves tourist and resort attractions along with seasonal residential development. Inland waters and wetlands comprise about 6.1% of the County's surface area. Ogemaw County has county-wide planning with the exception of West Branch Township, Edwards Township, and the City of West Branch.

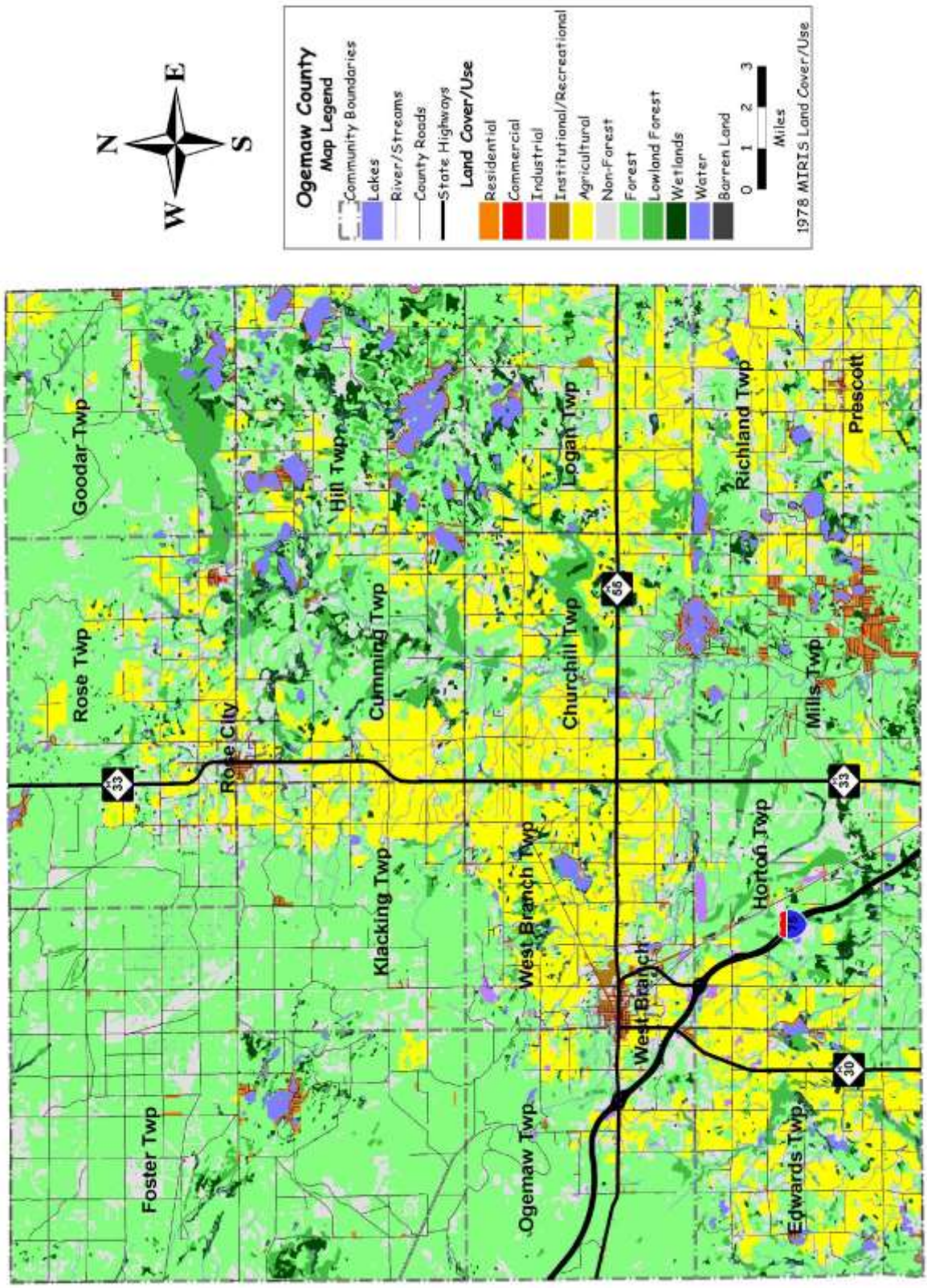


Figure 1 1978 MIRIS Land Cover Map

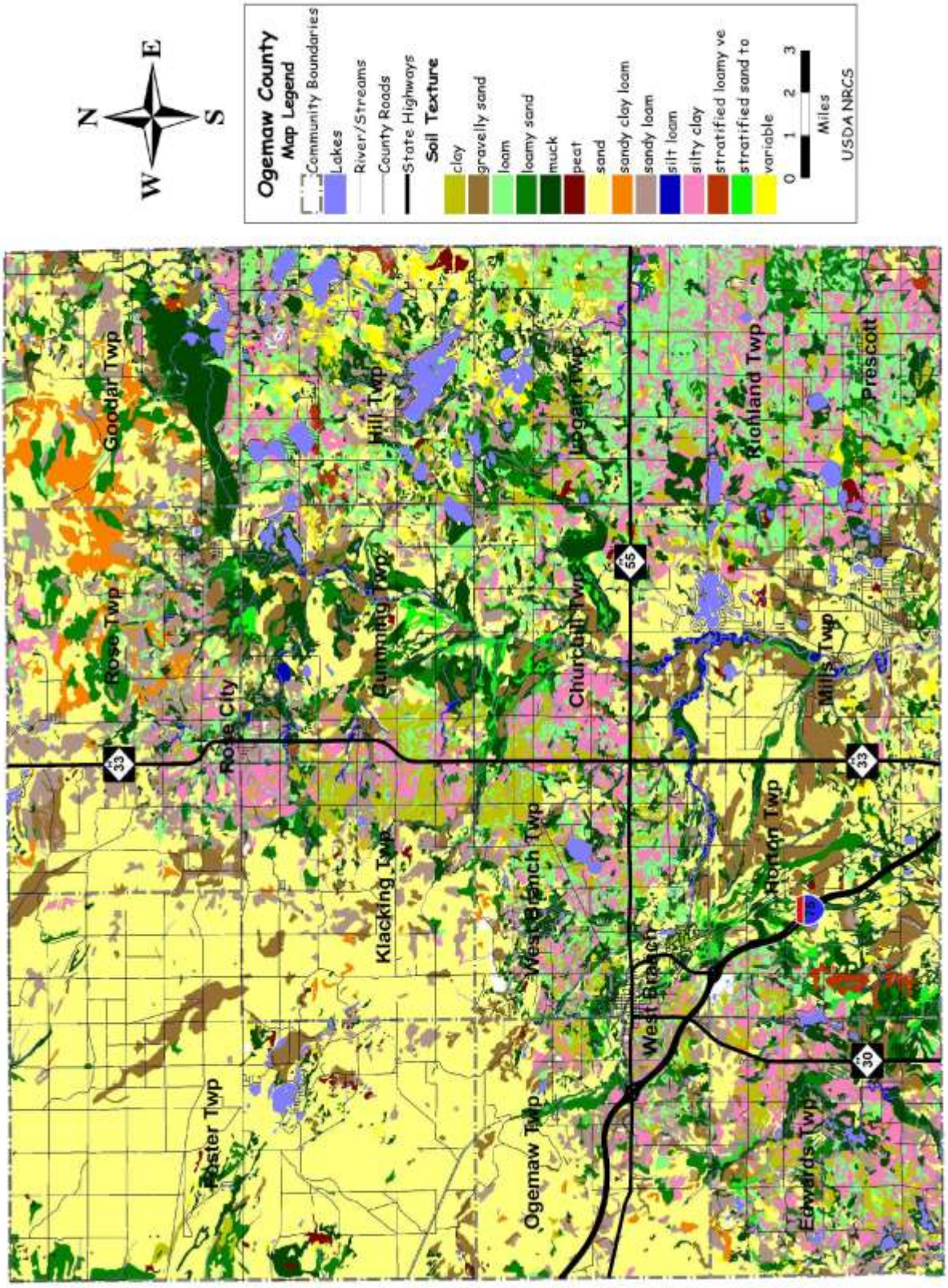


Figure 2 USDA – NRCS Soils Map

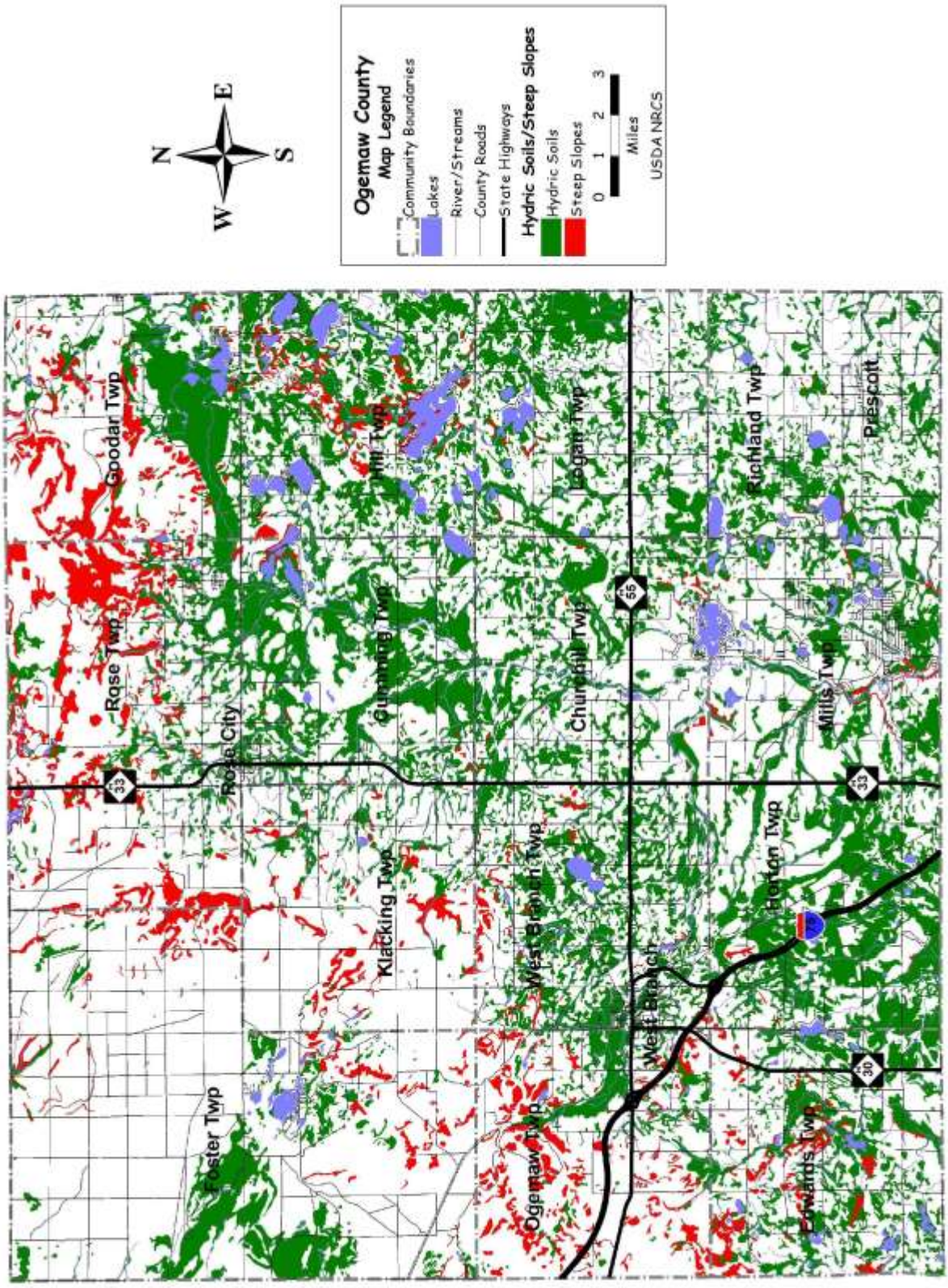


Figure 3 **Ogemaw County Hydric Soils & Steep Slopes Map**

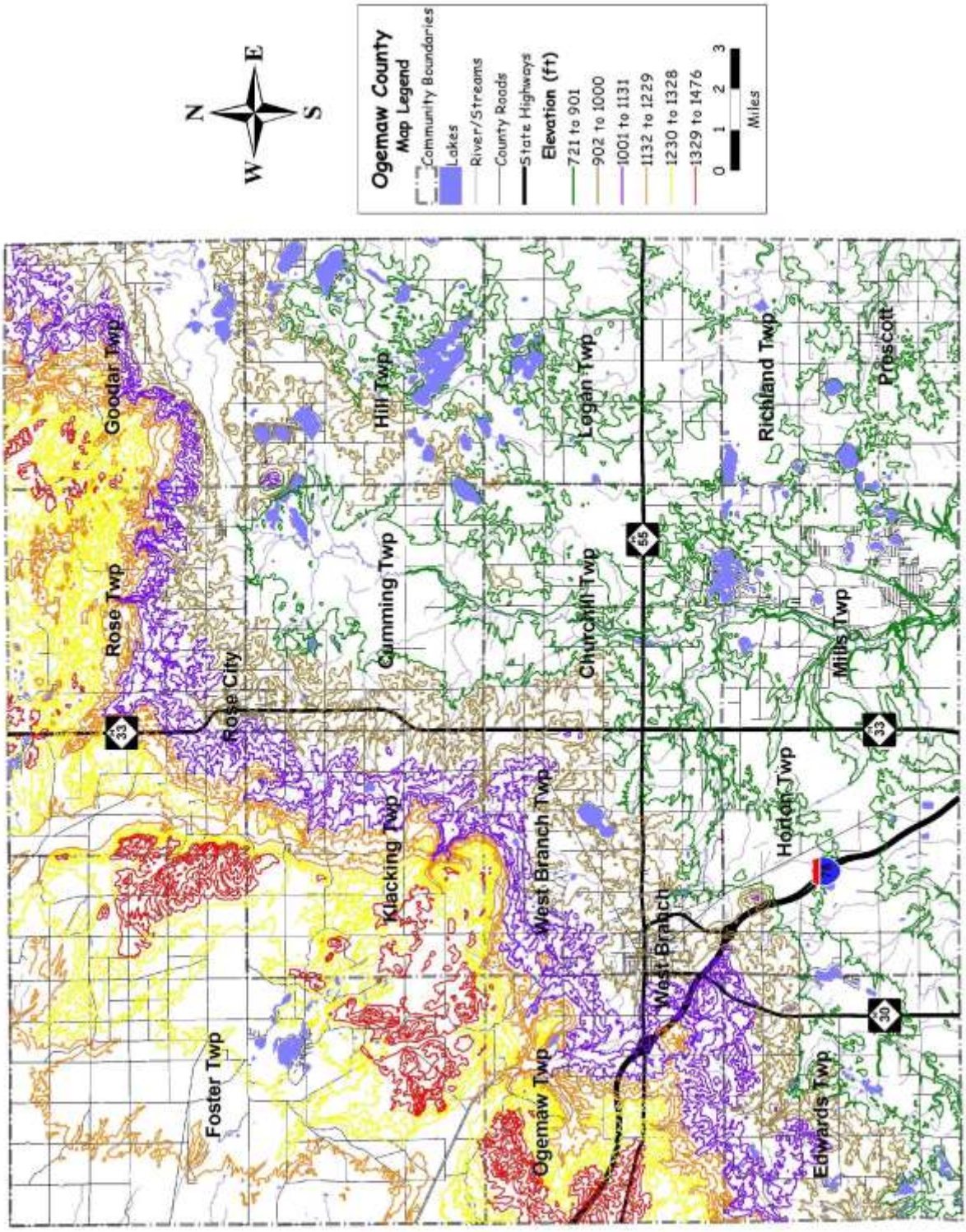


Figure 4 Ogemaw County Elevation Map

Topography

Ogemaw County's topography has a total relief of about 755 feet with the lower points being at the southeast corner with an elevation of 721 ft. Elevations increase moving in towards the northwestern area of the county with an area of steeper slopes and an elevation of 1476 feet. Generally speaking, the terrain in the county varies from flat areas to gently rolling or hilly areas. The most significant relief and topographic features can be seen in the northwest area of the county towards the center of the county.

Hydrology

Ogemaw County has a variety of water bodies such as rivers, streams, lakes and wetlands. The County has about 6,637 acres of lake surface. Together they account for about 6% of the County's total acreage.

Fourteen lakes of more than 100 acres lie within the County and provide ample opportunity for water related activities such as fishing and boating. The most significant lakes include: Sage Lake, Lake Ogemaw, South Dease Lake, Au Sable Lake, Stylus Lake, Peach Lake, Clear Lake, George Lake, Rifle Lake, Hardwood Lake, North Dease Lake, Henderson Lake, Cranberry Lake, and Devoe Lake.

Watersheds within the county are the Rifle, Au Gres, and Tittabawassee. The Rifle, Au Gres, and Tittabawassee watersheds all eventually drain into Lake Huron.

Wetlands are defined by the existence of water, either on or near the surface for a portion of the year and by the type of vegetation that is present. Wetlands may have many names and are often referred to as bogs, marshes, and swamps. Wetlands are an important resource to the people of Ogemaw County. They improve the water quality of lakes and streams by filtering polluting nutrients and chemicals. More importantly, wetlands recharge aquifers, support wildlife and vegetation, and protect shorelines from erosion. The eastern side of the county has a significant amount of wetlands that cover large continuous areas along the Au Gres River. Hill Township has a significant amount of wetlands.

Ogemaw County does not participate in the FEMA National Flood Insurance Program, and therefore no flood zones maps have been created.

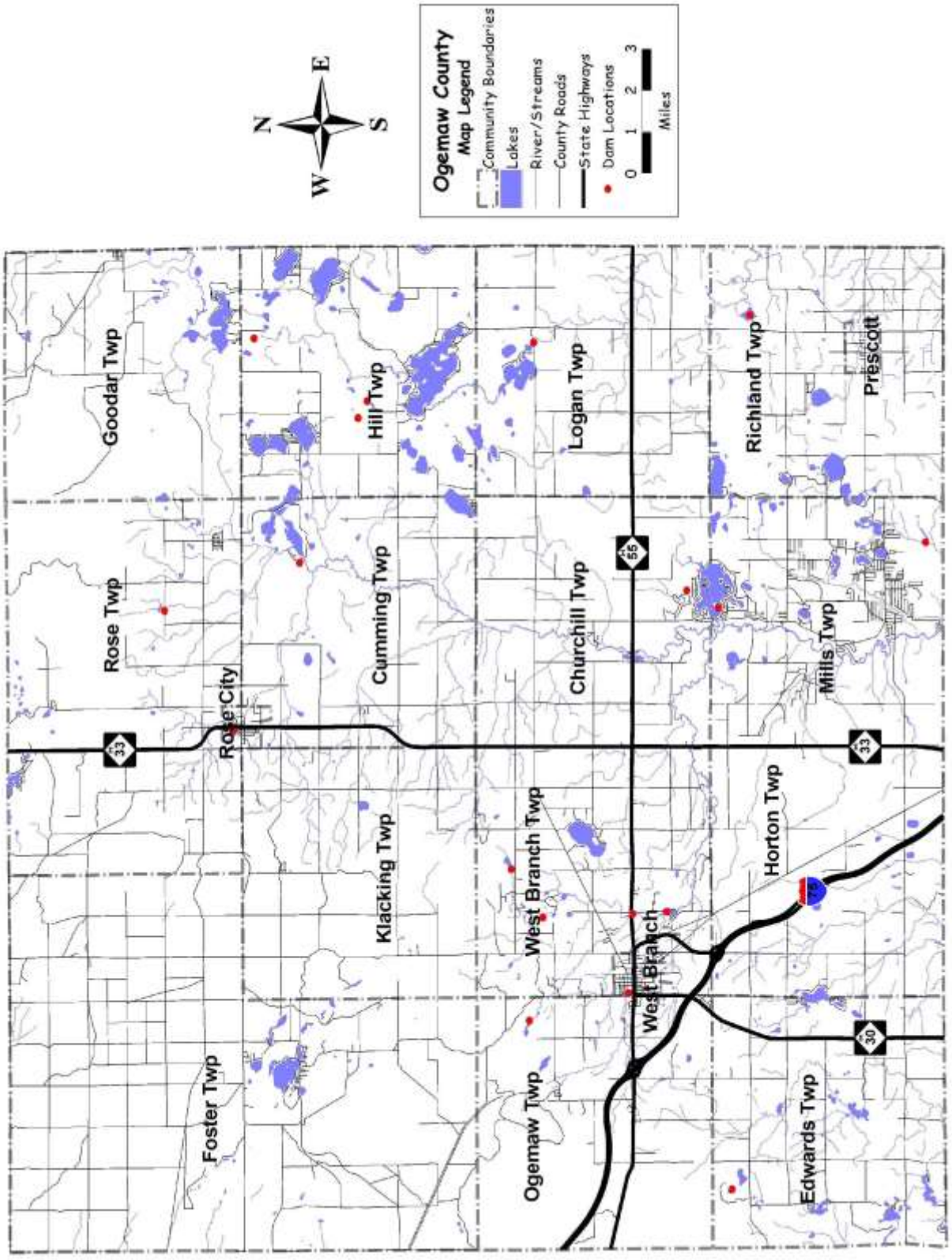


Figure 5 Ogemaw County Dam Locations Map

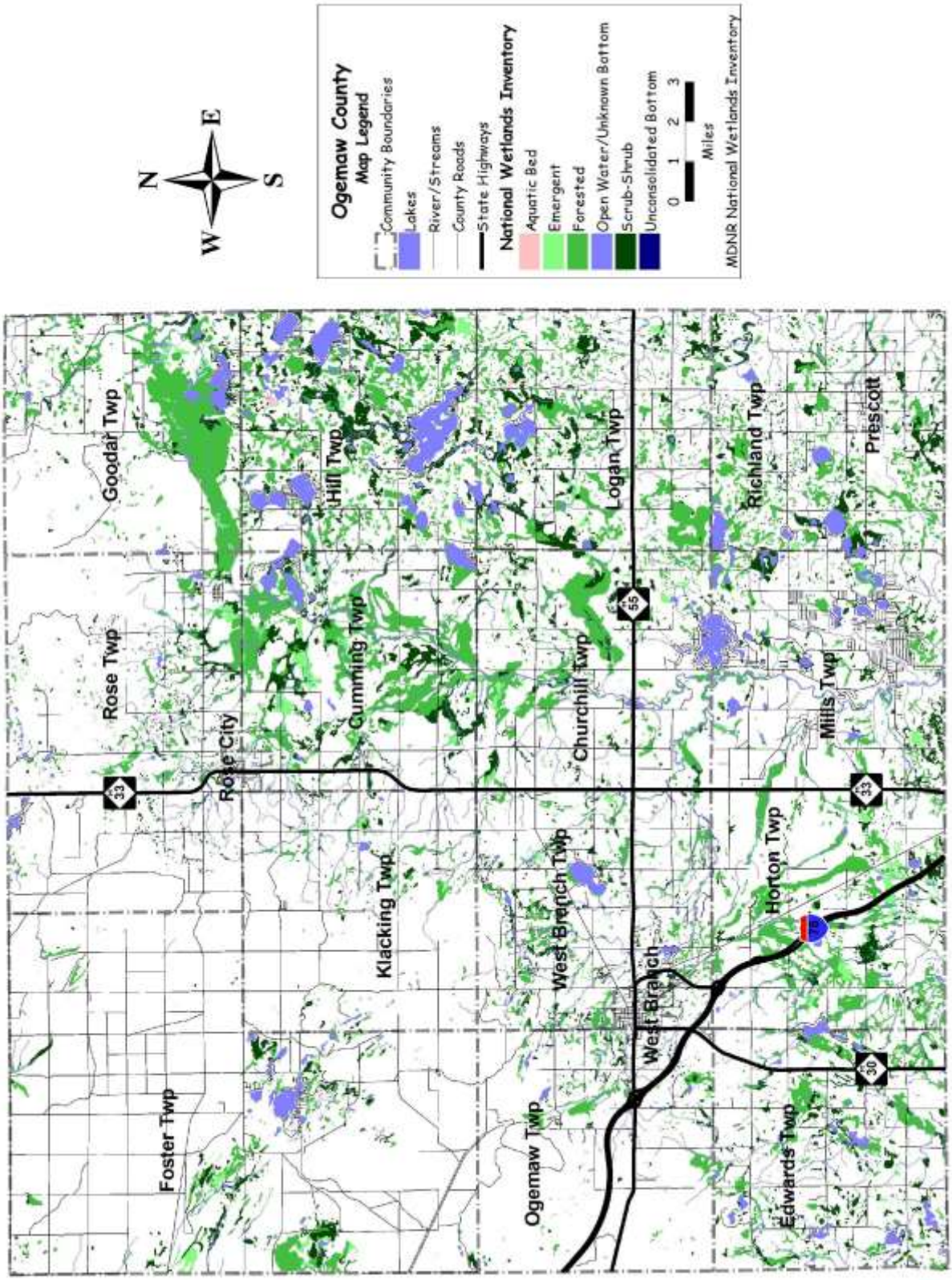


Figure 6 Ogemaw County National Wetland Inventory Map

Geology

The rolling hills, river valleys, swamps and lakes were created by the retreating continental glacier some 12,000 years ago. Beneath this thick mantle of the glacial deposits lays a foundation of layered sedimentary bedrock.

Starting approximately 2 million years ago, during the Pleistocene era, continental glaciers formed in the Hudson Bay area. Several times, over this two million year period, the massive sheets of ice built up and moved south across what is today Michigan. Massive ice sheets, more than one mile thick, advanced in a southerly direction bulldozing their way across the landscape. The glacier pushed material in front of it, incorporating rocks and soil into the debris laden ice, and scraped the ground and broke apart the sedimentary bedrock of the Michigan Basin.

Each advance and retreat of the continental glaciers took tens of thousands of years. This reoccurring process shaped and reshaped the land, obliterating and then creating hills, valleys, rivers and lakes, swamps and marshes. The last glacial period, called the Wisconsin Era, created the landscape we know today. The glacier left behind boulders, rocks, cobble, sand, gravel, silt, clay and loam. In some areas the material was deposited in unsorted masses called till plains, ground moraines and end moraines. Water flowing from the melting glaciers also sorted materials, creating outwash channels, sand deltas, kames and eskers. Fine materials, captured in the fast moving glacial meltwaters, settled to the bottom of expansive glacial lakes creating lacustrine clay and silt plains. The map on page 29 shows the formation of glacial landforms.

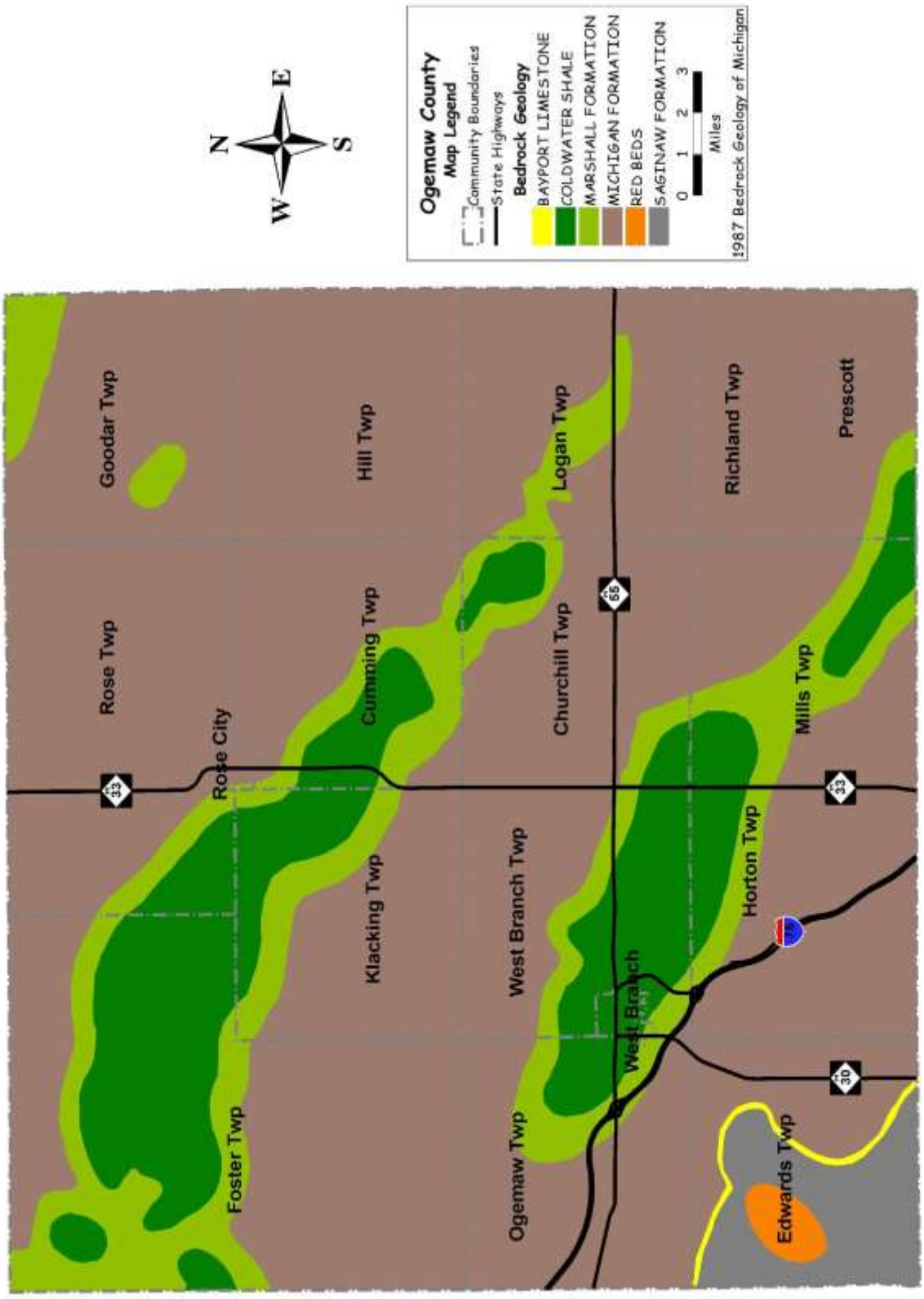


Figure 7 Ogemaw County Bedrock Geology Map

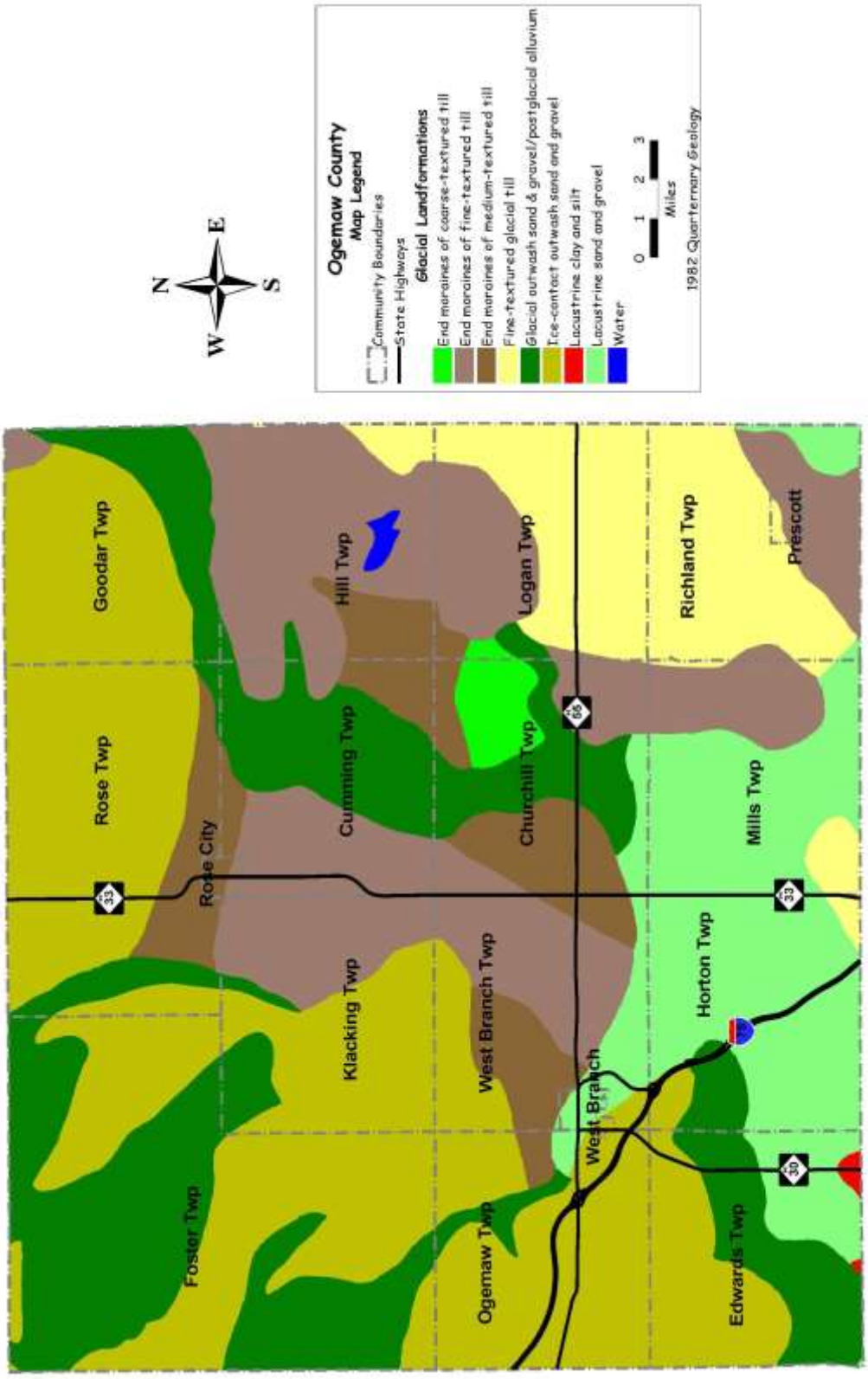


Figure 8 Ogemaw County Glacial Land Formations Map

Pre-settlement Vegetation

The Michigan Department of Natural Resources has compiled pre-settlement vegetation maps of counties in Michigan. The maps were generated from information contained in the first government land survey notes of the 1800's along with information about then current vegetation, landforms and soils. A review of the pre-settlement vegetation map of Ogemaw County shows large areas were covered with white pine – red pine forest, jack pine forest, beech – sugar maple – hemlock forest, and hemlock – white pine forest. The map delineates jack pine-red pine forest covered areas in Foster Township, Rose Township, Goodar Township, Cumming Township, Klacking Township, Ogemaw Township, Mills Township, Horton Township, and Churchill Township.

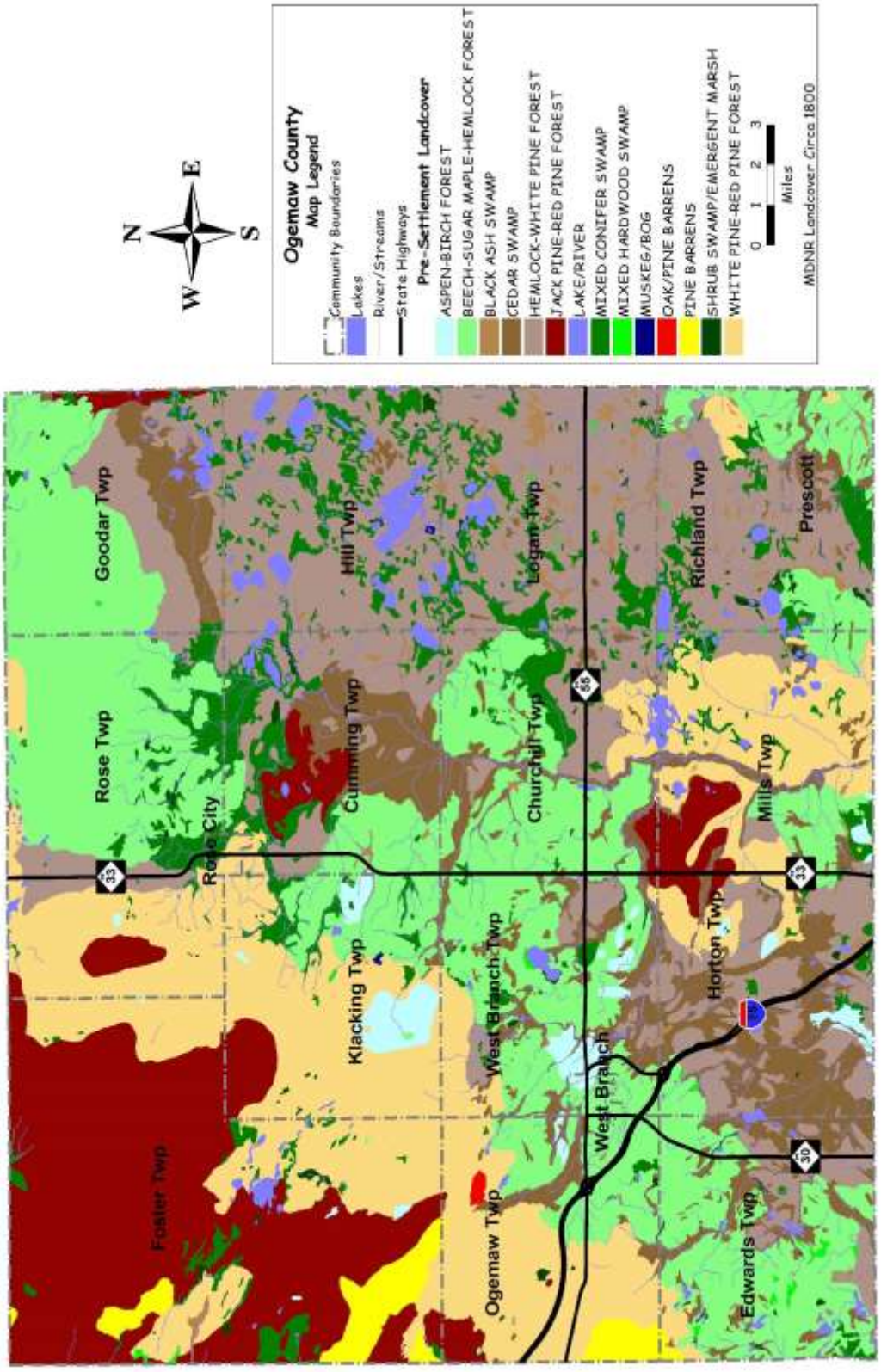


Figure 9 Ogemaw County Pre-Settlement (Circa 1800) Landcover Map

Forest Cover

Almost 60 percent of the county is forested and an analysis of forest types will assist in defining vulnerable areas and populations. The Michigan Resource Information System's (MIRIS) 1978 land use inventory compiled land cover maps that still depict forest types in the county. Tree species vary depending upon the soils, moisture and past activities such as logging, fires and land clearing. Aspen-Birch, central hardwoods, and pine are the most common forest types in the county. Under dry spring conditions forest fires can occur in any forest type; however, some forest types have higher risks. Jack and red pine forests have a high risk for wildfires. Oak and white pine forests have a moderate risk for wildfires. Draughty, low fertility sandy soils, found in outwash plains and channels, supported pre-settlement pine forests that for thousands of years were perpetuated by wildfires. Today, residential development has occurred within the same wildfire prone areas. There are still extensive areas of pine forests in the county.

Red jack and white pine forest types are included in the pine forest category. Bigtooth aspen, quaking aspen, white birch, red maple and red oak are the primary tree species found in the aspen-birch type. Red oak, white oak, black oak and northern pin oak are the primary species growing in the oak forests. Northern hardwoods include species such as sugar maple, red maple, American beech, basswood and yellow birch.

Poorly drained, lowland areas support northern white cedar, tamarack, balsam fir, black spruce, eastern hemlock, white pine, balsam poplar, trembling aspen, paper birch, black ash, speckled alder and shrub willows. Northern white cedar dominates the wetland areas where there is good lateral water movement and the soils are high in organic content. Lowland forests are typically located adjacent to water and function as riparian forests and water buffers. The network of lowland forests, associated with rivers and creeks, also function as wildlife corridors and are the backbone of large regional ecological corridors. Lowland forests adjacent to rivers and streams are prone to flooding during the spring snowmelt, particularly when combined with heavy spring rains. Extensive areas of lowland forests can be found in Goodar Township, Hill Township, Logan Township, Churchill Township, and Edwards Township.

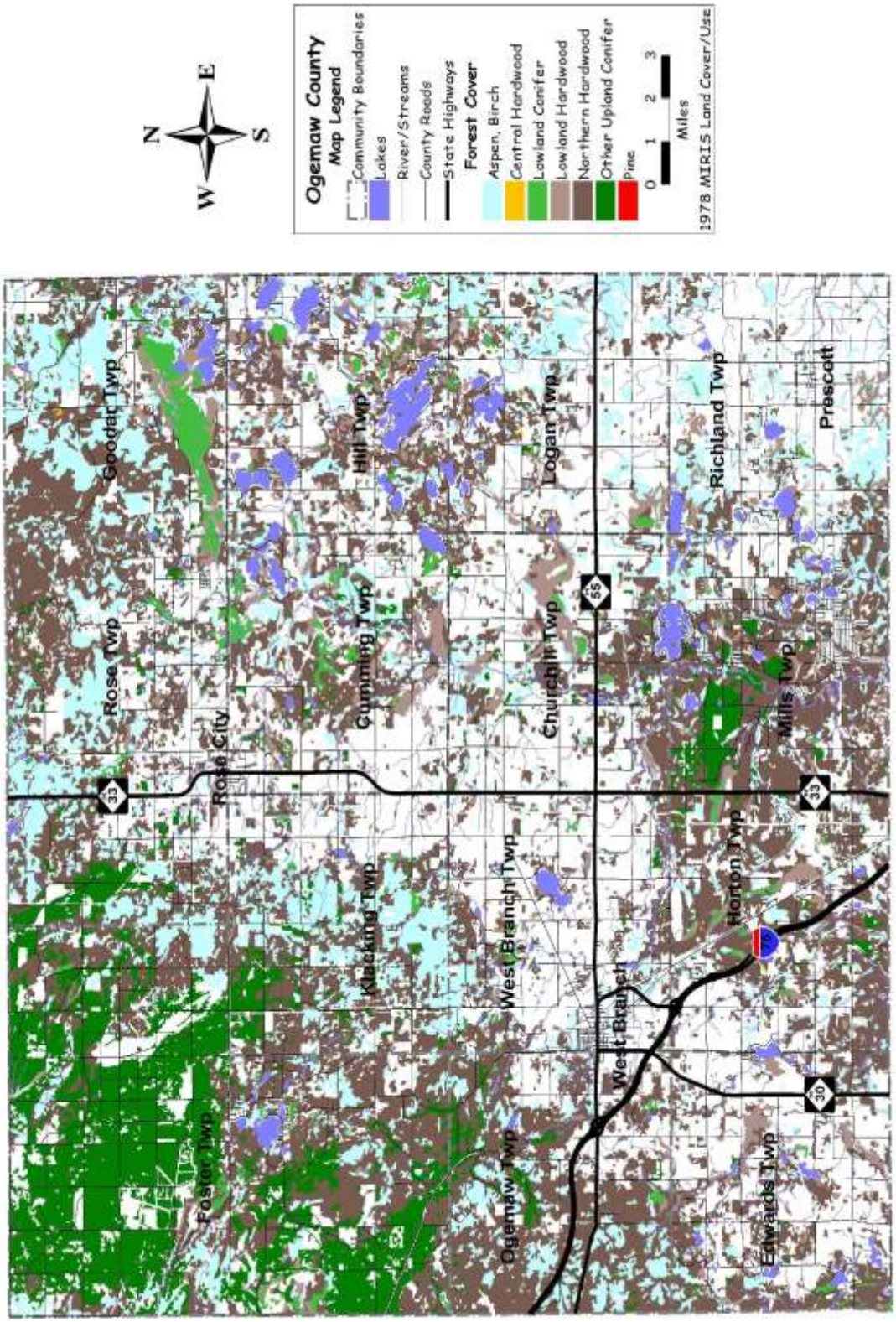


Figure 10 Ogemaw County 1978 MIRIS Forest Cover Map

Contaminated Sites

The Michigan Environmental Response Act (Part 201 of PA 451 of 1994, as amended) provides for the identification, evaluation and risk assessment of sites of environmental contamination in the State of Michigan. The Environmental Response Division (ERD) is charged with administering this law. A site of environmental contamination, as identified by ERD, is "a location at which contamination of soil, ground water, surface water, air or other environmental resource is confirmed, or where there is potential for contamination of resources due to site conditions, site use or management practices." A search of the Department of Environmental Quality's web site database found 19 sites of environmental contamination in Ogemaw County.

Figure 11 Ogemaw County Part 201 Sites Map

Site ID	Site Name	Address	City	Zip Code	Source	Pollutants
65000002	Henderson Lk Rd (Prescott Products)	5250 E. Henderson Lake Rd.	Prescott	48756	Fabricated Metal Products	1,1 DCA; 1,1 DCE; TCE; trans-1,2 DCE
65000004	Osceola Refining Co	2790 S Refinery Rd.	West Branch	48661	Petroleum Refining	Pb; Xylenes
65000007	Former Fuller Oil	Rose City Road	Rose City	48654	null	1,2,4 TMB; Benzene; Toluene; Xylenes
65000009	Zettel Drive Fuel Oil Spill	3091 Zettel Drive	West Branch	48661	Private Households	Fuel oil; Heating oil
65000010	Taylor Building Products	631 North Third St.	West Branch	48661	Metal Doors Sash & Trim	Benzene; Ethylbenzene; Toluene; Xylenes
65000019	Baker, Thomas E. #1	321 North 6th St.	West Branch	48661	null	null
65000066	Sempco Inc.	201 North 8th St.	West Branch	48661	Metal Coating & Allied Service	Pb; VC; Xylenes; Paint sludge; Paint waste; Solvents
65000067	Foster Oil Co Bulk Plant	1985 & 1993 E M-55 Highway	West Branch	48661	Petroleum Bulk Stations & Term	1,2,4 TMB; Benzene; Ethylbenzene; Toluene; Xylenes
65000070	I-75 Business Loop 2640, West Branch	2460 I-75 Business Loop	West Branch	48661	Scrap & Waste Materials	PCB's; Metals
65000073	Mike's Garage	6563 E County Line Rd.	South Branch	48761	null	null
65000075	Chippewa Trail 2867, Lupton	2867 Chippewa Trail	Lupton	48635	Private Households	Xylenes
65000076	Old M-76 2690 South West Branch	2690 S. Old M 76 Highway	West Branch	48661	null	Pb
65000094	M-30, 3977 S.	3977 S M-30	West Branch	48661	Nonferrous Forgings	null
65000096	Auto Parts M-33	520 N M-33	Rose City	48654	Motor Vehicle Parts	Batteries; Oil
65000097	M-76, 2702 South Old, West Branch	2702 S Old M-76	West Branch	48661	Scrap & Waste Materials	Benzene; Toluene

Site ID	Site Name	Address	City	Zip Code	Source	Pollutants
65000098	I-75 Business Loop 2490, West Branch	2490 I-75 Business Loop	West Branch	48661	Scrap & Waste Materials	Naphthalene; Hg
65000103	Refinery Rd. Mercury Waste	Refinery Rd.	West Branch	48661	null	null
65000105	Reasner Rd. Drum 1/6/05	Reasner Rd. @ Sage Lake Rd.	Rose City	48654	null	null
65000111	Town Hall Road, East 5330	Short's Landfill 5330 E Town Hall Rd.	Hale	48739	null	null

Source: MDEQ

The regulatory authority for underground storage tanks is under Part 211, Underground Storage Tank Regulations, of Act 451 of 1994, as amended, and the Michigan Underground Storage Tank Rules (MUSTR). In addition to MUSTR, new tanks and piping shall comply with the Storage and Handling of Flammable and Combustible Liquids Rules. Owners/operators of petroleum underground storage tanks (USTs) are required to provide for taking corrective action and for compensating third parties for bodily injury and property damage arising from a release by petroleum USTs. Suspected and confirmed releases from regulated USTs must be reported currently to the Storage Tank Division. There are 36 Active Underground Storage Tanks in Ogemaw County most of which are located in or around the City of West Branch.

Figure 12 Ogemaw County Underground Storage Tanks Map

Facility ID	Facility Name	Address	City	Zip Code
1282	Ogemaw County Road Commission	1250 S M-33	West Branch	48661
1625	Community Rehabilitation Services, PC	600 Bennett	West Branch	48661
2657	Resners Chevrolet Sales & Service	113 S Bennett St.	Rose City	48654
3262	Foster Oil Pac-Pride	2288 Refinery Rd.	West Branch	48661
3489	N.M.C Shop-n-go #285	101 S Bennett	Rose City	48654
3502	Woodland Oil Co	312 Washington St.	Prescott	48756
4773	Village of Prescott Dept. Of Public Works	203 N Sherman	Prescott	48756
6664	Whittemore-Prescott Bus Garage	5925 Mills Rd.	Prescott	48770
7758	Schmitt Tire & Gas	624 W Houghton Ave.	West Branch	48661
8399	Guide Post Grocery	3815 Grass Lake Rd.	West Branch	48661
8877	South Branch Trading Post	5926 Thompson St	South Branch	48761
10577	Sandvik Inc.	510 Griffin Rd.	West Branch	48661
10714	Forward Corp West Branch Plaza	2980 Cook Rd.	West Branch	48661
10715	WIB Mini Plaza Forward	600 W Houghton Ave.	West Branch	48661
10838	The Lazy Oil Company	116 S Third St.	West Branch	48661
12847	Forward Rose City	103 Williams	Rose City	48654
14525	Quigley Lumber Co	5918 Heath Rd.	South Branch	48761
14893	Dore Store #7	411 E Houghton Ave.	West Branch	48661
15895	Wangler & Sons Trucking Inc.	156 E M 55	West Branch	48661
17569	Medical Arts Center	335 E Houghton Ave.	West Branch	48661
18086	Sunrise Store #14	2447 W Tawas Rd.	West Branch	48661

Facility ID	Facility Name	Address	City	Zip Code
19329	Turner Westside	3737 W M-76	West Branch	48661
19881	Prescott Party Store	107 Sage Lake Rd.	Prescott	48756
21538	Super Flite Oil	2338 S M-76	West Branch	48661
33248	Corner Express 2	2997 Cook Rd.	West Branch	48661
33312	Sunrise Store #65	2097 Greenwood Rd.	Prescott	48756
34028	Parkview Acres Inc.	2575 Rose City Rd.	Lupton	48635
34044	County Line Service	4521 E County Line Rd.	Hale	48739
34452	Lake Ogemaw Marina & Boat Storage Inc.	3009 Rifle River Trail	West Branch	48661
38813	Sunrise Store #66	2474 Vern Ct.	West Branch	48661
39129	Dave Green	2015 S M-33	West Branch	48661
39325	West Branch Regional Medical Center	2463 S M 30	West Branch	48661
40003	Rose City EZ Mart	619 Bennett St.	Rose City	48654
41117	Kirby Properties	1250 S US-23	Tawas City	48763
41155	Nester Creek Convenience Store LLC	4971 E Tawas Rd.	Prescott	48756
41415	Murphy USA #7025	2762 Cook Rd.	West Branch	48661

Source: MDEQ

At the time of a release, the owner/operator is responsible for the corrective actions mandated by Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 of PA 451, as amended. Owners/operators are required to hire consultants that meet the qualifications in Section 21325 of Part 213 to perform corrective actions and to submit specific reports required by the statute. The Remediation Division is charged with selectively auditing the final assessment reports and closure reports. There are 38 open Leaking Underground Storage Tanks in Ogemaw County.

Figure 13 Ogemaw County Leaking Underground Storage Tanks Map

Facility ID	Facility Name	Address	City	Zip Code	
322	Community Rehabilitation Services	113 N 1st St.	West Branch	48661	
1233	City of Rose City DPW	300 N Williams St.	Rose City	48654	
1625	Dantzers Standard Service	105 W Houghton Ave.	West Branch	48661	
1850	Little Reds	508 E Houghton Ave.	West Branch	48661	
2626	Shady Shores Restaurant	3610 Forest Dr.	Lupton	48635	

Facility ID	Facility Name	Address	City	Zip Code	
2657	Resners Chevrolet Sales & Service	113 S Bennett St.	Rose City	48654	
3489	N.M.C Shop-n-go #285	101 S Bennett St.	Rose City	48654	
4773	Village of Prescott Dept. Of Public Works	203 N Sherman	Prescott	48756	
7758	Schmitt Tire & Gas	624 W Houghton Ave.	West Branch	48661	
8163	Nester Corner Store	5007 E M 55	Hale	48739	
8399	Guide Post Grocery	3815 Grass Lake Rd.	West Branch	48661	
9162	Lovewells Corner Store	1005 Wiltse Rd.	Lupton	48635	
9570	Robert Baker	5743 S M-33	Alger	48610	
10575	Avrams Fuel Service	5225 Park St.	Prescott	48756	
10719	Lucy Schlichter	1968 S Mio Rd.	West Branch	48661	
12847	Forward Rose City	103 Williams	Rose City	48654	
14295	Griffin Beverage Co	1901 Dam Rd.	West Branch	48661	
14318	Milton L. Harrington	201 S Bennett St.	Rose City	48654	
14893	Dore Store #7	411 E Houghton Ave.	West Branch	48661	
17093	Mcgregors Kountry Store	3980 Henderson Lake Rd.	Prescott	48756	
18086	Sunrise Store #14	2447 W Tawas Rd.	West Branch	48661	
18789	CCE West Branch Distribution Factory	221 Thomas St.	West Branch	48661	
19242	West Branch Airport	1519 Airport Rd.	West Branch	48661	
19329	Turner Westside	3737 W M-76	West Branch	48661	
21414	Rose City Service	305 Williams	Rose City	48654	
21538	Super Flite Oil	2338 S M-76	West Branch	48661	
32955	Al's Service	2140 Greenwood Rd.	Prescott	48756	
33545	Rose City Feed & Tack	301 Bennett St.	Rose City	48654	

Facility ID	Facility Name	Address	City	Zip Code	
33664	Kens Iga	4005 S M 30	West Branch	48661	
36625	Franklin Forge Co	4747 S M-76 PO Box 216	West Branch	48661	
37229	Clear Lake Party Store	2224 N Clear Lake Rd.	West Branch	48661	
39387	Proposed Rite Aid Store	501 E Houghton Ave.	West Branch	48661	
40566	MDNR-Lupton	3337 Main St.	Lupton	48635	
41756	Northern Bay Investments	400 E Houghton Ave.	West Branch	48661	
42407	Independent Bank Branch Office	700 W Houghton Ave.	West Branch	48661	
50001451	Carscallens Store	1340 E State	West Branch	48661	
50002087	Skidway Car Care Center Inc.	1881 Greenwood Rd.	Prescott	48756	
50002114	Prescott Former Garage	201 Washington	Prescott	48756	

Source: MDEQ

Superfund Amendments & Restoration Act Title III establishes requirements for federal, state, and local governments, Indian tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The Community Right-to-Know provisions help increase the public's knowledge and access to information on chemicals at individual facilities, their uses, and releases into the environment. States and communities, working with facilities, can use the information to improve chemical safety and protect public health and the environment.

Superfund Amendments & Restoration Act Title III is a federal act that is enforced in Michigan by the U.S. Environmental Protection Agency. The requirements are implemented in Michigan under an executive order from the Governor. Executive Order 2007-18 created the Michigan Citizen-Community Emergency Response Coordinating Council as an advisory body within the Michigan Department of State Police. This new council is responsible for developing and implementing citizen volunteer emergency response plans and hazard mitigation plans, and it acts as the "state emergency response commission" as required by federal statute.

Ogemaw County has three facilities that are registered in the Toxics Release Inventory. Sandvik Hard Materials in West Branch is the largest contributor to the release of chemicals with a 2014 annual amount of 86lbs to the air, 6lbs to the land and 12lbs transferred off-site

for disposal. The primary chemicals released are Cobalt Compounds and Nickel Compounds. The other two listed facilities are Taylor Entrance Systems in West Branch and Header Products in Rose City which do not have any reported releases for 2014.

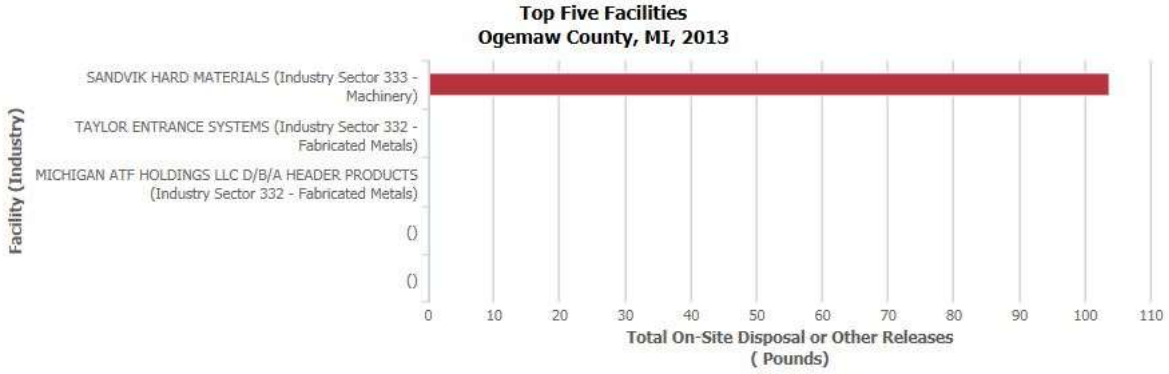


Figure 14 Toxic Release Inventory

The objectives of the Resource Conservation and Recovery Act (RCRA) are to protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner. RCRA regulates the management of solid waste, hazardous waste, and underground storage tanks holding petroleum products or other specific chemicals. Hazardous waste information is contained in a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies in turn pass on the information to regional and national EPA offices. These regulations are governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984.

Below is a table of Registered Facilities in Ogemaw County under the RCRA program:

Facility Name	Street Address	City Name	State	ZIP Code
ACTION COLLISION	512 N 2ND ST	WEST BRANCH	MI	48661
ADMIN INDUSTRIES LLC	3049 BEECHWOOD RD	ROSE CITY	MI	48654
AMERICAN PLASTIC TOYS INC	3059 BEECHWOOD RD	ROSE CITY	MI	48654
CITY ENVIRONMENTAL SERVICES	460 S VALLEY RD	WEST BRANCH	MI	48661
CONSUMERS ENERGY CO	411 BENNETT ST	ROSE CITY	MI	48654
CONSUMERS ENERGY COMPANY	4100 W M-76	WEST BRANCH	MI	48661
DCP MIDSTREAM LP	1684 W TAWAS RD	WEST BRANCH	MI	48661
DEAN ARBOUR FORD OF WEST BRANCH INC	3382 W M 76	WEST BRANCH	MI	48661
DORE STORE 7 WEST BRANCH	411 E HOUGHTON AVE	WEST BRANCH	MI	48661

Facility Name	Street Address	City Name	State	ZIP Code
E & D FOREST PRODUCTS INC	441 INDUSTRIAL DR	ROSE CITY	MI	48654
EDNA WILLIAMS ESTATE	2962 E ROSE CITY RD	LUPTON	MI	48635
EMRO PROPANE CO	2147 I 75 BUSINESS LOOP	WEST BRANCH	MI	48661
ENBRIDGE ENERGY INC	1530 W AIRPORT RD	WEST BRANCH	MI	48661
FERNELIUS CHEVROLET INC	113 S BENNETT ST	ROSE CITY	MI	48654
FINISH LINE AUTO WASH	2225 S M 76	WEST BRANCH	MI	48661
FORWARD CORP	103 N WILLIAMS ST	ROSE CITY	MI	48654
FOSTER OIL CO	2288 REFINERY RD	WEST BRANCH	MI	48661
GARB-KO INC	2997 COOK RD	WEST BRANCH	MI	48661
GOLD STAR COATINGS INC	2234 S DAM RD	WEST BRANCH	MI	48661-9366
GREEN ACE HARDWARE	2106 S M 76	WEST BRANCH	MI	48661
GRIFFIN-NORTHERN BEVERAGE COMPANY	1901 DAM RD	WEST BRANCH	MI	48661
HART BUICK GMC INC	3433 W M 55	WEST BRANCH	MI	48661
HOME DEPOT USA INC	2892 COOK RD	WEST BRANCH	MI	48661
INTERNATIONAL TRANSMISSION COMPANY LLC	1224 W M 55	WEST BRANCH	MI	48661
JONATHAN SCOTT BERNS DDS PLLC	278 N BURGESS ST	WEST BRANCH	MI	48661
KINCH AUTOMOTIVE MACHINE	103 PLAZA DR	WEST BRANCH	MI	48661
KMART CORPORATION	2110 S M 76	WEST BRANCH	MI	48661
LAKESIDE STAMPING INC	2901 S M 76	WEST BRANCH	MI	48661
MARATHON PETROLEUM COMPANY LLC	2251 FINERTY RD	WEST BRANCH	MI	48661
MARATHON PETROLEUM COMPANY LLC	2527 PEACH LAKE RD	WEST BRANCH	MI	48661
MARIANNES HOMETOWN LAUNDRY	2626 N M 33	ROSE CITY	MI	48654
MDMB FINANCIAL SERVICES	496 E HOUGHTON AVE	WEST BRANCH	MI	48661
MERCANTILE BANK OF MICHIGAN	115 5TH ST	WEST BRANCH	MI	48661
MI DEPT/NATURAL RESOURCES AND ENVIRONMENT	1005 WILTSE RD	LUPTON	MI	48635
MI DEPT/NATURAL RESOURCES AND ENVIRONMENT	2790 S REFINERY RD	WEST BRANCH	MI	48661-9248
MI DEPT/NATURAL RESOURCES AND ENVIRONMENT	3337 MAIN ST	LUPTON	MI	48635

Facility Name	Street Address	City Name	State	ZIP Code
MI DEPT/NATURAL RESOURCES AND ENVIRONMENT	3640 RIFLE RIVER TRL	PRESCOTT	MI	48756
MI DEPT/NATURAL RESOURCES AND ENVIRONMENT	410 N FAIRVIEW RD	WEST BRANCH	MI	48661
MICHIGAN ATF HOLDINGS LLC	285 CASEMASTER DR	ROSE CITY	MI	48654
MICHIGAN BELL TELEPHONE COMPANY	600 S VALLEY ST	WEST BRANCH	MI	48661
MURPHY OIL USA INC	2762 COOK RD	WEST BRANCH	MI	48661
NEARLY NEW TIRES AND AUTO REPAIR	2510 OLD 76	WEST BRANCH	MI	48661
NORTH STAR SPECIALTIES INC	2085 W M 55	WEST BRANCH	MI	48661
NORTHWEST MICHIGAN COMMUNITY HEALTH AGENCY	630 PROGRESS ST	WEST BRANCH	MI	48661
PBG MICHIGAN LLC	610 PARKWAY DR	WEST BRANCH	MI	48661
PCC OLOFSSON INC	2525 E GRIFFIN RD	WEST BRANCH	MI	48661-9296
PERRY DRUG STORES INC	501 E HOUGHTON AVE	WEST BRANCH	MI	48661
PETER BARBIER	508 E HOUGHTON AVE	WEST BRANCH	MI	48661
QUICK SAV	2636 POINTER RD	WEST BRANCH	MI	48661
ROBERT CHERRY	201 N 8TH ST	WEST BRANCH	MI	48661
ROSE CITY INDUSTRIES	464 E INDUSTRIAL DR	ROSE CITY	MI	48654
ROSE TOOL & DIE INC	640 S VALLEY RD	WEST BRANCH	MI	48661
RWD ENTERPRISES	301 S BENNETT ST	ROSE CITY	MI	48654
SANDVIK HARD MATERIALS	510 GRIFFIN RD.	WEST BRANCH	MI	48661
SAVOY ENERGY L P	1702 W TAWAS RD	WEST BRANCH	MI	48661
SELLEYS CLEANERS	135 N 4TH	WEST BRANCH	MI	48661
T R TIMBER	502 E STATE RD	WEST BRANCH	MI	48661
TAYLOR BUILDING PRODUCTS CO	600 N FIRST ST	WEST BRANCH	MI	48661
TAYLOR BUILDING PRODUCTS INC	631 N. FIRST ST.	WEST BRANCH	MI	48661-1058
TCPI ACQUISITION CORPORATION	522 E HOUGHTON AVE	WEST BRANCH	MI	48661
TEAM HODGES INC	2265 S M 76	WEST BRANCH	MI	48661
TRACTOR SUPPLY COMPANY #646	2050 S M 76	WEST BRANCH	MI	48661
UNIQUE AUTO BODY	2776 S M 76	WEST BRANCH	MI	48661
UNITED PARCEL SERVICE INC	615 PARKWAY DR	WEST BRANCH	MI	48661
VILLAGE QUIK LUBE	3149 W HOUGHTON AVE	WEST BRANCH	MI	48661
WAL-MART STORES EAST LP	2750 COOK RD	WEST BRANCH	MI	48661
WALGREEN CO	2480 E HOUGHTON AVE	WEST BRANCH	MI	48661

Facility Name	Street Address	City Name	State	ZIP Code
WEST BRANCH CLEANERS	404 W HOUGHTON AVE	WEST BRANCH	MI	48661
WEST BRANCH COLLISION INC	2515 S M 30	WEST BRANCH	MI	48661
WEST BRANCH FAMILY DENTISTRY	248 N BURGESS ST	WEST BRANCH	MI	48661
WEST BRANCH FAMILY DENTISTRY	3561 W M 76	WEST BRANCH	MI	48661
WEST BRANCH GAS PLANT	2251 SIMMONS ROAD	WEST BRANCH	MI	48661-9365
WEST BRANCH INDUSTRIES	2083 W M 55	WEST BRANCH	MI	48661
WILTSE PONTIAC BUICK GMC TRUCK INC	2445 W M 55	WEST BRANCH	MI	48661
WOODSTOCK, INC	3800 HIGHWAY M30	WEST BRANCH	MI	48661
ZETTELS COLLISION	3091 W HOUGHTON	WEST BRANCH	MI	48661

Public Water Supply & Wellhead Protection

Michigan's groundwater is used for drinking water by nearly half of the state's population. In addition, it is used for irrigation and industrial purposes and contributes to the economy and our quality of life in Michigan, the Great Lakes State. In an effort to safeguard public water supply systems from contamination, the federal Safe Drinking Water Act, 1976 PA 399, was amended in 1986 to include wellhead protection. Through these amendments Michigan implemented a voluntary, statewide Wellhead Protection Program (WHPP). Michigan's WHPP is composed of a set of guidelines that help communities protect their drinking water by identifying the area that contributes groundwater to public water wells, identifying sources of contamination within that area, and developing methods to manage the area cooperatively and to minimize the threat to the public water systems. The Communities in Ogemaw County that have public water systems are:

WSSN	NAME	Population	Source
County:	**OGEMAW**		
04935	OGEMAW TOWNSHIP	125	GW
05570	PRESCOTT-HIDDEN CREEK MANOR	40	GW
05815	ROSE CITY, CITY OF	180	GW
07010	WEST BRANCH, CITY OF	2139	GW
07012	WEST BRANCH TOWNSHIP	60	GW
40408	COUNTRY VILLAGE ESTATES MHP	133	GW
40410	TWIN PINES MOBILE HOME PARK	93	GW
64934	BORTZ HEALTH CARE-ROSE CITY	102	GW

Communities with a WHPP receive a higher level of environmental review in the state permitting process. In addition, permitting for underground and aboveground storage tanks, spillage of polluting materials, and discharging to groundwater include more stringent requirements within Wellhead Protection Areas. Consequently, communities that have designated Wellhead Protection Areas (WHPA) are better able to safeguard their groundwater from contamination. Financial assistance is also available for the development of management practices (e.g., planning and zoning) and the search for and plugging of abandoned wells within the WHPA.

As part of the local WHPP it is important that the municipalities with a public water supply identify an effective contingency plan for emergencies that may threaten wells serving the water system. The plan should identify personnel, testing equipment, materials and procedures necessary for the fast and effective mitigation of emergencies. A contingency plan should include public water supply system emergency response protocol, notification procedures, and methods for handling emergencies based upon the nature of the emergency and the threat to the water system. Contingency plans should provide a course of action with an emphasis on providing a mechanism for containment in the case of chemical spills. The contingency plan should also identify alternative water supplies in the event that an emergency results in an impact to a well or wells serving the public water system.

Figure 15 Ogemaw County Wellhead Protection Areas Map

Population and Economic Characteristics

Social Features

This section of the Plan describes the population of Ogemaw County and Michigan. The description focuses on the County and its unique population characteristics. In addition to the overall population figures, this section also describes the population's age, gender, and race. Household distribution is also detailed as well as the number of people with physical disabilities. Employment trends are discussed along with employment distribution, income, and poverty status.

Population Trends and Projections

Table 1

Ogemaw County Population					
	2000	2010	% Change 2000-10	2013	% Change 2010-13
OGEMAW COUNTY	21,645	21,699	0.2%	21,537	-0.7%
Townships					
Churchill	1,603	1,713	6.9%	1,682	-1.8%
Cumming	796	698	-12.3%	730	4.6%
Edwards	1,390	1,413	1.7%	1,232	-12.8%
Foster	821	843	2.7%	762	-9.6%
Goodar	493	398	-19.3%	378	-5.0%
Hill	1,584	1,361	-14.1%	1,574	15.7%
Horton	997	927	-7.0%	992	7.0%
Klacking	617	614	-0.5%	533	-13.2%
Logan	581	551	-5.2%	622	12.9%
Mills	4,005	4,291	7.1%	4,243	-1.1%
Ogemaw	1,118	1,223	9.4%	1,019	-16.7%
Richland	956	914	-4.4%	1,146	25.4%
Rose	1,409	1,368	-2.9%	1,293	-5.5%
West Branch	2,628	2,593	-1.3%	2,570	0.9%
Villages					
Prescott	286	266	-7.0%	335	25.9%
Cities					
Rose City	721	653	-9.4%	623	-4.6%
West Branch	1,926	2,139	11.1%	2,138	0.0%

Source: U.S. Census Bureau, 2010 Census

Table 2

Ogemaw County Population Projections		
	2020	2040
OGEMAW COUNTY	22,533	24,189
Townships		
Churchill	1,816	2,021
Cumming	701	706
Edwards	1,459	1,549
Foster	873	934
Goodar	394	386
Hill	1,358	1,350
Horton	940	966
Klacking	628	656
Logan	560	577
Mills	4,554	5,076
Ogemaw	1,317	1,506
Richland	658	677
Rose	656	660
West Branch	2,648	2,756
Villages		
Prescott	270	278
Cities		
Rose City	656	660
West Branch	2,309	2,647

Source: EMCOG
Method: Linear Trend Extrapolation

Age Distribution

While the overall population is the most important consideration, there are other characteristics to consider when addressing potential hazards. The age distribution of a County can influence the types of facilities and programs needed. Table 3 shows that the County's median age (46.5) is higher than Michigan's median age of 38.9 with a larger percentage of individuals in every age bracket after 45 years of age.

Table 3

Ogemaw County Age Distribution		
Age Group	**Population**	**Percentage**
Under 5 years	1,038	4.8%
5 to 9 years	1,176	5.4%
10 to 14 years	1,295	6.0%
15 to 19 years	1,378	6.4%
20 to 24 years	939	4.3%
25 to 34 years	1,984	9.1%
35 to 44 years	2,255	10.4%
45 to 54 years	3,463	16.0%
55 to 59 years	1,749	8.1%
60 to 64 years	1,657	7.6%
65 to 74 years	2,791	12.9%
75 to 84 years	1,470	6.7%
85 years and over	504	2.3%
Median age (years) 46.5		

Michigan Age Distribution		
Age Group	**Population**	**Percentage**
Under 5 years	596,286	6.0%
5 to 9 years	637,784	6.5%
10 to 14 years	675,216	6.8%
15 to 19 years	739,599	7.5%
20 to 24 years	669,072	6.8%
25 to 34 years	1,164,149	11.8%
35 to 44 years	1,277,974	12.9%
45 to 54 years	1,510,033	15.3%
55 to 59 years	683,186	6.9%
60 to 64 years	568,811	5.8%
65 to 74 years	724,709	7.3%
75 to 84 years	444,940	4.5%
85 years and over	191,881	1.9%
Median age (years) 38.9		

Source: U.S. Census Bureau, 2010 Census

Gender Distribution

Most communities have a slightly higher proportion of females since they have a longer life expectancy. In Michigan, females account for 50.9 percent of the population. Ogemaw County has 10,814 males and 10,885 females, about the same as Michigan's makeup.

Table 4

Ogemaw County Gender Distribution		
	Population	Percentage
Male	10,814	49.8%
Female	10,885	50.2%

Michigan Gender Distribution		
	Population	Percentage
Male	4,848,114	49.1%
Female	5,035,526	50.9%

Source: U.S. Census Bureau, 2010 Census

Racial Composition

The racial composition of Ogemaw County is different than Michigan's but similar to most northern Michigan communities. Table 5 shows the County's population distribution is 97.1 percent White, 0.2 percent Black or African American, 0.7 percent American Indian and Alaska Native, 0.4 percent Asian, 0.0 Native Hawaiian and other Pacific Islander and 1.6 percent some other race. Ogemaw County has a higher percentage of Whites, a lower percentage of Black or African American, and a lower percentage of Asians and other races than the State of Michigan.

Table 5

Ogemaw County Racial Distribution		
	Population	Percentage
White	21,076	97.1%
Black or African American	39	0.2%
American Indian and Alaska Native	157	0.7%
Asian	76	0.4%
Native Hawaiian and Other Pacific Islander	6	0.0%
Some other race	345	1.6%

Michigan Racial Distribution		
	Population	Percentage
White	7,803,120	78.9%
Black or African American	1,400,362	14.2%
American Indian and Alaska Native	62,007	0.6%
Asian	238,199	2.4%
Native Hawaiian and Other Pacific Islander	2,604	0.0%
Some other race	377,348	3.9%

Source: U.S. Census Bureau, 2010 Census

Household Composition

Household composition can influence a community's needs since the distribution often identifies unique community traits. Ogemaw County has several household characteristics that may influence hazard mitigation planning. Table 6 shows the County has a 0.4% higher proportion of family households (66.4 percent) than the State of Michigan (66.0 percent). Ogemaw County has a higher percentage of married couple families than the state and a lower proportion of female householders with no spouse in comparison to Michigan as a whole. The State of Michigan does have a slightly higher average household size than Ogemaw County.

Table 6

Ogemaw County Household Distribution		
HOUSEHOLDS BY TYPE	**Total**	**%**
Total household	9,283	100%
Family households	6,162	66.4%
With own children under 18 years	2,041	22.0%
Husband-wife family	4,754	51.2%
With own children under 18 years	1,282	13.8%
Male householder, no wife present	477	5.1%
With own children under 18 years	253	2.7%
Female householder, no husband present	931	10.0%
With own children under 18 years	506	5.5%
Nonfamily households	3,121	33.6%
Householder living alone	2,623	28.3%
Households with individuals under 18 years	2,290	24.7%
Households with individuals 65 years and over	3,324	35.8%
Average household size 2.31		
Average family size 2.78		

Source: U.S. Census, 2010 Census

Table 6

Michigan Household Distribution		
HOUSEHOLDS BY TYPE	**Total**	**%**
Total households	3,872,508	100.0%
Family households	2,554,073	66.0%
With own children under 18 years	1,106,735	28.6%
Husband-wife family	1,857,127	48.0%
With own children under 18 years	730,892	18.9%
Male householder, no wife present	185,363	4.8%
With own children under 18 years	92,281	2.4%
Female householder, no husband present	511,583	13.2%
With own children under 18 years	284,562	7.3%
Nonfamily households	1,318,435	34.0%
Householder living alone	1,079,678	27.9%
Households with individuals under 18 years	1,224,631	31.6%
Households with individuals 65 years and over	985,333	25.4%
Average household size 2.49		
Average family size 3.05		

Source: U.S. Census, 2010 Census

Physical Disabilities

Table 7 lists non-institutionalized residents with disabilities. The tables indicate the County has overall a slightly higher proportion of residents with physical disabilities than Michigan as a whole. This population can require additional assistance in the event of certain emergencies such as power outages or severe weather.

Table 7

Ogemaw County Physical Disabilities		
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION	**Number**	**%**
Population 5 to 20 years	4,682	100.0%
With a disability	445	9.5%
Population 21 to 64 years	11,728	100.0%
With a disability	2,949	25.1%
Percent employed 38.7		
No disability	8,779	74.9%
Percent employed 69.9		
Population 65 years and over	3,860	100.0%
With a disability	1,702	44.1%

Table 7

Michigan Physical Disabilities		
DISABILITY STATUS OF THE CIVILIAN NONINSTITUTIONALIZED POPULATION	**Number**	**%**
Population 5 to 20 years	2,335,938	100.0%
With a disability	197,611	8.5%
Population 21 to 64 years	5,631,322	100.0%
With a disability	1,017,943	18.1%
Percent employed 54.8		
No disability	4,613,379	81.9%
Percent employed 77.9		
Population 65 years and over	1,171,080	100.0%
With a disability	495,677	42.3%

Source: U.S. Census, 2010 Census

Employment

In 1990 – 1992 Ogemaw County and State of Michigan jobless rates increased. Ogemaw County rate leveled off from 1992 until 1993 while the State of Michigan declined. In 1993 Ogemaw County's jobless rate began to decline consistently until 2001. In 2001 both Ogemaw County and the State of Michigan jobless rates began to increase where they again leveled off until 2008. In 2008 both the county and state jobless rates increased until 2009. In 2009 the county jobless rates began to drop continually while the State of Michigan jobless rates leveled off until 2011 before beginning to drop.

The highest percentage of employment by industry is Services at 33.7% increasing 14.3% since 1996. Retail accounts for 26.3% of the workforce which indicates the high number of retail stores within the county including the Tanger Outlet Mall in West Branch. Government is the third highest employment by industry at 19.4%.

Figure 16 Jobless Rate

Table 8

Ogemaw County Employment by Industry		
Industry	**2010 % Employed**	**1996 % Employed**
Services	33.7%	19.4%
Retail	26.3%	30.5%
Government	19.4%	16.4%
Manufacturing	4.4%	9.1%
Wholesale Trade	4.1%	4.7%
Finance Insurance and Real Estate	3.5%	6.3%
Construction	2.9%	5.4%
Transportation	2.7%	5%
Agricultural	1.7%	2.3%

Source: Michigan Department of Technology, Management & Budget

Table 8

OGEMAW COUNTY EMPLOYMENT BY INDUSTRY (Number of Jobs)			
Components by Type	**2000**	**2005**	**2010**
Total Employment	9,557	9,783	8,836
Farm Employment	422	403	374
Ag. Serv., forestry, fishing & other	129	89	90
Mining	58	51	79
Construction	512	572	455
Manufacturing	1,065	655	334
Wholesale trade	318	304	340
Retail trade	2,799	2,000	1,881
Finance, insurance, and real estate	691	816	511
Government and government enterprises	1,448	1,412	1,266

Source: Bureau of Economic Analysis, U.S. Department of Commerce

Table 8 identifies employment distribution in the County and Michigan. In Ogemaw County the largest employment category is Educational, health and social services (22.9%) followed by Retail Trade (14.5%)and Manufacturing (13.6%). Michigan's employment distribution differs in several ways, including a higher percentage of Manufacturing, lower percentage in Educational, health and social services.

Table 8

Ogemaw County Employment by Industry		
Industry	**Total**	**Percentage**
Agriculture, forestry, fishing and hunting, and mining	361	4.4%
Construction	656	8.0%
Manufacturing	1,115	13.6%
Wholesale trade	364	4.4%
Retail trade	1,195	14.5%
Transportation and warehousing, and utilities	367	4.5%
Information	148	1.8%
Finance, insurance, real estate, and rental and leasing	280	3.4%
Professional, scientific, management, administrative, and waste management services	297	3.6%
Educational, health and social services	1,882	22.9%
Arts, entertainment, recreation, accommodation and food services	692	8.4%
Other services (except public administration)	466	5.7%
Public administration	398	4.8%

Source: Michigan Department of Technology, Management & Budget

Table 8

Michigan Employment by Industry		
Industry	**Total**	**Percentage**
Agriculture, forestry, fishing and hunting, and mining	49,496	1.1%
Construction	278,079	6.0%
Manufacturing	1,045,651	22.5%
Wholesale trade	151,656	3.3%
Retail trade	550,918	11.9%
Transportation and warehousing, and utilities	191,799	4.1%
Information	98,887	2.1%
Finance, insurance, real estate, and rental and leasing	246,633	5.3%
Professional, scientific, management, administrative, and waste management services	371,119	8.0%
Educational, health and social services	921,395	19.9%
Arts, entertainment, recreation, accommodation and food services	351,229	7.6%
Other services (except public administration)	212,868	4.6%
Public administration	167,731	3.6%

Source: Michigan Department of Technology, Management & Budget

Socio-Economic Levels

The County's household income levels are considerably lower than the State of Michigan. Table 9 shows that Ogemaw County's median household income was estimated at $34,619 in 2013. This figure is considerably lower than Michigan's estimated median household income of $48,411 in 2013. The County also has a lower per capita income than the State of Michigan. The estimated percentage of families below poverty level in Ogemaw County was 21.5% in 2013, considerably higher than the State of Michigan's estimated rate of 16.8%.

Table 9

Ogemaw County Income Levels	
Median household income (dollars)	$34,619
Per capita income (dollars)	$19,634
Percent below poverty level (Families)	21.5%

Michigan Income Levels	
Median household income (dollars)	$48,411
Per capita income (dollars)	$25,681
Percent below poverty level (Families)	16.8%

Source: 2009-2013 American Community Survey 5-Year Estimates

Housing

Housing in Ogemaw County is an important consideration in hazard mitigation since it is where the population lives and makes up a large part of a community's wealth. The location and quality of housing can influence the amount of damage a community sustains in many types of emergencies.

Housing Tenure

In 2013, Ogemaw County had 16,015 housing units (Table 10). Of the total figure, 8,998 were occupied (56.2 percent), which is a far lower percentage than Michigan as-a-whole (84.4 percent). Ogemaw County has a higher percentage of owner-occupied housing units, 82.8 percent as compared to the 72.1 percent State average, along with a considerably higher percentage of vacant housing units – 43.8 percent as compared to 15.6 for the State. Many of these units are seasonal homes that are occupied at various times of the year.

These figures show some special needs related to hazard mitigation and housing. The large number of vacant houses can also create problems if problems go unchecked for long periods of time (broken pipes, gas leaks, vandalism, etc.).

Table 10

Ogemaw County Housing Units		
Total housing units	**16,015**	**100.0%**
Occupied housing units	8,998	56.2%
Vacant housing units	7.017	43.8%
Total occupied housing units	**8,998**	**100.0%**
Owner-occupied housing units	7,448	82.8%
Renter-occupied housing units	1,550	17.2%

Michigan Housing Units		
Total housing units	**4,529,311**	**100.0%**
Occupied housing units	3,823,280	84.4%
Vacant housing units	706,031	15.6%
Total occupied housing units	**3,823,280**	**100.0%**
Owner-occupied housing units	2,757,062	72.1%
Renter-occupied housing units	1,066,218	27.9%

Source: 2009-2013 American Community Survey 5-Year Estimates

Housing Distribution

Ogemaw County has a much higher percentage of single-family homes than Michigan as a whole, 85.6 percent in Ogemaw County compared to 72 percent for Michigan (Table 11). The largest difference in housing distribution is the County's lower percentage of multiple-family housing (apartments) and the considerably higher percentage of mobile homes. The very low number of multiple family housing units in Ogemaw County compared to the state, demonstrates a common difference that is often seen in Michigan's rural communities.

Table 11

Ogemaw County Housing Distribution		
Total housing units	**16,015**	**100.0%**
UNITS IN STRUCTURE		
1-unit, detached	13,702	85.6%
1-unit, attached	59	0.4%
2 units	114	0.7%
3 or 4 units	72	0.4%
5 to 9 units	113	0.7%
10 to 19 units	122	0.8%
20 or more units	206	1.3%
Mobile home	1,627	10.1%
Boat, RV, van, etc.	0	0.0%

Michigan Housing Distribution		
Total housing units	**4,529,311**	**100.0%**
UNITS IN STRUCTURE		
1-unit, detached	3,259,881	72.0%
1-unit, attached	209,529	4.6%
2 units	119,644	2.6%
3 or 4 units	115,335	2.5%
5 to 9 units	189,374	4.2%
10 to 19 units	163,302	3.6%
20 or more units	224,829	5.0%
Mobile home	246,438	5.4%
Boat, RV, van, etc.	979	0.1%

Source: 2009-2013 American Community Survey 5-Year Estimates

Age of Housing

The majority of the housing structures in Ogemaw County were built before 1980. From 1970 to 1979 24.8 percent of homes were built and 32.4% from 1940 to 1969. The State of Michigan also has higher percentages of homes built during the same time periods. Older housing stock is often more susceptible to fires due to construction materials and methods as well as potentially having electrical systems that do not meet current codes.

Table 12

Ogemaw County Housing Age		
Year Structure Built	**Total**	**Percentage**
2010 or later	34	0.2%
2000 to 2009	1,351	8.4%
1990 to 1999	2,036	12.7%
1980 to 1989	2,030	12.7%
1970 to 1979	3,979	24.8%
1960 to 1969	2,642	16.5%
1940 to 1959	2,540	15.9%
1939 or earlier	1,403	8.8%

Michigan Housing Age		
Year Structure Built	**Total**	**Percentage**
2010 or later	10,292	0.2%
2000 to 2009	461,546	10.2%
1990 to 1999	580,249	12.8%
1980 to 1989	449,924	9.9%
1970 to 1979	704,599	15.6%
1960 to 1969	551,102	12.2%
1940 to 1959	1,074,192	23.7%
1939 or earlier	697,407	15.4%

Source: 2009-2013 American Community Survey 5-Year Estimates

Value of Owner-Occupied Housing

The median value of owner-occupied housing in Ogemaw County was $89,500 in 2013, considerably lower than Michigan's median value of $121,700 (Table 13). The majority of the County's owner-occupied housing is valued between $50,000 and $100,000, while the majority of Michigan's is between $50,000 and $149,000. Housing affordability does not really factor into hazard mitigation unless inexpensive housing is directly tied to inferior construction materials or methods.

Table 13

2013 Ogemaw County Owner-Occupied Housing Value		
Specified owner-occupied units	**7,448**	**100.0%**
VALUE		
Less than $50,000	1,539	20.7%
$50,000 to $99,999	2,649	35.6%
$100,000 to $149,999	1,292	17.3%
$150,000 to $199,999	1,037	13.9%
$200,000 to $299,999	646	8.7%
$300,000 to $499,999	203	2.7%
$500,000 to $999,999	50	0.7%
$1,000,000 or more	32	0.4%
Median (dollars) $89,500		

2013 Michigan Owner-Occupied Housing Value		
Specified owner-occupied units	2,757,062	100.0%
VALUE		
Less than $50,000	409,290	14.8%
$50,000 to $99,999	683,668	24.8%
$100,000 to $149,999	571,773	20.7%
$150,000 to $199,999	454,660	16.5%
$200,000 to $299,999	378,700	13.7%
$300,000 to $499,999	185,491	6.7%
$500,000 to $999,999	57,137	2.1%
$1,000,000 or more	16,343	0.6%
Median (dollars) $121,700 Source: 2009-2013 American Community Survey 5-Year Estimates		

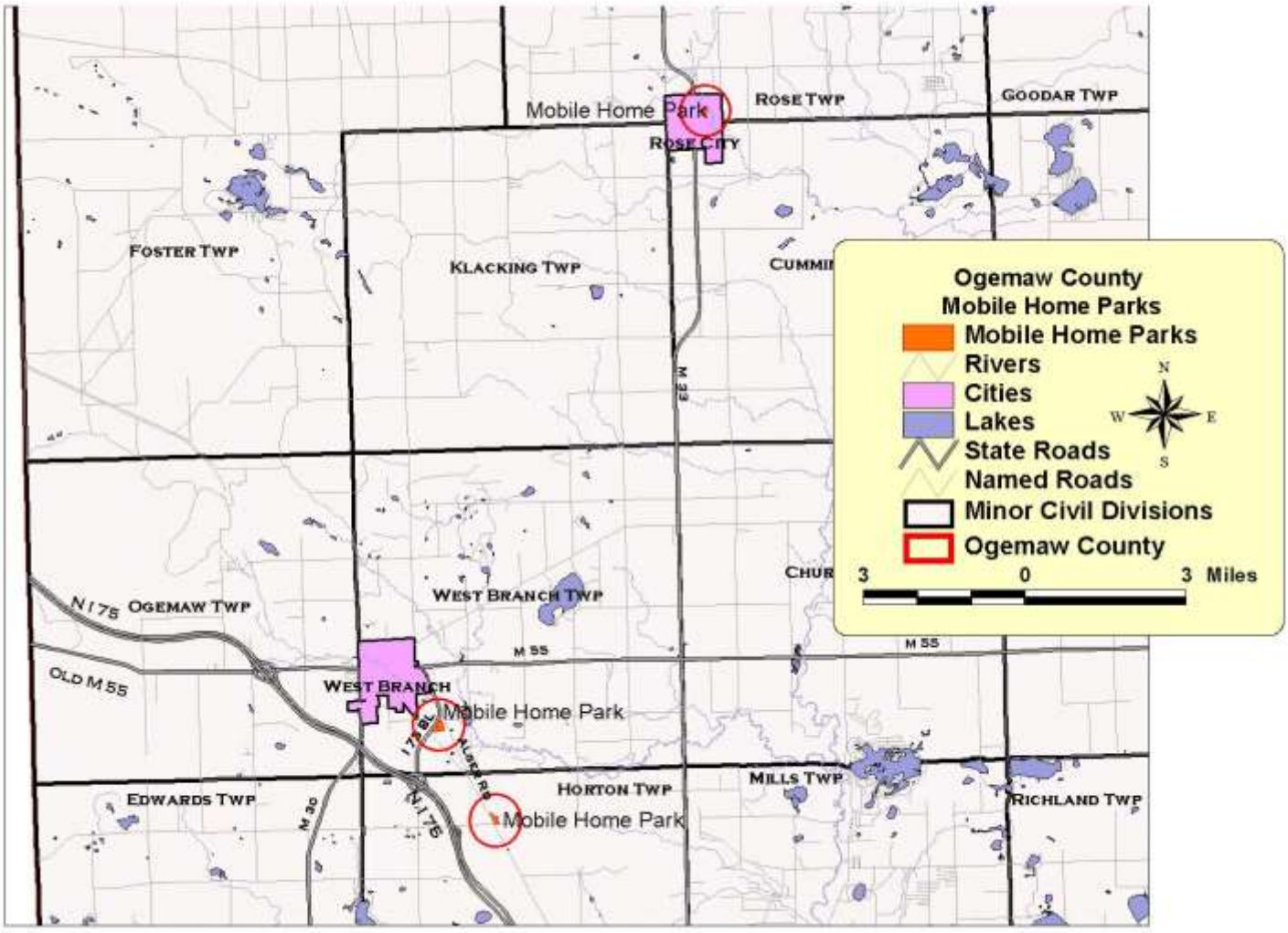


Figure 17 Ogemaw County Mobile Home Parks Map

Land Divisions and Ownership

Most of the private land is divided into tracts of 10 acres or larger. Small lots and subdivisions can be found within the cities and along the lakeshores.

State forest lands can be found in every township in the county except Logan Township, Richland Township, and Edwards Township. The State forest land dominates the northwestern area in Figure 18. A State Park is located at the northeastern corner of Cumming Township and northwestern corner of Hill Township. National Forest areas are found in Rose Township and Goodar Township. State of Michigan lands are located in the City of West Branch along with Richland, Mills, Horton, Edwards, West Branch, Churchill, Logan, Hill, Rose, and Goodar Townships.

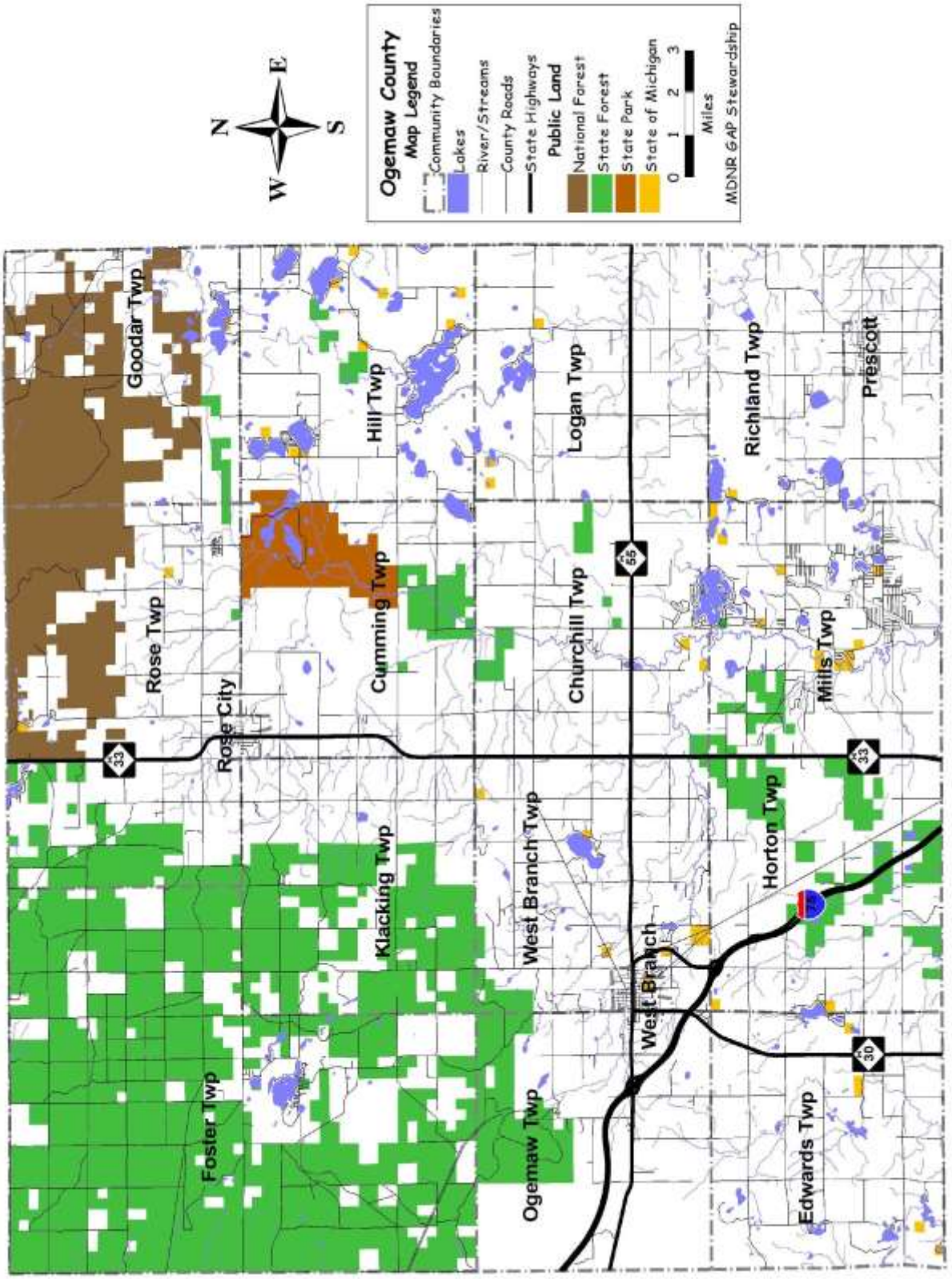


Figure 18 Ogemaw County Public Lands Map

Land Cover/Use

In 1978 a countywide land cover and use inventory was completed under the Michigan Resource Information System of the Michigan Department of Natural Resources. This is the only countywide land use inventory ever completed. The map of 1978 land cover and use illustrates the distribution of land uses throughout the County. The following table is a listing of the land cover and use categories by acreage. Forested land was the primary land cover and use in Ogemaw County. This is still the case today. The top five largest categories included Forest, Agricultural Lands, Rangelands, Wetlands, and Urban and Built Up areas.

Residential

As can be seen on the Existing Land Use Map (Figure 19), residential use occupied 1.8 percent (6606.6 acres) of the land in the county. Residential development is concentrated around the village, lakes, and rivers. Seasonal residential development is located adjacent to the major lakes in the county. General trends in residential development have been the construction of primary or secondary homes on lots two acres and larger. As well, residential development is more common along major roads. Mills Twp. has a large concentration of residential areas in the Skidway Lake CDP. These areas are located along the Rifle River in southern Ogemaw County. Other large areas of residential development are located around the City of West Branch, Rose City, Hill Township around Sage Lake, Churchill Township, Rose Township, and West Branch Township.

Commercial/Industrial/Institutional

The largest concentrations of commercial uses are found in the communities of West Branch, Rose City, Prescott, and Lupton. Most of the commercial land uses are service and retail in nature, catering to local residents and tourists. Small pockets of commercial uses can be found in several rural locations around the county. These rural commercial uses are typically convenience retail uses that serve the rural residents and tourists. Institutional land uses are comprised of school land and government offices. Lands used for commercial, industrial, and institutional purposes comprise less than one-half of one percent of the county's total area.

Table 14

Land Use/Cover Table of Ogemaw County		
Category	**Acres**	**Percent of Total**
Residential	6606.562	1.796%
Commercial/Industrial/Institutional	627.086	0.166%
Other Land Use	2852.615	0.776%
Agricultural	69017.27	18.768%
Rangeland	48727.316	13.250%
Forested Land	217609.842	59.174%
Wetlands	15443.550	4.199%
Surface Water	6863.394	1.866%
Total	367747.62	100%

Source: Michigan Department of Natural Resources - MIRIS: 1978

Other Land Use

Land in this use category included extractive (sand and gravel pits), cemeteries, utilities, waste disposal, outdoor recreation, and transportation (airports, road medians) and account for less than one percent.

Agricultural

According to the 1978 inventory, there are significant areas of agricultural activity in the county. The townships with the highest concentrations of farmland are Horton, Edwards, West Branch, Churchill, Richland, Logan, Klacking, Cumming, and Rose. While there has been a downward trend in acreage dedicated to agricultural uses, these lands are falling idle as opposed to being developed for urban built-up uses like other parts of the state and country.

Rangelands

The 48727 acres (13.25 percent) of rangeland openings make it the third largest land cover in the county. This category consists of herbaceous open and shrub land. This land cover is scattered throughout the county with concentrations serving as a border or buffer zone between agriculture and forestland. Much of the rangeland was once active farmland. Given the downward trend in acreage dedicated to farming, this category has increased over the last 25 years.

Forested Land

Forested Land accounts for 217,609 acres or 59% of the county. The most prevalent forest types were northern hardwood and aspen-birch. Other forest types include upland conifers and lowland hardwoods. Lowland forests grow on soils with a seasonally high water table and are often classified as wetlands. Lowland forests include areas that support lowland hardwoods and conifers, such as northern white cedar, black spruce, balsam fir, elm, red maple, ash and aspen species. Lowland forests are usually swampy in nature.

Wetlands

Wetlands include land that has sufficient water at, or near, the surface to support wetland or aquatic vegetation. These areas are commonly referred to as swamps, marshes and bogs. The wetland category comprises non-forested types such as lowland brush (tag alder and willow), cattail marshes, bogs and wet meadows. This category comprises 15,443 acres of the county and that equates to 4.2%.

Two of the most important functions of wetlands are water quality protection and ecological corridors. The major wetland areas are adjacent to streams and lakes. The networks of wetlands receive surface water and subsurface water discharge, creating the many streams and creeks that in turn flow into the area lakes. The interconnected resources exemplify how activities distant from major water bodies can still have an impact on water quality.

Surface Water

Lakes and impoundments were mapped as open water and account for 1.9% of the area in the county.

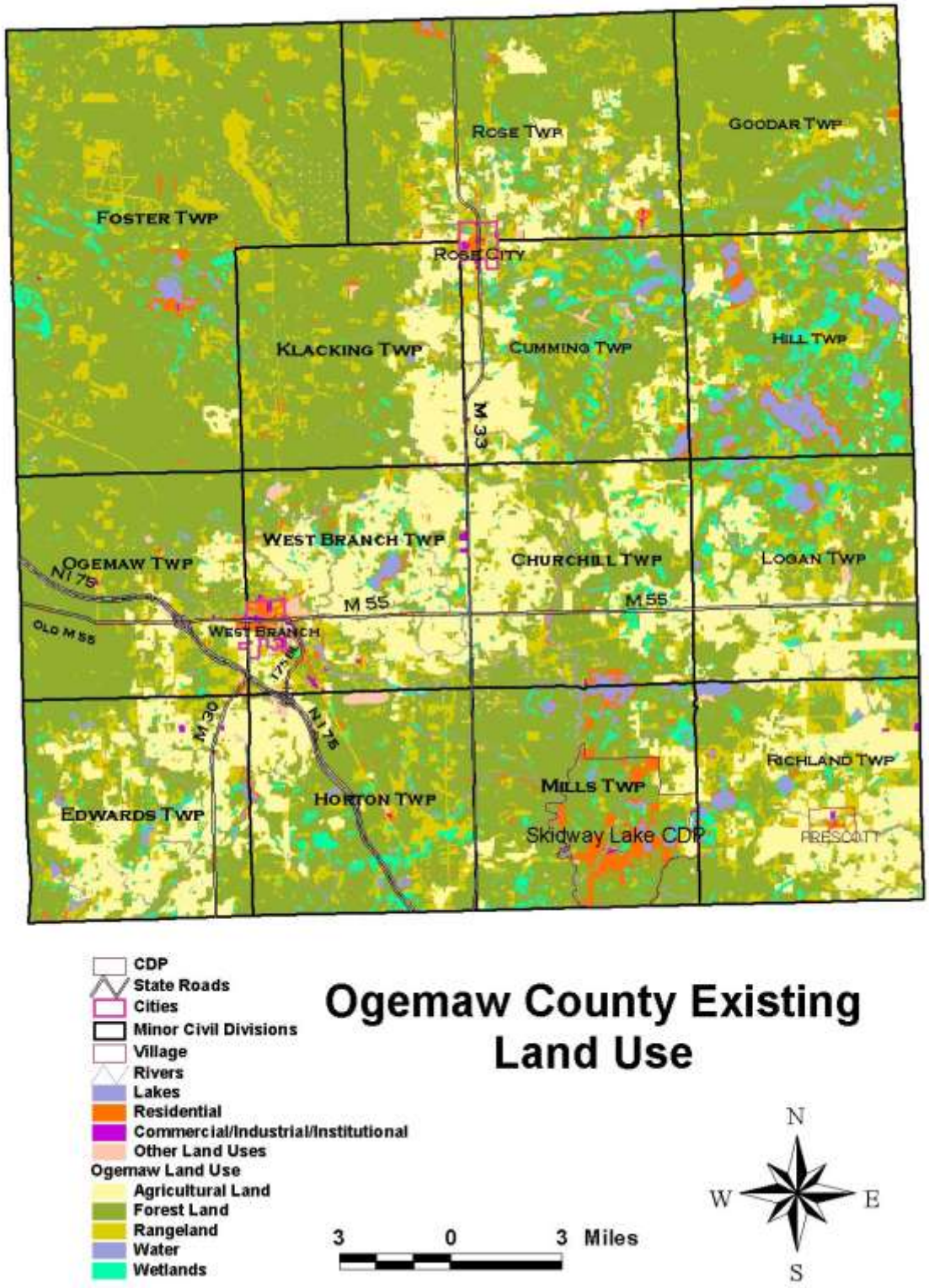


Figure 19 Ogemaw County Existing Land Use Map

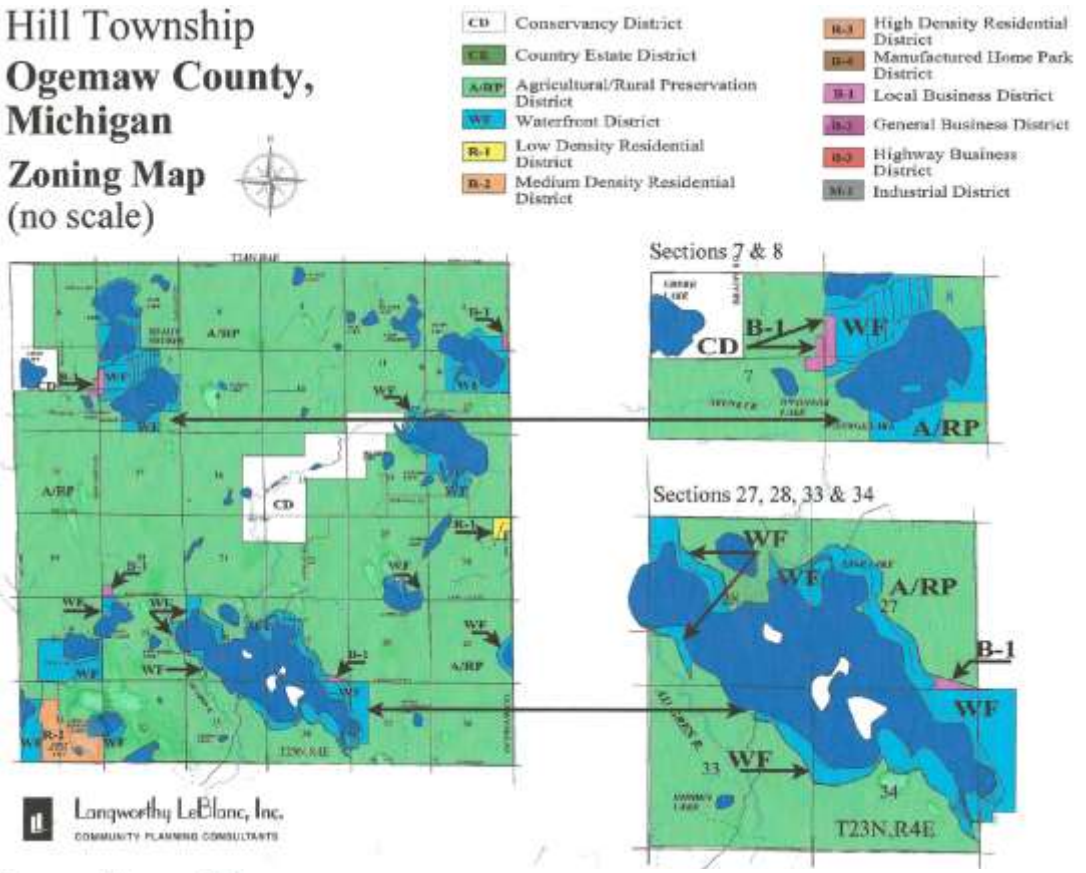
Chapter 3 *Community Capabilities*

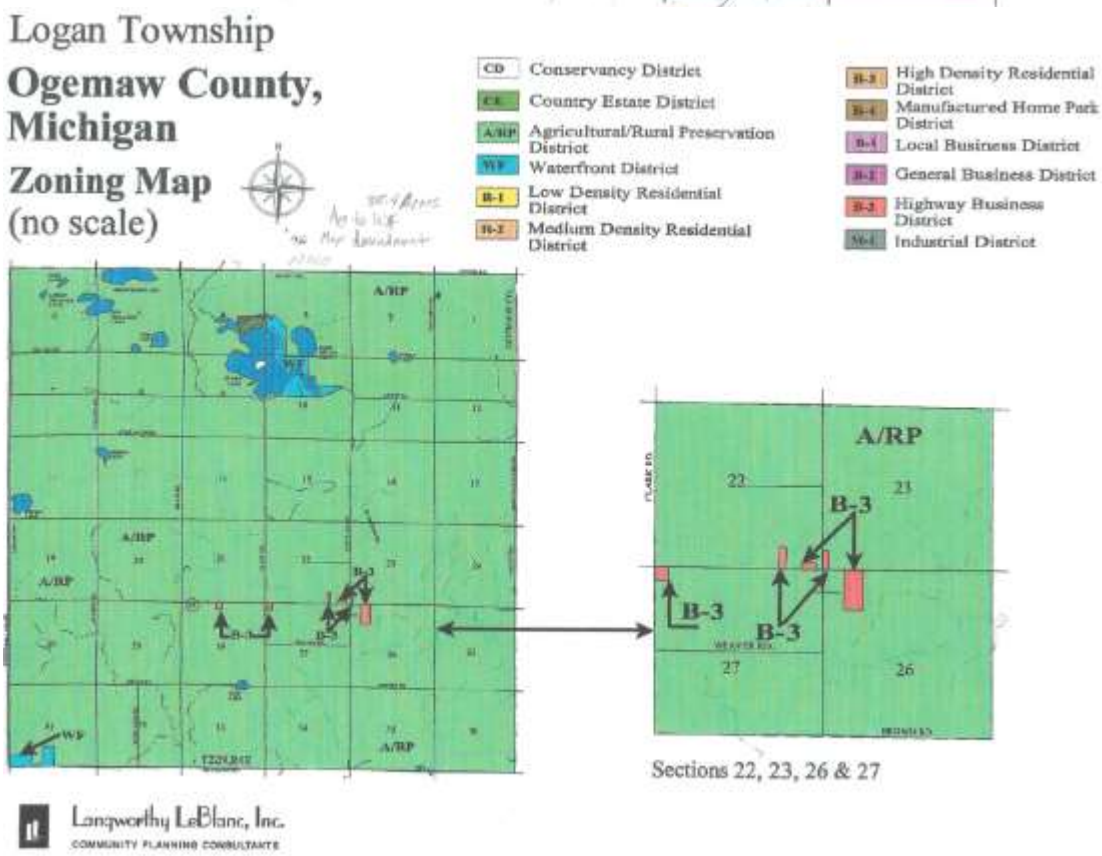
Public Facilities and Community Services

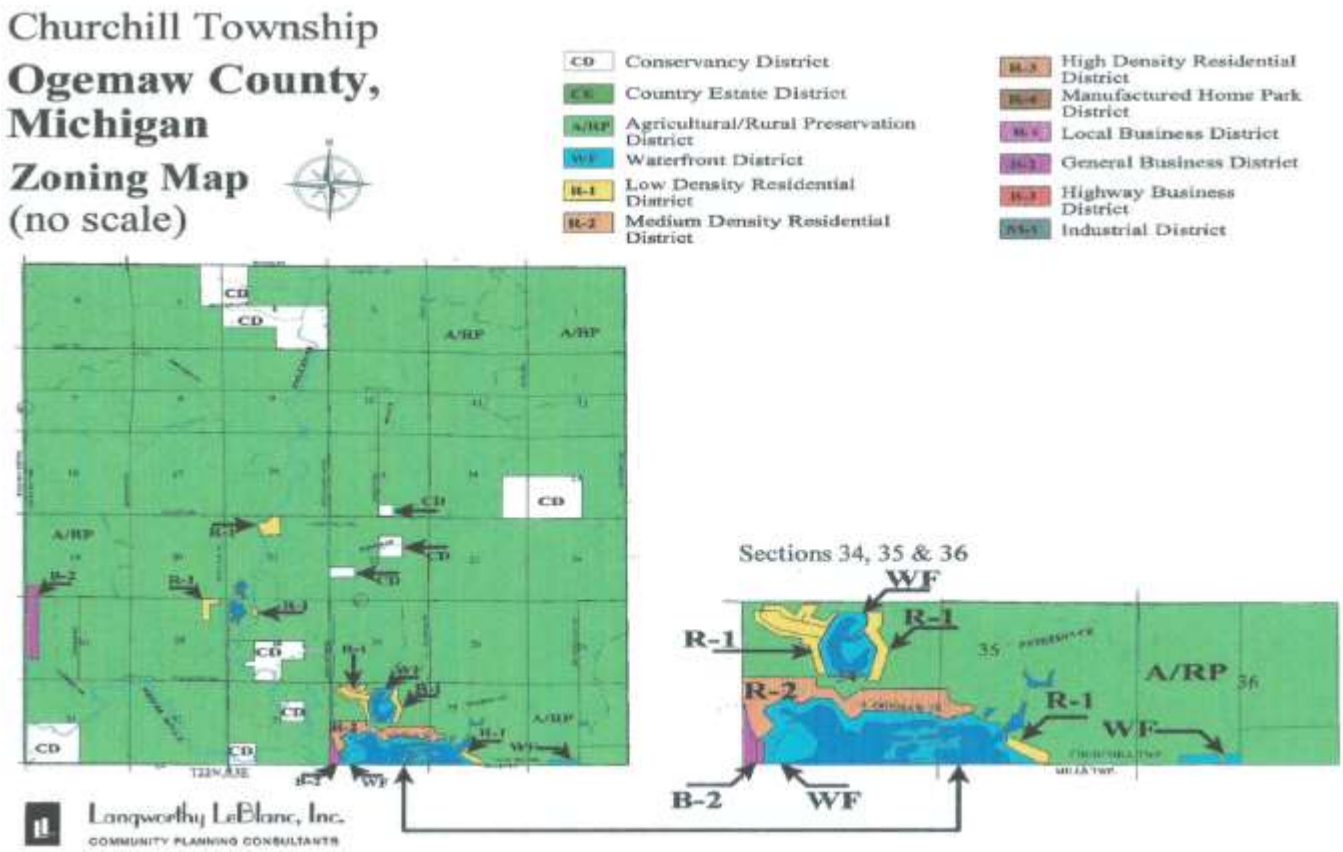
Planning and Zoning

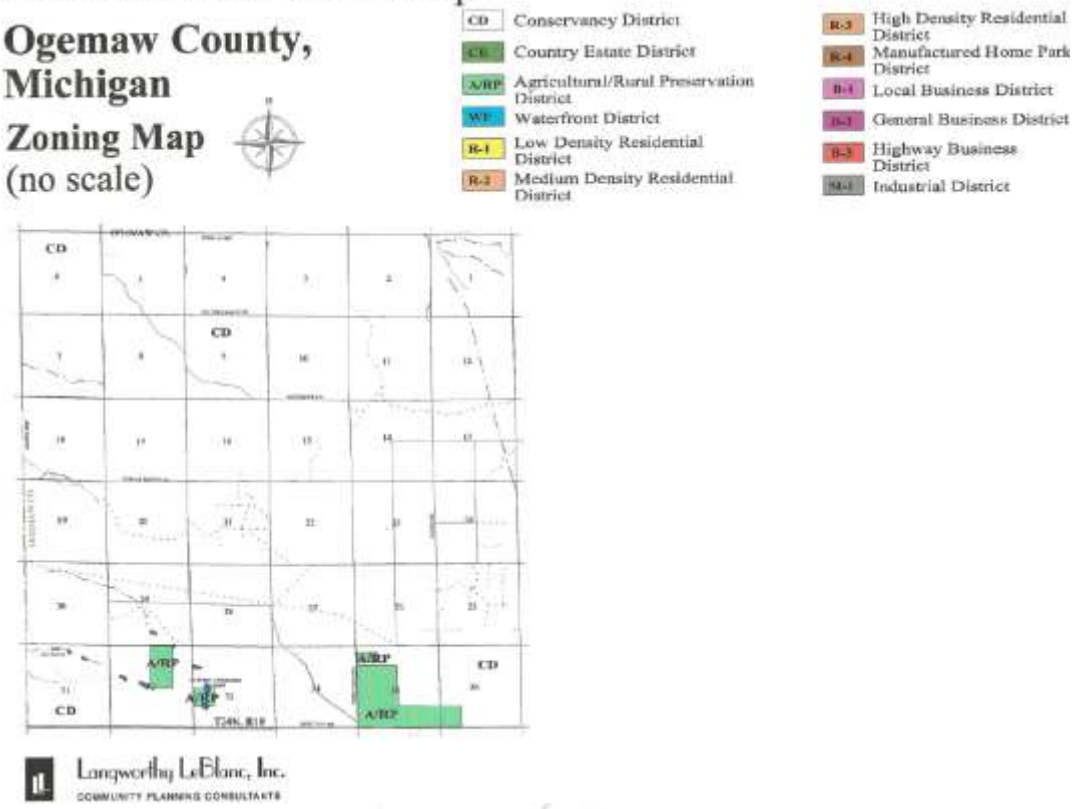
The counties and municipalities of Ogemaw County are typical of a rural northern Michigan county. There are fourteen townships, two cities, and one village. All of these are governed by the stipulated boards and councils and have participated in this plan. Ogemaw County has county level planning and zoning with the exception of West Branch Township, Edwards Township, and the City of West Branch. The townships and the City of West Branch oversee their own planning and zoning.

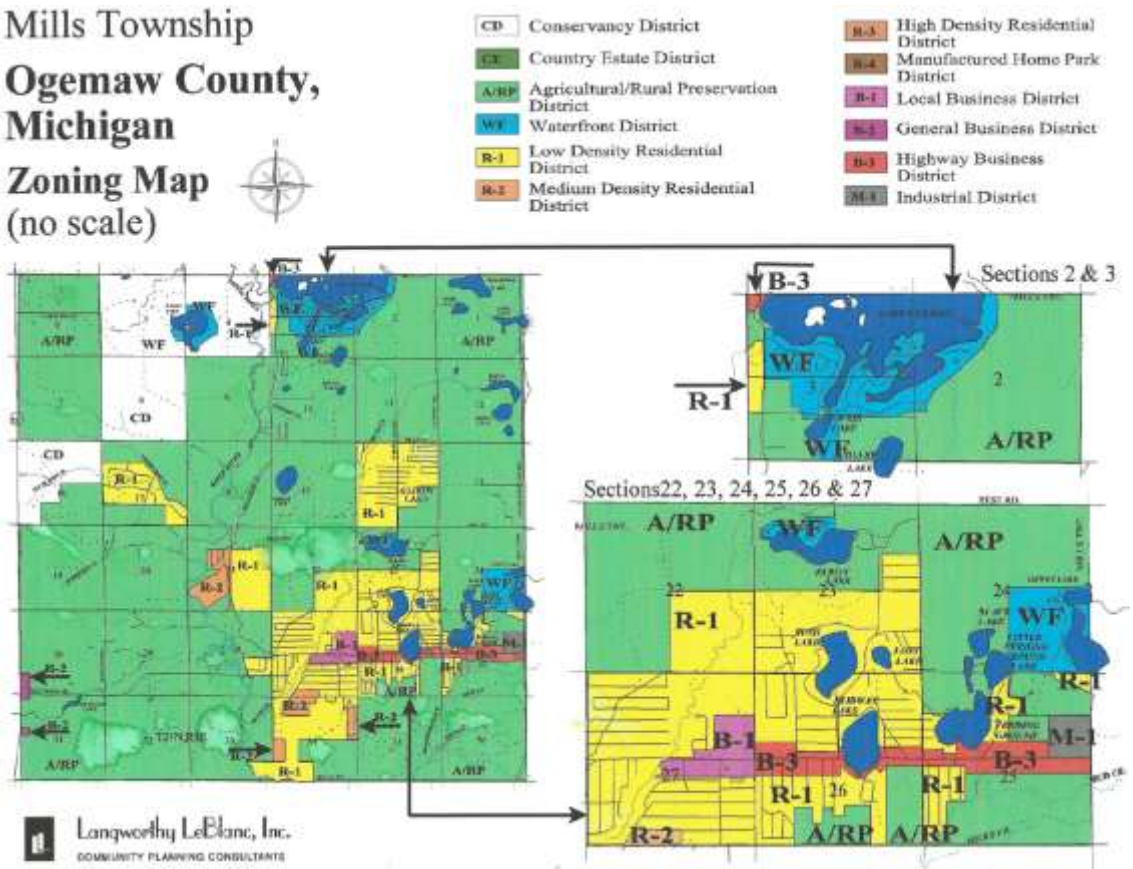
The county has just renewed its masterplan and West Branch Township and Edwards Township have current master plans. Master plans are reviewed and updated, if necessary, every five years.

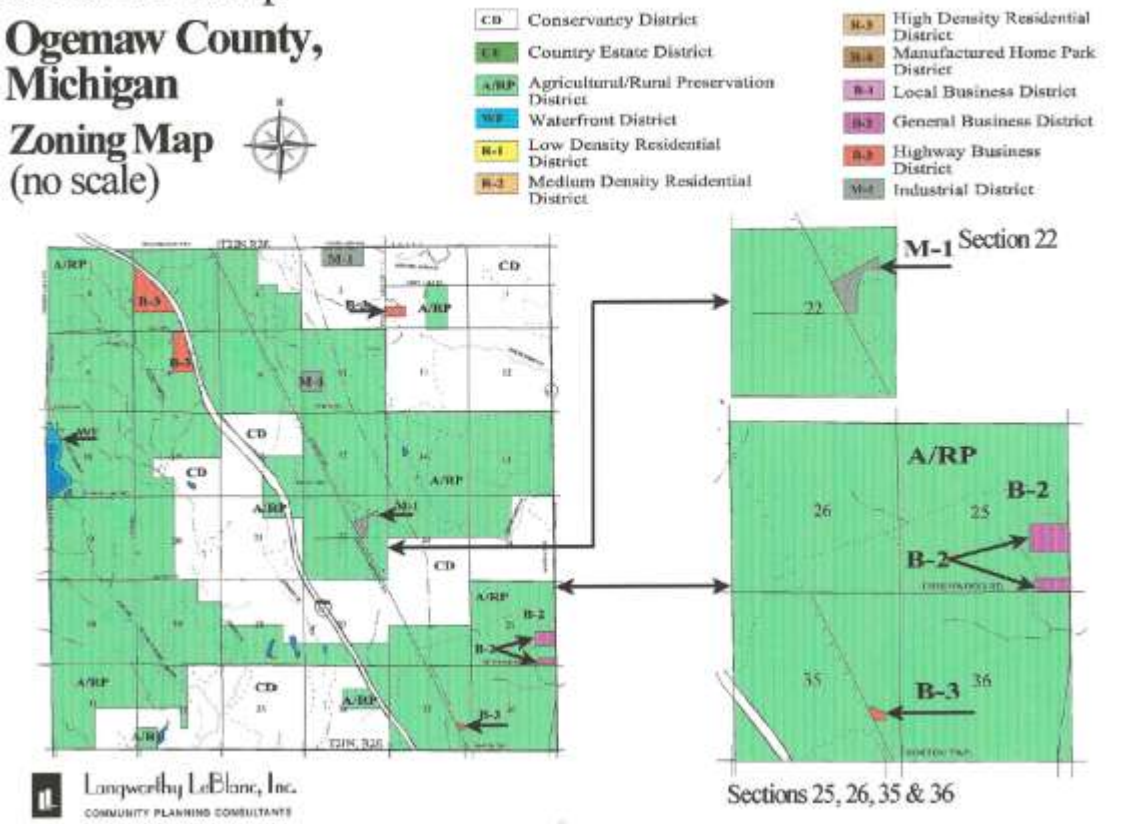

Hill Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
CE Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
R-3 High Density Residential District
R-4 Manufactured Home Park District
B-1 Local Business District
B-2 General Business District
B-3 Highway Business District
M-1 Industrial District
Sections 7 & 8
Sections 27, 28, 33 & 34
T23N,R4E
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS


Logan Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
CE Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
R-3 High Density Residential District
R-4 Manufactured Home Park District
B-1 Local Business District
B-2 General Business District
B-3 Highway Business District
M-1 Industrial District
Sections 22, 23, 26 & 27
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS


Churchill Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
Sections 34, 35 & 36
Longworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS


Northwest Part of Foster Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
Longworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

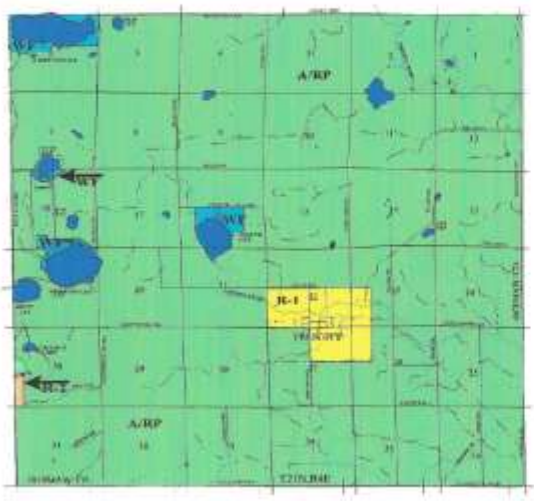

Mills Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
Sections 2 & 3
Sections22, 23, 24, 25, 26 & 27
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS


Horton Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
M-1 Section 22
Sections 25, 26, 35 & 36
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

Richland Township

Ogemaw County, Michigan

Zoning Map
(no scale)



Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

Klacking Township

Ogemaw County, Michigan

Zoning Map
(no scale)

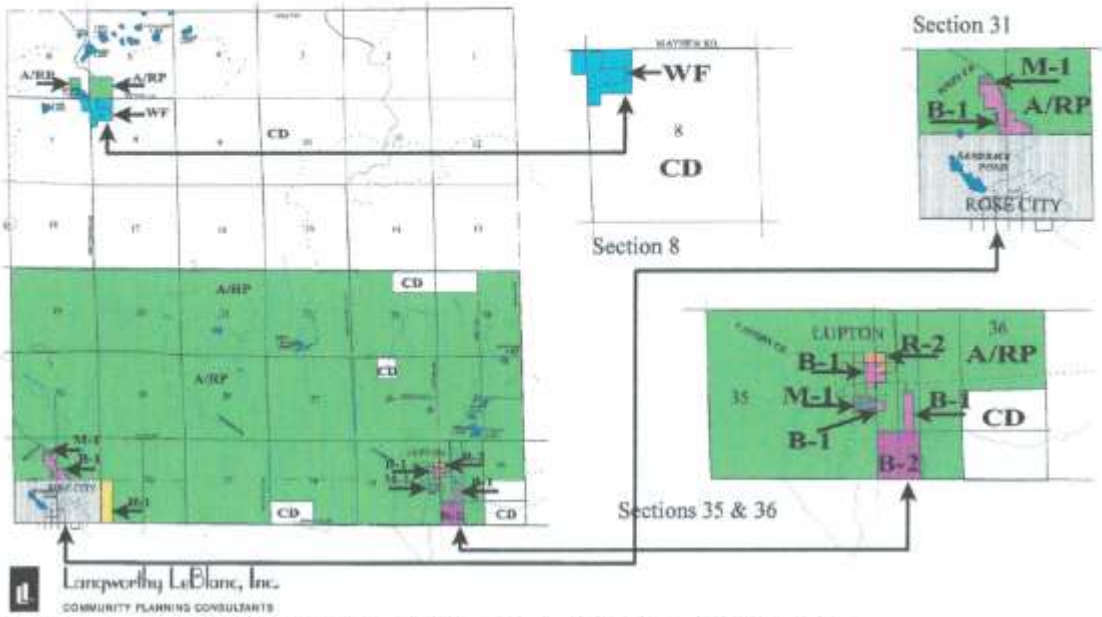
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

East Part of Rose Township

Ogemaw County, Michigan

Zoning Map

(no scale)



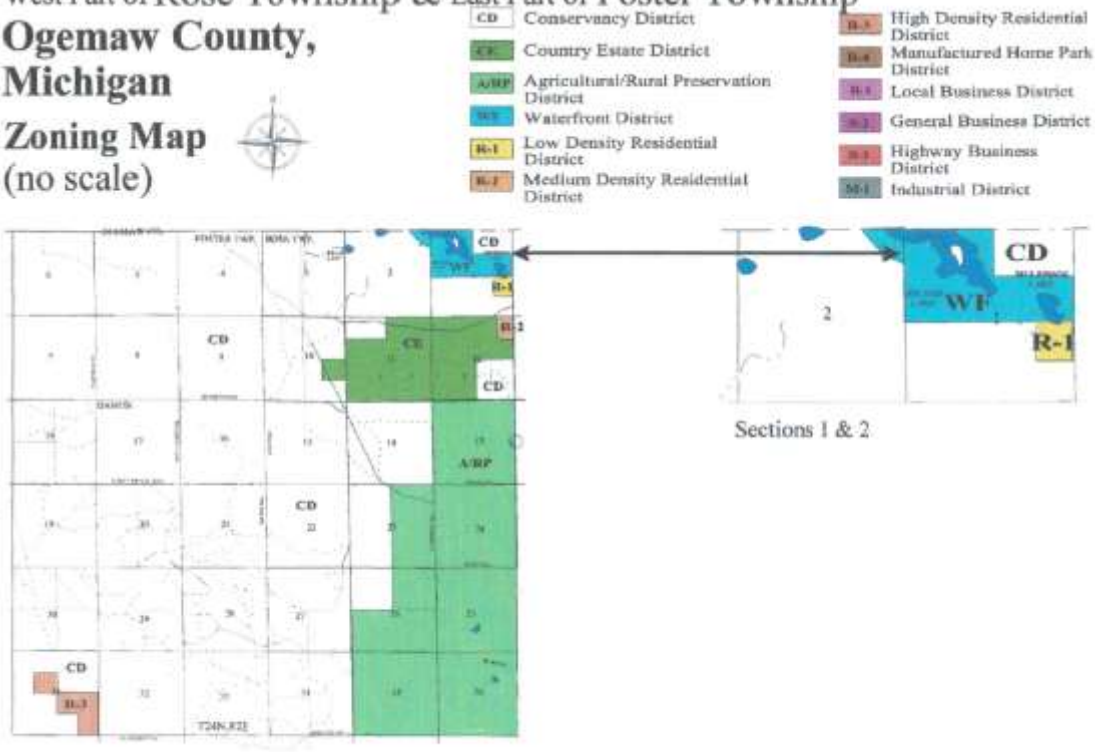
Longworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

West Part of Rose Township & East Part of Foster Township

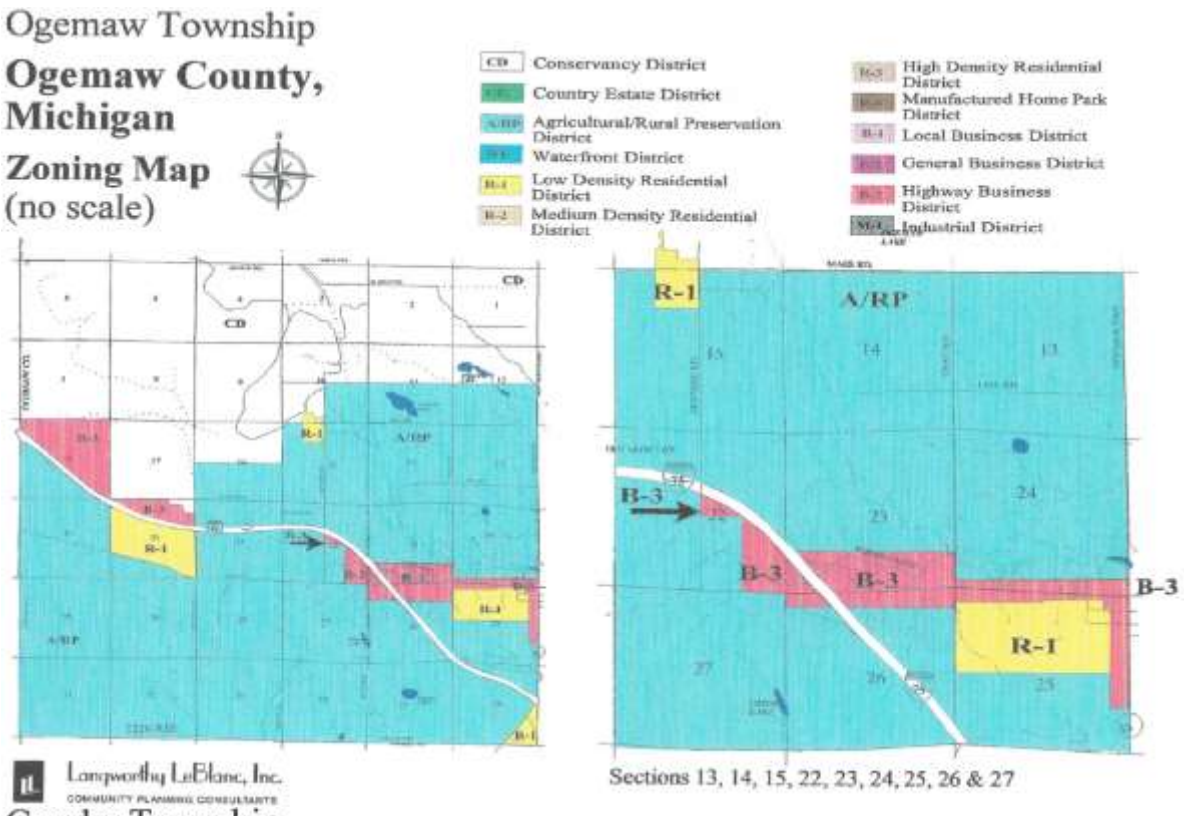
Ogemaw County, Michigan

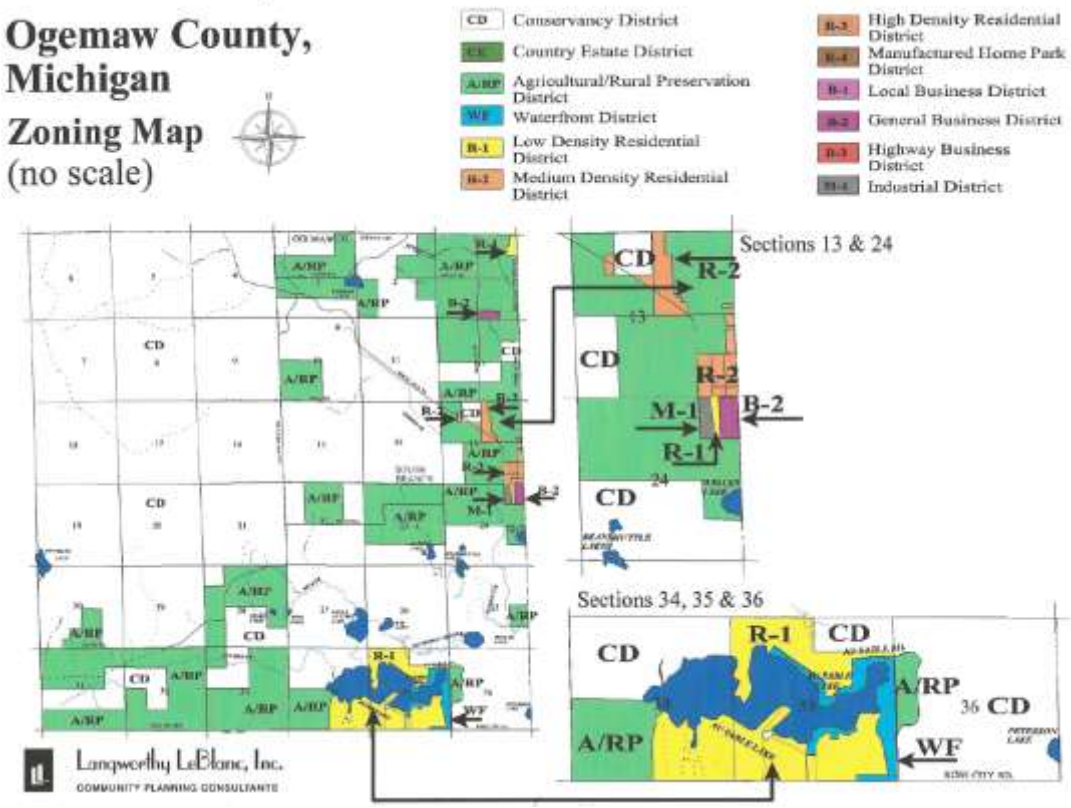
Zoning Map

(no scale)



Longworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS


Ogemaw Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
Agricultural/Rural Preservation District
Waterfront District
Low Density Residential District
Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
R-1
A/RP
B-3
B-3
B-3
B-3
R-1
Sections 13, 14, 15, 22, 23, 24, 25, 26 & 27
Lanpworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

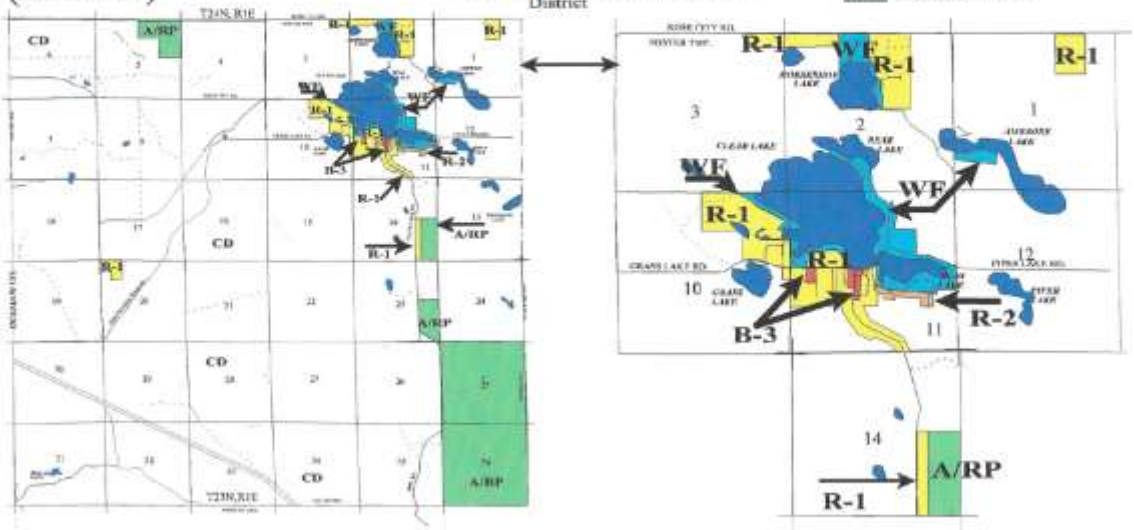

Goodar Township
Ogemaw County, Michigan
Zoning Map
(no scale)
CD Conservancy District
Country Estate District
Agricultural/Rural Preservation District
Waterfront District
Low Density Residential District
Medium Density Residential District
High Density Residential District
Manufactured Home Park District
Local Business District
General Business District
Highway Business District
Industrial District
Sections 13 & 24
CD
R-2
CD
R-2
M-1
B-2
R-1
CD
Sections 34, 35 & 36
CD
R-1
CD
A/RP
36 CD
A/RP
WF
Lanpworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

South Part of Foster Township

Ogemaw County, Michigan

Zoning Map
(no scale)

CD Conservancy District
C-E Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
R-3 High Density Residential District
R-4 Manufactured Home Park District
B-1 Local Business District
B-2 General Business District
B-3 Highway Business District
M-1 Industrial District



Sections 1, 2, 3, 10, 11, 12 & 14

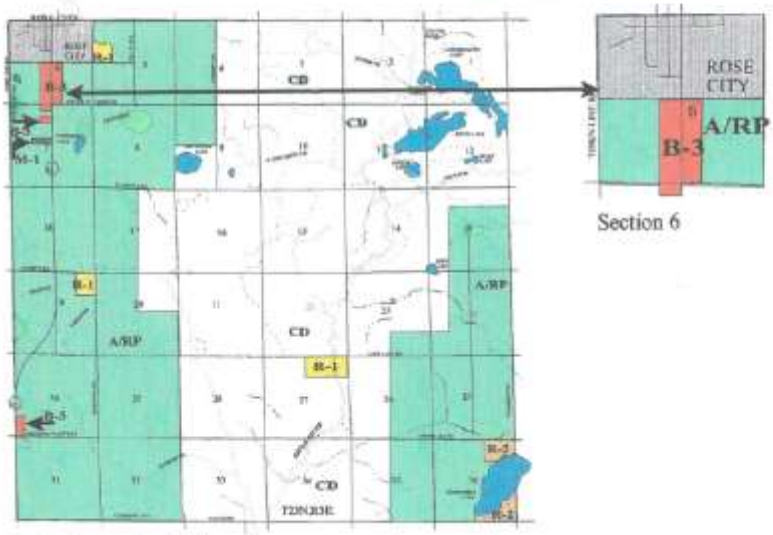
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

Cumming Township

Ogemaw County, Michigan

Zoning Map
(no scale)

CD Conservancy District
C-E Country Estate District
A/RP Agricultural/Rural Preservation District
WF Waterfront District
R-1 Low Density Residential District
R-2 Medium Density Residential District
R-3 High Density Residential District
R-4 Manufactured Home Park District
B-1 Local Business District
B-2 General Business District
B-3 Highway Business District
M-1 Industrial District

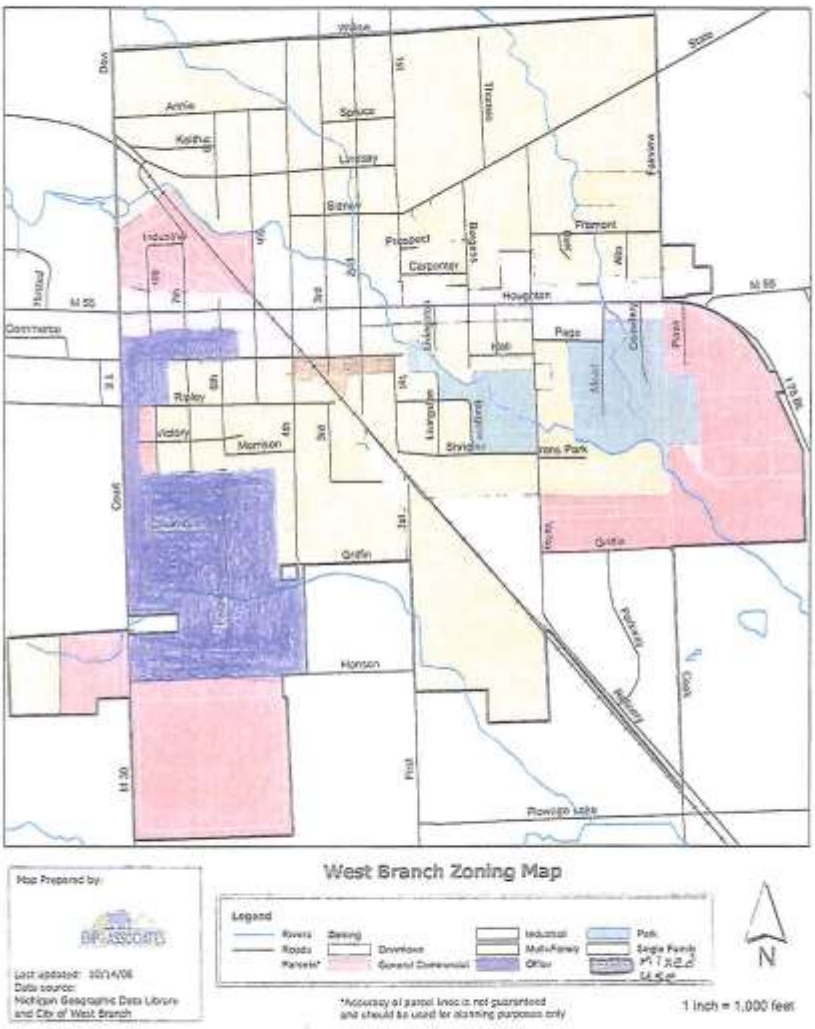


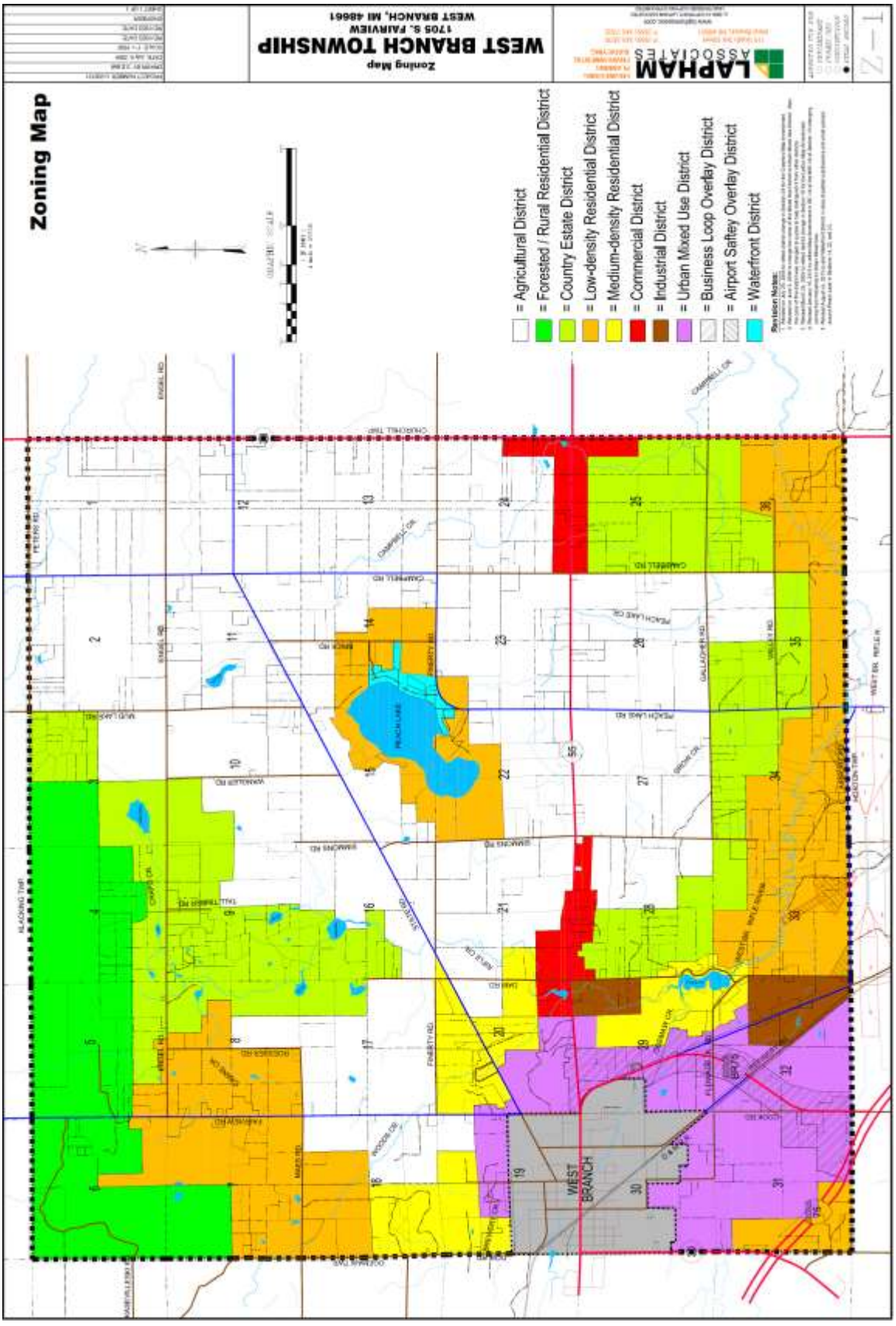
Section 6

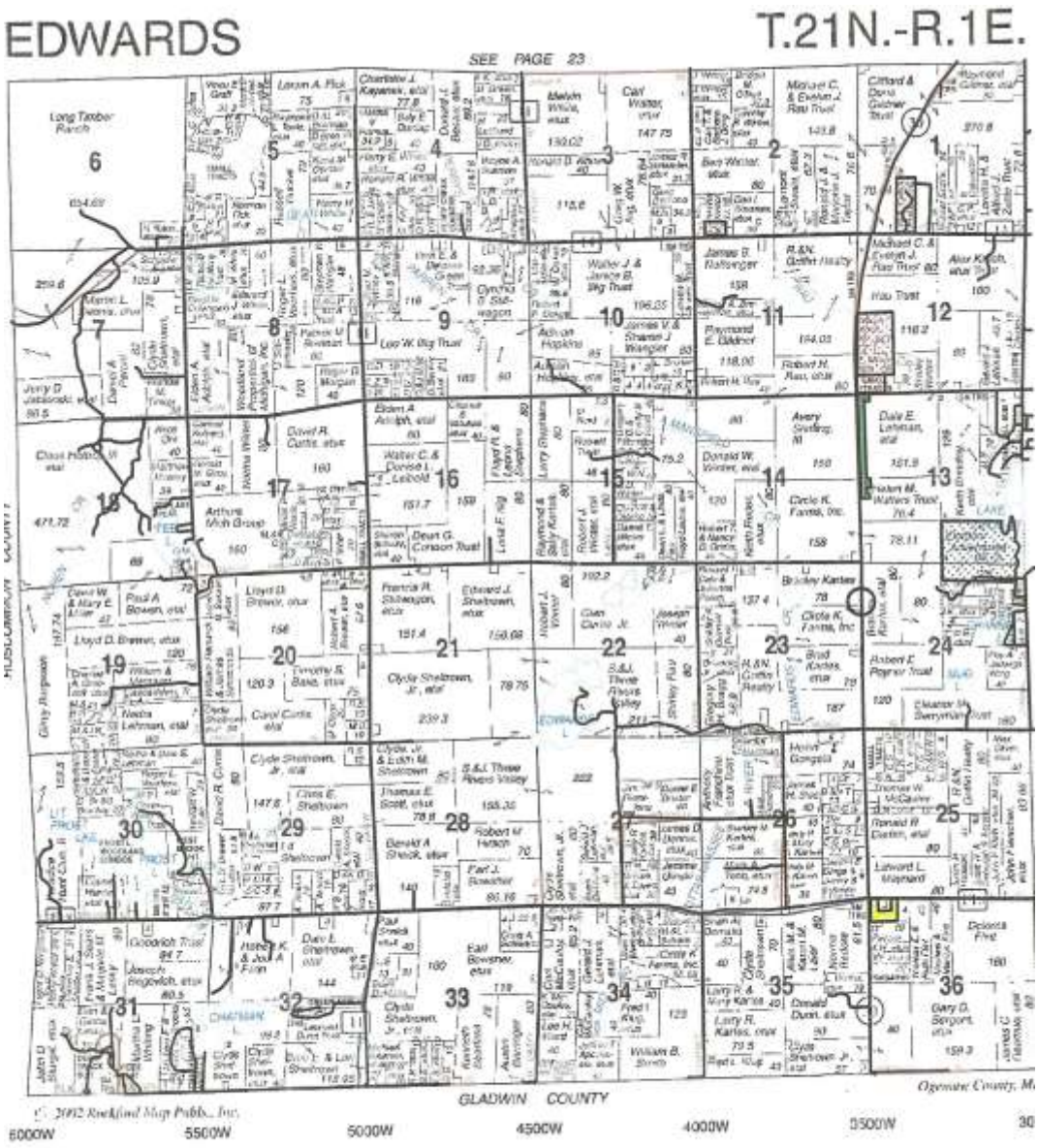
Langworthy LeBlanc, Inc.
COMMUNITY PLANNING CONSULTANTS

Zoning Ordinance

MAP 1. CITY OF WEST BRANCH ZONING MAP




Zoning Map
WEST BRANCH TOWNSHIP
1705 S. FAIRVIEW
WEST BRANCH, MI 48661
LAPHAM ASSOCIATES
Zoning Map
= Agricultural District
= Forested / Rural Residential District
= Country Estate District
= Low-density Residential District
= Medium-density Residential District
= Commercial District
= Industrial District
= Urban Mixed Use District
= Business Loop Overlay District
= Airport Saftey Overlay District
= Waterfront District
Revision Notes:
WEST BRANCH

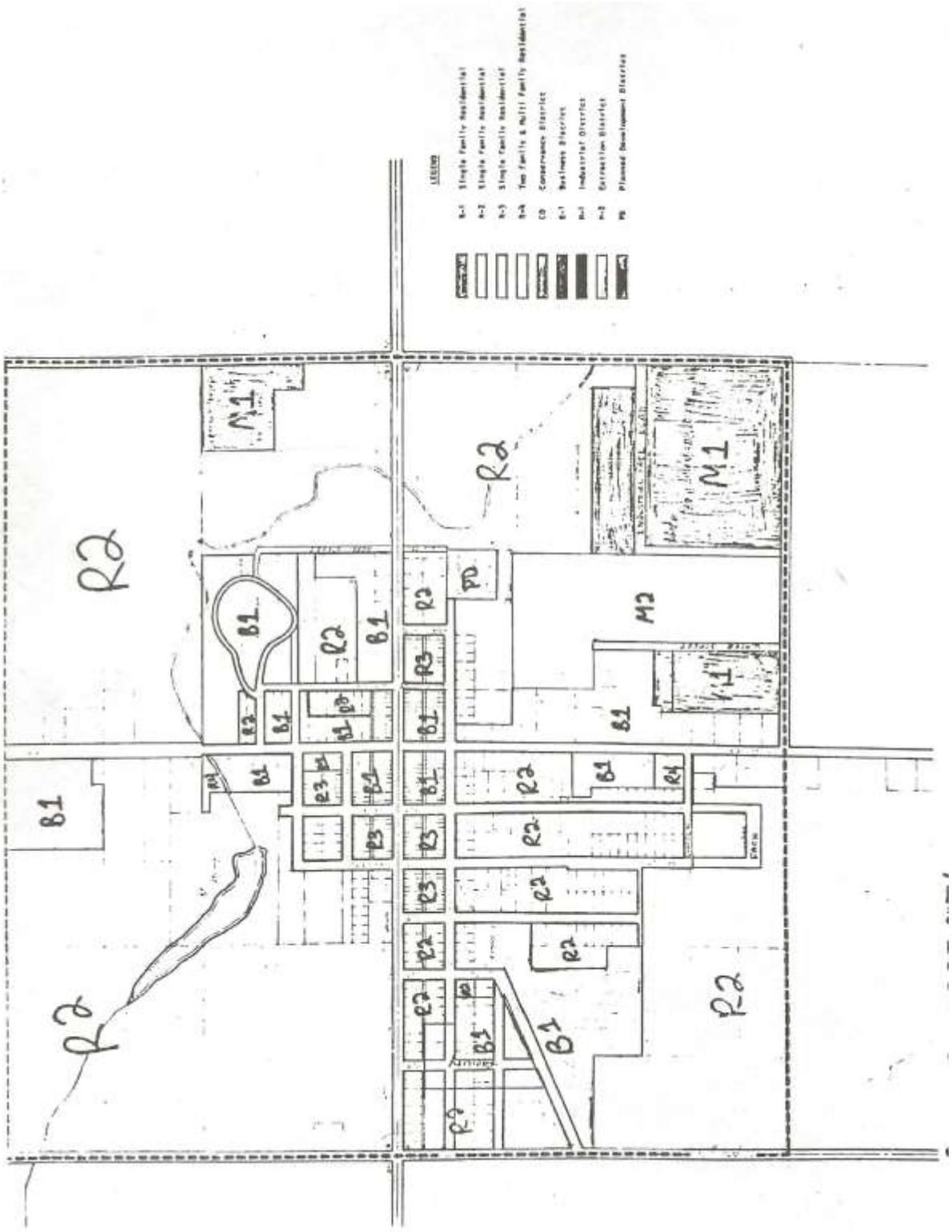


Edwards Township Zoning Map

Legend

- Roads
- AR - Agriculture - Residential
- MHP - Manufactured Home Park Overlay
- HC - Highway Commercial
- NC - Neighborhood Commercial
- R1 - Residential
- LI - Light Industrial

N
W
E
S



Rose City Zoning Map

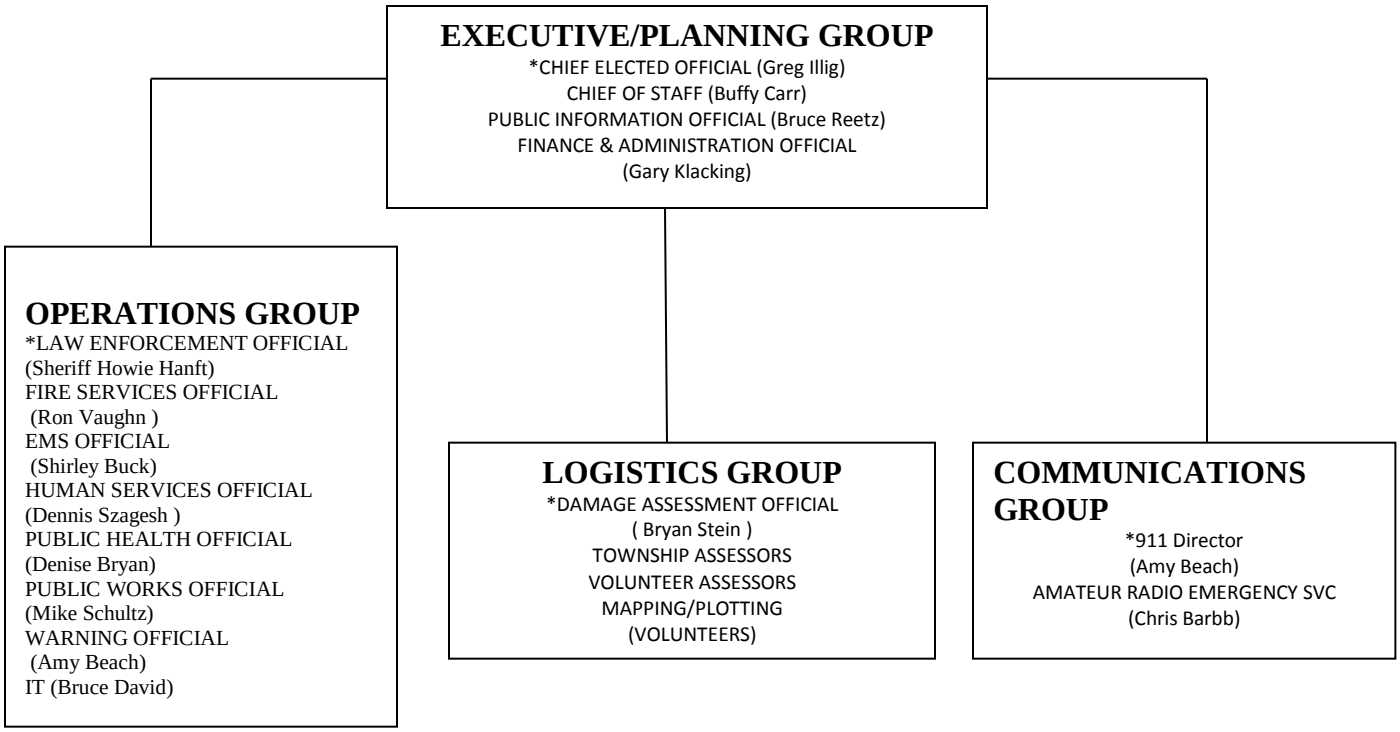
The Ogemaw County Planning Commission plays the central role for land use planning in the county. The County Board of Commissioners and the Planning Commission participate in emergency planning through its Local Emergency Planning Committee (LEPC) and the Local Planning Team (LPT). Committee and team members are from the following agencies:

Ogemaw County Emergency Management Coordinator
Ogemaw County Board of Commissioners/Planning Commission
Ogemaw County 911 Central Dispatch
Ogemaw County Department of Corrections
Ogemaw County Sheriff's Department
The City of West Branch
Michigan Department of Human Services
Ogemaw County Road Commission
Radio Amateur Civil Emergency Service
Michigan State Police, Emergency Management and Homeland Security Division
American Red Cross/Ogemaw County
Ogemaw County Fire Department/Fire Chiefs Association
West Branch Regional Medical Center
Michigan District Health Department #2
Ogemaw County Community Emergency Response Team
Emergency Management Systems

OGEMAW COUNTY
EMERGENCY OPERATIONS CENTER
ORGANIZATIONAL CHART (AS OF 03/2015)

*SIGNIFIES GROUP CHIEF

Named individual is Primary See EOC Call List for Alternates



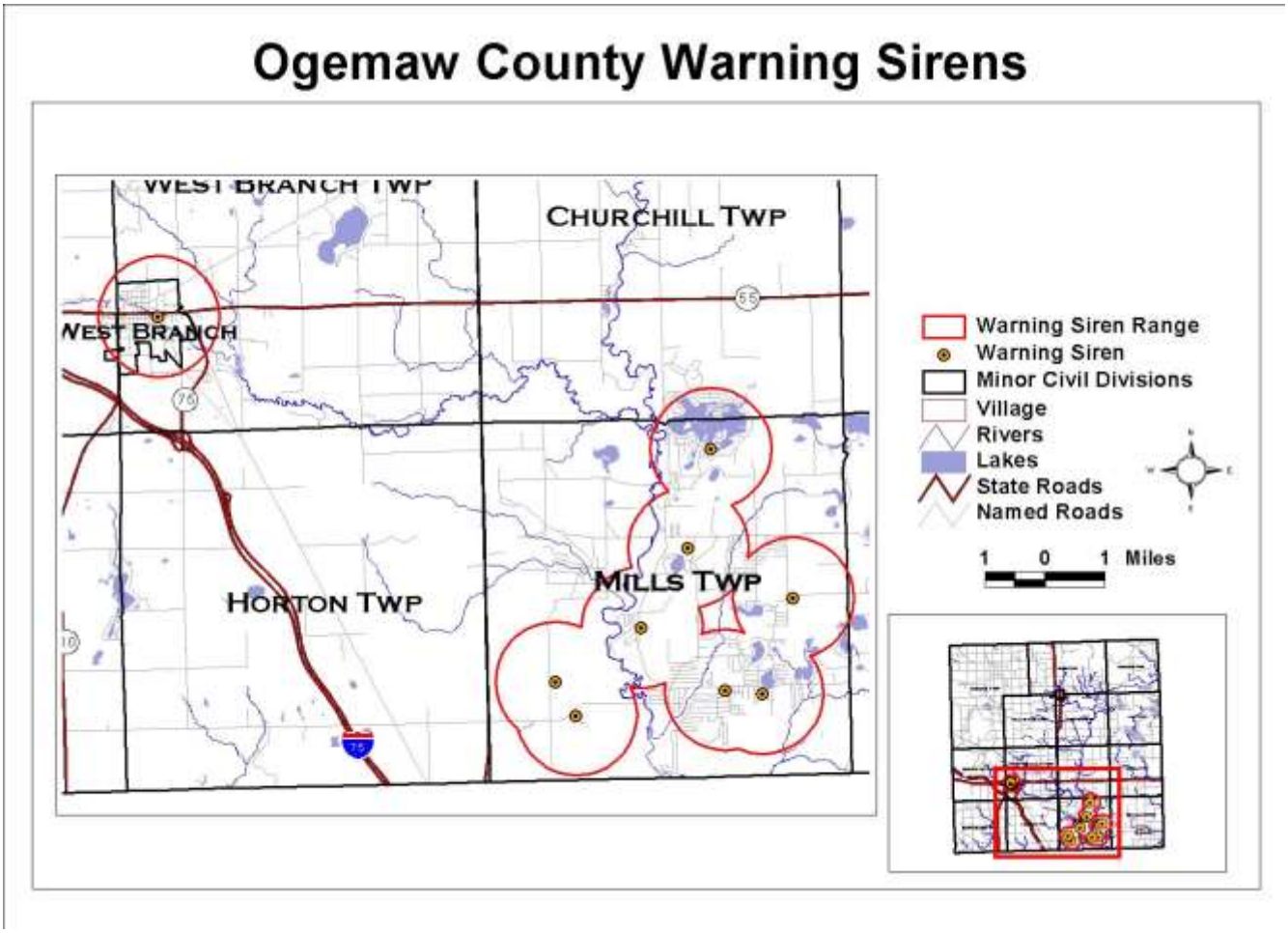


Figure 20 Ogemaw County Warning Sirens Map

Warning Sirens or System

Ogemaw County has nine total active warning sirens. One is located in the City of West Branch and eight are located in Mills Township. Mills Township is planning to add four more sirens in the future.

Emergency Services

Emergency services are very important for the Hazard Mitigation Process. These services help serve the public in times of natural disasters and other emergency situations. It is crucial for the public to know where these services exist and how to reach them in times of need.

Emergency Management

Elizabeth Carr – Coordinator
205 8th Street
West Branch, MI 48661
989-345-5941

911 Central Dispatch

Ogemaw County has a central dispatch system, utilizing 911 for the public to report emergencies. Central Dispatch is staffed by eight full time and two part time dispatchers and one full-time director. They dispatch for seven fire departments, three EMS stations, four police agencies and local DNR officers. The 911 facility is located at 205 8th Street in the City of West Branch. Dispatching services utilize state of the art computer systems to receive emergency calls and to direct fire, police, and ambulance units to the emergency scene. An enhanced 911-(E911) system was established and became operational in 1996. The Advisory Board is made up of representatives from the State Police, Sheriff's Department, City of West Branch, Rose City Police Department, County Board of Commissioners, Ogemaw County Fire Chief's Association, members at large, and Emergency Management.

Police

The Ogemaw County Sheriff's Office is located in West Branch. Road patrol consists of 11 full-time deputies, one lieutenant, one detective/lieutenant, one undersheriff, and one sheriff. The sheriff oversees the animal control program which consists of one animal control officer. The City of West Branch City Police have two deputies full-time and one part-time, one sergeant, and one police chief.

The Rose City Police Department is located at 5230 Rifle River Trail, Alger, MI 48610 and has one full-time chief.

Michigan State Police Post #36 is located in the City of West Branch. The post serves four counties; Ogemaw, Arenac, Gladwin, and Iosco. Road patrol consists of four uniformed officers, two detectives, 21 troupers and one lieutenant all working full-time.

The balance of the Ogemaw County relies upon either the Ogemaw County Sheriff's Office or the Michigan State Police for police protection. All local police departments utilize the Ogemaw County Correctional Facility for the housing of arrested persons.

The Ogemaw Correctional Facility is also located in the City of West Branch. The facility has a rated capacity of 124 beds consisting of eight single person maximum security cells, 14 two person medium security cells, and 88 minimum security beds in open dormitory style pods. The correctional facility consists of 15 full-time corrections officers, three corporals, and one lieutenant.

Ogemaw County Sheriff's Department
806 W. Wright Street
West Branch, MI 48661
989-345-3786

Michigan State Police Post #36, District 3
496 E. Houghton Ave.
West Branch, MI 48661
989-345-0956

Ogemaw County Correctional Facility
912 W. Houghton Ave.
West Branch, MI 48661
989-345-5908

Rose City Police
310 N. Williams Street
Rose City, MI 48654
989-685-3051

West Branch City Police
130 Page Street
West Branch, MI 48661
989-345-2627

Fire

The population and government units of Ogemaw County depend upon seven separate volunteer fire departments, interconnected by a Mutual Aid Agreement that includes membership from neighboring counties as well. Each local fire department is staffed by volunteers. Each fire department has a fire chief and at least one assistant fire chief. Each fire department is governed by its local township government body, with the exception of West Branch Fire Department, which has five townships and one city authority board, and the Lupton Fire Department, an incorporated fire agency.

Ogemaw Fire Department
Foster Township and Clear Lake Fire Department
Goodar Township Volunteer Fire Department
Rose City Fire Department
Lupton Fire Department
Mills Township Fire Department
Richland-Logan fire Department

Ambulance
2872 Hansen Road
West Branch, MI 48661
989-345-4503

EMS Stations
5230 Rifle River Trail
Alger, MI 48610

647 N. M-33
West Branch, MI 48661

2872 Hansen Road
West Branch, MI 48661

Health Care
District Health Department No. 2
630 Progress Road
West Branch, MI 48661
989-345-5020

Emergency Preparedness

District Health Department No. 2 is dedicated to protecting the health of our community during public health emergencies such as disease outbreaks, terrorist attacks or natural disasters. We actively collaborate with local, state and federal agencies to prepare for and respond to incidents that threaten public health.

Since the terrorist attacks and anthrax mail attacks of September 2001 the role of public health as a front line emergency responder has become more evident. The role of public health has been greatly expanded beyond responding to naturally occurring disease outbreaks to include bioterrorist attacks and other disasters, natural or man-made. The expansion of this role has benefited our community greatly by bringing the vast resources and knowledge of local public health to multiple emergency response activities.

For several years District Health Department No. 2 has received funding from the Centers for Disease Control to improve our emergency response capabilities and build infrastructure to support emergency response. We have utilized these funds to develop a comprehensive emergency preparedness program that is capable of responding to a variety of emergency situations.

State of Michigan Department of Health and Human Services
444 E. Houghton Avenue
West Branch, MI 48661
989-345-5135

West Branch Regional Medical Center
2463 S. M-30
West Branch, MI 48661
989-345-3660

Drain Commissioner
Michael DeMatio
4954 Stillwagon Rd.
West Branch, MI 48661
989-345-7498

Government Facilities

Government facilities may have a large impact on how emergencies are handled. They provide services to the public such as shelter in times of natural disasters. They also serve as a way to distribute information on how to handle emergency circumstances.

Government Offices and Facilities (Main Office Locations)
Ogemaw County
806 W. Houghton Ave.
West Branch, MI 48661
989-345-3560

Townships
Churchill Township
1308 State Rd.
West Branch, MI 48661
989-345-5579

Cumming Township
751 N. Morrison Rd.
West Branch, MI 48661
989-685-3439

Edwards Township
3601 Wickes Rd.
West Branch, MI 48661
989-345-7748

Foster Township
1968 Clear Lake Rd.
West Branch, MI 48661
989-345-2701

Goodar Township
P.O. Box 100, 4471 County Line Rd.
South Branch, MI 48761
989-257-3455

Hill Township
4985 Townhall Rd.
Hale, MI 48739
989-728-5131

Horton Township
2120 Rau Rd.
West Branch, MI 48661
989-345-5431

Klacking Township
405 N. Campbell Rd.
West Branch, MI 48661
989-685-9093

Logan Township
4507 E. M-55
Prescott, MI 48756
989-873-5532

Mills Township
2441 Greenwood Rd.
Prescott, MI 48756
989-873-4411

Ogemaw Township
1990 Gray Rd.
West Branch, MI 48661
989-343-1428

Richland Township
3620 McLean Rd.
P.O. Box 358
Prescott, MI 48756
989-873-4969

Rose Township
3380 Lupton Rd.
P.O. Box 38
Lupton, MI 48635
989-473-2001

West Branch Township
1705 Fairview Rd.
West Branch, MI 48661
989-345-5450

Village

Village of Prescott
P.O. Box 323
302 N. Sherman St.
Prescott, MI 48756
989-873-5675

Cities

City of Rose City
410 N. Williams St.
Rose City, MI 48654
989-685-2103

City of West Branch
121 N. Fourth St.
West Branch, MI 48661
989-345-0500

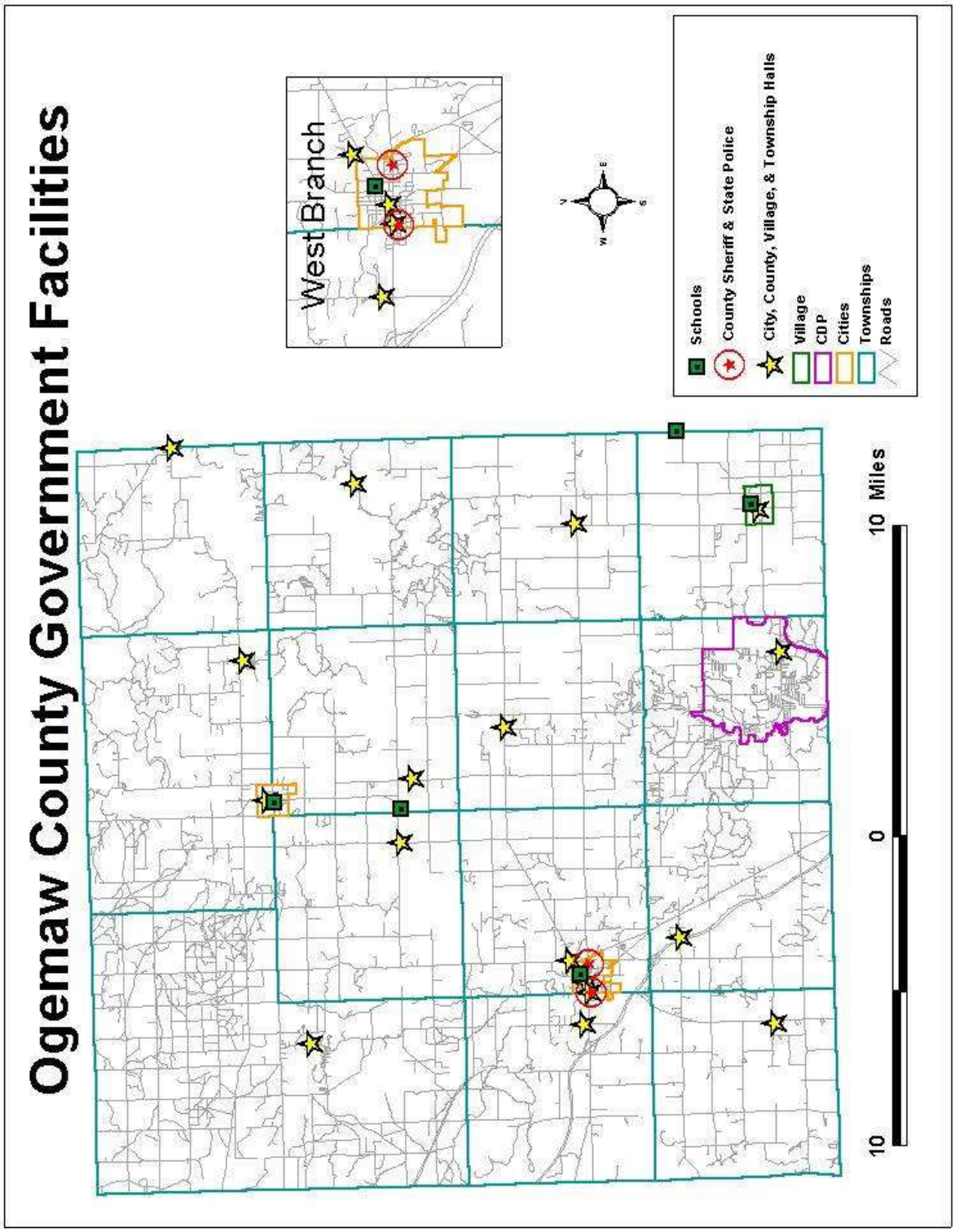


Figure 21 Ogemaw County Governmental Facilities Map

Schools

Kirtland Community College
10775 N. St. Helen Rd.
Roscommon, MI 48653
989-275-5121

Kirtland Community College Satellite Office
2479 South M-76
West Branch, MI 48661
989-275-5000

West Branch / Rose City Schools
Administrative Office – 989-343-2000
Ogemaw Heights High School – 989-343-2020
Rose City Elementary School – 989-685-2484
Rose City Middle School – 989-685-2583
Surline Elementary School, grades K-4 – 989-343-2190
Surline Middle School, grades 5-8 – 989-343-2140

Whittemore / Prescott Schools
Administrative Office – 989-756-2500
Adult Alternative Ed – 989-756-4219
Early Childhood Ed Center – 989-756-4175
Prescott Elementary 1-3 – 989-873-3488
Whittemore Elementary 4-6 – 989-756-2881
Whittemore Head Start – 989-756-4351
Whittemore/Prescott Jr. High and High School – 989-756-2501

St. Joseph School
935 W. Houghton Ave.
West Branch, MI 48661
989-345-0220

Charlton Heston Academy
135 N. St. Helen Rd.
St. Helen, MI 48656
989-632-3390

Hale Area Schools
311 N. Washington
Hale, MI 48739
989-728-3551

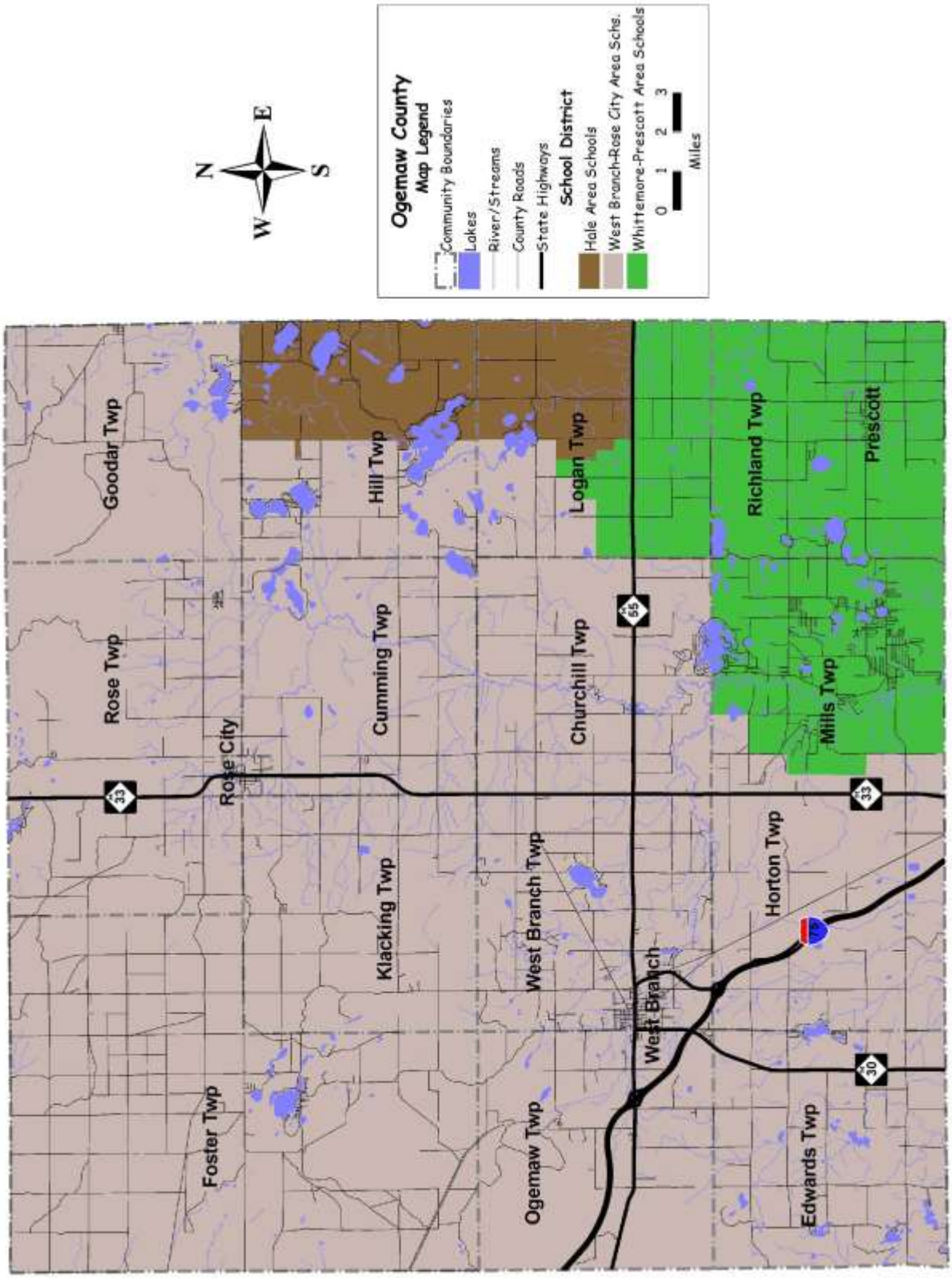


Figure 22 Ogemaw County School Districts Map

Service Agencies

Utilities

Ogemaw County and its municipalities are serviced by Consumers Energy and DTE.

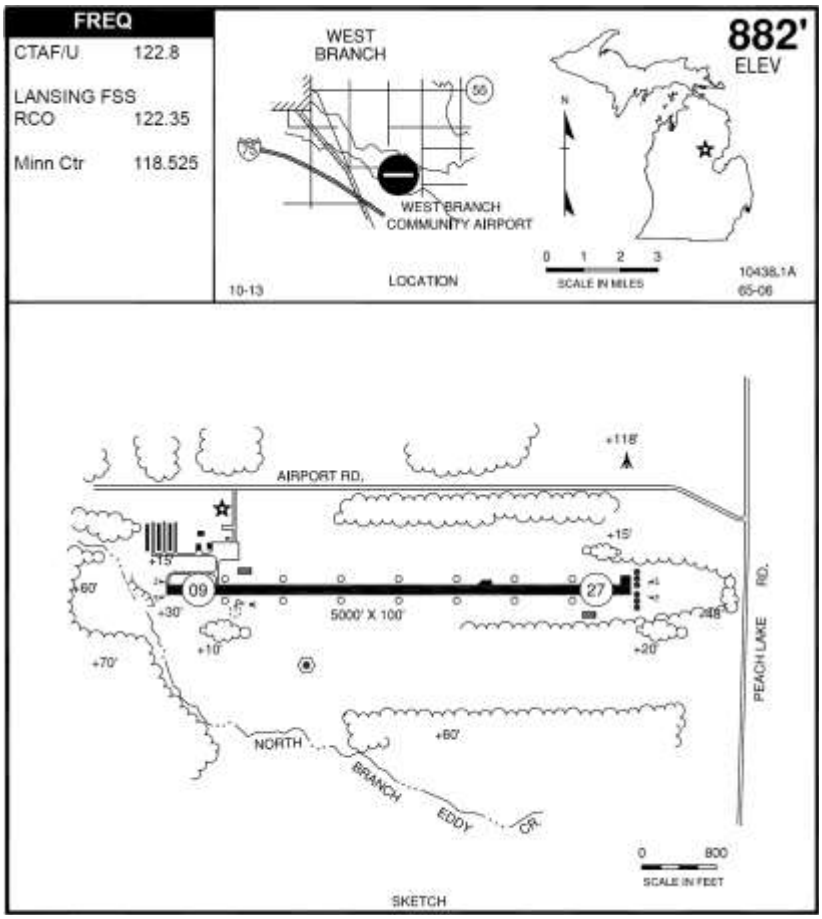
Solid Waste

Michigan has active landfills throughout the State of Michigan according to the Department of Natural Resources. The nearest active landfills to Ogemaw County are located in Arenac and Clare Counties. Ogemaw County is serviced by Waste Management, Sunrise Disposal, Republic Disposal, and many other disposal companies located in nearby counties.

Transportation

There are four state highways in Ogemaw County. M-33, M-30, and Interstate 75 are north/south trunk lines while M-55 is a major east/west trunk line. The county and local governments maintain the remaining road networks. General aviation and or freight air service is available at the West Branch Community Airport in southern West Branch Township.

A community airport, three miles southeast of the City of West Branch, serves private airplanes. The airport has a lighted 5,000 foot asphalt runway and offers fuel, hangers, and tie downs. The airport has an attendant during normal business hours and by appointment during non-business hours. Recently a new airport terminal building was constructed to offer visitors additional airport services. Ogemaw Public Transit Organization serves the area with a demand/response bus service.



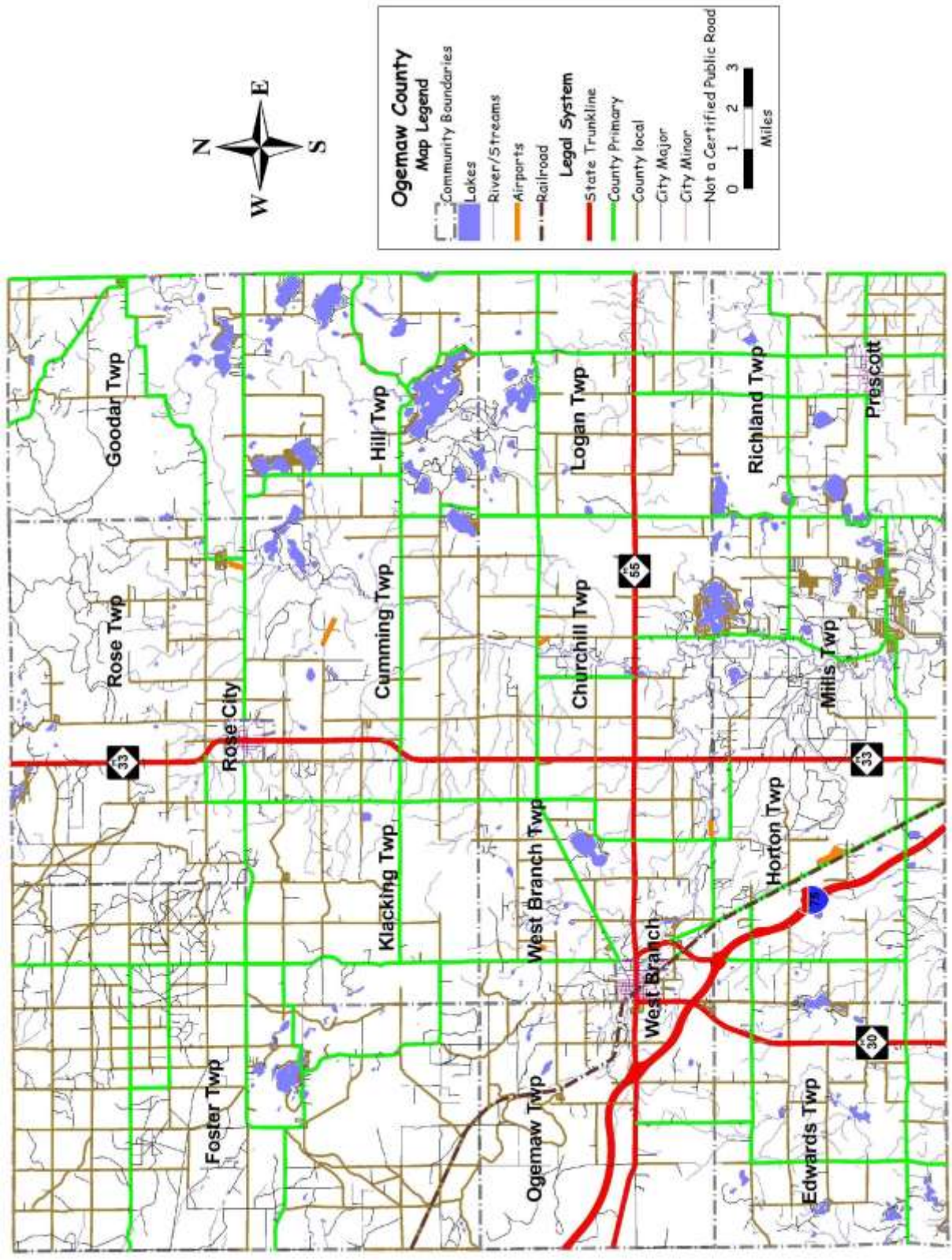


Figure 23 Ogemaw County Surface Transportation Map

Ogemaw County Road Commission
1250 S. M-33, P.O. Box 157
West Branch, MI 48661
989-345-0234

Ogemaw County Airport Board
1519 Airport Rd., P.O. Box 183
West Branch, MI 48661
989-345-1453

Ogemaw Public Transit
1383 Airport Rd.
West Branch, MI 48661
989-345-5790

Ogemaw County Hazard Mitigation Municipal Questionnaire

In the fall of 2015 a survey was sent to the townships and cities of Ogemaw County to gather pertinent information for hazard mitigation planning. The questions asked were to ascertain what their seasonal population shifts are and how they rate natural hazards in their communities. A majority of the communities responded.

Most communities indicated that they have large seasonal shifts in population, the summer being the season of large increases in population. One community noted that a "fair amount of retirees go south during winter months." Estimates of increases in seasonal populations ranged from 15% to 62%. Most communities also indicated that they have significant numbers of seasonal homes and there are large numbers of people who travel to their communities "to hunt, fish, snowmobile, camp, etc."

Most communities listed events that draw large numbers of people. The City of West Branch and Rose City noted that the Ogemaw County Fair, Fabulous Fridays, and the 4th of July attract large numbers of people. Archery and rifle deer season, and softball tournaments were also noted.

In terms of natural hazards, the communities rated the hazards from one to ten, one being a low threat and ten being a high threat. The following are the averages of their responses:

Wildfire 5
Tornado 5
Flood 3
Severe Wind 6
Winter Weather 7
Thunderstorms 6
Earthquakes 2
Drought 3
Extreme Temperatures 4

The communities rated technological hazards also from one to ten. The averages of their responses are:

Public Health Emergency 3
Structural Fire 5
Oil and Gas Accident 5
Civil Disturbance 3
Infrastructure Failure 3
Dam Failure 2
Hazard Material Incidents 4
Air, Land, or Water Transportation Accidents 4
Terrorism/Sabotage 2

The communities were asked to give the types of hazards they thought they were least prepared for and why. The primary hazards the communities gave are tornados, terrorism, pipeline leaks, and earthquakes. The reasons they feel unprepared are that they believe one can never be prepared for certain large disasters, the hospital could never handle the volume of a large disaster, and there are no sirens in parts of the county.

The communities' feel they are best prepared for fires and tornados, noting that the local fire departments are very good.

Lastly, the communities were asked to indicate what initiatives, projects, strategies, etc. should be implemented to reduce their vulnerability to specific hazards. The responses included: Generators, sirens, plans to work jointly, information and education of actions needed to be taken, and emergency shelters and supplies (food, water, other).

There are significant differences among the communities' responses; Please see the complete survey responses in appendices for details.

Financial Capabilities, Education, and Outreach

The county and the local jurisdictions have very limited resources to fund mitigation actions, but Emergency Management will continue to meet with representatives of the communities to keep them involved in initiating new policies and actions that can be undertaken as there is funding available.

Chapter 4 *Risk Assessment*

In this section county hazards are identified, described, and analyzed. The county communities, capabilities, and assets will be reviewed against those risks and a summary of vulnerabilities will be set out.

DISASTER, DESCRIPTION and HISTORY

Thunderstorm Hazards

Hailstorms

A condition where atmospheric water particles from thunderstorms form into rounded or irregular lumps of ice that fall to the earth.

Hazard Description

Hail is a product of strong 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. As one of these thunderstorms passes over, hail usually falls near the center of the storm, along with the heaviest rain. Most hailstones range in size from a pea to a golf ball, but hailstones larger than baseballs have been reported. Large hail is a characteristic of severe thunderstorms, and it may precede the occurrence of a tornado.

Hailstorms in Ogemaw County

45 HAIL event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**.

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 OGEMAW	03/30/1976	14:00	Hail	1.00 in.	0	0	0	0
2 OGEMAW	07/14/1976	16:12	Hail	2.75 in.	0	0	0	0
3 OGEMAW	06/20/1982	13:40	Hail	1.75 in.	0	0	0	0
4 OGEMAW	10/14/1989	10:00	Hail	1.75 in.	0	0	0	0
5 OGEMAW	08/15/1991	14:45	Hail	0.75 in.	0	0	0	0
6 Skidway Lake	04/24/1993	18:30	Hail	2.25 in.	0	0	0	0
7 Rose City	04/18/1995	19:48	Hail	1.00	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
				in.				
8 Prescott	06/27/1995	20:30	Hail	0.75 in.	0	0	0	0
9 West Branch	07/13/1995	1645	Hail	1.75 in.	0	0	0	0
10 W Ogemaw County	05/19/1996	04:55 AM	Hail	1.00 in.	0	0	0	0
11 Clear Lake	05/19/1996	08:21 PM	Hail	1.00 in.	0	0	0	0
12 N Of West Branch	05/19/1996	09:20 PM	Hail	0.75 in.	0	0	0	0
13 West Branch	05/06/1998	03:53 PM	Hail	0.75 in.	0	0	0	0
14 South Branch	06/25/1998	10:45 PM	Hail	0.75 in.	0	0	0	0
15 West Branch Arpt	05/12/2000	03:12 PM	Hail	0.88 in.	0	0	0	0
16 Prescott	05/12/2000	03:45 PM	Hail	1.75 in.	0	0	0	0
17 Prescott	05/12/2000	03:48 PM	Hail	1.75 in.	0	0	0	0
18 Prescott	05/12/2000	03:50 PM	Hail	1.00 in.	0	0	0	0
19 Lupton	06/09/2001	05:25 PM	Hail	0.75 in.	0	0	0	0
20 Rose City	06/09/2001	05:42 PM	Hail	1.75 in.	0	0	0	0
21 Lupton	06/09/2001	05:45 PM	Hail	1.75 in.	0	0	0	0
22 Lupton	08/08/2001	02:21 PM	Hail	1.00 in.	0	0	0	0
23 Rose City	08/08/2001	02:30 PM	Hail	0.75 in.	0	0	0	0
24 Lupton	05/30/2002	01:24 PM	Hail	0.75 in.	0	0	0	0
25 West Branch	07/28/2002	03:20 AM	Hail	0.88 in.	0	0	0	0
26 West Branch	06/08/2003	04:00 PM	Hail	0.75 in.	0	0	0	0
27 West Branch	07/20/2003	02:02 PM	Hail	0.75 in.	0	0	0	0
28 Clear Lake	06/08/2005	02:30 PM	Hail	0.75	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
				in.				
29 West Branch	07/21/2005	03:35 PM	Hail	0.88 in.	0	0	0	0
30 Rose City	07/09/2006	05:25 PM	Hail	0.75 in.	0	0	0	0
31 South Branch	05/30/2007	04:30 PM	Hail	1.00 in.	0	0	0	0
32 West Branch Arpt	06/15/2008	02:18 PM	Hail	0.75 in.	0	0	0	0
33 Selkirk	06/15/2008	02:30 PM	Hail	0.88 in.	0	0	0	0
34 Lupton	06/15/2008	02:36 PM	Hail	0.75 in.	0	0	0	0
35 Rose City	06/15/2008	04:02 PM	Hail	1.00 in.	0	0	0	0
36 Campbells Corners	06/15/2008	04:09 PM	Hail	1.00 in.	0	0	0	0
37 Lupton	06/15/2008	04:28 PM	Hail	0.88 in.	0	0	0	0
38 West Branch	06/15/2008	07:22 PM	Hail	1.00 in.	0	0	0	0
39 Prescott	06/15/2008	07:57 PM	Hail	0.88 in.	0	0	0	0
40 South Branch Arpt	06/21/2008	04:19 PM	Hail	0.88 in.	0	0	0	0
41 West Branch	06/22/2008	05:40 PM	Hail	1.25 in.	0	0	0	0
42 Lupton	07/16/2008	04:42 PM	Hail	0.75 in.	0	0	0	0
43 West Branch	07/10/2010	04:28 PM	Hail	1.10 in.	0	0	0	0
44 West Branch	07/19/2013	08:07 PM	Hail	0.75in.	0	0	0	0
45 Selkirk	04/29/2014	06:57 PM	Hail	0.75 in.	0	0	0	0
TOTALS					**0**	**0**	**0**	**0**

Source: National Climatic Data Center

Existing Prevention Programs

National Weather Service Doppler Radar

The National Weather Service (NWS) Doppler Weather Surveillance Radar can detect severe weather events that threaten life and property, including storms that are likely to produce damaging hail and lightning. With Doppler Radar the lead time and specificity of warnings for severe weather have improved significantly. Doppler technology calculates both the speed and the direction of severe storms. By providing data on the wind patterns within developing storms, the new system allows forecasters to identify better the conditions leading to severe weather such as tornadoes, strong 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 (NWS) issues severe thunderstorm watches when the meteorological conditions are conducive to the development of a severe thunderstorm. People in the watch area are instructed to stay tuned to local radio or television stations for weather updates and to watch for developing storms. Once radar or a trained Skywarn spotter detects the existence of a severe thunderstorm, the NWS 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. People in the warning area are instructed to seek shelter immediately.

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

The NWS also has an extensive public information program aimed at educating citizens about the dangers of lightning and other severe weather, and ways to prevent weather-related deaths and injuries.

Severe Weather Awareness Week

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

Hail Overview

Annually, thunderstorms will occur an average of 30 days in Ogemaw County. Most occur in June, July, and August. The incidence of hail follows the incidence of thunderstorms. Therefore, those areas of the state most prone to thunderstorms are also prone to large and damaging hail.

The National Weather Service, which began recording hail activity in Michigan in 1967, indicates that approximately 50% of the severe thunderstorms that produce hail have occurred during the months of June and July. Nearly 80% have occurred during the prime growing season of May through August. As a result, the damage to crops is often extensive.

The National Weather Service forecasts of severe thunderstorms usually gives sufficient warning time to allow residents to take appropriate action to reduce the effects of hail damage to vehicles and some property. Public education and awareness of the dangers posed by these natural hazards is the best defense against thunderstorms and the hail that often accompanies them.

Lightning

The discharge of electricity from within a thunderstorm.

Hazard Description

Most direct impacts from lightening are relatively site specific in scope, and therefore do not have a tremendous impact on the community as a whole. With the temperature of a bolt of lightning approaching 50,000 degrees Fahrenheit in a split second, the most common direct damage from lightning is fire. The most common indirect effect of lightning is power outages. This indirect effect can have an impact on a much larger segment of the community, leaving hundreds and sometimes thousands of homes without electricity.

Lightning Events in Ogemaw County

2 LIGHTNING event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**.

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 West Branch	06/11/1999	09:30 PM	Lightning	N/A	0	0	0	0
2 Lupton	06/28/2014	05:50 PM	Lightning	N/A	0	6	0	0
TOTALS					**0**	**6**	**0**	**0**

Source: National Climatic Data Center

Existing Prevention Programs

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 and facilities, and the general public.

Lightning Protection for Structures

The National Lightning Safety Institute (NLSI) has identified a systematic lightning hazard mitigation approach that can be followed to protect structures from lightning damage. That approach attempts to mitigate both the direct and indirect effects of lightning strikes though the application of appropriate structural safety improvements, as identified in a comprehensive lightning safety analysis.

National Lightning Detection Network

Despite advancements in electric power system design and equipment, lightning continues to be the single largest cause of outages on electrical distribution and transmission lines. To help combat that problem, the National Lightning Detection Network (NLDN) – a technologically advanced lightning location system operated by a private company in Phoenix, Arizona – was invented. The NLDN helps electric utilities make effective decisions regarding line maintenance priorities, crew dispatch, and future design and placement of utility transmission lines and lightning protection. NLDN lightning data is available in both real-time and archival format (1989-present). The lightning information from NLDN can lead to significant savings to utility maintenance and construction budgets, improved design and placement of future transmission and distribution infrastructure, and reduced outages due to lightning-related damage. Data from the NLDN can also be used to improve the safety of participants at outdoor events such as golf tournaments, air shows, fairs and outdoor festivals, and sporting events and concerts at outdoor stadiums and racetracks.

Local Lightning Detection Systems

Local lightning detection systems are increasingly being installed at golf courses, parks, pools, sports fields and stadiums, and other outdoor venues. These detection devices monitor electrical activity in the atmosphere and identify when favorable lightning conditions exist by activating a warning light or horn. That early warning can give local officials the time necessary to clear outdoor areas before actual lightning strikes occur.

Thunderstorm Hazards – Lightning Overview

Unfortunately, lightning prevention or protection in an absolute sense is impossible. However, the consequences of lightning strikes have been diminished (both in terms of deaths and injuries and property damage) through the implementation of the above programs and special initiatives.

Severe Winds

Winds 58 miles per hour or greater.

Hazard Description

Severe winds spawned by thunderstorms and other weather events can have devastating effects in terms of loss of life, injuries, and property damage. According to data compiled by the National Weather Service for the period 1970-August 2000, Michigan experienced over 9,000 severe wind events (not including tornadoes) that resulted in 115 deaths and millions of dollars in damage. One of the major problems associated with windstorms is the loss of electrical power and associated services. Windstorms also cause property damage from falling tree limbs and other flying debris.

Wind Events in Ogemaw County

Locations that are not specified in the Location and County category are larger and on a bigger scale than Ogemaw County.

75 THUNDERSTORM & HIGH WIND event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**.

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 OGEMAW	05/30/1956	13:30	Tstm Wind	0 kts.	0	0	0	0
2 OGEMAW	04/19/1975	01:00	Tstm Wind	0 kts.	0	0	0	0
3 OGEMAW	07/14/1976	16:12	Tstm Wind	0 kts.	0	0	0	0
4 OGEMAW	07/04/1977	19:45	Tstm Wind	0 kts.	0	0	0	0
5 OGEMAW	06/14/1980	16:25	Tstm Wind	0 kts.	0	0	0	0
6 OGEMAW	07/05/1980	07:00	Tstm Wind	0 kts.	0	0	0	0
7 OGEMAW	06/15/1981	13:45	Tstm	0 kts.	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
			Wind					
8 OGEMAW	06/15/1981	13:48	Tstm Wind	0 kts.	0	0	0	0
9 OGEMAW	06/29/1981	15:32	Tstm Wind	0 kts.	0	0	0	0
10 OGEMAW	06/29/1981	16:00	Tstm Wind	0 kts.	0	0	0	0
11 OGEMAW	07/17/1982	11:15	Tstm Wind	0 kts.	0	0	0	0
12 OGEMAW	08/29/1983	17:15	Tstm Wind	0 kts.	0	0	0	0
13 OGEMAW	09/07/1985	19:20	Tstm Wind	0 kts.	0	0	0	0
14 OGEMAW	06/29/1987	12:20	Tstm Wind	0 kts.	0	0	0	0
15 OGEMAW	07/20/1987	16:14	Tstm Wind	0 kts.	0	0	0	0
16 OGEMAW	08/03/1988	15:15	Tstm Wind	0 kts.	0	0	0	0
17 OGEMAW	03/27/1991	18:30	Tstm Wind	0 kts.	0	0	0	0
18 OGEMAW	05/28/1991	16:40	Tstm Wind	52 kts.	0	0	0	0
19 OGEMAW	05/29/1991	22:55	Tstm Wind	0 kts.	0	0	0	0
20 OGEMAW	07/03/1991	12:40	Tstm Wind	0 kts.	0	0	0	0
21 OGEMAW	07/03/1991	14:00	Tstm Wind	0 kts.	0	0	0	0
22 Bay City	08/27/1993	18:00	Thunderstorm Winds	N/A	0	0	1K	0
23 South Branch	07/05/1994	21:45	Thunderstorm Winds	N/A	0	0	5K	0
24 West Branch	06/28/1995	12:35	Thunderstorm Winds	N/A	0	0	0	0
25 West Branch	07/13/1995	15:52	Thunderstorm Winds	N/A	0	2	0	0
26 Skidway Lake	06/24/1997	10:19 PM	Tstm	50	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
			Wind	kts.				
27 Lupton	06/24/1997	10:20 PM	Tstm Wind	50 kts.	0	0	0	0
28 Prescott	07/02/1997	03:15 PM	Tstm Wind	61 kts.	0	0	0	0
29 Rose City	07/16/1997	03:00 PM	Tstm Wind	52 kts.	0	0	0	0
30 West Branch	07/16/1997	03:05 PM	Tstm Wind	52 kts.	0	0	0	0
31 West Branch	05/31/1998	05:20 AM	Tstm Wind	50 kts.	0	0	0	0
32 MIZ008 - 015>036 - 041>042	11/10/1998	05:00 AM	High Wind	82 kts.	0	0	0	0
33 West Branch	07/23/1999	12:30 PM	Tstm Wind	50 kts.	0	0	0	0
34 West Branch	06/26/2000	01:25 PM	Tstm Wind	50 kts.	0	0	0	0
35 Selkirk	06/09/2001	06:10 PM	Tstm Wind	50 kts.	0	0	0	0
36 Selkirk	06/15/2001	03:10 PM	Tstm Wind	60 kts.	0	0	15K	0
37 Selkirk	06/15/2001	03:10 PM	Tstm Wind	55 kts.	0	0	20K	0
38 Lupton	08/09/2001	05:45 PM	Tstm Wind	50 kts.	0	0	0	0
39 West Branch	09/08/2001	04:49 PM	Tstm Wind	50 kts.	0	0	0	0
40 West Branch	07/28/2002	03:25 AM	Tstm Wind	50 kts.	0	1	0	0
41 Prescott	07/28/2002	03:35 AM	Tstm Wind	50 kts.	0	0	0	0
42 West Branch	07/31/2002	12:38 AM	Tstm Wind	50 kts.	0	0	0	0
43 West Branch	08/12/2002	05:30 PM	Tstm Wind	50 kts.	0	0	0	0
44 Skidway Lake	08/12/2002	07:00 PM	Tstm Wind	50 kts.	0	0	0	0
45 West Branch	09/19/2002	04:54 PM	Tstm Wind	50 kts.	0	0	0	0
46 West Branch	07/20/2003	02:02 PM	Tstm Wind	52 kts.	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
47 MIZ016 - 019>021 - 025>026 - 030>032 - 035>036	11/12/2003	08:30 PM	High Wind	68 kts.	0	0	155 K	0
48 Clear Lake	06/13/2004	05:04 PM	Tstm Wind	50 kts.	0	0	1K	0
49 Lupton	07/13/2004	08:05 PM	Tstm Wind	54 kts.	0	0	0	0
50 Clear Lake	08/02/2004	03:53 PM	Tstm Wind	52 kts.	0	0	15K	0
51 Rose City	06/28/2005	01:33 PM	Tstm Wind	52 kts.	0	0	2K	0
52 West Branch	07/18/2005	12:15 PM	Tstm Wind	52 kts.	0	0	35K	0
53 Rose City	07/18/2005	12:15 PM	Tstm Wind	52 kts.	0	0	5K	0
54 West Branch	07/21/2005	03:35 PM	Tstm Wind	55 kts.	0	0	20K	0
55 Clear Lake	07/24/2005	06:20 AM	Tstm Wind	52 kts.	0	0	4K	0
56 Clear Lake	05/16/2006	06:38 PM	Tstm Wind	52 kts.	0	0	4K	0
57 Rose City	07/09/2006	06:25 PM	Tstm Wind	55 kts.	0	0	12K	0
58 West Branch	07/17/2006	05:38 PM	Tstm Wind	52 kts.	0	0	0K	0
59 Rose City	07/17/2006	06:10 PM	Tstm Wind	52 kts.	0	0	12K	0
60 West Branch Arpt	07/17/2006	06:20 PM	Tstm Wind	50 kts.	0	0	0K	0
61 Rose City	07/22/2006	04:20 PM	Tstm Wind	52 kts.	0	0	5K	0
62 Rose City	08/01/2006	11:38 PM	Tstm Wind	58 kts.	0	0	15K	0
63 West Branch	05/30/2007	04:00 PM	Tstm Wind	52 kts.	0	0	2K	0
64 Edwards	06/06/2008	03:40 PM	Tstm Wind	52 kts.	0	0	4K	0
65 Lupton	06/06/2008	04:05 PM	Tstm Wind	54 kts.	0	0	2K	0
66 West Branch	06/08/2008	02:27 PM	Tstm	65	0	0	190	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
			Wind	kts.			K	
67 West Branch	06/28/2008	07:35 PM	Tstm Wind	54 kts.	0	0	9K	0
68 Beaver Lake	06/24/2009	07:00 PM	Tstm Wind	60 kts.	0	0	35K	0
69 Skidway Lake	06/24/2009	07:10 PM	Tstm Wind	52 kts.	0	0	12K	0
70 West Branch	07/10/2010	04:34 PM	Tstm Wind	52 kts.	0	0	5K	0
71 Edwards	07/15/2010	12:30 PM	Tstm Wind	54 kts.	0	0	7K	0
72 West Branch	06/22/2011	01:38 PM	Tstm Wind	55 kts.	0	0	5K	0
73 West Branch	05/20/2013	03:30 PM	Tstm Wind	52 kts.	0	0	1.5K	0
74 Nester	07/19/2013	08:20 PM	Tstm Wind	52 kts.	0	0	5K	0
75 West Branch	09/01/2014	02:05 PM	Tstm Wind	54 kts.	0	0	6K	0
TOTALS					**0**	**3**	**462 K**	**0**

Source: National Climatic Data Center

Existing Prevention Programs

Many of the programs and initiatives designed to mitigate against, prepare for, respond to, and recover from tornadoes have the dual purpose of also protecting against other strong winds. As a result, there is some overlap in the narrative programs and initiatives descriptions for each respective hazard.

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 – including severe winds. Most important, the lead time and specificity of warning 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 and severe straight-line winds. 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).

Public Warning Systems

Numerous communities in Michigan have outdoor warning siren systems in place to 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, a large number of communities across the state do not have adequate public warning systems in place to warn their residents of severe weather or other hazards. Federal funding specifically allocated to assist communities in the purchase of public warning systems has effectively disappeared, leaving many communities unable to purchase adequate systems to warn their residents of impending danger.

Attempting to fill some of that funding void, the State of Michigan has used federal Hazard Mitigation Grant Program (HMGP) funds to assist local communities in purchasing public warning systems. To date, HMGP funds have been used to purchase and install 76 outdoor warning sirens, over 1,000 NOAA weather alert monitors for schools, hospitals and places of public assembly, 4 NOAA weather radio transmitters, and several other early warning systems. Communities that received funding for these projects were encouraged to implement a warning education program to ensure that residents know what to do once they receive warning of an impending hazardous event. Because HMGP funds must be used to fund a wide variety of mitigation projects, the amount of funds available to fund warning systems is limited to a small percentage of the overall available grant funds allocated to the state. The HMGP funds are provided on a 75% federal, 25% local cost share. A Presidential

Major Disaster Declaration is required to activate the HMGP funding. As a result, the funding stream may not always be available. In addition, state mitigation priorities may change over time, putting public warning systems at a lower priority than other mitigation projects. However, the HMGP does provide at least one possible avenue for assisting communities in enhancing their local public warning capability.

Severe Weather Awareness Week

Each spring, the Emergency Management Division, 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 severe weather events such as tornadoes, thunderstorms, lightning, hail, flooding and high winds. Informational materials on severe winds and other weather hazards are disseminated to schools, hospitals, nursing homes, other interested community groups and facilities, and the general public.

Manufactured Home Anchoring

Manufactured homes are vulnerable to wind damage if they are not properly anchored. As a result, a major national effort has been initiated to encourage the structural anchoring or "tie down" of manufactured homes. The Michigan Manufactured Housing Commission Administrative Rules (R 125.1602, Subsection 5) required new manufactured home installation in floodplains to be anchored structurally to a foundation. Through this requirement, the possibility of damage from wind is minimized. Unfortunately, structures outside designated floodplains do not have to comply with the anchoring provision, although many owners choose to comply voluntarily. It should also be noted that local communities have the option of adopting an ordinance that requires anchoring of manufactured home installations located outside a designated floodplain. State anchoring system standards are outlined in Administrative Rules R 125.1605 through R 125.1608.

Electrical Infrastructure Reliability

One of the major problems associated with severe winds is the loss of electric power. As illustrated above, Michigan has had numerous widespread and severe electrical power outages caused by severe winds, and 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 cooperatives have active, ongoing programs to improve system reliability and protect facilities from damage by severe 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.

Structural Bracing/Wind Engineering

One of the best ways to protect buildings from damage from severe winds 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 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.

The Emergency Management Division, Michigan Department of State Police (EMD/MSP), and the Michigan State Housing Development Authority (MSHDA), have begun a small pilot program aimed at employing wind engineering techniques on new residential construction. This initiative is designed to show that implementing such techniques can be a relatively inexpensive way to protect buildings from damage in high wind events. While these techniques will do nothing to protect a building from damage caused by flying debris, they will help ensure that the damage does not occur from the building coming apart at critical junctures due to extreme wind forces. If this pilot program is successful, it may be expanded in the future to include retrofitting existing residential and commercial structures.

The EMD/MSP is also involved in another pilot wind engineering research program with Michigan Technological University (MTU) to design composite shear walls and test them for their effectiveness at resisting high wind loads. Under this program, the university will design, analyze, construct and test four composite wall designs and then publicize the findings on the Internet so that homeowners, building professionals and other interested parties can review and download the information. Recommendations will also be made to the American Society of Civil Engineers (ASCE) based on the program outcome and peer review of the results of the project. The MTU research program compliments and builds on studies completed by FEMA and the Building Research Council of the School of Architecture at the University of Illinois at Urbana-Champaign regarding structural connections in light wood frame construction. The MTU shear wall design may subsequently be used in construction projects in Michigan and throughout the country to mitigate damage from severe winds.

Urban Forestry/Tree Maintenance Programs

Urban forestry programs can be very effective in minimizing storm damage caused by falling trees or tree branches. In almost every severe wind event, falling trees and branches cause power outages and clog public roadways with debris. However, a properly designed, managed and implemented urban forestry program can help keep tree-related damage and impact to a minimum. To be most effective, an urban forestry program should address tree maintenance in a comprehensive manner, from proper tree selection, to proper placement, to proper tree trimming and long-term care.

Every power company in Michigan has a tree trimming program, and numerous local communities have some type of tree maintenance program. The electrical utility tree trimming programs are aimed at preventing encroachment of trees and tree limbs within power line rights-of-way. Typically, professional tree management companies and utility work crews perform the trimming operations. At the local government level, only a handful of Michigan communities have actual urban forestry departments or agencies. Crews from the public works agency or county road commission perform the bulk of the tree trimming work.

When proper pruning methods are employed, and when the work is done on a regular basis with the aim of reducing potential storm-related damage, these programs can be quite effective. Often, however, tree trimming work is deferred when budgets get tight or other work is deemed a higher priority. When that occurs, the problem usually manifests itself later in greater storm-related tree debris management problems.

Severe Winds Overview

Figures from the National Weather Service indicate that severe winds occur more frequently in the southern half of the Lower Peninsula than any other area in the State. On an average, severe wind events can be expected 3-4 times per year in the northern Lower Peninsula. These figures refer to winds from thunderstorms and other forms of severe weather, not tornadoes.

National Weather Service forecasts of severe winds usually gives sufficient warning time to allow residents to take appropriate action to reduce, at least to some degree, the effects of wind on structures and property. This allows residents some time to gather outdoor furniture, lawn ornaments etc. indoors from becoming flying debris and causing further property damage. However, when these events occur during the night, or very early in the morning when people most likely are not listening to their television or radios, both damage and injury can be more severe. Also, as indicated earlier, proper structural bracing techniques can help minimize or even eliminate major damage due to the loss of the roof or movement of the building off its foundation.

In terms of response to a severe wind event, providing for the mass care and sheltering of residents left without heat or electricity, and mobilizing sufficient resources to clear and dispose of downed tree limbs and other debris from roadways, are the primary challenges facing Michigan communities. In addition, downed power lines present a public safety threat that requires close coordination of response efforts between local agencies and utility companies. Severe winds can affect every Michigan community. Therefore, every community should adequately plan and prepare for this type of emergency. That planning and preparedness effort should include the identification of necessary resources such as cots, blankets, food supplies, generators, and debris removal equipment and services. In Ogemaw County, the local chapter of the American Red Cross would be called. Depending

on the severity and location of the disaster, the Red Cross will establish a shelter in one or a number of pre-approved sites.

In addition, each community should develop debris management procedures (including the identification of multiple debris storage, processing and disposal sites) so that the stream of tree and construction debris can be handled in the most expedient, efficient, and environmentally safe manner possible. Both FEMA and the Michigan Department of State Police Emergency Management Division offer debris management courses to provide local, State, and Federal management personnel at all levels with an overview of issues and recommended actions necessary to plan for, respond to, and recover from a major debris generating event. Such a course would be useful for local government leaders in developing a debris management plan.

To mitigate against the effects of severe winds, communities can: 1) institute a comprehensive urban forestry program; 2) properly brace and strengthen vulnerable public facilities; 3) ensure compliance with manufactured home anchoring regulations;
4) coordinate with utility companies on local restoration priorities and procedures; 5) improve local warning systems; and 6) amend local codes to require structural bracing, where appropriate, in all new residential and commercial construction.

Tornados

A violently whirling column of air extending downward to the ground from a cumulonimbus cloud.

Hazard Description

Tornadoes in Michigan are most frequent in 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 tornadoes. A tornado may have winds up to 300 miles per hour and an interior air pressure that is 10 to 20 percent below that of the surrounding atmosphere. The typical length of a tornado path is approximately 16 miles, but tracks up to 200 miles have been reported. Tornado path widths are generally less than one-quarter mile wide. Historically, tornadoes have resulted in tremendous loss of life, with a national average of 111 deaths per year. Property damage from tornadoes is in the hundreds of millions of dollars every year in the United States.

Tornado Intensity

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 damage 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. 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 (see following page for scale.)

Tornado Events in Ogemaw County

13 TORNADO(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**.

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 OGEMAW	04/12/1974	1855	Tornado	F2	0	0	2.5K	0
2 OGEMAW	03/30/1976	1315	Tornado	F3	0	10	250 K	0
3 OGEMAW	03/30/1976	1340	Tornado	F3	1	7	250 K	0
4 OGEMAW	06/20/1982	1340	Tornado	F1	0	1	250 K	0
5 OGEMAW	06/13/1984	1410	Tornado	F1	0	0	250 K	0
6 OGEMAW	03/27/1991	1815	Tornado	F3	0	0	2.5 M	0
7 OGEMAW	03/27/1991	1815	Tornado	F2	0	0	250 K	0
8 OGEMAW	03/27/1991	1820	Tornado	F3	0	0	2.5 M	0
9 West Branch	07/06/1994	1720	Tornado	F1	0	0	5K	0
10 West Branch	07/13/1995	1541	Tornado	F1	0	1	500 K	0
11 West Branch	07/13/1995	1555	Tornado	F0	0	0	0.5K	0
12 West Branch	06/25/1998	10:23 PM	Tornado	F0	0	0	0	0
13 Campbells Corners	06/06/2008	03:55 PM	Tornado	EF0	0	0	75K	0
TOTALS					**1**	**19**	**6.833 M**	**0**

Source: National Climatic Data Center

The Fujita Scale of Tornado Intensity

F-Scale Number	Intensity Description	Wind Speed (mph)	Type/Intensity of Damage
F0	Gale tornado	40-72	Light damage. Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate	73-112	Moderate damage. The lower limit is the beginning of

	Tornado		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.
F2	Significant Tornado	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe Tornado	159-206	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.
F4	Devastating tornado	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible Tornado	261-318	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
F6	Inconceivable Tornado	319-379	These winds are very unlikely. The area of damage they might produce would be unrecognizable.

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. The new enhanced Fujita Scale introduced on February 1, 2007 continues using F0-F5 ratings but is enhanced (E) based on additional calculations of wind and damage.

Existing Prevention Programs

Many of the programs and initiatives designed to mitigate against, prepare for, respond to, and recover from severe winds have the dual purpose of also protecting against tornadoes. As a result, there is some overlap in the narrative programs and initiatives descriptions for each respective hazard.

National Weather Service Doppler Radar

Doppler Weather Surveillance Radar can assist in the detection of severe weather events that threaten life and property, including tornadoes and the severe storms that spawn them. With this technology, the lead time and specificity of warnings for severe weather have improved significantly over previous methods of weather detection. Doppler technology calculates both the speed and the direction of motion of severe storms. By providing data on wind patterns within developing storms, this new system helps forecasters identify the conditions leading to severe weather such as tornadoes. 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 (NWS) issues tornado watches when the meteorological conditions are conducive to the development of a tornado. People in the watch area are instructed to stay tuned to local radio or television stations for weather updates, and watch for developing storms. Once a tornado has been sighted and its existence is confirmed, or Doppler Radar shows strong probability of the development or occurrence of a tornado, the NWS 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. People 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 Management Weather Information Network (EMWIN). Public warning is provided through the Emergency Alert System (EAS). The NWS stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The NWS also provides detailed warning information on the Internet, through the Interactive Weather Information Network (IWIN).

Public Warning Systems

Numerous communities in Michigan have outdoor warning siren systems in place to warn the public about impending tornadoes and other hazards. Most of these systems were originally purchased as civil defense sirens to warn residents of a nuclear attack, but that purpose was later expanded to include severe weather hazards. 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, a large number of communities across the state, including parts of Ogemaw County, do not have adequate public warning systems in place to warn their residents of severe weather condition or other hazardous events. Federal funding specifically allocated to assist communities in the purchase of public warning systems has effectively disappeared, leaving many communities unable to purchase adequate systems to warn their residents of impending danger. Several communities in the County do not have warning sirens, nor do all areas of the County receive the NOAA weather radio transmission signal.

The State of Michigan has used federal Hazard Mitigation Grant Program (HMGP) funds to assist several communities in purchasing outdoor warning sirens, NOAA weather alert systems, or both. Communities were also encouraged to implement a warning education program as part of the project, to ensure that residents know what to do once they receive warning of an impending hazardous event. Because HMGP funds must be used to fund a wide variety of mitigation projects, the amount of funds available to fund warning systems is limited to a small percentage of the overall available grant funds allocated to the state.

The HMGP funds are provided on a 75 percent federal, 25 percent local cost share. A Presidential Major Disaster Declaration is required to activate the HMGP funding. As a result, the funding stream may not always be available in the future. In addition, state mitigation priorities may change over time, putting public warning systems at a lower priority than other mitigation projects.

Severe Weather Awareness Week

Each spring, the Department of State Police Emergency Management Division, in conjunction with the Michigan Severe Weather Awareness Committee, sponsors Severe Weather Awareness Week. This annual public information and education campaign focuses on severe weather events such as tornadoes, thunderstorms, lightning, hail, high winds and flooding. The purpose of the tornado portion of this campaign is to inform the public about what tornadoes are, when tornadoes usually occur, what people should do if a tornado occurs, what community warning systems exist, and to provide other pertinent tornado-related information as appropriate. Informational materials are distributed to schools, hospitals, nursing homes, other interested community groups and facilities, and the general public. Special educational programs are often conducted during this week.

Manufactured Home Anchoring

Manufactured homes are always vulnerable to tornado damage, but especially so if they are not properly anchored. As a result, a major national effort has been initiated to encourage structural anchoring, or “tie down”, of manufactured homes. The Michigan Manufactured Housing Commission Administrative Rules (R 125.1602, Subsection 5) require new manufactured home installations in floodplains to be structurally anchored to a foundation. Through this requirement, the possibility of damage from wind is also reduced, although this will not protect a manufactured home from a direct hit by a tornado, it certainly will help prevent rollovers in many high-wind situations. Unfortunately, structures outside designated floodplains do not have to comply with the anchoring provision, although many owners choose to comply voluntarily. It should be noted that local communities have the option of adopting an ordinance that requires anchoring of manufactured home installations located outside a designated floodplain. State anchoring system standards are outlined in Administrative Rules R 125.606 through R 125.1608.

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 percent 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. (See also Urban Forestry/Tree Maintenance Programs section).

Structural Bracing/Wind Engineering

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. It the damage continues unabated, the building can end up being a total loss.

The Michigan State Housing Development Authority, with Hazard Mitigation Grant Program funding from the Michigan Department of State Police, Emergency Management Division, has begun a small pilot program aimed at employing wind engineering techniques on new residential construction. This initiative is designed to show that implementing such techniques can be a relatively inexpensive way to protect buildings from damage in high wind events. While these techniques will do nothing to protect a building from damage caused by flying debris, they will help ensure that the damage does not occur from the building coming apart at critical junctures due to extreme wind forces. If this pilot program is successful, it may be expanded in the future to include retrofitting existing residential and commercial structures.

The EMD/MSP is also involved in another pilot wind engineering research program with Michigan Technological University (MTU) to design composite shear walls and test them for their effectiveness at resisting high wind loads. Under this program, the university will design, analyze, construct and test four composite wall designs and then publicize the findings on the Internet so that homeowners, building professionals and other interested parties can review and download the information. Recommendations will also be made to the American Society of Civil Engineers (ASCE) based on the program outcome and peer review of the results of the project. The MTU research program compliments and builds on studies completed by FEMA and the Building Research Council of the School of Architecture at the University of Illinois at Urbana-Champaign regarding structural connections in light

wood frame construction. The MTU shear wall design may subsequently be used in construction projects in Michigan and throughout the country to mitigate damage from severe winds.

Urban Forestry/Tree Maintenance Programs

Urban forestry programs can be very effective in minimizing storm damage caused by falling trees or tree branches. In almost every tornado or other severe wind event, falling trees and branches cause power outages and clog roadways with debris. However, a properly designed, managed and implemented urban forestry program can help keep tree-related damage and impacts to a minimum. To be most effective, an urban forestry program should address tree maintenance in a comprehensive manner, from proper tree selection, to proper placement, to proper tree trimming and long-term care.

Every power company in Michigan has a tree trimming program in place, and numerous local communities have some type of tree maintenance program in place. The electrical utility tree trimming programs are aimed at preventing encroachment of trees and tree limbs within power line rights-of-way. Typically, professional tree management companies and utility work crews perform the trimming operations. At the local government level, only a handful of Michigan communities have actual urban forestry departments or agencies. Rather, crews from the public works agency or county road commission perform the bulk of the tree trimming work.

When proper pruning methods are employed, and when the work is done on a regular basis with the aim of reducing potential storm-related damage, these programs can be quite effective. Often, however, tree trimming work is deferred when budgets get tight or other work is deemed a higher priority. When that occurs, the problem usually manifests itself in greater storm-related tree debris management problems down the line. Although nothing will prevent tree damage from a direct tornado strike, a well-planned, well-managed urban forestry program can certainly reduce the scope and magnitude of the post-tornado tree debris problem.

Tornadoes Overview

Michigan is located on the northeast fringe of the Midwest tornado belt. The lower frequency of tornadoes occurring in Michigan may be, in part, the result of the colder water of Lake Michigan during the spring and early summer months, a prime period of tornado activity. During a time frame between 1950 -1999, Ogemaw County had a total of 12 tornadoes.

Like severe wind events, tornado disasters require that communities plan and prepare for the mass care of residents left without electrical power and the clearance of trees and other debris from roadways. These are two primary challenges that face all Michigan communities in such an event. The planning and preparedness effort should include the

identification of mass care facilities and supplies. In Ogemaw County, the local chapter of the American Red Cross would be called to prepare shelters.

In addition, each community should develop debris management procedures (including the identification of multiple debris storage, processing and disposal sites) so that the stream of tree and construction debris can be handled in the most expedient, efficient, and environmentally safe manner possible. Both FEMA and the Michigan Department of State Police Emergency Management Division offer debris management courses to provide local, State, and Federal management personnel at all levels with an overview of issues and recommended action necessary to plan for, respond to, and recover from a major debris generating event. Such a course would be useful for local government leaders in developing a debris management plan.

Although tornadoes cannot be prevented or predicted until almost the last moment, their potential impact on the citizens of Ogemaw County can certainly be reduced with the appropriate forethought and preparation.

Severe Winter Weather Hazards

Ice/Sleet Storms

A winter storm that generates sufficient quantities of ice or sleet that results in hazardous conditions or property damage.

Hazard Description

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.

Ice and Sleet Storms in Ogemaw County

Locations that are not specified in the Location and County category are larger and on a bigger scale than Ogemaw County.

59 SNOW & ICE event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2005**.

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MIZ018 - 021 - 024 - 028>030 - 035	01/10/1993	0400	Heavy Snow	N/A	0	0	0	0
2 MIZ001>010 - 013>017 - 029>032 - 035>037 - 049>059 - 073 - 077	02/22/1993	1000	Lake Effect Snow	N/A	0	0	0	0
3 MIZ004>006 - 013>017 - 025 - 026 - 031>044 - 049 - 051 - 053	03/23/1993	0300	Freezing Rain	N/A	0	0	0	0
4 MIZ011 - 012 - 018>039 - 042>048 - 062>068	04/01/1993	0000	Heavy Snow	N/A	0	0	50K	0
5 MIZ001>009 - 015>023 - 025>028 - 031>035 - 037>039 - 043>045 - 050 - 056>058 -	12/23/1993	1400	Heavy Snow	N/A	0	0	0	0
6 Part Of Upper And All	01/27/1994	0000	Heavy Snow/freezing Rain	N/A	0	0	5.0 M	0
7 Central Upper; North-	02/22/1994	1900	Heavy Snow	N/A	0	0	0	0
8 North-central Lower M	03/17/1994	2000	Heavy Snow	N/A	0	0	0	0
9 Northern Lower	12/16/1994	1900	Heavy Snow	N/A	0	0	0	0
10 Southern Lower	02/27/1995	0100	Ice Storm	N/A	0	0	0	0
11 MIZ001>050	03/06/1995	0000	Heavy Snow	N/A	0	0	0	0
12 MIZ035	01/09/1997	02:00 PM	Winter Storm	N/A	0	0	0	0
13 MIZ035	01/15/1997	12:00 PM	Winter Storm	N/A	0	0	0	0
14 MIZ035	01/24/1997	09:00 PM	Winter	N/A	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
			Storm					
15 MIZ035	02/27/1997	04:00 AM	Winter Storm	N/A	0	0	0	0
16 MIZ016>036 - 041>042	01/08/1998	08:00 AM	Winter Storm	N/A	0	0	0	0
17 MIZ008 - 015>036 - 041>042	01/14/1998	04:00 PM	Winter Storm	N/A	0	0	0	0
18 MIZ020 - 034>036	04/11/1999	10:00 AM	Winter Storm	N/A	0	0	0	0
19 MIZ033>036	04/07/2000	04:00 PM	Heavy Snow	N/A	0	0	0	0
20 MIZ029>030 - 033>036 - 041>042	12/11/2000	08:00 PM	Winter Storm	N/A	0	0	0	0
21 MIZ035>036 - 042	12/17/2000	05:00 AM	Winter Storm	N/A	0	0	0	0
22 MIZ022>025 - 027>030 - 032>036	02/08/2001	06:30 AM	Heavy Snow	N/A	0	0	0	0
23 MIZ008 - 015>036 - 041>042	02/24/2001	08:30 PM	Ice Storm	N/A	0	0	0	0
24 MIZ008 - 015>036 - 041>042	03/02/2002	12:00 AM	Heavy Snow	N/A	0	0	0	0
25 MIZ030 - 032>033 - 035>036	03/09/2002	06:00 PM	Winter Storm	N/A	0	0	0	0
26 MIZ008 - 016>036 - 041>042	04/03/2003	06:00 PM	Winter Storm	N/A	0	0	0	0
27 MIZ008 - 015 - 017>018 - 023>024 - 029>030 - 035>036	12/25/2003	03:00 AM	Heavy Snow	N/A	0	0	0	0
28 MIZ031>036 - 041>042	01/14/2004	01:00 PM	Heavy Snow	N/A	0	0	0	0
29 MIZ016>030 - 032>036 - 041>042	01/26/2004	09:00 PM	Heavy Snow	N/A	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
30 MIZ019 - 021>022 - 027>029 - 033>035 - 042	02/23/2004	02:45 PM	Heavy Snow	N/A	0	0	0	0
31 MIZ015>027 - 029>032 - 035	01/02/2005	04:00 AM	Ice Storm	N/A	0	0	0	0
32 MIZ019 - 023>024 - 027>036 - 041>042	01/06/2005	11:00 AM	Heavy Snow	N/A	0	0	0	0
33 MIZ033>036 - 041>042	02/20/2005	07:30 PM	Heavy Snow	N/A	0	0	0	0
34 Ogemaw Zone	11/24/2005	12:00 PM	Winter Storm	N/A	0	0	0	0
35 Ogemaw Zone	12/15/2005	10:00 PM	Heavy Snow	N/A	0	0	0	0
36 Ogemaw Zone	01/21/2006	12:30 AM	Heavy Snow	N/A	0	0	0	0
37 Ogemaw Zone	02/16/2006	03:30 PM	Winter Storm	N/A	0	0	0	0
38 Ogemaw Zone	12/01/2006	06:00 PM	Winter Storm	N/A	0	0	0	0
39 Ogemaw Zone	02/04/2007	01:00 AM	Extreme Cold / wind Chill	N/A	0	0	0	0
40 Ogemaw Zone	02/25/2007	11:00 AM	Winter Storm	N/A	0	0	0	0
41 Ogemaw Zone	03/01/2007	08:00 AM	Winter Storm	N/A	0	0	0	0
42 Ogemaw Zone	04/11/2007	01:00 PM	Winter Storm	N/A	0	0	0	0
43 Ogemaw Zone	12/01/2007	04:00 PM	Winter Storm	N/A	0	0	0	0
44 Ogemaw Zone	12/15/2007	04:00 PM	Heavy Snow	N/A	0	0	0	0
45 Ogemaw Zone	12/28/2007	02:00 PM	Heavy Snow	N/A	0	0	0	0
46 Ogemaw Zone	01/29/2008	09:00 PM	Winter Storm	N/A	0	0	0	0
47 Ogemaw Zone	12/08/2008	09:00 PM	Heavy Snow	N/A	0	0	0	0
48 Ogemaw	01/17/2009	08:00	Heavy	N/A	0	0	0	0

Location	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
Zone		AM	Snow					
49 Ogemaw Zone	02/21/2009	09:00 AM	Heavy Snow	N/A	0	0	0	0
50 Ogemaw Zone	12/09/2009	01:00 AM	Winter Storm	N/A	0	0	0	0
51 Ogemaw Zone	02/11/2011	11:00 PM	Winter Storm	N/A	0	0	0	0
52 Ogemaw Zone	03/22/2011	07:00 PM	Heavy Snow	N/A	0	0	0	0
53 Ogemaw Zone	02/24/2012	01:00 AM	Heavy Snow	N/A	0	0	0	0
54 Ogemaw Zone	02/29/2012	04:00 AM	Winter Storm	N/A	0	0	0	0
55 Ogemaw Zone	03/02/2012	06:00 PM	Heavy Snow	N/A	0	0	0	0
56 Ogemaw Zone	02/07/2013	04:00 PM	Heavy Snow	N/A	0	0	0	0
57 Ogemaw Zone	04/11/2013	04:00 PM	Ice Storm	N/A	0	0	5K	0
58 Ogemaw Zone	01/06/2014	09:00 PM	Extreme Cold / wind Chill	N/A	0	0	0	0
59 Ogemaw Zone	02/14/2014	06:00 PM	Extreme Cold / wind Chill	N/A	0	0	0	0
TOTALS					**0**	**0**	**5K**	**0**

Source: National Climatic Data Center

Existing Prevention Programs

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 - including severe winter weather events such as ice and sleet storms. Most important, the lead time and specificity of warnings for severe weather have improved significantly.

National Weather Service Watches/Warnings

Sufficient warning can do much to reduce the damage from ice and sleet storms by permitting people to prepare properly. The National Weather Service uses the terms “ice

storm", "freezing rain", and "freezing drizzle", to warn the public when a coating of ice is expected on the ground and on other exposed surfaces. The qualifying term "heavy" is used to indicate ice coating which, because of the extra weight of the ice, could cause significant damage to trees, overhead wires, and other exposed objects.

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).

Winter Hazards Awareness Week

Each fall, the Emergency Management Division, Department of State Police, in conjunction with the Michigan Committee for Severe Weather Awareness, sponsors Winter Hazards Awareness Week. This annual public information and education campaign focuses on winter weather hazard events such as snowstorms, blizzards, extreme cold, and ice and sleet storms. Informational materials on winter weather hazards and safety are disseminated to schools, hospitals, nursing homes, other interested community groups and facilities, and the general public.

Electrical Infrastructure Reliability

One of the major problems associated with ice storms is the loss of electric power. Michigan has had numerous widespread and severe electrical power outages caused by ice storms, several of which have resulted in a power loss to 250,000 – 500,000 electrical customers for several hours to several days at a time. Ice-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 and cooperatives have active, ongoing programs to improve system reliability and protect facilities from damage by ice, severe winds, and other hazards. Typically, these programs focus on trimming tree 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.

Urban Forestry/Tree Maintenance Programs

Urban forestry programs can be very effective in minimizing ice storm damage caused by falling trees or tree branches. In almost every ice storm, falling trees and branches cause power outages and clog public roadways with debris. However, a properly designed,

managed and implemented urban forestry program can help keep tree-related damage and impact to a minimum. To be most effective, an urban forestry program should address tree maintenance in a comprehensive manner, from proper tree selection, to proper placement, to proper tree trimming and long-term care.

Every power company in Michigan has a tree trimming program, and numerous local communities have some type of tree maintenance program. The electrical utility tree trimming programs are aimed at preventing encroachment of trees and tree limbs within power line rights-of-way. Typically, professional tree management companies and utility work crews perform the trimming operations. At the local government level, only a handful of Michigan communities have actual urban forestry departments or agencies. Rather, crews from the public works agency or county road commission perform the bulk of the tree trimming work.

When proper pruning methods are employed, and when the work is done on a regular basis with the aim of reducing potential storm-related damage, these programs can be quite effective. Often, however, tree trimming work is deferred when budgets get tight or other work is deemed a higher priority. When that occurs, the problem usually manifests itself in greater storm-related tree debris management problems down the line.

Ice and Sleet Storms Overview

One of the biggest problems with ice and sleet storms is loss of power. The weight of the ice causes power lines to snap and break. Sometimes it can take days to restore power. If this happens temporary shelters may need to be set up. The local chapter of the American Red Cross would be called. Also with the power loss would come loss of heat, which could cause death from hypothermia especially with the elderly population. Another problem caused by ice and sleet storms would be debris cleanup. The weight of the ice could cause tree limbs to snap and break.

Approximately 87% of ice storms occur during the months of January, February, March and April, when conditions are most conducive for the development of ice and sleet. By listening for winter storm watches and warnings, people can be better prepared and lessen the impact of this hazard. The best way to avoid any consequences from an ice storm would be to stay inside and not travel unless absolutely necessary.

Snowstorms

A period of rapid accumulations of snow, often accompanied by high winds, cold temperatures, and low visibility.

Hazard Description

As a result of being surrounded by the Great Lakes, Michigan experiences large differences in snowfall in relatively short distances. The annual mean accumulation in Michigan ranges from 30 to 170 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.

The western Upper Peninsula experiences the most snowstorms in Michigan each year. The western half of the Lower Peninsula also experiences a relatively large number of snowstorms. One reason for this is the "lake effect", a process by which cold winter air moving across Lake Michigan and Lake Superior picks up moisture from the warmer lake waters, resulting in significant snowfall amounts in the western part of the state.

Snowstorms in Ogemaw County

(See events table above in Ice and Sleet Section)

Existing Prevention Programs

National Weather Service Doppler Radar

The National Weather Service 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 – including severe winter weather events such as snowstorms. Most important, the lead time and specificity of warnings for severe weather have improved significantly.

National Weather Service Watches, Warnings and Advisories

The National Weather Service issues winter storm watches and winter weather warnings to notify the public of severe winter weather conditions. A winter storm watch indicates severe winter weather conditions (freezing rain, sleet, or heavy snow) may affect an area, while a winter weather warning indicates that severe winter weather conditions are imminent.

Winter storm warnings can be issued for snow alone, but they also can take on different varieties. For example, a blizzard warning signifies that blizzard conditions are imminent or occurring. Blizzard conditions mean that the visibility will frequently be one-quarter mile or less in falling or blowing snow with wind speeds at least 35 miles per hour. A wind chill warning is issued when wind chills drop below –50 degrees Fahrenheit with winds equal to or greater than 10 miles per hour. Finally, an ice storm warning is issued for a significant accumulation of ice, normally a coating of at least one-quarter inch.

The National Weather Service also issues a number of different advisories for winter weather. These advisories can be issued for snow, freezing rain, blowing snow, and wind chill, among other things. Advisories mean that conditions are expected to cause significant inconveniences and may be hazardous. However, if caution is exercised, the situation should not become life threatening.

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).

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Each fall, the Emergency Management Division, Department of State Police, in conjunction with the Michigan Committee for Severe Weather Awareness, sponsors Winter Hazards Awareness Week. This annual public information and education campaign focuses on winter weather hazard events such as snowstorms, blizzards, extreme cold, and ice and sleet storms. Informational materials on winter weather hazards and safety are disseminated to schools, hospitals, nursing homes, other interested community groups and facilities, and the general public.

Electrical Infrastructure Reliability

One of the major problems associated with any winter weather hazard (including snowstorms) is the loss of electric power. Although the problem is not quite as chronic in Michigan as it is with ice storms, snowstorms have nonetheless caused several widespread and severe electrical power outages. Weather-related damage to electric power facilities and systems is a concern that is being actively addressed by utility companies across the state. DTE, Consumers Energy and other major electric utility companies and cooperatives have active, ongoing programs to improve system reliability and protect facilities from damage by snow, ice, severe 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.

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Urban forestry programs can be very effective in minimizing snowstorm damage caused by falling tree or tree branches. In almost every severe snowstorm, falling trees and branches cause power outages and clog public roadways with debris. However, a properly designed, managed and implemented urban forestry program can help keep tree-related damage and impact to a minimum. To be most effective, an urban forestry program should address tree maintenance in a comprehensive manner, from proper tree selection, to proper placement, to proper tree trimming and long-term care.

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When proper pruning methods are employed, and when the work is done on a regular basis with the aim of reducing potential storm-related damage, these programs can be quite effective. Often, however, tree trimming work is deferred when budgets get tight or other work is deemed a higher priority. When that occurs, the problem usually manifests itself in greater storm-related tree debris management problems down the line.

Snowstorms Overview

Severe snowstorms can affect every Michigan community. Listening for the severe storm watches and warnings can lessen the impact of these storms. People should have adequate time to prepare for these storms by getting food, wood, fuel etc. into their homes. Another way to lessen the impact of the storm would be to stay off the roads unless it is absolutely necessary to travel.

Emergency service directors should have a plan in effect for mass care facilities, resources (such as cots, blankets, food, etc.), and snow removal. Severe snowstorms can cause power outages and block the roadways for several days at a time in some occasions. Thus, having a plan in affect would lessen this impact also.

Wildfire

An uncontrolled fire in grass or brush lands, or forested areas.

Hazard Description

Contrary to popular belief, lightning strikes are not a leading cause of wildfires in Michigan. Today, lightning causes only 2 percent of all wildfires, and the rest are caused by human activity. Outdoor burning is the leading cause of wildfires in Michigan. Debris burning was responsible for 32 percent of the wildfires in Michigan in 1999. Incendiary, or intentional, fires accounted for another 12 percent of the total wildfires.

Upon examination of the causes of fire, it becomes apparent that most Michigan wildfires occur close to where people live and recreate, which puts both people and property at risk. The immediate danger from uncontrolled wildfires is the destruction of timber, structures, other property, wildlife, and injury or loss of life to people who live in the affected area or who are using recreational facilities in the area.

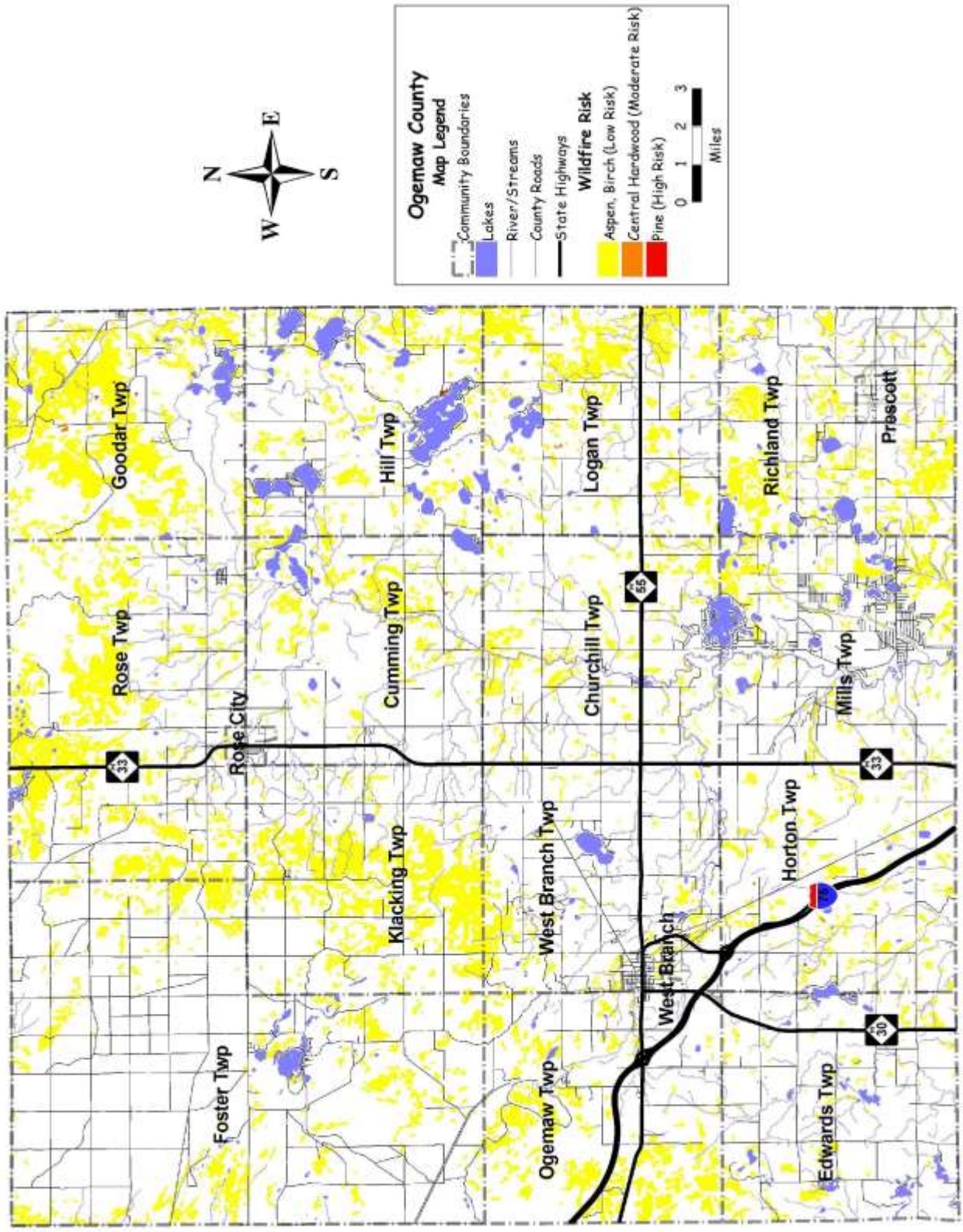

Figure 24 Wildfires

Existing Prevention Programs

Michigan Department of Natural Resources, Forest Management Division

The MDNR Forest Management Division directs and coordinates wildfire prevention, containment and suppression activities on all non-federal lands in the state, as well as Indian Reservations (under contract with the U.S. Bureau of Indian Affairs). The MDNR places great emphasis on wildfire prevention and public education, since the vast majority of wildfires in Michigan are caused by human activity. The MDNR Forest Management Division's philosophy is that preventing fires from starting in the first place, and taking precautionary measures around rural homes to stop the spread of wildfires, are the best means of avoiding or minimizing wildfire losses. When conditions of extreme fire hazard exist, the MDNR can request that the Governor issue an outdoor burning ban to mitigate the potential for wildfire in all or part of the state. Such a ban restricts smoking, fireworks, and outdoor burning activities to approved locations.

Michigan Forest Fire Experiment Station

A string of disastrous wildfires in the early part of the 20th century led to the creation of the Michigan Forest Fire Experiment Station in 1929. This Station, established by the Michigan Department of Conservation (now Natural Resources) is designed to investigate how wildfires behave, how to properly manage forest fuels, and how to use mechanized equipment to fight wildfires. Its research efforts have been invaluable in helping to prevent, contain and suppress wildfires in Michigan and across the country.

Michigan Interagency Wildland Fire Protection Association

Because the vast majority of wildfires are caused by human activity, the Michigan Interagency Wildfire Prevention Group was established in 1981 by the Michigan Department of Natural Resources. This was the first such group in the nation promoting wildfire prevention and awareness that had 100 percent involvement of the State's fire agencies. By 1993, the Michigan Interagency Wildfire Prevention Group had 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:

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 Marshal Division
7. Michigan State Firemen's Association
8. Michigan Fire Chiefs' Association.

Michigan Natural Resources and Environmental Protection Act

The Michigan Natural Resources and Environmental Protection Act (451 P.A. 1994), Part 515, assigns responsibility for the prevention and suppression of forest fires to the Director of the Michigan Department of Natural Resources. The Act also establishes requirements for burning permits, allows the Governor to issue prohibitions against the use of fire during extreme fire hazard conditions, and allows the DNR Director to enter into forest fire assistance agreements with other states and the federal government to control forest fires. These measures contribute to forest fire mitigation by preventing forest fires from starting in the first place, or lessening the spread of fires when they do start.

Solid Waste Management Act

The Michigan Solid Waste Management Act (264 P.A. 1990) prohibits the burning of leaves and grass clippings in municipalities over 7,500 in population, unless a municipality has an ordinance expressly allowing such burning activities. When properly applied and enforced, this law helps prevent some wildfires, since over one-quarter of all wildfires are started by small residential waste fires that get out of control.

Great Lakes Forest Fire Compact

The DNR Forest Management Division is a member of the Great Lakes Forest Fire Compact. The Compact is a partnership between the states of Michigan, Wisconsin and Minnesota, and the Canadian provinces of Ontario and Manitoba. Its purpose is to promote effective prevention, pre-suppression, and control of wildfires in the Great Lakes region through mutual aid and cooperation. Initiatives are implemented by committees comprised of members of the Compact. An example of an activity the Compact has undertaken is the development of a fire hazard assessment for the region. Michigan took the lead on this project, and it has proven to be an extremely beneficial educational tool for communities and property owners in assessing their fire hazard potentials.

The efforts of the Compact to build coordination and cooperation are based on the understanding that wildfires are multi-jurisdictional, and that suppression of fires usually requires the efforts of many groups and jurisdictions.

"Firewise Communities" Wildfire Protection Program

The MDNR is a participant in the national "Firewise Communities" Program developed by the National Wildland/Urban Interface (WUI) Fire Protection Program. The WUI Fire Protection Program is sponsored by the nation's major wildland fire agencies and the National Fire Protection Association (NFPA). In addition to the NFPA, other sponsors include: 1) USDA Forest Service; 2) USDI; 3) USDI National Park Service; 4) USDI Bureau of Land Management; 5) USDI Bureau of Indian Affairs; 6) USDI U.S. Fish and Wildlife Service;

and 7) National Association of State Foresters. These member agencies have been promoting "Firewise" living since 1986.

The Firewise Communities Program is designed to educate governmental officials and professionals in a wide variety of disciplines (i.e., planners, builders, engineers, architects, bankers, insurance representatives, emergency managers, land managers) on ways in which communities can be designed and built to minimize the threat from wildfires. The current focus of that educational effort is a series of Firewise Communities Workshops being held around the country. At the workshops, participants use computerized mapping and wildfire simulations to learn how to recognize wildland/urban interface fire hazards, design Firewise homes and landscapes, deliver fire education, and integrate Firewise planning into existing and developing areas of communities. The Firewise Communities Program also produces and distributes guidance documents, videos, and software packages on wildland/urban interface fire issues.

The Firewise Program is being implemented locally in selected pilot communities across the country. The City of Grayling was selected by the MDNR as the Michigan's first Firewise pilot community. If the program proves successful, additional communities will be selected for program implementation in the near future.

National Fire Incident Reporting System

The National Fire Incident Reporting System (NFIRS) was established by the National Fire Data Center in order to carry out the intentions of the Federal Fire Prevention and Control Act of 1974(P.L. 93-498). This Act authorizes the National Fire Data Center of the United States Fire Administration (USFA) to gather and analyze national information on fires. The Act further authorizes the USFA to develop uniform data reporting methods, and to encourage and assist state agencies in developing and reporting data.

The most recent version of NFIRS, version 5.0, was released in January 1999. This software has been designed as a tool for fire departments to report and maintain computerized records of fires and other fire department incidents in a uniform manner. Not only does NFIRS 5.0 help State and local government develop fire reporting and analysis capability for their own use, and to obtain data that can be used to assess more accurately and subsequently to combat the fire problem at a national level, it expands the collection of data beyond fires to include the full range of fire department activity on a national scale. It is a true all-incident reporting system.

As of January 1, 1999 Michigan required that all fire incidents be reported with NFIRS 5.0. This includes those fires suppressed by both the DNR and local fire departments.

Infrastructure Failures

A failure of critical public or private utility infrastructure resulting in a temporary loss of essential functions or services.

Hazard Description

Michigan's citizens are dependent on the public and private utility infrastructure to provide essential life supporting services such as electric power, heating and air conditioning, water, sewage disposal and treatment, storm drainage, communications, and transportation. When one or more of these independent, yet interrelated systems, fail due to disaster or other cause – even for a short period of time – it can have devastating consequences. For example, when power is lost during periods of extreme heat or cold, people can literally die in their homes if immediate mitigative action is not taken. When the water or waste treatment systems in a community are inoperable, serious public health problems arise that must be addressed immediately to prevent outbreaks of disease. When storm drainage systems fail due to damage or an overload of capacity, serious flooding can occur.

These are just some examples of the types of infrastructure failures that can occur, and all of these situations can lead to disastrous public health and safety consequences if immediate mitigative actions are not taken. Typically, it is the most vulnerable members of society (i.e., the elderly, children, impoverished individuals, and people in poor health) that are the most actively affected by an infrastructure failure. If the failure involves more than one system, or is large enough in scope and magnitude, whole communities and possibly even regions can be severely affected.

Existing Prevention Programs

State and Federally-Assisted Infrastructure Mitigation Projects

The State of Michigan has been very pro-active in its mitigation efforts for public infrastructure. Since 1994 the state has partnered with 26 Michigan local governments to allocate over $31 million in federal Hazard Mitigation Grant Program (HMGP) and local funds (a 25% local match) to address vulnerabilities in water, sewer, storm drainage, telecommunications, radio communications, and highway transportation infrastructure.

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 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.

Wastewater Collection/Treatment Systems

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 U.S. Environmental Protection Agency's (EPA) Technology Transfer Program, the "Recommended Standards for Sewage Works" developed by the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers, and other technical references provide important technical information to MDEQ personnel about the design and operation of wastewater collection and treatment system components. This information is used extensively by the MDEQ to review designs and operation procedures for the municipal wastewater program. Included within this guidance are basic minimum standards that help ensure an adequate level of structural and operational integrity for wastewater systems.

Surface Drainage Systems

Michigan's first drainage 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 recodification 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 and inter-county drainage facilities. Each drain has a corresponding special assessment district (watershed), a defined route and course, and 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 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.

The intra-county and inter-county drainage program, administered by county drain commissioners and the MDA operates, maintains, and improves water conveyance and treatment systems ranging from small agricultural drains to urban storm drains or sanitary drains. (Note: Some drains are constructed of pipes that range in size from 12 inches in diameter to over 16 feet in diameter, with massive pumping stations carrying storm or sanitary sewage which serve thousands of residents. Other drains are open channels or ditches that vary from several feet in width and dry during part of the year, to large river channels in excess of 100 feet in width. Flood water retarding dams, flood pumps, erosion control structures, storage basins and wastewater treatment structures are also part of the infrastructure constructed under the Michigan Drain Code.) Statewide, there are over 18,000 established drainage districts with an estimated combined length of over 40,000 miles of channel. These facilities vary from rural agricultural open channels with drainage areas of several hundred acres to large river systems with drainage areas of several hundred square miles.

As Michigan's villages, towns and cities have grown, the drains that were designed to serve primarily agriculture have also been used to carry storm water from municipalities and subdivisions, as well as serve as outlets for sanitary treatment plants and a variety of other permitted discharges. Operation, maintenance, and improvement of drains in suburban and urban areas now provides for the management of storm water, combined sanitary overflows, and sanitary sewage collection and treatment. Increasing demands on the drainage system in many areas of the State requires that continuous improvements be made to enhance drain capacity and flow characteristics, reduce sedimentation, and improve structural integrity.

The Michigan Drain Code allows for landowners or municipalities to petition for maintenance or improvement of the drainage systems. Drain commissioners or drainage

boards, in the absence of a petition, are allowed to maintain the drainage systems but are limited by law in the amount of money they are allowed to expend. The maintenance limit is equal to $2,500 per mile of established drain. This amount is generally sufficient for ordinary operation and maintenance, but it is inadequate during times of widespread damage such as happens during a disaster. Because drainage districts stand on their own, money or the maintenance limit cannot be shared between districts. This greatly limits flexibility and can severely constrict drain reconstruction, improvement, and damage mitigation efforts in a post-disaster setting.

Efforts are underway to amend the Michigan Drain Code to address more adequately current and anticipated future problems and concerns, and to make it more applicable to modern development circumstances.

Electrical System

Disaster-related damage to electric power facilities and systems is a concern that is being actively addressed by utility companies across the state. DTE, Consumers Energy and other major electric utility cooperatives and companies have active, ongoing programs to improve system reliability and protect facilities from damage by wind, snow and ice, 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 systems underground. The Michigan Public Service Commission (MPSC) monitors power system reliability to help minimize the scope and duration of power outages.

Telecommunications System

Like electric utility companies, telecommunications companies are concerned with the issue of protecting facilities and systems from disaster-related damage. Major telecommunications companies have programs to improve system reliability and physically protect facilities and system components from wind, snow and ice, and other hazards, utilizing many of the same techniques as the electric utility companies.

Infrastructure Failures Overview

Most of Ogemaw County's infrastructure failures are secondary events caused by other major events such as floods, windstorms, snow and ice storms. The main infrastructure failures are power outages, which are normally restored in a matter of hours. However, if the power were out for a longer period of time, the local chapter of the American Red Cross would be called to set up temporary shelters.

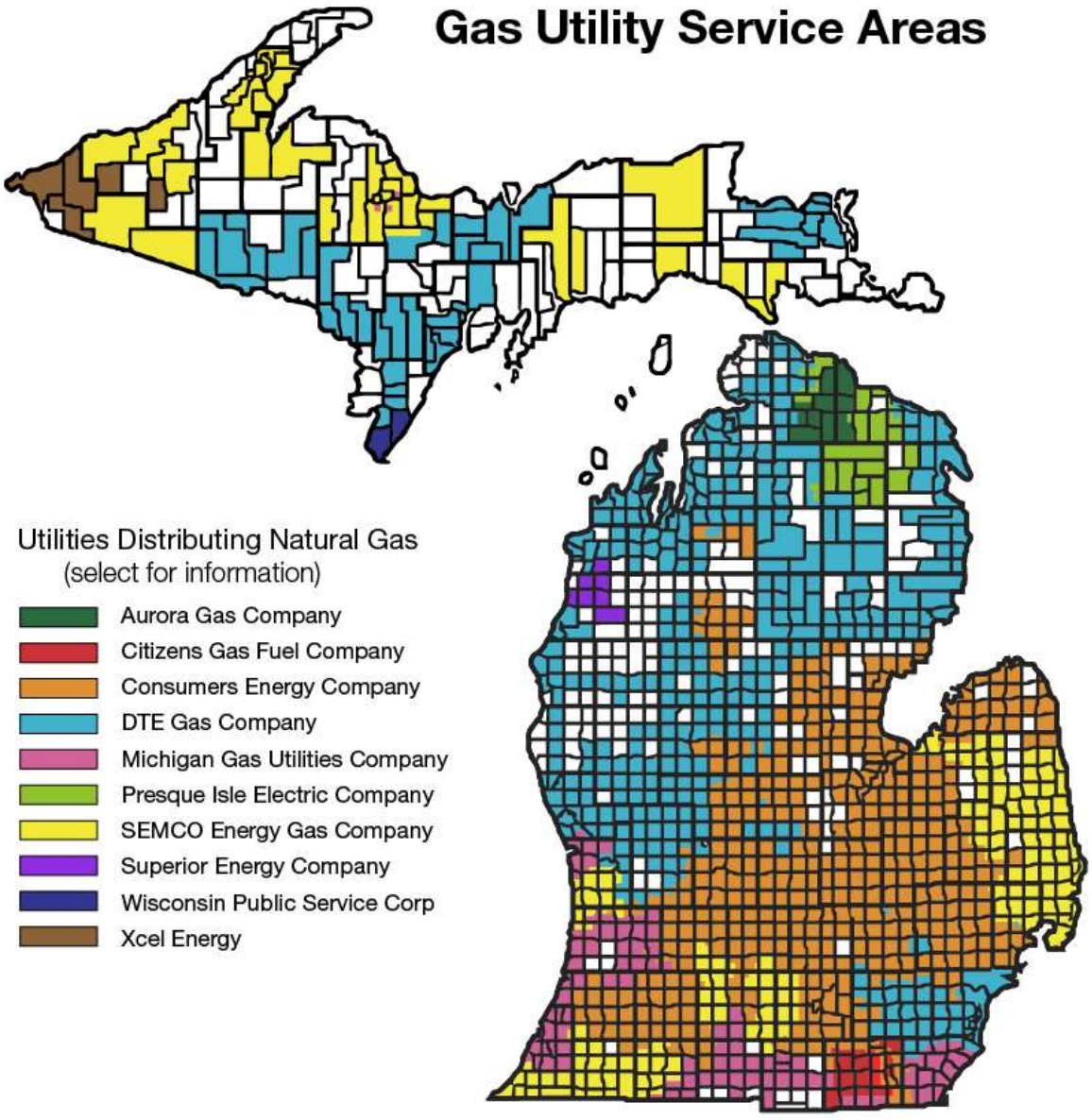

Figure 25 Utilities Distributing Natural Gas Map

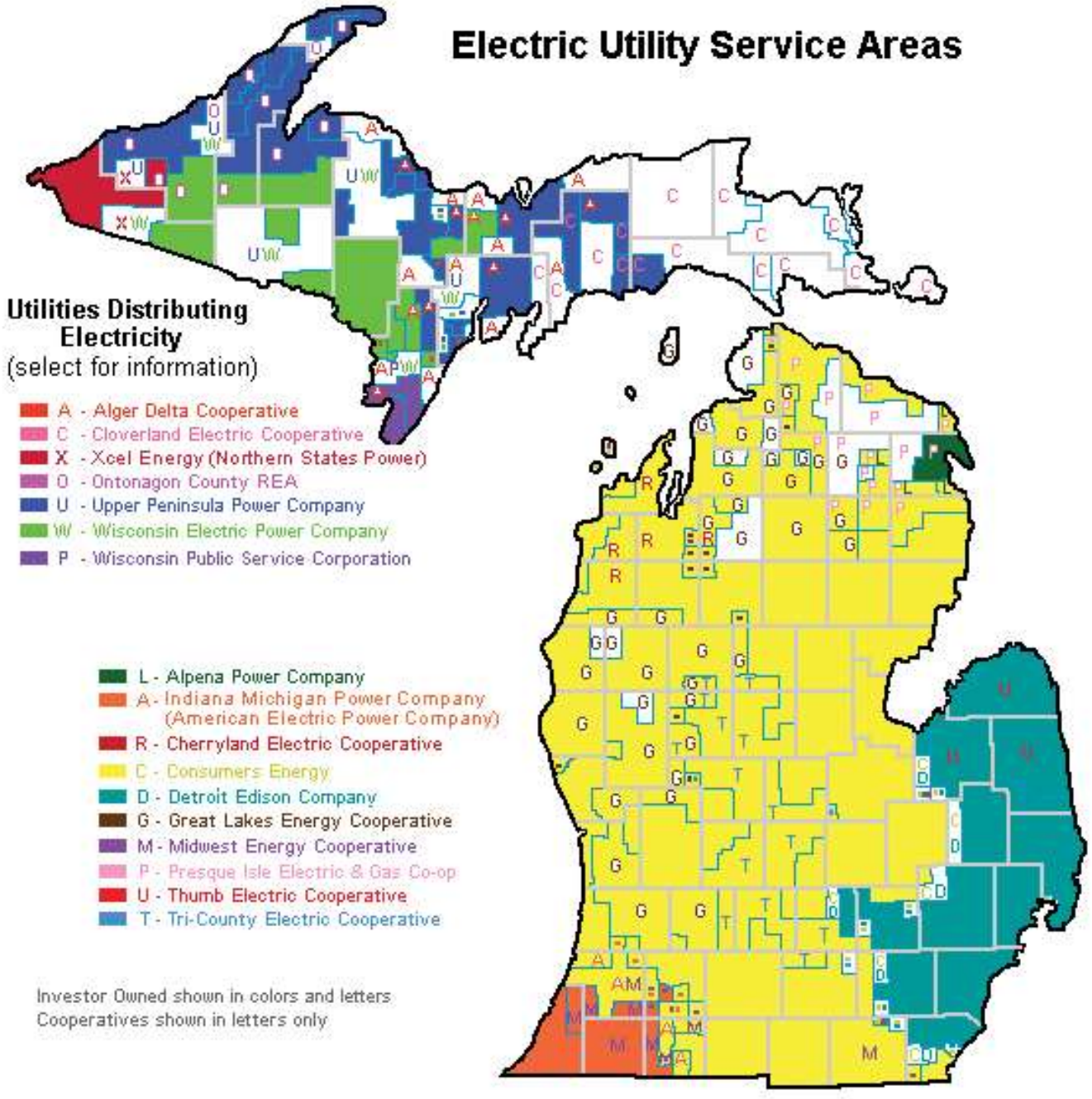

Figure 26 Utilities Distributing Electricity Map

Hazardous Material Incidents - Transportation

An uncontrolled release of hazardous materials during transport, capable of posing a risk to health, safety, property or the environment.

Hazard Description

As a result 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 communities. A transportation accident involving any one of those hazardous material shipments could cause a local emergency affecting many people.

Michigan has had numerous hazardous material transportation incidents that affected the immediate vicinity of an accident site or a small portion of the surrounding community. Those types of incidents, while problematic for the affected community, are fairly commonplace. They are effectively dealt with by local and state emergency responders and hazardous material response teams. Larger incidents, however, pose a whole new set of problems and concerns for the affected community. Large-scale or serious hazardous material transportation incidents that involve a widespread release of harmful material (or have the potential for such a release) can adversely impact the life safety and health and well-being of those in the immediate vicinity of the accident site, as well as those who come in contact with the spill or airborne plume. In addition, damage to property and the environment can be severe as well. Statistics show almost all hazardous material transportation incidents are the result of an accident or other human error. Rarely are they caused simply by mechanical failure of the carrying vessel.

Existing Prevention Programs

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 general 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.

4. Development of hazardous material safety training policies and programs.

The USDOT regulations specify the type and size of container that can be utilized for shipping each hazardous material, the label that must be on the container, the placards that must be shown on the carrying vessel, how much of the material can be shipped in one vessel, and in some cases, how the contents should be organized or loaded. Many hazardous materials are assigned a unique four-digit identification number that is located on the placard or container. In addition, the regulations also require a company involved with hazardous material transport to maintain a manifest which details what material is being transported and its quantity, a list of emergency contact numbers in case of an uncontrolled release, where the material is from, and its intended destination.

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 Grant [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.

Transportation Community Awareness and Emergency Response

Many industry groups are involved in an outreach program, coordinated by the Chemical Manufacturers association, called Transportation Community Awareness and Emergency Response (TRANSCAER). This program is a nationwide community outreach program that addresses community concerns about the transportation of hazardous materials through planning and cooperation. The program provides assistance to communities to develop and evaluate their emergency response plans for hazardous material transportation incidents. In Michigan, TRANSCAER activities and initiatives are coordinated by the Michigan Chemical Council.

Hazardous Material Response Training

The Emergency Management Division, Department of State Police, provides a wide array of hazardous material response training programs through the Michigan Hazardous Material

Training Center. The Center provides training courses for individuals and companies responsible for planning, inspection, response, mitigation, and cleanup activities involving hazardous materials. Specific subjects include:

1. Computer-aided management.
2. Hazardous material chemistry
3. Hazardous materials emergency response.
4. Hazardous waste worker compliance.
5. Incident management.
6. Hazardous materials monitoring/sampling.
7. Other specialized hazardous materials-related courses such as highway and rail cargo tanker handling, confined space entry, emergency medical services, and technical rescue.

Courses are conducted at the Center in Lansing and at various other locations throughout the state.

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 agri-chemical 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.

U.S. EPA Chemical Emergency Preparedness and Prevention Office

The U.S. Environmental Protection Agency's Chemical Emergency Preparedness and Prevention Office (CEPPO) provides leadership, advocacy and assistance to states, local governments, and private industry to:

1. Prevent and prepare for chemical emergencies.
2. Respond to environmental crisis.
3. Inform the public about chemical hazards that may be present in their community.

The CEPPO works closely with several Michigan state agencies to implement and coordinate a number of regulatory and non-regulatory programs designed to protect human health and the environment in Michigan from chemical accidents.

National Transportation Safety Board

The National Transportation Safety Board (NTSB) investigates all significant transportation accidents that occur in this country and issues safety recommendations to the transporter and government regulators aimed at preventing future accidents. (To date, four hazardous material transportation accidents in Michigan have resulted in an NTSB investigation. A fifth accident is currently under investigation.) The NTSB also publishes a list of "most wanted" safety improvements for all modes of transportation for nationwide implementation by appropriate entities. Although these safety improvement recommendations are not mandatory, and the NTSB has no regulatory or enforcement powers, it nonetheless has been successful in getting more than 80% of its recommendations adopted. Many safety features currently incorporated into the various hazardous material transportation vessels had their genesis in NTSB recommendations. The NTSB works directly with the USDOT on most hazardous material transportation accident issues.

Michigan Chemical Council

The Michigan Chemical Council is the primary trade association representing the chemical and allied industries in Michigan. As such, it works in partnership with the national Chemical Manufacturers Association, the Emergency Management Division, Department of State Police, and other agencies and local governments to provide educational and community outreach services in the area of chemical awareness and safety. The Council provides an important informational and coordination bridge between Michigan's chemical industries, federal, state and local regulatory agencies, and the public.

Chemical Awareness Week

Each spring, the Emergency Management Division, Department of State Police, in conjunction with several other state agencies, Local Emergency Planning Committees (LEPCs), and the Michigan Chemical Council, sponsors Chemical Awareness Week. This annual public information campaign focuses on:

1. The hazards associated with the manufacture, transport, storage, use and disposal of chemicals.
2. The programs and systems in place to protect the public from accidental chemical releases.
3. Community emergency response procedures for chemical accidents.

Informational materials on chemical hazards and safety are disseminated to schools, hospitals, nursing homes, other interested community groups and facilities, and the general public.

Hazardous Material Incidents: Transportation Overview

Although there have not been any significant hazardous materials transportation incidents in Ogemaw County, there have been many minor petroleum and hazardous materials spills throughout the years. Most major highways within the county are two lanes or interstates. These routes are heavily traveled in the summer months and often icy or impassible in the winter. Unless wise policies are followed, a serious hazardous materials incident could occur on one of our roadways or railways.

Structural Fires

Any instance of uncontrolled burning which results in structural damage to residential, commercial, industrial, institutional, or other properties in developed areas.

Hazard Description

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 United States. 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.

Ironically, while the United States has made great strides in reducing deaths and injuries caused by other types of disasters, structural fires are a worse problem in this country than in many other industrialized countries (even those with a more dense population pattern). The United States Centers for Disease Control (CDC) figures indicate that fire-associated mortality rates in the United States are approximately 2-3 times greater than those in many other developed countries.

Structural fires are a common occurrence in Ogemaw County. They are especially likely to happen in the winter, when wood stoves and substandard heating implements are used or when extreme temperatures cause otherwise adequate heating units to be overtaxed. Many communities in Ogemaw County have downtown areas consisting of buildings built in the 19th century with zero lot lines which pose a significant threat.

Existing Prevention Programs

Michigan Fire Prevention Act

The Michigan Fire Prevention Act (207 P.A. 1941), the State's primary fire enabling legislation, provides for the prevention of fires and the protection of persons and property

from exposure to the dangers of fire and explosion. The Act gives the State Fire Marshal (Michigan Department of State Police) and local fire chief's broad authority to take actions necessary to prevent fires and stop the spread of fires once they have started. This includes:

1. Requiring the razing, repair, alteration or improvement of buildings and premises that constitute fire hazards.
2. Controlling the use and occupancy of such buildings and premises.
3. Engaging in public education activities aimed at preventing or mitigating the effects of fire and explosion.

Michigan State Police, Fire Marshal Division

The Michigan Fire Fighters Training Council, housed within the Michigan State Police, performs a number of tasks aimed at developing, improving, and enhancing the training of fire fighters in Michigan. This includes, but is not limited to:

1. Developing standards for training and fire fighter selection
2. Establishing courses of study and instructor qualifications and certification.
3. Evaluating instructors and schools.
4. Assisting fire departments with training.

All of these functions contribute to structural fire mitigation by enhancing the skills of fire fighters in preventing and suppressing fires.

The Fire Marshal Division, in conjunction with local fire departments, conducts a number of other important fire-related initiatives, including:

1. Statewide public education programs aimed at preventing fires.
2. Investigating fires, explosions and hazardous material incidents.
3. Collecting, compiling and analyzing fire-related data (through the Michigan Fire Incident Reporting System) to determine fire frequency, causes, and impacts.

Michigan Department of Consumer and Industry Services, Office of Fire Safety

The Michigan Department of Consumer and Industry Services, 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.
4. Coordination of fire alarm and fire suppression system installation in regulated facilities.
5. The State Fire Safety Board, also housed within the Michigan Department of Consumer and Industry Services, 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.

National Fire Protection Association

Established in 1896, the National Fire Protection Association (NFPA) conducts research on fires and fire-related issues, develops codes and standards for fire prevention and protection, and disseminates fire safety information to fire departments and the public. The cornerstone of the NFPA's fire prevention activities is its consensus standards development system. The NFPA's consensus process involves over 5,000 volunteers from a wide range of professional backgrounds who serve on more than 200 technical committees, each reflecting a balance of affected interests. This consensus standards development system resulted in the creation of the National Fire Codes, 275 codes and standards covering all areas of fire safety. These codes are used throughout the world, and virtually every building and construction process in place today is affected, in one way or another, by the codes and standards developed through the NFPA system.

U.S. Fire Administration

Established by P.L. 93-498, the Federal Fire Prevention and Control Act of 1974, the U.S. Fire Administration (USFA) provides leadership, coordination and support for the nation's fire prevention and control, fire training and education, and emergency medical services activities. The USFA, a branch of the Federal Emergency Management Agency, conducts training for firefighters through the National Fire Academy (NFA), located in Emmitsburg, Maryland. Many Michigan firefighters have attended those training courses. In addition, the USFA administers a number of national fire programs aimed at fire prevention, with a particular emphasis on structural fire prevention. The USFA also supports the National Fire Incident Reporting System (NFIRS), administered and implemented in Michigan by the State Police Fire Marshal Division. The NFIRS provides the vehicle for collecting and analyzing information on fire frequency and causes, as well as deaths, injuries and property losses associated with fires. Over 900 local fire departments in Michigan participate in the NFIRS. The NFIRS data is used by the Fire Marshal Division and other state and local fire agencies to assess and combat the fire problem in Michigan.

Local Fire Service

Over 1,000 local fire departments and roughly 30-35,000 fire fighters constitute the bulk of Michigan's fire service forces. By and large, these local forces are either volunteers or paid part-time (approximately 50% paid part-time; 22% volunteer; 28% paid full-time). According to statistics from the State Police Fire Marshal Division, local fire departments in Michigan respond to a fire call, on average, every 1 ½ minutes, and to a structural fire call roughly every 26 minutes. In addition to fire suppression, local fire departments also conduct vitally important public education, code enforcement and fire investigation

activities within their respective communities. Local fire departments are the lifeblood of Michigan's fire prevention and suppression system.

Fire Safety Rules for Michigan Dormitories

Even before the Seton Hall University dormitory fire in January 2000, the State Fire Safety Board within the Michigan Department of Consumer and Industry Services 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 renovation. However, existing dormitories don't fall under the new rules and therefore do not have to be retrofitted unless they are being renovated.

Nature and Composition of Michigan Fire Service

The primary challenge facing the Fire Marshal Division, in particular, and the State of Michigan, in general, is the nature and composition of the Michigan fire service. The high proportion of fire fighters that are either volunteer or paid part-time presents significant challenges to sustaining adequate code enforcement and inspection efforts. In addition, the relatively high level of turnover within this group places additional demands on state and local training resources.

The lack of full-time professional fire fighters in many areas of the state means less time is available to conduct fire inspections and take other preventive measures necessary to lessen the structural fire threat. In many small towns and rural communities, local efforts in fire prevention are almost non-existent due to lack of personnel and time to devote to such activities. Out of necessity, efforts in these communities are directed at fire suppression. Clearly, the lack of full-time paid fire professionals in many areas across the state poses great challenges for maintaining a sustainable fire prevention and inspection program.

Lack of State Fire Safety Code

The other major challenge facing the Michigan fire service is the lack of a state-mandated fire safety code and code enforcement program. Currently, Michigan is one of a small handful of states in the country that does not have a mandated statewide fire safety code. Although the State enforces fire safety codes in schools, dormitories, health care facilities,

and correctional facilities, plus some businesses, the remainder of the job is left to local officials. Because there is not a uniform, mandated fire safety code, numerous different local ordinances have been promulgated. In some communities, fire safety codes do not exist at all. This contributes to Michigan's structural fire problem by allowing serious fire safety violations to be created and to go unchecked, often for years. This problem manifests itself more seriously in rural areas and small towns, which typically have few, if any, paid full-time fire fighters. Michigan's larger cities have full-time fire departments with qualified inspectors. As a result, fire safety inspections are performed on a more regular basis (but not necessarily as often as they should be).

Even if mandated fire safety codes were instituted statewide, it wouldn't totally solve the problem of structural fire prevention because the costs of compliance in existing buildings would often be prohibitive for many business owners. Such a measure would, however, help see that new construction doesn't compound the problem.

Oil/Gas Well Incidents

An uncontrolled release of oil or gas, or the poisonous by-product hydrogen sulfide, from wells.

Hazard Description

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.

The petroleum and natural gas industry is highly regulated and has a good safety record, but the threat of accidental releases, fires and explosions still exists. In addition to these hazards, 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 150ppm, 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

10ppm	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.

Existing Prevention Programs

Oil and Natural Gas Well Regulatory Authority

Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 451 P.A. 1994, as amended, regulates oil and natural gas well drilling in Michigan. Revisions to the statute in 1999 clarified the Supervisor's authority to address public health and safety issues. The Administrative Rules for Part 615 were most recently updated in September 1996. These Rules require classification of wells using the concept of radius of exposure (RoE). A simple formula is used to calculate the distance, in feet, from the point of release at which the H2S concentration in air reaches 100 ppm. This is the 100 ppm RoE. Wells with more than 300 ppm H2S in the gas stream are classified according to the 100 ppm RoE.

Contingency Planning

Contingency plans for public protection are required for wells at which the 100 ppm RoE is greater than 100 feet. The plans are divided into two parts. Part 1 contains general procedures that must be implemented by company personnel in an emergency when H2S is released. This includes emergency contacts and their assigned duties and responsibilities, notification and evacuation procedures for the general public, and procedures for igniting the well. Part II contains site-specific information and must be filed with the application for a drilling permit. Well owners have the option of working with the local Emergency Management Coordinator instead of preparing a required site map and list of residences. This option can be used in highly populated areas. Other H2S Administrative Rules address

special equipment requirements for drilling, testing and production of H2S-bearing wells. The Rules are intended to provide for public protection and nuisance odor mitigation.

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.

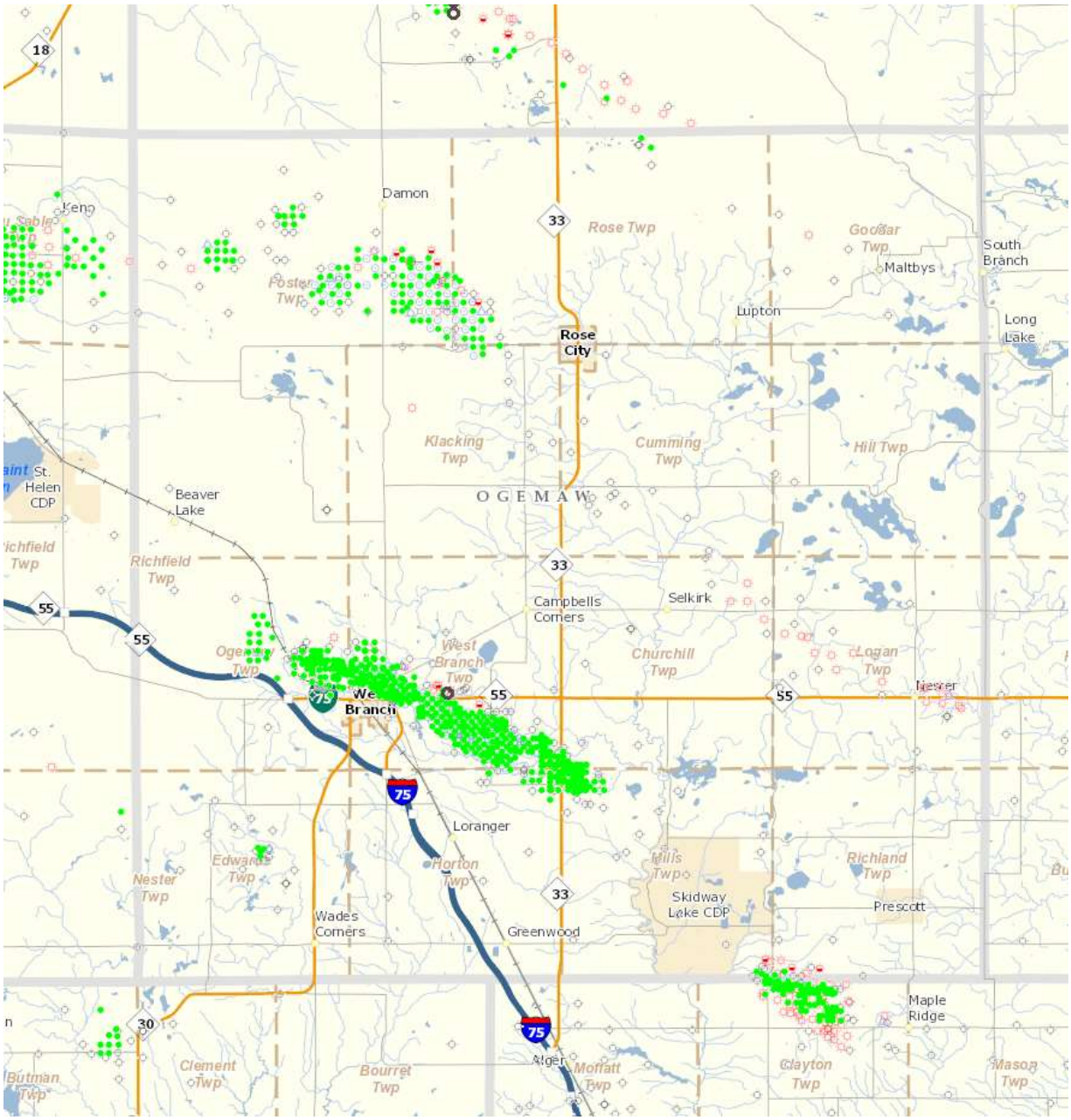

Figure 27 Oil and Gas Wells

Oil and Gas Well Accidents Overview

There are 1125 oil and natural gas wells in Ogemaw County along with 29.6 miles of gas pipeline. This is a relatively small quantity when compared with state leader, Otsego County, with over 5700 wells. Making planning and response difficult is the fact that a combination of organizations and individuals own the wells. As a general rule, most gas companies prefer to respond to incidents involving their wells, and in the vast majority of cases that is what happens. Because gas companies often have controlled burns, and deal

with wells on a daily basis, it is impossible to ascertain how many incidents have actually occurred in the county. However, there is still the possibility that an emergency response agency could be in the situation of responding to an incident at a gas well. Responders must understand the dangers associated with HS2 and must have a working knowledge of the wells that are in their areas of responsibility.

Dam Failures

The collapse or failure of an impoundment resulting in downstream flooding.

Hazard Description

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 may be the result of improper operation, lack of maintenance and repair, or vandalism. A common form of dam failure occurs when tree roots disrupt the integrity of an earthen dam. Water can pass through the dam where the soil has been broken apart by the roots. Such failures can be catastrophic because they occur unexpectedly with no time for evacuation.

In Michigan, all dams over 6 feet high that create an impoundment with a surface area of more than 5 acres are regulated by Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act (451 P.A. 1994), as amended. This statute requires the Michigan Department of Environmental Quality (DEQ) to rate each dam as either a low, significant, or high hazard potential. This rating system is based solely on the potential downstream impact if the dam were to fail and is not the physical condition of the dam.

The potential downstream impact is determined by assessing the population concentration and economic activities located downstream from the dam. Dams assigned the low hazard potential rating are those where failure or improper operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property. Dams assigned the significant hazard potential rating are those dams where failure or improper operation results in no probable loss of human life but can cause economic loss, environment damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with higher population and important infrastructure. Dams assigned the high hazard potential classification are those where failure or improper operation will probably cause loss of human life.

Dam owners are required to maintain an emergency action plan (EAP) for significant and high hazard potential dams. Owners are also required to coordinate with local emergency management officials to assure consistency with local emergency operations plans.

Existing Prevention Programs

Both the Michigan Department of Environmental Quality (DEQ) and the Federal Energy Regulatory Commission (FERC) classify and regulate dams in Michigan.

Michigan Department of Environmental Quality

The current Dam Safety Act was passed following a September 1986 flood in central Lower Michigan. During this event 11 dams failed and 19 others were threatened with failure, resulting in the evacuation of 1500 people from downstream of the dams. The Dam Safety Act is meant to ensure that dams are built and maintained with the necessary engineering and inspections for safety of the public and the environment.

The DEQ Dam Safety Program administers the provision of Part 307 and Part 315 of the Natural Resources and the Environmental Protection Act (451 P.A. 1994), as amended. Part 315, Dam Safety, provides for the inspection of dams. This statute requires the DEQ to rate each dam as either low, significant, or high hazard potential, according to the potential downstream impact if the dam were to fail. Dams over 6 feet in height that create an impoundment with a surface area of more than 5 acres are regulated by this statute. Statewide, the DEQ has identified and rated over 2,400 dams. Dam owners are required to maintain an emergency action plan (EAP) for significant and high hazard potential dams. Owners of these dams are also required to coordinate with local emergency management officials to assure consistency with local emergency operations plans. Approximately 240 dams in Michigan come under state regulations requiring EAPs.

Part 307 of The Natural Resources and Environmental Protection Act, (451 P.A. 1994), as amended regulates the construction and maintenance of dams specifically as they relate to inland lakes.

Potential Dam Hazards In Michigan (12/2010)

COUNTY	High Hazard	Significant Hazard	Total	COUNTY	High Hazard	Significant Hazard	Total
Alcona	1		**1**	Kalkaska	1		**1**
Alger	1		**1**	Kent	2	5	**7**
Allegan	7	2	**9**	Lake		2	**2**
Alpena	2	1	**3**	Lapeer	1	6	**7**
Antrim	2		**2**	Leelanau	2	1	**3**
Arenac		1	**1**	Lenawee	3	5	**8**
Baraga	2		**2**	Livingston	3	7	**10**
Barry		3	**3**	Macomb	2	1	**3**
Benzie		1	**1**	Manistee	2		**2**
Berrien	2	2	**4**	Marquette	9	7	**16**
Branch		1	**1**	Mason	2		**2**
Calhoun		3	**3**	Mecosta		4	**4**
Cass	2	1	**3**	Menominee	4	2	**6**
Charlevoix		3	**3**	Midland	4		**4**
Cheboygan	6	3	**9**	Missaukee		1	**1**
Chippewa		1	**1**	Monroe		2	**2**
Clare	3		**3**	Montcalm		2	**2**
Clinton		2	**2**	Montmorency		2	**2**
Delta	1	1	**2**	Muskegon	1	2	**3**
Dickinson	2	3	**5**	Newaygo	3	1	**4**
Eaton	3		**3**	Oakland	8	15	**23**
Emmet		1	**1**	Oceana	2	2	**4**
Genesee	3	7	**10**	**Ogemaw**		**3**	**3**
Gladwin	5	1	6	Ontonagon	2	2	**4**
Gogebic			**0**	Osceola		1	**1**
Grand Traverse	4	4	**8**	Oscoda	1		**1**
Gratiot		2	**2**	Ottawa	1	1	**2**
Hillsdale		5	**5**	Roscommon	1	3	4
Houghton		2	**2**	Saginaw	1		**1**
Ingham	1	1	**2**	St. Joseph	5	3	**8**
Ionia	1	1	**2**	Schoolcraft	1	1	**2**
Iosco	4	1	**5**	Shiawassee		2	**2**
Iron	3	2	**5**	Van Buren	1	1	**2**
Isabella	1	3	**4**	Washtenaw	8	6	**14**
Jackson	1	4	**5**	Wayne	8	1	**9**
Kalamazoo	5	5	10	Wexford		2	**2**

Source: Michigan Department of Environmental Quality, Land and Water Management Division

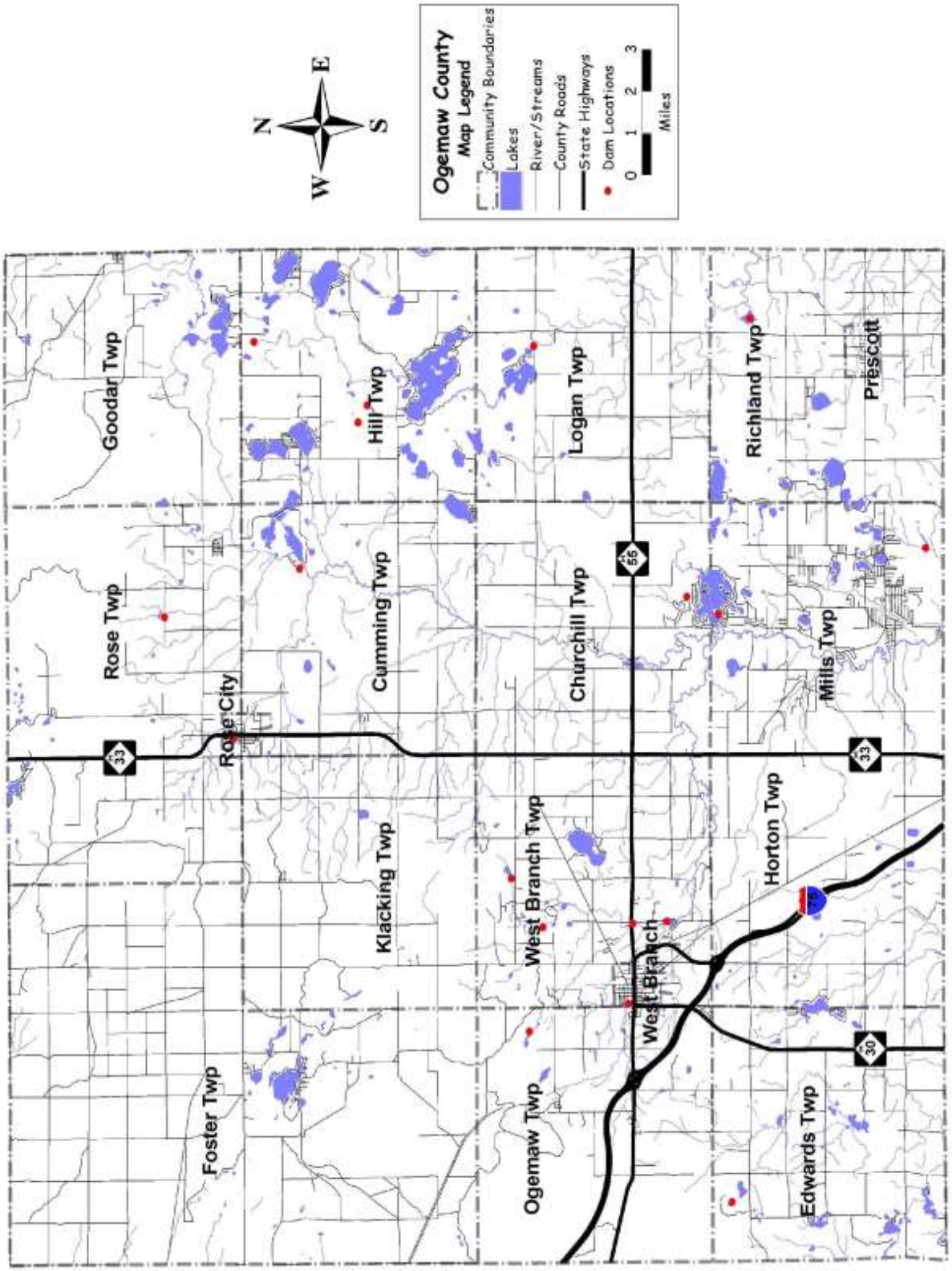

Figure 28 Ogemaw County Map

Dam Failure Flooding Overview

Ogemaw County has 3 dams rated as a significant hazard. There are concerns in the county about the dams on Lake Ogemaw and Flowage Lake.

Sabotage/Terrorism

Sabotage/terrorism is an intentional, unlawful use of force or violence 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 can take many forms or have many vehicles for delivery including: 1) bombings; 2) assassinations; 3) organized extortion; 4) use of nuclear, chemical, radiological, and biological weapons; 5) information warfare; 6) ethnic/religious/gender intimidation (hate crimes); 7) state and local militia groups that advocate overthrowing the U.S. Government; 8) eco-extremism, designed to destroy or disrupt specific research or resource-related activities; and 9) widespread and organized narcotics smuggling and distribution organizations. Because sabotage/terrorism objectives are widely varied, so too are the potential targets of such actions. Virtually any public facility or infrastructure, or place of private or public assembly, can be considered a potential target. In addition, certain types of businesses engaged in controversial activities are also potential targets, as are large computer systems operated by government agencies, banks, financial institutions, large businesses, health care facilities, and colleges/universities.

One of the first acts of domestic sabotage/terrorism ever carried out occurred in Michigan was on May 18, 1927 in Bath. A disgruntled taxpayer and farmer detonated 1,000 pounds of explosives under the newly constructed Bath Consolidated School killing 38 students and 3 teachers and injuring 58 others. The perpetrator then blew himself up, along with the school superintendent. As tragic as that event was, it could have been worse were it not for the fact that half of the explosives failed to detonate as planned. Activities to prevent terrorist activities have become even important and in the wake of the 9/11 events of destruction in New York City and Washington D.C. Many more resources may be mobilized to prevent terrorist activities in the future.

Although at first it might appear Ogemaw County is an unlikely target for terrorism, it cannot be totally discounted. Potential targets include the water treatment plant, the runways at the airports, and all industrial sites in the area. Furthermore, any government building, school, individual, or group of individuals can become a target of domestic terrorism.

Transportation Accidents: Air, Land, and Water

A crash or accident involving an air, land or water-based commercial passenger carrier resulting in death or serious injury.

Hazard Description

Air Transportation Accidents

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.
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.
5. Providing crash site security, crowd and traffic control, and protection of evidence.

Land Transportation Accidents

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, a bus slipping off a roadway in inclement weather or colliding with another vehicle causes bus accidents. 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 minimal. Bus accidents, on the other hand, can be quite serious – especially if the bus has tipped over. Numerous injuries are possible in these types of situations.

Existing Prevention Programs

Air Transportation

The Michigan Aeronautics Commission of the Michigan Department of Transportation 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.
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 Michigan Department of Transportation 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).

Land Transportation

School bus safety programs and initiatives generally fall into two categories:

1. Driver skill and competency training.
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 a 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.

Local transit and intercity bus safety falls under the purview of the Michigan Department of Transportation's Bureau of Urban and Public Transportation. Generally, the issue of intercity and transit bus safety is handled on a partnership basis with the service providers, with MDOT providing oversight of the initiatives undertaken by the providers to ensure mechanical and operational safety.

The Michigan Department of Transportation is the state regulatory agency for railroad-highway grade crossing safety issues. In this role, MDOT conducts biennial, on-site crossing reviews for Michigan's 5,535 public crossings and reports observed crossing maintenance deficiencies to the responsible railroad or roadway authority. In addition, MDOT conducts diagnostic study team reviews at selected crossings to determine whether the current level of warning devices require enhancement. At the present time, 42% of Michigan's public crossings have automatic side-of-street flashing light signals and 16% have automatic gates.

In January 2001 an amendment (367 P.A. 2000) to the Michigan Vehicle Code went into effect allowing the MSP, MDOT, or specified local officials to install video cameras at railroad crossings to serve as a deterrent to motorists who might attempt to go around or through activated railroad crossing lights and gates. Although the ultimate purpose of this law is to reduce pedestrian and vehicular deaths and injuries at railroad crossings, the law will also likely reduce passenger train accidents caused by collisions with vehicles on the tracks, a major cause of many passenger train derailments.

Michigan's "Operation Lifesaver" Coalition part of a national, non-profit education and awareness program dedicated to ending tragic collisions, fatalities and injuries at highway-rail grade crossings and on railroad rights of way has helped reduce the number of serious crashes at railroad crossing in the state. The Operation Lifesaver coalition in Michigan is spearheaded by the MSP and MDOT and is comprised of state and local government officials, law enforcement, and employees of the railroad companies operating in Michigan. The Operation Lifesaver program emphasizes education and enforcement and its efforts appear to be working. Since 1996, the number of crashes, injuries, and fatalities at railroad crossing in Michigan has shown a steady decline.

Another MDOT program that helps improve rail safety is the Michigan Rail Loan Assistance Program. Established under Act 117, P.A. 1997, this program was initiated to help finance capital improvements on Michigan's rail infrastructure. Although the program is designed primarily to help preserve and improve rail freight service, any improvements made to the rail infrastructure that serves passenger rail service can only help improve passenger rail safety. Track rehabilitation is one of the eligible projects that can be funded under this program; the safety value of a project is one of the primary selection criteria.

National Transportation Safety Board

The National Transportation Safety Board is an independent federal agency responsible for promoting aviation, highway, railroad, marine, pipeline, and hazardous materials transportation safety. The NTSB is mandated to investigate significant transportation accidents, determine the probable cause of such accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB publicizes its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews. Although the NTSV has no regulatory or enforcement powers, it has nonetheless been successful in seeing the adoption and implementation of over 80% of its recommendations from transportation accident investigations.

Petroleum and Natural Gas Pipeline Accidents

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

Hazard Description

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. The remaining 75% is imported by five interstate pipeline companies that have access to the major natural gas producing regions in North America. Michigan cycles more natural gas through its storage system than any other state. Michigan ranks 11th in the nation in production of natural gas, and ranks 6th in consumption at 937.2 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. Michigan's gas and petroleum networks are highly developed and extensive, representing every sector of the two industries from wells and production facilities to cross-country transmission pipelines, that bring the products to market, to storage facilities, and finally to local distribution systems.

The petroleum and natural gas industries have historically had a good safety record and pipelines are by far the safest form of transportation for these products, but the threat of fires, explosions, ruptures, and spills nevertheless exists. In addition to these hazards, there is the danger of hydrogen sulfide (H2S) release. These dangers (explained in the Oil and Natural Gas Well Accidents section) can be found around oil and gas wells, pipeline terminals, storage facilities, and transportation facilities where the gas or oil has a high sulfur content.

Figure 29 Gas Transmission Lines in Ogemaw County
(Blue = DTE; Orange = Consumers Energy)

Figure 30 Michigan Oil Pipe Line Map

Existing Prevention Programs

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 Michigan Public Service Commission (MPSC) Gas Safety Office.
2. The U.S. Department of Transportation/Office of Pipeline Safety (USDOT/OPS) in Kansas City, Missouri.
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 Natural Gas	State of Michigan/ MPSC	Michigan Gas Safety Standards	MPSC Gas Safety
Liquid Petroleum	USDOT/OPS	49 CFR Parts 193/195	USDOT/OPS
Gathering Lines*	MDEQ/GSD	Oil/Gas Administrative Rules under Part 615, 1994 P.A. 451	MDEQ/GSD

*Note: Gathering lines run from a production facility (i.e. well) to pre-processing plant (i.e., dehydration facility, separator, and compression station).

The issue of gathering line jurisdiction is even more complex. Gathering lines in non-rural areas fall under the jurisdiction of the Michigan Gas Safety Standards. Gathering lines that serve as common carriers fall under the jurisdiction of the MPSC, but may not necessarily fall under the Michigan Gas Safety Standards. All other gathering lines fall under the jurisdiction of the MDEQ/GSD.

Michigan Gas Safety Standards

Pipeline operators are regulated under the Michigan Gas Safety Standards Act, 165 P.A. 1969 and associated Administrative Rules (known as the Michigan Gas Safety Standards), to ensure public safety is protected to the extent possible in the transportation of gas by pipeline. Under the Standards (which are administered by the MPSC), gas pipeline companies (operators) must develop and maintain written procedures to minimize the hazard resulting from a gas pipeline emergency. The procedures must provide for the following:

1. Identification and classification of events.
2. Notification of and communication with local response agencies and public officials.
3. Response to all types of gas emergencies, including emergency shutdown and pressure reduction procedures.

4. Coordination of response actions with the local jurisdiction(s).
5. Restoration of service.

Operators must also ensure that personnel are properly trained and knowledgeable concerning emergency procedures. If an incident occurs, the operator must review response actions to determine if procedures were followed, and if necessary, take samples of the failed facility or equipment for laboratory examination to determine the cause of the failure. Mitigative actions are taken as necessary to minimize the possibility of a recurrence.

MPSC Pipeline Safety Inspections

Safety engineers from the MPSC are certified by the USDOT/OPS to conduct inspections on gas and petroleum 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 or petroleum 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. It does an excellent job of minimizing pipeline and utility line accidents.

U.S. Department of Transportation, Office of Pipeline Safety

Federal pipeline safety requirements are contained in the Federal Safety Standards (Parts 191, 192, 193 and 195), as administered by the USDOT/OPS. Interstate gas and liquid petroleum pipeline operators must develop and maintain written emergency procedures similar to those required under the Michigan Gas Safety Standards. In addition, they are required to coordinate both planned and actual response actions with local officials and response agencies. Part 195 also has a continuing education requirement to keep local officials and the general public informed about the risks associated with the transportation of hazardous liquids via pipeline.

National Transportation Safety Board

The National Transportation Safety Board (NTSB) investigates all significant pipeline accidents that occur in this country and issues safety recommendations to the pipeline company and government regulators aimed at preventing future accidents. (To date, only

the August 2, 1975 pipeline accident in Romulus has resulted in an NTSB pipeline investigation in Michigan.) The NTSB also publishes a list of "most wanted" safety improvements for pipelines and other modes of transportation for nationwide implementation by appropriate entities. Although these safety improvement recommendations are not mandatory, and the NTSB has no regulatory or enforcement powers, it nonetheless has been successful in getting more than 80% of its recommendations adopted. Many safety features currently incorporated into pipelines and other transportation modes had their genesis in NTSB recommendations.

Local Emergency Capability

Communities that may be affected by petroleum or natural gas emergencies should have adequate procedures in their Emergency Operations Plans to address the unique problems associated with this hazard, including specific functions such as rescue and evacuation. Affected communities must 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.

Civil Disturbance

A civil disturbance is 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 the result of one or more of the following events: 1) labor disputes where there is a high degree of animosity between the two dissenting 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; or 6) a perceived unjust death or injury to a person or persons of concern to a particular segment of society.

Areas subject to civil disturbances may encompass large portions of a community. Types of facilities that may be subject to or adversely impacted by civil disturbances may include government buildings, military bases, community colleges, businesses, and critical service facilities such as our hospital, police and fire facilities. Civil disturbances (including jail uprisings) often require the involvement of multiple community agencies to respond to, and to recover from, the incident.

Riverine Flooding

The overflowing of rivers, streams, drains and lakes due to excessive rainfall, rapid snowmelt or ice. The meeting participants stated that there has been history of riverine flooding of the Rifle River and its tributaries in the county.

Hazard Description

Flooding of land adjoining the normal course of a stream or river has been a natural occurrence since the beginning of time. If these floodplain areas were still in their natural states, 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, and broken sewer lines causing water supply pollution, downed power lines, broken gas lines, fires, and the release of hazardous materials.

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. 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 flow into the lowest elevations surrounding a water course. This type of flooding is becoming increasingly prevalent in Michigan, as development outpaces the ability of the drainage infrastructure to carry and disburse the water flow properly. Flooding also occurs due to combined storm and sanitary sewers that cannot handle the flow of water that often accompanies storm events, the result of which is water backing into basements with damage to mechanical systems and the possibility of creating serious public health and safety problems.

Ice Jams

Cold winters, such as those those we experience in Ogemaw County, can produce thick river ice and the potential for ice jams. An ice jam develops when pieces of snow and ice buildup along and in a river. As the ice buildup increases, water slows and flooding develops behind the dam of ice. Water levels can also rise rapidly when temperatures rise and result in snowmelt runoff or rain, thus adding more water to the river behind an ice jam.

In the spring, or when temperatures rise, the ice buildup will thaw and break up and may unleash all of the damned up water in a short period of time. When this occurs, flooding can rapidly result downstream from the ice jam. The combination of ice, debris, and water

released from the ice jam can cause tremendous physical damage to homes, docks, and other structures.

Existing Prevention Programs

National Weather Service Doppler Radar

The National Weather Service 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 – including weather events that can lead to riverine flooding. Most important, the lead-time and specificity of warnings for severe weather have improved significantly.

National Weather Service Watches/Warnings

The National Weather Service issues flood watches and flood warnings when conditions are right for flooding. A flood watch indicates meteorological conditions are conducive to flooding. People in the watch area are instructed to stay tuned to local radio or television stations for updates on flooding and weather conditions. When flooding is imminent, a flood warning is issued. The warning will identify the anticipated time, level and duration of flooding. Persons in areas that will be flooded are instructed to take appropriate protective actions, up to and including evacuation of family members and removal or elevation of valuable personal property.

State and local government agencies are warned of flood watches and warnings by 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 NWS stations in Michigan transmit information directly to radio and television stations, which in turn pass the warning on to the public. The NWS also provides detailed warning information on the Internet, through the Interactive Weather Information Network (IWIN) and “weather.gov”.

Severe Weather Awareness Week

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

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 new developments for residential purposes and occupancy, within or affected by the floodplain. Restrictive deed covenants are filed with the final plat which stipulate 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 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 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, manage, 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 serves 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.

The Drain Code, 40 P.A. 1956, as amended.

The Drain Code of 1956, commonly known as Act 40, establishes laws relating to the laying out and consolidation of drainage districts, and the maintenance of drains, sewers, pumping equipment, bridges, culverts, fords, and other structures and mechanical devices to ensure that the drains function properly. The Drain Code also provides for the development of flood control and water management projects, the creation of water management districts and sub districts, and for flood control and drainage projects within drainage districts. As a means to obtain funding for drain and water management projects, this Act provides for the assessment and collection of taxes, the investment of funds, and the deposit of funds for future maintenance of drains. Also, it authorizes public corporations to impose taxes for the payment of assessments in anticipation of which bonds are issued, provides for the issuance of bonds by drainage districts and for the pledge of the full faith and credit of counties for payment of the bonds; it authorizes counties to impose taxes when necessary to pay principal and interest on bonds for which full faith and credit is pledged, validates certain acts and bonds, and prescribes penalties.

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 which 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.

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

The Michigan Manufactured 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.

National Flood Insurance Program

For many years, the response to reducing flood damages followed a structural approach of building dams and 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.

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 floodplain 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).
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 or 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.

Flood Mitigation Assistance Program

With the passage of the National Flood Insurance Reform Act of 1994, Congress authorized the establishment of a federal grant program to provide financial assistance to states and local communities for flood mitigation planning and activities. The Federal Emergency Management Agency (FEMA) has designated this the Flood Mitigation Assistance Program (FMAP). The FMAP funds can be used to fund activities that reduce the risk of flood damage to structures insurable under the National Flood Insurance Program. The FMAP is state-administered (jointly by the department of State Police and the Department of Environmental Quality) and cost-shared on a 75% federal, 25% local basis.

Three types of FMAP grants are available:

1. Planning grants to assist local communities in developing flood mitigation plans.
2. Project grants to fund eligible flood mitigation projects, with emphasis on repetitively or substantially-damaged structures insured under the NFIP.

3. Technical assistance grants to assist the State in providing technical assistance to applicants in applying for the program or implementing approved projects.

Flood Management and Mitigation Education

The Land and Water Management Division, Department of Environmental Quality, has developed two guidance documents aimed at local officials involved in floodplain management and flood hazard mitigation. These guidebooks are used as textbooks in training workshops and as a reference for day-to-day activities.

The Emergency Management Division of the Michigan State Police, has developed a local hazard mitigation planning handbook for local officials. This guidance document provides an overview of a planning process that communities can follow to help reduce their vulnerability to a wide array of natural, technological and human-made hazards – including riverine flooding.

Both the Land and Management Division and Emergency Management Division regularly conduct floodplain management and flood hazard mitigation training courses and workshops for state and local officials. The Land and Water Management Division also conducts regular community assistance contacts and visits as part of its administrative duties under the National Flood Insurance Program. Such contacts and visits are a form of training aimed at improving a community's implementation of floodplain management practices. In addition, the Land and Water Management Division continuously conducts flood hazard workshops for lenders, realtors, building officials, engineers, citizens and any other interested parties.

Road Infrastructure Flood Mitigation Committee

Following the September, 1986 floods, the Michigan Department of Transportation (MDOT) formed a flood mitigation committee to determine ways to lessen damage to road infrastructure caused by riverine flooding. The committee consisted of representatives from the County Road Association of Michigan, the Federal Highway Administration, the Department of Environmental Quality, and MDOT. One of the primary purposes of the committee was to identify reasons for failed stream crossings and damaged roads during a flood event and to make recommendations for achieving more flood-resistant stream crossings. The committee published its findings and recommendations in a report that is used today as a reference guide for officials involved in road infrastructure design and maintenance.

As a result of one of the committee's recommendations, the Department of Environmental Quality regularly sponsors workshops and seminars on stream crossing design and erosion control practices. These workshops are geared toward design engineers at the state, county and local levels, in addition to private consultants and county drain commissioners.

State and Federally-Assisted Relocation of Flood prone Properties

The State of Michigan has been very pro-active in its initiation and participation in the acquisition and relocation of flood prone properties, in both pre- and post- disaster situations. Typically, properties are purchased by the local unit of government using federal Hazard Mitigation Grant Program (HMGP) and Flood Mitigation Assistance Program funds. In Michigan, the HMGP is administered by the Michigan Department of State Police Emergency Management Division.

Other State and Federally-Assisted Flood Hazard Mitigation Projects

The State of Michigan has used a variety of federal funding sources to assist in the implementation of flood hazard mitigation projects. Those funding sources have included:

1. The Hazard Mitigation Grant Program (HMGP).
2. The Flood Mitigation Assistance Program (FMAP).
3. The Public Assistance Grant Program (PAGP).
4. The Individual and Family Grant Program (IFGP).
5. Community Development Block Grants (CDBG).
6. Farmers Home Administration (FmHA) loans.

State and local funds have also been used to match the federal sources of funding.

Extreme Temperatures

Prolonged periods of very high or very low temperatures, often accompanied by exacerbating conditions such as high humidity and lack of rain, or heavy snowfall and high winds. Extreme temperatures – whether it is extreme heat or extreme cold – share a commonality in that they both primarily affect the most vulnerable segments of society such as the elderly, impoverished individuals, and people in poor health. The major threats of extreme heat are heatstroke (a major medical emergency), and heat exhaustion. Extreme heat is a more serious problem in urban areas, where the combined effects of high temperature and high humidity are more intense. The major threats of extreme cold are hypothermia (also a major medical emergency) and frostbite. Michigan is subject to both temperature extremes.

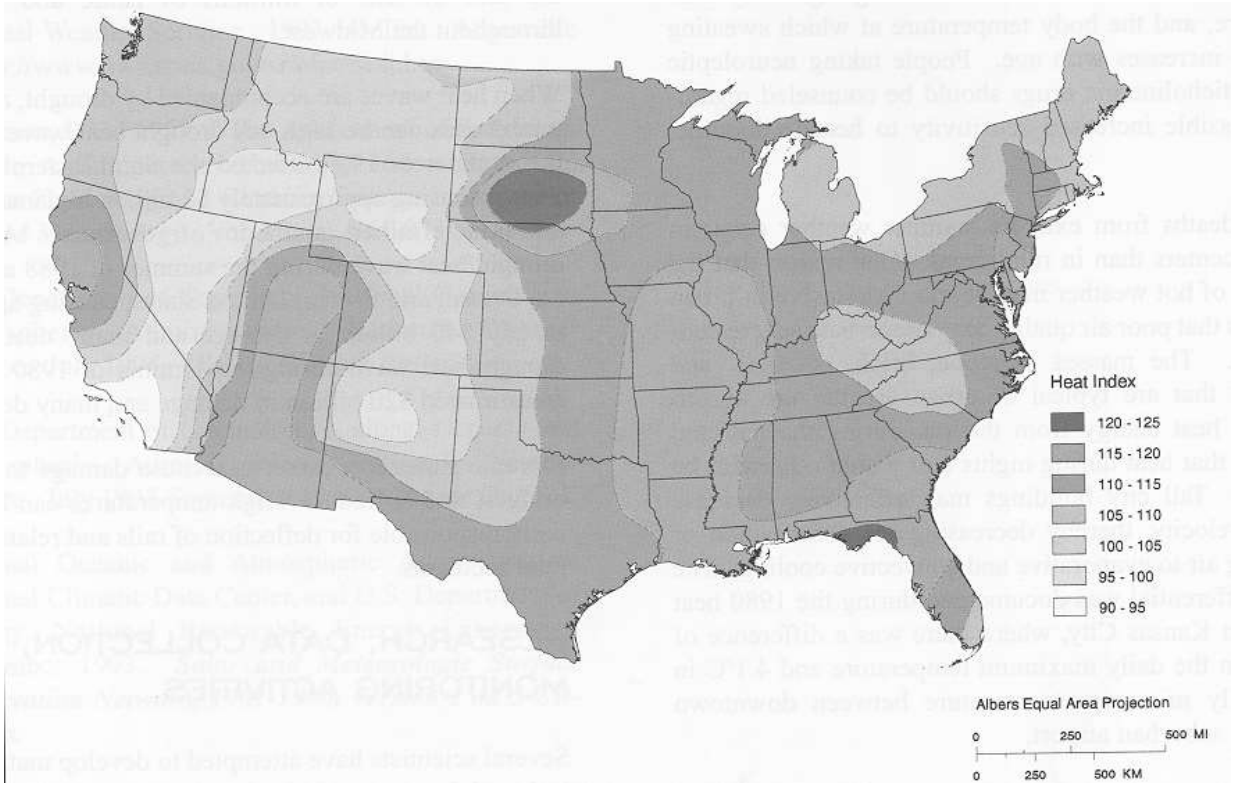

Figure 31 Heat Index

Ogemaw County is susceptible to both extreme heat and extreme cold. The temperate climate of southern Michigan, combined with the effects of Lake Huron, make for extreme deviations in temperature. 50-degree swings in the temperature in a 24 hour period are not uncommon.

Extreme Temperatures in Ogemaw County

Locations that are not specified in the Location and County category are larger and on a bigger scale than Ogemaw County.

0 EXTREME TEMPERATURE event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**. Source: National Climatic Data Center

Drought

Drought is a water shortage caused by a deficiency of rainfall, generally lasting for an extended period of time.

Hazard Description

Drought is the consequence of a reduction in the amount of precipitation that was expected over an extended period of time, 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.

A drought can cause severe hardships for communities and regions. Probably one of the most common and severe impacts to a community like Ogemaw County would be the threat of wildfires as 53 percent of the County is forested. Also there would be a drop in the quantity and quality of agricultural crops. Other negative impacts that can be attributed to a drought include water shortages for human consumption, industrial, business and agricultural uses, recreation and navigation, declines in water quality in lakes, streams and other natural bodies of water, malnourishment of wildlife and livestock, increases in fires and wildfire related losses of timber, homes, and other property, increases in wind erosion, and declines in tourism in areas dependent on water-related activities.

These direct impacts can further result in indirect impacts to a community, such as reduced revenue due to income losses in agriculture, retail, tourism and other economic sectors; declines in land values due to physical damage from the drought conditions and decreased functional use of the property, and possible loss of human life due to extreme heat, fire, and other heat-related problems.

Two common measurement tools of dry weather conditions are the Palmer Drought Indices (including the Palmer Drought Severity Index and the Palmer Hydrological Drought Index) and the Crop Moisture Index. The Palmer Drought Severity Index is a good long-term drought monitoring tool. It is a monthly index that indicates the severity of a wet or dry spell. This index is based on average temperature and rainfall information for a particular location in a formula to determine dryness. It uses a value of 0 for the normal amount of rainfall in a particular location, and drought is shown in terms of negative numbers, for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought. Any value above 0 demonstrates that there has been above normal amounts of precipitation. This index can be used for indicating lake levels and surface water supply abnormalities, but it is not good for monitoring climatic impacts on vegetation, especially crops.

The Crop Moisture Index (CMI) evaluates short-term moisture conditions across crop producing regions. The CMI measures how much moisture is in the plant root zone of the soil. This index is based on the mean temperature and total precipitation that occurs each week, as well as the CMI from the previous week. The CMI changes as quickly as the weather changes. A heavy rainstorm can dramatically change the CMI for a region. Since this index changes so quickly and in response to a single weather event, the CMI is not considered a good long-term drought measurement tool.

Droughts/Drought Related Events in Ogemaw County

0 DROUGHT event(s) were reported in **Ogemaw County, Michigan** between **01/01/1950** and **06/30/2015**. Source: National Climatic Data Center

Existing Prevention Programs

National Drought Policy Act and Commission

Currently, no single federal or state agency monitors drought. Rather, a number of agencies have programs and initiatives in place designed to identify, monitor, analyze, and respond to drought. Recognizing the need for a nationwide, coordinated drought policy designed to prepare for and respond to drought emergencies, Congress enacted in 1998 the National Drought Policy Act (P.L. 105-199), which established the National Drought Policy Commission. The Commission is composed of fifteen members - representative of all levels of government and other drought impacted groups – and is charged by Congress to provide advice and recommendations on the creation of an integrated, coordinated Federal policy for drought emergencies. On May 17, 2000, the Commission provided its findings and recommendations to Congress and published the report "Preparing for Drought in the 21st Century". The Report outlines a national drought policy statement developed by the Commission with preparedness as its foundation. The Report establishes five broad goals and a number of specific recommendations under each. The Commission intends to achieve the goals in the coming years through a combination of legislation, planning, coordination of programs, public/private collaborative partnerships, and public education.

U.S. Army Corp of Engineers

The U.S. Army Corp of Engineers (USACE) Institute for Water Resources developed and maintains the National Drought Atlas, which provides information on the magnitude and frequency of minimum precipitation and stream flow in the United States (two important indices of drought).

U.S. Geological Survey

The U.S. Geological Survey (USGS) is the primary federal agency that collects and analyzes streamflow data, another good index of the relative severity of drought. The USGS Hydro-Climatic Data Network is composed of 1,659 streamflow stations in all 50 states and U.S. Territories. These stations have recorded streamflows for 20 years or more. The USGS, in cooperation with over 600 other government agencies, operates some 7,300 stream gauges for data collection. In addition to streamflow data, the USGS collects data on water quality, reservoir levels and contents, and groundwater levels for each state. For Michigan, this data can be found in the annual Water Source for Michigan document.

National Weather Service

The National Weather Service (NWS) is the primary Federal agency that collects and publishes precipitation data. The NWS publishes data from approximately 9,100 non-recording and 2,100 recording stations in the United States. This data is published monthly, by state, in the Climatological Data and Hourly Precipitation Data. A drop from normal precipitation levels is a commonly-used index to determine drought severity.

U.S. Department of Agriculture

The U.S. Department of Agriculture (USDA) has a variety of programs designed to provide federal assistance to farmers and other agricultural enterprises that have suffered a loss due to a natural disaster – including drought. Some assistance programs require that either the President of the United States or Secretary of Agriculture make a disaster declaration before assistance is made available. The USDA Farm Service Agency (FSA) can provide emergency loans to farmers, ranchers, and agriculture operators under one or more of the following programs:

- The Emergency Conservation Program (ECP)
  The ECP shares with agricultural producers the cost of rehabilitating eligible farmlands damaged by natural disaster. During severe drought, ECP also provides emergency water assistance, both for livestock and for existing irrigation systems for orchards and vineyards. ECP assistance may be made available without a Presidential or Secretarial emergency disaster designation.
- Emergency Loan Assistance (EM)
  Low interest EM loan assistance is provided to eligible farmers to help cover production and physical losses in counties declared a disaster by the President or designated by the Secretary of Agriculture. The FSA Administrator may also authorize EM loan assistance to cover physical losses.
- Emergency Haying and Grazing Assistance
  Emergency haying and grazing of certain Conservation Reserve Program acreage may be made available in areas suffering from weather-related disaster. Requests for assistance are granted on a county-by-county basis. If approved, harvesting of hay and/or livestock grazing is allowed on cropland that has been removed from production in annual crop programs.

In some instances, farmers affected by disaster in counties contiguous to areas that have received a Presidential disaster declaration, or those that have been specifically designated in a Secretary of Agriculture Disaster declaration, may also qualify for assistance.

In addition to the FSA, the USDA Natural Resources Conservation Service (NRCS) can also provide technical and financial assistance to farmers and agriculture operators for land and water conservation-related efforts aimed at recovering from the adverse impacts of drought and other natural disasters.

National Drought Mitigation Center

The National Drought Mitigation Center (NDMC), located at the University of Nebraska-Lincoln, is a major research and information center with the mission to help people and institutions in the United States develop and implement measures to reduce communities' vulnerability to drought. The NDMC, through its various programs and initiatives, stresses prevention and risk management rather than crisis management. The NDMC builds on the work of the International Drought Information Center (IDIC), also at the University of Nebraska-Lincoln, which takes a worldwide perspective in its research and mitigation work related to the hazard of drought. The NDMC and IDIC are both clearinghouses for drought-related research studies, policy and planning assistance, training and educational initiatives, and information sharing. These organizations are the worldwide coordinating points for drought-related programs and initiatives.

State of Michigan

In Michigan, drought identification and monitoring is a multi-agency collaborative effort that may involve the departments of Agriculture, Environmental Quality, Natural Resources, Community Health, and State Police Emergency Management Division. When a drought occurs in Michigan, other agencies, such as the Office of Services to the Aging and the Family Independence Agency, may also become involved to monitor the impact of the drought conditions on individuals and families. Depending on the nature and extent of the situation, a state-level task force may be set up to promote cooperation, coordination, and good information flow among participating agencies. In extreme cases, the State Emergency Operations Center may be activated and staffed for the duration of the event.

Drought Overview

Because Ogemaw County consists of 60% forests, the biggest problem drought presents is the increased threat of wildfire. A drought impacted landscape could quickly turn a small fire into a raging out of control blaze. Wildfires could destroy homes, businesses, and other property located in the County's rural residential areas.

A drought could also impact the agricultural areas of the County. A drought could alter the quantity and quality of crops, livestock and other agricultural activities, resulting in severe economic and social hardships throughout the County.

Public Health Emergencies

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

Hazard Description

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 among others. 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 affect, or have the potential to adversely affect, a large number of people. Public health emergencies can be statewide, regional, or localized in scope and magnitude.

Perhaps the greatest emerging public health threat would be the intentional release of a radiological, chemical or biological agent with the potential to adversely affect a large number of people. Such a release could be an act of sabotage aimed at the government or a specific organization or segment of the population. Fortunately, Michigan has not experienced such a release aimed at mass destruction. However, Michigan has experienced hoaxes and it is probable that an actual incident of that nature or magnitude will occur.

The following information describes some of the more common or serious pathogenic illnesses that possibly could develop into a public health emergency in Ogemaw County.

Food-borne Illness

There are approximately 250 known food-borne illnesses. They can be caused by many different bacteria, viruses, parasites, and natural or man-made chemicals. People contract these agents by the ingestion of contaminated food with, or without, subsequent spread from person to person by the fecal-oral route. Below are just a few of the more common food-borne illnesses that have the potential to result in a wide-spread outbreak.

Salmonellas

Salmonellas is a bacterial infection from the Salmonella bacteria. The Salmonella germ is actually a group of bacteria that can cause diarrhea illnesses in humans. Every year, approximately 40,000 cases of salmonellas are reported in the United States. Because many mild cases are not diagnosed or reported, the actual number of infections may be much greater. National medical costs and lost wages associated with this illness have been estimated to be $1 billion per year.

Salmonellas is more common in the summer than winter. Children are the most likely to get salmonellas, and young children, the elderly, and the immune-compromised are the most likely to have severe infections. It is estimated that approximately 1,000 people die each year from acute salmonellas. Most people infected with Salmonella develop diarrhea, fever, and abdominal cramps within 12 to 72 hours after ingestion of contaminated matter.

The illness usually lasts 4 to 7 days, and most people recover without treatment. However, for some people the diarrhea may be so severe that the patient must be hospitalized. In these patients, the Salmonella infection may spread from the intestines to the blood stream, and then to other parts of the body and can cause death unless the person is treated promptly with antibiotics.

Salmonella live in the intestinal tracts of humans and other animals. Salmonella are usually transmitted to humans by eating food contaminated with animal feces. Contaminated foods typically are animal products, such as beef, poultry, milk, or eggs, but all foods may become contaminated. Raw foods of animal origin are frequently contaminated, but thorough cooking kills the bacteria. Food may also become contaminated by the hands of an infected food handler. Salmonella may also be spread by pets especially those with diarrhea. Reptiles are particularly likely to harbor Salmonella and people should always wash their hands immediately after handling a reptile, even if the reptile appears healthy.

Escheria coli 0157:H7 (E coli)

Escherichia coli 0157:H7, commonly known as E. coli, is a relatively new cause of food-borne illness. An estimated 10,000 to 20,000 cases of E. coli infection occur in the United States each year. Infection often leads to bloody diarrhea, and occasionally, to kidney failure.

Most illness has been associated with eating undercooked, contaminated ground beef. Infection can also occur after drinking un-pasteurized milk, or from swimming in, or drinking, sewage-contaminated water. Because E. coli bacteria are present in the stool of those infected, person-to-person contact in families and child care centers is another possible mode of transmission. Although the number or organisms required to cause illness is not known, it is suspected to be very small.

Meat can become contaminated with E. coli during slaughter, and organisms can be thoroughly mixed into beef when it is ground. Bacteria present on the cow's udders or on equipment may get into raw milk. Because the organism lives in the intestines of healthy cattle, preventive measures on cattle farms and during meat processing are being investigated.

Young children typically shed the organism in their feces for a week or two after their illness subsides. E coli infection often causes severe bloody diarrhea and abdominal cramps; however sometimes the infection causes non-bloody diarrhea or no symptoms. Usually little or no fever is present, and the illness resolves in 5 to 10 days.

In some people, especially children under 5 years old and the elderly, the infection can cause a complication called hemolytic uremic syndrome, in which the red blood cells are destroyed and the kidneys fail. About 2 to 7 percent of E. coli infections lead to this complication. In the United States, hemolytic uremic syndrome is the principal cause of

acute kidney failure in children, and most cases of hemolytic uremic syndrome are caused by E. coli.

People can help prevent E. coli infection by thoroughly cooking ground beef, avoiding un-pasteurized milk, and washing hands carefully.

Listeriosis

Listeriosis, a serious infection caused by eating food contaminated with the bacterium Listeria monocytogenes, has recently been identified as an important public health problem in the United States. Each year, an estimated 1,100 people in the United States become seriously ill with listeriosis. Of the ill, approximately 250 die. The disease affects primarily pregnant women, newborns, and adults with weakened immune systems. Babies can be born with listeriosis if their mothers eat contaminated food during pregnancy. Healthy adults and children occasionally may consume contaminated foods and get infected with Listeria, but they rarely become seriously ill.

Listeria monocytogenes is found in soil and water. Vegetables can become contaminated from the soil or from manure used as fertilizer. Animals can carry the bacterium without appearing ill and can contaminate foods such as meats and dairy products. The bacterium has been found in a variety of raw foods, such as uncooked meats and vegetables, as well as in processed foods that become contaminated after processing, such as soft cheeses and cold cuts. Un-pasteurized milk or foods made from raw milk may contain the bacterium.

Listeria is killed by pasteurization, and other heating procedures used to prepare ready-to-eat processed meats should be sufficient to kill the bacterium; however, unless good manufacturing practices are followed, contamination can occur after processing. People at risk can prevent Listeria infection by avoiding certain high risk foods and by handling food properly.

Botulism

Botulism is a rare but serious paralytic illness caused by a nerve toxin that is produced by the bacterium Clostridium botulinum. In the United States an average of 110 cases of botulism are reported each year. Of these, approximately 25 percent are food-borne. Food-borne botulism is caused by eating foods that contain the botulism toxin. All forms of botulism can be fatal and are considered medical emergencies. Food-borne botulism can be especially dangerous because many people can be poisoned by eating a contaminated food. Because the amount of toxin required to paralyze a person is so low, the potential for a very large scale botulism outbreak always exists.

Outbreaks of food-borne botulism involving two or more people occur almost every year, and usually are caused by eating contaminated home-canned foods. In 1977, one of the largest outbreaks of food-borne botulism ever to occur in North America was linked to

home canned jalapeno peppers served by an Oakland County restaurant. Reportedly 59 people became ill from the peppers; many of these people required intensive care treatment and the horse serum botulism antitoxin.

Hepatitis A

Hepatitis A is a virus that harms the liver and causes fever, loss of appetite, nausea, abdominal pain, and jaundice. It is transmitted through the fecal/oral route or by consuming food or water contaminated by an infected food handler. Hepatitis A infection is usually a mild and self-limiting illness. It is rarely fatal and can be prevented through post-exposure immune globulin or by pre-exposure vaccination.

Hepatitis A can occur in situations ranging from isolated cases to widespread epidemics. Nationally, it is estimated that there are between 125,000 and 200,000 infections per year.

In the spring of 1997, an outbreak of almost 300 cases of hepatitis A occurred in at least four Michigan school districts. And epidemiological investigation linked the outbreak to contaminated frozen strawberries distributed through the national school lunch program.

Arthropod-borne Illness

Arthropod-borne illnesses are those caused by viruses that are transmitted between susceptible vertebrate hosts (people, birds, and other animals) by blood feeding arthropods, such as mosquitoes and ticks.

Encephalitis

Encephalitis is an illness characterized by the swelling of the brain. An outbreak of the West Nile encephalitis had never before been reported in the Western Hemisphere until an outbreak in St. Louis, Missouri in 1933 with over 1,000 cases reported to local health departments. Birds were believed to be the carriers of this strain of encephalitis. The virus was transmitted to humans by mosquitoes that had previously fed on the infected birds. However, there is no evidence that a person can get the virus from handling live or dead infected birds. Although this outbreak was localized in New York, given the mobility of humans and birds, it had the potential to be transported to other regions of the country.

St. Louis encephalitis is a more common strain of encephalitis in the United States. Since 1964 there have been 4,478 reported human cases of St. Louis encephalitis, with an average of 128 cases reported annually.

Mild encephalitis infections are most common and include fever, headache, and body aches, often with skin rash and swollen lymph glands. More severe infection is characterized by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, paralysis, and on rare occasions, death.

The risk of these and other arthropod-borne illnesses is greatly reduced by the effectiveness of mosquito control and public education programs.

Water-borne Illnesses

Cryptosporidiosis

Cryptosporidiosis is contamination by a microscopic parasite Cryptosporidium that can live in the intestines of humans and animals. This parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very resistant to chlorine disinfection. Normally, healthy people can effectively fight the parasite on their own and have no symptoms. However, for people with preexisting health conditions, infection with Cryptosporidium can be life threatening.

Cryptosporidiosis is present in approximately 97 percent of surface water, and 39 percent of drinking water supplies in the United States. Cryptosporidiosis can be contracted by ingesting anything that has come in contact with the stool of a person or animal with the parasite. This includes swallowing water from swimming pools, hot tubs, Jacuzzis, lakes, rivers, springs, ponds, or streams contaminated with sewage or feces from humans or animals, or by eating uncooked food contaminated with Cryptosporidiosis.

Symptoms of cryptosporidiosis generally begin 2 to 10 days after being infected and include diarrhea, stomach cramps, upset stomach, and a slight fever. These symptoms tend to last about 2 weeks. Once the symptoms are gone, a carrier continues to pass Cryptosporidium in his stool for up to 2 months. During this 2 month period, the infection can spread to others. People should avoid swimming in pools for at least 2 weeks after the symptoms stop if they have had cryptosporidiosis. Infected swimmers have caused several outbreaks of cryptosporidiosis among pool users because the parasite can survive in chlorinated pools for several days.

To prevent the spread of Cryptosporidium, hands should be washed with soap and water after using the toilet, changing diapers, and before eating or preparing food. Also, avoid water or food that may be contaminated: this includes avoiding drinking water from lakes, rivers, springs, ponds, or streams unless it has been filtered and chemically treated. During community-wide outbreaks caused by contaminated drinking water, boil drinking water for one minute to kill the Cryptosporidium parasite and make the water safe to drink.

A severe Cryptosporidium outbreak occurred in Milwaukee, Wisconsin in April of 1993. On April 5, thousands of city residents suddenly became ill with a gastrointestinal disorder. Follow-up investigations identified the largest water-borne disease outbreak in U.S. history as being caused by Cryptosporidium in the city's water supply. Engineering studies indicated the need for more than $90 million in improvements to Milwaukee's water supply and treatment system. During this outbreak more than 400,000 people were infected with the parasite, and over 4,000 victims required hospitalization. In addition, over 100 people

in the Milwaukee area with compromised immune systems are believed to have died prematurely after being infected with Cryptosporidium during the outbreak.

Other Communicable Diseases

Influenza

Influenza, commonly called "the flu", is caused by viruses, which infect the respiratory tract. The virus is typically spread from person-to-person when an infected person coughs or sneezes the virus into the air. Compared with other viral respiratory infections such as the common cold, influenza infection can cause severe illness and also precipitate life-threatening complications in all age groups. Flu is a major cause of sickness and death in the U.S., leading to approximately 20,000 deaths and more than 110,000 hospitalizations each year. During a typical flu season in Michigan, 200 to 500 people will die from flu related illness.

Typical symptoms of flu include fever, dry cough, sore throat, runny or stuffy nose, headache, muscle aches, and extreme fatigue. Children may experience nausea, vomiting, and diarrhea, but these symptoms are not common in adults. Some medical complications brought on by flu include bacterial pneumonia, dehydration, and worsening of preexisting chronic conditions, such as congestive heart failure and asthma. Complications occur most often in people who are elderly or people who suffer from chronic health conditions.

In the United States, flu outbreaks typically occur during the winter months from late December through March. The start, peak period, duration and total hospitalizations and deaths of a flu season vary considerably from year to year.

The most important preventive measure against the flu is for individuals, especially those at risk for complications, to get vaccinated in the fall prior to the onset of flu season. The effectiveness of the flu vaccine in protecting individuals against illness depends on primarily:

1. The age and physical condition of the person receiving the vaccine.
2. The similarity or "match" between the virus strains in the vaccine and those in circulation.

When the "match" between vaccine and circulating strain is close, the flu vaccine prevents illness in 70 to 90 percent of healthy people younger than age 65.

Public Health Emergencies in Ogemaw County

There have been no significant public health emergencies in Ogemaw County.

Existing Prevention Programs

Public Health Programs

The Michigan Department of Community Health, local, and district health departments across the state have a number of programs and initiatives in place to protect the health, safety and well-being of Michigan's residents. These programs and initiatives, such as providing immunizations, have been very successful in limiting the scope and magnitude of the types of public health emergencies described above. However, because the nature of the threats to our public health is always changing, and because the population is becoming larger and more mobile, the possibility always exists for a local, regional or statewide public health emergency to occur.

The Director of the Department of Community Heath, and local public health officers, have the authority (under the Michigan Public Health Code) to take those steps deemed 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 that effect, and those orders can be enforced through the imposition of civil and criminal penalties for failure to comply.

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 mitigative measures. The CDC can also assist state and local public health officials in establishing health surveillance and monitoring programs, and in disseminating information on prevention and treatment to the general public.

One example of a CDC program is PulseNet. In 1998 the CDC launched this collaborative interagency initiative that uses DNA fingerprinting to better detect food-borne illness. With this program, more than 35 laboratories across the country can identify E. coli in less than 24 hours. This identification process used to take days or weeks.

Water Distribution Systems

Michigan's public water supplies are regulated under the Federal Safe Drinking Water Act through the Michigan Safe Drinking Water Act (399 P.A. 1976). The Michigan Department of Environmental Quality (DEQ) provides supervision and control of Michigan's public water supplies (including their operation and physical improvements).

The DEQ 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). Most communities in Michigan have, in conjunction with the DEQ, 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.

Wastewater Collection/Treatment Systems

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 DEQ Surface Water Quality Division for surface water discharge facilities, and the DEQ 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 DEQ 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. The regulatory authority vested in the DEQ is primarily aimed at preventing pollution of waters of the state. An effective wastewater treatment system helps to ensure that people in Michigan will not contract illnesses from contaminated waters.

Michigan Unified Food Law (92 P.A. 2000)

Michigan's Unified Food Law went into effect November 8, 2000. The law was enacted to modernize, standardize, and consolidate Michigan's food laws while adopting the U.S. Food and Drug Administration's (FDA) 1999 Food Code as a uniform regulatory standard for retail food establishments such as restaurants, other food service facilities, groceries and convenience stores. The law will help in protecting Michigan consumers from serious foodborne illnesses such as E. coli, salmonella, listeriosis, botulism, and hepatitis.

U.S. Food and Drug Administration Food Code

The U.S. Food and Drug Administration (FDA) Food Code is the national regulatory standard for retail food establishments. The FDA Food Code is neither Federal law nor Federal regulation, but represents the FDA's best advice for a uniform system of regulation to ensure that food at retail establishments is safe and properly protected and presented. It may be adopted and used by agencies at all levels of government that have responsibility for managing food safety risks at the retail level. The Food Code provides practical, science-based advice and manageable provisions for mitigating risk factors known to contribute to food borne illnesses. The FDA Food Code is revised every two years.

Michigan adopted the 1999 FDA Food Code in the Michigan Unified Food Law of 2000 – 92 P.A. 2000.

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 located in Atlanta, Georgia, has the responsibility and authority to investigate public health emergencies to determine their causes, 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 has dedicated funding for bioterrorism response. Michigan will be strengthening its surveillance and intervention infrastructures with these funds.

Public Health Emergencies Overview

The Central Michigan District Health Department offers influenza vaccines yearly. Ogemaw County residents may receive these vaccines at the local health department. The vaccines are also offered at various other locations throughout the County.

Annually the Environmental Health Sanitarians inspect restaurants, public swimming pools and campgrounds. These inspections insure that the establishments are complying with health and safety standards. Business establishments are given a certain amount of time to correct these violations if found in violation of any health hazards. In some cases if there are too many serious violations, the establishments may be ordered to close until they are in compliance.

Scrap Tire Fires

Scrap tire fires are an instance of uncontrolled burning at a scrap tire storage recycling site.

Hazard Description

With the disposal of an estimated 250 million vehicle tires annually in the United States, management of scrap tires has become a major economic and environmental issue. 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 fifty years present environmental and safety hazards that will last into the foreseeable future. The State of Michigan has identified a total in excess of 23 million scrap tires in disposal sites scattered around the state.

Issues pertaining to the management of scrap tire disposal sites are difficult and diverse. Whole tires are difficult to landfill because they tend to float to the surface. Whole tires are banned by many licensed landfills due to associated problems. In addition, scrap tires are breeding grounds for mosquitoes, which can reproduce at 4,000 times their natural rate in a scrap tire disposal site. From an emergency management perspective, the most serious

problem that scrap tire disposal sites pose is that they can be a tremendous fire hazard if not properly designed and managed.

Tire disposal sites can be fire hazards due to the large number of tires typically present at a site. This large quantity of "fuel", coupled with the fact that the shape of a tire allows air to flow into the interior of a large tire pile, renders standard firefighting practices nearly useless. Flowing burning oil released by the tires spreads the fire to adjacent areas. Some scrap tire fires have burned for months, creating acrid smoke and an oily residue that can leach into the soil, creating long-term environmental problems.

Scrap tire fires differ from conventional fires in several respects: 1) even relatively small scrap tire fires can require significant resources to control and extinguish; 2) the costs of fire management are often far beyond that which a local government can absorb; 3) the environmental consequences of a major tire fire are significant; and 4) as alluded to earlier, the extreme heat converts a standard passenger vehicle tire into about two gallons of oily residue, which can leach into the soil or migrate to streams.

Current technologies are sufficient to address the reuse of newly generated scrap tires, but some waste tires still migrate to the least expensive disposal method, which usually means they end up in a scrap tire disposal site (sometimes illegally).

Existing Prevention Programs

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. The goal of the program is to promote development of an acceptable scrap tire management system which minimizes environmental, public health, and nuisance concerns, and maximizes the resource recovery of scrap tire materials. To accomplish this, the following were initiated:

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.
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. Also addressed in the legislation were:

1. Increased scrap tire regulations – including fire lane widening from 20 to 30 feet.
2. Minimum bonding requirements for all scrap tire storage sites.
3. Authorization of local fire department inspections of storage/disposal sites.

Scrap Tire Management

To be effective, scrap tire management must be viewed from two perspectives. First, methods for dealing with the millions of scrap tires currently being generated must be devised to stop the problem from growing in scope and magnitude. Recycling and re-use appear to be the best options in that regard. Second, measures must be devised to address the issues pertaining to the millions of scrap tires already present in existing disposal sites. In developing such a corrective solution, the economic realities of the problem must be understood.

The vast majority of disposal site owners have neither the financial means nor the incentive to address the health and fire hazards that result from the storage of scrap tires on their property. Unless the value of the tires increases dramatically through technological development (an unlikely situation in the foreseeable future), the piles will continue to grow, exacerbating the health and safety hazards for surrounding communities.

Mitigation of Scrap Tire Fires

To combat these problems at current disposal sites, suggestions have been made about establishing a state policy and program for acquiring such sites and suitably disposing of the millions of tires at these locations. Other proposals call for educating local jurisdictions on the hazards associated with scrap tire disposal sites so that enforcement of existing legislation is effective in minimizing future potential scrap tire fires.

In January 2000, $580,000 in state grants was made available to 12 applicants to help clean up over 420,000 scrap tires at major disposal sites across the state. The grants were provided under the authority of Part 169, Scrap Tires, of the Natural Resources and Environmental Protection Act (1994 P.A. 451), as amended. Sites with abandoned scrap tires and collection sites where tires were accumulated prior to January 1, 1991 were eligible to apply for the funds. The grants will help reduce the potential public health and environmental concerns (i.e., fire and mosquitoes) associated with the largest of the sites, some of which contain from 50,000 to 750,000 scrap tires.

Scrap Tire Fire Statewide Response Plan

To comply with the amendments to Section 169 of the Natural Resources and Environmental Protection Act, the State of Michigan has developed a statewide response plan for large scrap tire fires. This plan, which was written by the Michigan Department of Environmental Quality with input from the Michigan State Police and the Michigan Association of Fire Chiefs, establishes a framework for planning, preparedness and response measures for large scrap tire fires. While this plan will certainly not stop scrap tire fires from occurring, it is hoped that the plan will at least keep the problem in check until more permanent hazard mitigation measures can be instituted to reduce the threat of tire fires across Michigan.

Scrap Tire Fire Overview

Even with the improvements to the State's regulatory authority brought about by the recent legislative changes, much work still needs to be done to mitigate the impacts of scrap tire fires. Incident management planning, recognition of the hazardous material potential of fires at scrap tire sites, and improving/enhancing disposal site selection and design processes are all critical pre-incident preparedness factors that must be addressed by government and the private sector. In light of the potential consequences of scrap tire fires, prevention must become a primary goal in the treatment of scrap tire disposal sites.

Although the estimated 17,000 scrap tires in Ogemaw County cannot be ignored as a threat, it is doubtful a scrap tire fire in itself could cause a severe emergency or disaster. In Ogemaw County, scrap tires are more likely to add problems to an already existing fire. In the past, all scrap tire fires in Ogemaw County have been managed by local fire fighters.

Hazardous Material Incidents - Fixed Site

A hazard material incident is an uncontrolled release of hazardous materials from a fixed site, capable of posing a risk to health, safety, property, and to the environment. Hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other community facilities. Hazardous materials are materials or substances which, because of their chemical, physical, or biological nature, pose a potential threat to life, health, property and the environment if they are released. Examples of hazardous materials include corrosives, explosives, flammable materials, radioactive materials, poisons, oxidizers, and dangerous gases.

Hazardous materials are highly regulated by the government to reduce risk to the general public, property, 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. Areas at most risk are within a 1-5 mile radius of identified hazardous material sites. Many communities have detailed plans and procedures in place for responding to incidents at these sites, but release can still cause severe harm to people, property, and the environment if proper mitigation action is not taken in a timely manner.

The world's deadliest hazardous material incident occurred on December 4th, 1984 in Bhopal, India. A cloud of methyl isocyanate gas, an extremely toxic chemical, escaped from a Union Carbide chemical plant, killing 2,500 people and injuring tens of thousands more. This incident triggered historical Federal legislation intended to minimize such disasters from occurring in the United States.

There are currently three sites in Ogemaw County designated SARA Title III, Section 302 Sites. These sites are required to have an emergency plan on file with the local Emergency Planning Committee, Fire Department, and at their facilities. All three 302 Sites in Ogemaw

County have an emergency plan on file with the Local Emergency Planning Committee and with their individual Fire Departments.

302 Sites: (Buffer Zones for 302 Sites are half-mile radius)

Map 24

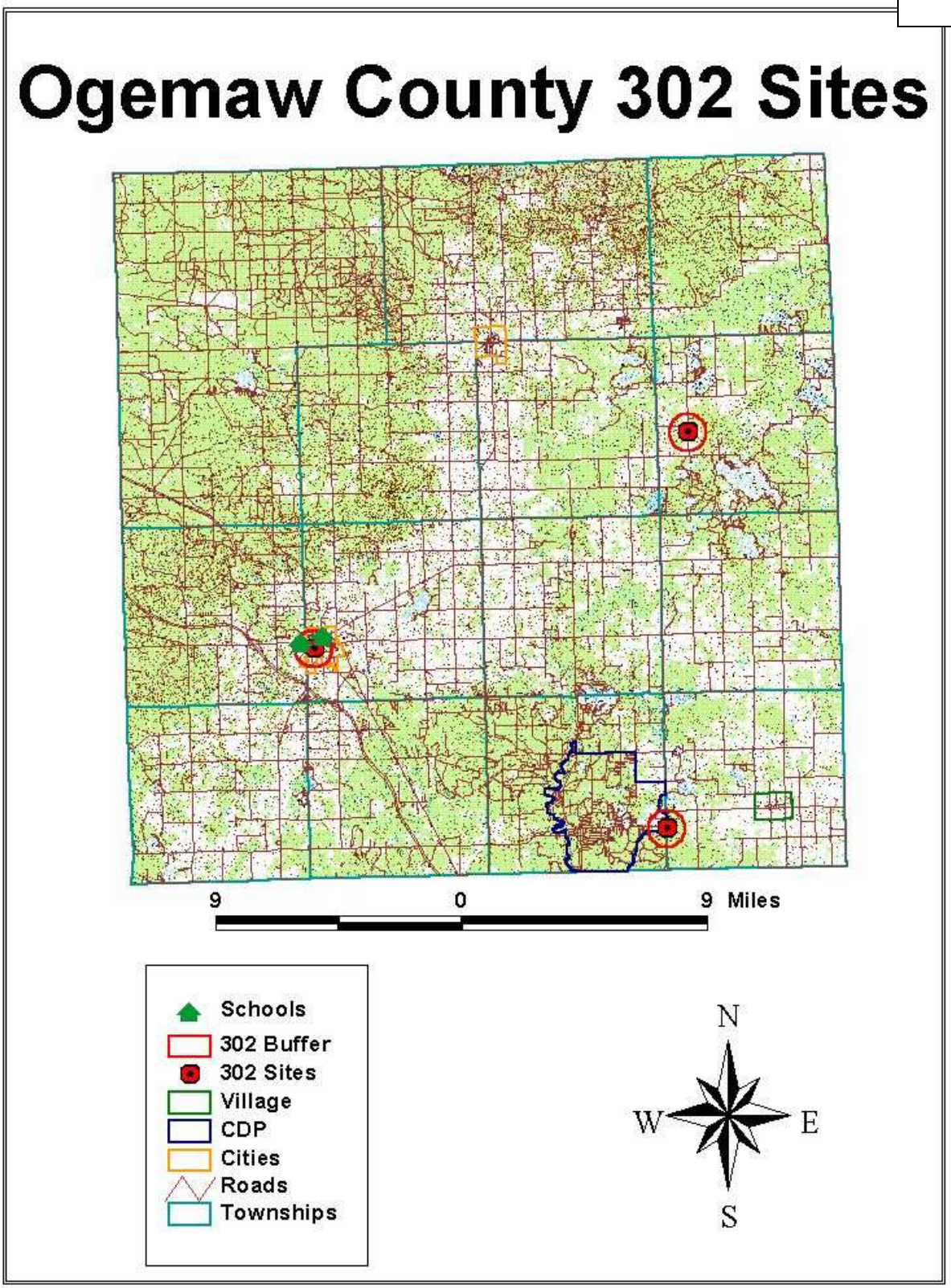

Figure 32 Ogemaw County 302 Sites

Map 25

Sage Lake Area 302 Site

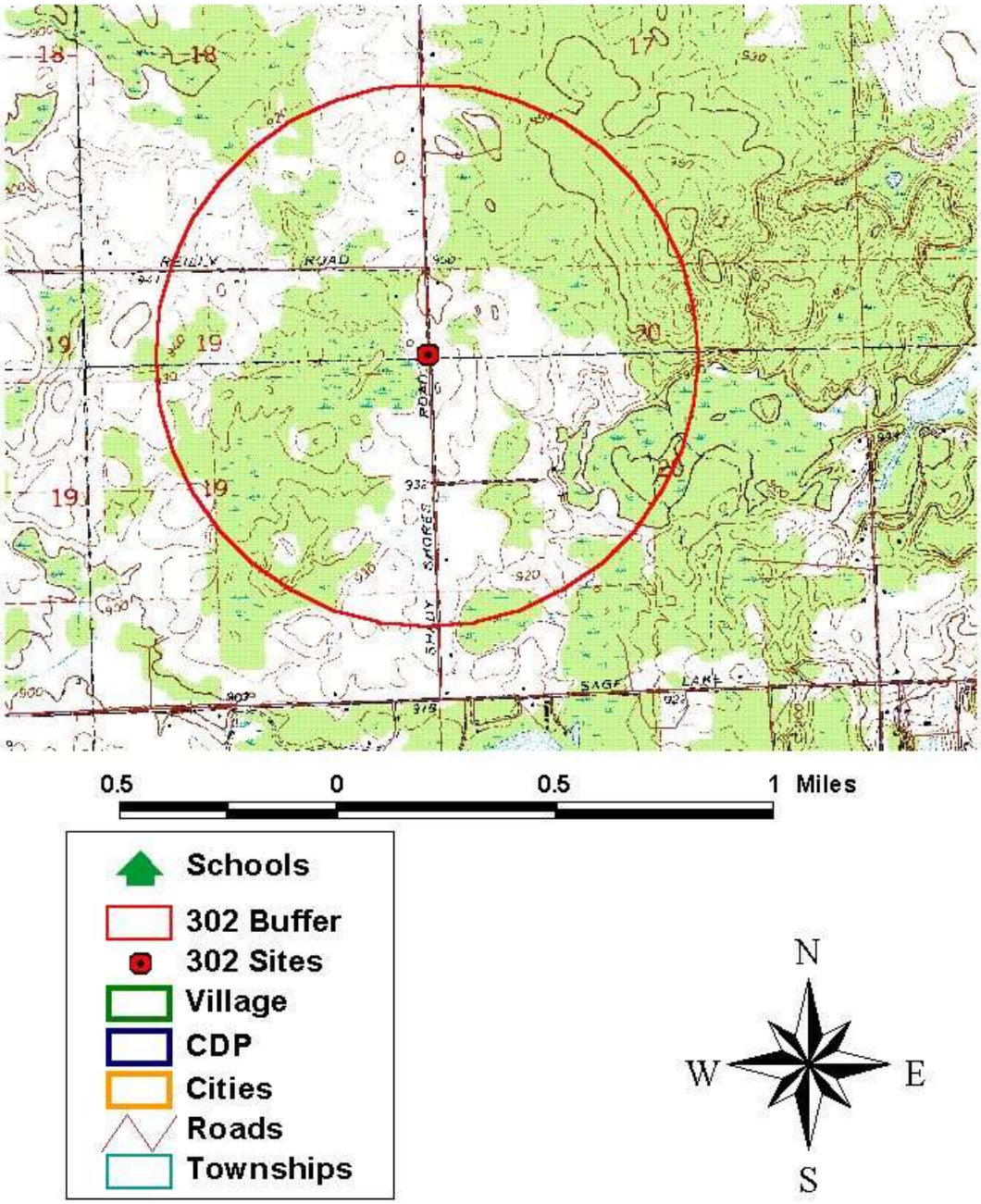

Figure 33 Sage Lake Area 302 Site

Map 26

Skidway Lake 302 Site

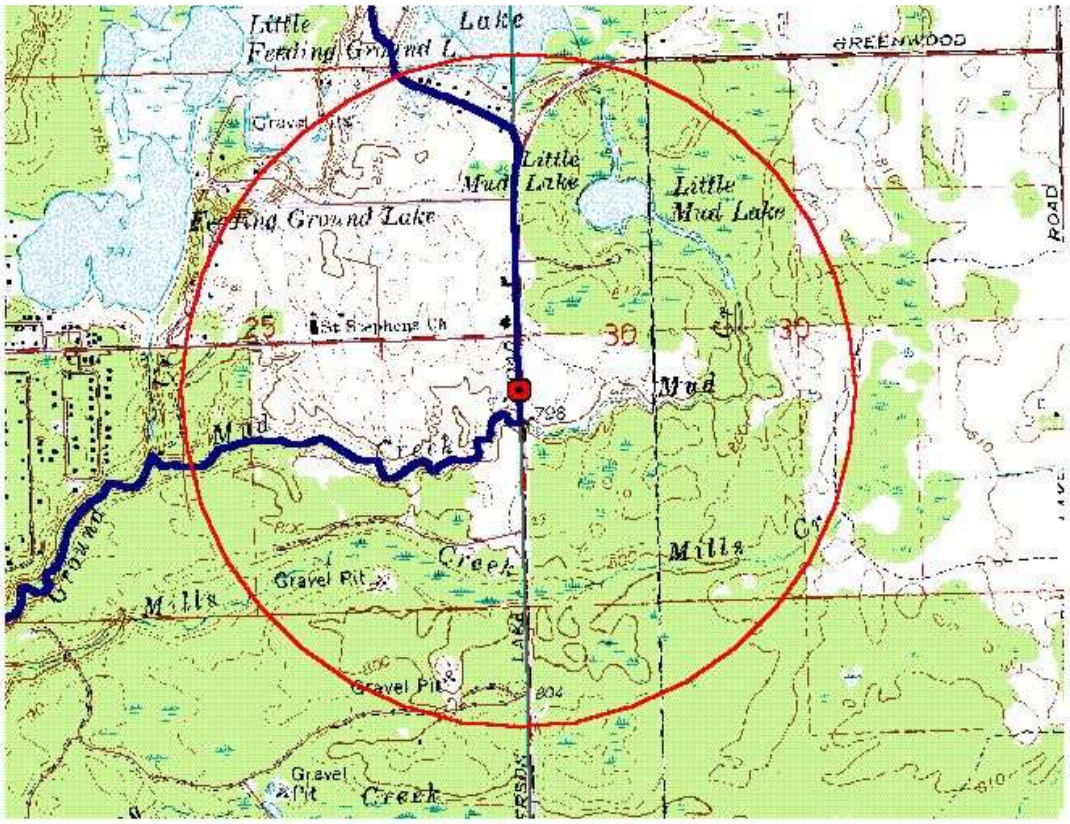

Figure 34 Skidway Lake 302 Site

Map 27

West Branch 302 Site

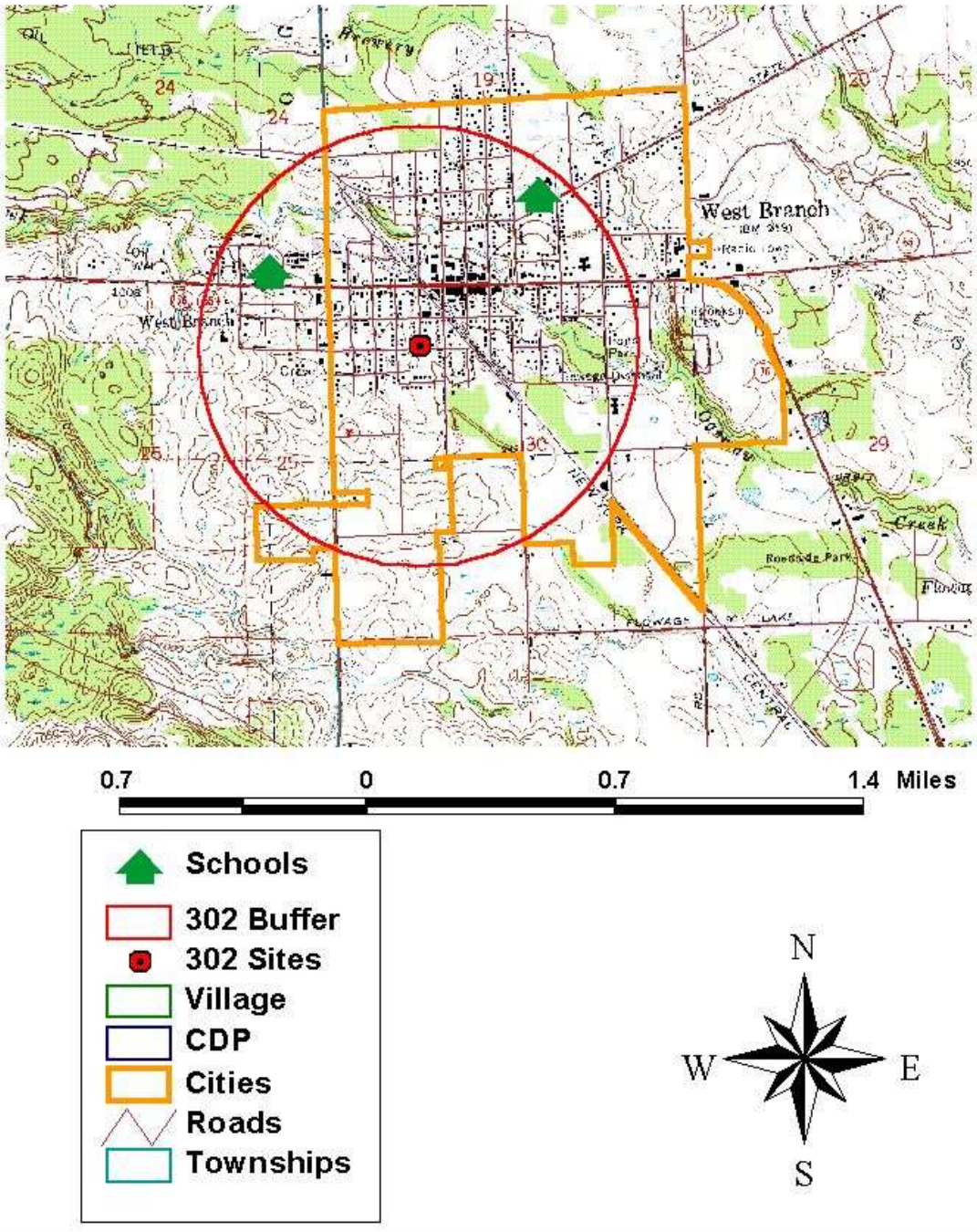

Figure 35 West Branch 302 Site

Community Vulnerability and Risk Assessment

Ogemaw County Local Jurisdictional Hazards

Ogemaw County is located in mid-Michigan. The County encompasses approximately 575 square miles or approximately 367,749 acres. The county is composed of 14 townships. There are two cities and one village in the county. The City of West Branch is the county seat and is located at M-30 and M-55 in southwestern West Branch Twp.

Ogemaw County has county-wide planning and zoning with the exception of the City of West Branch West Branch Township, and Edwards Township that have their own planning and zoning.

The City of West Branch is located in the southwestern quarter of Ogemaw County on the border between Ogemaw Township and West Branch Township. The West Branch of the Rifle River flows through the middle of the city west to east. M-55 runs through the city east to west, M-30 on the western border runs north/south, and Business Loop 75 on the eastern border travels north/south. The city covers an area of 1.45 square miles with a population density of 1325.3 people per square mile. The 2010 U.S. Census showed that West Branch had a population of 1926, a slight increase of 1% from 2000.

The main land uses in the City of West Branch are residential and commercial. Commercial uses are concentrated along Business Loop 75, in the center of the city, and along M-30 where the West Branch Regional Medical Center is located. Some of the commercial uses are scattered in the residential areas. Residential areas can be found extending outward from M-55.

Potential Natural Hazards: Hail, Lightning, Severe Winds, Tornados, Winter Weather Hazards, Ice Storms, Extreme Temps, Riverine Flooding, Wildfire, Public Health Emergencies

Potential Technological Hazards: Dam Failure, Structural Fire, Transportation Accidents, Hazardous Materials Fixed Site and Transportation, Infrastructure Failures, Oil/Gas well Incident, Pipeline Accidents

West Branch Township is located near the center of Ogemaw County. Interstate I-75, M-55 and M-33 run through or along the township. Interstate I-75, runs in a southeast to northwest direction, M-55 in an east west direction, and M-33 in a north-south direction. The major water features are Peach Lake, Mud Lake, Crapo Lake and the West Branch of the Rifle River. The township is rural with a moderate population and it encompasses 34.5 square miles. It has a population density of 75 people per square mile. The 2010 U.S. Census showed that the township had a population of 2,593, a decrease of 1.3% from 2000. West Branch Township is home to a retail business area at the I-75 212 exit. This area has several restaurant businesses and major retailers such as Wal-Mart, Home Depot, and an outlet

mall with stores. The population of this area increases greatly during weekends and holidays.

The main land uses in the township are forest, agriculture, and rangeland. The majority of the township is covered by forests. Agricultural areas are scattered in the township with the large farms located in the southern half. Rangeland areas are mainly located between agricultural areas and forests.

Potential Natural Hazards: Hail, Lightning, Severe Winds, Tornados, Winter Weather Hazards, Ice Storms, Extreme Temps, Riverine Flooding, Wildfire, Drought

Potential Technological Hazards: Dam Failure, Structural Fire, Oil/Gas Well Incident, Transportation Accidents, Hazardous Materials Fixed Site and Transportation, Infrastructure Failures, Drug Labs, Pipeline Accidents

Edwards Township is located in the southwestern corner of Ogemaw County. M-30 runs on the eastern side of the township in the north/south direction. The major water features are Mansfield Creek, Middle Branch Tittabawassee River, Lake George, Mud Lake, Edwards Lake, Gear Lake, Tee Lake, Frost Lake, Little Frost Lake, Chatman Lake, and Elk Lake. The township is rural with a moderate population and it encompasses 35.66 square miles. It has a population density of 39 people per square mile. The 2010 U.S. Census showed that the township had a population of 1390, an increase of 15% from 2000.

The main land uses in the township are forest, agriculture, and rangeland. The majority of the township is covered by forests. Agricultural areas are scattered in the township with larger areas located in the southern half. Rangeland areas are mainly a buffer zone for agricultural areas and forests. Residential areas are mainly located along the Tittabawassee River, lakes, and M-30. Wetland areas can be found scattered on the western side of the township and along Mansfield Creek and the Tittabawassee River.

Potential Natural Hazards: Hail, Lightning, Severe Winds, Tornados, Winter Weather Hazards, Ice Storms, Extreme Temps, Riverine Flooding, Wildfire, Drought

Potential Technological Hazards: Dam Failure, Structural Fire, Oil/Gas Well Incident, Transportation Accidents, Hazardous Materials--Fixed Site and Transportation, Infrastructure Failures, Drug Labs, Pipeline Accidents

Risk Assessment

The Local Planning Team and the Hazard Mitigation Planning Committee assessed the risk of potential events and issues based on such criteria as the frequency of such hazards in Michigan, trends, level of impact, and other elements listed below.

Very Likely: A similar event/issue has occurred within the past 20 years in Ogemaw County, or in another Michigan County within the past 10 years.

Somewhat Likely: A similar event/issue has occurred within the past 40 years in Ogemaw County, or in another Michigan County within the past 20 years.

Not Likely: A similar event/issue has not occurred within recent history in Ogemaw County, or in another Michigan County within the past 40 years.

From these basic starting criteria, through discussion and meetings, the committee, decided which hazards were very likely and somewhat likely to affect their communities. The committee decided that Thunderstorm Hazards, Severe Winter Weather Hazards, Wildfire, Infrastructure Failure, Haz/Mat Transportation, Structural Fire, Oil/Gas Well Accident, Dam Failure, Sabotage/Terrorism, Transportation Accidents, Petroleum/Natural Gas Pipeline Accidents are the hazards that need to be looked at in greater detail.

After the potential hazards for the community were identified, surveys were sent out to the communities in Ogemaw County. This survey was sent out to gather information on vulnerabilities and to help in preparing a preliminary ranking of the potential hazards in the community. The hazards were ranked on a simple scale of 1 to 10 with 10 being the highest risk (see appendix for survey results).

Hazard Assessment Rating Table

The next step was to further analyze the hazards. The previous evaluation criteria that split the hazards into different aspects such as, likelihood of occurrence, physical damage, and potential to cause casualties was utilized. These aspects were chosen because the committee though that these evaluation criteria were of the most concern for the community.

Each of the evaluation criteria was assigned a "weight" to express the level of importance each of the criteria will have in the rankings. The sum of the weights equals 100%. Each of the individual criteria was assigned a percentage value based on the relative importance that specific criteria would have in ranking the various hazards. Point values of 0-10 were assigned using the scoring parameters below. Using a spreadsheet, values were input and calculated to get the rankings.

Hazard Analysis Evaluation Measures

The following is a list of three evaluation measures and corresponding benchmark factors that were used to evaluate each hazard facing the community.

Likelihood of Occurrence

Likelihood of occurrence measures the frequency with which a particular hazard occurs. The more frequently a hazard event occurs, the more potential there is for damage and negative impact on a community.

Potential for Damage

The capacity to cause physical damages refers to the destructive capacity of the hazard. While the destructive capacity of some hazard events, such floods and tornados, is often immediate and readily apparent, some hazards may have significant destructive capacity that is less obvious as it may occur over an extended period of time, such as extreme temperatures or drought.

Potential for Casualties

Potential for causing casualties refers to the number of casualties (deaths and injuries) that can be expected if a particular hazard event occurs.

OGEMAW COUNTY HAZARD RATINGS					
	Evaluation Criteria				
WEIGHT =========>	Likelihood of Occurrence 35%	Physical Damage 20%	Potential to cause casualties 45%	Total Weight 100%	
Hazard	Score			**Weighted Score**	**Rank**
Structural fire	8	7	5	6.45	1
Severe Winter Weather Hazards	10	7	3	6.25	2
Thunderstorm Hazards	10	9	2	6.2	3
Wildfire	10	5	2	5.4	4
Infrastructure Failure	8	3	4	5.2	4
HazMat transportation	5	5	5	5	6
Sabotage/terrorism	4	4	6	4.9	7
Transportation Accidents	5	2	5	4.4	8
Tornado	5	5	3	4.1	9
Oil/Gas Well Accident	6	2	3	3.85	10
Public Health Emergencies	4	0	4	3.2	11
Dam Failure	1	5	3	2.7	12
Petroleum/Natural Gas Pipeline Accidents	4	2	2	2.7	13
Civil Disturbance	2	1	3	2.25	14
Riverine Flooding	3	3	1	2.1	15
Drought	4	1	1	2.05	16
Extreme Heat	2	0	2	1.6	17
HazMat fixed site	1	1	1	1	17
Scrap Tire Fire	1	1	1	1	19
Earthquake	1	0	0	0.35	20

Vulnerability Assessment

This step measures the vulnerability of Ogemaw County to potential hazards. When the potential hazards are compared to the Community Profiles, including the physical profile and social profile, the potential for harm becomes apparent. It is serious when hazards are combined with people or resources both natural and economic. Hazard Mitigation planning intends to make hazards less damaging to people and resources.

This step looks at such points as population concentrations, age-specific populations, development pressures, types of housing (older homes, mobile homes), presence of agriculture, valuable natural resources, and other issues that may make Ogemaw County more vulnerable to specific hazards. Basic criteria are listed below.

High Vulnerability: If an event occurred it would have serious impact on both the safety and financial impact of County residents and businesses.

Medium Vulnerability: If an event occurred it would have minimal impact on the safety of residents but would have a serious financial impact on County residents and businesses.

Low Vulnerability: If an event occurred it would have no impact on the safety of County residents and minimal financial impact on County residents and businesses.

Structural Fire

Structural fires can happen anywhere and anytime throughout Ogemaw County. Homeowner negligence is a factor with structural fires. Smoking, electrical appliances, storing combustible materials, and many other circumstances can cause a house fire. Businesses can have the same circumstances that cause fires. The county fire departments are mostly volunteer, so the response times may be longer. Of the 8,998 occupied units in the county, 31.1% use utility gas, 43.4% use bottled, tank or LP gas, 5.8% use electricity, 4.4% use fuel oil or kerosene, 13.8% use wood, and 1.5% use another fuel. Wood fires in the home pose a higher risk than the other fuels. 13.8% of the population in Ogemaw County uses wood as a fuel and that poses a greater than normal risk due to the fact that there is already controlled fire in the house. Structural fires are universal hazards and Ogemaw County is **highly vulnerable** to them.

Severe Winter Weather Hazards

Winter weather hazards such as blizzards, sleet, freezing rain, and heavy snow are known hazards in Ogemaw County, and they can occur multiple times every winter. There is no pattern to the occurrence of winter hazards, which means one year can have none while the next year has multiple storms. While there has not been damage from every storm, there is a possibility of damage from each winter storm. Damages from winter weather hazards totaled 5.1 million dollars from 1950 to 2015. Since these figures were recorded for

each storm and not the county, it is unknown if the damage from these figures is for Ogemaw County alone.

Winter weather hazards happen all over the county, and the people that are most affected are the elderly, homebound, and disabled. Infrastructure problems can occur with a more severe storm that causes power lines to break from the weight of the snow or ice. Branches from trees may fall on power lines and cause power outages. Health problems may occur to vulnerable populations due to the power outages that might cause adverse conditions in their homes. Almost a quarter of the county's population is very vulnerable to winter weather hazards. All areas and populations of the county have **high vulnerability** to winter weather hazards.

Thunderstorm Hazards

Lightning

Lightning kills more people than hurricanes or tornados. Lightning is a very common hazard that people tend to ignore. Economic loss from lightning can include infrastructure damage, private property damage, and wildfires. There have been three recorded events in Ogemaw County since 1950 according to the National Climatic Data Center. Lightning is mainly associated with thunderstorms and they usually occur in the warmer months. This means that there are more people in the county during influx of seasonal population. People also tend to spend more time outdoors. Outdoor events and festivals need to take precautions with the crowds to keep them safe. Lightning happens on a smaller scale in localized spots, but it can affect large areas. Ogemaw County has a **high vulnerability** to lightning.

Severe Winds

Severe wind is a hazard that is prevalent usually during severe thunderstorms. These events can happen multiple times in any year, and they can cause extensive damage to all areas of the county. Fifty-one thunderstorm and high wind events have been recorded in Ogemaw County since 1950. These events have caused three injuries and $462,000 in damages. The damage totals and other statistics are taken from some events that involved an area larger than Ogemaw County. Some of the totals do not apply to Ogemaw County, but the storm that caused the totals affected Ogemaw County. Severe winds are most likely to be associated with thunderstorms that occur in the summer, but can occur any time of year. One of the most powerful windstorms ever recorded in the Great Lakes region occurred on November 10, 1998. Wind speeds from this powerful storm reached 87 knots. Homes in wooded areas may not be damaged from the winds, but trees or branches may fall and damage homes costing thousands of dollars to repair. Ogemaw County has **high vulnerability** to severe winds.

Hail

Hail is a hazard that is also associated with severe thunderstorms. Economic loss is potentially very high with damage to homes, cars, and crops. The potential for death is low but the chance is there if people are caught outside when larger hailstones are falling. There have been 45 hail events in Ogemaw County since 1950. There is a chance for hail in every thunderstorm season and it very hard to predict when and where this event will occur. Ogemaw County has **high vulnerability** to hail events.

Wildfire

When conditions are dry, any type of forest can succumb to wildfires. Certain types of vegetation are more susceptible to wildfire, such as coniferous trees (e.g.-red pines, jack pines). Trees that are a moderate risk to wildfire are mainly deciduous, such as oak or birch. There are areas of pine in Ogemaw County and these areas are designated high risk. Campgrounds in these areas are especially dangerous because visitors might not know the local conditions. They must be informed to keep conditions safe.

With the amount of forest cover in the county, the whole county is considered to have **high vulnerability** to wildfire hazards.

Infrastructure Failure

Power outages are the greatest concern in the category of infrastructure failures. Losing power for extended periods of time can cause many problems especially in the summer or winter. The older population may find it difficult to do many of their daily routines. After a few days, people may become ill due to lack of heat in the winter or heat exhaustion in the summer. Infrastructure failure may be caused by adverse weather conditions, wildfires, or sabotage. The county is covered by a high percentage of forest so it raises the chances of trees or branches falling on power lines. Phone service is vital for Ogemaw because cell phones have limited coverage areas. Heavy rains and spring thaw can inundate or wash away sections of road that can cause death or injury. Historic problem areas on roads need to be improved in order to prevent loss of life or property damage. Due to the many variables and systems in the infrastructure network, the whole county is considered **highly vulnerable** to infrastructure failure.

Hazardous Materials Incidents – Transportation

Hazardous Materials Transportation has a potential to cause injury, but the areas are confined to the main trunklines such as M-55, M-30, M-33 and I-75. I-75 is an especially high risk because freeways have high volumes of traffic that carry large amounts of hazardous materials across the state. Ogemaw County has a **high vulnerability** to hazardous material incidents.

Sabotage and Terrorism

Sabotage and terrorism objectives vary widely, so too are the potential targets of such actions. Virtually any public facility or infrastructure, or place of public assembly, can be considered a potential target. In addition, certain types of businesses engaged in controversial activities are also potential targets, as are large computer systems operated by government agencies, banks, financial institutions, large businesses, health care facilities, and colleges and universities.

Although at first it might appear Ogemaw County is an unlikely target for terrorism, it cannot be totally discounted. Potential targets include water treatment plants, the runways at the airports, and all industrial sites in the area. Furthermore, any government building, schools, or individual can become a target of domestic terrorism. Ogemaw County has a **medium vulnerability** to Sabotage and Terrorism.

Transportation Accidents

Air Transportation Accidents

Although there are not commercial air passenger services at the West Branch Community Airport, there are many small planes that takeoff and land at this facility. The possibility of an air transportation accident occurring is not out of the question. Statistics from the National Transportation Safety Board and the airline industry show that the over 75% of airplane crashes and accidents occur during the takeoff or landing phases of a flight. West Branch Township, the City of West Branch, and Horton Township all have **medium vulnerability** to air transportation accidents.

Land Transportation Accidents

Although public modes of land transportation have an excellent safety record, the combination of large numbers of passengers, unpredictable weather conditions, potential mechanical problems, and human error always leaves open the potential for a transportation accident involving mass casualties. The case in Clare County involving a tour bus that slid off the road due to rainy conditions is an example. With the one major freeway and three state highways that traverse the county, the whole county is considered **highly vulnerable** to transportation accidents.

Water Transportation Accidents

Ogemaw County has many lakes that are used for recreation throughout the year. Many lakes in Ogemaw County are known statewide for boating and summer vacationing. The high influx of boats and jet-skis cause more problems and accidents with inexperienced operators. The large amount of pleasure boaters in the summer months makes the county **highly vulnerable** to water transportation accidents.

Tornados

Tornados are rare but cause the damage that can be felt for years. Since 1950, nineteen tornados have hit Ogemaw County causing $6.833 million in damages. Of the tornados that touched down in Ogemaw County, rated on the Fujita Scale, three have been F0, four have been F1, two have been F2, and four have been F3. Tornados usually occur in the warmer months when a significant amount of seasonal population moves into the county. One death and 19 injuries have been recorded in the time period. The increase in population raises the chances of people getting injured or losing their life. There are few things that can be done to prevent damage from a tornado. People should be advised to go to their basements or have plans to get to a designated community shelter quickly if they do not have a basement. All of Ogemaw County is considered **highly vulnerable** to tornados.

Other areas for concern are campgrounds and community events. Campgrounds are extensively used during prime summer months and on Memorial and Labor Day weekends. Campgrounds have large concentrations of transient populations staying in structures that are highly vulnerable to severe storm events.

Oil and Gas Well Incident and Petroleum/Natural Gas Pipeline Accidents

Oil and gas well incidents could be a major problem in Ogemaw County. A significant number of wells are located in the county along with a few pipelines. The pipelines are located in Horton Township, Edwards Township, Ogemaw Township, West Branch Township, Klacking Township, and Foster Township. There are wells located all over the county but the majority are located in the southern half of West Branch Township. A significant number are also in the City of West Branch, Horton Township, Mills Township, Ogemaw Township, Rose Township, and Foster Township. Due to the high number of oil and gas wells in the county, Ogemaw County has a **high vulnerability** to oil and gas well incidents and petroleum and natural gas pipeline accidents.

Dam Failure

Ogemaw County has three dams that are rated as significant hazards. The dam owners are responsible for having dam safety inspection reports completed and emergency action plans approved every three years. Part 315, Dam Safety, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, requires that dam owners prepare, and keep current, Emergency Action Plans (EAP) for all high and significant hazard potential dams. An EAP is defined as “a plan developed by the owner that establishes procedures for notification of the department, public off-site authorities, and other agencies of the emergency actions to be taken prior to and following an impending or actual failure of a dam.” These EAP are approved and on file with the county Emergency Management Coordinator.

The areas around Lake Ogemaw and Flowage Lake in Mills Township and West Branch Township, respectively, are **highly vulnerable** to dam failure.

Chapter 5 *Mitigation Strategy*

The Hazard Mitigation Plan and Mitigation Strategies

Research conducted as a part of the preparation of this plan reveals that, relative to other areas of the United States, Ogemaw County is a relatively safe place to live, one where loss of life and damage to property from these hazards is relatively low. The Ogemaw Community is not plagued with threats from recurrent hurricanes, riverine flooding common to the areas of the Midwest, earthquakes of the potential evident in the Western United States, or the types of wildfires common in dry climates on the West Coast. The community does, however, face significant threat to life and property associated with structural fires and wildfires, sever winter snow and ice storms, thunderstorms, and tornados. The county also may face the consequences of hazardous materials accidents, oil and gas accidents, and terrorism.

The purpose of this plan is to anticipate the potential consequences of these events upon the community and to take measures and to implement strategies to minimize the impact and the severity of these hazards on the community. The plan is intended to protect the health, safety, and economic interests of residents reducing the effects of these natural and man-made hazards through hazard mitigation planning, awareness, and implementation. Actions taken to eliminate or reduce long-term risk to human life and property will not only help to minimize the impacts of disasters, but will enable a rapid recovery and restoration of community functions in the event of an occurrence. As such, the Hazard Mitigation Plan is an essential element of emergency planning as a part of the emergency services provided by Ogemaw County.

Local governmental units in Ogemaw County, in common with local units of government through the state, face increasingly difficult challenges in terms of revenues to fund governmental operations, activities, and programs. Planning for natural disasters and implementing measures to mitigate those disasters, can, in the long run, save tax dollars. FEMA has noted that every dollar spent on hazard mitigation results in a savings of four dollars. The wise use of expenditures to mitigate such hazards will benefit the community in terms of the need of funding for all local governmental operations. Limited dollars should be expended where they generate the greatest amount of effectiveness in terms of the delivery of public services.

The following are hazard mitigation goals derived from the risk assessment. These goals are general guidelines that explain what the community wants to accomplish. They are long term and represent broad visions. The objectives define strategies or implementation steps to attain the identified goals. Actions for local communities, community organizations, and others to take are set forth in the action plan.

GOAL 1: Protect Public Health and Safety

OBJECTIVES

- Provide community wide hazard warning systems (natural, health and terrorism)
- Provide information and resources to increase hazard awareness and education
- Maintain existing resources and equipment and provide necessary training on how to use them

- Identify and obtain additional necessary resources and equipment to prevent or minimize hazard effects.

GOAL 2: Minimize Damage and Economic Loss to Public and Private Property

OBJECTIVES

- Promote policies to make properties less vulnerable
- Apply mitigation measures to prevent hazard damage
- Obtain necessary equipment (e.g., contractors with cranes to help with dams), resources, and training to protect property if a hazard occurs
- Conduct training sessions and exercises to prepare for possible hazards.

GOAL 3: Maintain Natural and Man-made Systems and Essential Services

OBJECTIVES

- Identify, inspect, and maintain all critical infrastructure and facilities
- Improve security for the County Courthouse
- Repair or replace critical infrastructure and facilities that are damaged or degraded
- Protect critical infrastructure and facilities from hazard damage
- Obtain necessary resources and equipment to insure essential services are maintained in the event of a hazard
- Work with the Department of Natural Resources and the Michigan Department of Environmental Quality to identify how to minimize disaster effects on vital natural resources.

GOAL 4: Manage Growth and Development for Hazard Mitigation

OBJECTIVES

- Develop hazard resistant growth policies
- Restrict development in high hazard areas
- Integrate hazard mitigation planning into land use planning
- Encourage sustainable development
- Protect and conserve natural resources.

The next step in the hazard mitigation planning process is to identify mitigation actions suitable to the community, to evaluate the effect the actions will have on the specified mitigation objectives, and to prioritize actions to decide in what sequence or order these actions should be pursued.

Mitigation actions can be grouped into seven broad categories:

1. Prevention. Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.

2. Property Protection. Develop actions that involve the modification of existing buildings and structures to protect them from hazards, or to remove them from a hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass. It can also include changing the landscape around buildings, brush and grass removal, and flood reduction systems.

3. Public Education and Awareness. Develop actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Such actions include outreach projects, real estate disclosures, hazard information centers, and school-age and adult education programs.

4. Natural Resource Protection. Develop actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems. These actions include sediment and erosion control, stream corridor restoration, watershed management, forest, and vegetation management, and wetland restoration and preservation.

5. Emergency Services. Develop actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.

6. Structural Projects. Develop actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, seawalls, retaining walls, and safe rooms.

7. **Cyber Security Protection and Access Control.** Access and identity verification apply a broad range of physical, technological, and cyber measures to control admittance to critical locations and systems, limiting access to authorized individuals to carry out legitimate activities. Cybersecurity protects against damage to, the unauthorized use of, and/or the exploitation of (and, if needed, the restoration of) electronic communications systems and services (and the information contained therein).

Mitigation actions may be characterized by their relevant urgency. Many of the actions proposed for mitigation in Ogemaw County are ongoing programs. Included among these are:

- Public education programs
- Outreach to vulnerable populations
- Development of and training for the emergency response team
- Provision of proper and adequate equipment for emergencies
- Weather spotters
- Debris management program
- Assistance to vulnerable populations such as shelters and payment of heating bills
- Emergency plans and evacuation procedures for various hazards including schools, businesses, and the community as a whole
- Mutual aid pacts with local agencies and neighboring communities
- Emergency media broadcasts
- Dam emergency action plans
- Emergency action plans and emergency operations plans

Mitigation Strategies for Specifically Identified Hazards

The major hazards identified in the Risk Assessment and by the Hazard Mitigation Committee fall into the broad categories of fires, severe weather, hazardous materials, and transportation accidents. Fire hazards include structural fires and wildfires. Severe weather events include winter storms, thunderstorms, and tornados. This category overlaps with transportation accidents and infrastructure failures and are usually a consequence of the above events or as a result of sabotage or terrorism. Although no events of sabotage or terrorism have taken place in the county, the prevalence of these activities throughout the world has raised the possibility of their occurrence locally. Also, the connectivity and use of computerized systems for public records and public infrastructure makes these systems vulnerable to sabotage.

Meetings were held with each Ogemaw County municipality where 1) the goals of the Hazard Mitigation plan, 2) the risk assessment developed by the Hazard Mitigation Committee, and 3) possible mitigation actions were discussed. The primary concerns expressed by the individual communities were diverse and dependent upon the local circumstances and conditions; but major actions identified for mitigation activities included:

- Identification and upgrade of hazardous road stream crossings
- Pursue Department of Natural Resources involvement in Ogemaw County emergency management activities and participation in the Local Emergency Planning Committee and Local Planning Team. Major Department of Natural Resources concerns are wildfires and Rifle River emergency rescues

- Continue to develop contact systems for the elderly and disabled-reverse 911, weather radios, contact lists, and city "Remind" system of text notification
- Identify sufficient local safe buildings
- Installation of additional warning sirens
- Address utility needs during storms-electricity, sanitary sewers, water, and storm sewers
- Frequent power outages and communication cuts during storms (dead Ash trees causing many problems). Address power line easement clearing.

(The community meeting minutes are contained in the Appendix.)

The community meeting results were reviewed by the Hazard Mitigation Committee and actions were put forth by committee members.

Despite almost every community discounting the possibility of civil disturbances and acts of terrorism, Mr. Walters, Chief of Police in the City of West Branch, stated that there are possibilities of such occurrences in the county. (There are persons on the federal watch list in the county.)

Mike Schultz, managing engineer of the Ogemaw County Road Commission, admitted that many road stream crossings need improvements due to lack of funds in the past, but culvert replacements and other actions are going forward rapidly. He will provide the Road Commission a five-year plan that addresses this issue for the hazard mitigation plan. A culvert replacement data base will be prepared.

Specific locations for warning sirens to be installed were discussed for Shady Shores and Sage Lake. (The Department of Natural Resources has a siren in its campground.) See page 85 for the location of existing sirens.

Tracy Wood discussed health department actions and its part in health emergency preparedness including new programs for preventing Zika virus.

Ann Bak discussed the Department of Health and Human Service's cooperation with Red Cross for local emergency shelters. Buffy Carr will provide the enlisted buildings and groups that cooperate with the Red Cross for inclusion in the plan.

Buffy Carr proposed her main mitigation actions for the near term:

- Repair warning and communication towers in Lupton
- Install a siren in Shady Shores/George Lake area
- Hardening schools against terrorist attacks
- Gain Michigan Department of Natural Resources participation in Ogemaw County Emergency Management planning.

The following are strategies to address specific hazard identified by the Hazard Mitigation Committee and the local municipalities:

Structural Fires

Structural fires pose a threat to human life and are a leading cause of property damage and destruction in Ogemaw County. In addition to these losses, the cost of fire protection services is one of the highest budgeted items for most local units of government. Mitigation strategies both to reduce the incidence of structural fires and to reduce the cost of fire protection services are as follows:

1. Expand the use of the fire protection sprinkler systems, particularly in existing older buildings in downtown areas. Fire protection sprinkler systems are effective in extinguishing structure fires. Sprinkler systems are especially important in buildings in the West Branch downtown area because buildings are located close to, or attached to, on another, and because of the number of persons working in buildings, evacuation is difficult. It is suggested that a committee be established to consist of the emergency management coordinator for the county, the fire chief for the City of West Branch, and building owners in the downtown area, to discuss and address this issue.

2. Ogemaw County has a good system of fire protection provided by its local units of government: the City of West Branch, Rose City, and the Ogemaw County townships and villages. An effective mutual aid system exists. While the community has made much progress in the development of intergovernmental cooperation in responding to fire emergencies and in the areas of equipment purchases and training, more should be done to promote cooperation among the units and to reduce fire protection costs. The goal of such efforts should be the enhancement of fire protection services at a reduced cost. The responsibility for the implementation of these measures rests with the local units of government and their collective fire departments.

Ice and Snowstorm Emergencies

Ogemaw County has experienced numerous ice and snowstorm emergencies. These emergencies are associated with large amounts of snowfall and ice storms in which the accumulation of ice results in slips and falls, transportation hazards due to impassable or slippery conditions, downed trees and tree limbs, and energy failures associated with fallen tree limbs and the weight of ice on powerlines and poles. Mitigation strategies for ice and snowstorms are as follows:

1. Pre-plan for debris management staging and storage areas. In anticipation of downed trees, tree limbs, and snow accumulation, strategies must be in place to predetermine locations for the collection and processing of snow, tree limbs, and other debris. The establishment of such staging areas will facilitate the clearing of roads and handling of debris and snow.

2. Identify local schools and other public buildings throughout the county which could be designated as warming shelters where vulnerable residents can go to escape the effects of loss of heat in their homes due to power outages. Once identified, a public awareness campaign should be initiated to inform citizens of the availability of these shelters.

3. Continue to develop notification and aid systems such as the "Remind" program in the City of West Branch and reverse 911 for the elderly and others needing assistance before, during, and after emergencies.

Thunderstorm Hazards

Severe thunderstorms occur very often in Ogemaw County. These storms can cause great physical damage and occasionally bodily harm or death to individuals. They can also cause disruption of electrical service and other infrastructure.

1. Engage electricity providers to continue clearing power line easements to prevent power outages especially in the rural areas of the county.

2. As with snowstorms, establish safe buildings where residents and visitors to the county can go if power and communications are disrupted.

3. Continue to develop notification and aid systems.

Wildfires

The extensive forests and other undeveloped areas in Ogemaw County make the possibility of wildfires extremely high. The Department of Natural Resources is responsible for wildfire suppression on state land in the county. The Hazard Mitigation Committee and Emergency Management Coordinator should take the following actions for mitigation of wildfire effects:

1. Providing information and presentations to inform landowners how to reduce susceptibility to wildfires in vulnerable locations should be undertaken. General information on preventing wildfires will be disseminated to county residents through advertisements, school notices, and at various events.

2. Encourage the Michigan Department of Natural Resources to cooperate with emergency planning with the Ogemaw County.

Transportation Accidents, Hazard Material Transport, and Oil and Gas Accidents

Because of Ogemaw County's highway system, railways, pipelines, and the makeup of its undeveloped sector, the county is vulnerable to transportation accidents which may include hazardous material spills, gas and oil leaks and spills, including hydrogen sulfide leaks. Whatever agency is first on the scene/e.g. sheriff's department of West Branch Police) take control of site operations and inform emergency management and others for containment, etc. Actions that may reduce the occurrence of incidents include:

1. Rigorous enforcement of weight restrictions and speed limits

2. Enforce USDOT and MDOT regulations regarding hazard material transport

3. Development of site emergency plans of entities near oil, gas, production and pipelines

4. Disseminate information in regards to hydrogen sulfide.

Energy and Infrastructure Disruptions

As indicated earlier, storms, fires, and various accidents can cause disruptions of energy transmission that can also lead to water, sewer, and other infrastructure dysfunctions. In addition to the strategies proposed under the previous categories, the following are proposed:

1. Critical facilities, hospitals, schools, jails and prisons, nursing homes, emergency communication facilities, care facilities, and similar institutions require the use of backup generators for electrical power in the event of a power failure. A listing of such critical facilities will be prepared and an inventory of backup generating equipment, including their capacity and condition, will be prepared to develop an estimate of equipment and facility needs. Based upon the inventory, a prioritized listing of equipment needs and costs can be assembled so that the purchase, update, or repair of equipment can be scheduled based on resources available.

2. Where possible, to resist damage from severe winds and the accumulation of ice, electrical and telephone lines should be buried where the costs associated with the activity can be justified based upon the costs of service disruption, the likelihood of occurrence, and the public health and safety risks to the community.

3. Redundancies in utility and communication systems, especially those associated with critical community, safety, health and business activities, will be implemented where feasible.

Sabotage and Terrorism

Although most communities dismissed the likelihood of civil disturbances, sabotage, and terrorism, law enforcement officials have indicated that there are possibilities for these actions to be carried out.

1. Law enforcement agencies, state police, local police, and sheriff departments should continue to cooperate to prevent individuals or groups from carrying out these types of acts.

2. The federal program "If You See Something, Say Something" campaign should be implemented to make businesses, local governments, and citizens aware of potential threats, methods promoted on how to protect various vulnerable assets, and how to respond to suspicious behavior.

3. The types of possible threats, including cyber security and access control, should be identified with recommended actions to be taken by communities and individuals to prevent these events.

Climate Change

There is almost no belief in the credibility of "climate change" theories in Ogemaw County communities. In fact, many believe a longer growing season and warmer temperatures would be beneficial for the county, e.g., better harvests, lower heating bills, and they do not see actions that could be affected locally that would be of any consequence if the speculations are valid. The following actions could be taken:

1. Provide concrete, verifiable data from both sides of the debate so that individuals and communities can evaluate the claims regarding climate change.

2. Determine particular actions, individuals, and communities could take that would be appropriate based upon the data.

The following Ogemaw County Implementation Strategy Tables detail mitigation actions, possible financing, and their status by hazard.

Ogemaw County Implementation Strategy Table					
Mitigation Actions **A. Multi-Hazard Actions**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Build the capabilities of the county GIS program to function as a tool to address multiple hazards. This effort would require the creation/updating of datasets such as parcel/ownership, location of all structures, driveways with ingress/egress conditions, roads, forest types, ownership types, floodplains, utilities (power lines, gas lines, and water lines), wetlands, water features, bridges and culverts, (SARA III sites)	High	A, B, C, E, H, J, V	B, T, Q	Some progress with county mapping.	Ongoing
Enhance and expand an all hazards education and awareness program in schools, which includes classroom presentations and incorporating wildfire and weather hazard preparedness into school curriculums.	High	A, B, C, J, O,R	B, T	Programs carried out.	Ongoing
Work with power companies to inventory condition of power line rights-of-way, and identify priority sections to clear branches and trees from power lines. The end goal is to create and maintain a disaster-resistant landscape in public rights-of-way.	High	A, E, P, U	B, P, C	Power companies have accomplished much. Ash trees dying have created new problems.	Ongoing
Organize outreach program to vulnerable populations during and after hazard events, including wildfires, extreme winter and summer weather events, periods of extreme temperatures, public health emergencies, and other hazards that can impact the community.	Med.	A, D, H, I, J, N, O, V	B, C, T, Q	Red Cross programs.	Ongoing
Ensure key gasoline stations have the capacity to pump gasoline during power outages especially for emergency vehicles.	High	A, C, E, M, V	B, T	Some progress.	2017
Continue to develop Emergency Response Team program to help prepare for all hazard events in the county.	Med.	A, B, C, D, E	B, Q, T	Continued efforts.	Ongoing
Ensure that the county and individual communities have adequate equipment, staff, and training to respond to transportation-related accidents specific to their needs.	Med.	D, E, J, V	B, Q, T	Continued efforts.	Ongoing
Develop plans to identify and inform persons of “Safe Areas” during festivals/events. (Include signs and directions to shelters.)	Med.	I, J, V	B, I, N, G	Continued efforts.	2018

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M. Local Businesses	**N.** Civic Groups and Churches	**O.** National Weather Service
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V. Law Enforcement		

Ogemaw County Implementation Strategy Table					
Mitigation Actions **A. Multi-Hazard Actions**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Increase usage of NOAA Weather Radio by subsidizing purchase and distribution of radios to county residents, organizations and businesses. Use NOAA radios as a community emergency alert system for information on hazard events.	Med.	A	T	Received grants/radios purchased and distributed.	Ongoing
The county will continue to prepare future land use plans and capital improvement programs to plan for future needs.	Low	B, C	B, C	New County Master Plan 2016	Revise plan 2021
Conduct workshops at community gatherings to encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.	Low	A, I, J, K, N	B, C, H, I, N, T	Continued progress.	Ongoing
Communities will acquire and maintain an adequate level of emergency power generators to supply emergency water needs, wastewater processing, emergency communications, emergency health care and shelters.	High	A, B, C	B, C, T	In progress.	2018
Communities will work with the Federal Emergency Management Agency (FEMA) to identify flood plains.	Low	A, B, C, T	T	No activity.	2025
Procure access to portable/changeable message signs to direct crowds and provide information.	Med.	A, B	N/A	In progress.	2017
Identify and hire optimal staffing levels for county emergency operation and seek funding.	Low	A, B	N/A	In progress.	2020
Develop a plan for pet care and rescue during and after storms.	Low	A, B	N/A	New program	2018

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Ogemaw County Implementation Strategy Table					
Mitigation Actions B. Thunderstorm Hazards (Summer)	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Continue installing public early warning systems and networks.	Med.	A, B, C, O, and Media	B, T	Two sirens installed two years ago. Others in planning.	Ongoing
Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.	Med.	A, H, I, K, N, J	B, T	Continued progress.	Ongoing
Organize outreach to isolated, vulnerable, or special-needs populations.	High	A, C, H, I, N, Q, S	B, H, T	Continued progress.	Ongoing
Plan for adequate road and debris clearing capabilities.	Med.	A, B, C, E, P, V	N/A	Road commission lead.	Ongoing
Identify flood prone road stream crossings and develop schedule for reconstruction to carry flood waters.	High	A, E	N/A	Road commission lead.	2017
Provide public education and awareness of thunderstorm dangers.	Med.	A, G, O, Media	N/A	Continued progress.	Ongoing
Identify then construct where necessary concrete safe rooms in homes and shelter areas in mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas.	Low	A, B, C, J, M, R	C, T	Gain support from various entities.	2020
Increase coverage and use of NOAA Weather Radio.	Med.	A, O	T	Progress made; Radios procured and distributed.	Ongoing
Continue organizing outreach to vulnerable populations during periods of severe weather events, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.	Med.	A, C, H, N, S	B, C, H, T	Continued progress.	Ongoing
Develop or update emergency response plans for schools, campgrounds, fairgrounds, parks, community events, and marinas.	High	A, G, N, R	B, I	Updates ongoing	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions B. Thunderstorm Hazards (Summer)	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Training and increased use of weather spotters.	Med.	A, C, O	O	Attended NWS workshops	Ongoing
Ensure proper anchoring of manufactured homes and exterior structures such as carports and porches.	Low	B	N/A	County Building Department lead.	Ongoing
Pre-planning for debris management staging and storage areas.	Med.	A, E	N/A	County Road Commission lead.	Ongoing
Farmer preparedness to address livestock needs/problems.	Med.	A, B, C, G	N/A	MSU Extension lead.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **C. Winter Weather Hazards**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Maintain adequate road and debris clearing capabilities	High	A, B, C, E, U, V	N/A	Road Commission continue efforts.	Ongoing
Inventory problem areas on roads. Place snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting snow over critical roadway segments.	Low	E, V	E, Q	Road Commission lead.	2017
Establishing heating centers/shelters for vulnerable populations.	High	A, B, C, I, N	H, I, Q, T	Red Cross lead.	Ongoing
Continue producing and distributing family emergency preparedness information relating to severe winter weather hazards.	Med.	A, C	C, Q, T	Continued program.	Ongoing
Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.	Med.	A, H, I, K, N, T	B, T	Continued program.	Ongoing
Increase coverage and use of NOAA Weather Radios.	Med.	A, O	T	Continued program.	Ongoing
Compile a listing of homes and facilities with vulnerable residents such as elderly, informed, and disabled individuals; and establish outreach procedures for assisting residents after severe winter storm events including payment of heating bills.	High	A, C, H, N, Q	A, H, T	Progress made.	Ongoing
Pre-arrange for shelters for stranded motorists/travelers, and others.	Low	A, N, Q	B, C, I, N	Continued program.	Ongoing
Continue proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.	Low	B	N/A	County Building Department lead.	Ongoing
Inform farmers regarding preparedness to address livestock needs/problems.	Low	A, G	N/A	New program.	2018
Continue public education for using surge protectors on critical electronic equipment and home and public maintenance to prevent roof and wall damage from "ice dam."	Low	A, B, C, K	N/A	Continued program.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **D. Wildfires**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Inform residents by presentations and literature regarding proper evacuation procedures, such as wearing protective clothing (sturdy shoes, cotton or wool clothing long pants, a long-sleeved shirt, gloves and a handkerchief to protect the face), taking a Disaster Supplies Kit, and choosing a route away from fire hazards. Residents should plan several escape routes away from their homes – by car and by foot.	High	A, C, D, H, J, V	B, T	Continued program.	Ongoing
Create and enforce local ordinances that require burn permits and restrict campfires and outdoor burning.	High	A, B, C, D, V	B, C,	Need local municipalities support.	2021
Promote media broadcasts of fire weather and fire warnings.	Med.	A, M, V	N/A	Continued program.	Ongoing
Continue training and use of fire spotters, towers, and planes.	Med.	A, J	Q, T	Continued program.	Ongoing
Promote creation of defensible space around structures in fire-prone wildland areas.	Med.	A, C, D, I, J, K	T		
Distribute wildfire education material to home owners and businesses through tax bills and encourage insurance companies to include wildfire safety information in materials provided by insurance companies to area residents.	Med.	A, B, K	K	Begin program.	2017
Conduct multi-agency, inter-county emergency management response exercises for fire suppression.	Med.	A, D, I, J, V	T	Exercises conducted.	Ongoing
Promote and implement fuel management by thinning of flammable vegetation, creation of fuel breaks, use of fire-retardant materials/vegetation and selective thinning.	Med.	J, U	Q, T	Fuel breaks being created. DNR lead.	Ongoing
Ensure adequate water supplies for emergency firefighting (in accordance with NFPA standards).	Low	D, J, U	D, J, Q	Continued program.	Ongoing
Carry out prescribed burns and fuel management (thinning flammable vegetation, possibly including selective logging to thin out some areas).	Low	J, U	J, U	Continued program.	Ongoing
Coordinate county-wide wildfire education program by distribution of materials via direct mailings, school presentations, demonstration projects, displays at community events, and education materials at community libraries.	High	A, B, C, D, G, J, L, R	A, B, C, G, Q, R, T	Continue program.	Ongoing
Promote creation of defensible space around structures in fire-prone wildland areas.	Med.	A, C, D, J, K	A, B, C, J, T	Continue program.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **E. HAZ/MAT Transportation**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Promote compliance with and enforcement of USDOT and MDOT regulations regarding hazardous materials transport and enforcement of weight and travel restrictions.	High	E, V	G, Q, T	Road Commission and State Police lead.	Ongoing
Proper planning, design, maintenance of, and enhancements to designated truck routes.	High	C, B, E, Q, T	E, Q, T	Road Commission and municipal actions.	Ongoing
Railroad inspections and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossings).	High	E, Q	E, Q, T	Road Commission and municipal actions.	Ongoing
Develop evacuation plans and community awareness of them.	Med.	A, B, C, D	B, C, T	Progress and ongoing	2019
Locate schools, nursing homes, and other special facilities away from major hazardous material transportation routes.	Low	A, B, C, D, R	B, C	County and municipal planning through site plan review.	Ongoing
Increase coverage and use of NOAA Weather Radios (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents).	Low	A	T	Major progress.	Ongoing
Improve capability of agencies to carry-out road closures and to provide traffic control in accident areas.	Med.	E, V	E, T	Completed and ongoing.	Ongoing
Provide for trained, equipped, and prepared local hazardous materials emergency response teams and rescue teams.	Med.	A, B, C, D	B, C, T	Major progress.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **F. Infrastructure Failure**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Procure and maintain generators for backup power at critical facilities.	High	A, B, C, R, S, T, V	B, C, H, M, S, T	Most sites identified. Review annually. Purchase as monies available.	Ongoing
Encourage or require burying of electrical and phone lines, where possible, to resist damage from severe winds, lightning, ice, and other hazards.	Low	A, B, C, P	M	Planning and zoning requirements in zoning ordinance.	Ongoing
Increase public awareness and widespread use of the "Miss Dig" utility damage prevention service.	Med.	A, B, C, M, Media	N/A	Programs continuing.	Ongoing
Identify sites and seek funding to improve critical road/stream crossings.	Med.	B, C, E, Q	B, C, Q, T	Road Commission lead. Progress made.	Ongoing
Continue programs/networks for contacting elderly or homebound persons during periods of infrastructure failure.	Med	A, B, C, H, I, N, S, V	B, C, H, I	Red Cross and Health Department continued program.	Ongoing
Protect electrical and communications systems from lightning strikes.	Med.	B, C, M, R, S	P, M, S	Continued program.	Ongoing
Establish redundancies in utility and communication systems, especially "Lifeline" systems.	Low	A, B, C, P	B, C, P	Redundancies in City of West Branch and Townships. Continued program.	Ongoing

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V. Law Enforcement		

Ogemaw County Implementation Strategy Table					
Mitigation Actions G. Structural Fire	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Continue improved and continuing training for emergency responders, and provision of equipment for them.	High	A, B, C, D, V	B, F, Q	Training done and continuing.	Ongoing
Develop site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, and recreation areas, and other appropriate sites.	High	A, B, C, D, M, N, R, S, V	B, C, M, T	Progress made. Continue programs.	Ongoing
Continue public education and school programs (especially about the use of stoves, heaters, fireworks, matches/lighters, etc.)	High	A, D, R	B, R, T	Programs presented and continuing.	Ongoing
Eliminate clandestine, illegal methamphetamine laboratories through law enforcement and public education.	High	V, Q	V, Q, T	Some operations shut down; continuing.	Ongoing
Provide proper maintenance of power lines and efficient response to fallen power lines.	High	P	P	Continued maintenance.	Ongoing
Provide continued education and literature regarding safe cigarette handling, candle use, fireworks, campfires, and holiday lights. The safe use and maintenance of fireplaces, stoves, and chimneys.	Med.	A, B, D, G, H, S	Q, T	Continuing programs.	Ongoing
Require and encourage installation and maintenance of smoke detectors and fire extinguishers. Teach family members and residents how to use.	Med.	A, B, D, G, H, R	B, Q, T	Continuing regulation and inspections.	Ongoing
Promote proper workplace procedures and training for handling of explosive and flammable materials and substances.	Med.	A, D, K, M	Q, T	Continuing programs.	Ongoing
Do transportation planning that provides for roads, overpasses, etc. to maximize access and improve emergency response times and evacuation potential, for all inhabited or developed areas of a community. This includes transportation access within developed sites used as shopping malls, stadiums, office and commercial parking lots, etc.	Low	B, E, M, Q	E, M, Q, T	Requirements in place and local planning needs to ensure adequate review.	Ongoing
Control civil disturbances and criminal activities that could lead to arson.	Low	V	N/A	Regular law enforcement.	Ongoing
Identify adequate water supplies and dry hydrants for emergency firefighting. In areas lacking adequate water supplies, develop strategy to construct fire hydrants where needed.	High	A, B, C, D, E, K	Q, T	Dry hydrant and water drafting is continuous. Many dry hydrants are in place.	Long-term Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **H. Oil/Gas Pipeline/Well Accident**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Develop site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.	High	A, B, C, D, M, N, R, S, T, V	B, C, D, M, N, R, T	Promoting plans and continue program.	Ongoing
Continue proper pipeline design, construction, maintenance, and inspection.	Med.	A, B, C, D, M, Q	Q	Continued program.	Ongoing
Establish contingency plans for worker and public protection, including the inclusion of rescue and evacuation procedures for well hazard areas in the local emergency operations plan.	High	A, B, C, D, H, I, N, Q, S, T, V	B, T	Some plans in place. Continue efforts.	Ongoing
Increase public awareness and widespread use of the "MISS DIG" utility damage prevention service (800-482-7171) and increase public awareness of pipeline locations and appropriate emergency preparedness.	Med.	A, B, C, M, P	N/A	Continue program.	Ongoing
Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.	Low	A, H, I, K, N, P	B, T	Progress continuing.	Ongoing
Promote awareness of hydrogen sulfide gas dangers and personal protection actions for these dangers.	Low	A, B, C, G, M, P	Q, T	Progress continuing.	Ongoing

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V. Law Enforcement		

Ogemaw County Implementation Strategy Table					
Mitigation Actions **I. Dam Failure**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Maintain public awareness and warning systems in place.	High	A, B, C, D, Media	B, T	In place.	Ongoing
Ensure consistency of dam Emergency Action Plans (EAP) with the local Emergency Operations Plans (EOP).	High	A, B, C, J, P and MDEQ	Q, T	In place and reviews are done every 2 or 5 years.	Ongoing
Maintain trained, equipped, and prepared search and rescue teams.	Med.	A, B, C, D, E, V	B, Q, T	Regular ERT training continuing.	Ongoing
Increase coverage and use of NOAA Weather Radios.	Low	A, B	T, O	Radios procured and distributed.	Ongoing
Constructing emergency access roads to dams.	Low	B, E	N/A	In place, regular maintenance.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **J. Terrorism/Sabotage**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Develop site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.	High	A, B, C, D, M, Q, R, S, T	C, Q, T	Some progress.	2021
Develop a thorough community risk and threat assessments that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.	High	A, B, C, V	Q, T, V	New program.	2018
Promote alertness, awareness, and monitoring of organizations and activities that may threaten the community.	High	A, B, C, G, M, V	N/A	New area for planning.	Ongoing
Promote consistent use of computer data back-up systems and anti-virus software.	High	A, B, C, D, V	N/A		Ongoing
Training, planning, and preparedness by local law enforcement and other responders for terrorist/sabotage/WMD attacks.	Med.	A, B, C, D, V	Q, T, V	Some preparation. Continue program.	Ongoing
Establish avenues of reporting information preventing terrorist incidents and sabotage.	Med.	A, B, V	Q, T, V	New program.	2018
Heighten security at public gatherings, special events, and critical community facilities and industries.	Med.	B, G, M, R, V	Q, T, V	Promote to organizations holding events.	2017
Implement school safety and violence prevention programs.	Med.	A, R, V	Q, T, V	Continue established programs.	Ongoing
Promote understanding of and provision for, mental health services in schools, workplaces, and institutions.	Low	A, H, M, R, S	B, C, Q, T	Continue Health and Mental Health Department programs.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **K. Transportation Accidents**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Use improved design, routing, and traffic control at problem roadway areas.	High	E, Q	E, Q, T	Road Commission continue.	Ongoing
Continue training, planning, and preparedness for mass-casualty incidents involving all modes of public transportation.	High	A, B, C, E, V	Q, T	Regular emergency preparedness routines.	Ongoing
Continue railroad inspections and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossing).	Med.	E, Q	E, Q, T	Regular inspections. Improvements being made.	Ongoing
Provide airport maintenance, security, and safety and airfield emergencies programs and training.	High	A, B, C, D, Q	B, C, Q, T		
Continue enforcement of designated truck routes, weight, and travel restrictions, and highway speed limits.	Low	E, Q, V	N/A	Stricter adherence to laws.	Ongoing

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Ogemaw County Implementation Strategy Table					
Mitigation Actions **L. Public Health Emergencies**	**Priority**	**Responsible Agency**	**Funding Sources**	**Progress**	**Status**
Encourage residents to receive immunizations against communicable diseases.	Med.	H, N, Q, S	H, Q	Progress made.	Ongoing
Increase public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.	High	H, N, R, S	H, Q, T	Progress made and continue to work on activity.	Ongoing
Inform public and support pollution control, enforcement and cleanup, proper disposal of chemicals and scrap materials.	Med.	A, B, C, H, M, Q, R	H, Q, T	In place and continuing.	Ongoing
Expand reduced-fee clinics and school health services for the needy.	Med.	B, C, H, N, Q, S	H, Q, T	Continuing to expand programs.	Ongoing
Increase public awareness of radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings.	Low	H, Q	B, G, H	In place.	Ongoing

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A CHECKLIST OF POSSIBLE MITIGATION STRATEGIES BY HAZARD

Each hazard has a list of associated mitigation strategies. Below is a list of specific groups or organizations that can be active in implementing the described mitigation-related activity.

Business owners & managers (including site developers and builders and government administrators whose activities are similarly associated with the selection, design, and operation of specific sites performing economic or community functions)
Public Citizens and those who provide educational services or marketing campaigns to them
Emergency management coordinators and related persons (LEPCs, incident commanders, etc.)
First-responders (law enforcement, fire fighters, medical services, other response services at all levels)
Insurance agencies & real estate offices
Elected officials and Legislators
Non-profit organizations and government departments which support them or have similar concerns (welfare provision, environmental protection, etc.)
Building Officials and other inspection, regulation, and code enforcement officials (health, fire, etc.)
Planning departments, consultants, officials, engineers, and others involved in similar activities guiding long-term development patterns and conditions in a community.
Researchers, engineers, architects, and others involved in the study and design of human environments and support infrastructure; also includes public works, utility providers, and others dealing with infrastructure design, development and maintenance (road commissioners, drain commissioners, etc.)

Thunderstorm Hazards
____ Increased coverage and use of NOAA Weather Radio.
____ Producing and distributing family emergency preparedness information relating to thunderstorm hazards.
____ Public education and awareness of thunderstorm dangers.
____ Training and increased use of weather spotters.
____ Public early warning systems and networks.
____ Tree trimming and maintenance to prevent limb breakage and safeguard nearby utility lines. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
____ Buried/protected power and utility lines.
____ Inclusion of safety strategies for severe weather events in driver education classes and materials.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

____ Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, objects from destroyed/damaged structures, vegetation or other items knocked down or blown by winds.)
____ Using structural bracing, window shutters, laminated glass in window panes, and hail-resistant roof shingles to minimize damage to public and private structures.
____ 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.)
____ Using surge protectors on critical electronic equipment.
____ Installing lightning protection devices on the community's communications infrastructure.
____ Using appropriate wind engineering measures and construction techniques (e.g. structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced entry and garage doors, window shutters, waterproof adhesive sealing strips, and interlocking roof shingles) to strengthen public and private structures against severe wind damage.
____ Proper anchoring of manufactured homes and exterior structures such as carports and porches.
____ Establishing safe and appropriate locations for temporary debris disposal sites.
____ Securing loose materials, yard, and patio items indoors or where winds cannot blow them about.
____ Construction of concrete safe rooms in homes and shelter areas in mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas.
____ Pre-planning for debris management staging and storage areas. (Debris could be rubble, vehicles, objects from destroyed/damaged structures, vegetation or other items knocked down or blown by winds, or broken power or phone lines that had frozen or been weighted down by fallen branches and trees.)

Drought

____ Storage of water for use in drought events (especially for human needs during extreme temperatures).
____ Measures or ordinances to prioritize or control water use (especially when needed to fight fires).
____ Encouragement of water-saving measures by consumers (especially during irrigation and farming).
____ Anticipation of potential drought conditions, and preparation of drought contingency plans.
____ Designs and plans for water delivery systems that include a consideration of drought events.
____ Obtaining agricultural insurance.

Winter Weather Hazards

____ Increased coverage and use of NOAA Weather Radio.

____ Producing and distributing family emergency preparedness information relating to severe winter weather hazards.
____ Including safety strategies for severe weather events in driver education classes and materials.
____ Tree trimming and maintenance to prevent limb breakage and safeguard nearby utility lines. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
____ Buried/protected power and utility lines.
____ Establishing heating centers/shelters for vulnerable populations.
____ Organizing outreach to isolated, vulnerable, or special-needs populations.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.
____ Pre-planning for debris management staging and storage areas. (Debris is usually the snow and ice itself, 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 fallen branches could be part of the problem. Some storage areas will definitely be needed for snow removal during blizzards.)
____ Home and public building maintenance to prevent roof and wall damage from "ice dams."
____ Pre-planning for 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 fallen branches could be part of the problem. In some cases, roofs may collapse under the weight of ice and snow.)
____ Proper building/site design and code enforcement relating to snow loads, roof slope, snow removal and storage, etc.
____ Farmer preparedness to address livestock needs/problems.
____ Pre-arranging for shelters for stranded motorists/travelers, and others.
____ Maintaining adequate road and debris clearing capabilities.
____ Using snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.
____ Pre-planning for 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 fallen branches could be part of the problem. In some cases, roofs may collapse under the weight of ice and snow. Some storage areas will definitely be needed for snow removal during blizzards.)

Extreme Temperatures

____ Organizing outreach to vulnerable populations during periods of extreme temperatures, including establishing and building awareness of accessible heating and/or cooling centers in the community, and other public information campaigns about this hazard.
____ Increased coverage and use of NOAA Weather Radio.

____ Housing/landlord codes enforcing heating requirements.
____ Special arrangements for payment of heating bills.

Wildfires

____ Proper maintenance of property in or near wildland areas (including short grass; thinned trees and removal of low hanging branches; selection of fire-resistant vegetation; 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; and keeping garage areas protected from blowing embers).
____ Safe disposal of yard and house waste rather than through open burning.
____ Use of fire spotters, towers, planes.
____ Keep handy household items that can be used as fire tools; a rake, axe, hand/chainsaw, bucket and shovel. Install and maintain smoke detectors and fire extinguishers. Install a smoke alarm on each floor of buildings and homes. Test monthly and change the batteries two times each year. Teach family members how to use the fire extinguisher.
____ Post fire emergency telephone numbers.
____ Organizing neighborhood wildfire safety coalitions (to plan how the neighborhood could work together to prevent a wildfire).
____ 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 (cleaning up areas of abandoned or collapsed structures, accumulated junk or debris, and with any history of flammable substances stored, spilled, or dumped on them).
____ Public education on smoking hazards and recreational fires.
____ Proper maintenance and separation of power lines. Ask the power company to clear branches from 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.
____ Create and enforce local ordinances that require burn permits and restrict campfires and outdoor burning.
____ Mutual aid pacts with neighboring communities.

____ Prescribed burns and fuel management (thinning of flammable vegetation, possibly including selective logging to thin out some areas. Fuels cleared can be given away as firewood or chipped into wood chips for distribution.)

____ 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 firefighting (in accordance with NFPA standards). For residents, identify and maintain an adequate outside water source such as a small pond, cistern, well, swimming pool or hydrant; have a garden hose that is long enough to reach any area of the home and other structures on the property; install freeze-proof exterior water outlets on at least two sides of the home and near other structures on the property. Install additional outlets at least 50 feet from the home; consider obtaining a portable gasoline powered pump in case electrical power is cut off.

____ Obtaining insurance.

____ Including wildfire safety information in materials provided by insurance companies to area residents.

____ When Wildfire threatens, residents should be instructed to carry and listen to battery-operated radios for reports and evacuation information, and follow the instructions given by local officials. Cars should be backed into garages or parked in an open space facing the direction of escape, with doors and windows closed and the key in the ignition. Garage windows and doors should be closed but left unlocked. If residents have time, they can take steps to protect their homes by closing windows, vents, doors, venetian blinds and heavy drapes; removing lightweight curtains; shutting off gas at the meter; turning off pilot lights; opening fireplace damper; closing fireplace screens; moving flammable furniture into the

center of the home away from windows and sliding-glass doors; and turning on a light in each room to increase the visibility of homes in heavy smoke. Outside, residents can seal attic and ground vents with pre-cut plywood or commercial seals, turn off propane tanks, place combustible patio furniture inside, connect the garden hose to outside taps, set up a portable gasoline-powered pump, place lawn sprinklers on the roof and near above-ground fuel tanks, wet the roof, wet or remove shrubs within 15 feet of the home, and gather fire tools.

____ Residents should be instructed on proper evacuation procedures, such as wearing protective clothing (sturdy shoes, cotton or woolen clothing, long pants, a long-sleeved shirt, gloves and a handkerchief to protect the face); taking a Disaster Supplies Kit; and choosing a route away from fire hazards.

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

Dam Failures

____ Ensuring consistency of dam Emergency Action Plan (EAP) with the local Emergency Operations Plan (EOP).

____ Garnering community support for removal or repair of dams in disrepair.

____ Regulate development in the dam's hydraulic shadow (where flooding would occur if there was a severe dam failure).

____ Public awareness and warning systems.

____ Obtaining insurance.

____ Greater local support for/assistance with dam inspections and enforcement of the Dam Safety Program (Part 315 of the Natural Resources and Environmental Protection Act) requirements and goals.

____ Increased coverage and use of NOAA Weather Radio

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

____ Constructing emergency access roads to dams.

____ Pump and flood gate installation/automation.

____ Real estate disclosure laws that identify a home's location within a dam's hydraulic shadow.

____ Trained, equipped, and prepared search and rescue teams.

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

Riverine and Urban Flooding

____ Accurate identification and mapping of flood-prone areas.

____ Flood plain management – planning acceptable uses for areas prone to flooding (through comprehensive planning, code enforcement, zoning, open space requirements, subdivision regulations, land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.

____ Acceptable land use densities, coverage and planning for particular soil types and topography (decreasing amount of impermeable ground coverage in upland and drainage areas, zoning and open space requirements suited to the capacity of soils and drainage systems to absorb rainwater runoff, appropriate land use and capital improvements planning) and involving drain commissioners, hydrologic studies, etc. in these analyses and decisions.

____ Dry flood proofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).

____ Wet flood proofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).

____ Elevation of flood-prone structures above the 100-year flood level.

____ Construction of elevated or alternate roads that may be unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.

____ Government acquisition, relocation, or condemnation of structures within a floodplain or floodway area.

____ Public awareness of the need for permits (MDEQ Part 31) for building in floodplain areas.

____ Inclusion of safety strategies for flooded areas in driver education classes and materials.

____ Employing techniques of erosion control within the watershed area (proper bank stabilization, techniques such as planting of vegetation on slopes, creation of terraces on hillsides, use of riprap boulders and geotextile fabric, etc.).

____ Dredging and clearance of sediment and debris from drainage channels.

____ Protection (or restoration) of wetlands and natural water retention areas.

____ Enforcement of basic building code requirements related to flood mitigation.

____ Formation of a watershed council.

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

____ Obtaining insurance.

____ Joining the National Flood Insurance Program.

____ Participating in the Community Rating System (CRS).

____ Structural projects to channel water away from people and property (dikes, levees, floodwalls) or to increase drainage or absorption capacities (spillways, water detention and retention basins, relief drains, drain widening/dredging or rerouting, debris detention basins, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, wetlands protection and restoration).

____ Higher engineering standards for drain and sewer capacity.

____ Drainage easements (allowing the planned and regulated public use of privately owned land for temporary water retention and drainage).

____ Installing (or re-routing or increasing the capacity of) storm drainage systems, including the separation of storm and sanitary sewage systems.

____ Farmland and open space preservation.

____ Elevating mechanical and utility devices above expected flood levels.
____ Improved/updated floodplain mapping.
____ Real estate disclosure laws.
____ Public education and flood warning systems.
____ Monitoring of water levels with stream gauges and trained monitors.
____ Increased coverage and use of NOAA Weather Radio.
____ Training for local officials on flood fighting, floodplain management, floodproofing, etc.
____ Anchoring of manufactured homes to a permanent foundation, but preferably these structures would be readily movable if necessary or else permanently relocated outside of flood-prone areas.
____ Road closures and traffic control in flooded areas.
____ Trained, equipped, and prepared search and rescue teams.
____ Control and securing of debris, yard items, or stored objects (including oil, gasoline, and propane tanks, and paint and chemical barrels) in floodplains that may be swept away, damaged, or pose a hazard when flooding occurs.
____ Back-up generators for pumping and lift stations in sanitary sewer systems, and other measures (alarms, meters, remote controls, and switchgear upgrades) to ensure that drainage infrastructure is not impeded.
____ Detection and prevention/discouragement of illegal discharges into storm-water sewer systems, from home footing drains, downspouts and sump pumps.
____ Employing techniques of erosion control in the area (bank stabilization, planting of vegetation on slopes, creation of terraces on hillsides).
____ Increasing functioning and capacity of sewage lift stations and treatment plants (installation, expansion, and maintenance), including possible separation of combined storm/sanitary sewer systems, if appropriate.
____ Purchase or transfer of development rights – to discourage development in floodplain areas.
____ Stormwater management ordinances or amendments.
____ Wetlands protection regulations and policies.
____ Regional/watershed cooperation.
____ Use of check valves, sump pumps and backflow preventers in homes and buildings.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Shoreline Flooding and Erosion

____ Accurate identification and mapping of flood-prone areas.
____ Floodplain/coastal zone management – planning acceptable uses for areas prone to flooding (comprehensive planning, zoning, open space requirements, subdivision regulations, land use and capital improvements planning).
____ Dry floodproofing of structures within known flood areas (strengthening walls, sealing openings, use of waterproof compounds or plastic sheeting on walls).
____ Wet floodproofing of structures (controlled flooding of structures to balance water forces and discourage structural collapse during floods).

____ Elevation of flood-prone structures above the 100-year flood level.
____ Construction of elevated or alternative roads that are unaffected by flooding, or making roads more flood-resistant through better drainage and/or stabilization/armoring of vulnerable shoulders and embankments.
____ Government acquisition, relocation, or condemnation of structures within floodplain or floodway areas.
____ Employing techniques of erosion control in the area (bank stabilization, planting of vegetation on slopes, creation of terraces on hillsides).
____ Enforcement of basic building code requirements related to flood mitigation.
____ Obtaining insurance.
____ Joining the National Flood Insurance Program.
____ Participating in the Community Rating System (CRS).
____ Structural projects to channel water away from people and property (dikes, levees, floodwalls) or to increase drainage or absorption capacities (spillways, water detention and retention basins, relief drains, drain widening/dredging or rerouting, debris detention basins, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, wetlands protection and restoration).
____ Elevating mechanical and utility devices above expected flood levels.
____ Public education and flood warning systems.
____ Monitoring of water levels with stream gauges and trained monitors.
____ Anchoring of manufactured homes to a permanent foundation in flood areas, but preferably these structures would be readily movable if necessary or else permanently relocated outside of flood-prone areas and erosion areas.
____ Trained, equipped, and prepared search and rescue teams.
____ Control and securing of debris, yard items, or stored objects in floodplains that may be swept away, damaged, or pose a hazard when flooding occurs.
____ Real estate disclosure laws.
____ Increased coverage and use of NOAA Weather Radio.
____ Road closures and traffic control in flooded areas.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Fixed Site Hazardous Material Incidents (including explosions and industrial accidents)
____ Maintaining an active and viable Local Emergency Planning Committee (LEPC).
____ Developing and exercising site emergency plans and community response plans as required under SARA Title III.
____ Development of Risk Management Plans for sites that manufacture, store, or handle hazardous materials, to comply with EPA regulations. (For guidance, see the EPA's CEPPO web site at http://www.epa.gov/swercepp/acc-pre.html .)
____ Training in and compliance with all safety procedures and systems related to the manufacture, storage, transport, use, and disposal of hazardous materials.
____ Policies stressing the importance of safety above other considerations.
____ Trained, equipped, and prepared site and local hazardous material emergency response teams.

____ Compliance with/enforcement of Resource Conservation and Recovery Act (RCRA) standards.
____ Elimination of clandestine methamphetamine laboratories through law enforcement and public education.
____ Hazardous material public awareness and worker education programs.
____ Facility and community training and exercise programs.
____ Brownfield cleanup activities.
____ Identification of radioactive soils and high-radon areas
____ Proper separation and buffering between industrial areas and other land uses.
____ Location of industrial areas away from schools, nursing homes, etc.
____ Evacuation plans and community awareness of them.
____ Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
____ Public warning systems and networks for hazardous material releases.
____ Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents).
____ Road closures and traffic control in accident areas.
____ Trained, equipped, and prepared search and rescue teams.
____ Compliance with all industrial, fire, and safety regulations.
____ Insurance coverage.
____ Enhanced security and anti-terrorist/sabotage/civil disturbance measures.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Hazardous Material Transportation Incidents

____ Improvements in driver education, traffic law enforcement, and transportation planning that balance the needs of hazardous material transporters with the safety of the general public.
____ Improved design, routing, and traffic control at problem roadway areas.
____ Long-term planning that provides more connector roads for reduced congestion of arterial roads.
____ Railroad inspections and improved designs at problem railway/roadway intersections (at grade crossings, rural signs/signals for RR crossing).
____ Proper planning, design, maintenance of, and enhancements to designated truck routes.
____ Enforcement of weight and travel restrictions for truck traffic.
____ Training, planning, and preparedness for hazardous material incidents along roadways and railways (in addition to fixed site emergencies).
____ Public warning systems and networks.
____ Increased coverage and use of NOAA Weather Radio (which can provide notification to the community during any period of emergency, including large scale hazardous material incidents).

____ Use of ITS (intelligent transportation systems) technology.
____Compliance with and enforcement of USDOT and MDOT regulations regarding hazardous materials transport.
____ Locating schools, nursing homes, and other special facilities away from major hazardous material transportation routes.
____ Road closures and traffic control in accident areas.
____ Trained, equipped and prepared local hazardous materials emergency response teams.
____ Trained, equipped, and prepared search and rescue teams.
____ Evacuation plans and community awareness of them.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Infrastructure Failures

____ Proper location, design, and maintenance of water and sewer systems (to include insulation of critical components to prevent damage from ground freeze).
____ Burying electrical and phone lines, where possible, to resist damage from severe winds, lightning, ice, and other hazards.
____ Redundancies in utility and communications systems, especially "lifeline" systems.
____ Mutual aid assistance for failures in utility and communications systems (including 9-1-1).
____ Alternative 9-1-1 access through radio operators whose homes are identified through special markings.
____ Programs/networks for contacting elderly or homebound persons during periods of infrastructure failure, to assess whether they have unmet needs.
____ Separation and/or expansion of sewer system to handle anticipated stormwater volumes.
____ Use of generators for backup power at critical facilities.
____ Regular maintenance and equipment checks.
____ "Rolling blackouts" in electrical systems that will otherwise fail completely due to overloading.
____ Replacement or renovation of aging structures and equipment (to be made as hazard-resistant as economically possible).
____ Protecting electrical and communications systems from lightning strikes.
____ Tree-trimming programs to protect utility wires from falling branches. (Ideal: Establishment of a community forestry program with a main goal of creating and maintaining a disaster-resistant landscape in public rights-of-way.)
____ Increasing public awareness and widespread use of the "MISS DIG" utility damage prevention service (1-800-482-7171).
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Oil and Natural Gas Well Accidents

____ Community and operator compliance with industry safety regulations and standards.

____ Awareness of hydrogen sulfide gas dangers and personal protection actions for these dangers.
____ Using buffer strips to segregate wells, storage tanks, and other production facilities from transportation routes and adjacent land uses, in accordance with state regulations, and consistent with the level of risk.
____ Developing site emergency plans for schools, factories, office buildings, shopping malls, hospitals, correctional facilities, stadiums, recreation areas, and other appropriate sites.
____ Contingency plans for worker and public protection, including the inclusion of rescue and evacuation procedures for well hazard areas in the local emergency operations plan.
____ Encourage residents to develop a Family Disaster Plan which includes the preparation of a Disaster Supplies Kit.

Public Health Emergencies
____ Encouraging residents to receive immunizations against communicable diseases.
____ Improving ventilation techniques in areas/facilities prone to crowding, or that may involve exposure to contagion or noxious atmospheres.
____ Increasing public awareness of radon dangers and the prevention efforts that can be taken to reduce concentrations of radon in homes and buildings.
____ Maintaining community water and sewer infrastructure at acceptable operating standards.
____ Providing back-up generators for water and wastewater treatment facilities to maintain acceptable operating levels during power failures.
____ Demolition and clearance of vacant condemned structures to prevent rodent infestations.
____ Maintaining a community public health system with sufficient disease monitoring and surveillance capabilities to adequately protect the population from large-scale outbreaks.
____ Increasing public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies.
____ Community support of free or reduced-expense clinics and school health services.
____ Preventing public contact with contaminated sites or waters (including floodwaters).
____ Brownfield and urban blight clean-up activities.
____ Pollution control, enforcement, and cleanup; proper disposal of chemicals and scrap materials.
____ Proper location, installation, cleaning, monitoring, and maintenance of septic tanks.
____ Separation of storm and sanitary sewer systems.

Sabotage/Terrorism/Weapons of Mass Destruction (WMD)
____ Development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for a sabotage/terrorism/WMD attack.
____ Alertness, awareness, and monitoring of organizations and activities that may threaten the community.
____ Implementing school safety and violence prevention programs.
____ Providing legitimate channels of political and public expression.

____ Heightening security at public gatherings, special events, and critical community facilities and industries.

____ Using laminated glass and other hazard-resistant, durable construction techniques in public buildings and critical facilities.

____ Greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings.

____ Training, planning, and preparedness by local law enforcement and other responders for terrorist/sabotage/WMD attacks.

____ The development and testing of internal emergency plans and procedures by businesses and organizations.

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

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

____ Consistent use of computer data back-up systems and anti-virus software.

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

____ 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.

Chapter 6 *Implementation*

Approval Process

Public Review and Comment

Several avenues were used to disseminate the draft plan for public review and comment. CD copies of the draft Ogemaw County Hazard Mitigation Plan were distributed to each local municipality. Draft copies were placed at the main library in the County and in the County Clerk's office. The draft plan was posted on the county's web site. A newspaper notice informed county residents of the draft plan, where it could be reviewed and when the County Board of Commissioners would be considering approval of the plan.

A presentation was made to the Ogemaw County Chapter of the Michigan Township Association. The purpose of the presentation is to describe the hazard mitigation planning process, conclusions, and recommended actions. Townships and municipalities will be asked to adopt the plan at their next township board, city, or village meetings.

Approval

The Ogemaw County Hazard Mitigation Plan was presented to the Ogemaw County Board of Commissioners at their regular monthly meeting on _____. A notice of the presentation and proposed actions was published in the paper of county record, the _____. The purpose of the presentation was to describe the planning process, conclusions and recommended actions. The Ogemaw County Board of Commissioners approved the Hazard Mitigation plan on _____. A copy of the resolution is reproduced at the end of this chapter.

Plan Implementation

Roles and Responsibilities

The primary entities responsible for implementing the Hazard Mitigation Plan are the Ogemaw County Board of Commissioners and the Ogemaw County Emergency Management Coordinator. The Local Emergency Management Committee (LEPC) is organized under the SARA Title III Program and meets on a regular basis to carry out its duties. This plan recommends the committee expand its role to function as the County Hazard Mitigation Committee to oversee implementation of the plan. Roles will need to be defined by the committee and should include establishing an annual work plan, supporting grant writing to seek funding to complete projects, monitoring mitigation activities, evaluating the need for new projects, amending the plan to add new projects and to function as a review body for mitigation grant applications.

It is understood that current resources, both staff and financial, will not accommodate the expanded role of the Ogemaw LPT and Ogemaw Emergency Management Office. The County Board of Commissioners will need to evaluate funding and staffing required to

implement the Ogemaw Hazard Mitigation Plan. Working partnerships with the following agencies and organizations will strengthen the County's hazard mitigation program:

County Emergency Management Coordinator
County Board of Commissioners
County Sheriff's Department
Ogemaw County Departments
Cities of West Branch, Rose City, Village of Prescott, and the townships in Ogemaw County
Township, City and Village Fire Departments
Ogemaw County Conservation District
Ogemaw County Road Commission
Michigan Department of Natural Resources
Michigan Department of Environmental Quality
U.S. Forest Service
Michigan State University Cooperative Extension Service
Michigan Department of Agricultural and Rural Development
Natural Resource Conservation Service
District Health Department
American Red Cross
Insurance Companies
Real Estate Companies
Local Businesses
Civic Groups and Churches
Federal Emergency Management Administration
Michigan State Police

Process for Monitoring, Evaluating, and Updating

Monitor – The Ogemaw County Hazard Mitigation Committee and the Ogemaw County Emergency Management Coordinator will be responsible for monitoring the implementation of the Mitigation Plan. This may include reviewing reports from agencies involved in implementing projects or activities; having a staff person, who is responsible for overseeing the plan, conducting site visits and meetings concerning mitigation project activities; preparing an annual mitigation activity report for the County Board of Commissioners.

Evaluate – The Ogemaw County Hazard Mitigation Committee and the Ogemaw County Emergency Management Coordinator will be responsible for evaluating the effectiveness of the plan.

The evaluation should assess whether:
• The goals and objectives address current and expected conditions;
• The nature, magnitude and/or type of risks that have changed.
• The current resources are appropriate for implementing the plan.

- There are problems with implementation.
- There have been favorable or unfavorable outcomes
- Agencies and other partners participated as expected.

The Disaster Mitigation Act (DMA) of 2000 requires the Ogemaw County Hazard Mitigation Plan be updated every five years. This may include updating community profiles, examining goals, redoing the hazard analysis and revisiting the project list. In order to properly update the plan, Ogemaw County will need to seek funding from appropriate state and federal agencies. It may be necessary to examine the plan each year and as projects are completed and new mitigation projects are identified. Local units of government, county departments, and local, state and federal agencies will have the ability to propose and sponsor projects from the hazard mitigation plan. Any update would require public comment, county approval, local jurisdictional approval if projects are located or proposed in a particular township, and approval by the State of Michigan and FEMA.

Process to Incorporate into Local Planning Activities

Ogemaw County and its cities, village and townships, as well as, local and state agencies will consider integrating information from the Hazard Mitigation plan into their prospective comprehensive and operations plans. Land use planning and zoning is administered at the county, city, and township level. As a part of the education and outreach aspect of the hazard mitigation effort, communities will be encouraged to incorporate hazard mitigation planning into their respective comprehensive planning and capital improvements planning and adopt zoning regulations that will minimize effects of hazards. The Ogemaw County Hazard Mitigation Plan will be considered and analyzed by local officials when updating local plans, such as master plans and recreation plans. After the Hazard Mitigation Plan is considered and analyzed, the appropriate actions and requirements will be incorporated into other plans.

Ongoing Public Participation

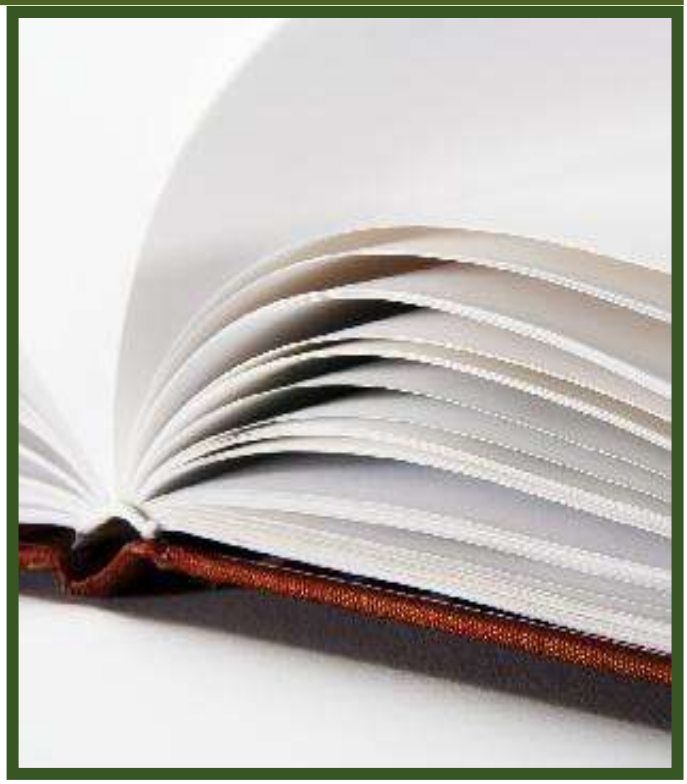
Ogemaw County is committed to involving the public in the implementing and updating of the Hazard Mitigation Plan. Copies of the plan will be available at county libraries, county clerk's office and all county municipality offices. The plan contains the address and phone number of the Emergency Management Office which will be responsible for keeping a record of public comments on the plan.

Copies of the plan will be posted on a community web site or regional planning agency web site. The web page will contain the mailing address, phone number and email address of the appropriate contact persons.

During the update process of the Hazard Mitigation Plan, the committee will advertise and facilitate a public meeting to obtain input and guidance from the general public, businesses, county municipalities, and agencies. A notice will be posted to advertise any meeting of the

Hazard Mitigation Committee where the committee is reviewing or updating the mitigation plan.

Chapter *Appendix*



2016 Ogemaw County Hazard Mitigation Plan
Municipal Questionnaire Results & Summary

Surveys and memoranda were sent to all Ogemaw County municipalities. Below are the results and summary of the municipal questionnaire.

1. Does your community have large seasonal shifts in population?

Summary: Yes a large seasonal shift in population

Logan Township - No
City of West Branch – Yes – Fair amount of retirees that go south during winter months
Horton Township - No
Rose City - Yes
Rose Township – Yes
Mills Township- Yes
Richland Township – No
Foster Township - Yes
West Branch Township – No (only snowbirds)

What are the changes in increases or decreases?

Summary:

Logan Township - None
City of West Branch – Would expect population to remain steady at its current rate
Horton Township – Did not answer
Rose City – Seasonal residents, tourist, hunters, fishermen, ORV riders
Rose Township – Did not answer
Mills Township – 15% - 25%
Richland Township – Did not answer
Foster Township – Increases 60% to 62%
West Branch Township – 5% decrease +/- in winter

At what time of the year do population changes occur?

Summary: Increase in summer. Decrease in late fall/early winter

Logan Township – Summer
City of West Branch – When it gets cold
Horton Township – Did not answer

Rose City – Increases in late spring/early summer and decreases in late fall/early winter
Rose Township – Summer and winter
Mills Township – Fall
Richland Township – Did not answer
Foster Township – Summer
West Branch Township – Winter months

2. Are there a significant number of seasonal homes in the community?

Summary: Yes

Logan Township - No
City of West Branch – A fair amount
Horton Township - Yes
Rose City – Not in Rose City itself, the surrounding townships have lake communities that tend to have a large percentage of seasonal homes
Rose Township – Yes
Mills Township – Yes
Richland Township – Moderate number of snowmobilers
Foster Township – Yes
West Branch Township - No

3. Do large numbers of people come to your community to hunt, fish, snowmobile, camp, etc.?

Summary: Yes

Logan Township – No
City of West Branch – Yes
Horton Township - Yes
Rose City – Yes
Rose Township – Yes
Mills Township – Yes
Richland Township – Yes – township owned campground Hardwood Lake
Foster Township – Yes
West Branch Township - Yes

4. Are there any annual events held in the community that attract large numbers of people? If so, describe the event(s), location, dates and approximate attendance.

Summary: Most communities have some sort of event held in their community or surrounding communities

Logan Township - No
City of West Branch – Ogemaw County Fair in August – All summer long the city has Fabulous Fridays that feature events downtown
Horton Township – Not in Horton but do have an ice race in Bunting and hill climb in Grand
Rose City – Rifle and archery seasons in November, December, and January.
Rose Township – 4th of July in Rose City
Mills Township – No
Richland Township – Yes the Todd Horn Memorial softball tournament in mid-July in the Village of Prescott at the Prescott park/ball fields. This is the largest event and brings in approximately 200 to 250 people.
Foster Township – at park
West Branch Township – Not in the township specifically but in the West Branch Community three are numerous events; the fair, bike week, fabulous Fridays, etc.

5. Please rate the following natural hazards each 1-10, with 1 being a low threat to your community and 10 a high threat. Hazards are considered events that can cause death or injury, damage property or the environment, or disrupt business or services.

* = Average

Wildfire – 5*

Logan Township – 7
City of West Branch – 5
Horton Township – 3
Rose City – 9
Rose Township – 5
Mills Township – 1
Richland Township – 1
Foster Township – 10
West Branch Township - 5

Tornado – 5*

Logan Township – 6
City of West Branch – 8
Horton Township – 5
Rose City – 7
Rose Township – 2
Mills Township – 1

Richland Township – 5
Foster Township – 5
West Branch Township - 4

Flood (River/Lake Shoreline) – 3*

Logan Township – 8
City of West Branch – 1
Horton Township – 2
Rose City – 6
Rose Township – 2
Mills Township – 0
Richland Township – 1
Foster Township – 3
West Branch Township – 2

Severe Wind – 6*

Logan Township – 9
City of West Branch – 8
Horton Township – 4
Rose City – 6
Rose Township – 4
Mills Township – 3
Richland Township – 5
Foster Township – 8
West Branch Township - 4

Winter Weather Hazards – 7*

Logan Township – 9
City of West Branch – 8
Horton Township – 5
Rose City – 8
Rose Township – 6
Mills Township – 3
Richland Township – 5
Foster Township – 10
West Branch Township - 6

Thunderstorm (Lightning/Hail) – 6*

Logan Township – 9

City of West Branch – 8
Horton Township – 4
Rose City – 8
Rose Township – 4
Mills Township – 4
Richland Township – 5
Foster Township – 9
West Branch Township – 5

Earthquakes – 2*

Logan Township – 5
City of West Branch – 1
Horton Township – 1
Rose City – 1
Rose Township – 1
Mills Township – 0
Richland Township – 1
Foster Township – 3
West Branch Township - 1

Drought – 3*

Logan Township – 8
City of West Branch – 5
Horton Township – 2
Rose City – 5
Rose Township – 1
Mills Township – 0
Richland Township – 5
Foster Township – 3
West Branch Township - 2

Extreme Temperatures – 4*

Logan Township – 8
City of West Branch – 5
Horton Township – 5
Rose City – 6
Rose Township – 1
Mills Township – 2
Richland Township – 5
Foster Township – 2

West Branch Township – 3

6. Please rate the following technological hazards each 1-10, with 1 being a low threat to your community and 10 a high threat.

* = Average

Public Health Emergencies – 3*

Logan Township – 5
Horton Township - 2
City of West Branch – 5
Rose City – 5
Rose Township – 2
Mills Township – 0
Richland Township – 3
Foster Township – 2
West Branch Township - 5

Structural Fires – 5*

Logan Township – 7
City of West Branch – 5
Horton Township – 5
Rose City – 5
Rose Township – 4
Mills Township – 1
Richland Township – 3
Foster Township – 5
West Branch Township - 8

Oil and Gas Well Accidents – 5*

Logan Township – 6
City of West Branch – 5
Horton Township – 5
Rose City – 7
Rose Township – 6
Mills Township – 0
Richland Township – 1
Foster Township – 10
West Branch Township – 5

Civil Disturbances – 3*

Logan Township – 8
City of West Branch – 5
Horton Township – 2
Rose City – 5
Rose Township – 1
Mills Township – 0
Richland Township – 1
Foster Township – 2
West Branch Township – 5

Infrastructure Failure – 3*

Logan Township – 4
City of West Branch – 5
Horton – 1
Rose City – 5
Rose Township – 1
Mills Township – 0
Richland Township – 1
Foster Township – 2
West Branch Township - 4

Dam Failure – 2*

Logan Township– 8
City of West Branch – 1
Horton Township– 1
Rose City – 2
Rose Township – 1
Mills Township – 0
Richland Township – 0
Foster Township – 2
West Branch Township - 1

Hazardous Material Incidents – 4*

Logan Township – 7
City of West Branch – 5
Horton Township – 3
Rose City – 8
Rose Township – 5

Mills Township – 0
Richland Township – 1
Foster Township – 2
West Branch Township - 3

Air, Land, or Water Transportation Accidents – 4*

Logan Township – 8
City of West Branch – 5
Horton Township – 3
Rose City – 8
Rose Township – 5
Mills Township – 0
Richland Township – 3
Foster Township – 0
West Branch Township - 2

Terrorism/Sabotage – 2*

Logan Township – 4
City of West Branch – 5
Horton Township – 1
Rose City – 1
Rose Township – 1
Mills Township – 0
Richland Township – 1
Foster Township – 2
West Branch Township - 2

7. What type of specific hazard (any in natural or technological) do you think your community is least prepared for? Why?

Summary: All, tornado, large disaster, terrorism, earthquake, pipeline leak, and public health outbreak.

Logan Township – All of them; Last hazard was a tornado back in 1970
City of West Branch – A large tornado or other disaster causing a large number of injuries. I do not believe our hospital would be able to handle the volume
Horton Township – Terrorism
Rose City – Earthquake – no one is ever prepared for them
Rose Township – Did not answer
Mills Township – Earthquake

Richland Township – Tornado. There are no warning sirens throughout the township
Foster Township – Pipe line leak
West Branch Township – Terrorism or public health outbreak. Because of the likelihood of such an event in a small town we are probably not equipped or prepared for such an event.

8. What type of specific hazard (any in natural or technological) do you feel your community is best prepared for? Why?

Summary: Fire and tornado.

Logan Township – Unknown
City of West Branch – Unknown
Horton Township – Fire. As a community we pull together
Rose City – Wildfire – the Rose City fire department is well trained and highly skilled
Rose Township – Fire. We have good fire departments.
Mills Township – Tornado
Richland Township – Fires. Local fire departments
Foster Township – Fires. 80% of township is state and federal land
West Branch Township – Structure fires because we have a well-trained fire department.

9. Important: This information is also a requirement to receive funding in the event of a disaster. What types of initiatives, projects, mitigation strategies, improvements or efforts (i.e. public education, training, equipment, programs, communications, etc.) do you think could be implemented that would help reduce your community's vulnerability to specific hazards? (Please state specifics and list as many as you can)

Summary: Warning sirens, education on being prepared, website and plan for departments to work together.

Logan Township – Sirens, warnings and education/prepared for emergencies
City of West Branch – making sure all local authorities and law enforcement departments have a plan that they can work together. For instance, if we have a disaster and our 3 police departments are all working separately instead of together, it would cause more problems than it would help
Horton Township – As a community we pull together whatever you can provide our community
Rose City – Emergency preparedness education; long term power outage and emergency shelters; public awareness on how and where to get help

Rose Township – Did not answer
Mills Township – Power outage supplies: generators, shelter supplies, food and water
Richland Township – Tornado warning sirens; evacuation plan for Hardwood Lake Campground (township owned)
Foster Township – Did not answer
West Branch Township – Public training and education could be more readily available. Possibly a "Disaster Awareness Week" website with helpful tips and information, booth at fair, and business expo with handouts, etc.

2016 Municipality Meeting Notes

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Churchill Township
June 6, 2016

Attendees:
John Clark, Supervisor, Lynn Kavalunas, Clerk, Gail Quigley, Treasurer, John Gregg, Trustee, Larry Lauria, Trustee, Ken Chapman, Ken Schnautz, Fred Hages, and Fred Hinkley.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Review road crossing at Peters Road and Rifle River.
2. Allied with the Ogemaw County Fire Department in West Branch. Survey of township residents declined establishing a township volunteer fire department.
3. Eight inch to 10 inch high pressure natural gas line traverses township (along M55); valves installed recently at stream crossings (Campbell Creek, etc.).
4. Electric lines cleared by utilities.
5. Siren at Fawn Lake +/- 1 mile audibility. Interested in reverse 911 concept.
6. Ogemaw County does planning and zoning for township.
7. No concerns about civil disturbances and terrorism.
8. Very skeptical about climate change "Hasn't the earth been warming since the Ice Age?"

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
City of Rose City
June 7, 2016

Attendees:
Dave Reasner, Mayor, Jeremy Card, Rose Allard, Jane Griffith, Louise Egan, Jenny Bentley, Jeramie Brookins, Howard LaCosse, DPW, Chief Dean Coleman, Carol Lee Butler, Treasurer, Cindy Rosebrugh, Clerk, Jay Jacobs, Consumers Energy, Eric Laphers, Consumers Energy, Marge Nurski, Theresa Erickson, Cara Scott, and Travis Manchilox.

After a discussion of the purpose and the status of the Ogemaw County Hazard Mitigation Plan, the council suggested the following actions be included in the plan:

1. The storm drains in the city are much too small and should be upgraded to carry storm waters of any significance.
2. Question whether lightning rods protect structures or attract lightning.

3. The dam at Mill Pond is unsound; should be repaired or removed. (City has tried unsuccessfully to procure funding to keep the dam but allow fish to go around it to the pond.)
4. Department of Natural Resources does "control burns" in area (coordinate with city?)
5. Utilities have trimmed trees in rights-of-way.
6. Volunteer fire department has mutual aid agreements with all townships surrounding the city.
7. Department of Public Works has small portable generators for use during emergencies.
8. Middle school was to be emergency shelter but is now closed. City has a basement that could accommodate +/- 100 people. Motel has basement that is offered for safe shelter in an emergency.
9. Weather radios are available.
10. Siren located in city for "outdoor notification", +/- 1 mile radius notification. Many say very loud; others cannot hear it. All will listen when next tested.
11. Discussed reverse 911; much interest.
12. Volunteer fire department drives around city with sirens to announce emergencies. Should also have the authority/ability to sound siren when necessary.
13. County provides planning and zoning.
14. No concerns regarding civil disturbances and terrorism.
15. Consensus that "global warming" and "climate change" are not of significance, if real at all.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Cumming Township
June 2, 2016

Attendees:
Jerry Neubecker, Supervisor, Janice Fritz, Clerk
Beth Fish, Treasurer, Delinn Keetch, Trustee, Bruce Schneider, Trustee, Shari Denstedt, Deputy Treasurer, Keith Ponak, Assessor, Ron Quackenbush, County Commissioner, Larry Walter, Dan Morrison, Connie Malecek, Barbara Losee, and Reid Morrison.

After a discussion of the purpose and status of the new Ogemaw County Hazard Mitigation Plan, the township board suggested the following actions be included in the plan:

1. Review Department of Natural Resources disaster plans for Rifle River campers, canoers, and kayakers.

2. Review bridges and culverts at Rifle River and Houghton Creek crossing with the Ogemaw County Road Commission for capabilities in 100-year flood events.

3. Eleven sections of the township have state forest lands. All have dwellings and other structures. Review with Department of Natural Resources for wildfire preparedness and do informational programs for property owner actions.

4. There is a siren in Rose City, but it is not audible in most of the township. Install siren? Discussed reverse 911 concept for vulnerable persons and thought it a good idea.

To the board's knowledge, there are no generators at any public buildings in the township. The Cumming Township Volunteer Fire Department cooperates with Rose City, Klacking Township, and Rose Township for fire protection. Coordinate with Emergency Management during disaster emergencies?

The board gave no importance to terrorism.

Climate change was thought to be overstated, but it could be beneficial for farmers if the growing season was lengthened and temperatures increased slightly.

The M33 corridor through the township was considered a main evacuation route if needed and is in very good condition.

The Board expressed its satisfaction that the Hazard Mitigation Plan is being prepared.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Edwards Township
June 13, 2016

Attendees:
Dennis Stephens, Clerk, Yvonne Mahl, Treasurer, Brent Illig, Trustee, Bryan Stein, Trustee, Nadelle Fournier, Deputy Clerk, Crystal Winter, Deputy Supervisor, Harry John Kolberg, Planning Commission Chair, Ray Miller, Planning Commission, Rick Stillwagon, Planning Commission, Rose White, Planning Commission, Dave Ross, Board of Review Chair, Sexton Mike Laier, Phyllis Gooding, Hall Coordinator, Dale Sheltrown, Board of Review, Greg Illig, County Commissioner, Van Sheltrown, County Road Commissioner, Kathryn Burkholder, Outreach Coordinator from Consumers Energy, Andrew Fournier, Resident, Eileen Fournier, Resident, Pat Miller, Resident, and Brandy Curtis, Resident.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Concerns with downed power lines from the dead ash trees was expressed. Consumers Energy had a representative at the meeting and expressed an interest in exploring trimming.
2. The township would like to have warning sirens in their community however; they don't believe that people would know what the sirens mean. A public education and

awareness program to inform the citizens on what the sirens mean would be necessary.
3. Various locations in the township have had roads washouts at culvert crossings. Possible culvert improvements and replacements may help alleviate those problems.
4. Tornados are a concern for the township and a way to help protect the citizens and warn them of a potential tornado.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Foster Township
June 14, 2016

Attendees:
Sandi Miller, Supervisor, Karen McIntyre, Clerk, Karen Holko, Treasurer, Rod Robertson, Auditor, Greg Illig, County Commissioner, Kip Burger, Chief of Police.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Township has Volunteer Fire Department with mutual aid agreement with county and surrounding townships.
2. There is a siren at fire hall-audible +/- three miles.
3. There are problems with downed wires during storms; easements need clearing (much of township is forested).
4. County does planning and zoning for township.
5. No concerns with civil disturbances or terrorism in township - residents can handle.
6. No concerns with climate change.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Goodar Township
June 21, 2016

Attendees:
Jim Allen, Supervisor, Cindy Allen, Clerk, Robert Quillen, Treasurer, Larry McNenly, Trustee, Rob View, Trustee, Cynthia Weingartz, Judith Snabes, Charles, Snabes, John Ragan, Brent Egleston, Virginia Egleston, Phil Weskalivier, Allen Davis, Larry Thompson, Lonnie Hasler, Ed Fischeur, Dennis Wheeler, Mary Larner, Janice Thorson, Kathleen Wheeler, Lawrence Lenski, Laney Linski, Debra Fedder, Mildred Feddar, Dale Hill, Dan Kocis, Elmer Griffin, Karen Griffin, Mike Gonda, Hugh Walling, Catherine Walling, Leslie NcNenly, Paulette Jackson, Joseph Strickland, Kathy Strickland, Rose Curtis, Diane Tilling, Ernie Hinderliter, Katie Hinderliter, Heidi Pressley, Mark Swope, Lynn Nichols, Delbert Roy, Lynne Roy, Paulette Baughman, Sue Ianitelli, Lou Ianitelli, Diane DeHaven.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. The township would like to have warning sirens in their community. There was a tornado last year and a warning system for the township would be nice.
2. Lack of cell phone coverage is a problem in the area and ability of contacting emergency services when needed can be difficult.
3. Power lines being too close to homes and not in easements was expressed as a concern. Moving the utilities further from occupied dwellings and into road way easements was a desire.
4. Dam failures are a concern for the citizens and an emergency action plan would be a great help.
5. Concerns for local elderly having access to medical emergency services when needed could be a problem during storms and/or other disasters.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Hill Township
July 5, 2016

Attendees:
Rob Reid, Supervisor, Carol Gillman, Clerk, Sally Reid, Treasurer, Dave Mayhew, Trustee, Lorie Williams, Trustee, Ron Quackenbush, Board of Commissioners, David Landenberg, Ellen Scott, Charlotte Griffin, Robert Taylor, Jerry Maynard, Rich Shellenberger, Margaret Walker, Robert Shore, Skip Lawrence, Jim Kelts, Beth Stump, Evelyn McNichole, Shirley Tomplin, Carole Engel.

After a discussion of the purpose and status of the new Ogemaw County Hazard Mitigation Plan, the township board suggested the following actions be included in the plan:

1. Concerns with downed power lines from the dead ash trees was expressed.
2. The township would like to have warning sirens in their community to inform the residents of hazards.
3. Various locations in the township have had roads washouts at culvert crossings. Possible culvert improvements and replacements may help alleviate those problems. Peters Road is a particular area of concern.
4. Identical road names in the community may cause problems with emergency services. Many of the subdivisions around the numerous lakes have roads with the same name and GPS has a difficult time locating certain addresses. It was discussed that citizens can arrange for a 911 test call to clear up any problems with locating a particular address.
5. Lack of cell phone coverage is a problem in the area and ability of contacting emergency services when needed can be difficult. A desire to pursue new tower locations within the township was expressed.
6. Wildlife such as bears in populated areas was a concern.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Horton Township
July 11, 2016

Attendees:
Karen Michael, Supervisor, Erma Lurvey, Treasurer, Connie Kraska, Clerk, George Goodchild, Trustee, Gerald Lehman, Trustee, Greg Illig, County Commissioner, Ryan Johnson, Resident, Charles Michael, Resident, Robert Hamilton, Resident, Julie Stachowski, Township Assessor, Jim Wiles, Resident, and Jake Jameson, Resident.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Township residents are concerned with the ageing Enbridge Pipeline.

2. Township residents are concerned with washouts and culvert conditions on local roadways.

3. The township would like to see a better warning siren system and more awareness and education on how the system works.

4. Township residents feel that they need a better cell phone service and coverage area.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Klacking Township
June 15, 2016

Attendees:
Debra Thomas, Supervisor, Carrie Reetz, Treasurer, Al Wiltse, Trustee, Ellen Rush, Clerk, Ted Scheid, John Clark, and Tony Little.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Three culverts just recently replaced on roads. Still problems in west, and northwest of township – forested areas. Campbell and Scribner area.
2. Power outages in this area also during storms.
3. Communications, both land and wireless, poor in area as well. Would be difficult to contact people during storms, etc.
4. No siren – had begun to procure one with previous Emergency Management Coordinator, but has not been followed through with.

5. Volunteer Fire Department with Rose City, Cumming Township, and Rose Township.
6. County provides planning and zoning.
7. No concerns about civil disturbances or terrorism.
8. There is not safe public place in the township. Township hall has no basement.
9. Skeptical about climate change. "This is Michigan: The weather changes."

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Logan Township
July 6, 2016

Attendees:
William Fleck, Sara Fleck, Mike Wiesinowski, Pat Alkire, Dolores Mains, Arnold Hanson, Karl Howell, Jim Evans, Bob Cicoro, Joe John, Dick Nott, Tim Jones, Ray Don.

After a discussion of the purpose and status of the new Ogemaw County Hazard Mitigation Plan, the township board suggested the following actions be included in the plan:

1. Concerns with the road commission not maintaining their roads and replacing culverts.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Mills Township
June 14, 2016

Attendees:
Lloyd Saunders, Supervisor, April Schils, Clerk, April Mason, Trustee, Brenda Eymer,Trustee, Dona Emerson, Treasurer, Bill York, Parks and Recreation, Rob Ford, Ordinance Officer, Mel Cunningham, Elizabeth Harden, Mike Richman, Duane Prince, Geo Fuhst, Dennise Steele, Elizabeth Grabow, Gene Myer, Kathleen Mihalik, Herb Drouillard, Ben Frazzian, Brenda Simmons, Ladonna Schultz, Lisa Cotton, and Scott Nunn.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Concerns with downed power lines from the dead ash trees was expressed. The township is concerned with the elderly population that may require electricity for essential medical equipment and during long term outages there may be problems. A desire to establish a wellness check system for these people during these events was expressed. Possibly working with the Council on Aging to establish a list.
2. Flooding along the Rifle River has been a problem in the past and several rescue calls have been made to rescue canoeists during high water.
3. The Tri-County club next to the township hall is set up as a local emergency center.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Ogemaw Township
July 13, 2016

Attendees:
Denis Stephens, Supervisor, Sandra Hodgins, Trustee, Renee Ryland, Treasurer, Virginia Linsenman, Clerk, Ron Dantzer, Trustee, Tracey Turner, Deputy Clerk, Greg Illig, County Commissioner,

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Some road intersections, railroad crossings, etc. not maintained sufficiently (no visibility).
2. Interested in warning siren for areas of township away from the city siren.
3. Red Cross has safe buildings it uses (church). Could use Ogemaw Hills Free Clinic building? No public buildings with basements in township.
4. Frequent power outages in hills; many dead ash trees now.
5. The county provides planning and zoning.
6. The township secures its facilities, but wary of potential terrorism.
7. Do not know of any specific civil disturbances or possible terrorism but, again, are wary of possible events.
8. Climate change is not a concern. Did not believe purported effects would be felt in the township.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Richland Township
June 6, 2016

Attendees:
Dale Bronson, Clerk, Dawn Johnson, Clerk, Lee Brown, Trustee, Deborah Burton, Treasurer, William Cliff, Trustee, Brian Bellville, Nancy Bellville, Ralph Hall, Keith Ponak, Pete Hennard, Commissioner, Sharon, V J Kumar Representative.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. The township would like to have warning sirens in their community.
2. Concerns with downed power lines from the dead ash trees was expressed. Particularly power outages near the corner of Cemetery Road and Sage Lake Road have been a problem in the recent past.
3. A desire to try to establish the township hall as an emergency center for the community during emergencies.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Rose Township
July 11, 2016

Attendees:
Russell Oyster, Supervisor, Kelli Collins, Clerk, Carol Hanus, Treasurer, Linda Blair, Aaron Gemmill, Fred Babich, Resident, Henry Inman, Resident, Charles Johnson, Resident, Ron Quackenbush, County Commissioner, Aaron Gerrill, Resident, Linda O'Brien, Trustee.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Township residents are concerned about the cell phone service and coverage in their area.

2. The township feels that there should be updated maps/GIS and integrated into EMS.

3. The township feels that road washouts are a potential hazard.

4. Township residents are concerned with the response time of their ambulance service.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
Village of Prescott
June 13, 2016

Attendees:
Peggy Mashke, President, Darla Best, Clerk, Paula Nagy, Treasurer, Kirk Webster, Trustee, Brian Gagnon, Trustee, Pete Hennard, Commissioner, and Diane Wright.

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. Village storm drain (≈ ¾ mile) at J Street and Harrison prone to flooding; needs to be dredged.
2. Village roads need repairing to be safe during storms.
3. Pumps at sewage treatment plant are old and need to be replaced to prevent backups during heavy rain or snowmelt.
4. Need a siren for emergencies. Used to have one at fire station. Mills Township is closest siren.
5. Have Volunteer Fire Department; millage with Richland and Logan Townships.
6. There is a Consumers substation in village.

7. Tree trimming in utility easements needed; power losses during storms. Many dead ash trees.
8. County provides planning and zoning.
9. No concerns yet for civil disturbances or terrorism.
10. Did not know what effects climate change could have in village.
11. No public safe structures in village. Baptist church has large basement that could be used.

Community Meeting Notes
Ogemaw County Hazard Mitigation Plan
West Branch Township
July 13, 2016

Attendees:
Ryan Veedar, Supervisor, Margaret Winslow, Clerk, Diane Philbrick, Treasurer, Donald Hodgins, Trustee, Brenda Hughey, Trustee, Ronald Gaven, Deputy Clerk, Jean Neubecker, Resident, Kirt Blanchard, Resident, Nyla Blanchard, Resident, Megan Blanchard, Resident, Cheryl Mallard, Resident, Melissa Wangler, Bruce Reetz, Commissioner

After a discussion of the purpose and status of the Ogemaw County Hazard Mitigation Plan, the board suggested the following actions be included in the plan:

1. The township is concerned on the possibility of dam failure at Flowage Lake Dam which many years ago failed.

2. The township feels that there should be more public awareness of warning siren systems and residents should receive education on how the system works.

3. Township residents are concerned with the limited cell phone coverage in the area.

4. Township residents are concerned of elderly residents being left alone.