

Natural Hazards Mitigation Plan

DRAFT



Emmet County, Michigan

Produced by:
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I. ACKNOWLEDGEMENTS

The Plan is the culmination of the 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.

Following is a list of the key contributors to the Plan who participated in the Emmet County Hazard Mitigation Planning Task Force:

Emmet County Emergency Management Coordinator

Jack Messer

Emmet County Planning Department

Max Putters

Denise Dundon

Emmet County Sheriff Office

Pete Wallin

Little Traverse Bay Bands of Odawa Indians

Rachel Schwarz

Norman Emery

Charlevoix/Emmet Conservation District

Chris Anderson

Organizations

American Red Cross, Northern Lower Michigan (2)

II. LETTER OF TRANSMITTAL

Date

Mike Sobocinski
Michigan State Police Emergency Management Division
4000 Collins Road
PO Box 30636
Lansing MI 49809-8136

Dear Mr. Sobocinski:

Enclosed, please find the Emmet County Natural Hazards Mitigation Plan. This Plan has been developed in conjunction with the County Emergency Management Coordinator, County Planners, Task Force Members, the public, and the State of Michigan. The Plan lays out the process of evaluating the potential natural hazards, land use, and mitigation strategies to protect lives and property in the County.

This transmittal letter serves notice that all future development decisions in Emmet County will consider hazard vulnerability reduction as a standard practice. The intent of the Natural Hazards Mitigation Plan is not to limit development, but to ensure that all development occurs in a manner that minimizes the possibility of damage from potential natural hazards to the greatest extent possible.

Thank you for your time and consideration. If you have any questions, please feel free to contact the Emmet County Emergency Management Coordinator, Jack Messer at 231.439.3333.

Sincerely,

Emmet County Board Chair

III. PREFACE

Hazard mitigation is any action taken before, during, or after a disaster to permanently eliminate or reduce the long-term risk to human life and property from natural and technological hazards. This procedure is an essential element of emergency management, along with preparedness, response, and recovery. Emergency management includes four phases: community planning for a disaster; responding when it occurs; recovery process from the disaster with mitigation measures are evaluated and adopted. The evaluation improves the preparedness posture of the County for the next incident, and so on. When successful, mitigation will lessen the impacts of natural hazards to such a degree that succeeding incidents will remain incidents and not become disasters.

Communities may mitigate to reduce the impact of hazards on people and property through the coordination of resources, programs, and authorities. Through a combination of regulatory, administrative, and engineering approaches, losses can be limited by reducing susceptibility to damage. Mitigation allows repairs and reconstruction to be completed after an incident occurs in such a way that does not just restore the damaged property as quickly as possible to pre-disaster conditions. This process 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.

Recognizing the importance of reducing community vulnerability to natural hazards, Emmet County is actively addressing the issue through the development and implementation of this plan. The many benefits to be realized from this effort are:

1. Protection of the public health and safety;
2. Preservation of essential services;
3. Prevention of property damage; and
4. Preservation of the local economic base.

This process will help ensure that Emmet County remains a vibrant, safe, enjoyable place in which to live, raise a family, maintain a tourist base, and continue to conduct business.

IV. EXECUTIVE SUMMARY

In 2000, the Disaster Mitigation Act shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention, or what is called hazard mitigation planning. FEMA now requires government entities to have natural hazards mitigation plans in place as a condition for receiving grant money, such as hazard mitigation grant program funds, in the future.

To meet this requirement, the Michigan State Police provided funding to regional planning agencies throughout the State of Michigan to work with individual counties in developing their Hazard Mitigation Plans. For northwest, lower Michigan the **Northwest Michigan Hazard Mitigation Planning Project** was coordinated by the Northwest Michigan Council of Governments (NWMCOG) and included the ten county area of Emmet, Charlevoix, Antrim, Kalkaska, Missaukee, Wexford, Grand Traverse, Leelanau, Benzie, and Manistee. NWMCOG worked with the Task Forces and developed plans for the counties. These plans included a general community profile, a comprehensive inventory of existing hazards, a hazard analysis, goals and objectives, and feasible mitigation strategies to address the prioritized hazards.

The Emmet County Natural Hazards Mitigation Plan focuses on the following natural hazards - drought, wildfires, flooding, shoreline erosion, ground subsidence/landslides, thunderstorms and high winds, and severe winter weather, and was created to protect the health, safety, and economic interests of the residents and businesses by reducing the impacts of natural hazards through planning, awareness, and implementation. Through this Plan, a broad perspective was taken in examining multiple natural hazards mitigation activities and opportunities in Emmet County. Each natural hazard was analyzed from a historical perspective, evaluated for potential risk, and considered for possible mitigative action.

The Plan serves as the foundation for natural hazard mitigation activities and actions within Emmet County, and will be a resource for building coordination and cooperation within the community for local control of future mitigation and community preparedness around the following:

Natural Hazards Mitigation Planning Goals for Emmet County:

Goal 1: Increase local participation in natural hazards mitigation

Goal 2: Integrate natural hazards mitigation considerations into the County's comprehensive planning process

Goal 3: Utilize available resources and apply for others for natural hazards mitigation projects

Goal 4: Develop and complete natural hazards mitigation projects in a timely manner

The Emmet County Task Force participants designated the following top Natural Hazards Mitigation Priority Areas:

1. *Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay*
2. *Flooding and Dams: Harbor Springs, Boyer Creek, Tannery Creek, Bear River Alanson Locks, Maple River*
3. *Severe thunderstorms, High Winds, and Tornadoes throughout the County*
4. *Severe Winter Weather throughout the County*

And, recommended the following mitigation strategies:

1. Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay

Landslide/Erosion Mitigation Strategies:

- a. Enforcement of the Stormwater Management Ordinance and the Soil Erosion and Sedimentation Control Ordinance: slide areas, drainage control, grading, debris flow measures, vegetation (native species) placement
- b. Utilize the Critical Dunes Overlay
- c. Education and enforcement of building and zoning codes: development setbacks, lot sizes, driveways, relocation of structures, Lake Michigan coastal zoning ordinances – U.S. Army Corps of Engineers and Michigan Department of Environmental Quality
- d. Building code enforcement through permits
- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for developers, realtors, and engineers, especially for out of the area entities
- g. Public education

2. Flooding: Harbor Springs, Boyer Creek, Tannery Creek, Bear River, Alanson Locks, Maple River

Flood Mitigation Strategies:

- a. Assessment of flood threat and dam inspections results
- b. Drainage improvements
- c. Enforcement of Stormwater Management Ordinance
- d. Enforcement of building and zoning codes
- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for realtors through the creation of a handbook for distribution
- g. Public education

3. Severe thunderstorms, High Winds, and Tornadoes throughout the County

Thunderstorm and High Winds Mitigation Strategies:

- a. Address the practice of placing utilities underground for new construction
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Education and enforcement of building codes for such activities as bracing elevated platforms and anchoring and tie downs (inventory the renovated county fairgrounds)
- d. Tree management coordination
- e. Public education

Tornado Mitigation Strategies:

- a. Consistent weather event warnings
- b. Public awareness and education

4. Severe Winter Weather throughout the County

Snow and Ice Mitigation Strategies:

- a. Public education and awareness
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Improve shelter capacity
- d. Promote community response for snow removal activities such as using community services clients to assist the elderly

- e. Enforcement of building code snow load requirements which is 70 lbs. per sq. ft. especially when there is snow, rain and then freezing

Other mitigation strategies:

- ***Working with utility companies to protect the power grid***
- ***Working with other governmental entities, organizations, businesses, and the public***
- ***Incorporating the Plan's natural hazards mitigation concepts, strategies, and policies into existing elements of Emmet County's Master Land Use Plan***

The Emmet County Natural Hazards Mitigation Plan was recommended by the Emmet County Planning Commission on _____ to the Emmet County Board of Commissioners for adoption. The County Board of Commissions adopted the Plan on _____.

V. PURPOSE OF THE PLAN

The Disaster Mitigation Act of 2000 shifted the Federal Emergency Management Agency's (FEMA) scope of work to promoting and supporting prevention, or what is called Hazard Mitigation Planning. FEMA has now required government entities to create mitigation plans as a condition of receiving grant money, such as hazard mitigation grant program funds. To meet this requirement, the Michigan State Police funded regional planning agencies to work with individual counties to develop the Natural Hazards Mitigation Plans. The Northwest Michigan Council of Governments was the agency to develop this Plan.

The **purpose of the Emmet County Natural Hazards Mitigation Plan** is to find solutions to existing problems; anticipate future problems; prevent wasteful public and private expenditures; protect property values; and allocate land resources. The implementation of the Plan is to prevent injury, loss of life, property damage, breakdown in vital services like transportation and infrastructure, economic slumps, diminished tourist activity, liability issues, and damage to a community's reputation. For Emmet County, the **planning process** utilized the following steps in the development of the Plan. Emphasis was placed on natural hazards that have had significant impact on the community in the past.

1. Identification of natural hazards and risks
2. Preparation of draft plan
3. Identification of natural hazards mitigation goals and objectives for emergency management programs
4. Selection of evaluation criteria
5. Selection of mitigation strategies using locally chosen criteria
6. Public Comment
7. Completion of the final plan

The Plan also lays out the implementation of the plan, and the monitoring and periodic revision of the plan.

What is a Hazard?

A **hazard** is an event or physical condition that has potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss. This plan focuses on natural hazards such as drought, earthquakes, extreme temperatures, wildfires, urban and riverine flooding, high or wind driven waters that cause shoreline flooding and erosion, ground subsidence/landslides, thunderstorms and high winds, tornadoes, and winter weather hazards. This Plan is intended to be a resource for building coordination and cooperation within a community for local control of future mitigation and community preparedness.

In the State of Michigan, the **principle natural hazards** are:

- Tornadoes
- Flooding
- Lightning
- Severe winds
- Severe winter weather (snow, ice, sleet)

These principle natural hazards events have caused the top impacts to be erosion/debris flow, frozen pipes, and floods.

Governor Declarations for major disasters in the State of Michigan that occurred from 1977 to 2001 include:

- Thirteen (13) severe storms
- Eleven (11) floods
- Eight (8) winter storms
- Six (6) tornadoes
- Five (5) technical disasters
- Three (3) fires

What is Mitigation?

Mitigation is the sustained action taken to lessen the impact from natural hazards and to work to reduce the long-term risk to human life and property, and their effects. This long-term planning distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery. This Plan can be used to lessen the impact; to support and be compatible with community goals; to lay out considerations in choosing and evaluating methods; and to look at the feasibility of mitigation strategies.

VI. COMMUNITY PROFILE

Emmet County is located in the northern lower peninsula and is traversed by Highway US 31 and US 131 with Lake Michigan to the west. The county also encompasses the Waugoshance island group in Wilderness State Park. The county seat, in Petoskey and the city of Harbor Springs are at the heart of a large natural harbor in Little Traverse Bay. The county is experiencing some of the most rapid growth in the state, with a major resort development on Little Traverse Bay, and a thriving industrial base.

The community data located below, is provided to describe Emmet County for planning and implementing the mitigation strategies.

Major Geographic Features of Emmet County

Area in Water	10,560 acres
Miles of Great Lakes shoreline	75 miles
Forest Lands	208,100 acres 69.5% of total land area
Wetlands	58,589 acres 19.6% of total land area
Operating Farms (2002)	274
Farmland (2002)	43,665 acres

The total County population in the 2000 census was **31,437**. The projected growth for 2010 is 37,008 and for 2020 it is 41,353. The population numbers from the 2000 Census for the **16 Townships and 5 major Cities/Villages:**

Township	Population
Bear Creek	5,269
Bliss	572
Carp Lake	807
Center	499
Cross Village	294
Friendship	844
Harbor Springs	1,567
Littlefield	2,783
-- Alanson	785
Little Traverse	2,426
McKinley	1,269
-- Pellston (part)	601
Maple River	1,232
-- Pellston (part)	170
Petoskey	6,080
Pleasant View	943
Readmond	493
Resort	2,479
Springvale	1,727
Wawatam	705

-- Mackinaw (part)	540
West Traverse	1,448

County Resident Profile

1. There are 19,665 *Housing Units* in Emmet County with an average household size of 2.44 people per household. 36.3% of households have 2 persons.
2. The number of residents 65 years and over is 4,495, or 14.3% of the population.
3. The number of residents 19 years and under is 8,685, or 28% of the population.
4. The number of residents over 65 with a disability is 1,675, or 5% of the population.
5. The total Number of residents with disability is 4,929, or 16% of the population.
6. The number of residents that have a language barrier or are linguistically isolated is 61, or less than 1% of the population.
7. Percent below poverty level:
February 2004 Poverty level: \$15,670 Family of 3 and \$9,310 Family of 1
 - Families in poverty with children: 270
 - Income less than \$15,000: 13.9%
 - Individuals in poverty: 2,266

1997 Economic Census

Industry Description	Number of Establishments	Number of Employees
Manufacturing	57	1,377
Wholesale trade	32	228
Retail trade	298	2,509
Real estate, rental, leasing	41	120
Professional, scientific, technical services	86	312
Administrative, support, waste management, remediation services	40	449
Educational services	3	0-19
Health care, social assistance	85	1,233
Arts, entertainment, recreation	18	135
Accommodation and food services	143	1,970
Other services (except public administration)	52	193
Merchant Wholesalers		
Wholesale trade	26	201
Manufacturers' Sales Branches and Sales Offices		
Wholesale trade	1	20-99
Agents, Brokers, and Commission Merchants		
Wholesale trade	5	0-19

*Information provided above was retrieved from the Northwest Michigan Council of Governments' *Benchmarks 2004*, *Northwest Lower Michigan County Profiles 2000*, and reports on the Northwest Michigan Council of Governments' website.

VII. THE DEVELOPMENT OF THE PLAN

A. Data Methodology and Map Development

Emmet County staff identified the critical facilities and infrastructure on the base map and then the Northwest Michigan Council of Governments digitized the facilities as point files. Natural hazards points, polygons, and population centers data was then added to the base maps utilizing the following data:

Critical Infrastructure

3	Airports <ul style="list-style-type: none"> Emmet County/Pellston Airport – 64,123 passengers in 2002 Harbor Springs Boyne Highlands
20	Banks
1	Bridge
45	Churches
1	Communications Facility
1	Dam
4	Emergency Management Services Facilities
11	Fire Stations
1	Fish Hatchery
23	Government Buildings
3	Hazardous Materials Sites or Facilities
4	Historic Sites
2	Hospital Facilities
3	Industrial Facilities
5	Medical Facilities <ul style="list-style-type: none"> Primary physicians per 100,000 population 1998 is 123.5
6	Police Stations
14	Resort/Recreational Facilities
18	Schools
1	Senior Apartment Complex
4	Utility Facilities
3	Water and Sewage Treatment Facilities <ul style="list-style-type: none"> Water: 40.3% public system or private company; 61.2% individual wells; Sewer: 40.3% public sewer; 58.0% individual septic/cesspool; 1.7% other
2	Water Well/Towers

Flood Data

Flood hazard information can usually be derived from the Flood Rate Insurance Maps (FIRM) available for jurisdictions. In order to delineate potential flood plain areas (seasonal floodplains) for each county, NWMCOG overlaid wetland, soils, and elevation data to determine the most likely flood prone areas. Once overlaid, isolated polygons (areas) were deleted in order to show a more accurate representation of potential flood prone areas along lakes, rivers, and streams. Sources: Temporary/Seasonally Flooded Areas data are from the

National Wetland Inventory of the US Fish and Wildlife Service; Hydric soils data are from the county digital soil surveys (were available); and Digital Elevation Model data are from the Center for Geographic Information, Michigan Department of Information Technology.

Fire Data

Modern forest fire data were obtained from the USDA forest service and the Departments of Natural Resources in Minnesota, Wisconsin, and Michigan. Fire regimes data (fire prone areas) were provided by the USDA Forest Service, North Central Research Station in Wisconsin. Land type associations, and historical and modern fire rotations were used to identify the fire prone areas.

Tornadoes - National Weather Service

Damaging Winds - National Weather Service

Large Hail - National Weather Service

Winter Weather - National Weather Service

Landslide/Erosion

Shoreline erosion and landslide incident zones delineated by the US Geological Service. Digital Elevation Model data from the Center for Geographic Information, Michigan Department of Information Technology.

Other hazards may exist in northwest Michigan communities, but are not considered to be substantial risks.

The detailed Emmet County Map is presented in Appendix B. #1.

B. Natural Hazards Information

1. *Natural Hazards and Climate Change*

Scientists are now convinced that human activity, primarily the burning of fossil fuels to produce electricity and drive cars, is changing the climate. These activities emit gases, primarily carbon dioxide, that blanket the planet and trap heat. Some of the signs of climate changes we are seeing already throughout the Great Lakes region are average annual temperatures are increasing; severe rainstorms have become more frequent; winters are getting shorter; and the duration of lake ice cover is decreasing. In general, Michigan's climate will grow considerably warmer and probably drier during this century, especially in the summer.

Potential Impacts from Climate Change

Northwest, lower Michigan depends heavily on groundwater, on freshwater from Lake Michigan, and on rainfall for agriculture, drinking, and industrial uses. As the population in this region continues to grow, the demand for water for all the needs increases. The projected changes in rainfall, evaporation, and groundwater recharge rates from climate change events will affect ecosystems and all freshwater users.

- Lower summer water levels are likely to diminish the recharge of groundwater, cause small streams to dry up, and reduce the area of wetlands, resulting in poorer water quality and less habitat for wildlife.
- Lake levels are expected to decline in both inland lakes and the Great Lakes, as more moisture evaporates due to warmer temperatures and less ice cover.
- Pressure to increase water extraction from the Great Lakes will grow, exacerbating an already contentious debate in the region.
- Development and climate change will degrade the flood-absorbing capacities of wetlands and floodplains, resulting in increased erosion, flooding, and runoff polluted with nutrients, pesticides, and other toxins.

2. *Natural Hazards Recorded Events*

Data for events was compiled from the National Oceanic and Atmospheric Administration's web site utilizing the following sections:

- Weather/Climate Events, Information, Assessments
- Climatology and Extreme Events
- U.S. Storm Events Data Base: 1950 to present, local storm reports, damage reports, etc. from various sources – events checked for Emmet County included drought, flooding, funnel clouds, hail, lightning, snow and ice, thunderstorms and high winds, tornadoes, wild/forest fires.

The most severe events recorded for Emmet County are listed below, including the number of events, dates, and descriptions of the most severe.

1. Hail – 9 events
 - June 1998: (county) \$100,000 property damage; large hail up to 2.5 inches in diameter caused damage to cars on two lots west of Petoskey
2. Snow and Ice – 57 events (12 inches or more of snow)
 - January 1993: (region) \$50,000 property damage; heavy snow
 - January 1994: (region) \$5.0 million property damage; heavy snow/freezing rain
 - December 1996: (Cross Village) 12-18 inches of heavy snow; (county) 8-12 inches of snow
 - January 1997: (county) ice storm; up to 3 inches of ice; widespread power outages and numerous driving accidents
 - February 1997: (county); 10-14 inches of heavy snow
 - March 1997: (county); 8-12 inches of heavy snow
 - November 2000: (county); 16-20 inches of heavy snow
 - December 2001: (county); 71 inches of heavy snow 25th-28th; records were broken and a State of Emergency was declared by Governor John Engler. The county requested \$59,538.34 in disaster assistance.
 - March 2002: (region); 10-16 inches of heavy snow/winter storm; also freezing rain and sleet; trees and power lines down
 - February 2003: (region); winter storm with some ice
 - April 2003: (region); winter storm with rain, sleet, and snow; tree limbs and power lines down

- November 2003: (region) \$40,000 property damage; winter storm
- January 2004: (region); winter storm; no travel recommended; (Cross Village and Bliss); 12 inches of heavy snow; (Petoskey); 4-12 inches of heavy snow

3. Thunderstorm and High Wind – 43 events

- October 1993: (county); high winds with many trees, power poles and power lines blown down; power outages; 59 mph gusts
- June 1994: (12 miles west of Cheboygan); thunderstorm/winds; two foot diameter maples trees were downed and several 6-12 inch diameter trees, a corn bin, numerous tree branches were blown down;
- July 1994: (Harbor Springs); thunderstorm/winds; utility poles toppled; 52 knots
- November 1994: (region – mostly southern Michigan) 1 injury, \$100,000 property damage; high winds of 50 knots
- July 1995: (county) thunderstorm/wind; 30-50 mph gusts
- October 1997: (Bliss/Carp Lake); thunderstorm/winds; numerous trees of various sizes were downed in Wilderness State Park; U.S. Coast Guard received reports of several waterspouts in northern Lake Michigan; a report of a wind gust of around 90 knots was received from a ship on northern Lake Michigan; 52 knots
- August 1998: (Conway); thunderstorm/wind; trees toppled; 52 knots
- July 1999: (Harbor Springs); thunderstorm/winds; large benches ripped from the ground and thrown; (Pellston Airport); trees and power lines down; 65 knots
- June 2001: (Petoskey) \$15,000 property damage; thunderstorm/winds; numerous large tree limbs blown down; one large limb fell on a house; 50 knots
- August 2001: (Alanson) 1 injury – tree fell on a car, injuring occupant; thunderstorm/winds; numerous trees were down; 50 knots
- September 2001: (Petoskey); thunderstorm/winds; trees down; 50 knots
- October 2001: (region); high wind; trees down; 50 knots
- August 2002: (Harbor Springs) thunderstorm/winds; trees and power lines down; 50 knots
- October 2002: (Petoskey); thunderstorm/winds; two trees down; 50 knots
- August 2003: (Petoskey/Alanson) \$51,000 property damage; thunderstorm/winds; number trees and power lines down damaging several homes and cottages near Crooked and Pickerel Lakes, a small aluminum boat was tossed into a tree, trailers at a dealership in Petoskey were rolled off the parking lot and into a ditch; 55 knots
- November 2003: (region) \$155,000 property damage; high wind; trees and power lines down, power outages; 56 mph at Harbor Springs and 62 mph at Pellston Airport; 68 knots

4. Tornadoes – 6 events

- September 1953: (county) F1 classification
- June 1955: (county) \$3,000 property damage; F1 classification; 1 mile long, 33 yards wide
- July 1957: (county) \$25,000 property damage; F1 classification; 6 miles long, 33 yards wide
- August 1987: (county) \$25,000 property damage; F0 classification; 0 miles long, 30 yards wide
- August 1996: (Pellston Airport); F0 classification; 0 miles long; 5 yards wide

- August 1999: (Petoskey); 2 miles northwest of Petoskey; three waterspouts on Little Traverse Bay, Lake Michigan

3. *Probability of Natural Hazards:*

The probability that a natural hazard such as hail, thunderstorms and high winds, tornadoes, and snow and ice will affect this area of Michigan is an annual possibility. The magnitude and severity depends on the season, which determines temperature, moisture in the air, ice cover on the lakes, etc. Also, the severity of an event is connected with tourist activity during the year, the pace of developing second homes, and an increasing base population in northwest, lower Michigan which in turn leads to more development. The events recorded by NOAA show that natural hazard events may be happening more frequently, but the geographic impact of the natural hazards' impact has remained the same in Emmet County.

The areas where natural hazards overlap in Emmet County can include heavy snow that causes trees and power lines down, and then melting, rain and flooding.

Please see Appendix C: Risk Assessment Summary Table.

C. Emmet County Natural Hazards Task Force and Public Input

To create the Emmet County Natural Hazards Task Force, invitations for the meetings were sent to the following entities requesting their participation:

County Administrator/Coordinator
 County Board of Commissioners
 County Sheriff/Emergency Services (911 Services Coordinators, Public Safety)
 County Emergency Manager/Coordinator
 County Public Works Director
 County Health Department Director
 County Planning or Community Development Director
 County Drain Commissioner/Soil Erosion Officers
 County Road Commission Director
 County Conservation District Director/Soil Erosion Officers
 Township elected and appointed officials
 Township Supervisors
 Township Clerks
 Michigan State Police
 Michigan Department of Environmental Quality
 Michigan Department of Natural Resources
 Michigan Department of Transportation
 U.S. Coast Guard
 Hospitals
 City/Village Maintenance/Utilities
 Tribes
 Environmental/Conservation Groups/Organizations
 American Red Cross
 Groundwater Protection
 Housing Associations

Chambers of Commerce
National Weather Service (Gaylord)
Michigan Family Independence Agencies

The first Task Force meeting was held on **May 10th, 2004** to identify the natural hazards priority areas and the second Task Force meeting was held on **August 24th, 2004** to develop the mitigation strategies for the priority issues. Participants in the meetings included representatives from:

Emmet County Emergency Management Coordinator
Emmet County Sheriff Department
Emmet County Planning Department
Charlevoix/Emmet Conservation District
Little Traverse Bay Bands of Odawa (2)
American Red Cross (2)

At the first Task Force meeting, the NWMCOG staff presented the background of the required project; the principle natural hazards in Michigan; what is mitigation planning; the purpose of the plan; suggested goals; and the political process. A full county natural hazards map was available for review with four separate quadrant maps. These sectional maps were for the participants to review the areas of the county they were most familiar with. The Emergency Management Coordinator and Planners reviewed all the maps to give input on the entire county.

The group analyzed the map areas for the top natural hazard priority areas by documenting the most threatening. They did a qualitative assessment of points and concerns where they saw potential conflicts with and the relationship to critical facilities and population centers. The general list created included:

1. Lake Michigan shoreline erosion from Harbor Springs to Cross Village – wave action; bluffs; M-119 road deterioration; development engineering of houses on the bluffs
2. Mackinaw Bridge
3. Need power substations (Wolverine Power); tap Consumers Energy
4. Harbor Springs – flood (1923) effected structures and people, now there are schools, major road, and EMS building in the flood route
5. Bear River dam in Petoskey
6. Carp River dam in Levering
7. US 31 South of Petoskey – Pine Bluff area for erosion along Little Traverse Bay
8. Boyer Creek/Tannery Creek flooding area – yearly near US 31 and M-119
9. Pipeline pumping station
10. Communications area southwest of town (winter weather)
11. Forest fire potential near airport in Pellston
12. Hazardous Materials – Mitchell Road: populated and flood zone, farms
13. Industrial areas – Circuit Controls M-119; Northern Michigan Diecast Industrial park; Little Traverse Park; Moeller Drive; Mitigation strategy – revert back certain industrial areas to non-industrial, planning of industrial parks and hazards; transportation of hazardous materials and avoiding cities
14. Minimum driveway size for emergencies
15. Need a NOAA weather station

16. Transportation Issues on U.S. 31 through Bay View
17. Pipeline pumping station at Pellston
18. Walloon Lake Dam and Bear River flooding; Bridge Street area with houses and senior apartments; Sheridan Road area
19. Severe winter weather
20. Severe thunderstorms and high winds in the Petoskey area
21. Little Traverse Bay erosion during high water; Boulder Avenue area, water rushing down the slope and erosion
22. Alanson Lock area
23. Maple River dam
24. Stormwater runoff down steep roads with erosion
25. Increase in development in dune areas
26. Ice damage on Little Traverse Bay and Walloon Lake
27. Mitchell Road washout – small creek to near the High School, to Winter Park, to Lockwood MacDonald Building, then under US 31 to the Bay

The participants then took the complete list above and developed their Top Five Natural Hazards Priority Areas. Due to the rural nature of the county, there has not been a lot of property damage, injuries, or deaths due to natural hazards. Please refer to Figure 1.

Top Five Natural Hazards Priority Areas

1. **Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay**
 Shoreline erosion hazards involve the loss of property as sand or soil is removed by water action and carried away over time. This can cause structures to stand perilously close to waters or bluffs. The foundation of a structure, or underground utility pipes in the area, may become fully exposed and vulnerable to extreme temperatures, water damage, or other sources of risk.

 Shoreline roadways may banks erode causing the road surface to crack, become unstable, or prone to deposits of sand, snow, water, and ice from nearby beaches and water bodies.
2. **Flooding: Harbor Springs, Boyer Creek, Tannery Creek, Bear River, Alanson Locks, Maple River**
 The risk of the dam failures and stormwater runoff. Damages could be greater from flash flood types of events than they would from gradual floodplain inundation.

 In addition to “regular” flooding in a riverine floodplain, other flooding may involve low-lying areas that collect runoff waters; flaws or shortcomings in existing sewer infrastructure; undersized or poorly designed stormwater control practices; collective effects of land use and development trends; illegal diversion of water, or deliberate actions that interfere with stormwater systems.
3. **Severe thunderstorms, High Winds, and Tornadoes throughout the County**
 There is a historical record of damaging wind events in Emmet County and a few tornadoes in the county. Severe winds, or straight line winds that sometimes occur during severe thunderstorms can be very damaging to a community. Severe winds have the potential to cause loss of life from property damage and flying debris. Damage

from straight line winds is more widespread than tornadoes and often affects multiple counties. There is also risk of infrastructure damage from downed power lines from falling trees and limbs.

There is a historical record of severe thunderstorm events in the county with some concerns regarding the influx of tourists. Thunderstorms are hazards that bring a variety of problems during the spring, summer, and fall seasons. They can bring potential lightning, flash flooding, hail, strong winds, and even tornadoes.

Tornadoes are high-profile hazards that can cause catastrophic damage to a limited or extensive area. There are no recorded tornado touchdowns in this area, but there is concern of the potential regarding the utility facility.

4. Severe Winter Weather throughout the County

Emmet County's winter weather is influenced by lake effect snows. Snowstorms can be very dangerous for a community for short periods of time. Blowing and drifting with blizzard conditions cause driving hazards. Heavy snows can shut down towns and businesses for a period of a few days if the snow is falling faster that it can be cleared in a timely fashion. Ice damages can occur when the ice is breaking up and strong wind occur pushing the ice onto shore.

Winter storms can also result in freezing rain and ice storms resulting in hazardous driving conditions, downed power lines, and blocked roads.

D. Emergency Warning System Coverage

There is no information at this time.

E. Economic Impact Analysis

The total Damaging Events' Costs recorded since 1950 by the National Oceanic and Atmospheric Administration for Emmet County and the region are as follows:

1.	Hail	\$100,000
2.	Snow and Ice	\$5,149,538
3.	Thunderstorm and High Wind	\$321,000
4.	Tornadoes	\$53,000

NWMCOG staff worked with the Emmet County parcel maps to calculate each Priority Area's economic value through the State Equalized Values (SEV) for real and personal property (residential and commercial). The following includes the 2000 Census data for the priority area and the SEV dollar amount times two (estimated fair market values) for each priority area.

- Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay*
Population: 31,437
Total: \$3,767,872,600
- Flooding and Dams: Harbor Springs, Boyer Creek, Tannery Creek, Bear River Alanson Locks, Maple River*

Population: 16,931 plus seasonal influx
Total: \$2,848,359,400

3. *Severe thunderstorms, High Winds, and Tornadoes throughout the County*

Population: 31,437 plus seasonal influx
Total: \$6,309,514,184

4. *Severe Winter Weather throughout the County*

Population: 31,437 plus seasonal influx
Total: \$6,309,514,184

VIII. NATURAL HAZARDS MITIGATION GOALS AND OBJECTIVES

The mission of the Emmet County Natural Hazards Mitigation Plan is to protect the health and safety of the public and property in the County which includes prevention of injury, loss of life, property damage, breakdown in vital services like transportation and infrastructure, economic slumps, maintain tourist base, and liability issues. This is done by taking action to permanently eliminate or reduce the long-term risks from natural hazards.

Specific goals and objectives have been established based upon the community's natural hazards analysis, as well as input from the Task Force participants and the public through meetings, posting of the draft plan with a request for comments in the local newspaper and on the NWMCOG website, and the presentation of the plan to the Emmet County Planning Commission.

Goal 1: Increase local awareness and participation in natural hazards mitigation strategies

Objectives:

- A. Encourage cooperation and communication between planning and emergency management officials
- B. Encourage additional local governmental agencies to participate in the natural hazards mitigation process
- C. Encourage public and private organizations to participate

Goal 2: Integrate natural hazards mitigation considerations into the community's comprehensive planning process

Objectives:

- A. Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures, and into the county's master plan
- B. Incorporate natural hazards mitigation into basic land use regulation mechanisms
- C. Update of zoning ordinances, shoreline protection rules, etc.
- D. Incorporate natural hazards area classifications into standard zoning classifications
- E. Develop community education programs and public warning systems
- F. Strengthen the role of the Local Emergency Planning Committee in the land development process
- G. Integrate natural hazards mitigation into the capital improvement planning process so that public infrastructure does not lead to development in natural hazards areas
- H. Encourage county agencies to assess local roads, bridges, dams, and related transportation infrastructure for natural hazards vulnerability

Goal 3: Utilize available resources and apply for additional funding for natural hazards Mitigation projects

Objectives:

- A. Prepare a list of desired community mitigation projects to submit to the State for mitigation grant funding
- B. Encourage the application for project funding from other entities

Goal 4: Develop and complete natural hazards mitigation projects in a timely manner

Objectives

- A. Encourage public and business involvement in natural hazards mitigation projects

IX. IDENTIFICATION AND SELECTION OF MITIGATION STRATEGIES

A. Climate Change Solutions

Regional residents, business leaders, and policymakers can help reduce the potential impacts from climate change by pursuing three necessary and complementary strategies:

- Reducing heat-trapping gas emissions will help curb the threat from a changing climate. This can be achieved, for example, by increasing energy efficiency, switching to renewable energy sources such as wind and biomass, increasing the fuel economy of vehicles, and investing in clean transportation choices.
- Minimizing pressures on the environment by improving air quality, protecting the quality and supply of water resources, protecting habitat, and limiting sprawl.
- Preparing for those impacts from global warming that cannot be avoided through better planning and emergency preparedness, adaptations in agriculture, strengthening public health response and warning systems, and adjusting flood control infrastructure based on projected precipitation trends.

B. Selection of Feasible Mitigation Strategies

A set of evaluation criteria was developed to determine which mitigation strategies were best suited to address the identified problems in Emmet County.

1. The measure must be technically feasible.
2. The measure must be financially feasible.
3. The measure must be environmentally sound and not cause any permanent, significant environmental concerns.
4. The measure must be acceptable to those participating in the strategy and/or primarily impacted by the strategy.

By anticipating future problems, the County can reduce potential injury, structure losses, loss of power such as electric and gas, and prevent wasteful public and private expenditures.

At the second Task Force meeting in **August 2004** the participants reviewed the suggested list of natural hazards mitigation strategies, matched them with each of the top natural hazards (numbered below) priority areas, and also suggested others to create a list of the most desired strategies for each. Please refer to Appendix B. #2.

1. Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay

Landslide/Erosion Mitigation Strategies:

- a. Enforcement of the Stormwater Management Ordinance and the Soil Erosion and Sedimentation Control Ordinance: slide areas, drainage control, grading, debris flow measures, vegetation (native species) placement
- b. Utilize the Critical Dunes Overlay
- c. Education and enforcement of building and zoning codes: development setbacks, lot sizes, driveways, relocation of structures, Lake Michigan coastal zoning ordinances – U.S. Army Corps of Engineers and Michigan Department of Environmental Quality
- d. Building code enforcement through permits

- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for developers, realtors, and engineers, especially for out of the area entities
- g. Public education

2. Flooding: Harbor Springs, Boyer Creek, Tannery Creek, Bear River, Alanson Locks, Maple River

Flood Mitigation Strategies:

- a. Assessment of flood threat and dam inspections results
- b. Drainage improvements
- c. Enforcement of Stormwater Management Ordinance
- d. Enforcement of building and zoning codes
- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for realtors through the creation of a handbook for distribution
- g. Public education

3. Severe thunderstorms, High Winds, and Tornadoes throughout the County

Thunderstorm and High Winds Mitigation Strategies:

- a. Address the practice of placing utilities underground for new construction
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Education and enforcement of building codes for such activities as bracing elevated platforms and anchoring and tie downs (inventory the renovated county fairgrounds)
- d. Tree management coordination
- e. Public education

Tornado Mitigation Strategies:

- a. Consistent weather event warnings
- b. Public awareness and education

4. Severe Winter Weather throughout the County

Snow and Ice Mitigation Strategies:

- a. Public education and awareness
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Improve shelter capacity
- d. Promote community response for snow removal activities such as using community services clients to assist the elderly
- e. Enforcement of building code snow load requirements which is 70 lbs. per sq. ft. especially when there is snow, rain and then freezing

C. Summary of Recommended Natural Hazards Mitigation Actions for Emmet County

For rural Emmet County, increased public awareness and education is the top mitigation strategy to implement regarding the potential for severe thunderstorms, high winds, possible tornadoes, snow and ice, and stormwater runoff or flooding.

- **Public education and awareness of potential hazards**
- **Education and enforcement of building codes for new construction**

- ***Education and enforcement of zoning regarding natural hazards occurrences***
- ***Working with utility companies***
- ***Working with organizations, businesses, and the public***
- ***Incorporating the Plan's hazard mitigation concepts, strategies, and policies into existing elements of Emmet County's Master Land Use Plan***

X. IMPLEMENTATION OF THE EMMET COUNTY NATURAL HAZARDS MITIGATION PLAN

1. *Natural Hazards Mitigation Plan Managers and Technical Assistance*

The leader for implementing the Natural Hazards Mitigation Plan is the Emmet County Board of Commissioners, with the staff leaders being the Emergency Management Coordinator and the Planning Department. Working partnerships can be established with the following to provide technical assistance to accomplish the goals and objectives of the Plan.

Emmet County Government
Townships, cities, and villages
Emmet County Conservation District
Emmet County Drain Commissioner
Emmet County Road Commission
Little Traverse Bay Bands of Odawa Indians
Tip of the Mitt Watershed Council
Michigan State University Extension
Michigan Department of Environmental Quality
Michigan Department of Natural Resources
U.S. Environmental Protection Agency
U.S. Army Corps of Engineers
U.S. Department of Agriculture Natural Resources Conservation Service
Insurance Companies
Real Estate Companies

All natural hazards mitigation planning could be pursued with the new tool available to local governments which is Michigan Public Act 226 of 2003, the Joint Municipal Planning Act. This Act provides for joint land use planning by cities, villages, and townships and allows two or more municipalities' legislative bodies to create a single joint planning commission to address planning issues. This tool helps with planning for the "big picture" issues such as natural hazards that cross jurisdictional boundaries.

The intent of this legislation is for local governments to consider the following:

- ☞ Individual units of government modifying their ordinances simultaneously to include language that would incorporate aspects of protection
- ☞ Developing an overlay zoning district that would cross jurisdictional boundaries that would be incorporated into existing independent units of government's zoning ordinances
- ☞ Forming a new joint (multi-jurisdictional) planning commission or zoning board
- ☞ Sharing zoning administration
- ☞ Sharing enforcement activities

2. *Funding the Implementation of the Plan*

To assist with the funding of the proposed natural hazards mitigation strategies, here is a list of potential financial assistance entities to help fund the implementation projects of the Plan.

Federal Emergency Management Administration – Hazard Mitigation Grant Program
 U.S. Environmental Protection Agency
 U.S. Department of Agriculture Natural Resources Conservation Service
 U.S. Department of Agriculture Rural Development: Rural broadband opportunity – high speed telecommunication funding from the Public Telecommunications Facilities Planning and Construction grants
 U.S. Department of Housing and Urban Development
 Michigan Department of Environmental Quality
 Michigan Department of Natural Resources
 National Oceanic and Atmospheric Administration
 Community, Regional Foundations
 Businesses: Home Depot (local store and Foundation) assists with educational initiatives that provide developers and the general public with the information they need to make homes more disaster resistant.

3. Action Agenda

Following is summary for accomplishing the **recommended natural hazards mitigation actions** for Emmet County.

1. Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay

Landslide/Erosion Mitigation Strategies:

- a. Enforcement of the Stormwater Management Ordinance and the Soil Erosion and Sedimentation Control Ordinance: slide areas, drainage control, grading, debris flow measures, vegetation (native species) placement
- b. Utilize the Critical Dunes Overlay
- c. Education and enforcement of building and zoning codes: development setbacks, lot sizes, driveways, relocation of structures, Lake Michigan coastal zoning ordinances – U.S. Army Corps of Engineers and Michigan Department of Environmental Quality
- d. Building code enforcement through permits
- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for developers, realtors, and engineers, especially for out of the area entities
- g. Public education

2. Flooding: Harbor Springs, Boyer Creek, Tannery Creek, Bear River, Alanson Locks, Maple River

Flood Mitigation Strategies:

- a. Assessment of flood threat and dam inspections results
- b. Drainage improvements
- c. Enforcement of Stormwater Management Ordinance
- d. Enforcement of building and zoning codes
- e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
- f. Education for realtors through the creation of a handbook for distribution
- g. Public education

3. Severe thunderstorms, High Winds, and Tornadoes throughout the County

Thunderstorm and High Winds Mitigation Strategies:

- a. Address the practice of placing utilities underground for new construction
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Education and enforcement of building codes for such activities as bracing elevated platforms and anchoring and tie downs (inventory the renovated county fairgrounds)
- d. Tree management coordination
- e. Public education

Tornado Mitigation Strategies:

- a. Consistent weather event warnings
- b. Public awareness and education

4. Severe Winter Weather throughout the County

Snow and Ice Mitigation Strategies:

- a. Public education and awareness
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Improve shelter capacity
- d. Promote community response for snow removal activities such as using community services clients to assist the elderly
- e. Enforcement of building code snow load requirements which is 70 lbs. per sq. ft. especially when there is snow, rain and then freezing

Other mitigation strategies:

- ***Working with utility companies to protect the power grid***
- ***Working with other governmental entities, organizations, businesses, and the public***
- ***Incorporating the Plan's natural hazards mitigation concepts, strategies, and policies into existing elements of Emmet County's Master Land Use Plan*** - The most effective method for fostering and promoting the implementation of the hazard mitigation concepts, strategies, and policies within the County is to integrate them into existing elements of the Master Land Use Plan. Mitigation concepts, strategies, and policies would appear in appropriate places throughout the plan.

Emmet County can also utilize watershed management plans that have been developed within the county boundaries. Proposed mitigation strategies that have been laid out in the Little Traverse Bay Watershed Management Plans include:

- Resident, commercial/industry, and government official education
- Stabilizing erosion at road/stream crossings.
- Correcting most severe streambank and lakeshore erosion sites.
- Reducing the pollutant load from stormwater in the urban areas.
- Restricting livestock from streams.
- Maintaining adequate recreational access.
- Removing sediments from appropriate locations.
- Contacting landowners of sensitive lands and educating about land stewardship and protection options.

- Ensuring that state and federal wetland laws are properly administered and enforced.
- Developing local ordinances to protect wetlands.
- Educating landowners, developers, and citizens on the importance of wetland protection.

The County should consider the following key land use issues and the relationship to hazard mitigation:

- Safe, beneficial uses for hazard prone areas
- Concentration issues
- Proximity issues
- Location of public facilities and infrastructure
- Development standards for public facilities and infrastructure
- Effect of accumulated development on community systems and facilities

4. *Monitoring and Evaluation*

The Emmet County Natural Hazards Mitigation Plan will be monitored on a regular basis by the Emergency Management Coordinator and the Planning Department. Because Emmet County is a dynamic, changing county with population growth, it is expected that the plan should be reviewed on an annual basis.

To assess the effectiveness of the Plan, some questions to ask in the review include: 1) How many and which mitigation strategies were developed? Implemented? 2) Did any new natural hazards events take place the past year to report? This review will be administered by the Emergency Management Coordinator with the Local Emergency Planning Committee, the County Planning Commission and Department, and the public. If changes are needed, the plan will be presented to the Task Force participants for revisions.

Although review of the plan will occur annually, and a formal revision may not be needed each year, a new edition of the plan will be expected within every five-year period. New additions of the plan will be based on annual reviews, monitoring, evaluation, and an accumulation of official feedback and public input. When it is appropriate to publish a revised version of the plan, the Task Force participants shall again be involved in the revision process. Each new edition of the plan will again be officially adopted by the Emmet County Board of Commissioners.

XI. Review of the Emmet County Natural Hazards Mitigation Plan

The opportunities for review by other governmental entities and the public included the following:

- A. Quarterly reports were given to the Northwest Michigan Council of Governments' Board of Directors for neighboring counties' review.
- B. Public Notices were published in the Petoskey News Review – no comments were received.

Public Notice

The Northwest Michigan Council of Governments is requesting public comment on the Natural Hazards Mitigation Plan draft for Emmet County. The Plan is available for review at the Emmet County Planning Department, County Building, Petoskey or at nwm.org, Community Resources, Community and Economic Development, Hazard Mitigation Planning Program, Emmet County Plan. Please send comments by September 17, 2004 to: Hazard Mitigation Plans, NWMCOG, PO Box 506, Traverse City MI 49685-0506.

- C. Postcards that gave notice of the draft plan to review were sent to all the Township Supervisors - no comments were received.
- D. The Natural Hazards Mitigation Plan was presented to the Emmet County Planning Commission where the meetings are posted in the newspaper and are open to the public. Commission members gave their input and there were no comments from the public.

****To be done – approval for recommendation to the Emmet County Board of Commissioners then,**

- E. The Natural Hazards Mitigation Plan was presented to the Emmet County Board of Commissioners where the meetings are posted in the newspaper and are open to the public. Commissioners gave their input and there were no comments from the public.

XII. NATURAL HAZARDS MITIGATION PLAN ADOPTION RESOLUTION

WHEREAS, Emmet County, Michigan has experienced natural disasters that have damaged commercial, residential, and public properties, displaced citizens and businesses, closed streets and bridges, and presented general public health and safety concerns; and

WHEREAS, Emmet County has prepared a *Natural Hazards Mitigation Plan* that outlines the County's options to reduce overall damage and impact from natural hazards; and

WHEREAS, the *Natural Hazards Mitigation Plan* has been reviewed by County residents, business owners, and federal, state, and local agencies, and has been revised to reflect their concerns;

NOW, THEREFORE, BE IT RESOLVED THAT

1. The *Emmet County Natural Hazards Mitigation Plan* is hereby adopted as an official plan of Emmet County, Michigan.
2. The Emergency Management Coordinator, the Planning Department staff, and Planning Commission are charged with supervising the implementation of the Plan's recommendations within the funding limitations as provided by the Emmet County Board of Commissioners or other sources.
3. Priority attention shall be given to the following action items recommended by the *Natural Hazards Mitigation Plan*:
 1. **Shoreline and Steep Slope Erosion: Lake Michigan/Little Traverse Bay
*Landslide/Erosion Mitigation Strategies:***
 - a. Enforcement of the Stormwater Management Ordinance and the Soil Erosion and Sedimentation Control Ordinance: slide areas, drainage control, grading, debris flow measures, vegetation (native species) placement
 - b. Utilize the Critical Dunes Overlay
 - c. Education and enforcement of building and zoning codes: development setbacks, lot sizes, driveways, relocation of structures, Lake Michigan coastal zoning ordinances – U.S. Army Corps of Engineers and Michigan Department of Environmental Quality
 - d. Building code enforcement through permits
 - e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
 - f. Education for developers, realtors, and engineers, especially for out of the area entities
 - g. Public education
 2. **Flooding: Harbor Springs, Boyer Creek, Tannery Creek, Bear River, Alanson Locks, Maple River
*Flood Mitigation Strategies:***
 - a. Assessment of flood threat and dam inspections results
 - b. Drainage improvements
 - c. Enforcement of Stormwater Management Ordinance
 - d. Enforcement of building and zoning codes
 - e. Open space designations: acquisition or conservation easements by land conservancies, county, townships
 - f. Education for realtors through the creation of a handbook for distribution
 - g. Public education
 3. **Severe thunderstorms, High Winds, and Tornadoes throughout the County**

Thunderstorm and High Winds Mitigation Strategies:

- a. Address the practice of placing utilities underground for new construction
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Education and enforcement of building codes for such activities as bracing elevated platforms and anchoring and tie downs (inventory the renovated county fairgrounds)
- d. Tree management coordination
- e. Public education

Tornado Mitigation Strategies:

- a. Consistent weather event warnings
- b. Public awareness and education

4. Severe Winter Weather throughout the County

Snow and Ice Mitigation Strategies:

- a. Public education and awareness
- b. A National Oceanic and Atmospheric Administration weather station for the area
- c. Improve shelter capacity
- d. Promote community response for snow removal activities such as using community services clients to assist the elderly
- e. Enforcement of building code snow load requirements which is 70 lbs. per sq. ft. especially when there is snow, rain and then freezing

Other mitigation strategies:

- ***Working with utility companies to protect the power grid***
- ***Working with other governmental entities, organizations, businesses, and the public***
- ***Incorporating the Plan's natural hazards mitigation concepts, strategies, and policies into existing elements of Emmet County's Master Land Use Plan***

4. The Emergency Management Coordinator and the Planning Director shall review the Natural Hazards Mitigation Plan once per year. The staff shall monitor implementation of the plan and shall submit a written progress report to the County Board of Commissioners in accordance with the following format:
 - a. A review of the original plan.
 - b. A review of any disasters or emergencies that occurred during the previous calendar year.
 - c. A review of the actions taken, including what was accomplished during the previous year.
 - d. A discussion of any implementation problems.
 - e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the County Board of Commissioners.

Passed this _____ day of _____.

Signed by: _____

XIII. APPENDICES

Appendix A

Glossary of Mitigation Planning Terms

Alluvial fan: A gently sloping fan-shaped landform created over time by the deposition of eroded sediment and debris.

Base Flood: A flood having a one percent chance of being equaled or exceeded in any given year.

Coastal high hazard area: An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms.

Disaster: A major detrimental impact of a hazard upon the population and economic, social, and built environment of an affected area.

Exposure: The number, types, qualities, and monetary values of various types of property or infrastructure and life that may be subject to an undesirable or injurious hazard event.

Flood Insurance Rate Map: As defined under the National Flood Insurance Program, an official map of the community on which the administrator of the Flood Insurance Administration has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

Floodplain or flood prone area: Any land area susceptible to being inundated by water from any source.

Floodplain management: The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works, and floodplain management regulations.

Fuel: Combustible plant material, both living and dead, that is capable of burning in a wildland situation; any other flammable material in the built environment that feeds a wildfire.

Hazard: An event or physical condition that has the potential to cause fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, interruption of business, or other types of harm or loss.

Hazard identification: The process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

Lifeline systems: Public works and utilities such as electrical power, gas and liquid fuels, telecommunications, transportation, and water and sewer systems.

Major disaster: As defined in the Stafford Act, “any natural catastrophe or, regardless of cause, any fire, flood, or explosion in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of states, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby.”

Mitigation: Sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

Multiple-objective management: A holistic approach to floodplain management (or the management of other hazards) that emphasizes the involvement of multiple distinct interest in solving land use problems related to the hazardous area.

Natural hazard: Hurricanes, tornadoes, storms, floods, tidal wave, tsunamis, high or wind-driven waters, volcanic eruptions, earthquakes, snowstorms, wildfires, droughts, landslides, and mudslides.

One hundred year flood: The flooding event that has a one percent chance of occurring in a particular location in any given year. While this is the most common reference point statistically because it is used for regulatory purposes in the National Flood Insurance Program, the same language applies in referring to other actual or hypothetical events in terms of their statistical probabilities.

Risk: The potential losses associated with a hazard, defined in terms of expected probability and frequency, exposure, and consequences.

Risk assessment: A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure, and consequences.

Special flood hazard area: Land in the floodplain within a community subject to one percent or greater chance of flooding in any given year.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act (P.L. 93-288, as amended by P.L. 100-707), which provides the greatest single source of federal disaster assistance.

Structure: A walled and roofed building, including a storage tank for gas or liquid, that is principally above ground, as well as a manufactured home.

Tornado Classifications:

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157 mph	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	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318 mph	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.
F6	Inconceivable tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Urban Wildfire: A fire moving from a wildland environment, consuming vegetation as fuel, to an environment where the fuel consists primarily of buildings and other structures.

Urban/wildland interface: A developed area, also known as the “I-zone,” occupying the boundary between an urban or settled area and a wildland characterized by vegetation that can serve as fuel for a forest fire.

Vulnerability: The level of exposure of human life and property to damage from natural hazards.

Watershed management: The implementation of a plan or plans for managing the quality of flow of water within a watershed, the naturally defined area within which water flows into a particular lake or river or its tributary. The aims of watershed management are holistic and concern the maintenance of water quality, the minimization of stormwater runoff, the preservation of natural flood controls such as wetlands and pervious surface, and the preservation of natural drainage patterns. Watershed management is, in many ways, an enlargement of most of the concerns that underlie floodplain management.

Wildland: An area in which development has not occurred with the exception of some minimal transportation infrastructure such as highways and railroads, and any structures that are widely spaced and serve largely recreational purposes.

Appendix B

Detailed Maps

1. **11 x 17 Full Map**
2. **11 x 17 Zoom in of Priority Areas**

Appendix C

Population Density Map

Appendix D

Risk Assessment Summary Table: EMMET COUNTY

HAZARD	How Frequently has the Hazard Occurred in the Past?	How Likely is the Hazard to Occur in the Future?	Potential Geographic Size of the Affected Area	Potential Population Impacted	Priority of Mitigation Activities	Detailed Damaged and Estimated Costs (Population, Economic, Environment)
Fire Hazards		Warnings Seasonal	Pellston/Airport Wycamp Area Petoskey State Park Wilderness SP	771		Population, Economic, Environment
Flooding Hazards	Large flood in Harbor Springs 1923	.01% chance	Hughston Road to Harbor Springs Tannery Creek; Mitchell Road; Bear River; Maple River; Alanson Locks	1,567 6,080 2,783	2	Population, schools, EMS building, businesses, condominiums, houses, economic, environment
Hail	9 events	17% chance	Petoskey E County, Pellston, Bayshore	6,080		Population, Economic \$100,000
Landslides/Severe Erosion	High Water Cycle 1986	30-35 year cycle	Lake Michigan shoreline US 31 S of Pet	homes condominiums	1	Economic, Environment
Snow and Ice	57 events	106% chance	County	31,437	4	Population, Economic \$5,149,538
Thunderstorm and High Wind	43 events	80% chance	County	31, 437	3	Population, Economic \$321,000, Environment
Tornadoes	6 events	11% chance	Petoskey Harbor Springs, Lake Michigan, Pellston, Petoskey County	6080 4936 1787 31,437	3	Population, Economic \$53,000, Environment

Appendix E

Examples of Past Mitigation Projects

Flood Projects	Tornado/Wind Projects	Extreme Cold/Winter/Infrastructure Failure Projects
Replace culvert with bridge	Modify roof ballast system on airport	Insulate municipal water tower
Install stormwater relief drain	Construct storm shelters in public buildings	Insulate city infrastructure
Upgrade road culvert	Construct storm shelters for homes, facilities	Insulate sanitary/storm sewer mains
Elevate floors of homes	Wind bracing for microwave/radio towers	Insulate water mains
Acquire of floodway properties	Construct mobile home park storm shelter	Bury utility lines
Create retention basin	Wind retrofitting for municipal buildings	Relocate sewer mains
Construct new dike	Wind bracing for school facilities	Reroute power lines under a river
Upgrade bridge over a creek (for greater stream flow)	Upgrade warning sirens**	Install plumbing devices to prevent sewer backup
Install sea wall	Install warning sirens**	Elevate and build casing for generator for EOC
Install rip rap to protect roadway	Purchase/Distribute NOAA radios**	Living snow fences for highways and roadways
Re-route various county drains	Severe weather monitoring systems**	
Purchase back-flow prevention valves	Implement long-term community outreach**	
Construct new drains for flood relief		
Flood study for home acquisition		
Flood study of community's flood risk	T-storm/Lightning Projects	Wildfire Projects
Flood study for stream, roadways		
Elevate electrical equipment in basements	Lightning protection (grounding/phasing)	Vegetation management for roadways
Floodproof wastewater treatment plant	Purchase/Distribute NOAA radios**	Vegetation mgmt. for urban interface areas of city
Warning sensor for creek/river	Install weather alert monitors**	Vegetation mgmt. for homes in fire prone areas
Warning sensor for dam		Urban Interface Education Program**
Raise manholes above 100-Yr floodplain		
Expand storm sewer network for subdivision		
Excavate floodway channel bypass		
Establish permanent flood elevation benchmarks**		
Increase pump capacity for pump stations		
Remove abandoned dam		
Construct emergency floodway		
Install plumbing devices to prevent sewer backup		

**Denotes Hazard Mitigation Grant Program State Discretionary projects (only 5-10% set aside of HMGP funding)

Appendix F

Resources

Benchmarks 2004, Northwest Michigan Council of Governments

Confronting Climate Change in the Great Lakes Region, Michigan fact sheet, Union of Concerned Scientists and the Ecological Society of America, April 2003.

Emmet County – www.co.emmet.mi.us

Integrating Human-Caused Hazards Into Mitigation Planning, State and Local Mitigation Planning how-to guide: Federal Emergency Management Agency, September 2002, FEMA 386-7 CD.

Little Traverse Bay Watershed Protection Plan, Tip of the Mitt Watershed Council, March 31, 2004, www.watershedcouncil.org.

Local Hazard Mitigation Planning Workbook: EMD-PUB 207, February 2003, Emergency Management Division, Michigan Department of State Police.

Michigan Hazard Analysis: EMD PUB-103, December 2001, Emergency Management Division, Michigan Department of State Police.

National Oceanic and Atmospheric Administration: Weather/Climate Events, Information, Assessments; Climatology and Extreme Events; U.S. Storm Events Data Base; 1950-present, local storm reports, damage reports, etc. from various sources. www.ncdc.noaa.gov

Northwest Michigan County Profiles 2000, Northwest Michigan Council of Governments, November 2002.

Northwest Michigan Council of Governments Website Data, nwm.org.

Planning for a Disaster-Resistant Community: A One-Day Workshop for City and County Planners, Planning Officials, and Consultants: American Planning Association Research Department, American Planning Association, 2002 in cooperation with the Federal Emergency Management Agency, Planning and Mitigation Branch (materials only).

State and Local Mitigation Planning how to guide: Understanding Your Risks, identifying hazards and estimating losses: Federal Emergency Management Agency, August 2001, FEMA 386-2.