APPENDIX N
Manistee and Mason County, Michigan
Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake Michigan
State of Michigan

Manistee County and Mason County
County-based Report

February 2013

FEMA

SUBMITTED BY:

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Project Area Community List

Manistee County	Mason County
Arcadia, Township of	Grant, Township of
Bear Lake, Village of	Hamlin, Township of
Brown, Township of	Ludington, City of
Eastlake, Village of	Pere Marquette, Township of
Filer, Township of	Summit, Township of
Manistee, City of	
Manistee, Township of	
Onekama, Township of	
Onekama, Village of	
Stronach, Township of	

This list includes all communities within the Project Area covered by this report for the Great Lakes Coastal Study under consideration for new Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) products and datasets, which may include Flood Insurance Studies (FISs) and Flood Insurance Rate Maps (FIRMs). Not all communities will receive new/updated FEMA Risk MAP products and datasets or FISs and FIRMs.

Table of Contents

List of Tables

List of Figures

List of Attachments

Acronyms and Abbreviations

AAL	Average Annualized Loss
CAV	Community Assistance Visit
CBRS	Coastal Barrier Resources System
CID	Community Identification Number
CIS	Community Information System
CMAG	Coastal Management Assistance Grant
C-MAN	Coastal Marine Automated Network
CNMS	Coordinated Needs Management Strategy
CO-OPS	Center for Operational Oceanographic Products and Services
CRS	Community Rating System
DFO	Department of Fisheries and Oceans
FEMA	Federal Emergency Management Agency
FIPS	Federal Information Processing Standards
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
GLCRG	Great Lakes Coastal Restoration Grant
HAZUS-MH	Multi-Hazard Risk Assessment and Loss Estimation Software Program
HWM	High Water Mark
HUC8	Hydrologic Unit Code 8
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
LOMR-F	Letter of Map Revision based on Fill
MLI	Midterm Levee Inventory
NDBC	National Data Buoy Center
NFIP	National Flood Insurance Program
NGDC	National Geophysical Data Center
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
Risk MAP	Risk Mapping, Assessment, and Planning
SFHA	Special Flood Hazard Area
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WMSRDC	West Michigan Shoreline Development Commission

I. Discovery Overview

The Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning, or Risk MAP, program, helps communities identify, assess, and reduce their flood risk. Through Risk MAP, FEMA provides information to enhance local mitigation plans, improve community outreach, and increase local resilience to floods.

During the Discovery phase of Risk MAP project development, FEMA:

- Gathers information about local flood risk and flood hazards
- Reviews mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities
- Supports communities within the coastal area to develop a vision for the future
- Collects information from communities about their flooding history, development plans, daily operations, and stormwater and floodplain management activities
- Uses all information gathered to determine which areas require mapping, risk assessment, or mitigation planning assistance through a Risk MAP project
- Develops Discovery Map and Report that summarize and display the Discovery findings

The Discovery process involves coordination with Great Lakes stakeholders, data collection and analysis, community interviews, a Discovery Meeting with stakeholders affected by the study, and development of recommendations based on an analysis of data and information gathered throughout the process

i. Great Lakes Coastal Flood Study

FEMA has initiated a coastal analysis and mapping study that may result in updated Flood Insurance Rate Maps (FIRMs) for coastal counties along the Great Lakes. The new coastal flood hazard analyses will utilize updated 1-percent-annual-chance (100-year) flood elevations obtained from a comprehensive storm surge study being developed by the U.S. Army Corps of Engineers (USACE).

The Great Lakes Coastal Flood Study (GLCFS) will incorporate modern analysis of historic storm and high water events and provide for updated flood risk information serving United States communities having shoreline along the Great Lakes. The storm surge study is one of the most extensive coastal storm surge analyses to date, encompassing coastal floodplains in the eight States with coastlines on the Great Lakes.

An updated coastal flood study is needed to obtain a better estimate of coastal flood hazards on the Great Lakes. The current, effective FIRMs are outdated primarily due to the age of data and the coastal methodologies used in producing them. Major changes in National Flood Insurance Program (NFIP) policies and methodologies have been implemented since the effective date of many flood insurance studies in the area, creating the need for an update that will reflect a more detailed and complete hazard determination.

The Great Lakes Coastal Flood Study includes a system-wide solution that provides a comprehensive analysis of storm and high water events within the Great Lakes Basin. This program is funded through the FEMA Risk MAP program. FEMA, USACE, Association of State Flood Plain Managers (ASFPM), State partners, and FEMA contractors will collaborate in updating the coastal methodology and flood maps, and create new flood risk products. FEMA manages the NFIP, which is the cornerstone of the national strategy for preparing communities for flood-related disasters.

ii. Purpose of Great Lakes Discovery

The Great Lakes Discovery process includes data collection, information exchange between all governmental levels of stakeholders, spatial data presentation, cooperative discussion with stakeholders to better understand the Great Lakes area, and a collaborative approach on the project planning in detail. The process allows FEMA to continue to vet the Great Lakes coastal study methodologies with a large stakeholder group, to discuss local priorities and data, to discuss mitigation strategies and coastal issues, and to move towards projects that will successfully identify the risks associated with Great Lakes flooding.

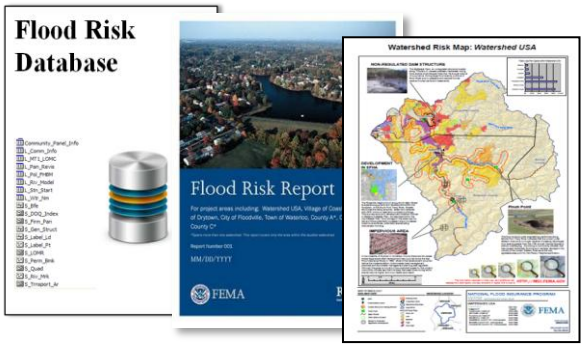
The Discovery process also helps FEMA better identify the types of datasets or products that are useful at the local level, especially as it relates to identifying new mitigation strategies and

actions and for use in local planning efforts. Products that may be available to communities as a result of this Great Lakes flood study include updated FIRMs, coastal flood risk products, calibrated models for storm surge and wave analysis on each of the lakes, and accurate depictions of water level and wave response on each lake occurring during hundreds of actual events. The type of product a community receives is dependant not only on the coastal flood study analysis results, but also on the type of data, local or nationally, that is available.

The following section describes the Coastal Flood Risk Products that a community may receive, as well as some products that are under development for the Great Lakes study areas.

iii. Coastal Flood Risk Products

As part of a Risk MAP project, FEMA will seek to provide State and community officials with three flood risk products to help them gain a better understanding of flood risk and its potential impact on communities and individuals. These products will also enable communities to move forward with informed mitigation actions to reduce identified risk. Delivery of the products discussed below will depend on available data, results of coastal analysis, local partnerships and needs, and fiscal year funding.



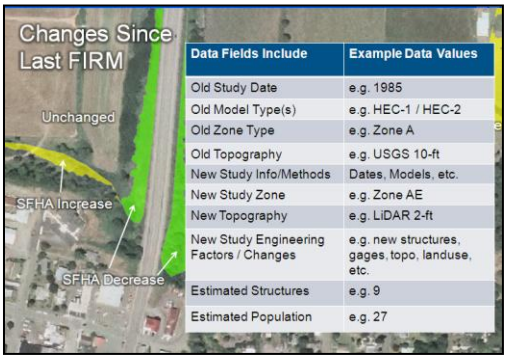
The three products are:

- Flood Risk Database
- Flood Risk Report
- Flood Risk Map

These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below:

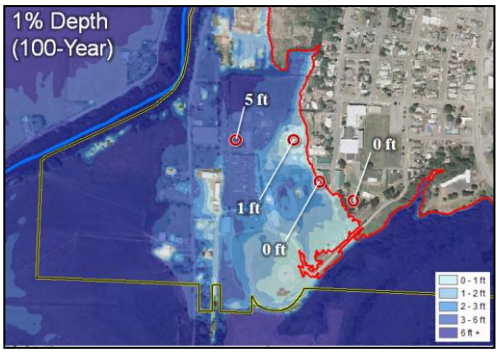
Changes Since Last FIRM (CSLF)

- Identify Areas and Types of Flood Zone Change:
    - Compares current effective (previous) with proposed (new) flood hazard mapping
- Flood zone changes are categorized and quantified



- Provide Study/Reach Level Rationale for Changes Including:
    - Methodology and assumptions
    - Changes of model inputs or parameters (also known as Contributing Engineering Factors).

Flood Depth and Analysis Grids (1-percent-annual-chance event only)



- Reflect total depth (i.e. stillwater and waves). Will be created for the 1% frequency event of the engineering studies performed and as appropriate for the data. Wave runup areas may not be applicable.
- Created using the regulatory mapping and associated zone breaks as input

Flood Risk Assessment (HAZUS-MH)

HAZUS MH
EARTHQUAKE • WIND • FLOOD

For more information about HAZUS and data inputs, visit http://www.fema.gov/plan/prevent/hazus/index.shtm or enter keywords "fema HAZUS" into an internet search engine.

- Hazard-United States Multi Hazard (HAZUS-MH) combines science, engineering and mathematical modeling with GIS technology to estimate losses of life and property—and shows those losses on a map
- HAZUS-MH estimates impacts to the physical, social, and economic vitality of a community from earthquakes, hurricane, winds, and floods
- Coastal flood risk assessments will be similar to riverine, but will use coastal depth grids as input for refined analysis.
- HAZUS-MH analysis and data can support adoption of high regulatory standards for structures in high loss areas
- HAZUS-MH results can help to provide justification to find mitigation projects to protect citizens and properties from losses during future coastal flood events

In addition, FEMA is looking into the possibility of developing some unique Great Lakes coastal flood risk products that utilize datasets that have recently been collected or will be collected as part of the GLCFS:

- Storm Response Erosion Data: Dataset is expected to contain the results from erosion analysis in response to the 1-percent-annual chance flood event

- Shoreline Feature Data: Dataset was developed by the USACE and contains primary and secondary land use tables, as well as coastline type, materials, and vegetation. The current dataset contains data at one-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection.

The delivery of these standard flood risk products and the Great Lakes coastal flood risk datasets will be dependent on the location of the Risk MAP study and coastal analysis, data availability, and partnerships with local communities. Not all communities will receive flood risk products.

II. Stakeholder Communication and Coordination

Communication and coordination with Federal, State and local stakeholders is key to the success of the GLCFS. A large emphasis has been placed on identifying stakeholders early and often and working with those stakeholders continually throughout the study process, from Discovery all the way through flood map and flood risk product development. Through outreach, the goal is to increase understanding of the new coastal study methodologies and the tools and processes that will be available for risk-based community planning, and to increase flood hazard awareness within the Great Lakes Coastal Region.

i. Lake Michigan Discovery Stakeholder Coordination

Meetings, emails, telephone calls, and letters are essential to communicate effectively throughout the life of this Lake Michigan Coastal Flood Study project, which has begun with this Discovery process.

To kick-off this Discovery process, FEMA formed a group of core stakeholders, which included representatives from FEMA Region V, STARR (mapping partner to FEMA), USACE, National Oceanic and Atmospheric Administration (NOAA), ASFPM, State National Flood Insurance Program (NFIP) Coordinator, State Hazard Mitigation Officer (SHMO), and State Engineers. The core stakeholders reviewed the Discovery plan, objectives, and key outcomes for Lake Michigan Discovery with FEMA, provided suggestions for outreach and communication, and raised any concerns as it related to Lake Michigan and the coastal flood study process. Following this kick-off process, outreach, communication, and coordination with local stakeholders was initiated.

Discovery Meeting invitations were sent to local community and county stakeholders within the Manistee and Mason Counties portions of the Lake Michigan Coastal Flood Study project. In addition, an email invitation was sent to a larger list of stakeholders, including but not limited to other federal agencies, universities, watershed groups, Great Lakes associations, technical stakeholders, and emergency management agencies.

Representatives from local governments, including cities, townships, and villages are considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of the Project Area. See Lake Michigan Basin-wide report for a complete list of the stakeholders invited to the Discovery Meeting.

Discovery Meeting invitations also included a Coastal Data Request Form (Attachment A). Communities were asked to provide information on data available at the local level that may be of use during the flood study update, and during the development of the coastal flood risk products discussed earlier in this report. The Coastal Data Request Form included data requests for:

- Base Map Data
- Coastal Data
- Historic Flood Data
- Risk Assessment
- Flood Mitigation Information
- Community Plans and Projects
- Other comments/concerns based on local knowledge

A compilation of responses to the coastal data request form can be found in Section IV, Summary of Data Analysis, of this report.

In addition to the hard copy letter invitations, and in order to improve communication and data sharing leading up to the Discovery Meeting, FEMA offered local communities an opportunity to attend pre-Discovery Meeting conference call, referred to as an Information Exchange Session. The conference call information was included in the Discovery Invitation letters mailed to local community officials, and an email reminder was sent out as well. The session's intent was to begin the process of learning about local data availability and what the critical issues are for the Great Lakes communities.

Stakeholder correspondence, invitations, meeting minutes, and presentations related to the information exchange session can be found in Attachment B, Manistee and Mason Counties Pre-Meeting Correspondence.

III. Manistee and Mason Counties Discovery Meeting

The Discovery Meeting for Manistee and Mason Counties coastal communities was held on September 12, 2012 in Ludington, MI. Communities potentially affected by coastal flooding were invited to the Discovery Meeting. The purpose of this meeting was to facilitate discussion

about study needs, mitigation project needs, desired compliance support, and local flood risk awareness efforts.

The objectives of the Discovery Meeting included:

- Continuation and expansion upon stakeholder engagement
- Discussion of data inputs from Federal, state and local stakeholders
- Identification of local coastal flood hazard needs and areas of concern
- Identification of flood risk products and datasets that best advance coastal mitigation action
- NFIP regulatory updates
- Discovery schedule and deliverables

The Discovery Meeting presentations included the following information:

- An overview of the GLCFS and schedule
- Review of the Discovery process and outcomes
- Discussion of coastal mapping and flood risk topics
- Discussion of how the study may affect communities, including compliance requirements
- Review of hazard mitigation opportunities and grant funding
- Encouragement and facilitation discussion regarding coastal study needs, mitigation project needs, desired compliance support, and local flood risk awareness efforts

Draft Discovery Maps for Manistee and Mason Counties (Attachments C-D) were displayed and utilized during the meeting to stimulate discussion regarding areas of coastal flood risk concern and areas of hazard mitigation interest. The draft Discovery Map shown at the meeting included geospatial data that had been collected prior to the meeting:

Geospatial Data:

- Average Annualized Loss (AAL) data
- Coastal Barrier Resources System (CBRS)[1]

[1] and generally depicted on a series of maps. CBRS areas are ineligible for most new Federal expenditures and financial assistance.

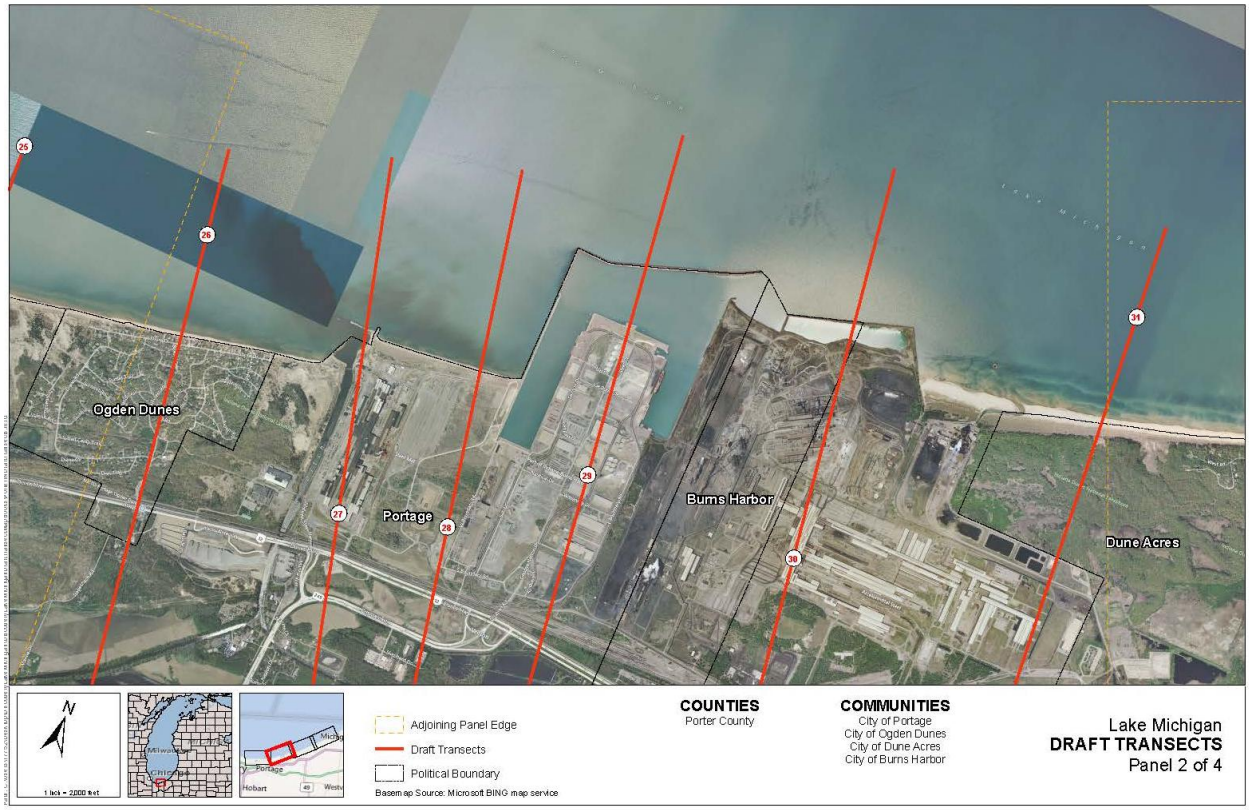
- Coordinated Needs Management Strategy (CNMS)[2] Data
- Proposed Coastal Transect Locations
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Shoreline
- Streams
- United States Geologic Survey (USGS) Gages
- Watershed Boundaries

Attendees were asked to cooperatively identify Areas of Concern and Areas of Mitigation Interest (AoMIs) within Manistee and Mason Counties, Lake Michigan study area using the Discovery Map and through general discussion during the meeting.

In addition to the draft Discovery Map, figures showing the location of initially proposed coastal transects around Manistee and Mason Counties were available for review and comment immediately following the meetings. Stakeholders were encouraged to review proposed transects and provide comments related to their location. Maps of proposed transect locations presented at the Discovery Meeting can be found in Attachment E. A sample map is shown below as Figure 1:

[2] CNMS is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that provides support to data-driven planning and the flood map update investment process in a geospatial environment. CNMS makes information related to mapping needs readily accessible and more usable. Currently, CNMS only captures riverine needs. It is expected coastal needs will be captured in this system in the future.

Figure 1: Sample Proposed Transect Figure



All comments provided during the Discovery Meeting on the draft Discovery Map and transect locations have been compiled into the Table 1 below.

Table 1: Stakeholder General and Transect Location Comments

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	Arcadia Township	26101	260306	Shift the transect to the south to cross into Arcadia Lake	Transect Comment
Michigan	Manistee	City of Manistee	26101	260131	There may be coastal structures in this area.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Road removed in FEMA Hazard Mitigation project (2008 event).	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Area of bluff erosion in Manistee River.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Identified breaches in Lake City Park.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Stormwater outfall.	General Comment

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to pass through jetties into the Manistee River.	Transect Comment
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to the south.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Community flooded in 2008. Currently working on a study.	General Comment
Michigan	Manistee	Manistee Township	26101	260132	Relocate transect to pass through lake outlet.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Shift transect to south and realign to the area where Barr Lake is closest to Lake Michigan.	Transect Comment
Michigan	Mason	Hamlin Township	26105	260134	Low seawall. Flooded in June 2008 due to rain.	General Comment
Michigan	Mason	Hamlin Township	26105	260134	Lake level control.	General Comment
Michigan	Mason	Hamlin Township	26105	260134	Shoreline movement at lighthouse.	General Comment
Michigan	Mason	Pere-Marquette Township	26105	160582	Potential erosion zone - due to rain event.	General Comment
Michigan	Mason	Pere-Marquette Township	26105	160582	Residential area.	General Comment

Discovery meeting minutes, sign in sheets, PowerPoint presentation, and correspondence have been included in the Attachment G, Manistee and Mason Counties Discovery Meeting Documents.

IV. Summary of Data Analysis

During the Discovery phase of the Lake Michigan Coastal Flood Study project, a massive collection of tabular and spatial data was conducted for all communities from Federal and State sources. In addition, information was collected through phone conversations, information exchange session conference calls, and the Discovery Coastal Data Request forms. Section III above lists the types of data collected for the study area prior to the Discovery Meeting. The

information that follows in Table 2 is divided into two sections: one section listing data that can be used for Risk MAP products and the other listing information that helped the study team form a better understanding of the Project Area, specifically as it may relate to mitigation and planning interests.

Table 2: Data Collected for Manistee and Mason Counties, MI

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Average Annualized Loss Data (AAL)	Discovery Map	Federal Emergency Management Agency (FEMA)	June 2012	Nationwide
Census Blocks	Discovery Map	U.S. Census Bureau	June 2012	Countywide
Contacts	Discovery Report	Local Community Websites, State/FEMA updates	June 2012	Countywide
Community Assistance Visits (CAVs)	Discovery Report	FEMA Community Information System (CIS)	July 2012	Countywide
Community Rating System (CRS)	Discovery Report	FEMA's "Community Rating System Communities and Their Classes"	July 2012	Nationwide
Comprehensive Plans	Discovery Report	Local Community Websites	July 2012	Countywide
Coastal Barrier Resources System (CBRS)	Discovery Map	U.S. Fish and Wildlife Service	July 2012	Nationwide
Coastal Construction	To Be Collected	U.S. Army Corps of Engineers (USACE)	TBD	Nationwide
Coordinated Needs Management Strategy (CNMS)	Discovery Map	FEMA	July 2012	Countywide
Critically Eroded Beach Areas	To Be Collected	To Be Collected	TBD	Statewide
Critical Facilities	Discovery Report	Local Mitigation Plan	July 2012	Countywide

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Dams	Discovery Report	USACE, National Inventory of Dams, Flood Insurance Rate Map (FIRM) Database	July 2012	Countywide
Declared Disasters	Discovery Report	FEMA's "Disaster Declarations Summary"	June 2012	Nationwide
Demographics, Industry	Discovery Report	U.S. Census Bureau, Local Mitigation Plans	June 2012	Countywide
Effective Floodplains	Discovery Map	FEMA Map Service Center and Mapping Information Platform	June 2012	Countywide
Hazard Mitigation Plans and Status	Discovery Report	Local Mitigation Plans	July 2012	Countywide
Hazard Mitigation Assistance Program Grants Received	Discovery Report	FEMA's "Hazard Mitigation Program Summary" Community Input	June 2012	Nationwide
Hazard Mitigation Projects	Discovery Report	Local Mitigation Plans	July 2012	Countywide
High Water Marks	To Be Collected	To Be Collected	TBD	Countywide
Historical Flooding	Discovery Report	Effective Flood Insurance Study (FIS), Local Mitigation Plans	July 2012	Countywide
Historical Storm Events	Discovery Report	Effective FIS, Local Mitigation Plans	July 2012	Countywide
Individual/Public Assistance	Discovery Report	FEMA's "Public Assistance Subgrantee Summary"	June 2012	Nationwide
Insurance Policies	Discovery Report	FEMA CIS	July 2012	Nationwide
Letters of Map Change (LOMCs)	Discovery Map	FEMA's Mapping Information Platform	July 2012	Countywide

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Meteorological Gages	Discovery Map	National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory	July 2012	Regionwide
Ordinance	Discovery Report	Local Community Websites	July 2012	Countywide
Repetitive Loss	Discovery Report	FEMA CIS	July 2012	Countywide
Shoreline Features Classification	Discovery Map	USACE	July 2012	Regionwide
Stream Gages	Discovery Map	USGS	July 2012	Countywide
Water Level Gages	Discovery Map	NOAA Department of Fisheries and Oceans	July 2012	Regionwide
Wave Gages	Discovery Map	NOAA	July 2012	Regionwide

i. Data that can be used for future Coastal Flood Risk Products

I.IV.i.1 Average Annualized Loss (AAL) Data

The Average Annualized Loss (AAL) data provide a general understanding of the dollar losses associated with a certain flood frequency events and are used to get a relative comparison of flood risk. They are determined by FEMA's Multi-Hazard Risk Assessment and Loss Estimation Program, otherwise known as HAZUS-MH.

HAZUS-MH, a free risk assessment software application from FEMA, is the most widely used flood risk assessment tool available. HAZUS-MH can run multiple flood scenarios (riverine and coastal) to estimate hazard related damage. HAZUS-MH can also be used to evaluate flood damage based on new/proposed mitigation projects or future development patterns and practices, and it can run specialized risk assessments, such as those attributable to dam or levee failures.

HAZUS-MH includes national datasets that can be supplemented with local data. If local detailed data are available, users may utilize this data to perform more refined HAZUS analyses. Augmenting HAZUS-MH national data with local data can improve the accuracy and resolution

of analysis results. Additional information about the HAZUS-MH process and tool can be found at http://www.fema.gov/protecting-our-communities/hazus.

The HAZUS-MH analysis data presented in this report is based on approximate flood boundaries and national datasets. The calculation is based on flood elevation estimates using a 10-meter Digital Elevation Model (DEM) on streams with drainage areas of at least 10 square miles. The results are shown in table 3 below. Information can also be obtained from the report titled FEMA *HAZUS AAL Usability Analysis*, dated April 13, 2011 (Federal Emergency Managment Agency, 2011). AAL data summarized at the census block level are shown on the draft Discovery Maps (Attachment C-D).

Table 3: HAZUS AAL Data for Manistee and Mason Counties, MI

FIPS Code	County	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
26101	Manistee	52,115	23,226	26,963
26105	Mason	17,875	7,388	9,899

Source: FEMA
FIPS = Federal Information Processing Standards

I.IV.i.2 Coastal Recession

In Michigan, areas prone to erosion along the Lake Michigan shoreline are subject to special setback requirements established by the Michigan Department of Environmental Quality (DEQ). The DEQ identifies High Risk Erosion Areas (HREA) as those shorelands of the Great Lakes and connecting waters where active erosion has been occurring at a long-term average rate of one foot or more per year. The erosion can be caused from one or several factors, including high water levels, storms, wind, ground water seepage, surface water runoff, and frost. The high risk erosion area regulations require setback distances to protect new structures from erosion for a period of 30 to 60 years, depending on the size, number of living units and type of construction.

Approximately 300 miles of Michigan's Great Lakes Coast are designated as high risk erosion area. Updates of the recession rate studies, which form the basis of the setbacks, are periodically conducted to reflect changing water levels and shore protection efforts.

High risk erosion areas and critical dune areas are illustrated on maps available in the Appendix. For Manistee, those maps include:

- Arcadia Township
- Manistee Township
- Onekama Township
- Filer Township

For Mason County, maps are available for:

- Grant Township
- Hamlin Township
- Pere Marquette Township
- Summit Township

These high risk erosion area and critical dune area maps can be found at the Department of Environmental Quality's High Risk Erosion Areas website at http://michigan.gov/deq/0,1607,7-135-3313_3677_3700-107407--,00.html.

I.IV.i.3 Federal Land

Federal lands data were obtained from the National Atlas at http://nationalatlas.gov/mld/fedlanp.html. The map layer shows those lands owned or administered by the Federal Government, including the Bureau of Land Management, the Bureau of Reclamation, the U.S. Department of Agriculture Forest Service, the Department of Defense, the U.S. Fish and Wildlife Service, the National Park Service, and other agencies. Only areas of 640 acres or more are included.

The Huron-Manistee National Forests are two national forests combined in 1945 for administration purposes and which comprise 976,043 acres of public lands, including 5,786 acres of wetlands, extending across the northern lower peninsula of Michigan. Each year, the forest receives approximately 4 million recreation visitors. The Manistee National Forest portion is located in northwest lower Michigan. It has varying but largely sandy terrain covered with trees. There are numerous lakes and frontage on Lake Michigan. It has a total area of 540,187 acres extending in parts of Lake, Newaygo, Wexford, Manistee, Mason, Oceana, Muskegon, Mecosta, and Montcalm counties.

I.IV.i.4 Jurisdictional Boundaries

Jurisdictional boundaries were obtained for Manistee and Mason Counties and Incorporated Areas from a derived set of TIGER line files available through the U.S. Census Bureau geography division. TIGER line files were last derived from the TIGER database in 1997. To learn more about TIGER line files and other Census TIGER database derived data sets visit http://www.census.gov/geo/www/tiger .

I.IV.i.5 Local Data

As part of the Discovery process, communities were asked to complete a Coastal Data Request Form (Attachment A) and identify data available at the local level that may be of use for the flood study update and development of the coastal flood risk products discussed earlier in this report. The Coastal Data Request Form included requests for base map data, coastal data, historic flood data, risk assessment information, mitigation information, and community plans and projects.

At the time this report was created, Mason County and the City of Manistee (Manistee County) have returned information through use of the Coastal Data Request Form.

Appendix Q. Local Data from Stakeholders: Coastal Data Request Form Compilation compiles all the information collected from Lake Michigan communities from the completed Coastal Data Request Forms, during the Discovery Meeting, or through phone conversations and email.

I.IV.i.6 Publicly Owned Land

There were no publicly-owned lands found along the shoreline of Manistee and Mason Counties within the study area at the time this report was created (FEMA 2011b).

I.IV.i.7 Shoreline Information

A shoreline feature dataset was generated by USACE Detroit District using 2012 oblique photographs. The dataset captures shoreline type, land use, coverage, and vegetation type along the entire Great Lakes shoreline, including Lake Michigan. The approximate shoreline along Manistee and Mason Counties that is covered by this Great Lakes Coastal Flood Study is 60.75 miles. Tables 4 through 7 below summarize the database contents for Manistee and Mason Counties.

Table 4: Summary of Shoreline Types

COUNTY	Total Shoreline (mile)	Artificial Shoreline (mile)	Boulders, Bedrock (mile)	Cohesive Clays and Silts (mile)	Sand (mile)	Shingles, Pebbles, Cobbles (Mile)
Manistee County	28.69	4.59	0	0	23.48	0
Mason County	32.06	4.10	0	0	27.96	0

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 5: Summary of Shoreline by Land Use

COUNTY	Total Shoreline (mile)	Commercial /Industrial (mile)	Forested (mile)	Low Density Residential (mile)	Moderate Density Residential (mile)	Park Land (mile)
Manistee County	28.69	1.24	0	14.4	1.24	3.73
Mason County	32.06	2.49	0.62	12.18	3.11	10.56

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 6: Summary of Shoreline Coverage

COUNTY	Total Shoreline (mile)	Bluff 2'-10' (mile)	Coastal Wetland (mile)	Dune 2'-10' (mile)	Flat Coast (mile)	High Bluff 10'+ (mile)	High Dune 10'+ (mile)	Other (mile)
Manistee County	28.69	3.73	3.11	0	0	2.35	18.89	
Mason County	32.06	2.49	0	0	1.24	0	28.34	

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 7: Summary of Shoreline Vegetation Types

COUNTY	Total Shoreline (mile)	High Density Shrubs/ Trees (mile)	Low Density Shrubs/ Trees (mile)	Manicured Lawn (mile)	Moderate Density Shrubs/ Trees (mile)	None (mile)	Unmaintained Non-Woody Vegetation (mile)
Manistee County	28.69	14.54	5.59	2.49	5.46	0.62	0
Mason County	32.06	2.86	16.78	1.86	10.56	0	0

Source: USACE 2012, Lake Michigan Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

Stream lines were obtained from USGS's National Hydrography Dataset (NHD). The NHD is a digital vector dataset for use by Geographic Information Systems (GIS). It contains features such as lakes, ponds, streams, rivers, canals, dams and stream gages. The datasets are designed to be used in general mapping and analysis of surface-water systems. Data can be downloaded from http://nhd.usgs.gov/data.html.

I.IV.i.9 Topography, Bathymetry, and Oblique Imagery

New Data Collected for Great Lakes Coastal Flood Study

As part of the Great Lakes Coastal Flood Study, LiDAR was collected to develop topographic and bathymetric data along the Lake Michigan shoreline. Topography is the configuration of natural and man-made features of a surface area and their relative position and elevations. Bathymetry is the underwater equivalent to topography.

The LiDAR data, collected and processed by USACE, is expected to become available in late 2012 or early 2013 for this study area. The transect-based coastal flood hazard analysis, as well as the mapping of the coastal flood risks, will utilize this new data. Existing high-resolution bathymetric and topographic data is available at http://csc.noaa.gov .

USACE has also collected oblique imagery for the entire Great Lakes coastline in 2012. Oblique imagery is captured at an angle, as compared to an overhead view provided by orthophotos, and allows users a 3-dimensional view of landscape, buildings, and other features. This dataset may be useful to communities during emergency response, planning, and management of assets, critical facilities, and public properties along the Lake Michigan shoreline. The oblique images

can also be used to identify the shoreline types and identify obstructions to the coastal flood hazard analysis.

The oblique imagery for the entire Great Lakes can be viewed from http://greatlakes.usace.army.mil/.

Other Data Available:
The NOAA Coastal Services Center, Digital Coast, hosts a variety of digital coastal data, including bathymetric and topographic data, and is located at http://www.csc.noaa.gov/digitalcoast .

I.IV.i.10 Transportation

The Bing Map service has been used as a basemap layer on the Discovery Map, and includes a transportation layer. For more information on Bing Map services and how they can be used in GIS, please visit http://www.arcgis.com/home and search for "Bing Maps".

I.IV.i.11 Watershed Boundaries

U.S. Geological Survey (USGS) Hydrologic Unit Code 8 (HUC8) watershed boundaries were obtained from the National Atlas 2011 "Raw Data Download" (http://nationalatlas.gov/atlasftp.html).

Manistee County contains portions of three HUC-8 watersheds and Mason County contains portions of two HUC-8 waterhsheds. The sub basin names and HUC-8 codes are listed below in Table 8:

Table 8: HUC-8 Watersheds in Manistee and Mason Counties

County	Huc_8	Sub basin
Manistee	4060101	Pere Marquette-White
Manistee	4060103	Manistee
Manistee	4060104	Betsie-Platte
Mason	4060101	Pere Marquette-White
Mason	4060103	Manistee

ii. Other Data and Information

Manistee County is located on the eastern shore of Lake Michigan. According to the 2010 census, it has a population of 24,733, which is a slight increase from 24,527 in 2000. The county has a total area of 1,280.77 square miles, of which 543.61 square miles is land and 737.16 square miles is water (U.S. Census Bureau, 2000). Additional information on Manistee County can be found at http://www.manisteecounty.com/.

Mason County is located on the eastern shore of Lake Michigan. According to the 2010 census, it has a population of 28,705, which is an increase from 28,274 in 2000. The county has a total

area of 1,241.86 square miles, of which 495.17 square miles is land and 746.70 square miles is water (U.S. Census Bureau, 2000). Additional information on Mason County can be found at http://www.masoncounty.net/.

I.IV.ii.1 Coastal Barrier Resources Systems

The Coastal Barrier Resource System (CBRS) is a nationwide system of protected coastal areas that includes ocean-front land, the Great Lakes and Other Protected Areas (OPAs). The Coastal Barrier Resources Act (CBRA) of 1982 designated undeveloped coastal barrier lands and associated aquatic habitat as part of the Coastal Barrier Resources System (CBRS). This law does not regulate how people can develop land in the CBRS, but the Federal government does not encourage development of these areas. By electing to build in CBRS areas, owners are responsible for the full cost and are ineligible for most federal expenditures and financial assistance programs.

Coastal barriers serve as important buffers between coastal storms and inland areas, often protecting properties on land from serious flood damage. Coastal barriers also provide protective habitat for aquatic plants and animals.

The CBRS boundaries around Lake Michigan were obtained from U.S. Fish and Wildlife Service (FWS) at http://www.fws.gov/CBRA/Maps/Data_Disclaimer_Shapefiles.html and are dated June 15, 2010. No coastal barrier units were found along Lake Michigan Shoreline in Manistee and Mason Counties.

I.IV.ii.2 Coastal Zone Protection Structures

The USACE maintains a large infrastructure of over 900 coastal structures in the United States. These coastal structures protect harbors and shore-based infrastructure, provide beach and shoreline stability control, provide flood protection to varying degrees, and protect coastal communities, roadways and bridges, etc. These maintained coastal structures include seawalls, bulkheads, revetments, dikes and levees, breakwaters, groins, sills/perched beaches, and jetties and piers. The Enterprise Coastal Inventory Database (ECID) from the USACE Engineer Research and Development Center (ERDC) was obtained to identify these structures along Lake Michigan. This data is presented in tabular form in the lake-wide Lake Michigan Discovery Report.

I.IV.ii.3 Community Assisted Visits

Statewide Community Assistance Visits (CAVs) are part of the evaluation and review process used by FEMA and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. Generally, a CAV consists of a tour of the floodplain, an inspection of community permit files, and meetings with local appointed and elected officials. During a CAV, observations and

investigations focus on identifying issues in various areas, such as the community's floodplain management regulations (ordinance), community administration and enforcement procedures, engineering or other issues within the FIRMs, other problems in the community's floodplain management, and problems with the biennial report data. Any administrative problems or potential violations identified during a CAV are documented in the CAV findings report. The community is notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. The summary of CAV visits were extracted from the FEMA Community Information System (CIS) (https://portal.fema.gov/famsVuWeb/home) July 2012. Table 9 below shows the summary of CAV dates by community within this study area.

Table 9: Summary of Community Assisted Visits in Manistee and Mason Counties, MI

County	Community	CID	CAV Date	FIRM Date
Manistee County	Arcadia, Township of	260306		10/16/96
Manistee County	Bear Lake, Village of			
Manistee County	Brown, Township of			
Manistee County	Eastlake, Village of			
Manistee County	Filer, Township of	260130	7/1/1991	07/01/91(L)
Manistee County	Manistee, City of	260131	3/18/1987	03/18/87
Manistee County	Manistee, Township of	260132	11/15/1989	11/15/89
Manistee County	Onekama, Township of	260276	5/1/1978	05/01/78
Manistee County	Onekama, Village of			
Manistee County	Stronach, Township of	260801	9/30/1988	09/30/88(M)
Mason County	Grant, Township of			
Mason County	Hamlin, Township of	260134	12/17/1987	12/17/87
Mason County	Ludington, City of			
Mason County	Pere Marquette, Township of	260582	7/3/1985	07/03/85(M)
Mason County	Summit, Township of	260307	12/17/1987	12/17/87

CAV = Community Assisted Visit

I.IV.ii.4 Community Rating System

The Community Rating System (CRS) is a voluntary incentive program to provide flood Insurance premium discounts to NFIP-participating communities that take extra measures to manage floodplains above the minimum requirements. A point system is used to determine a CRS rating. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points are awarded and the higher the discount on flood insurance premiums. The list of CRS communities is available on FEMA's Website site at

http://www.fema.gov/library/viewRecord.do?id=3629. No communities in Manistee and Mason Counties participate in the CRS program.

I.IV.ii.5 Comprehensive Plans

A comprehensive plan is a land use document providing framework and policy direction for land use decisions. Comprehensive plans usually include chapters detailing policy direction affecting land use, transportation, housing capital facilities, utilities, coastal and rural areas. Comprehensive plans identify where and how growth needs will be met.

In Manistee County, a plan was developed primarily by the County Planning Commission with assistance from many sources. Following the requirements of the Coordinated Planning Act, the County Planning Commission notified all adjacent governmental units of their intention to prepare this plan. An extensive list of "stakeholders" was developed to be sure all affected and interested parties would know about, and have a chance to participate in, the creation of the plan. In addition, a great deal of information and guidance was provided by the Northwest Michigan Council of Governments and enVision Manistee. A copy can be found at their website at http://www.manisteecountymi.gov/index.php?option=com_content&view=article&id=75&Itemid=126.

In Mason County, a County Comprehensive Plan exists to guide public decision making in Mason County. The plan states the goals for the future that have been identified by the citizens of the county or specified by the state in the Growth Management Act as state-wide goals. Mason County is growing, and the comprehensive plan looks ahead to the year 2014 and sets policies for county investments in roads, water, sewer, parks, and all other public facilities provided by the county. It projects what demands will be created by population increases in that time and how best to respond to these needs. It guides the land development regulations which will manage private growth and ensures that the resource lands and the environment are protected, efficient provision for public services are made, and that progress is made on the other goals of county and its citizens. Acopy can be found at their website at http://www.co.mason.wa.us/code/comp_plan/index.php.

I.IV.ii.6 Coordinated Needs Management Strategy (CNMS) and NFIP Mapping Needs

During FEMA's Flood Map Modernization program from 2003 to 2008, FEMA adhered to Procedure Memorandum No. 56 which states that, "Section 575 of the National Flood Insurance Program Reform Act of 1994 mandates that at least once every five years FEMA assess the need to review and update all floodplain areas and flood risk zones identified, delineated, or established under Section 1360 of the National Flood Insurance Act, as amended." This requirement was fulfilled through the Mapping Needs Assessment process. Other mechanisms such as the Mapping Needs Update Support System (MNUSS) and scoping reports were used to capture information describing conditions on the FIRMs and the potential for a map update.

FEMA's Coordinated Needs Management Strategy (CNMS) was initiated through FEMA's Risk MAP program in 2009.

CNMS is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that provides support to data-driven planning and the flood map update investment process in a geospatial environment. The goal is to identify areas where existing flood maps are not up to FEMA's mapping standards. More information about the CNMS can be found at http://www.fema.gov/library/viewRecord.do?id=4628 .

There are three classifications within the CNMS: "Valid," "Unverified," and "Unknown." New and updated studies (those with new hydrologic and hydraulic models) performed during the Map Modernization program were automatically determined to be "Valid". The remaining studies went through a 17-element validation process with seven critical and 10 secondary elements. Validation elements apply physical, climatological, and environmental factors to stream studies to determine validity. A stream study has to pass all of the critical elements and at least seven secondary elements to be classified as "Valid." The remaining streams are classified as "Unverified" or "Unknown". Studies for which flood hazard data are identified as having critical or significant secondary change characteristics are classified as "Unverified." Streams with a status of "Unknown" are those that have a study underway, will be evaluated in the future, or do not have sufficient information to determine whether they are "Valid" or "Unverified" (FEMA 2012a).

Table 10 below summarizes the results of the validation analysis obtained from CNMS in June 2012.

Table 10: CNMS Status for Manistee and Mason Counties, MI

County	FIPS	Unknown (stream miles)	Unverified (stream miles)	Valid (stream miles)	Total (stream miles)
Manistee County, MI	26101	Not Available	Not Available	Not Available	Not Available
Mason County, MI	26105	11.54	0.00	66.11	77.65

I.IV.ii.7 Critical Facilities

Critical facilities are the facilities that can impact the delivery of vital services, cause greater damages to other sectors of a community, or put special populations at risk.

Hospitals, roads, schools, and shelters are all examples of critical facilities that play a central role in disaster response and recovery. Understanding which facilities are exposed, and the degree of that exposure, can help reduce or eliminate service interruptions and costly redevelopment.

Incorporating this information into development planning helps communities get back on their feet faster.

Location of critical facilities with a county or community can be viewed from the NOAA Coastal Services Center, Critical Facilities Flood Exposure Tool at http://www.csc.noaa.gov/criticalfacilities/.

I.IV.ii.8 Critically Eroded Beaches and Beach Nourishment/Dune Replacement Projects

Critically eroded beaches and beach nourishment/dune replacement projects were not identified in Manistee and Mason Counties at the time this report was issued.

I.IV.ii.9 Dams

The National Inventory of Dams (NID) is a congressionally authorized database that documents dams in the United States and its territories. The current NID, published in 2010, includes information on 84,000 dams that are more than 25 feet high, hold more than 50 acre-feet of water, or are considered a significant hazard if they fail. The NID is maintained and published by the USACE, in cooperation with the Association of State Dam Safety Officials, the States and territories, and Federal dam-regulating agencies. The database contains information about the dams' locations, sizes, purposes, types, last inspections, regulatory facts, and other technical data. The information contained in the NID is updated approximately every 2 years.

Table 11 below is a summary of documented dams by county in Manistee and Mason Counties. The NID is available at the USACE Website https://nid.usace.army.mil/.

Table 11: Documented Dams for Manistee and Mason, MI

County	Name	Primary Purpose	Dam Type	River
Manistee	Stronach Dam	Other	-	Pine River
Manistee	Peters Bayou Dam	Other	Earth	Manistee River
Manistee	Copemish Dam	Recreation	Earth	First Creek
Manistee	Tippy	Recreation	-	Manistee River
Manistee	Hodenpyl	Hydroelectric	-	Manistee River
Mason	Whiskey Creek Dam #2	Recreation	Earth	Whiskey Creek
Mason	West Shore Community College Dam	Recreation	Earth	Tr South Branch Lincoln River
Mason	Hamlin Lake Dam	Recreation	-	Big Sable River
Mason	Brookside Cemetary Dam	Other	Earth	Trib to Pere Marquette River

I.IV.ii.10 Levees

The table below presents levee information from the National Levee Database (NLD), developed by the U.S. Army Corps of Engineers (USACE). The NLD does not contain all levees located in the United States. The database contains information to facilitate and link activities, such as flood risk communication, levee system evaluation for the NFIP, levee system inspections, floodplain management, and risk assessments. The NLD continues to be a dynamic database with ongoing efforts to add levee data from federal agencies, states, and tribes. There were no levees identified in Manistee or Mason Counties at the time of this report.

In addition, FEMA developed a Midterm Levee Inventory (MLI) report which compiled a database of structures designed to provide at least the minimum level of protection from the base flood level (1- percent-annual-chance flood), as this standard is the minimum level of protection recognized by the NFIP for accreditation. FEMA also maintains a Mid-term Levee Inventory (MLI), updated in November 2011, which can be accessed through FEMA's Regional Service Centers (RSCs). RCS contact information is listed on https://hazards.fema.gov/femaportal/docs/RSC%20Contact%20Information.pdf.

I.IV.ii.11 Declared Disasters

The FEMA Disaster Declarations Summary is a dataset describing all federally declared disasters. This information begins with the first disaster declaration in 1953 and features all three disaster declaration types: major disaster, emergency, and fire management assistance. The dataset includes declared recovery programs and geographic areas (County data not available before 1964; fire management records are considered partial because of the historical nature of the dataset).

The list of FEMA's disaster declarations is available on the FEMA Website at http://www.fema.gov/data-feeds. Table 12 below lists the major disaster declarations declared in Manistee and Mason Counties.

Table 12: Declared Disasters in Manistee and Mason, MI

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
Mason (County)	744	09/18/1985	Flood	Severe Storms And Flooding
Manistee (County)	774	09/18/1986	Flood	Severe Storms & Flooding
Mason (County)	774	09/18/1986	Flood	Severe Storms & Flooding
Manistee (County)	1777	07/14/2008	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
Mason (County)	1777	07/14/2008	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding

I.IV.ii.12 Flood Insurance Policies

A community's agreement to adopt and enforce floodplain management ordinances, particularly with respect to new construction, is an important element in making flood insurance available to home and business owners. For this Discovery project, data on flood insurance policies were also gathered.

Table 13 below summarizes the numbers and premiums of insurance policies, the total coverage, and the numbers and dollar amounts of paid losses in communities of Manistee and Mason Counties. The data were based on Community Summary Reports extracted from FEMA's CIS website (https://portal.fema.gov/famsVuWeb/home) in July 2012.

Table 13: Summary of Flood Insurance Policies and Claims for Manistee and Mason Counties

County	CID	No. Policies	Total Premium	Total Coverage	Number of claims since 1978	Dollar ($) paid for claims since 1978
Manistee	26101	39	$31,557	$6,721,800	20	$165,160
Mason	26105	32	$27,840	$6,586,100	7	$28,893

I.IV.ii.13 Gage Data

The NOAA Coastal Services Center, Digital Coast, hosts a variety of digital coastal data, including gage data, and is located at http://www.csc.noaa.gov/digitalcoast .

Meteorological Stations

The National Data Buoy Center (NDBC) is a part of the NOAA National Weather Service (NWS). NDBC designs, develops, operates, and maintains a network of data collecting buoys and coastal stations. NDBC provides hourly observations from a network of about 90 buoys and 60 Coastal Marine Automated Network (C-MAN) stations. All stations measure wind speed, direction, and gust; atmospheric pressure; and air temperature. Water level is measured at selected stations. The historical and current data are available at the NDBC Website http://www.ndbc.noaa.gov/.

Table 14 below shows the meteorological station identification number and location for the gages in the Lake Michigan Manistee and Mason Counties Coastal Flood Study area.

Table 14: Meteorological Stations in Lake Michigan, Manistee and Mason, MI

County	Station ID	Location	Owner	Data	Years of Historical Data
Mason	LDM4 – 9087023	Ludington, MI	NOAA's National Ocean Service	Wind, atmospheric pressure, air temperature	2004 - present
Mason	45024	Ludington, MI	University of Michigan Marine Hydrodynamics Laboratories	Wind, wave height, air temperature	2012
Mason	BSBM4	Big Sable Point, MI	National Weather Service Central Region	Wind, atmospheric pressure, air temperature	2006 – present
Manistee	MEEM4	Manistee, MI	National Weather Service Central Region	Wind, atmospheric pressure, air temperature	2009 - present

In addition, the Great Lakes Environmental Research Laboratory is a part of NOAA focused on the Great Lakes. It maintains multiple datasets, including a collection of meteorological data for both the United States and Canada. The datasets can be found online at http://www.glerl.noaa.gov .

Stream Gages

The USGS National Water Information System Web Interface (http://waterdata.usgs.gov/nwis, provides real-time data for any given stream gage location. Table 15 below shows the gage identification numbers and locations for the gages in Manistee and Mason Counties. USGS stream gage locations are also shown on the Discovery Map.

Table 15: Stream Gage Stations in Manistee and Mason Counties, MI

County	Gage ID	Begin Date	End Date	Gage Location
Mason	04122500	8/1/1939	Present	Pere Marquette River at Scottville, MI
Mason	04123000	6/1/1942	2008	Big Sable River near Freesoil, MI
Manistee	04126200	10/1/1956	2007	Little Manistee River near Freesoil, MI
Manistee	04126000	10/1/1951	1993	Manistee River near Manistee, MI
Manistee	04125510	10/1/1966	1970	Pine River near Wellston, MI
Manistee	04125550	10/1/1996	Present	Manistee River near Wellston, MI
Manistee	04124200	12/1/1996	Present	Manistee River near Mesick, MI

Water Level Station

Great Lakes water levels constitute one of the longest, high quality hydrometeorological data sets in North America with reference gage records beginning around 1860 with sporadic records back to the early 1800's. NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) maintains several water level stations along Lake Michigan. CO-OPS' primary motivation is the collection and dissemination of high quality and accurate measurements of lake level for scientific studies. The station information and water level data are available at NOAA CO-OPS Website: http://tidesandcurrents.noaa.gov/station_retrieve.shtml?type=Great Lakes Water Level Data&state=LakeMichigan.

The monthly high and low water level data from the year 1918 to 2011 for Lake Michigan are available at the USACE Website: http://www.lre.usace.army.mil/greatlakes/hh/greatlakeswaterlevels/.

The Great Lakes Water Levels Report provides daily mean water levels of Lake Michigan for the past three months. The data are available at the USACE Website: http://www.lre.usace.army.mil/greatlakes/hh/greatlakeswaterlevels/currentconditions/great lakes waterlevels/.

Wave Gage/Buoy Stations

As mentioned above, the NDBC provides hourly observations from a network of about 90 buoys and 60 C-MAN stations. In addition to standard meteorological observation, all buoy stations and some C MAN stations measure sea surface temperature, wave height and period. Conductivity and water current are measured at selected stations. The historical and current data are available at NDBC Website http://www.ndbc.noaa.gov/.

I.IV.ii.14 Hazard Mitigation Plans

Hazard Mitigation Plans (HMPs) are prepared to assist communities to reduce their risk to natural hazard events. The plans are used to develop strategies for risk reduction and to serve as a guide for all mitigation activities in the given county or community.

A local hazard mitigation plan is a long-term strategic/guidance document used by an entity to reduce future risk to life, property, and the economy in a community. A hazard mitigation plan has the following elements:

- A public participation process for bringing together diverse stakeholders in the jurisdiction(s) to provide an array of input into the plan
- A risk assessment to identify the hazards, determine the people and property subject to those hazards, and estimate vulnerability
- A mitigation strategy that contains goals, objectives, and an action plan to implement priority mitigation actions that reduce risk

- A maintenance process to ensure the plan is reviewed and updated
- An adoption requirement to ensure the support from participating jurisdictions

Local mitigation plans are required to be updated every 5 years to maintain eligibility for FEMA Hazard Mitigation Assistance grant programs. The status of current hazard mitigation plans for Manistee and Mason Counties is shown in Table 16 below. The data was obtained from FEMA's Plan Approval Status Report based on Regional reports for the end of June 2012 (FEMA 2012b).

Table 16: Hazard Mitigation Plan Status for Manistee and Mason Counties, MI

Jurisdiction	Approval Date	Expiration Date
Manistee County	02/03/2010	02/03/2015
Mason County	07/20/2006	07/20/2011

The State of Michigan has issued a comprehensive document listing Hazard Mitigation Success Stories. The document was prepared by the Emergency Management and Homeland Security Division, Michigan Department of State Police and Michigan Citizen- Community Emergency Response Coordinating Council (MCCERCC) and was issued in 2011. Michigan Hazard Mitigation Success Stories can be downloaded at http://www.michigan.gov/documents/msp/Michigan_Hazard_Mitigation_Success_Stories_May_2011_Final_Edition_web_355580_7.pdf

I.IV.ii.15 Hazard Mitigation Grant Program

Hazard mitigation initiatives are intended to actively reduce a community's vulnerability to hazards and are developed to accurately reflect a community's need. A variety of hazard mitigation projects have been submitted to FEMA's Hazard Mitigation Grant Program. A list of projects that have been closed, approved, withdrawn, or denied is included in the Appendices.

I.IV.ii.16 Historical Flooding & High Water Marks

In the analysis of a flood event, often the high watermark is identified to determine the maximum elevation of floodwaters. If a high watermark on a tree, building or other fixed object can be identified and measured following a flood event, the floodwater elevation and therefore the extent of flooding can be determined. Such high watermark information combined with storm data, lake level and river stage data can be useful when modeling the extent of flooding associated with specified flood events.

The high watermark should not be confused with the term 'Ordinary High Watermark' (OHW). The OHW is the line along the Lake Michigan shoreline that defines the boundary between uplands and submerged lands and designates a line of regulatory jurisdiction. The line is often used to define the boundary between public and private lands.

There are records indicating that the Township of Manistee (Manistee County) and the Township of Meade (Mason County) have incurred repetitive losses. No additional input on historical flooding was obtained at the time this report was developed. No High Water Mark (HWM) data was found within Manistee and Mason Counties for Lake Michigan. If local stakeholders have available HWM data or historic photographs, they are encouraged to submit them to FEMA Region V, Mitigation Division.

I.IV.ii.17 Letters of Map Change

A Letter of Map Change (LOMC) is a letter that reflects an official revision to an effective NFIP map. LOMCs are issued in place of the physical revision and republication of the effective FIRM. LOMCs include completed cases of Letters of Map Amendment (LOMAs) and Letters of Map Revision (LOMRs), including LOMRs based on fill (LOMR-Fs), and conditional LOMRs.

Table 17 below lists the number of LOMCs in Manistee and Mason Counties. No Conditional LOMAs or Conditional LOMR-Fs were included. The LOMCs are shown on the Discovery Maps. Clusters of LOMCs indicate a need for updated maps. The list of LOMC cases were obtained from the FEMA Mapping Information Platform Website (https://hazards.fema.gov/femaportal/wps/portal).

Table 17: Summary of LOMC cases in Manistee and Mason Counties, MI

County	Number of Letters of Map Amendments	Number of Letters of Map Revisions – Based on Fill	Number of Letters of Map Revisions – Floodway Removal	Number of Letters of Map Revisions
Manistee County	14	1	0	0
Mason County	13	0	0	0

I.IV.ii.18 Locally Identified Mitigation Projects

The list of potential mitigation actions and strategies, as pulled from each of the County level Hazard Mitigation Plans (Manistee and Mason Counties), is available in Attachment G.

I.IV.ii.19 Ordinances

For States that have demonstrated a commitment to, and experience in, the application of NFIP minimum floodplain management criteria, 44 CFR §60.25(d) allows FEMA to consider State approval or certification of community floodplain management ordinances as meeting NFIP requirements. This provision provides Regional Offices with the latitude to approve floodplain management regulations based on their review and approval by the State. However, the Regional Office must still formally approve the regulations in the Community Information System (CIS).

The requirements that apply to a community are referred to by the NFIP and appear in CIS as the community's "Level of Regulations." The Level of Regulations, determined by the most detailed data that FEMA has provided the community, is designated as (a), (b), (c), (d), (e), or (f), or (d) and (e) for communities with both floodways and V zones.

County regulations regarding development within known flood hazard areas can range from ordinances with minimum NFIP requirements to strong, pro-active ordinances. Stronger ordinances not only regulate and protect new and improved development in existing Special Flood Hazard Areas (SFHAs), but also seek to mitigate the growth of SFHAs. Increase of SFHA can be caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests.

I.IV.ii.20 Proposed Transects

Transects are shore perpendicular profiles along which coastal flooding analysis is performed. Transects are used to transform offshore conditions onshore and are used to define coastal flood risks inland of the shoreline. They are spaced to define representative segments of a shoreline reach. The transect layout for coastal hazard analysis and subsequent floodplain delineation is determined by physical factors such as changes in topography, bathymetry, shoreline orientation, and land cover data, in addition to societal factors such as variations in development and density. Base maps were reviewed to determine the proposed transect locations for hazard modeling along the Lake Michigan shoreline.

The proposed transect layout is shown on the draft Discovery Map for Manistee and Mason Counties (Attachment C-D) and includes an identification number for each transect.

Stakeholders were provided with the proposed transect shapefiles (GIS digital data) upon request, and the proposed transects were also reviewed during Discovery Meetings. Input from local officials was requested regarding the placement and the number of transects. Comments regarding placement of transects in Manistee and Mason Counties, Michigan are shown in Table 18.

Table 18: Stakeholder General and Transect Comments

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	Arcadia Township	26101	260306	Shift the transect to the south to cross into Arcadia Lake	Transect Comment
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to pass through jetties into the Manistee River.	Transect Comment

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to the south.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Relocate transect to pass through lake outlet.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Shift transect to south and realign to the area where Barr Lake is closest to Lake Michigan.	Transect Comment

I.IV.ii.21 Pre-Disaster Mitigation (PDM) Program

The Pre-Disaster Mitigation (PDM) program is a nation-wide competitive grant program that was created to assist State and local governments, including Indian Tribe governments, with the funding to implement cost-effective hazard mitigation activities prior to disasters. The intent of this program is to reduce overall risk to people and property, while also minimizing the cost of disaster recovery.

Grants awarded during past fiscal years can be downloaded from the Pre-Disaster Mitigation Archives at http://www.fema.gov/pre-disaster-mitigation-grant-program/pre-disaster-mitigation-archives

I.IV.ii.22 Great Lakes Coastal Restoration Grants

The Great Lakes received $475 million for restoration efforts in 2010, as part of the Great Lakes Restoration Initiative, or GLRI. Michigan Sea Grant was awarded more than $1.5 million to help restore particular areas in the region and is leading two projects while assisting on five others. The projects focus on endangered fish, invasive species, beach contamination, water pollution and sound boating and marina operations. Additional information can be found at Michigan Sea Grant website http://www.miseagrant.umich.edu/explore/restoration/.

I.IV.ii.23 Public Assistance Projects

The mission of FEMA's Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from declared disasters or emergencies. Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from

future events by providing assistance for hazard mitigation measures during the recovery process.

Table 19 below presents a summary of PA projects in Manistee and Mason counties. Detailed project descriptions for completed PA projects can be downloaded from https://explore.data.gov/catalog/raw .

Table 19: Public Assistance Projects for Manistee and Mason Counties, MI

County	Applicant Name	Education Applicant	Number of Projects	Federal Share Obligated
Manistee	East Lake, Village Of	No	2	$5,567.14
Manistee	Filer Charter, Township Of	No	3	$23,462.36
Manistee	Manistee, City Of	No	12	$534,139.40
Manistee	Manistee County	No	1	$1,880.24
Manistee	Manistee County Road Commission	No	20	$1,090,578.59
Manistee	Onekama, Village Of	No	1	$12,279.75
Manistee	Society Preservation Of The S.S. City Of Milwaukee	No	1	$4,059.00
Mason	Free Soil, Village Of	No	1	$8,688.99
Mason	Hamlin, Township Of	No	5	$35,418.50
Mason	Ludington Area School District	Yes	2	$9,693.17
Mason	Ludington, City Of	No	6	$47,276.57
Mason	Mason County	No	2	$17,516.10
Mason	Mason County Drain Commission	No	1	$5,355.75
Mason	Mason County Road Commission	No	18	$1,336,828.83
Mason	Mason County Rural Fire Authority	No	1	$40,831.25
Mason	West Shore Community College	Yes	1	$7,844.25

I.IV.ii.24 Regulatory Mapping

A FIRM is a regulatory map created by the NFIP for floodplain management and insurance purposes. The FIRM shows a community's base-flood elevations (BFE), flood zones and floodplain boundaries. The effective mapping for Manistee and Mason Counties are listed below by community. Manistee and Mason, Counties have not yet been modernized to digital mapsEffective FIRMs and Flood Insurance Studies (FIS) can be downloaded from FEMA's Map Service Center (MSC) at https://msc.fema.gov .

Table 20: Effective Status of Manistee and Mason Counties, MI

County	Community	CID	Effective Date
Manistee	Arcadia, Township of	260306	10/16/1996
Manistee	Filer, Township of	260130	7/1/1991
Manistee	Manistee, City of	260131	3/18/1987
Manistee	Onekama, Township of	260276	5/1/1978
Manistee	Stronach, Township of	260801	9/30/1988
Mason	Custer, Village of		1/1/1950
Mason	Hamlin, Township of	260134	12/17/1987
Mason	Logan, Township of		9/7/1998
Mason	Meade, Township of		1/1/1950
Mason	Pere Marquette, Charter Township of	260582	7/3/1985
Mason	Summit, Township of	260307	12/17/1987

I.IV.ii.25 Repetitive Loss/Severe Repetitive Loss

If a claimant receives two or more claim payments of more than $1,000 from the National Flood Insurance Program within any rolling 10-year period for their home or business, their property is considered a Repetitive Loss (RL) structure. More information can be obtained at http://www.fema.gov/repetitive-flood-claims-program.

Table 21: Repetitive Loss/Severe Repetitive Loss for Manistee and Mason Counties, MI

County	Community	CID	No. of Repetitive Losses	Total Area Population
Manistee	Manistee, Township of	260132	3	3,250
Mason	Meade, Township of		2	-

I.IV.ii.26 Socio-Economic Analysis

The 2010 American Community Survey 1-year estimate indicates the median income for a household in Mason County was $39,246 and the median income for a family was $48,012 Males had a median income of $36,405 versus $30,071 for females. The per capita income for the county was $20,847. About 11.9% of families and 16.6% of the population were below the poverty line, including 26.8% of those under the age 18 and 7.7% of those age 65 or over.

In Manistee County, the median income for a household in the county was $39,457 and the median income for a family was $50,699. Males had a median income of $39,073 versus $28,674 for females. The per capita income for the county was $21,758. About 8.6% of families and 13.0% of the population were below the poverty line, including 15.4% of those under the age 18 and 8.2% of those age 65 or over.

Additional information on demographics and socioeconomic trends can be found at the U.S. Census Bureau

I.IV.ii.27 State-level Datasets, Programs, and Information

USGS Studies

Michigan Coastal Zone Enhancement Program Assessment and Strategy (2011-2016): Every five years, the Coastal Zone Management Act encourages states and territories to conduct self-evaluations of their coastal management programs to assess significant changes in the state's coastal resources and management practices, identify critical needs, and prioritize areas for enhancement under the Coastal Zone Enhancement Program. More information on this program can be found at http://coastalmanagement.noaa.gov/enhanc.html. The Coastal Zone Enhancement Program Assessment and Strategy can be downloaded at http://coastalmanagement.noaa.gov/mystate/docs/mi3092011.pdf .

The Michigan Coastal Management Program website, located at www.mi.gov/coastalmanagementprovides information on the Program including information on its permitting, coastal planning and technical assistance programs. Michigan's Coastal Management Program was developed under the federal Coastal Zone Management Act and approved in 1978. Since then, the Program has assisted organizations in protecting and enhancing their coastal areas, funded studies related to coastal management, and helped to increase recreational opportunities in Michigan's Great Lakes coastal area.

Coastal Zone Boundary maps can be downloaded at http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3696-90802--,00.html

A list of previously awarded coastal management grants can be found here: http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3696-171451--,00.html

V. Risk MAP Projects and Needs

This section provides information about the planned next steps for the Lake Michigan Great Lakes Coastal Flood Study (GLCFS), including information about the upcoming coastal study, potential for mitigation technical assistance within the project area, changes in compliance as a result of the coastal flood study, future communications, and how unmet needs will be addressed.

i. Future Coastal Study

Information and data collected as part of this Manistee and Mason Counties Discovery effort and provided in this report will be utilized in the upcoming GLCFS for Lake Michigan.

A summary of the Great Lakes Coastal Flood Study project can be found at http://www.greatlakescoast.org/ under Great Lakes Coastal Analysis & Mapping.

The following is a summary of the work expected to be performed for Lake Michigan as part of the GLCFS. The scope of work described in this section is subject to change.

All engineering and mapping analysis performed as part of this study will follow guidance provided within FEMA's Draft Guidelines and Specifications for Coastal Studies Along the Great Lakes, issued on May 8, 2012 (Federal Emergency Management Agency, 2012).

Engineering & Mapping:

Coastal flood hazard analyses and mapping for all communities of the United States located along the Lake Michigan shoreline will be performed. This analysis will include the creation of bathymetric and topographic map data inventory, base map acquisition, and coastal flood hazard analysis.

National Flood Insurance Program Integration:

Regulatory Digital Flood Insurance Rate Map (DFIRM) files will be updated through FEMA's Physical Map Revision (PMR) process, using the results from the work performed in the Engineering and Mapping task described above.

Coastal flood maps (or workmaps) will be produced for the study area and reviewed with local community officials. The workmap will include the 1%- and 0.2%-annual chance Special Flood Hazard Area (SFHA), Coastal High Hazard Zone (VE Zone) and Coastal A Zone (AE Zone), Base Flood Elevations (BFEs) and Limit of Moderate Wave Action (LiMWA).

Not all communities will receive regulatory DFIRM panels as a result of this study. Distribution of updated regulatory DFIRM panels will be based upon the results of the coastal analysis and stakeholder discussions with FEMA.

Coastal Flood Risk Assessment Products:

Coastal flood risk products were introduced in section 1 iii of this report. Depending on available data, results of coastal analysis, fiscal year funding, and community partnerships with FEMA, coastal flood risk products may be generated for identified coastal communities in Manistee and Mason Counties as summarized in Table 22.

Table 22: Potential Flood Risk Products

County	State	Flood Risk Map and Flood Risk Report	Changes Since Last FIRM	Flood Depth and Analysis Grids	Optional Flood Risk Assessment Products
Manistee	MI	X		X	TBD
Mason	MI	X	X	X	TBD

A Flood Risk Map, Flood Risk Report and Flood Risk Database may also be developed as part of this process, in conjunction with the above described products, and is also dependant on results of coastal analysis, data available, fiscal year funding, and partnerships with local communities.

ii. Potential Mitigation Projects

Mitigation Planning Technical Assistance (MPTA) is available to help communities plan for and reduce risks by providing communities with specialized assistance. MPTA is a part of the Risk MAP program and includes risk assessment, mitigation planning, and traditional hazard identification (flood mapping) activities. MPTA is one available part of the Risk MAP process, as it can help communities increase awareness and take action to reduce risk. Technical assistance can be performed at any time during the hazard mitigation planning process.

Unfortunately, not every community will receive MPTA as part of a Risk MAP project. Forming a partnership between FEMA and a local community is an essential part of initiating a MPTA project. Assistance will be prioritized after all data and information is collected and assessed by FEMA in coordination with the local communities to determine where MPTA resources would be beneficial. Communities should alert FEMA of any resources that are available at the local level, and of actions they are interested in implementing in partnership with FEMA.

Technical assistance is available through Risk MAP to assist communitites in identifiying, selecting, and implementing activities to support mitigation planning and risk reduction. Technical assistance activities should be based on the needs of the community and assist with already established capabilities.

Such activities could include (but are not limited to):

- Advising in the creation of initial Hazard Mitigation Plans
- Advising in the update of existing Hazard Mitigation Plans
- Training to improve a community's capabilities for reducing risk
- Assistance in incorporating flood risk datasets and products into potential and effective community legislation, guidance, regulations, procedures, etc.
- Assistance with the creation, acquisition and incorporation of GIS data into potential and effective maps, planning mechanisms, emergency management procedures, etc.
- Facilitating the identification of data gaps and interpret technical data to identify risk reduction definiencies that should be corrected.

At the time of this report, specific potential future mitigation projects were not identified during the Discovery Meeting or Discovery process for communities in Manistee and Mason Counties. Continued discussion regarding FEMA partnership with local communities to assist in developing new mitigation actions and moving those actions forward will be essential as this coastal project moves forwards.

iii. Compliance

FEMA uses a number of key tools to determine a community's compliance with the minimum regulations of the NFIP. Among them are Community Assistance Visits (CAVs), the Letter of Map Change (LOMC) process, and Submit-for-Rates. These tools help assess a community's implementation of their flood damage reduction regulations and identify any floodplain management deficiencies and violations.

The CAV is a visit to a community by a FEMA staff member, or staff of a state agency on behalf of FEMA, that serves the dual purpose of providing technical assistance to the community and assuring that the community is adequately enforcing its floodplain management regulations. Potential violations may be identified during the CAV visit as a result of touring the floodplain, inspecting community permit files, and meeting with local appointed and elected officials. Open CAVs can be indicative of unresolved violations.

Violations can also be discovered when LOMR-F applications depict a non-compliant structure based on elevation data; or can be found through Submit-for-Rate requests, which occur when a structure applies for flood insurance but has been identified as being two or more feet below Base Flood Elevation (BFE). Elevation comparisons identified through LOMR-F applications and Submit-for-Rates imply structures were not built compliantly.

If administrative problems or potential violations are identified, the community will be notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. FEMA or the state will work with the community to help them bring their program into compliance with NFIP requirements. In extreme cases where the community does not take action to bring itself into compliance FEMA may initiate an enforcement action against the community.

During this Discovery process, stakeholders were provided with information regarding NFIP requirements that are associated with coastal hazard zones, as well as information about new FEMA guidance related to moderate wave action. These topics, including coastal SFHAs, building requirements in VE Zones, and the LiMWA, are discussed in detail at http://www.greatlakescoast.org and can also be found in the basinwide Lake Michigan Discovery Report (Federal Emergency Managment Agency, 2012).

iv. Communication

Throughout this Discovery process, community representatives and local stakeholders indicated the need to be kept informed about the results of Discovery, the upcoming coastal flood study, and opportunities for public input throughout the study process.

Ongoing communication and coordination will be an essential part of this Lake Michigan Coastal Flood Study for Manistee and Mason Counties. Throughout this study process, Federal, State, and local stakeholders for Manistee and Mason Counties will be kept informed via email, phone calls, letters, newsletters, and meetings.

The Great Lakes Coastal Flood Study website http://www.greatlakescoast.org is an excellent resource where stakeholders can obtain the most update-to-date information about the status of the Great Lakes Coastal Flood Study, data collection, upcoming meetings, new technical reports, the latest methodologies, factsheets, and much more.

FEMA encourages stakeholders to remain involved throughout the study process and will seek to identify partnership opportunities during the study process.

v. Unmet Needs

During the Discovery Meetings and throughout the Discovery process, Lake Michigan stakeholders identified concerns with proceeding with a new coastal flood risk study. Many stakeholders were concerned about what to expect in terms of extent of new SFHA boundaries. EMA acknowledged this concern and noted that upcoming engineering and production will include the distribution of draft workmaps and other flood risk products designed to give local stakeholders an opportunity to review and comment on flood risk data before the data is carried into NFIP FIRM maps.

In addition, comments related to the proposed transects were raised during the Discovery Meeting by State and County representatives. These comments were noted and will be considered as the study continues to move forward. It should be noted that transects proposed in this report remain subject to change.

VI. Close

Federal, State and local stakeholders were interested in the Discovery processes and in ensuring that local existing information and data that may assist in the upcoming Lake Michigan flood study was provided to FEMA so that it may be considered for use as the study progresses. Many stakeholders were interested in learning more about the new methodologies being used as part of the Great Lakes Coastal Flood studies, and how their community would be specifically affected by the flood study.

The information gathered in this Discovery process for Manistee and Mason Counties will provide invaluable information as the Lake Michigan Coastal Flood Study proceeds.

VII. References

Federal Emergency Management Agency. 2011a. *HAZUS Flood Average Annualized Loss Usability Analysis*. April 13, 2011.

Federal Emergency Management Agency, 2011b, "Public Owned Land," Mapping Information Platform. Accessed June 2012. https://hazards.fema.gov/femaportal/wps/portal.

Federal Emergency Management Agency, 2012a, Coordinated Needs Management System, http://cnms.riskmapcds.com/HelpCNMS.html, accessed July 2012.

Federal Emergency Management Agency, 2012b, Mitigation Planning Report with Transmittal Memo, May 2012.

U.S. Army Corps of Engineers, Great Lakes Hydraulics and Hydrology Branch, 1977. *Report on Great Lakes Open-Coast Flood Levels*.

U.S. Army Corps of Engineers, Detroit District, 2012, Lake Michigan Shoreline Classification obtained on July 3, 2012.

U.S. Census Bureau, 2010, State and County Quick Facts, http://quickfacts.census.gov/, accessed on July 30, 2012.

VIII. Attachments

The Discovery Report and appendices are stored digitally under their respective folders on the FEMA Mapping Information Platform (MIP) at:

LakeMichigan\Discovery\Project_Discovery_Initiation\Discovery_Report\

This Discovery Report and attachments are also available for download from the following website: http://www.greatlakescoast.org/

Expiration Date: TBD

A. Coastal Data Request Form
B. Manistee and Mason Counties Pre-Meeting Correspondence
C. Manistee County Draft Discovery Map
D. Mason County Draft Discovery Map

E. Manistee and Mason Counties Proposed Transects
F. Manistee and Mason Counties Discovery Meeting Documents
G. Locally Identified Mitigation Projects

Attachment A.

Coastal Data Request Form

U.S. Department of Homeland Security
536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

Community Discovery Coastal Data Request Form

Thank you for taking the time to complete this questionnaire. We are interested in obtaining coastal-specific data for your community. It will provide important information to help FEMA understand coastal flood risk issues in your community and to work with you in increasing your community's resilience to coastal flooding through implementation of the Risk MAP program. In addition, this form can be used as a way to prepare for the upcoming Discovery Meeting, as the topics on this form will be discussed throughout the meeting.

Once you have completed the questionnaire, please return the form:

Via e-mail: GreatLakesFloodStudy@starr-team.com
By mail: Holly Davis
Atkins/STARR
7406 Fullerton Street, Suite 350
Jacksonville, Florida 32256

Please provide as much information as possible. If you have any questions about the Discovery process or about completing this questionnaire, please contact:

Holly Davis, holly.davis@starr-team.com, (904) 363-8451

Contact Information	
Community/Organization	
Name:	
Title:	
Address:	
E-mail:	
Phone:	
Contact Preference	☐ Email ☐ Phone ☐ Mail

U.S. Department of Homeland Security
536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

Base Map Data		*Please select available data type*	
	Topography (e.g., LiDAR or contour data)	☐ *Hard copy*	☐ *Digital*
	Property information (e.g., Building footprints, parcel data, tax assessor's data)	☐ *Hard copy*	☐ *Digital*
Coastal Data			
	Coastal structures (e.g., seawalls, levees, jetties, groins, etc.)	☐ *Hard copy*	☐ *Digital*
	Coastal features (i.e., dunes and bluffs)	☐ *Hard copy*	☐ *Digital*
	Shoreline change data	☐ *Hard copy*	☐ *Digital*
	Locations of beach nourishment or dune restoration projects	☐ *Hard copy*	☐ *Digital*
	Areas of significant beach or dune erosion	☐ *Hard copy*	☐ *Digital*
	Mean high water	☐ *Hard copy*	☐ *Digital*
	Mean lake level	☐ *Hard copy*	☐ *Digital*
Other Data			
	Hydraulic structures (e.g., bridges, culverts, levees, dams) with inspection status, if available	☐ *Hard copy*	☐ *Digital*
	Elevated roads	☐ *Hard copy*	☐ *Digital*
	Critical facilities	☐ *Hard copy*	☐ *Digital*
	Other known hazards with geographical boundaries, i.e., landslide hazard areas, storm surge inundation zones, wildfire hazard areas, etc.	☐ *Hard copy*	☐ *Digital*
	Other relevant data	☐ *Hard copy*	☐ *Digital*

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Chicago, IL 60605
FEMA

Please provide the following information about the community:

Historical Flood Data		
Are you aware of any coastal flooding issues not represented on effective FIRMs:	☐ yes ☐ no	If yes, please explain and provide inundation areas of historic flooding events if available.
Risk Assessment		
Does your community have HAZUS-based loss estimates from average annualized loss?	☐ yes ☐ no	If yes, please describe:
Does your community have other risk assessment data?	☐ yes ☐ no	If yes, please describe:

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Flood Mitigation Information		
Does your community have a hazard mitigation plan?	☐ yes ☐ no	If yes, what is the status of the hazard mitigation plan? ☐ being reviewed ☐ it has been adopted ☐ it is currently being updated ☐ it is planned for updates
Does the plan reflect any coastal flood hazards?	☐ yes ☐ no	If yes, please explain:
Does the hazard mitigation plan indicate any data deficiencies for flood hazards that could be addressed through a flood study, especially near coastal zones?	☐ yes ☐ no	If yes, please explain:
Does your community have on-going mitigation projects, such as acquisition, elevation, flood control, soil stabilization, natural systems restoration, floodproofing, etc.	☐ yes ☐ no	If yes, please describe the projects and their locations:

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FEMA

Any specific coastal mitigation projects?	☐ yes ☐ no	If yes, please explain:
Does your community have experience with coastal flood disasters and flood disaster recovery?	☐ yes ☐ no	If yes, please explain:
Does your community coordinate floodplain management programs with programs for the management and planning of open space? If possible, any coastal specific?	☐ yes ☐ no	If yes, please explain:

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Chicago, IL 60605
FEMA

Have you had any prior proactive mitigation actions and planning efforts that resulted in reduced losses? If possible, any coastal specific?	☐ yes ☐ no	If yes, please describe:
Has your community applied and granted Individual Assistance/Public Assistance grants for declared disasters?	☐ yes ☐ no	If yes, please describe and provide the locations of these grants projects:
Has your community applied for FEMA Hazard Mitigation Grants program or other mitigation funds (USACE, NRCS, USGS, state Hazard Mitigation officer, etc.) in the past?	☐ yes ☐ no	If yes, please describe and provide the locations of on-going/planned/finished grants projects/structures:

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FEMA

How would you rank the community's ability to implement mitigation actions and to communicate flood risk to citizens?		☐ high ☐ medium ☐ low
Community Plans and Projects		
Does your community have a comprehensive plan?	☐ yes ☐ no	If you answered yes and you have a hazard mitigation plan, was your hazard mitigation plan coordinated with the comprehensive plan? ☐ yes ☐ no
Does your community's comprehensive plan have a special consideration for coastal areas?	☐ yes ☐ no	If yes, please explain elements/regulations that affect coastal area development.
Does your community have a coastal zone management plan?	☐ yes ☐ no	If yes, please provide a digital or hard copy of the plan.
Does your community have planning staff or a planning/zoning commission and other measures, such as ordinances, administrative plans, or other programs contributing to effective administration of floodplain zoning, building codes, open space preservation, and coastal zone management?	☐ yes ☐ no	If yes, please explain this group's role in floodplain management and provide examples of the types of programs in place:

U.S. Department of Homeland Security
536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

Does your community have areas of recent or planned development/re-development and areas of high growth or other natural land changes (e.g., wildfires or landslides):	☐ yes ☐ no	If yes, please describe:
Are there any locations of other ongoing studies or projects and studied areas that have been modified since the effective map and require an updated study (e.g., highway improvement, seawall improvement, etc.)	☐ yes ☐ no	If yes, please describe:
Any other comments/concerns based on local knowledge:		

Attachment B.

Manistee and Mason Counties Pre-Meeting Correspondence

Davis, Holly A

Subject: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for Manistee and Mason County, MI
Location: Call in number: 1-877-537-6647 Participant Code: 31578 and WebEx

Start: Wed 8/8/2012 10:00 AM
End: Wed 8/8/2012 11:00 AM

Recurrence: (none)

Meeting Status: Meeting organizer

Organizer: Davis, Holly A

Required Attendees:

Good Morning,

You are receiving this meeting invitation because you have been identified as a ***Lake Michigan*** local community stakeholder. You should have recently received an invitation in the mail from the Federal Emergency Management Agency (FEMA), regarding the ***Great Lakes Coastal Flood Study*** effort, inviting you to attend a Discovery Meeting in September, as well as this information exchange session, scheduled for **Wednesday, August 8, 2012 at 10am ET**. More information about the ***Great Lakes Coastal Flood Study*** may be found at http://www.greatlakescoast.org.

While the WebEx and call-in information was provided in the letter, I wanted to also provide this information to you via email to serve as a reminder. Below is the call-in and WebEx information:

Date:	Wednesday, August 8, 2012
Time:	10:00am – 11:00am ET
Link to WebEx:	https://www.webex.com/login/attend-a-meeting
Meeting No:	655 803 469
Call in number:	877-537-6647
Participant Code:	31578

This informal session will begin the process of learning about your available local coastal data, hazard mitigation strategies, and what the critical flooding issues are in your community so that we can then work with you to determine how to best utilize that information during FEMA's Great Lakes study. A data request form is attached to help facilitate the discussion. We encourage open discussions throughout this meeting and will use the information to better cater our upcoming Discovery Meetings as well. Attendees of this conference call, as well as the Discovery Meetings, may include, but certainly are not limited to, community leaders, emergency managers, GIS specialists, engineers, outreach specialists, and local planners.

We look forward to speaking with you on Wednesday, and appreciate your participation in this process. If you have any questions, or are not able to attend this session but would like to learn more, please do not hesitate to contact me directly. My information can be found below.

Thanks,
Holly

Holly A. Davis
STARR Team
Tel: (904) 363-8451 | Fax: (904) 363 8811 | Cell: (904) 476 9840 |

Great Lakes Coastal Flood Study
Information Exchange WebEx Meeting
Manistee and Mason Counties, Michigan
August 8, 2012 10:00am ET

Attendance:
Elizabeth Reimink, Emergency Management Coordinator, Mason County
Stacey Roberts, STARR
Holly Davis, STARR

Discussion:

- Elizabeth Reimink indicated she was attending the meeting on behalf of Fabian Krizacky, County Administration for Mason County.
- Mason County is currently in the process of updating their Hazard Mitigation Plan, with the estimated completion due at the end of 2013. This plan is part of a collation with Oceana and Muskegon counties.
- Elizabeth Reimink, Emergency Management Coordinator, Mason County will complete the data request form as send in to us.

Wrap-up and Adjourn

- Holly Davis, STARR, will send follow-up email, including a copy of the presentation and draft transects, to the entire group of invitees.

FEMA

Information Exchange Session for Lake Michigan Discovery

Manistee and Masson Counties, Michigan
August 8, 2012
10am – 11am ET

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Purpose of Information Exchange

- Introduction to Risk MAP
- Introduction to Great Lakes Flood Study and Discovery
- Learn more about your areas of concern, coastal flood risk, and coastal mitigation
- Bring the right people to the table early
- Identify data gaps

Risk MAP (Mapping, Assessment, and Planning) Vision

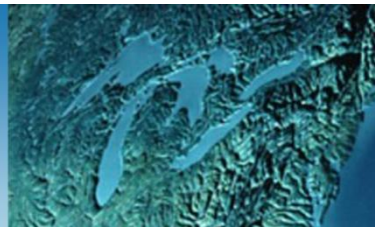
FEMA

Goals

1. Address gaps in flood hazard data
2. Increase risk awareness to encourage risk reduction
3. Risk-based Mitigation Planning resulting in risk reduction actions
4. Enhanced digital platform to improve communication and sharing of risk data
5. Align programs and develop synergies

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



Overview of Great Lakes Coastal Flood Study

FEMA

- Latest models, data, and technology
- Deliver updated flood maps and flood risk datasets
- Equip Federal Agencies, eight States and hundreds of coastal communities with data and planning tools to facilitate actions to enhance resiliency of the Great Lakes ecosystem

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Hazard Mitigation Resources, Strategies & Actions

FEMA

- **Recent community hazard mitigation experiences?**
  - *Public Works*
  - *Building Standards*
  - *Community Planning and Hazard Mitigation Plan Update*
  - *Communication Processes, GIS, etc.*
- **New option to document ideas and actions through the FEMA Mitigation Action Form**

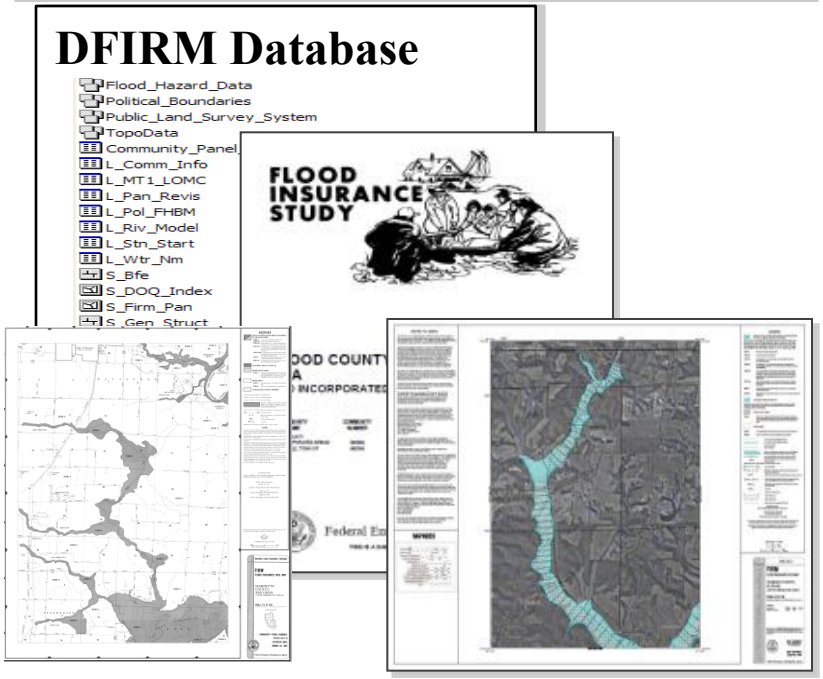
Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning mechanisms

RiskMAP
Increasing Resilience Together

Products and Datasets: Regulatory and Non-regulatory

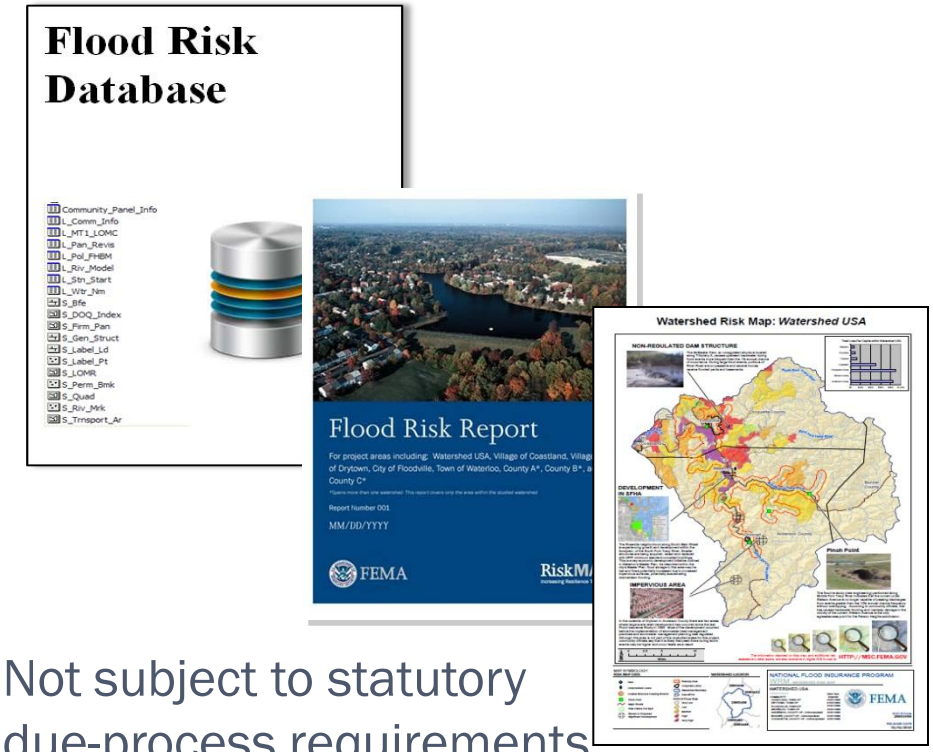
FEMA

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Products and Datasets: Coastal Products in Development

Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline
Reference

Shoreline Feature

Upper Peninsula Shoreline
Reference

Risk MAP Overview: Shoreline Features Database

Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

Primary Land Use
High Density Residential
Moderate Density Residential
Low Density Residential
Commercial/Industrial
Park Land
Farm Land
Forested

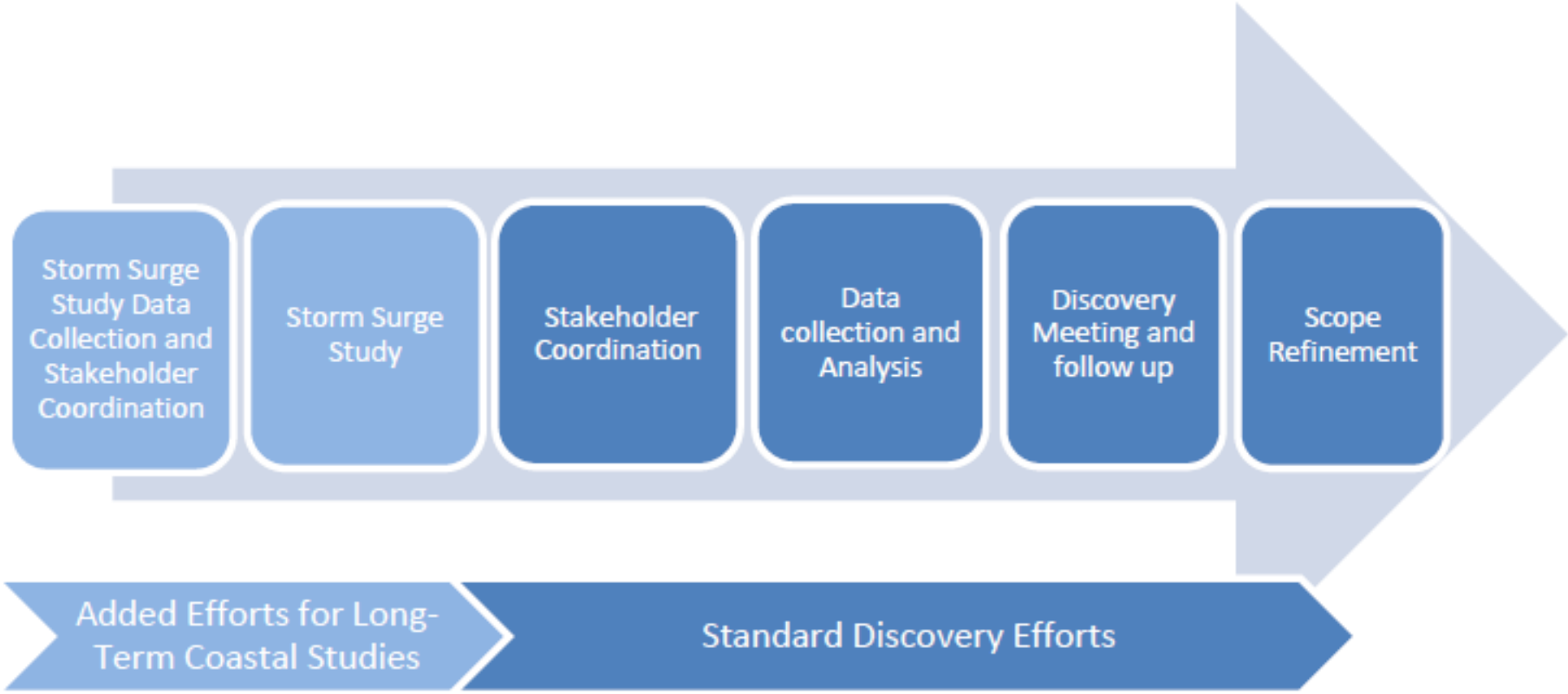
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

- Contains primary and secondary Land Use tables – same for coast type and vegetation.
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

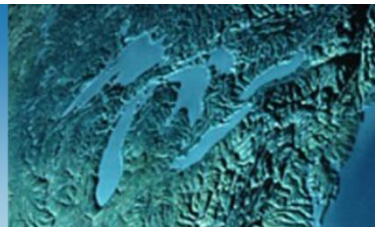
Great Lakes Coastal Flood Study
Discovery Process Overview

FEMA



RiskMAP
Increasing Resilience Together

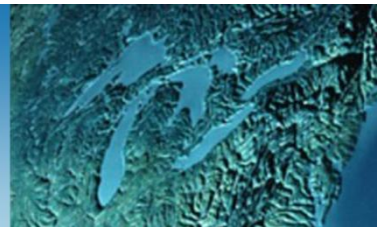
Great Lakes Coastal Flood Study
greatlakescoast.org



Great Lakes Coastal Flood Study
Discovery Meeting

FEMA

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
City of Ludington City Hall Community Room	400 South Harris Street Ludington, Michigan 49431	Wednesday 09/12/2012; 3:00 - 5:00 PM ET



Draft Discovery Meeting Agenda

- Why are we here?
- Coastal mapping and flood risk topics to be aware of
- How does this apply to my community?
  - NFIP compliance, hazard mitigation opportunities, and grant funding
- Interactive Session
  - Utilization of Coastal Flood Risk Products for Planning and Mitigation, Identification of Existing Local Coastal Data, View and Discuss Local Coastal Areas of Concern Using the Discovery Map, Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form
- Wrap Up

Draft Transect Map Station: Talk to technical staff about draft transects and view draft transects in GIS

Mitigation Resources, Strategies, and Actions Station: Talk with FEMA and State staff about areas of concern and potential mitigation actions to help reduce risk. Fill out Mitigation Action Form.

Great Lakes Coastal Flood Study
Discovery Products

- **Final Discovery Report**
  - Single, comprehensive report for all of Lake Michigan, with appendices for each coastal community by county
  - Includes pre-discovery data, meeting agenda, sign-in sheets, discussion topics, decisions made, etc.
- **Final Discovery Maps**
  - Including feedback from participants
  - Visual representation of meeting outcomes

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Who Should Attend the Discovery Meeting?

- **Community Officials**
  - CEO and Floodplain Administrators (FPAs)
  - Planners, GIS Specialists, Engineers, Outreach Specialists, Emergency Managers, and Community Leaders
- **State Representatives**
  - State Hazard Mitigation Officer (SHMO), National Flood Insurance Program (NFIP) Coordinators, Cooperating Technical Partners (CTPs)
- **Other Federal Agencies (NOAA, USACE, USGS)**
- **Regional Planning Agencies**
- **Great Lakes Organizations**

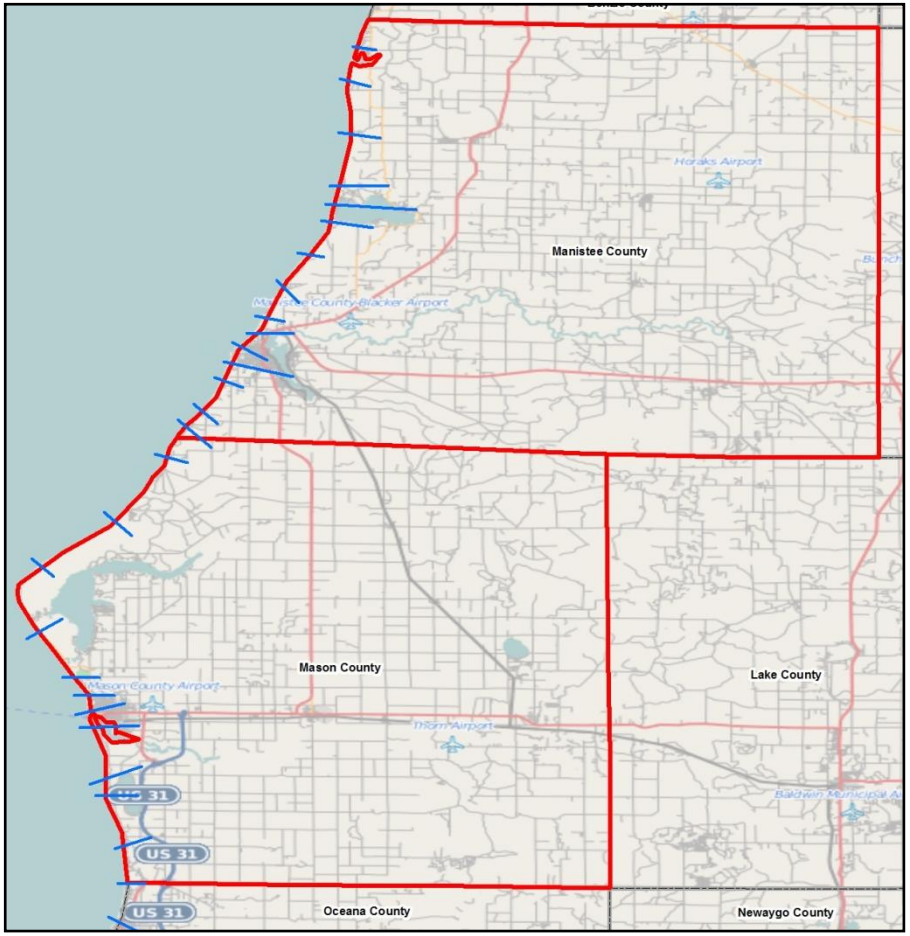
Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Lake Michigan coastal communities in Manistee and Mason Counties, Michigan

Manistee County
Arcadia Township
Bear Lake Village
Brown Township
East Lake Village
Filer Township
City of Manistee
Manistee Township
Onekama Township
Onekama Village
Stronach Township

Mason County
Grant Township
Hamlin Township
City of Ludington
Pere Charter Marquette Township
Summit Township

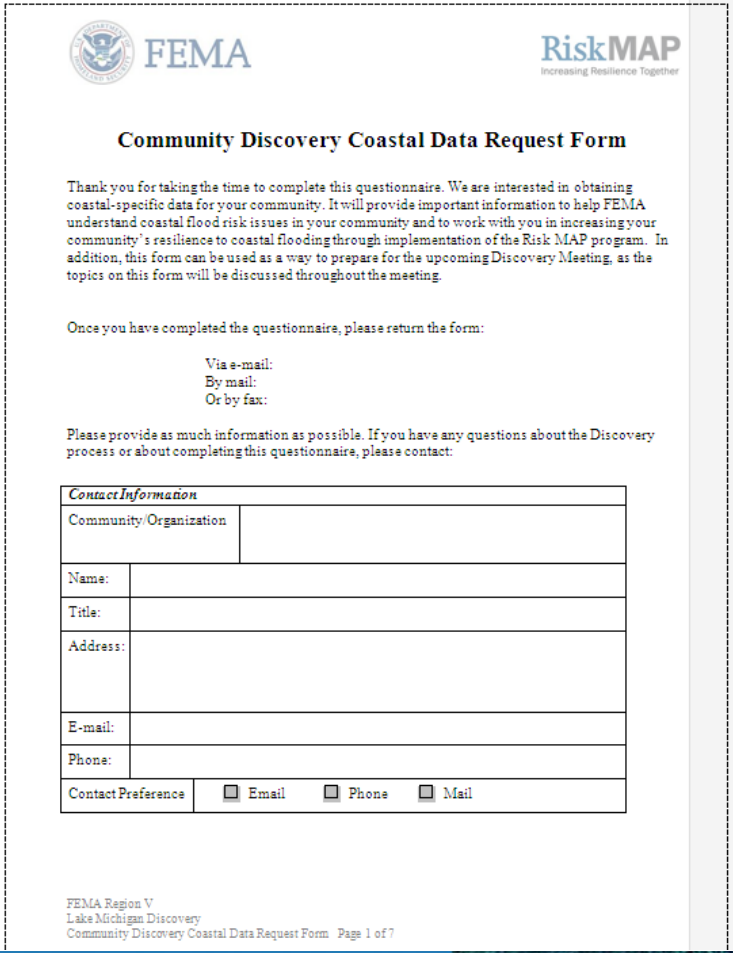


RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Data Request Form Overview

- Contact Information
- Base Map Data
- Coastal Data
- Other Data
- Historic Flood Data
- Risk Assessment
- Flood Mitigation Information
- Community Plans and Projects
- Any Other Comments/ Concerns Based on Local Knowledge



FEMA

RiskMAP
Increasing Resilience Together

Community Discovery Coastal Data Request Form

Thank you for taking the time to complete this questionnaire. We are interested in obtaining coastal-specific data for your community. It will provide important information to help FEMA understand coastal flood risk issues in your community and to work with you in increasing your community's resilience to coastal flooding through implementation of the Risk MAP program. In addition, this form can be used as a way to prepare for the upcoming Discovery Meeting, as the topics on this form will be discussed throughout the meeting.

Once you have completed the questionnaire, please return the form:

Via e-mail:
By mail:
Or by fax:

Please provide as much information as possible. If you have any questions about the Discovery process or about completing this questionnaire, please contact:

Contact Information	
Community/Organization	
Name:	
Title:	
Address:	
E-mail:	
Phone:	
Contact Preference	☐ Email ☐ Phone ☐ Mail

FEMA Region V
Lake Michigan Discovery
Community Discovery Coastal Data Request Form Page 1 of 7

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Review of Data Collected To Date

- Draft Transects
- Shoreline Classification Dataset
- Hazard Mitigation Plans
- Hazard Mitigation Grants Program (HMGP) projects
- Pre-Disaster Mitigation Program projects
- Declared Disasters
- Repetitive loss claims by community

Incident Type	Incident Begin Date	Incident End Date	Area Name
Flood	9/5/1985	9/28/1985	Mason (County)
Flood	9/10/1986	10/10/1986	Manistee (County)
Flood	9/10/1986	10/10/1986	Mason (County)
Severe Storm(s)	6/6/2008	7/13/2008	Manistee (County)
Severe Storm(s)	6/6/2008	7/13/2008	Mason (County)

Next Steps and Opportunity to Get Involved

- **Assessment of data and information provided**
- **Identification of best practices:**
  - Do you have an example of a local coastal mitigation best practice?
- **Discovery meeting involvement:**
  - Are you be interested in participating in Discovery Meeting facilitation?

THANK YOU FOR YOUR PARTICIPATION!

Who to Contact

- **For more information:** http://www.greatlakescoast.org/
- **Send completed questionnaires to:**
  - GreatLakesFloodStudy@starr-team.com
- **FEMA Region V**
  - Ken Hinterlong @ ken.hinterlong@fema.dhs.gov
  - Erin Maloney @ erin.maloney@fema.dhs.gov
- **STARR**
  - Holly Davis@ holly.davis@starr-team.com
  - Stacey Roberts @ stacey.roberts@starr-team.com

Questions?

Attachment C.

Manistee County Draft Discovery Map

MAP SYMBOLOGY

LEGEND

- Ports
- Dams
- USGS Gages
- Wave Gages
- Draft Transects
- Stream/River
- Watershed
- Waterbody
- Federal Lands
- Municipal Boundary
- County Boundary

AAL DATA/ Total Average Annualized Losses per Census Block

- $1,000 - $100,000
- $100,001 - $250,000
- $250,001 - $750,000
- $750,001 - $2,000,000
- $2,000,000+

Q3 Special Flood Hazard Areas

- AE
- A
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map

LAKE MICHIGAN COASTAL STUDY

MANISTEE COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Township of Arcadia	City of Manistee
Village of Bear Lake	Township of Manistee
Township of Brown	Township of Onekama
Village of Eastlake	Village of Onekama
Township of Filer	Township of Stronach

STARR

FEMA

Attachment D.

Mason County Draft Discovery Map

MAN01
MAS11
MAS10
MAS09
MAS08
MAS07
MAS06
MAS05
MAS04
MAS03
MAS02
MAS01
OCE11
Manistee County
Filer Township
Stronach Township
Grant Township
Ludington State Park
Hamlin Township
Victory Township
Mason County
City of Ludington
Amber Township
Pere Marquette Township
Summit Township
Riverton Township
Weare Township
Pentwater Township
N
0 0.75 1.5 3 Miles

MAP SYMBOLOGY

LEGEND

- Ports
- Dams
- USGS Gages
- Wave Gages
- Draft Transects
- Stream/River
- Watershed
- Waterbody
- Federal Lands
- Municipal Boundary
- County Boundary

AAL DATA/ Total Average Annualized Losses per Census Block

- $1,000 - $100,000
- $100,001 - $250,000
- $250,001 - $750,000
- $750,001 - $2,000,000
- $2,000,000+

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map

LAKE MICHIGAN COASTAL STUDY

MASON COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township of Pere Marquette
Township of Summit

STARR

FEMA

Attachment E.

Manistee and Mason Counties Proposed Transects

1 inch = 1,001 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 1 of 10

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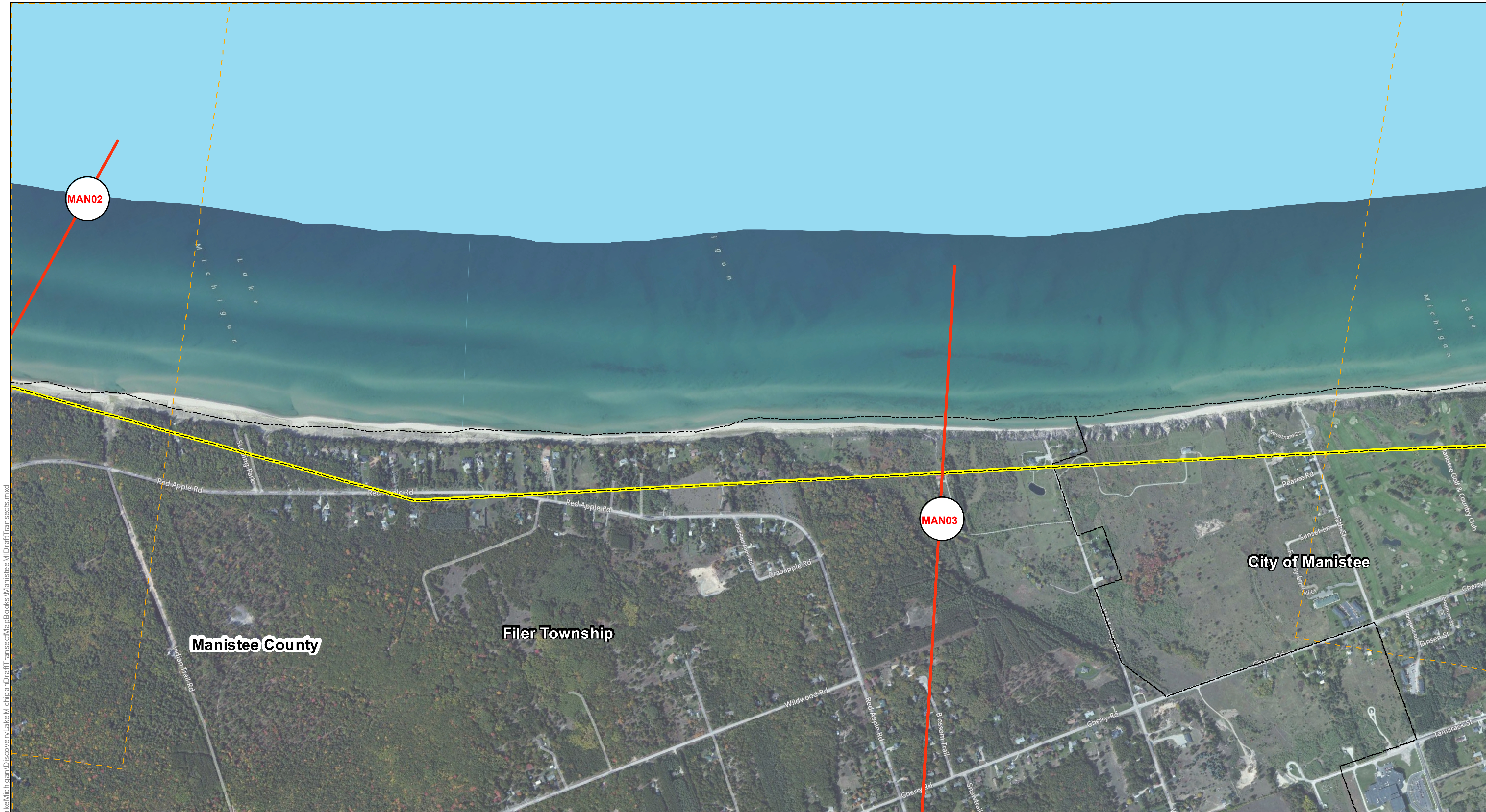
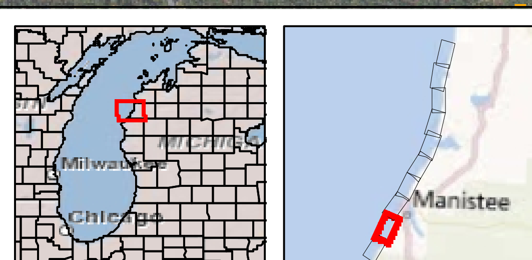


1 inch = 1,002 feet



Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia	City of Manistee
Village of Bear Lake	Township of Manistee
Township of Brown	Township of Onekama
Village of Eastlake	Village of Onekama
Township of Filer	Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 2 of 10

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MAN04

MAN05

MAN06

City of Manistee

Manistee County

Manistee Township

Lake Michigan

Lake Michigan

Lake Michigan

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1 inch = 1,003 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

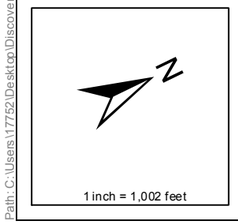
STUDY COMMUNITIES

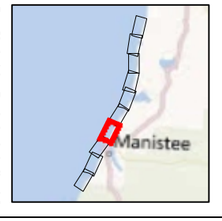
Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan

DRAFT TRANSECTS

Panel 3 of 10





Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 4 of 10

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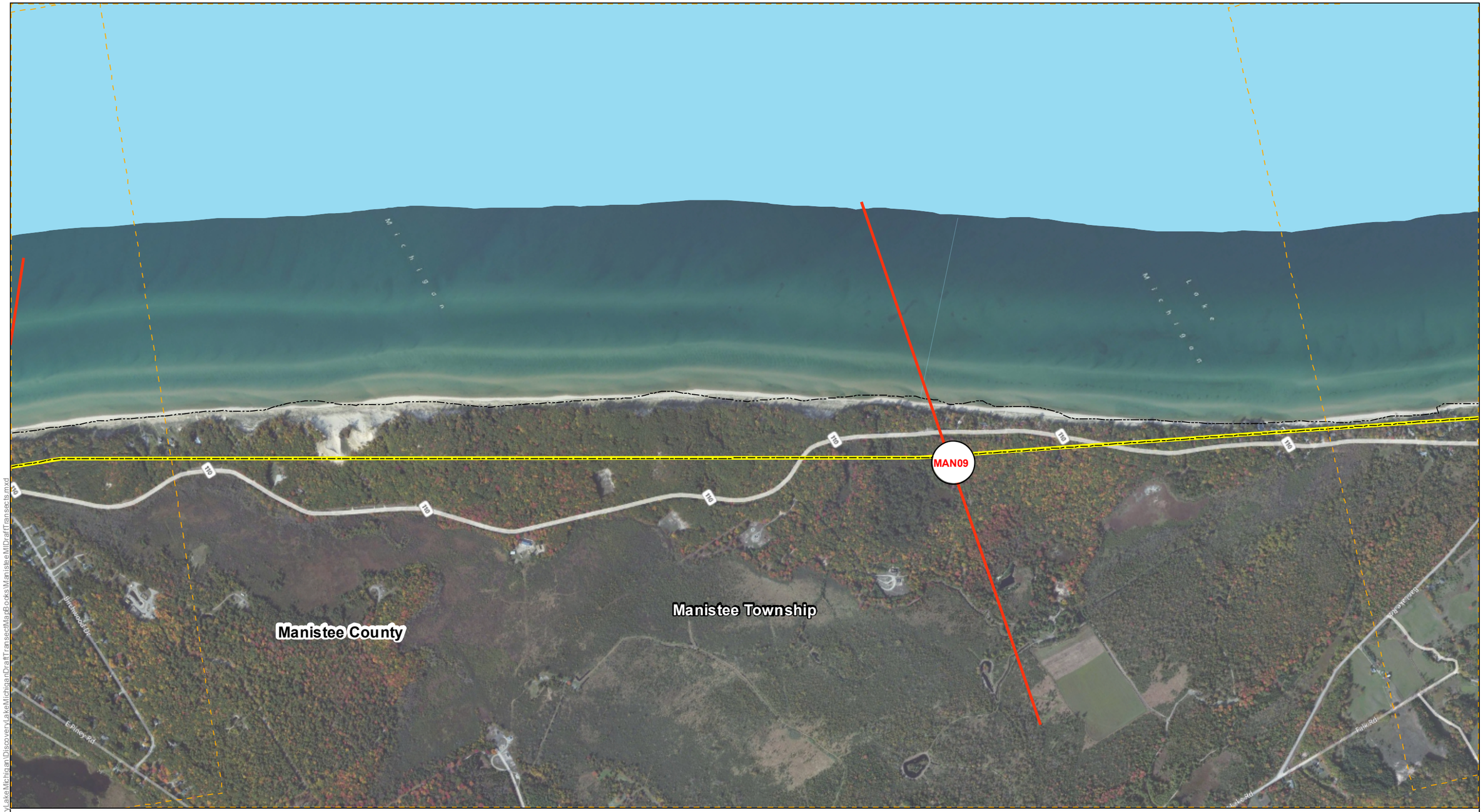

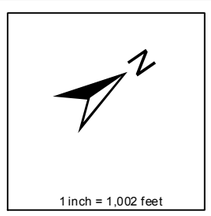

- Draft Transects
- County Boundary
- Municipal Boundary
- Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 5 of 10

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MAN10

MAN11

Manistee Township

Manistee County

Onekama Township

1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 6 of 10

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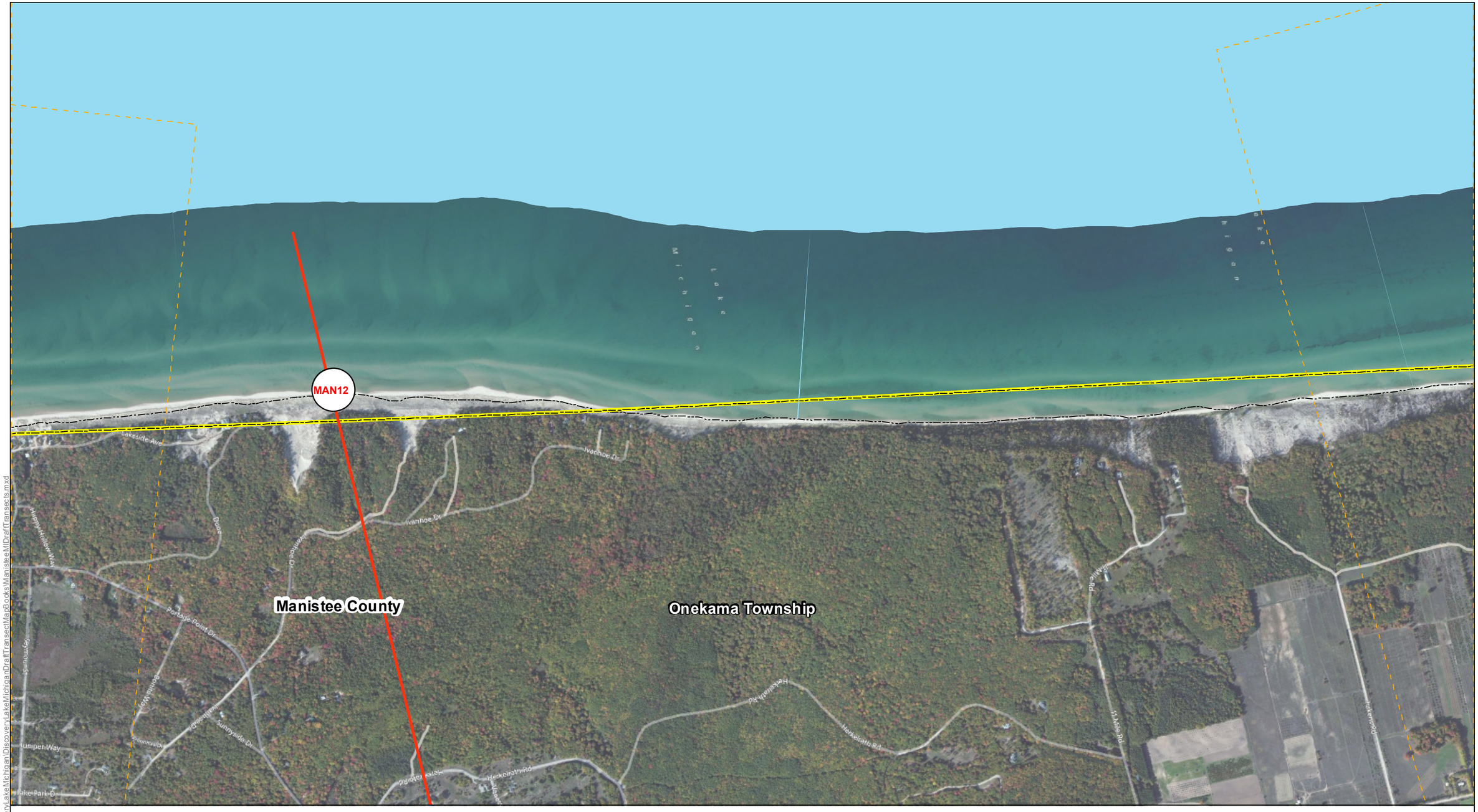

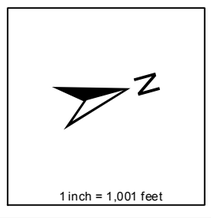

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 7 of 10

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Manistee County

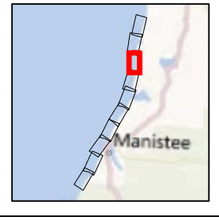
Arcadia Township

Onekama Township

MAN13

Lake Michigan

1 inch = 1,003 feet



Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 8 of 10

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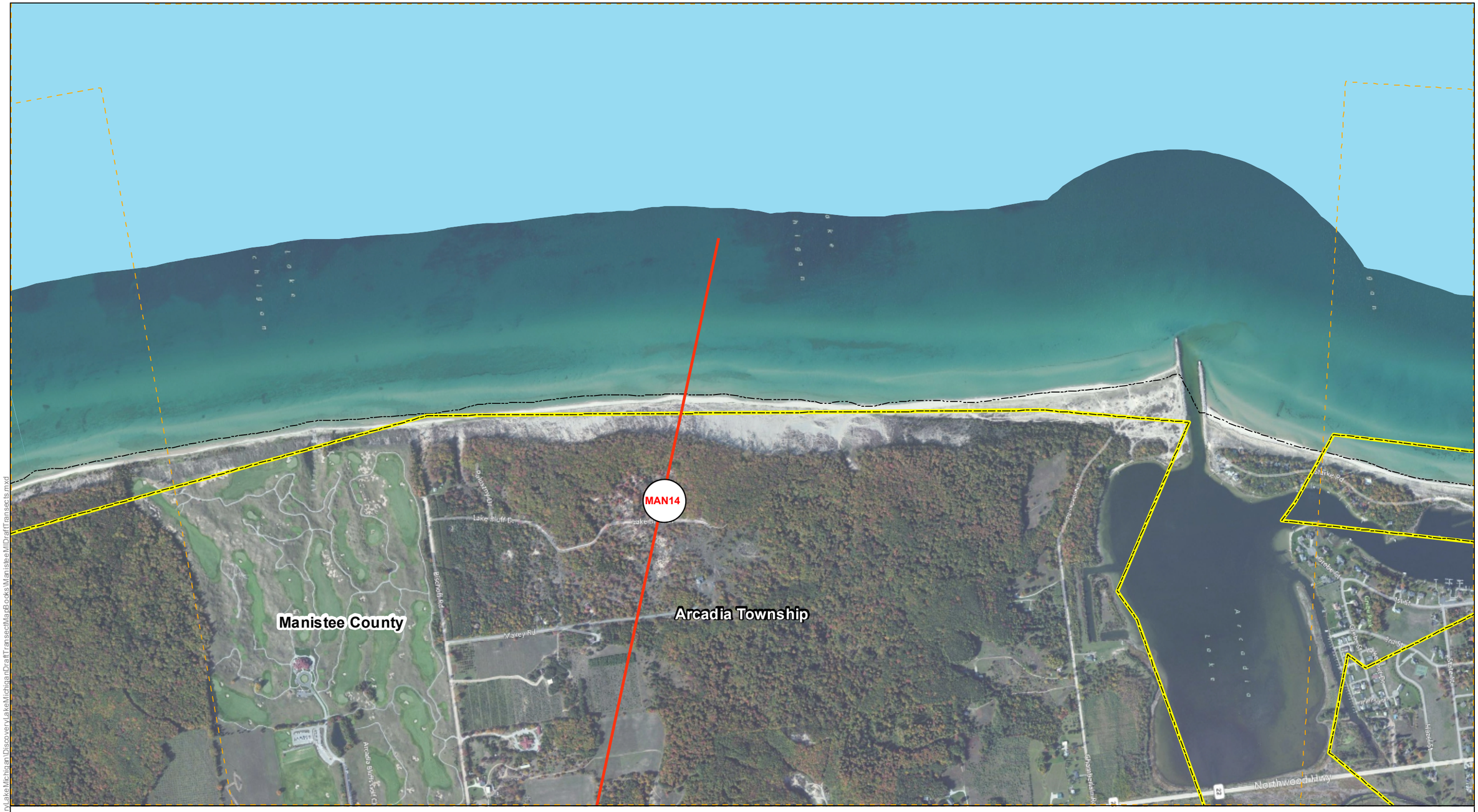

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1 inch = 1,002 feet

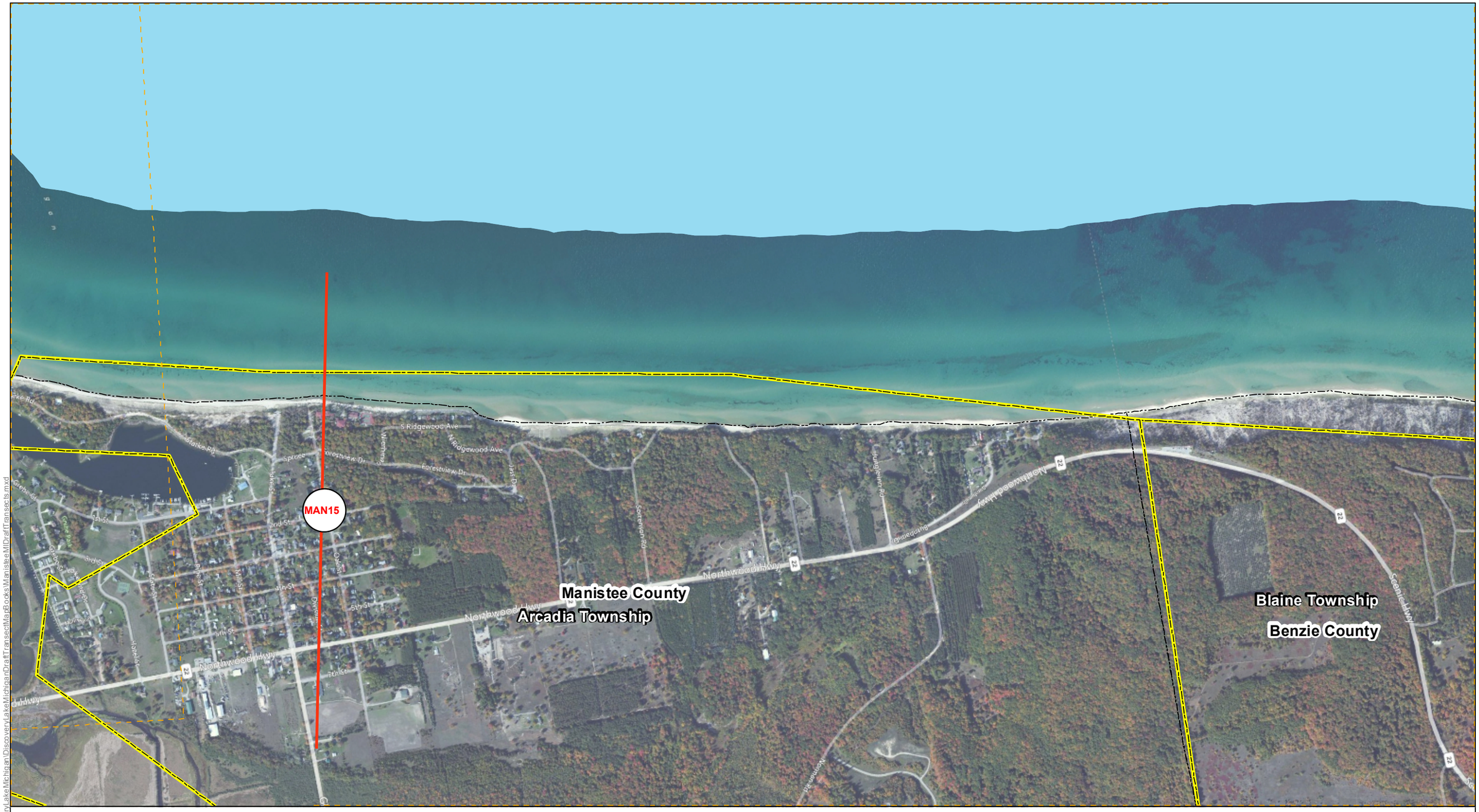
Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

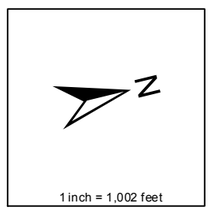
Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 9 of 10





Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Arcadia
Village of Bear Lake
Township of Brown
Village of Eastlake
Township of Filer
City of Manistee
Township of Manistee
Township of Onekama
Village of Onekama
Township of Stronach

Manistee County, Michigan
DRAFT TRANSECTS
Panel 10 of 10

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OCE11

Pentwater Township

Oceana County

Mason County

Summit Township

N

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan

DRAFT TRANSECTS

Panel 1 of 12

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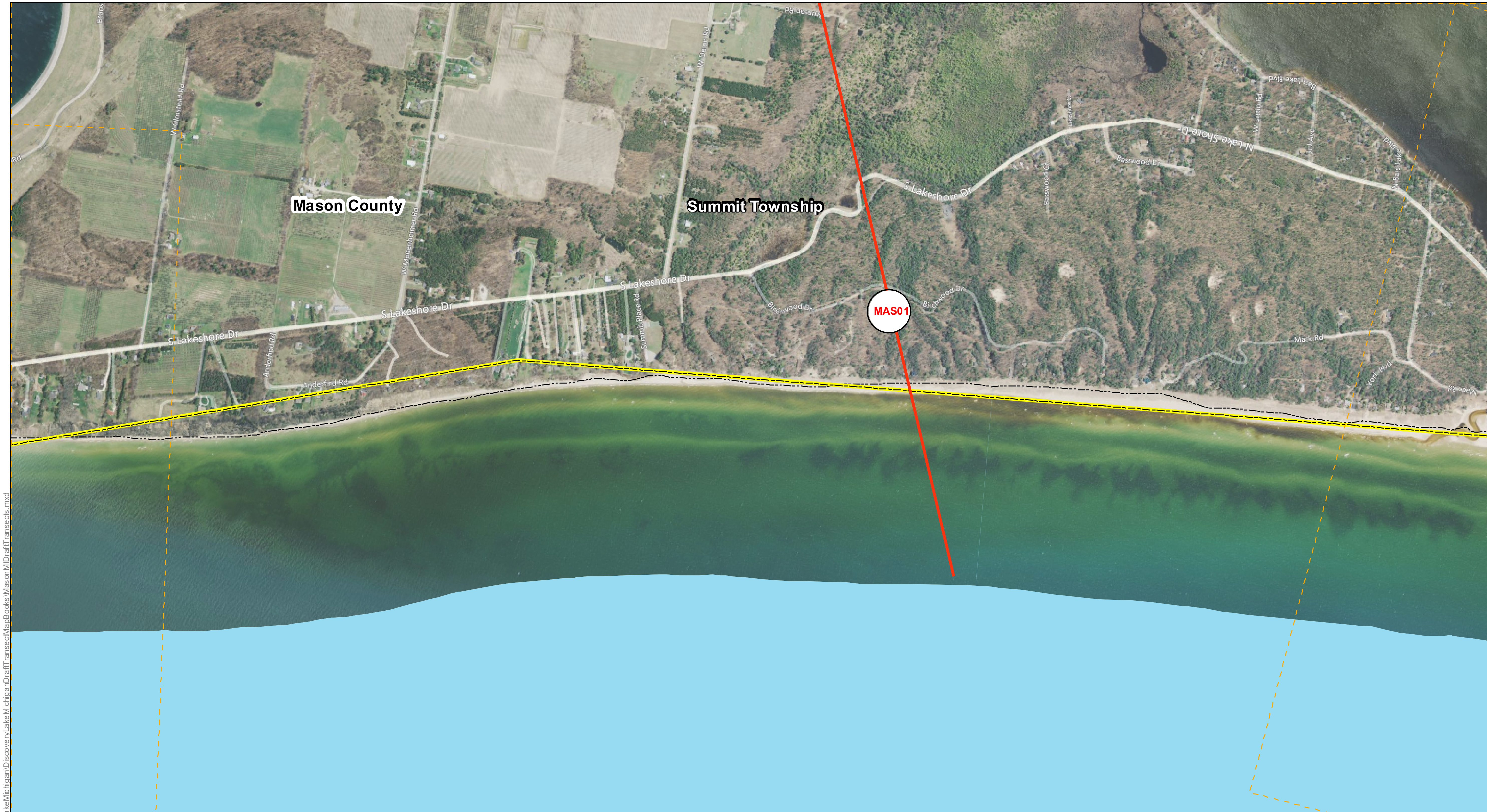

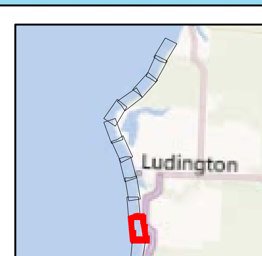

1 inch = 1,001 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 2 of 12

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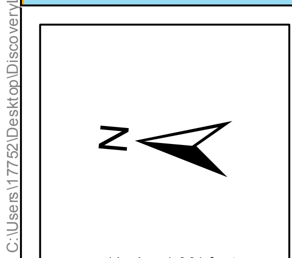

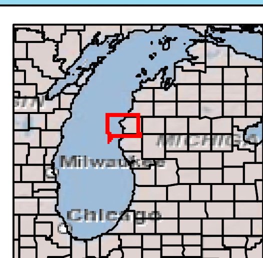

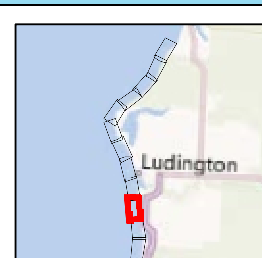

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 3 of 12

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\MasonMIDraftTransects.mxd

City of Ludington

Mason County

Pere Marquette Township

MAS04

1 inch = 1,003 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 4 of 12

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooksMasonMIDraftTransects.mxd

Hamlin Township

Mason County

City of Ludington

Pere Marquette Township

Mason County

MAS07

MAS06

MAS05

MAS04

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 5 of 12

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Mason County

Hamlin Township

MAS07

Lake Michigan

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 6 of 12

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\MasonMIDraftTransects.mxd

Mason County

Hamlin Township

MAS08

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\MasonMIDraftTransects.mxd

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

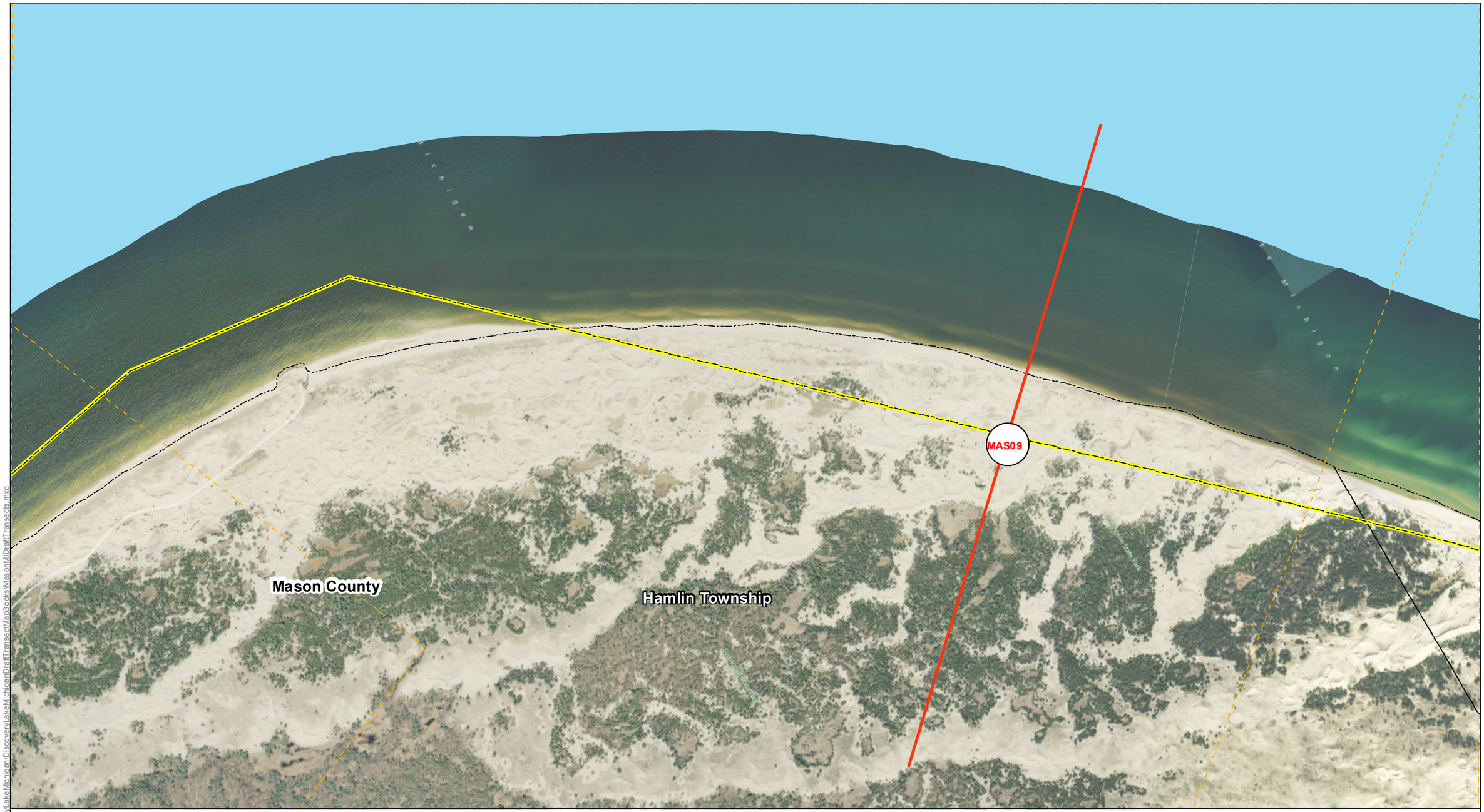
Adjoining Panel Edge

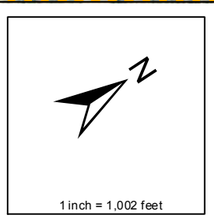
Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 7 of 12





Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 8 of 12

Path: C:\Users\17752\Desktop\Discovery\LakeMichiganDiscovery\LakeMichiganDraftTransectMapBooks\MasonMIDraftTransects.mxd

Lake Michigan

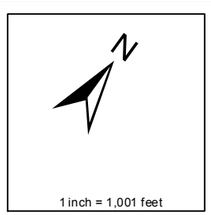
Lake Michigan

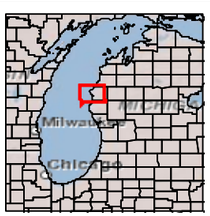
Lake Michigan

Mason County

Hamlin Township

Grant Township





Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 9 of 12

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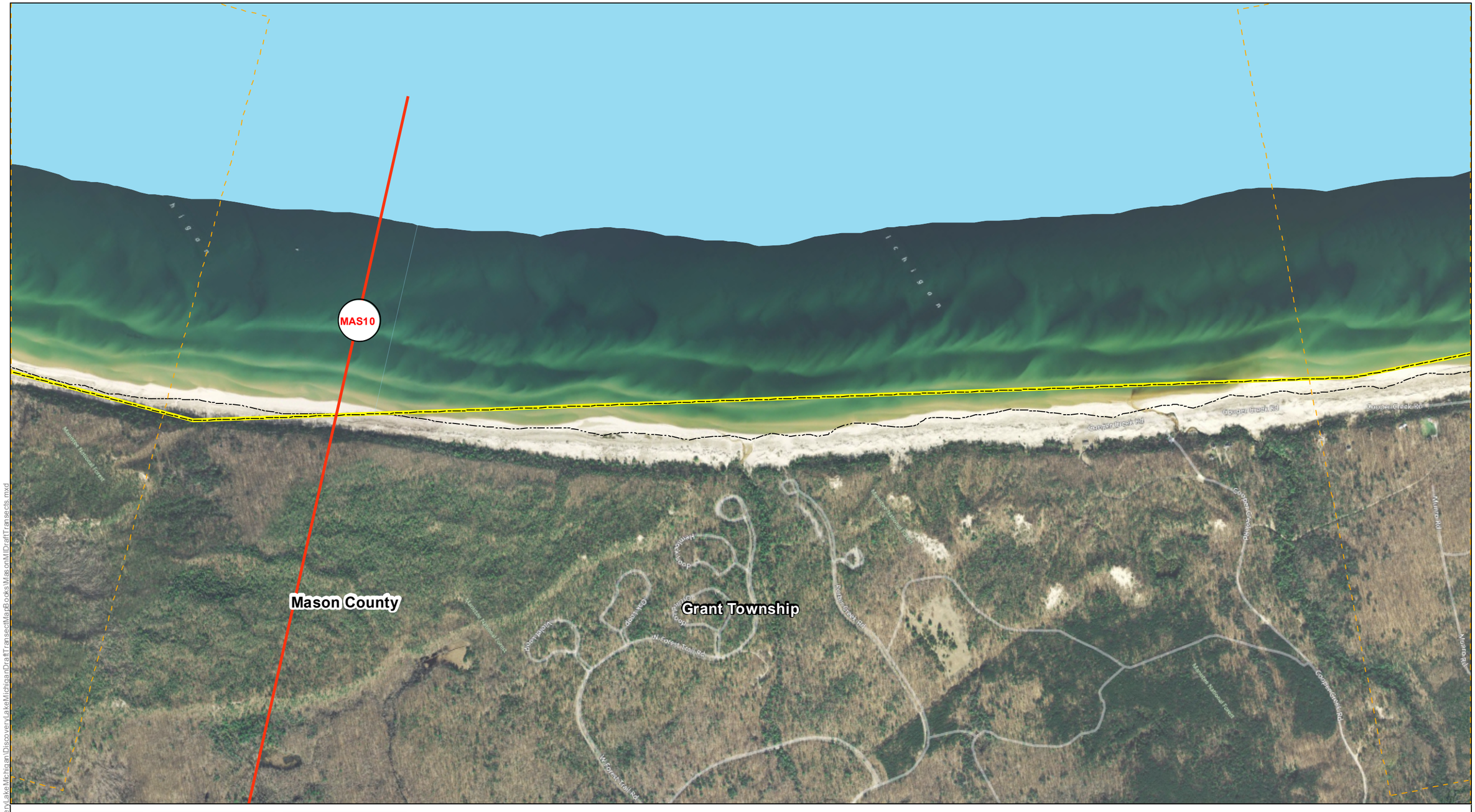

STUDY COMMUNITIES
Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 10 of 12

MAS11

Mason County

Grant Township

1 inch = 1,001 feet

- Draft Transects
- County Boundary
- Municipal Boundary
- Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 11 of 12

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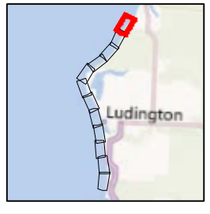
1 inch = 1,001 feet



- Draft Transects
- County Boundary
- Municipal Boundary
- Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

Township of Grant
Township of Hamlin
City of Ludington
Township Pere Marquette
Township of Summit

Mason County, Michigan
DRAFT TRANSECTS
Panel 12 of 12

Attachment F.

Manistee and Mason Counties Discovery Meeting Documents

U.S. Department of Homeland Security
536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

July 13, 2012

«Salutation» «First_Name» «Last_Name»
«Title», «Organization»
«Street_1» «Street_2»
«City», «State_Province» «Zip_Code»

Re: Invitation to Attend Community Meetings Regarding Lake Michigan Coastal Flood Risk

Dear «Salutation» «Last_Name»:

The Federal Emergency Management Agency (FEMA) is conducting a comprehensive study of flood hazards for Lake Michigan and the rest of the United States Great Lakes through FEMA's Risk Mapping, Assessment, and Planning (MAP) Program. Data from this study will eventually be used to convey coastal flood hazard risk through revised Flood Insurance Rate Maps (FIRMs), also known as regulatory products, and new risk planning and assessment products and datasets, also referred to as non-regulatory products and datasets. Please see enclosed Risk MAP Flood Risk Products Fact Sheet. More information about the Great Lakes Coastal Flood Study may be found at http://www.greatlakescoast.org.

The goal of Risk MAP is to support actions that make communities safer from flooding. The Risk MAP program wants to achieve continued improvement of flood hazard information for the National Flood Insurance Program (NFIP); to promote increased awareness and understanding of flood risk; to increase community engagement; and to identify and support actions that local stakeholders can take to reduce natural hazard risks. For additional information on the Risk MAP Program, please visit http://www.fema.gov/plan/prevent/fhm/rm_main.shtm.

The first phase of the Risk MAP process is Discovery. Through Discovery, input provided by communities will help FEMA to better understand local coastal flood risk data and needs, and characterize local conditions that contribute to coastal flood risk.

Your Discovery Meeting is scheduled to occur:

Date:	Wednesday, September 12, 2012
Time:	3:00pm – 5:00pm
Location:	City of Ludington, City Hall Community Room
Address:	400 South Harrison Street, Ludington, Michigan 49431

Please save this date on your calendar. At the meeting, we will review the coastal flood risk data we have gathered to date and discuss your community's coastal floodplains, mitigation plan and projects, coastal flood risk concerns, and coastal floodplain management activities. This discussion will allow us to better identify your community's coastal flood hazard needs and subsequent Risk MAP regulatory and non-regulatory products and datasets that can be delivered during the Risk MAP project. We will also discuss how the coastal flood risks and needs are related to mapping, risk assessment, Hazard Mitigation planning, and grant programs available to eligible communities. To best facilitate this discussion, we would like to request your help in inviting community leaders, emergency managers, GIS specialists, engineers, outreach specialists, and local planners to the meeting. Please RSVP to FEMA's study contractor (STARR) Holly Davis at (904) 363-8451 or email to GreatLakesFloodStudy@starr-team.com no later than **August 17, 2012.** Please reference the Discovery Meeting date and time in your RSVP.

So that we can better prepare for the upcoming Discovery Meeting, we are asking local communities to participate in an Information Exchange conference call and WebEx. This call will provide an overview of

FEMA's Risk MAP program and the Discovery process, and will allow us to review with you our request for the exchange of coastal flood risk and hazard mitigation data, and to learn more about your community's coastal flood hazard risks and needs, in advance of the Discovery Meeting. The partnership and exchange of data between FEMA, the State, and your community is vital to the success of identifying flood risks and needs that may impact your citizens.

The Information Exchange conference call is scheduled to occur:

Date:	Wednesday, August 8, 2012
Time:	10:00am – 11:00am EST
Link to WebEx:	https://www.webex.com/login/attend-a-meeting
Meeting No:	655 803 469
Call in number:	877-537-6647
Participant Code:	31578

If you or another community representative is unable to attend the Information Exchange conference call, we ask that you fill out and return the enclosed data request form by **August 17, 2012.** This is the same data request form that will be discussed during the conference call. The completed form can be sent to:

Via e-mail:	GreatLakesFloodStudy@starr-team.com
By mail:	Holly Davis Atkins/STARR 7406 Fullerton Street, Suite 350 Jacksonville, Florida 32256

We look forward to working with you to reduce the risks associated with coastal flooding and increase your community's resiliency for the long term. To learn more about Discovery, please visit http://www.fema.gov/library and search keywords "Discovery brochure" or contact Ken Hinterlong, FEMA Region V Senior Engineer, at (312) 408-5529, or by email at ken.hinterlong@fema.dhs.gov . We look forward to discussing this with you during the Information Exchange call and/or seeing you at the upcoming Discovery Meeting.

Sincerely,

Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

Enclosures: Risk MAP Flood Risk Products Fact Sheet
Community Discovery Coastal Data Request Form

cc: Community FPA
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

Wednesday, September 12, 2012
3:00pm - 6:00pm ET
City of Ludington, City Hall Community Room
400 S. Harrison Street
Ludington, MI 49431

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
1		Manistee County Emergency Management		Lt. Kenneth	Falk	1525 E. Parkdale Ave. Manistee, MI 49660	(231) 723-9970	falkk@manisteesheriff.org
2		Mason County	Equilization	Tom	Routhier	304 East Ludington Ave. Ludington, MI 49431	(231) 845-6288	trouthier@masoncounty.net
3		City of Manistee	Planning and Zoning	Denise	Blakeslee	70 Maple Street, PO Box 358 Manistee, MI 49660	(231) 398-2805	dblakeslee@manisteemi.gov
4		City of Manistee	Community Development Director	Jon	Rose	70 Maple Street, PO Box 358 Manistee, MI 49660	(231) 398-2805	jrose@manisteemi.gov
5		FEMA	FEMA Region V	Ken	Hinterlong	536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5529	Ken.Hinterlong@fema.dhs.gov
6		FEMA	FEMA Region V Risk Analysis	Erin	Maloney	536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5435	erin.maloney@fema.dhs.gov
7		STARR	Project Manager/Coastal Engineer	Stacey	Roberts		(850) 580-7896	stacey.roberts@starr-team.com
8		STARR	Outreach Coordinator	Holly	Davis		(904) 363-8451	holly.davis@atarr-team.com
9		STARR	Sr. Technical Coordinator	Janet	Luce		(321) 242-4942	janet.luce@atkinsglobal.com
10		Mason County	Administrator	Fabian	Knizacky	304 East Ludington Avenue Ludington, MI 49431	231-843-7999	fknizacky@masoncounty.net

Wednesday, September 12, 2012
3:00pm - 6:00pm ET
City of Ludington, City Hall Community Room
400 S. Harrison Street
Ludington, MI 49431

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
11	MDB	County	County Drain Commissioner	Mark	DiBenedetto	415 3rd St Manistee 49660	231-398-3500	MarkD@ManisteeCountyMI.gov
12	[illegible]	Mason County	Emergency Management	Liz	Reimink	408 Ressequie St Suite 100 Ludington, MI 49431	231 845-5911	emergencymanagement@masoncounty.net
13		City of Ludington	City Manager	John	Shay	400 S. Harrison St. Ludington, MI 49431	231-845-6237	jshay@ci.ludington.mi.us
14								
15								
16								
17								
18								
19								
20								

Wednesday, September 12, 2012
3:00pm - 6:00pm ET
City of Ludington, City Hall Community Room
400 S. Harrison Street
Ludington, MI 49431

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

Meeting Schedule: Wednesday, September 12, 2012 3:00 – 5:00 pm (ET)
Meeting Location: Ludington City Hall, Ludington, MI

PARTICIPANTS

FEMA
Ken Hinterlong, FEMA Region V

STARR Contractor
Stacey Roberts, STARR
Holly Davis, STARR
Janet Luce, STARR

Discovery Meeting Agenda

1. Why are we here?
- Great Lakes Coastal Flood Study Overview and Schedule
- Discovery Process and Outcomes

2. Coastal mapping (Regulatory) flood risk products (Non Regulatory)

3. How does this apply to my community?

4. Hazard mitigation opportunities and grant funding

5. Interactive Session
- View and Discuss Local Coastal Areas of Concern Using the Discovery Map
- Introduce the Mitigation Action Form and Mitigation Action Tracker
- Discuss Mitigation Action Opportunities

7. Wrap Up
- Review of action items and next steps

Optional Interactive Stations (30 minutes - 1hr following meeting)
- *Draft Transect* Map *Station: Talk to technical staff about draft transects and view draft transects in GIS*
- *Mitigation* Resources, *Strategies, and Actions Station: Talk with FEMA and State staff about areas of concern and potential mitigation actions to help reduce risk. Fill out Mitigation Action Form.*

INTERACTIVE DISCUSSION:

A. Questions asked during the presentations *(summary of answers provided in italics)*

1. None

B. Questions/comments raised during the discussion and break out session

1. Reported sheetpile installed and confirmed (Photo No. 915) with USACE Oblique Photo Viewer.
2. Reported stormwater outfall that has been around since the 1970's, confirmed (photo no. 1026) with USACE Oblique Photo Viewer.
3. FEMA funded mitigation project at the top of an erodible bluff– road removal, slope stabilization and design of a cul de sac to capture and funnel sheet flow down the bluff to discharge into the lake. (USACE Oblique Photo No. 916-917)
4. Structure built for access to Barr Lake, USACE Oblique Photo No. 1055
5. Erodible bluff areas.
6. There are currently no stormwater guidelines in the City of Manistee; rather policy. This is true also for the townships.
7. Developing a Lake Improvement Board to promote "reopening" the connection between Barr Lake & Lake Michigan. This was opened with navigation previously. Approximately, 25 years ago a culvert was installed and road (formerly a bridge) right over culvert – this is only connection between lakes.
8. The Manistee River gets focused wave action through the outlet to the interior shoreline in areas of commercial interest.

C. General notes

1. None for this meeting

FEATURES NOTED ON MAPS:

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	City of Manistee	26101	260131	There may be coastal structures in this area.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Road removed in FEMA Hazard Mitigation project (2008 event).	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Area of bluff erosion in Manistee River.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Identified breaches in Lake City Park.	General Comment
Michigan	Manistee	City of Manistee	26101	260131	Stormwater outfall.	General Comment
Michigan	Manistee	Manistee Township	26101	260132	Community flooded in 2008. Currently working on a study.	General Comment
Michigan	Manistee	Arcadia Township	26101	260306	Shift the transect to the south to cross into Arcadia Lake	Transect Comment
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to pass through jetties into the Manistee River.	Transect Comment

State	County	Community	FIPS	CID	Comment	Type
Michigan	Manistee	City of Manistee	26101	260131	Relocate transect to the south.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Relocate transect to pass through lake outlet.	Transect Comment
Michigan	Manistee	Manistee Township	26101	260132	Shift transect to south and realign to the area where Barr Lake is closest to Lake Michigan.	Transect Comment
Michigan	Mason	Hamlin Township	26105	260134	Low seawall. Flooded in June 2008 due to rain.	General Comment
Michigan	Mason	Hamlin Township	26105	260134	Lake level control.	General Comment
Michigan	Mason	Hamlin Township	26105	260134	Shoreline movement at lighthouse.	General Comment
Michigan	Mason	Pere-Marquette Township	26105	160582	Potential erosion zone - due to rain event.	General Comment
Michigan	Mason	Pere-Marquette Township	26105	160582	Residential area.	General Comment

ACTIONS:

- STARR will send out the discovery presentation as well as contact information to attendees.

FEMA

Lake Michigan Discovery

Manistee County, MI
Mason County, MI

September 12, 2012
3pm to 5pm ET

City of Ludington City Hall
Community Room
Ludington, Michigan

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Introductions

Who's here?

- **State Representatives**
  - MDEQ
- **Risk MAP Project Team**
  - FEMA
  - STARR
- **Local Stakeholders**
  - CEOs
  - Floodplain Administrators
  - Planners
  - Engineers
  - Emergency Managers
  - Community Leaders
  - Regional Planning Agencies
  - Coastal Organizations
  - Property Owner Associations and Other Key Stakeholders

Discovery Meeting Agenda

- Why are we here?
  - Risk MAP Program, Great Lakes Study, and Discovery Overview
- Coastal mapping (regulatory products)
- Flood risk products (non-regulatory products)
- How does this apply to my community?
  - NFIP compliance, local impacts of coastal study, hazard mitigation, and grant funding
- Interactive Sessions
  - View and Discuss Local Coastal Areas of Concern Using the Discovery Map and Community Risk MAP Questionnaire
  - Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form
- Wrap Up
- Optional Interactive Stations

Risk Mapping, Assessment and Planning
Risk MAP

FEMA

Through collaboration with State, Local, and Tribal entities, Risk MAP aims to deliver quality data that increases public awareness and leads to action that reduces risk to life and property

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study Overview

- Latest models, data, and technology
- Deliver updated flood maps and flood risk datasets
- Equip Federal Agencies, eight States and hundreds of coastal communities with data and planning tools to facilitate flood risk actions to enhance resiliency along the Great Lakes
- Partners Involved:
  - FEMA
  - USACE
  - ERDC
  - ASFPM
  - States
  - FEMA Contractors

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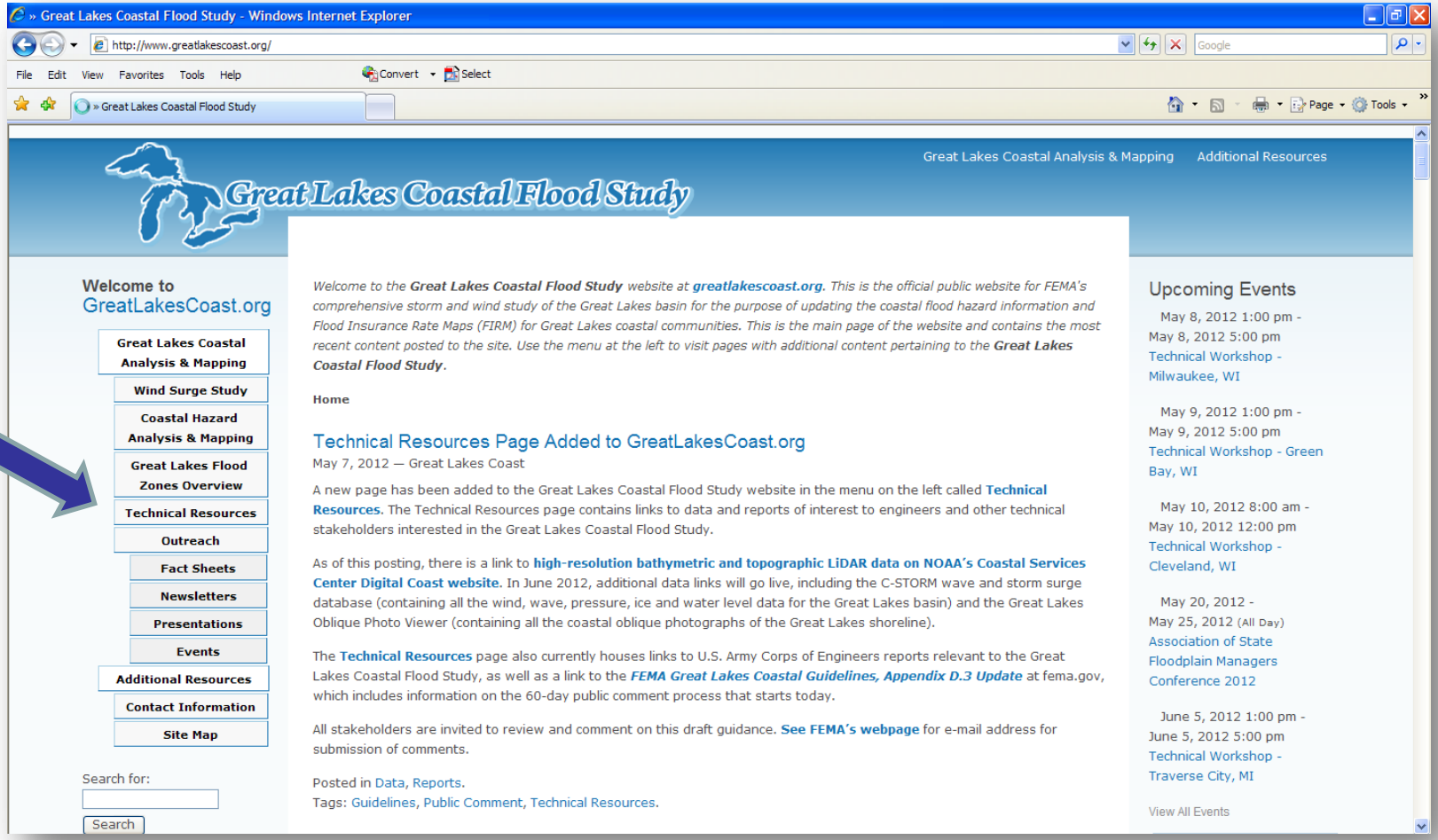
Great Lakes Coastal Flood Study
greatlakescoast.org

Technical Resources



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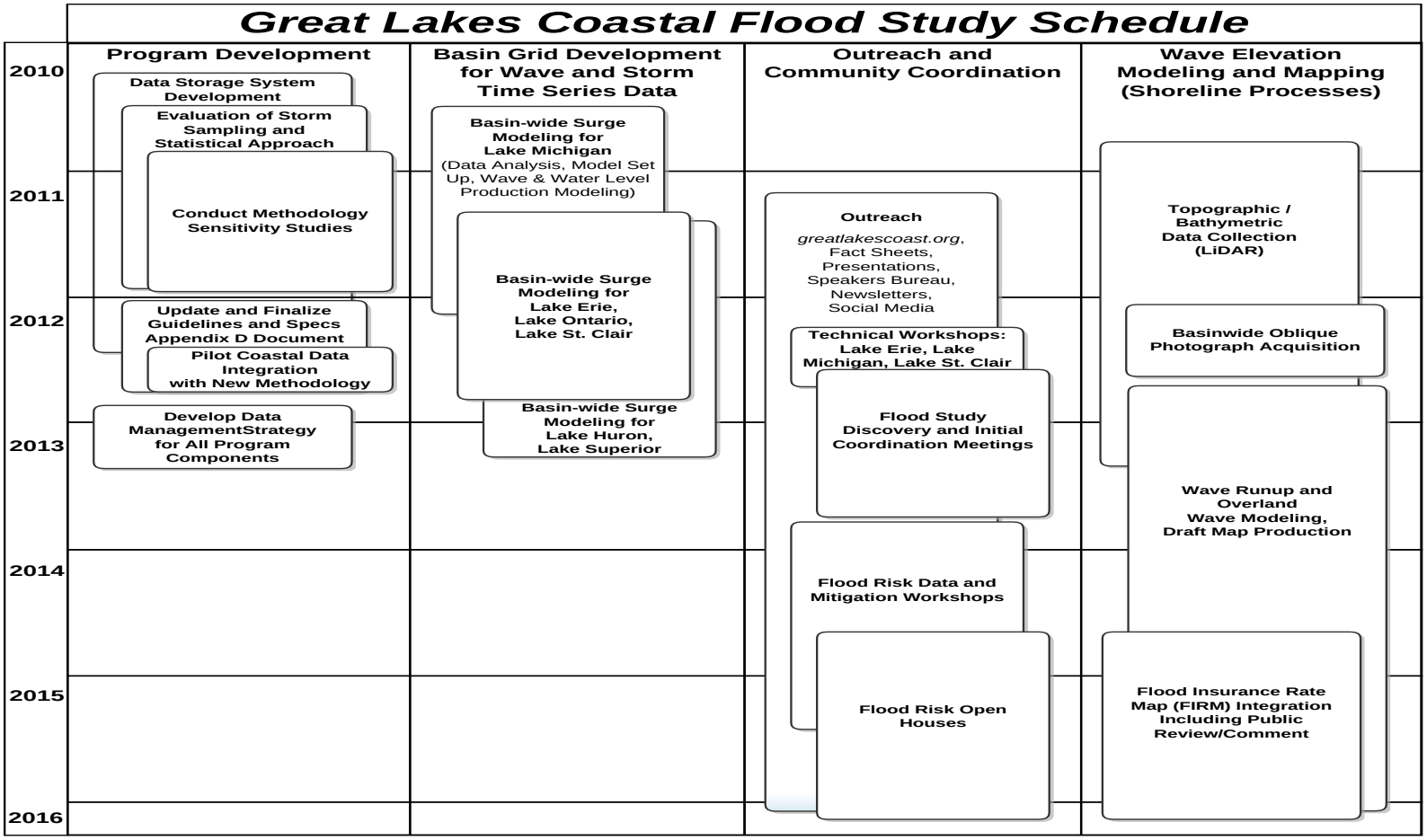
Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study Schedule



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Lake Michigan Discovery

- 34 counties in total
  - 4 counties in UP Michigan
  - 11 counties in Wisconsin
  - 2 counties in Illinois
  - 3 counties in Indiana
  - 14 counties in lower Michigan
- 226 coastal communities

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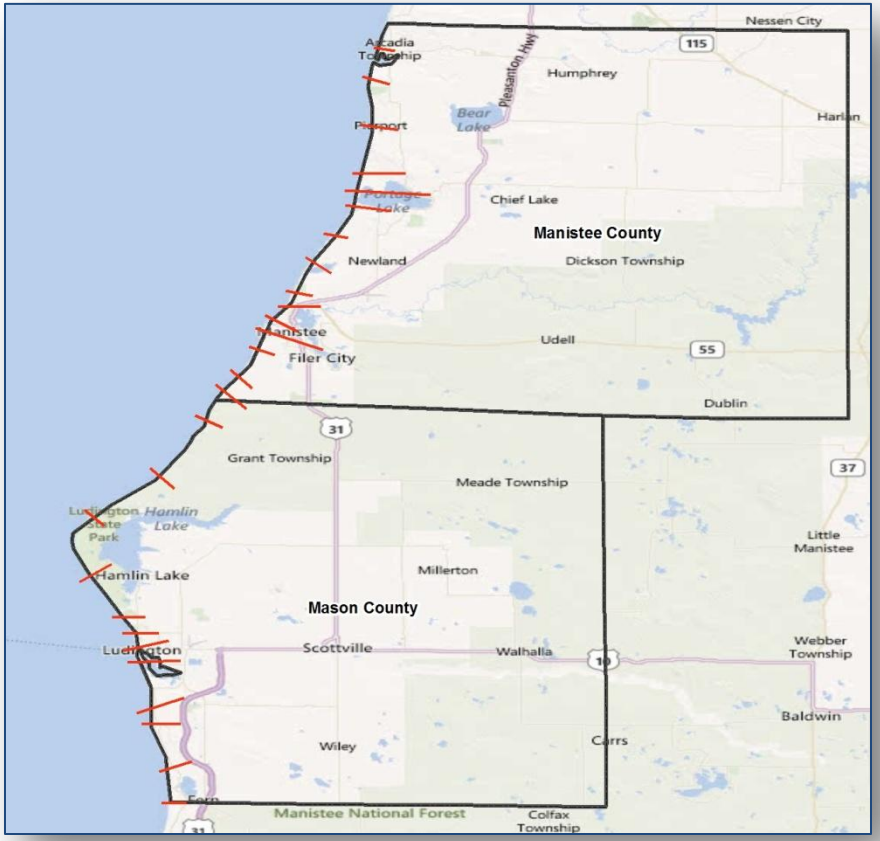
Great Lakes Coastal Flood Study Discovery Study Area

FEMA

Lake Michigan coastal communities in Manistee and Mason Counties:

Manistee County	Mason County
Arcadia, Township of	Grant, Township of
Bear Lake, Village of	Hamlin, Township of
Brown, Township of	Ludington, City of
Eastlake, Village of	Pere Marquette, Township of
Filer, Township of	Summit, Township of
Manistee, City of	
Manistee, Township of	
Onekama, Township of	
Onekama, Village of	
Stronach, Township of	



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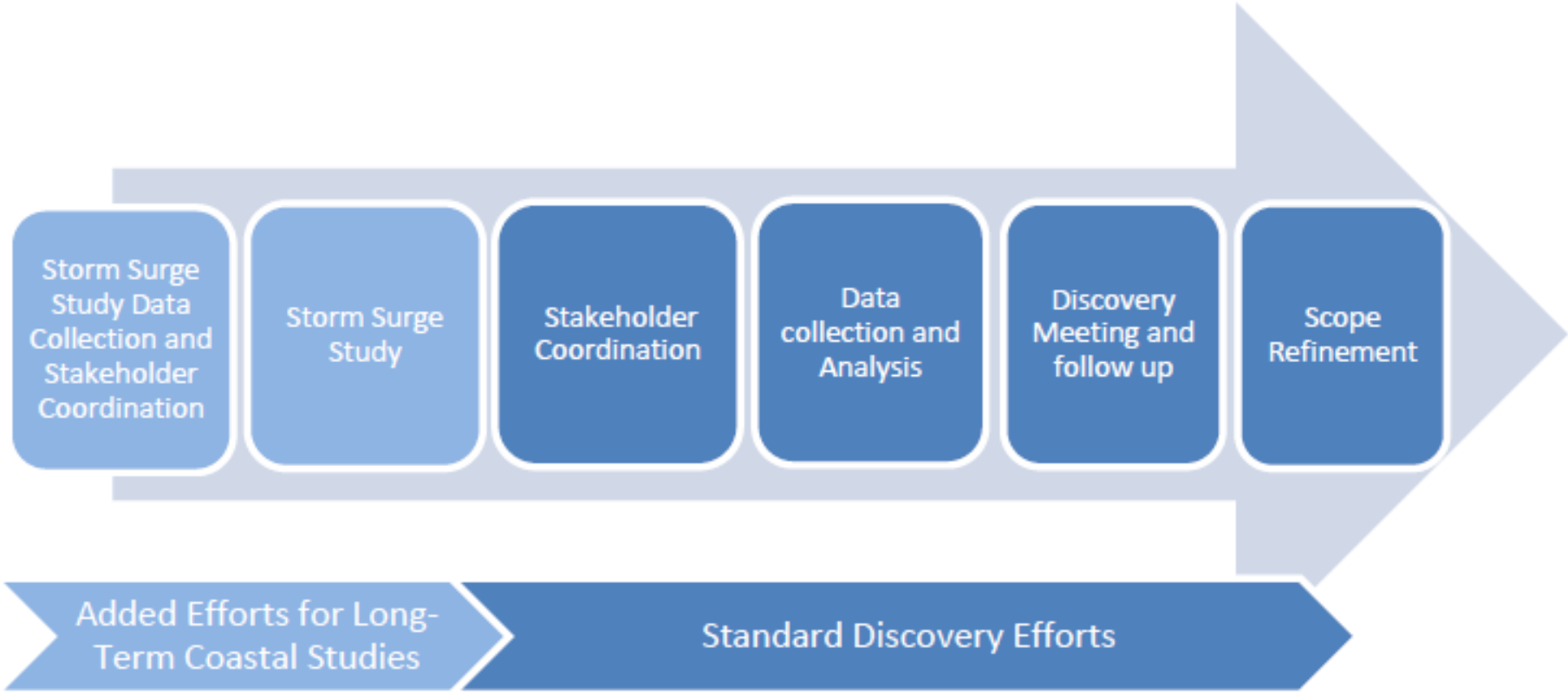
Great Lakes Coastal Flood Study
greatlakescoast.org

Discovery Schedule Overview



Discovery Outcomes

- **Explain the Project**
  - Regulatory and non-regulatory products/datasets
  - Analysis, concepts, timelines
- **Encourage Community Participation**
  - Transect Locations
  - Areas of concern and need
  - Data to improve upon products and datasets
- **Introduce Mitigation Action**
  - Mitigation Action Form
  - Action Tracker
  - Mitigation strategies for coastal flood and erosion

Lake Michigan Discovery

Schedule of Activities

- Identify Draft Transect Locations – Completed
- Research available data – Ongoing
- Information Exchange with Community Stakeholders – August 2012
- Prepare draft Discovery Maps and Reports – September 2012
- Discovery Meetings – September 2012
- Final Discovery Report and Maps – November/December 2012
- Create library of digital data – November/December 2012

Great Lakes Coastal Flood Study Discovery Products

- **Final Discovery Report**
  - Single, comprehensive report for all of Lake Michigan, with appendices for each Discovery meeting
  - Includes pre-discovery data, meeting agenda, sign-in sheets, discussion topics, decisions made, etc.
- **Final Discovery Maps**
  - Including feedback from participants
  - Visual representation of meeting outcomes
  - Delivered in digital format

Data Collection in Progress

- New high quality USACE Topographic – Light Detection and Ranging (LiDAR) and Bathymetry Data
- Base data – boundaries, streams, census blocks, etc.
- Average Annualized Loss data
- Shoreline Classification Dataset
- Dams
- Federal and State disaster information
- Repetitive loss data
- Hazard Mitigation plans
- Hazard Mitigation Grants Program (HMGP) projects
- Stream, wave, and water level gage locations
- Pre-Disaster Mitigation Program projects
- Draft Transects

FEMA

Coastal Mapping

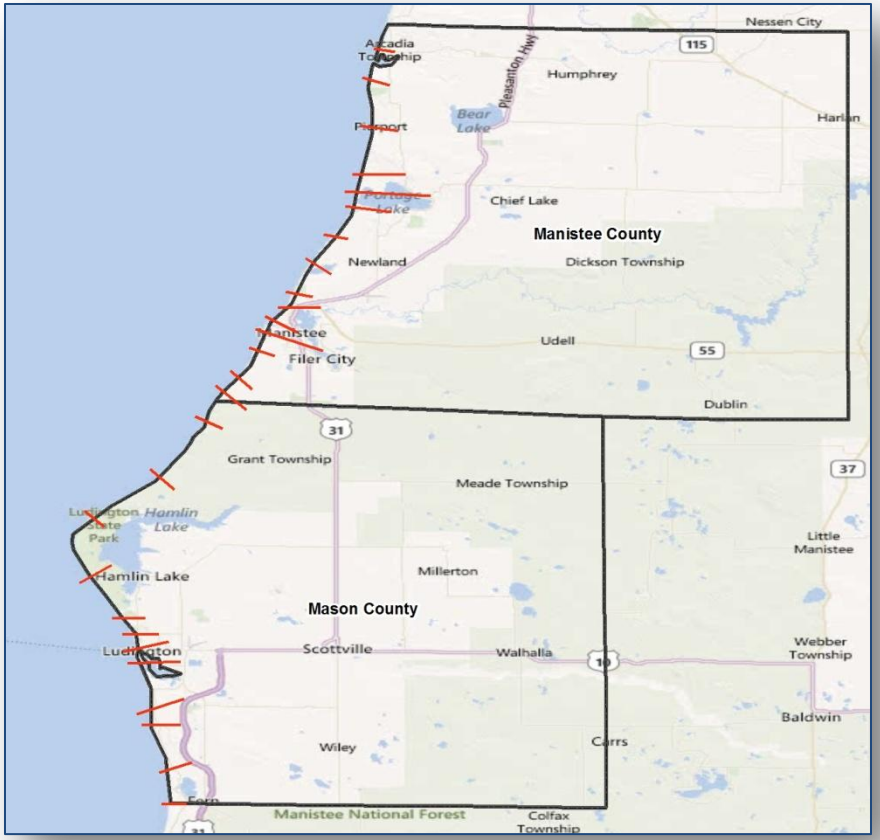
- Draft Transects
- VE Zone Mapping
- Limit of Moderate Wave Action (LiMWA)

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Draft Transect Layout
Manistee and Mason Counties

County	# Shoreline Miles	# Transects
Manistee	35	12
Mason	31	9



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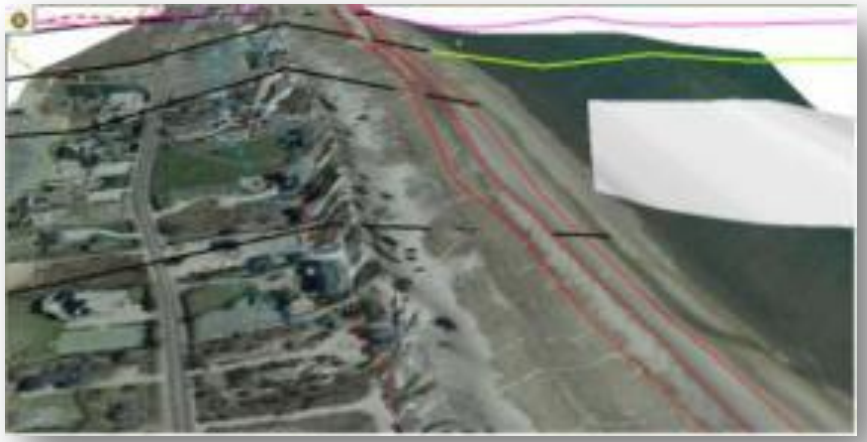
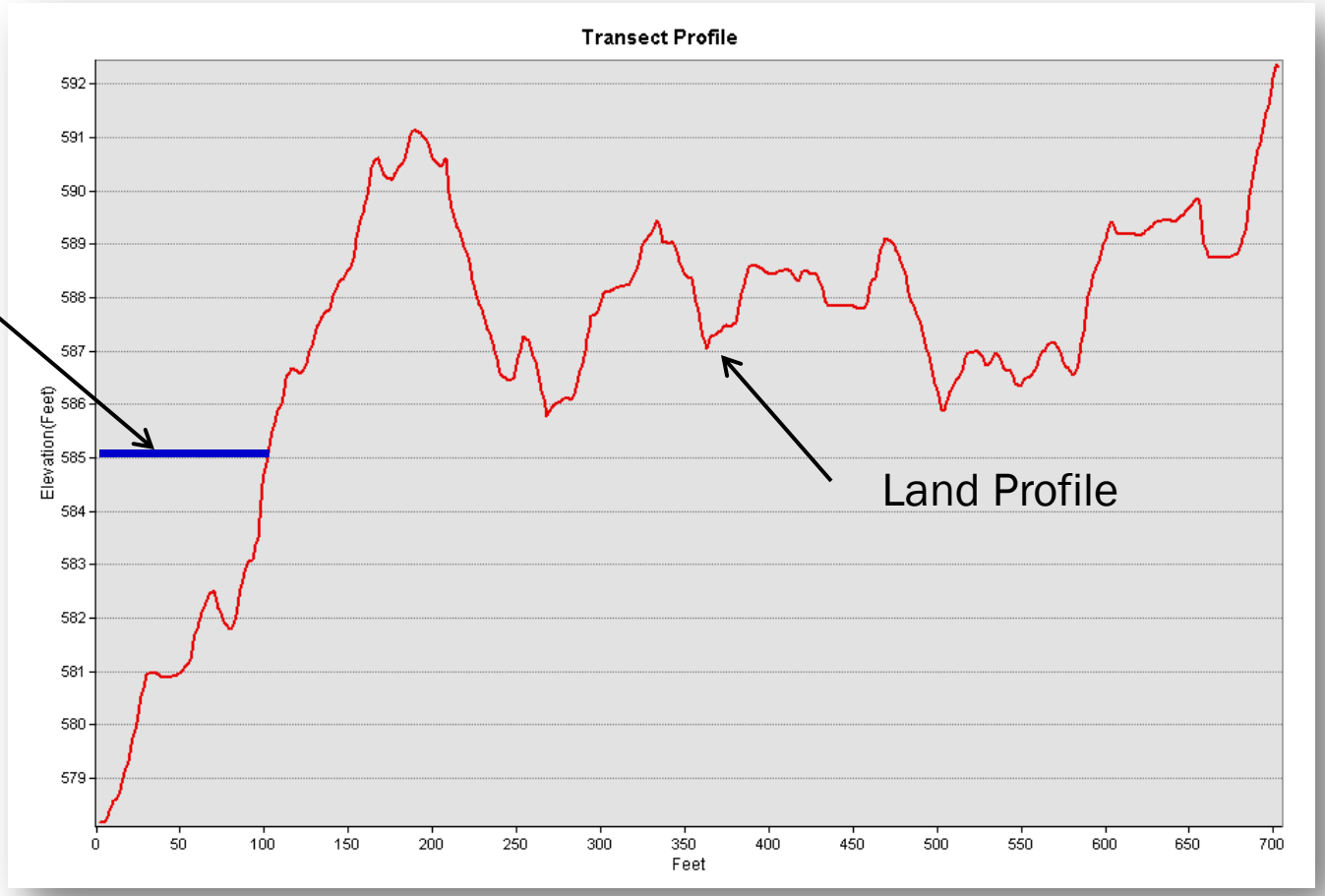
Transect Placement

- Transects are placed to define representative profiles for a shoreline reach
- Transect spacing depends on upland development
  - Developed areas – As dense as 1,000 ft
  - Rural areas – Spacing can be 1-2 miles
- Transects are:
  - Profiles along which flooding analysis is performed
  - Used to transform offshore conditions to shoreline
  - Use to define coastal flood risks inland of shoreline



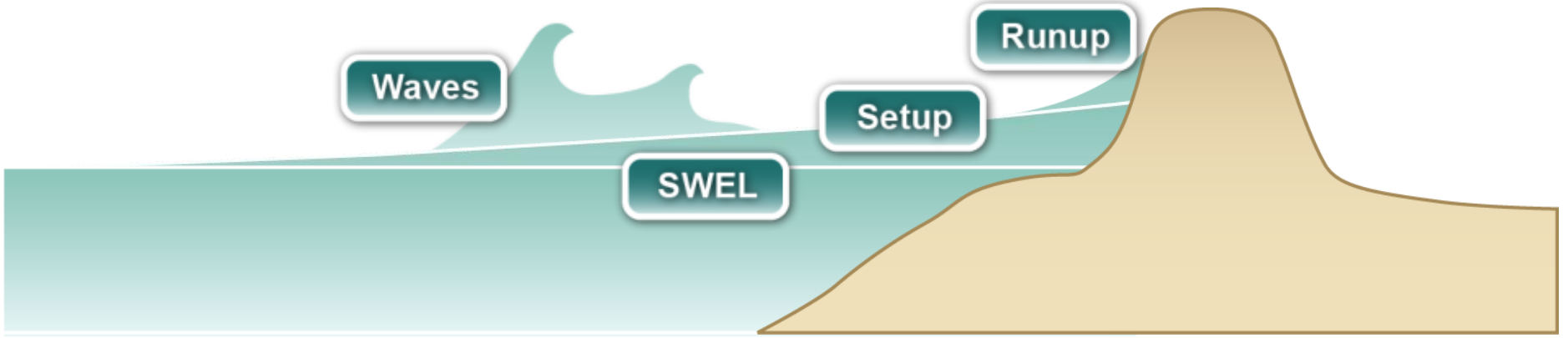
Coastal Transect



Basic Elements of a Coastal Hazard Analysis

Base Flood Elevation (BFE) on FIRM includes 4 components:

1. Stillwater elevation (SWEL) – determined from storm surge model
2. Amount of wave setup
3. Wave height above storm surge (stillwater) elevation
4. Wave runup above storm surge elevation (where present)



Coastal Flood Hazard Zones

- **Hazard Zones**
  - Zone AE – Areas expected to be flooded by inundation in 100-year event
    - BFE established (wave heights/runup less than 3 feet)
    - Limit of Moderate Wave Action (LiMWA) – Areas subject to wave heights of at least 1.5 feet
  - Zone X – Areas not expected to be flooded in 100-year event
    - Shaded X – Areas expected to be flooded in 500-year event
    - BFE not established
  - Zone VE – Areas expected to be affected by high velocity wave impact in 100-year event (wave heights or runup depth greater than or equal to 3 feet)
    - Base Flood Elevation (BFE) established
- **Gutters**
  - Internal zone breaks where BFE changes
  - VE/AE Gutter - Location where risk of damage due to wave action diminishes

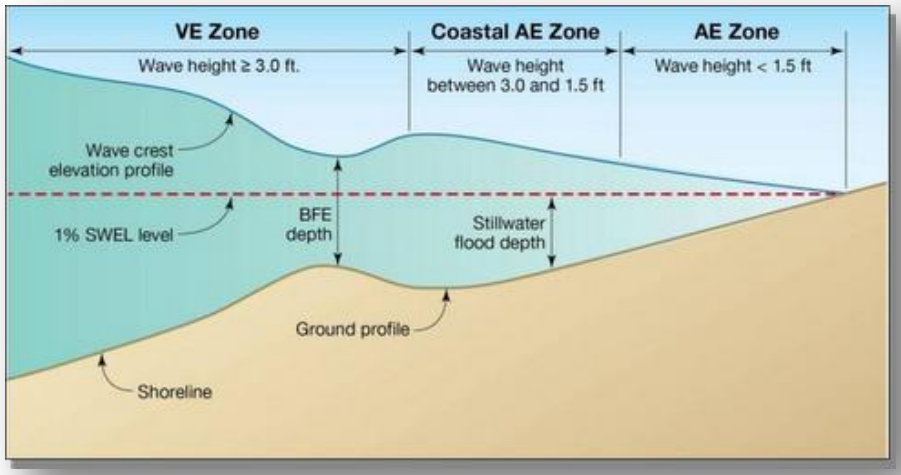
How is Limit of Moderate Wave Acton (LiMWA) Defined?

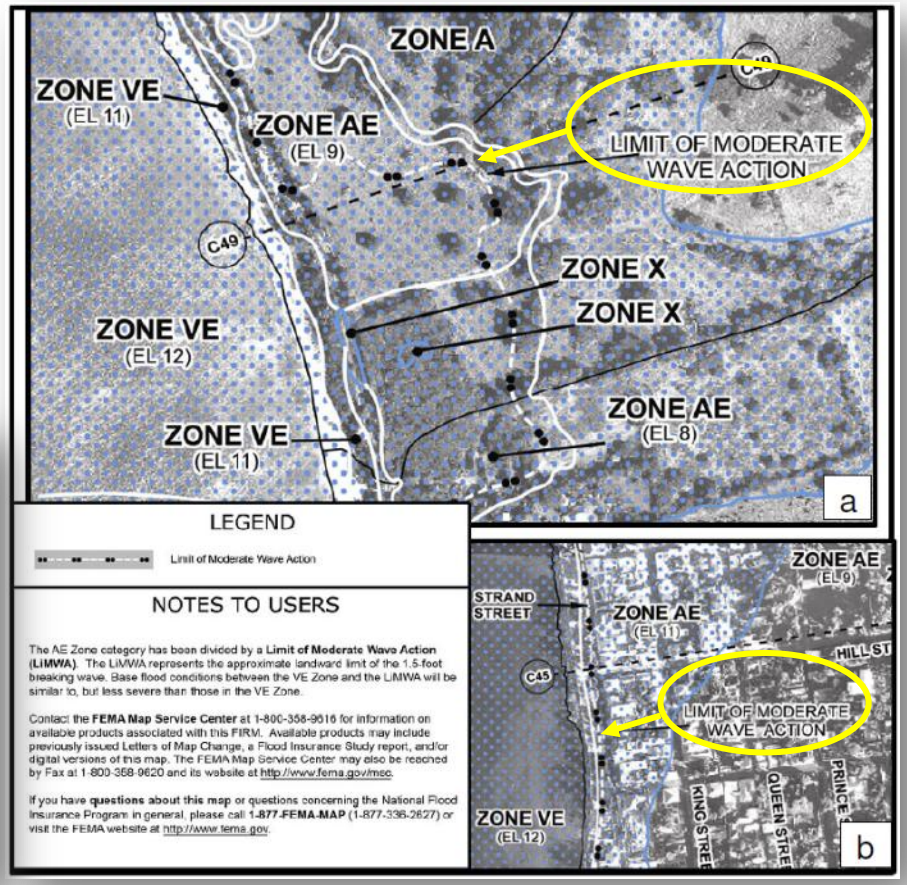
- LiMWA is the line mapped to delineate the inland extent of wave heights of at least 1.5 feet
  - Wave heights as small as 1.5 feet can cause significant damage to structures
- LiMWA is the same as coastal AE zones and can trigger coastal building codes for certain communities
- Community Rating System (CRS) benefits for communities implementing higher construction standards

Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

- Not a regulatory requirement
- No Federal Insurance requirements tied to LiMWA





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Wave Action – Structural Risk

- **US Army Corps of Engineers – 1973**
  - Breaking wave height of 3 feet
  - "area subject to high velocity waters, including but not limited to hurricane wave wash"
- **FEMA – 2000**
  - Coastal Construction Manual
  - Additional post-storm damage assessments identified 1.5 wave also can knock a structure off a foundation

http://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf

V Zones for Lake Michigan?

- Lake Michigan communities currently do not have V/VE Zones. Majority of the communities have coastal A/AE zones.
- If coastal AE and VE Zones are added on maps where they did not exist before, all affected communities must update regulations to include coastal requirements.
  - State will provide regulations assistance and technical support if/when coastal flood zones are added.

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Coastal Flood Risk Products

- Coastal Depth Grids and HAZUS
- Changes Since Last FIRM
- Coastal Non-Regulatory Products

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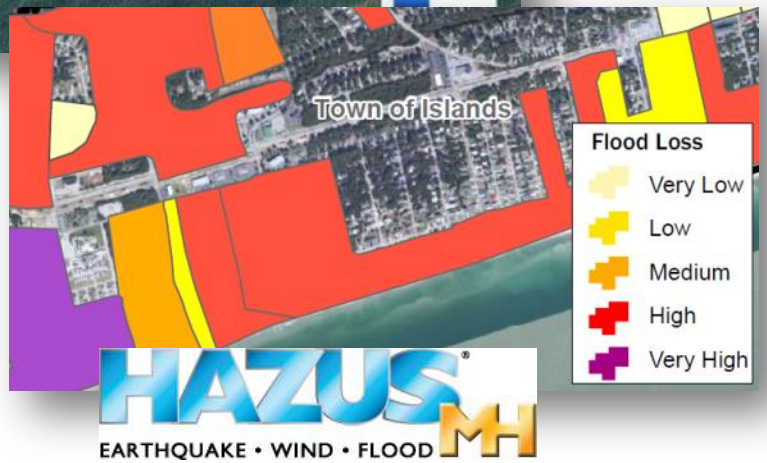
Standard Flood Risk Products

- Coastal Depth Grids
- Flood Risk Assessment (HAZUS)
- Changes since last FIRM

Data Fields Include	Example Data Values
Old Study Date	e.g. 1985
Old Model Type(s)	e.g. HEC-1 / HEC-2
Old Zone Type	e.g. Zone A
Old Topography	e.g. USGS 10-ft
New Study Info/Methods	Dates, Models, etc.
New Study Zone	e.g. Zone AE
New Topography	e.g. LiDAR 2-ft
New Study Engineering Factors / Changes	e.g. new structures, gages, topo, landuse, etc.
Estimated Structures	e.g. 9
Estimated Population	e.g. 27



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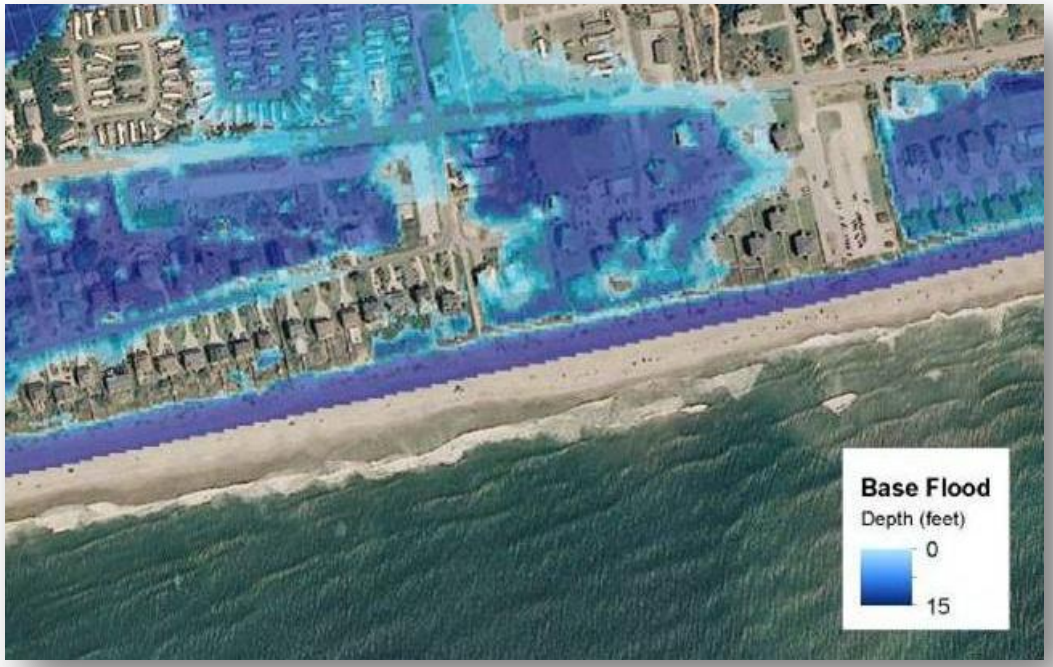
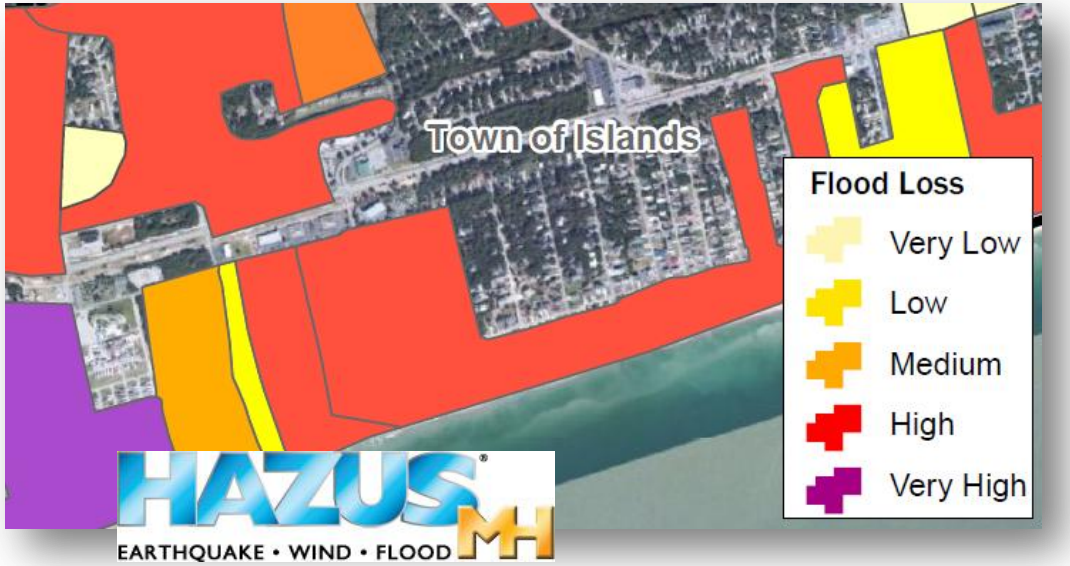
Coastal Depth Grid

- Should reflect total depth (i.e. stillwater and waves) – typically only produced for the 1% annual chance flood
- Created using the regulatory mapping and associated zone breaks as input



Coastal Flood Risk Assessments

- Similar to Flood Risk Assessments for riverine, but using the coastal depth grids as input for the refined analysis
- Hazus analysis and data can support adoption of higher regulatory standards for structures in high loss areas
- Provides justification to fund mitigation actions



Changes Since Last FIRM

Data Fields Include	Example Data Values
Old Study Date	e.g. 1985
Old Model Type(s)	e.g. HEC-1 / HEC-2
Old Zone Type	e.g. Zone A
Old Topography	e.g. USGS 10-ft
New Study Info/Methods	Dates, Models, etc.
New Study Zone	e.g. Zone AE
New Topography	e.g. LiDAR 2-ft
New Study Engineering Factors / Changes	e.g. new structures, gages, topo, landuse, etc.
Estimated Structures	e.g. 9
Estimated Population	e.g. 27

Coastal Non-Regulatory Products in Development

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Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline
Reference

Shoreline Feature Dataset

Upper Peninsula Shoreline
Reference

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Shoreline Features Database

Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

Primary Land Use
High Density Residential
Moderate Density Residential
Low Density Residential
Commercial/Industrial
Park Land
Farm Land
Forested

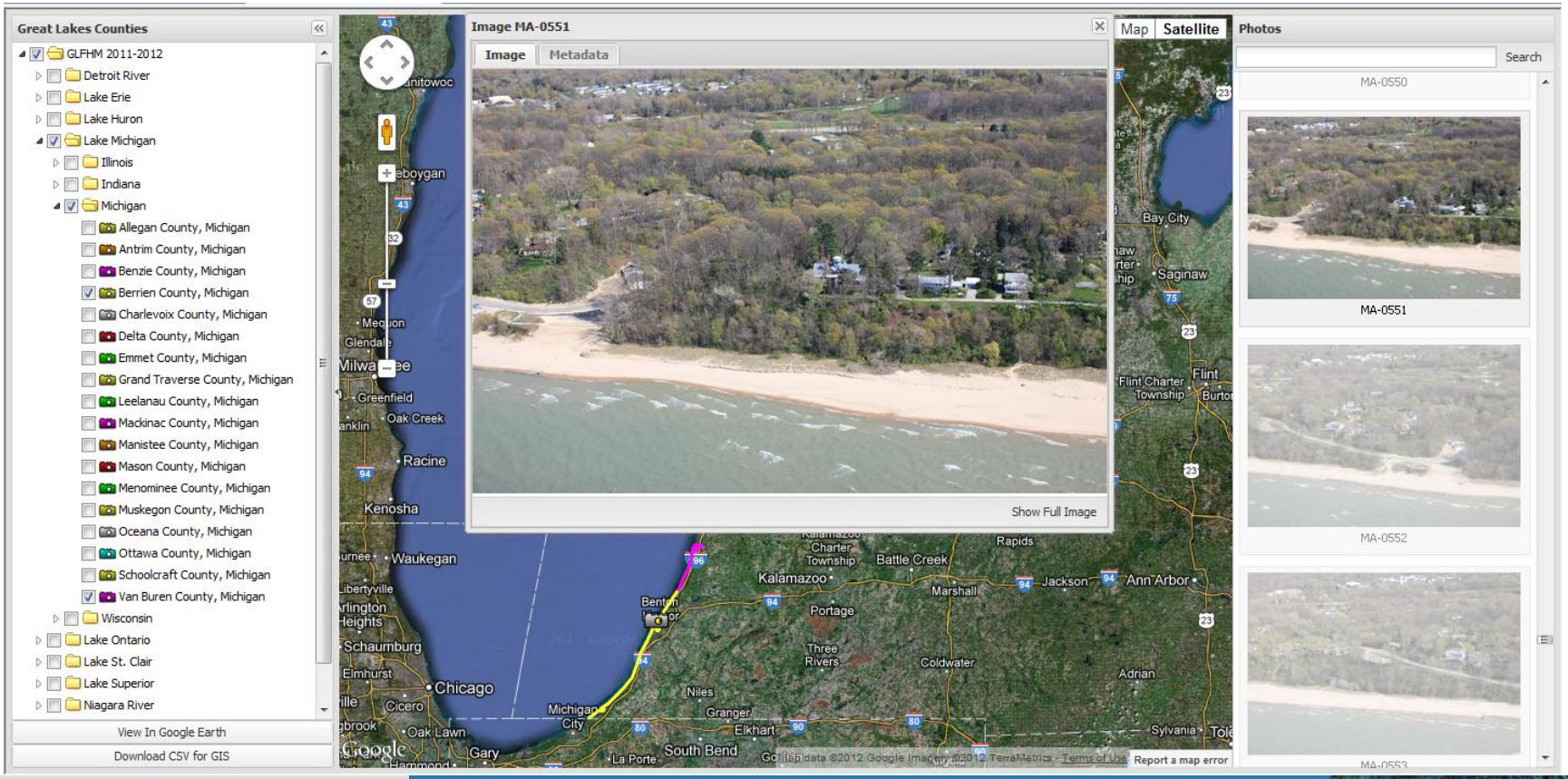
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

- Contains primary and secondary Land Use tables – same for coast type and vegetation
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

USACE Oblique Aerial Photo Viewer

http://greatlakes.usace.army.mil/



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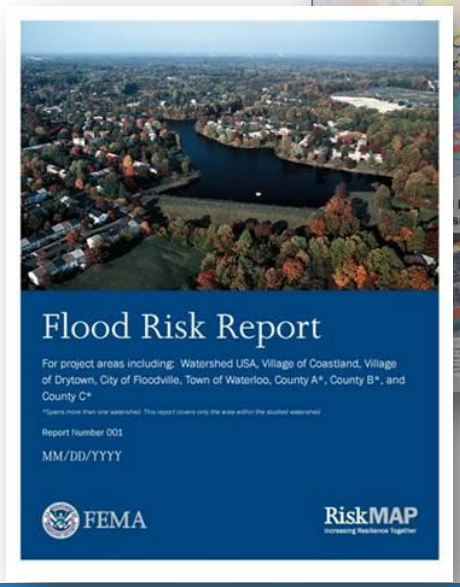
Coastal Flood Risk Map and Report

- Highlights area where datasets were produced
- Use of callout boxes
- Should drive the conversation towards mitigation



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How Can You Use These (Non-Regulatory) Products?

- Risk MAP Products and Datasets help communities make good decisions to reduce flood risk:
  - Hazard Mitigation Planning
  - Floodplain Management and Community Rating System
  - Community Comprehensive or General Planning
  - Community Investment - Capital Improvement Planning
  - Public Outreach
  - Hazard Mitigation Assistance Grant Application Prioritization and Support
  - Other Non-FEMA Grants to Reduce Flood Risk
  - Response and Recovery Planning
- Mitigation Action Form

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How does this apply to my community?

- NFIP Compliance
- Local impacts of coastal study

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National Flood Insurance Program (NFIP)

- Allows property owners to purchase flood insurance at reduced rates
- Community responsibilities
  - Adopt and enforce compliant regulations
- FOCUS is in building the local floodplain management capability

Coastal Zones and NFIP Compliance

- Must meet minimum NFIP and community coastal requirements
- V Zones will be treated as floodways for ordinance purposes and construction will be restricted in these areas.
- Recommendations for exceeding the minimum NFIP requirements (Coastal A Zones)
  - Can obtain CRS credits for Coastal A Zone Requirements
- Resources Available

Community Rating System (CRS)

- Flood insurance premium rates discounted to reward community actions that reduce flood losses, facilitate accurate insurance ratings, and promote the awareness of flood insurance
- Class rating system from 1 to 10
- Each Class improvement (500 point increments) results in additional 5% discount, up to 45% in SFHAs for Class 1 communities
- Uniform minimum credits give you points for activities on the state level (state laws) and make achieving a Class 9 relatively easy
- 18 creditable activities organized under four categories:

Public Information	Mapping and Regulations
Flood Damage Reduction	Flood Preparation

- http://training.fema.gov/EMIWeb/CRS/

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Hazard Mitigation

- Opportunities
- Grant Funding

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Great Lakes Coastal Flood Study
HM Resources, Strategies & Actions

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- The right action (or mix of actions) will be based on recent community experiences and level of complexity in existing infrastructure
  - *Public Works*
  - *Building Standards*
  - *Community Planning and HM Plan Update / Integration processes*
  - *Communication Processes, GIS, etc.*
- Get the right people to the table: Integrated vs. Discipline-specific
- Document ideas and actions through the FEMA Action Tracking form

Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning mechanisms

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Example Mitigation Actions

STRUCTURAL /NON-STRUCTURAL PROJECTS

Detention
Drainage
Acquisition
Elevation
Retrofits

PLANNING MECHANISMS

Zoning
Building Codes
Ordinances
Open Space Plan

EDUCATION & OUTREACH

Public Awareness
Outreach
Educational programs

NATURAL RESOURCE PROTECTION

Stream and wetland restoration
Erosion control

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Local Hazard Mitigation Plans

Risk MAP
Risk MAP products and Datasets

Hazard Mitigation Plan
- Uses Risk Information
- Identifies Projects/Actions
- Integrated with Other Community Plans

Other Community Plans
- Comprehensive plans
- Land Use Plans
- Capital Improvement
- Stormwater
- Management Plans
- Emergency Operations

Mitigation Actions/Projects

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Mitigation Actions

- Address specific **existing** assets (e.g., elevate critical facility, enlarge a culvert, acquisition of floodplain properties, floodproof floodproone properties)
- Address **future** risks (e.g., update building codes)
- Based on local capabilities
  - Build on current strengths, ongoing efforts (add-on to stormwater management regulations)
  - Coordinate with Federal programs (e.g., NFIP, CRS)

FEMA Funding Opportunities

- Hazard Mitigation Assistance includes both post-disaster and pre-disaster grants

HMGP is a post-disaster grant program.

PDM, FMA, RFC and SRL are available annually, subject to Congressional appropriations.

- Mitigation Plan Requirement
- Local/State Cost Share
- States Manage Programs and Set Funding Priorities
- State Hazard Mitigation Officer (SHMO) is contact

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Mitigation Grants/Programs: Other Federal Agencies (OFA)

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US Army Corps of Engineers®

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Meet the Action Form

Mitigation Action Form

Contact Information

Please enter the primary contact assc

1. **Full Name:**

2. **Title and Organization :**

3. **Jurisdiction Name(s) :**

Mitigation Action Information

4. **Mitigation Activity Name**

5. **Describe the natural hazard and mitigati**

6. **Hazard Type?**

☐ *Flood* ☐ *Erosion* ☐*Storm Sur*
☐ *Landslide* ☐ *Lighting* ☐ *Seve*
☐ *Wind* ☐ *Multiple Hazards* ☐

7. **What is the Mitigation Category?**

☐ *Local Plans and Regulations*
*Category*_____

8. **How was this action/strategy identi**

☐ *Risk Map Process*
☐ *Comprehensive Land Use Plan*
☐ *Capital Improvement Plan*

9. **Who is the Responsible Agency?**

☐ *Building Code Department*
☐ *Community Development*
☐ *Emergency Management*

9. **Who is the Responsible Agency?**

☐ *Building Code Department* ☐ *Planning* *Other*_____
☐ *Community Development* ☐ *Public Works*
☐ *Emergency Management* ☐ *State DOT*

10. **What is the expected/potential funding source?**

☐ *Community* ☐ *FEMA*
☐ *Private Sector, including Foundations* ☐ *Other Federal Agency*
☐ *Regional Water Management District* ☐ *Property Owner*
☐ *County* ☐ *Other*_____
☐ *State*

11. **What is the commitment for this action?**

☐ *new* ☐ *strengthen existing* ☐ *maintain existing*

12. **What is the status of this action?**

☐ *identified* ☐ *scoped* ☐ *in progress* ☐ *complete*

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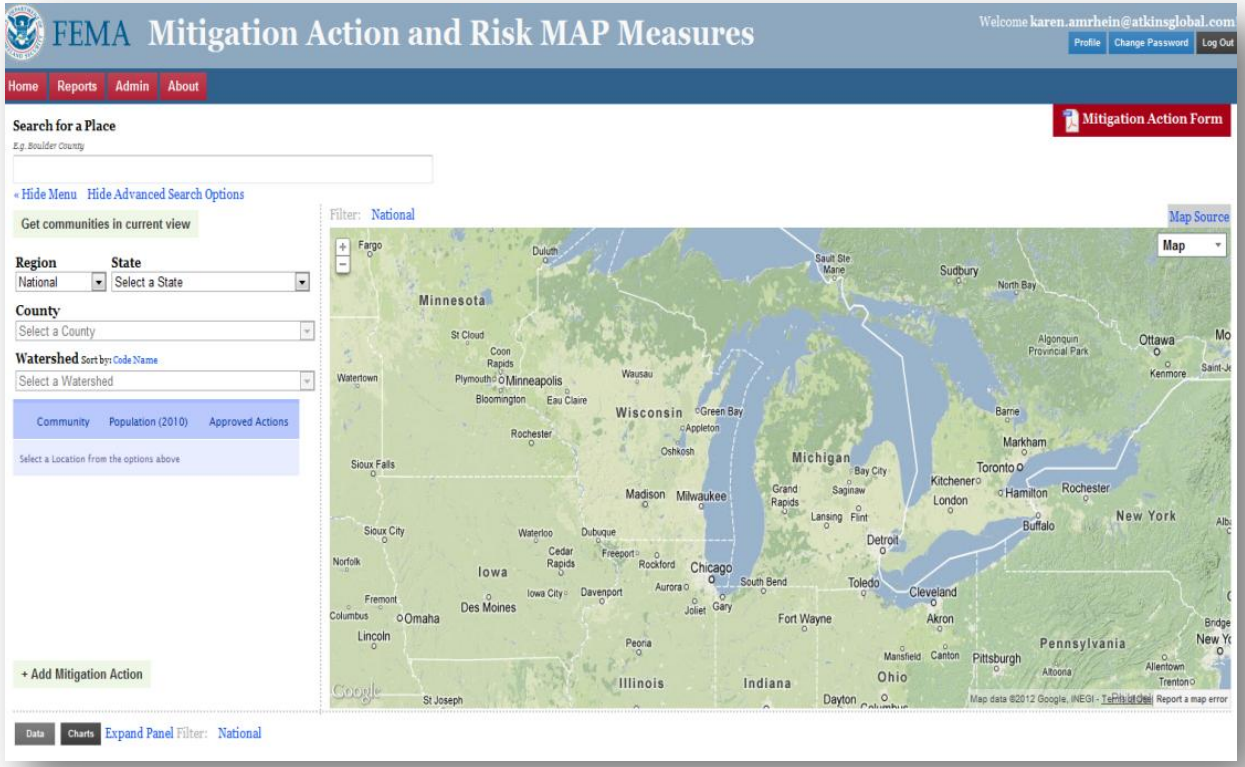
Action Tracker



- New mitigation tool
- Houses community-identified mitigation actions
- Actions can be edited by community officials
- A tool for communities to support future mitigation planning efforts

We will input your community's action into the Action Tracker and send you a report and a link - http://fema.starr-team.com

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Next Steps

- **Communities:**
  - Provide data and Mitigation Action Forms to STARR with a target date of September 28, 2012

- **STARR/FEMA will:**
  - Assess data and information provided
  - Email summary of today's Discovery Meeting to you within one month
  - Prepare final Discovery Maps and Discovery Report
  - Follow-up regarding Risk MAP Project

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Questions?

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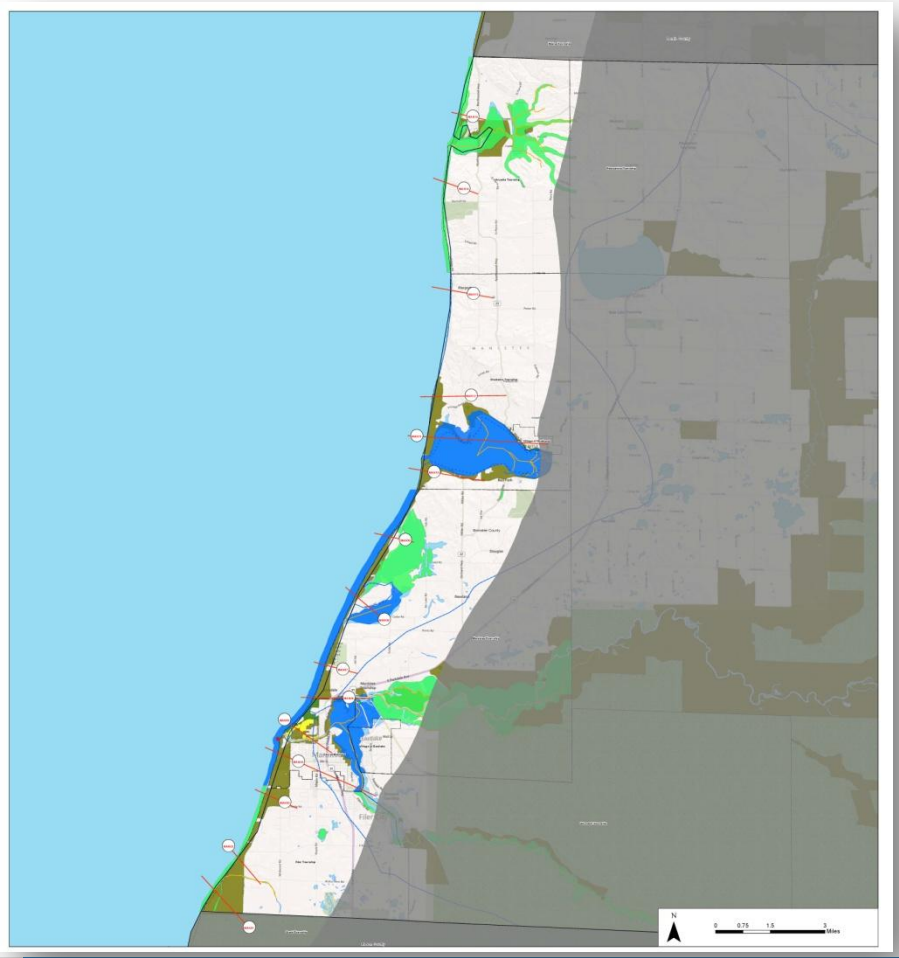
Interactive Session

- View and Discuss Local Coastal Areas of Concern Using the Discovery Map
- Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form

Manistee County, MI
Discovery Map



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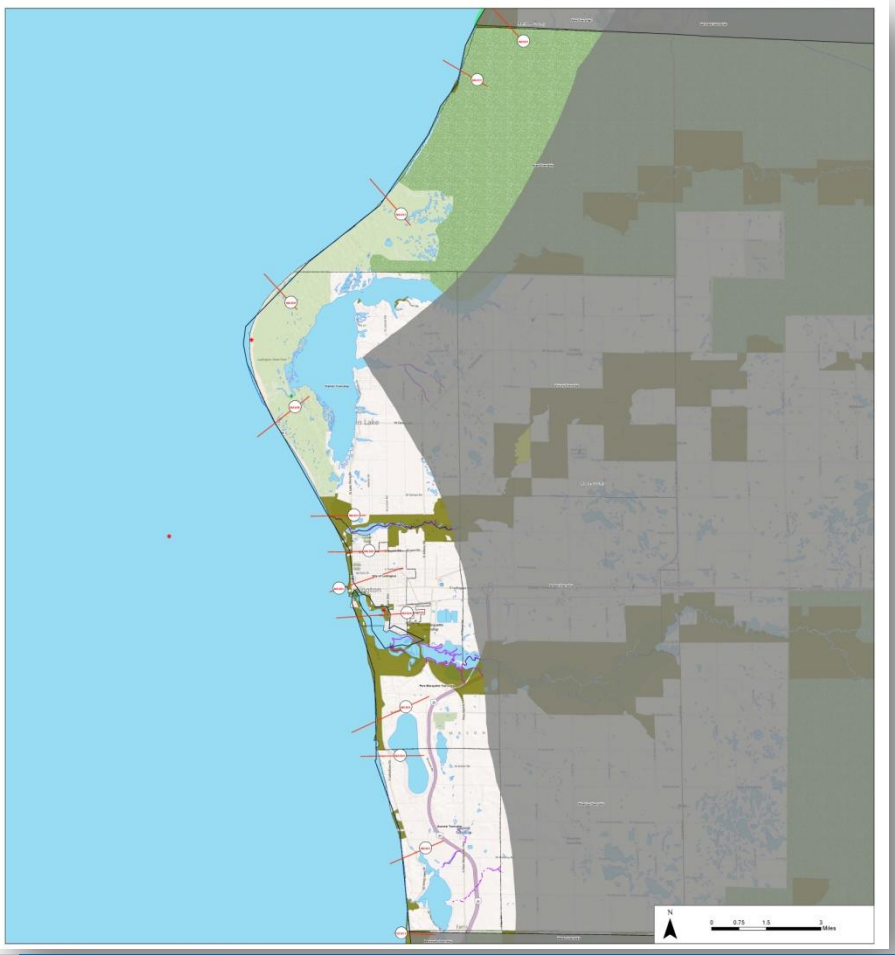
Mason County, MI
Discovery Map

FEMA



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Data Gaps

Do you know of any:

- Building footprints
- Coastal Structures
- Critically eroded beach areas
- Coastal construction control/setback line
- Critical Facilities (in GIS format)
- High water marks
- Areas of recent or planned development
- Areas of high growth
- Recent land changes due to development, erosion, etc.
- Known flooding issues not represented on effective FIRMs

Contact

- FEMA Region V
  - Ken Hinterlong @ ken.hinterlong@fema.dhs.gov
  - Erin Maloney @ Erin.Maloney@fema.dhs.gov
- Michigan Partners
  - Linda Burke (MDEQ) @ BURKEL4@michigan.gov
- STARR
  - Stacey Roberts (technical) @ stacey.roberts@starr-team.com
  - Holly Davis (outreach) @ holly.davis@starr-team.com
- Online
  - info@greatlakescoast.org (Great Lakes Coastal Flood Study)
  - http://greatlakes.usace.army.mil/ (Oblique Aerial Photo Viewer)

Optional Interactive Stations

- **Draft Transect Map Station**
  - View draft transect locations and oblique imagery in data viewer http://greatlakes.usace.army.mil/
  - Discuss draft transect locations with technical staff
- **Mitigation Resources, Strategies, and Actions Station**
  - Talk with FEMA and State representatives about areas of concern and potential mitigation actions to help reduce risk
  - Fill out Mitigation Action Form

Attachment G.

Locally Identified Mitigation Projects

Name of Plan	County	Hazard Mitigation Actions and Strategies
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage cooperation and communication between planning and emergency management officials
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage additional local governmental agencies to participate in the natural hazards mitigation process
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage public and private organizations to participate
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Enforce and/or incorporate natural hazards mitigation provisions in building code standards, ordinances, and procedures; and into the county's comprehensive master plan
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Incorporate natural hazards mitigation into basic land use regulation mechanisms
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Update or create zoning ordinances to reflect any new building codes, shoreline protection rules, etc.
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Incorporate natural hazard area classifications into standard zoning classifications
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Develop community education and warning systems
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Strengthen the role of the Local Emergency Planning Committee in the land development process
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Integrate natural hazards mitigation into the capital improvement planning process so that public infrastructure does not lead to development in natural hazard areas
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage county agencies to review local roads, bridges, dams, and related transportation infrastructure for natural hazards vulnerability
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Provide a list of desired community mitigation measures to the State for possible future funding
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage the application for project funding from diverse entities
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Encourage public and business involvement in natural hazards mitigation projects
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Acquisition of flood areas
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Enforcement of state, county, and township ordinances
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Enforcement of building and zoning codes
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Public education especially for fishing areas and campgrounds
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Complete soil erosion control ordinance and enforcement of permits
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Enforcement of the grading levels no more than 10%
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Placement of vegetation and utilizing native vegetation
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Sand dune protection
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Green belt buffer zones – example: Filer Township's ordinance
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Enforcement of building codes
Manistee County 2007 Natural Hazards Mitigation Plan	Manistee County	Public Education

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Incorporate hazard provisions in building code standards, ordinances, and procedures.
Mason County Hazard Mitigation Plan	Mason County	Incorporate hazard mitigation into land use and capital improvement planning and development activities.
Mason County Hazard Mitigation Plan	Mason County	Incorporate hazard mitigation into existing land use regulation mechanisms to ensure that development will not put people in danger or increase threats to existing properties.
Mason County Hazard Mitigation Plan	Mason County	Research, recommend, adopt and enforce other plans and ordinances that protect natural resources so that they can, in turn, provide hazard protection.
Mason County Hazard Mitigation Plan	Mason County	Use the most cost-effective approaches to keep hazards away from existing buildings and facilities.
Mason County Hazard Mitigation Plan	Mason County	Use the most cost-effective approaches to protect existing buildings and sites from hazards.
Mason County Hazard Mitigation Plan	Mason County	Maximize insurance coverage to provide financial protection against hazard events.
Mason County Hazard Mitigation Plan	Mason County	Maximize the resources for investment in hazard mitigation, including the use of outside sources of funding.
Mason County Hazard Mitigation Plan	Mason County	Assure that threat recognition (watches) and warning systems are adequate and appropriate and that they utilize the latest technology.
Mason County Hazard Mitigation Plan	Mason County	Protect infrastructure and services.
Mason County Hazard Mitigation Plan	Mason County	Build and support local capacity, commitment and partnerships to continuously become less vulnerable to hazards.
Mason County Hazard Mitigation Plan	Mason County	Enlist support of committed volunteers to safeguard the community before, during, and after a disaster.
Mason County Hazard Mitigation Plan	Mason County	Heighten public awareness of the full range of existing natural and man-made hazards and actions they can take to prevent or reduce the risk to life or property from them.
Mason County Hazard Mitigation Plan	Mason County	Encourage local communities, agencies, organizations and businesses to participate in the hazard mitigation process.
Mason County Hazard Mitigation Plan	Mason County	Encourage cooperation and communication between planning and emergency management officials.
Mason County Hazard Mitigation Plan	Mason County	Encourage participation in ISO's Building Code Effectiveness Grading Schedule (BCEGS), as recognized by FEMA for the Community Rating System of the National Flood Insurance Program.
Mason County Hazard Mitigation Plan	Mason County	Research the need to strengthen anchoring requirements for propane tanks and hazardous materials in the floodplain/floodway.
Mason County Hazard Mitigation Plan	Mason County	Assure proper location, installation, cleaning and maintenance of septic tanks, particularly in the floodplain/floodway and around lakes.
Mason County Hazard Mitigation Plan	Mason County	Incorporate mitigation provisions into comprehensive plans and land use plans, especially as they address open space preservation and development restrictions (particularly in flood plains).

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Incorporate the Muskegon Area-wide Plan's "Smart Growth" principles, including the link between resource protection and development and a collaborative approach for infrastructure and services, into comprehensive plans and land use plans.
Mason County Hazard Mitigation Plan	Mason County	Integrate hazard mitigation into the capital improvement planning process so that public infrastructure does not lead to development in hazard areas and so that possible set-asides for planned and engineered structural projects (berms, levees, floodwalls, detention and retention ponds, debris storage areas, etc.) are considered.
Mason County Hazard Mitigation Plan	Mason County	Incorporate hazard mitigation provisions and recommendations into local zoning ordinances as they restrict or direct development; with consideration given to flood plains, soil type and topography; and as they allow flexibility in lot sizes and locations, such as in Planned Unit Developments (PUD).
Mason County Hazard Mitigation Plan	Mason County	Enforce the existing Michigan Drain Code requirement for "set-back" from the drain channel, thereby assuring proper carrying capacity of the drain.
Mason County Hazard Mitigation Plan	Mason County	Enforce Michigan's Soil Erosion and Sedimentation Control Ordinance, regarding earth changes affecting an acre or more or within 500' of a lake or stream, and consider adopting and enforcing more stringent local regulations.
Mason County Hazard Mitigation Plan	Mason County	Enforce Michigan's Land Control Act as it furthers the orderly layout and use of land, provides for proper ingress and egress to lots and parcels, controls residential building development within floodplain areas, provides for reserving easements for utilities, and governs internal drainage.
Mason County Hazard Mitigation Plan	Mason County	Enforce Michigan's Sand Dune and Shorelands Protection and Management Programs that control development in high-risk erosion areas and protect dunes.
Mason County Hazard Mitigation Plan	Mason County	Develop, adopt, and enforce a Stormwater Ordinance to manage run-off from new development, including buffers and retention or detention basins, and regulations stipulating that stormwater cannot leave at a rate higher than it did prior to development.
Mason County Hazard Mitigation Plan	Mason County	Develop, adopt, and enforce a Nuisance Ordinance to prevent dumping "objectionable" solid matter into channels and wetlands and Waterway Dumping Regulations to prevent dumping "non-objectionable" waste.
Mason County Hazard Mitigation Plan	Mason County	Assess the capacity of urban storm water sewer systems to handle both storm waters and high water tables and make necessary improvements and expansions to assure property protection.
Mason County Hazard Mitigation Plan	Mason County	Construct berms, levees, or floodwalls to contain high waters; raise or relocate buildings in areas that flood; and/or acquire properties in flood areas for demolition and re-use of the land as open space.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Maximize the participation of property owners in protecting their properties from natural hazards, such as but not limited to the following activities: - Dry floodproofing, wet floodproofing, and incorporating sanitary sewer controls to protect against flooding
Mason County Hazard Mitigation Plan	Mason County	Adopt and enforce the Michigan Rehabilitation Code to offer to buildings being repaired the same protections against natural hazards as buildings being constructed have.
Mason County Hazard Mitigation Plan	Mason County	Assure insurance coverage on properties and obtain additional insurance coverage as appropriate (sump pump failure, sewer back-up, wildfire, dam failure, etc.).
Mason County Hazard Mitigation Plan	Mason County	Encourage municipalities to join the National Flood Insurance Program (NFIP) so that residents can obtain flood insurance.
Mason County Hazard Mitigation Plan	Mason County	Encourage municipalities to join the NFIP's Community Rating System (CRS), implement the CRS minimum standards, and implement additional flood loss reduction activities (such as the adoption of this plan) to reduce the cost of NFIP flood insurance.
Mason County Hazard Mitigation Plan	Mason County	Inventory critical facilities and assure proper insurance coverage, both type and amount, including deductibles and policy limits. Evaluate self-insurance coverage in light of its expense and NFIP policies.
Mason County Hazard Mitigation Plan	Mason County	Utilize federal programs; such as but not limited to FEMA's Pre-Disaster Mitigation Program, Flood Mitigation Assistance Program, and Hazard Mitigation Grant Program; to address community needs for hazard mitigation.
Mason County Hazard Mitigation Plan	Mason County	Consider establishing cost sharing programs, such as rebates, to encourage low cost (under $10,000) property protection measures against flooding ("flood-proofing" program") where acquisition and/or relocation is not required and against other natural hazards on private property.
Mason County Hazard Mitigation Plan	Mason County	Consider establishing a voluntary on-going floodway property acquisition and land re-use program, with corresponding changes in zoning, and purchase/transfer of development rights for properties.
Mason County Hazard Mitigation Plan	Mason County	Evaluate the effectiveness of the public warning system including the threat detection process, management system, communications links, and methods of dissemination. Evaluation should consider warning for slow onset as well as short onset hazards, new technologies, public views of the warning system (especially confusion about fire station sirens) and the effect this has on response to warnings, disseminating warnings to people with "special needs", redundancies, and effective methods of risk communication.
Mason County Hazard Mitigation Plan	Mason County	Improve warning system coverage and effectiveness and implement improvements to the warning system as deemed necessary.
Mason County Hazard Mitigation Plan	Mason County	Detail the public warning process and coordinate actions in a section of the Emergency Action Guidelines (EAG).

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Maintain the “First Call Telephone Notification System” to assure immediate warnings to Muskegon County residents or target groups of pending and existing hazards and actions they can take to protect themselves.
Mason County Hazard Mitigation Plan	Mason County	Increase the coverage and use of NOAA All-Hazards radios and weather alert systems (Emergency Alert Radio System, etc.) to people and communities in need.
Mason County Hazard Mitigation Plan	Mason County	Encourage the MDNR, U. S. Geological Survey, National Weather Service, and U. S. Army Corps of Engineers to continue to operate and monitor stream gauging stations and groundwater monitoring wells and consider whether the exposure to flooding on smaller rivers and streams warrants additional Advanced Hydrologic Prediction Services (AHPS) or local rain and stream gauging and flood threat recognition systems.
Mason County Hazard Mitigation Plan	Mason County	Utilize the NWS “Turn Around Don’t Drown” system to warn motorists to not cross roads with flooding over indicated levels and install PVC markers alongside roads illustrating those levels.
Mason County Hazard Mitigation Plan	Mason County	Encourage electrical utilities to place power lines underground wherever possible, but especially when upgrading lines or running power to new developments.
Mason County Hazard Mitigation Plan	Mason County	Recommend design of the electrical distribution system with built-in redundancies such that isolated failures do not lead to wide scale outages; recommend consideration of back-up generators powered with wind, sun, gasoline, or natural gas; and assess and improve, as needed, electric service system reliability.
Mason County Hazard Mitigation Plan	Mason County	Install back-up generators, as needed for short-term relief from power failures, at critical facilities such as sewage pump stations, road commissions, hospitals and medical centers, nursing home facilities, schools and shelters.
Mason County Hazard Mitigation Plan	Mason County	Establish secure “Community Storage” areas for temporary hazard-free storage of personal property and detention areas for temporary debris disposal (snow, ice, tree branches broken power/phone lines, etc.).
Mason County Hazard Mitigation Plan	Mason County	Continue and refine State, County, and local road and bridge maintenance programs, (including vegetation management), assure that road commissions have adequate equipment (including road barriers, sand bags, portable lighting, etc.) to respond to widespread weather events, and promote snow fences beside highways and other roads to decrease snow on roads, focusing on residential developments with limited road access.
Mason County Hazard Mitigation Plan	Mason County	Adopt this Hazard Mitigation Plan by official resolution to assure both consideration of natural hazards and eligibility for FEMA funding through the Pre-Disaster Mitigation Program, Flood Mitigation Assistance Program, and Hazard Mitigation Grant Program.
Mason County Hazard Mitigation Plan	Mason County	Explore funding options for a Hazard Mitigation Coordinator position, either on a county or regional level, to facilitate the actions contained in this plan.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Develop and review coordinated response plans and programs across service providers and agencies and assure both mutual aid and the ability to communicate during emergencies (compatibility of radio frequencies, impact of adverse weather on warning systems, etc.).
Mason County Hazard Mitigation Plan	Mason County	Share vital public safety services and resources more effectively and efficiently through county participation in MEMAC, thereby assuring county eligibility for funding from the Public Assistance Program.
Mason County Hazard Mitigation Plan	Mason County	Refer emergency responders and emergency staff to FEMA and MSPEMD training for conducting Damage Assessments and determining “Substantial Damage” for an efficient and accurate assessment of building damages.
Mason County Hazard Mitigation Plan	Mason County	Construct storm shelters/tornado shelters in parks, campgrounds, marinas, and mobile home parks and retrofit existing or construct public buildings, major industrial sites and other large businesses or complexes (such as shopping malls, fairgrounds, and other vulnerable public areas) to include such shelters.
Mason County Hazard Mitigation Plan	Mason County	Meet the criteria to become a NWS-approved “Storm Ready” community including: maintaining a 24-hour warning and emergency operations center, having more than one way to receive weather warnings and alert the public, assuring a local monitoring system for weather conditions, providing public information regarding readiness, and adopting a formal hazardous weather plan which includes training weather spotters and holding emergency exercises.
Mason County Hazard Mitigation Plan	Mason County	Utilize volunteer communication networks by amateur radio operators (RACES and Muskegon County ARES) to facilitate communication during emergencies when phone lines may be inoperable.
Mason County Hazard Mitigation Plan	Mason County	Designate amateur radio operators, who are in contact with NWS’s Skywarn net, Central Dispatch, and/or Emergency Services, to communicate information on “immediately dangerous” weather situations.
Mason County Hazard Mitigation Plan	Mason County	Create a volunteer outreach program by a network of amateur radio operators and others to regularly check on the needs and conditions of elderly, disabled and homebound persons, and other special-needs groups during and after severe weather conditions and deliver (by snowmobiles, etc.) goods or assistance to them.
Mason County Hazard Mitigation Plan	Mason County	Utilize NWS trained volunteer weather spotters to watch for developing storms, trained volunteers to take flood water measurements and to monitor stream conditions, and volunteer amateur radio operators to report the findings, as needed, especially in the event of power failure.
Mason County Hazard Mitigation Plan	Mason County	Conduct an annual “clean-up” program when trash, limbs, barrels, shopping carts and other potential blockages are removed from drainage culverts, channels and adjacent lands.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Distribute already produced information on hazards and cost-effective mitigation actions individuals can implement to county residents and/or targeted groups most at risk to experience significant impacts due to natural hazards, including those actions identified in Objective 2.2.
Mason County Hazard Mitigation Plan	Mason County	Produce and distribute local emergency preparedness and safety information concerning all natural hazards to the general public and/or targeted groups (floodplain residents, developers and builders, farm owners and operators, decision makers, Spanish speaking, etc.), as described in Objective 2.2.
Mason County Hazard Mitigation Plan	Mason County	Produce and distribute information on mitigation measures the county is taking/will take, as identified in this hazard mitigation plan, to local units of government and encourage them to participate in the plan and take mitigation actions.
Mason County Hazard Mitigation Plan	Mason County	Promote educational and informational programming through the media, especially related to the early warning network and to individual actions to protect citizens, properties, and businesses.
Mason County Hazard Mitigation Plan	Mason County	Encourage residents to develop a Family Emergency Preparedness Plan; including the preparation of a Disaster Supply Kit, the posting of emergency telephone numbers, and pre-planned escape routes.
Mason County Hazard Mitigation Plan	Mason County	Stockpile ARC, FEMA, NWS, USACE and other natural hazard, damage prevention, and post-disaster repair and cleanup publications.
Mason County Hazard Mitigation Plan	Mason County	Research availability of local and Michigan-based recovery "vendors" for post-disaster goods and services (e.g., cleaning, drying, pumps, repairs, construction supplies, portable refrigeration units, disaster recovery experts) to support disaster recovery efforts.
Mason County Hazard Mitigation Plan	Mason County	Assist local communities in participating in programs mentioned in Objectives 1.1,1.4, and 2.3 (National Flood Insurance Program, Community Rating System, Firewise Communities/USA, Tree City USA, BCEGS, Fortified…for safer living, Storm Ready, TADD, etc.) and assess and respond to concerns regarding program requirements and obstacles to participation.
Mason County Hazard Mitigation Plan	Mason County	Develop model hazard mitigation and contingency plans and regulations, such as those mentioned in Objectives 1.4 and 3.3 (stormwater ordinance, nuisance ordinance, waterway dumping regulations, urban forestry program, drought plan and ordinance, etc.) and provide them to interested communities.
Mason County Hazard Mitigation Plan	Mason County	Develop model business and critical facility disaster plans that include details on disaster response: evacuation plans; data protection, security, and recovery; property security; drills; first-aid training and CPR; and post disaster mitigation actions: facilities management, damage assessment, relocation of both services and people, insurance, contractors, list of resources for assistance both public and private, and evaluation, testing, and updating plans. Inform business owners about various disaster-recovery training programs available.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Mason County Hazard Mitigation Plan	Mason County	Notify communities of the availability of hazard mitigation funds, as they become available, and assist them in applying for funds.
Mason County Hazard Mitigation Plan	Mason County	Encourage meetings between utility providers and local Public Works and Road Commission Departments to determine the resources and funding required to mitigate recurring infrastructure failures.
Mason County Hazard Mitigation Plan	Mason County	Assist the LEPC in its activities related to developing and continually revising Emergency Action Guidelines detailing the response requirements of emergency responders (emergency management, damage assessment, communications, medical services, fire services, public health services, human services, law enforcement, public works, and public information).
Mason County Hazard Mitigation Plan	Mason County	Strengthen the role of the Local Emergency Planning Committee (LEPC) in the land development process, with input into land use plans, comprehensive plans, and zoning ordinances.
Mason County Hazard Mitigation Plan	Mason County	Obtain or share a Geographic Information System (GIS) to support pre-disaster planning (such as the creation of flood stage forecast maps), disaster response activities, and post-disaster recovery activities.
Mason County Hazard Mitigation Plan	Mason County	Coordinate with American Red Cross to ensure the county-wide availability of designated and accessible emergency shelters and assure facilities are inspected and certified.