APPENDIX L
Allegan and Ottawa County, Michigan
Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake Michigan
State of Michigan

Allegan County and Ottawa County
County-based Report

February 2013

FEMA

SUBMITTED BY:

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Submitted: February 2013

Project Area Community List

Allegan County	Ottawa County
Allegan, City of	Ferrysburg, City of
Casco, Township of	Grand Haven , City of
Douglas City, City of	Grand Haven Charter, Township of
Ganges, Township of	Holland, City of
Laketown, Township of	Park, Township of
Saugatuck, City of	Port Sheldon, Township of
Saugatuck, The Charter Township of	Spring Lake, Township of
South Haven, City 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.

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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

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.

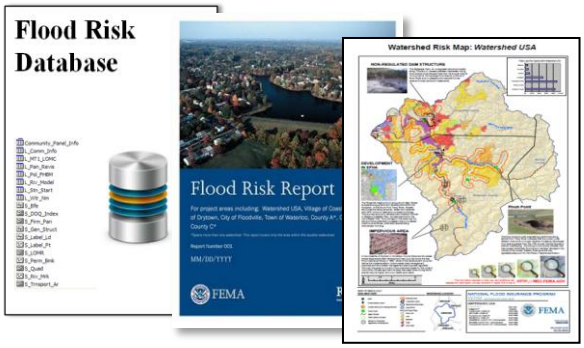
The Discovery process also helps FEMA better identify the types of datasets or products that are useful at the local level, especially as it relates to identifying new mitigation strategies and actions and for use in local planning efforts. Products that may be available to communities as a

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.



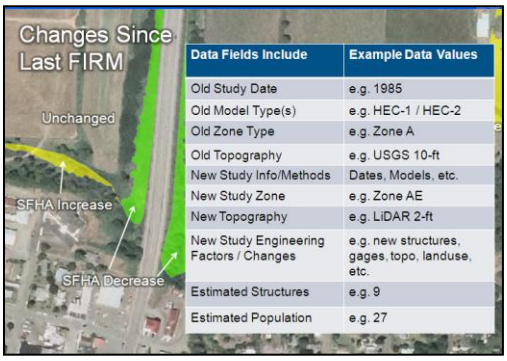
The three products are:

- 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:

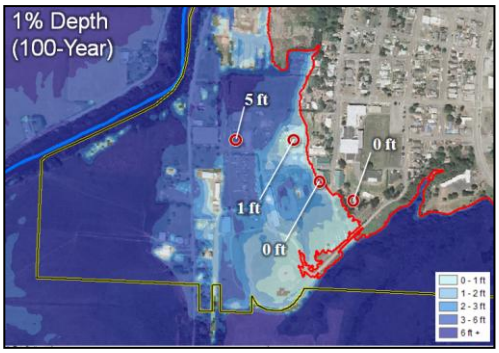
<u>Changes Since Last FIRM (CSLF)</u>

- 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 Allegan and Ottawa 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, Allegan and Ottawa Counties Pre-Meeting Correspondence.

III. Allegan and Ottawa Counties Discovery Meeting

The Discovery Meeting for Allegan and Ottawa Counties coastal communities was held on September 11, 2012 in West Olive, 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 Allegan and Ottawa 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 and tabular data that had been collected prior to the meeting:

Geospatial Data:

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

[1] CBRS consists of the undeveloped coastal barriers and other areas located on the coasts of the United States that are identified and generally depicted on a series of maps. CBRS areas are ineligible for most new Federal expenditures and financial assistance.

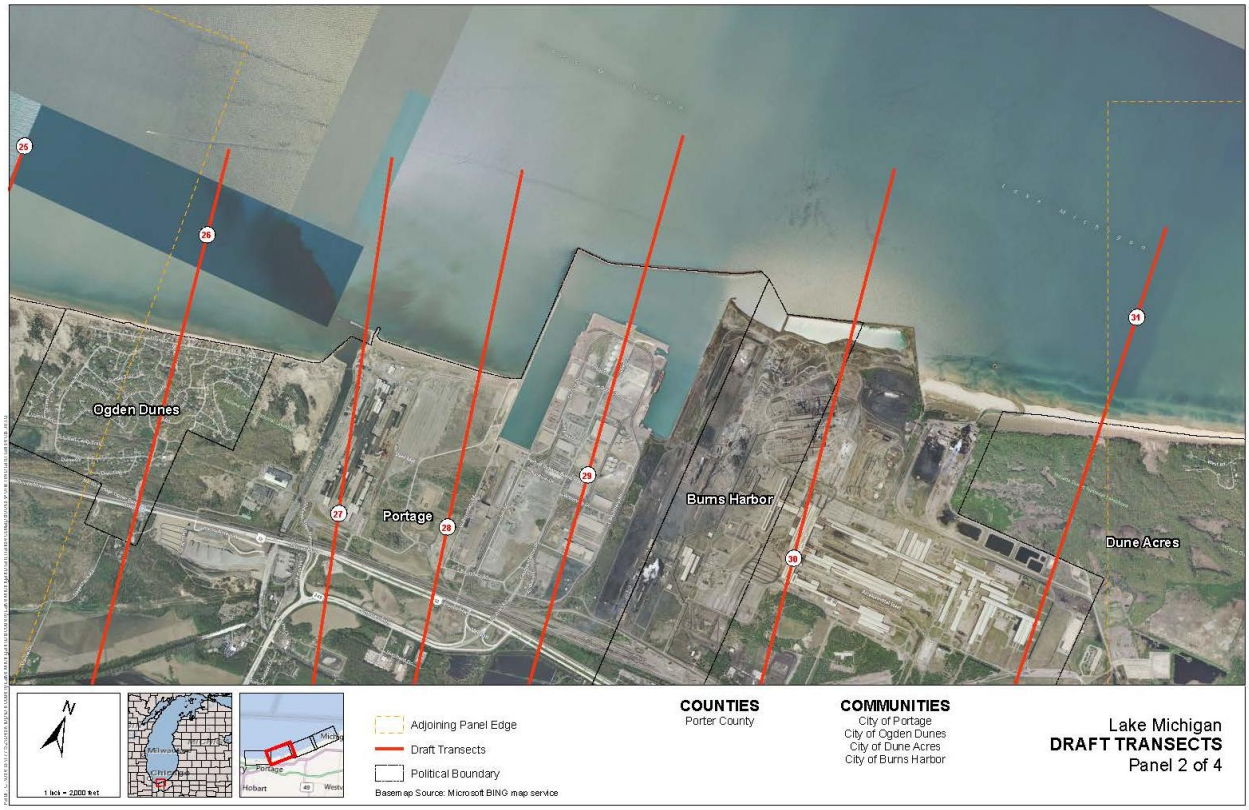
- Coordinated Needs Management Strategy (CNMS)[2] Data
- Proposed Coastal Transect Locations
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Shoreline
- Streams
- United States Geologic Survey (USGS) Gages
- Watershed Boundaries

Attendees were asked to cooperatively identify Areas of Concern and Areas of Mitigation Interest (AoMIs) within Allegan and Ottawa 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 Allegan and Ottawa 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 in 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 Table 1 below.

Table 1: Stakeholder General and Transect Location Comments

State		County	FIPS	CID	Comment	Type
Michigan	Allegan	City of Saugatuck	26005	260305	State Park	General Comment
Michigan	Allegan	Laketown Township	26005	260253	Residential houses (less than 20 houses).	General Comment
Michigan	Allegan	Macatowa	26005	260253	Dense residential	General Comment
Michigan	Ottawa	City of Ferrysburg	26139	260184	County park.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	Old structure (buried) put in years ago. USACE constructed the structure. Periodically inspected.	General Comment

State		County	FIPS	CID	Comment	Type
Michigan	Ottawa	City of Grand Haven	26139	260269	Condo with issues - floods now.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	Active (buried) water intake.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	20-inch water main that crosses Grand Lake River and runs along street.	General Comment
Michigan	Allegan		26005	260253	Transect 13; nearly no development, most development near 14 - may want to adjust transects	Transect Comment
Michigan	Allegan		26005	260253	Request to move transect 14 south	Transect Comment

Discovery meeting minutes, sign in sheets, PowerPoint presentation, and correspondence have been included in the Attachment G, Allegan and Ottawa 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 Allegan and Ottawa 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

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
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
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

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
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
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 Classification	Discovery Map	USACE	July 2012	Regionwide
Stream Gages	Discovery Map	USGS	July 2012	Countywide

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
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 (Attachments C-D).

Table 3: HAZUS AAL Data for Allegan and Ottawa Counties, MI

FIPS Code	County	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
26005	Allegan	230,895	87,854	128,653
26139	Ottawa	723,312	313,573	381,540

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 Allegan, those maps include:

- Casco Township
- Ganges Township
- Laketown Township
- Saugatuck Township

For Ottawa County, maps are available for:

- Grand Haven Township
- Park Township
- Port Sheldon Township
- Spring Lake 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. There are no federal lands in either Allegan or Ottawa Counties.

I.IV.i.4 Jurisdictional Boundaries

Jurisdictional boundaries were obtained for Allegan and Ottawa 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, Ottawa County, Port Sheldon Township (Ottawa County), City of Ferrysburg (Ottawa County), and City of Grand Haven (Ottawa County) provided 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 Allegan and Ottawa 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 Allegan and Ottawa Counties is 56.13 miles. Tables 4 through 7 below summarize the shoreline features from the USACE dataset for the Allegan and Ottawa lakeshore.

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)
Allegan County	26.16	1.23	0	0	24.93	0
Ottawa County	29.97	5.54	0	0	24.43	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)
Allegan County	26.16	0	0	15.48	4.57	6.15
Ottawa County	29.97	0.62	0.62	15.38	11.88	0.86

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)
Allegan County	26.16	0	0	0	0	23.24	2.92	
Ottawa County	29.97	0	0	0	4.31	6.35	19.31	

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)
Allegan County	26.16	14.18	3.69	2.49	5.8	0	0
Ottawa County	29.97	14.39	5.54	1.23	8.81	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.

LiDAR is an optical remote sensing technology that can measure the distance to, or other properties of, a target by illuminating the target with light, often using pulses from a laser. A narrow laser beam can be used to map physical features with very high resolution. Downward-looking LIDAR instruments fitted to aircraft and satellites are used for surveying and mapping. LiDAR can be used to create DTM (Digital Terrain Models) and DEM (Digital Elevation Models), which is a digital model or 3D representation of the terrain's surface.

The LIDAR data for this study was collected within a 1500m buffer (500m inland and 1000m seaward of the land/water interface). Where water clarity permitted, data was collected to cover all federal navigation projects. Flight lines were flown along the channel alignment to ensure the best possible coverage of inlets and structures.

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).

Allegan County contains portions of three HUC-8 watersheds and Ottawa County contains portions of four HUC-8 waterhsheds. The sub basin names and HUC-8 codes are listed below in Table 8:

Table 8: HUC-8 Watersheds in Allegan and Ottawa Counties

County	Huc_8	Sub basin
Allegan	4050002	Black-Macatawa
Allegan	4050003	Kalamazoo
Allegan	4050006	Lower Grand
Ottawa	4050002	Black-Macatawa
Ottawa	4050003	Kalamazoo
Ottawa	4050006	Lower Grand
Ottawa	4060101	Pere Marquette-White

ii. Other Data and Information

Allegan County is primarily an agricultural area that is rapidly becoming urbanized as the population centers of Grand Rapids on the northeast and Kalamazoo to the southeast expand into the county. In the southwest corner, a small portion of the city of South Haven extends into Allegan County. The Lake Michigan shoreline has long been a popular place for vacation homes, and that such development continues, especially around Saugatuck and Douglas. According to the 2010 census, it has a population of 111,408, which is an increase from 105,665 in 2000. The county has a total area of 1,833.3 square miles, of which 827.46 square miles is land and 1,005.83 square miles is water (U.S. Census Bureau, 2010). Additional information on Allegan County can be found at http://www.allegancounty.org/.

Ottawa County is located in the central portion of the State of Michigan, on the shore of Lake Michigan. According to the 2010 census, it has a population of 263,801, which is an increase from 238,314 in 2000. Summer seasonal residents are also a member of the populous Ottawa County. Port Sheldon Township has many lakefront homes and other inland retreats that serve as summer getaways for residents of Grand Rapids, Detroit, and Chicago. The county has a total area of 1,631.97 square miles, of which 565.65 square miles is land and 1,066.32 square miles is water (U.S. Census Bureau, 2010). Additional information on Ottawa County can be found at http://www.miottawa.org/.

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 Allegan and Ottawa 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 Allegan and Ottawa Counties, MI

County	Community	CID	CAV Date	FIRM Date
Allegan	Allegan, City of	260003		05/04/89
Allegan	Casco, Township of	260004		06/04/80
Allegan	Douglas City, City of		9/19/1995	
Allegan	Ganges, Township of	260005		12/18/79
Allegan	Laketown, Township of	260253		06/04/80
Allegan	Saugatuck, City of	260305	5/11/2005	02/01/80
Allegan	Saugatuck, The Charter Township of	260009		02/01/80
Allegan	South Haven, City of	260211		12/03/09
Ottawa	Ferrysburg, City of	260184	12/17/1996	12/16/11
Ottawa	Grand Haven , City of	260269	4/23/2007	12/16/11
Ottawa	Grand Haven Charter, Township of	260270	6/9/1995	12/16/11
Ottawa	Holland, City of	260006	11/10/2010	12/16/11
Ottawa	Park, Township of	260185	2/20/2002	12/16/11
Ottawa	Port Sheldon, Township of	260278	9/15/1998	12/16/11
Ottawa	Spring Lake, Township of	260281	12/3/2008	12/16/11

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.

The City of Saugatuck and The Charter Township of Saugatuck of Allegan County participate in the CRS program. Park Township in Ottawa County participates in the CRS program. It should be noted that communities outside of the Lake Michigan coastal communities may 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.

Information for Allegan and Ottawa Counties was not compiled at the time this report was drafted.

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 Allegan and Ottawa Counties, MI

County	FIPS	Unknown (stream miles)	Unverified (stream miles)	Valid (stream miles)	Total (stream miles)
Allegan County, MI	26005	Not Available	Not Available	Not Available	Not Available
Ottawa County, MI	26139	0.00	1.67	72.20	75.42

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. In Ottawa County, 1% of critical facilities and 2% of road miles (50 miles) are within the floodplain. (National Oceanic & Atmospheric Administration, 2009). Information regarding Allegan County was not available at the time of this report.

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 Allegan and Ottawa 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, 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.

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

Table 11: Documented Dams for Allegan and Ottawa, MI

County	Name	Primary Purpose	Dam Type	River
Allegan	Black River Dam	Irrigation	Earth	North Fork Black River
Allegan	Trowbridge Dam	Other	-	Kalamazoo River
Allegan	Otsego Dam	Other	-	Kalamazoo River
Allegan	Silver Valley Ponds Dam	Other	Earth	Tannery Creek
Allegan	Monterey Lake Dam	Recreation	Earth	Pigeon Creek
Allegan	Williams Mill Dam	Recreation	Earth	Mill Creek
Allegan	Palmer Bayou Dam	Other	Gravity	Palmer Bayou Trib to K zoo R.
Allegan	Lake Doster Dam	Recreation	Earth	Tributary to Silver Creek
Allegan	Allegan	Hydroelectric	-	Kalamazoo River
Allegan	Menasha Dam	Hydroelectric	Gravity	Kalamazoo River
Allegan	Allegan City Dam	Hydroelectric	-	Kalamazoo River
Allegan	Plainwell Dam Number 2	Other	-	Kalamazoo River
Allegan	Plainwell Dam #1	Other	-	Kalamazoo River

County	Name	Primary Purpose	Dam Type	River
Allegan	Pine Creek Dam	Recreation	Earth	Pine Creek
Allegan	Hamilton Dam	Other	-	Rabbit River
Allegan	Cross Dike Dam	Recreation	Earth	Palmer Bayou Trib to K zoo R.
Allegan	Ottogan Dam	Flood Control	Earth	Ottogan Inter-County Drain
Allegan	Van Dragt s Dam	Recreation	Earth	Tannery Creek
Allegan	Crooked Lake Dam (Structure #4)	Other	Earth	Utter Drain
Allegan	Swan Creek Dam	Recreation	-	Swan Creek
Allegan	Highbanks Dam	Recreation	-	Swan Creek
Allegan	Root Dam	Other	Earth	Sand Creek
Ottawa	Rush Creek Detention Basin Dam #2	Flood Control	Earth	Deweerd Drain
Ottawa	Beren s Dam	Flood Control	Earth	Tributary to Macatawa River
Ottawa	Steenwyk Dam	Flood Control	Earth	Tributary to Macatawa River
Ottawa	North Branch Rush Creek Retention Basin Dam	Other	Earth	North Branch Rush Creek
Ottawa	Kenowa Lake Level Control Structure	Recreation	-	Huizeinga Dr. trib to Rush Cr
Ottawa	Buttermilk Creek Detention Dam	Other	Earth	Buttermilk Creek

I.IV.ii.10 Levees

The National Levee Database (NLD), developed by the U.S. Army Corps of Engineers (USACE) currently contains the majority of levees within the USACE program. 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 National Flood Insurance Program (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 Ottawa and Allegan Counties at the time this report was developed.

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 Allegan and Ottawa Counties.

Table 12: Declared Disasters in Allegan and Ottawa, MI

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
Allegan (County)	465	04/26/1975	Flood	Severe Storms, High Winds & Flooding
Allegan (County)	486	09/30/1975	Flood	Severe Storms, High Winds & Flooding
Ottawa (County)	486	09/30/1975	Flood	Severe Storms, High Winds & Flooding
Allegan (County)	495	03/19/1976	Severe Storm(s)	Severe Storms, Tornadoes, Icing & Flooding
Ottawa (County)	495	03/19/1976	Severe Storm(s)	Severe Storms, Tornadoes, Icing & Flooding
Allegan (County)	631	09/08/1980	Flood	Severe Storms & Flooding
Ottawa (County)	631	09/08/1980	Flood	Severe Storms & Flooding
Allegan (County)	774	09/18/1986	Flood	Severe Storms & Flooding
Ottawa (County)	774	09/18/1986	Flood	Severe Storms & Flooding
Ottawa (County)	1527	06/30/2004	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
Allegan (County)	1777	07/14/2008	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
Ottawa (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 Allegan and Ottawa 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 Allegan and Ottawa Counties

County	CID	No. Policies	Total Premium	Total Coverage	Number of claims since 1978	Dollar ($) paid for claims since 1978
Allegan	26005	214	$110,317	$39,324,000	78	$632,648
Ottawa	26139	564	$381,499	$111,106,400	214	$2,150,709

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 Allegan and Ottawa Counties Coastal Flood Study area.

Table 14: Meteorological Stations in Lake Michigan, Allegan and Ottawa, MI

County	Station ID	Location	Owner	Data	Years of Historical Data
-	45007	43NM East Southeast of Milwaukee, WI	National Data Buoy Center	Wind, wave height, atmospheric pressure, air temperature, water	1981 - present

County	Station ID	Location	Owner	Data	Years of Historical Data
				temperature, dew point	
Ottawa	HLNM4 - 9087031	Holland, MI	NOAA's National Ocean Service	Wind, atmospheric pressure, air temperature	2010 – present
Ottawa	45029	Holland, MI	Limno Tech	Wind, wave height, air temperature, water temperature, dew point	2012

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 Allegan and Ottawa Counties. USGS stream gage locations are also shown on the Discovery Map.

Table 15: Stream Gage Stations in Allegan and Ottawa Counties, MI

County	Gage ID	Begin Date	End Date	Gage Location
Allegan	4108600	10/1/1965	9/30/2011	Rabbit River near Hopkins, MI
Allegan	4108660	10/1/1993	9/30/2011	Kalamazoo River at New Richmond, MI
Ottawa	4108800	10/1/1960		Macatawa River at State Road near Zeeland, MI
Ottawa	4119400			Grand river near Eastmanville, 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 at 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. A copy of the Ottawa hazard mitigation plans is available in the Appendix. The status of current hazard mitigation plans is shown in the 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 Allegan and Ottawa Counties, MI

Jurisdiction	Approval Date	Expiration Date
Allegan County	11/16/2006	4/25/2012
Ottawa County	Pending Adoption	

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 Hazard Mitigation Grant Program Project Requests for Allegan and Ottawa Counties are listed in Table 17 below.

Table 17: Hazard Mitigation Grant Program Project Requests for Allegan and Ottawa Counties, MI

County	Project No.	Project Title	Status
Ottawa	0029	Ottawa County -Relief Drain	Closed
Ottawa/Allegan	0033	City Of Holland Acquisition Project	Approved
Ottawa	0036	Mi Deq - Phase 1 Of Flood Mitigation Of Flood-Prone Structures On Grand River	Closed
Ottawa	0038	Floodplain Delineation And Land Use Planning In The Macatawa River Watershed	Approved
Ottawa	0043	Ottawa County -Noaa Weather Transmitter	Closed
Ottawa	0049	Robinson Township - Phase Ii Acquisition	Void
Ottawa	0051	Ottawa County Drain Commission - Maplewood Closedintercounty Drain - Reg. Det. Basin	Closed
Ottawa	0026	City Of Wyoming - Clay Avenue Bridge Mitigation	Closed

County	Project No.	Project Title	Status
Ottawa	0037	Mdeq - Phase 1 Of An Acquisition Of Flood-Prone Structures On The Macatawa River	Closed
Ottawa	0011	Noaa Wx Radio Distribution And Dedication Project	Approved
Allegan	0038	Holland-Siren Project	Approved
Ottawa	0049	Ottawa Co Road Comm. Raise M21 Roadway	Withdrawn
Ottawa	0063	South Shore Drive Over The Ottagon Drain Damage Mitigation	Approved
Ottawa	0071	Coopersville, Culvert & Acquisition 1 House	Approved
Ottawa	0080	Hudsonville, Siren Project	Approved
Ottawa	0083	Springlake Township, 2 Siren Project	Approved
Allegan	0090	Bear Swamp Drain - SP Industries Flood Proofing	Approved
Allegan	0095	Fennville City, Siren	Approved
Ottawa	0123	Flood Mitigation Of Structures On The Grand River	Approved
Ottawa	0002	Robinson Township-Public Warning Siren System	Approved
Allegan	0005	Salem Township-Public Warning Siren System	Approved
Ottawa	0007	Georgetown Township-Public Warning Siren System	Approved
Ottawa	0003	Blendon Township Early Warning Sirens	Approved
Ottawa	0007	Grand Haven City Early Warning Sirens	Approved

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 have been instances of repetitive flooding in the Township of Laketown (Allegan County) and the Township of Park (Ottawa County).

No High Water Mark (HWM) data was found for Allegan and Ottawa Counties associated with historical flooding of 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 18 below lists the number of LOMCs in the Ottawa and Allegan 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 18: Summary of LOMC cases in Allegan and Ottawa 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
Allegan County	53	1	0	0
Ottawa County	261	41	5	6

I.IV.ii.18 Locally Identified Mitigation Projects

A table is available in Attachment G which lists the potential mitigation actions and strategies as pulled from each of the County level Hazard Mitigation Plans (Allegan and Ottawa Counties).

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. Ordinance information is shown in Table 19 below.

Table 19: NFIP Program Status and Ordinance Level for Allegan and Ottawa, MI

County	Community	CID	Program Status	Level of Adopted Regulation
Allegan County	Allegan, City of	260003	Participating	
Allegan County	Casco, Township of	260004	Participating	
Allegan County	Douglas City, City of		Participating	
Allegan County	Ganges, Township of	260005	Participating	
Allegan County	Laketown, Township of	260253	Participating	
Allegan County	Saugatuck, City of	260305	Participating	
Allegan County	Saugatuck, The Charter Township of	260009	Participating	
Allegan County	South Haven, City of	260211	Not Participating	
Ottawa County	Ferrysburg, City of	260184	Participating	D
Ottawa County	Grand Haven , City of	260269	Participating	D
Ottawa County	Grand Haven Charter, Township of	260270	Participating	D
Ottawa County	Holland, City of	260006	Participating	D
Ottawa County	Holland Charter, Township of	260492	Participating	D
Ottawa County	Park, Township of	260185	Participating	D
Ottawa County	Port Sheldon, Township of	260278	Participating	C
Ottawa County	Spring Lake, Township of	260281	Participating	D

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 Allegan and Ottawa 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 Allegan and Ottawa Counties, Michigan are shown in Table 20.

Table 20: Stakeholder General and Transect Comments

State		County	FIPS	CID	Comment	Type
Michigan	Allegan		26005	260253	Transect 13; nearly no development, most development near 14 - may want to adjust transects	Transect Comment
Michigan	Allegan		26005	260253	Request to move transect 14 south	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.

A list of Public Assistance-funded projects is available at FEMA data feeds website (http://www.fema.gov/data-feeds , accessed July 2012).

Table 21: Public Assistance Projects for Allegan and Ottawa Counties, MI

County	Applicant Name	Education Applicant	Number of Projects	Federal Share Obligated
Allegan	Allegan County Drain Commission	No	3	$12,515.96
Allegan	Allegan County Emergency Management	No	1	$1,940.63
Allegan	Allegan County Road Commission	No	7	$351,758.34
Allegan	Borgess-Pipp Hospital	No	1	$2,112.70
Allegan	Dorr Leighton Waste Water Authority	No	2	$17,600.12
Allegan	Douglas, Village Of	No	5	$9,013.91
Allegan	Graafschap Fire Department	No	1	$1,178.14
Allegan	Gunplain, Township Of	No	1	$1,366.71
Allegan	Gun River Intercounty Drainage District, % Allegan County Drain Commissioner	No	1	$1,560.75
Allegan	Otsego, City Of	No	2	$4,438.14
Allegan	Plainwell, City Of	No	2	$4,237.48
Allegan	Saugatuck, City Of	No	3	$53,471.30
Ottawa	Blendon, Township Of	No	1	$882.00

County	Applicant Name	Education Applicant	Number of Projects	Federal Share Obligated
Ottawa	Coopersville Public School District	Yes	1	$1,875.00
Ottawa	Crockery, Township Of	No	1	$0.00
Ottawa	Grand Haven Area Public Schools	Yes	3	$6,937.50
Ottawa	Holland Board Of Public Works	No	3	$34,456.12
Ottawa	Holland, City Of	No	5	$30,533.72
Ottawa	Holland Community Hospital	No	1	$5,303.93
Ottawa	Holland Public Schools	Yes	1	$6,078.95
Ottawa	Hope College	Yes	2	$0.00
Ottawa	Hudsonville, City Of	No	4	$12,248.85
Ottawa	Olive, Township Of	No	1	$0.00
Ottawa	Ottawa Area Intermediate School District	Yes	2	$5,390.03
Ottawa	Ottawa County	No	1	$1,172.83
Ottawa	Ottawa County Drain Commission	No	1	$29,741.44
Ottawa	Ottawa County Road Commission	No	4	$266,875.72
Ottawa	Park Township Fire Department	No	1	$1,633.36
Ottawa	Port Sheldon, Township Of	No	2	$2,737.50
Ottawa	Spring Lake, Village Of	No	2	$8,268.21
Ottawa	Zeeland Charter, Township Of	No	1	$3,794.25
Ottawa	Zeeland, City Of	No	5	$15,351.72
Ottawa	Zeeland Public Schools	Yes	1	$841.42
Allegan	Allegan County Drain Commission	No	3	$12,515.96
Allegan	Allegan County Emergency Management	No	1	$1,940.63
Allegan	Allegan County Road Commission	No	7	$351,758.34
Allegan	Borgess-Pipp Hospital	No	1	$2,112.70
Allegan	Dorr Leighton Waste Water Authority	No	2	$17,600.12
Allegan	Douglas, Village Of	No	5	$9,013.91

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. FIRM maps with effective dates and NFIP Program participation status for Ottawa and Allegan Counties are listed below by community. Ottawa and Allegan Counties have not yet been modernized to digital maps. Effective FIRMs and Flood Insurance Studies (FIS) can be downloaded from FEMA's Map Service Center (MSC) at https://msc.fema.gov .

Table 22: Effective Status of Allegan and Ottawa Counties, MI

County	Community	CID	Effective Date
Allegan	Allegan, City of	260003	5/4/1989
Allegan	Casco, Township of	260004	6/4/1980
Allegan	Douglas City, City of		02/01/1980
Allegan	Ganges, Township of	260005	12/18/1979
Allegan	Laketown, Township of	260253	6/4/1980
Allegan	Saugatuck, City of	260305	02/01/1980
Allegan	Saugatuck, The Charter Township of	260009	02/01/1980
Ottawa	Ferrysburg, City of	260184	12/16/2011
Ottawa	Grand Haven , City of	260269	12/16/2011
Ottawa	Grand Haven Charter, Township of	260270	12/16/2011
Ottawa	Holland, City of	260006	12/16/2011
Ottawa	Park, Township of	260185	12/16/2011
Ottawa	Port Sheldon, Township of	260278	12/16/2011
Ottawa	Spring Lake, Township of	260281	12/16/2011

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 23: Repetitive Losses in Allegan and Ottawa Counties, MI

County	Community	CID	No. of Repetitive Losses	Total Area Population
Allegan	Laketown, Township of	260253	2	6,009
Ottawa	Georgetown, Charter Township of	260589	2	45,500
Ottawa	Holland Charter, Township of	260006	9	23,800
Ottawa	Park, Township of	260185	8	19,000
Ottawa	Robinson, Township of		8	5,588
Ottawa	Spring Lake, Township of	260281	2	10,751
Ottawa	Tallmadge, Charter Township of	260494	5	7,000
Ottawa	Zeeland, City of	260983	2	1,042

I.IV.ii.26 Socio-Economic Analysis

The 2010 American Community Survey 1-year estimate indicates the median income for a household in Allegan County was $50,240 and the median income for a family was $57,831. Males had a median income of $44,705 versus $32,953 for females. The per capita income for the county was $23,108. About 8.8% of families and 11.9% of the population were below the poverty line, including 14.4% of those under the age 18 and 7.9% of those age 65 or over.

InOttawa County, the median income for a household in the county was $44,435 and the median income for a family was $54,499. Males had a median income of $45,047 versus $32,518 for females. The per capita income for the county was $22,002. About 11.8% of families and 15.8% of the population were below the poverty line, including 22.3% of those under the age 18 and 12.0% 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 Allegan and Ottawa Counties Discovery effort and provided in this report will be utilized in the upcoming GLCFS for Lake Michigan.

A summary of the GLCFS 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 the 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 Allegan and Ottawa Counties as summarized in Table 24.

Table 24: 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
Allegan	MI	X		X	TBD
Ottawa	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 Allegan and Ottawa 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 Allegan and Ottawa Counties. Throughout this study process, Federal, State, and local stakeholders for Allegan and Ottawa 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. FEMA 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.

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 Allegan and Ottawa 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/

A. Coastal Data Request Form

B. Allegan and Ottawa Counties Pre-Meeting Correspondence

C. Allegan County Draft Discovery Map

D. Ottawa County Draft Discovery Map

E. Allegan and Ottawa Counties Proposed Transects

F. Allegan and Ottawa 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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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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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.

Allegan and Ottawa Counties Pre-Meeting Correspondence

Davis, Holly A

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

Start: Tue 8/7/2012 10:00 AM
End: Tue 8/7/2012 11:00 AM

Recurrence: (none)

Meeting Status: Meeting organizer

Organizer: Davis, Holly A

Required Attendees:

Optional 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 **Tuesday, August 7, 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:	Tuesday, August 7, 2012
Time:	10:00am – 11:00am ET
Link to WebEx:	https://www.webex.com/login/attend-a-meeting
Meeting No:	654 116 201
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 Tuesday, 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
Ottawa and Allegan Counties, Michigan
August 7, 2012 10:00am ET

Attendance:
Craig Bessinger, Zoning Administrator, City of Ferrysburg
Geri McCaleb, Mayor, City of Grand Haven
Pat McGinnis, Manager, City of Grand Haven
Dan Theile, City of Holland
Paul Geerlings, Drain Commissioner, Ottawa County
Beth Thomas, Director of Emergency Management, Ottawa County
Aaron Boos, Ottawa County
Eric Davis, Building Inspector, Park Township
Lukas Hill, Community Development Director, Spring Lake Township
Paul Vanderbosh, City of South Haven
Albert Meshkin, Laketown Township
Stacey Roberts, STARR
Holly Davis, STARR

Discussion:

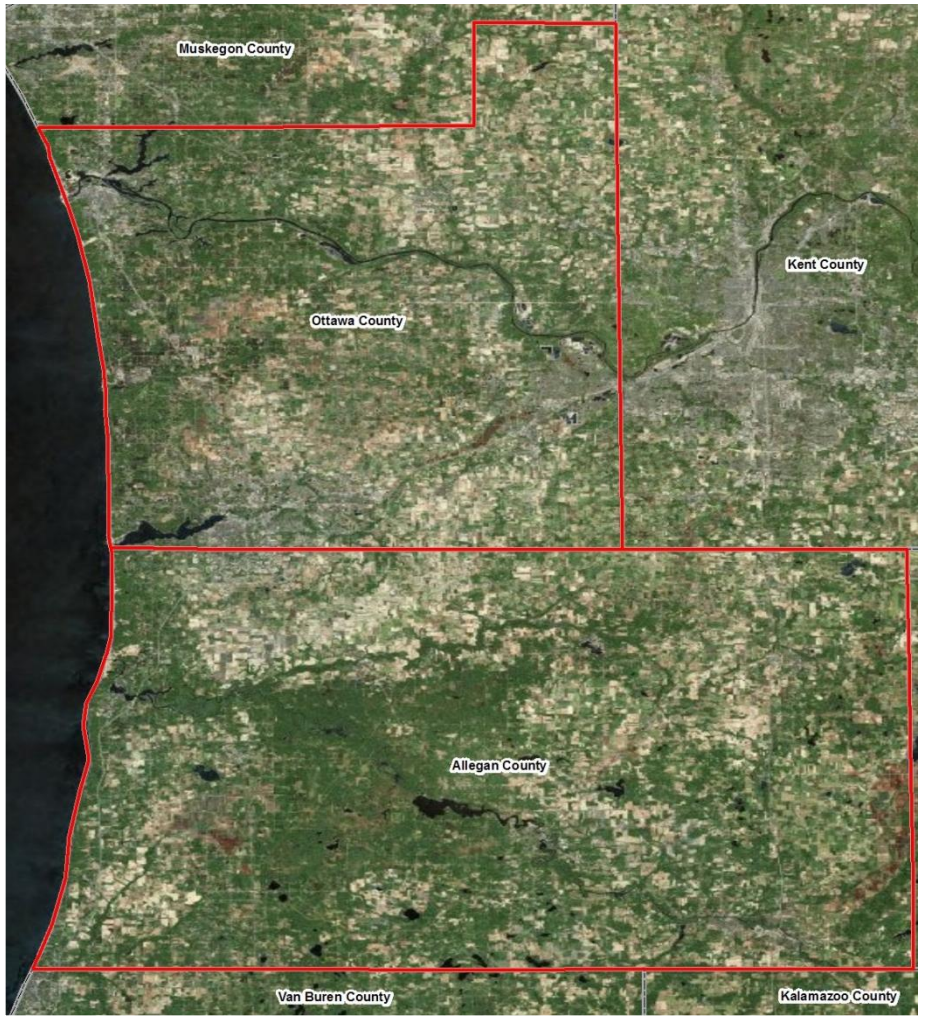
- Beth Thomas –
  - Mitigation projects/risk reduction activities – Shoreline flooding and erosion rated as low hazard at this time. They are monitoring lake levels and erosion at the community level.
  - The county would prefer sea wall protection and general education to the public through forms of media.
  - Wanted to note that the Grand River does run into Lake Michigan in Ottawa County and therefore might need to be considered.
  - Ottawa's Hazard Mitigation Plan is shared with Kent County due to the fact that they share the Grand River. The shared Hazard Mitigation Plan was recently approved by FEMA, Adoption date 5/22/2012.

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



Ottawa and Allegan Counties, Michigan
August 7, 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
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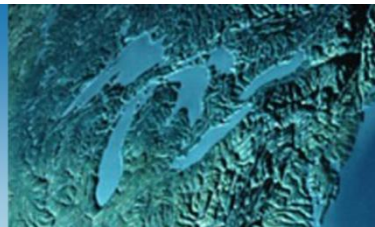
Great Lakes Coastal Flood Study
greatlakescoast.org



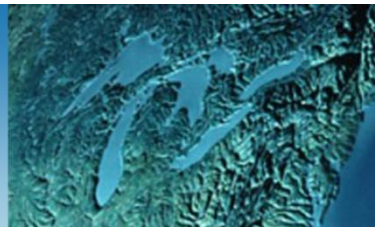
Overview of Great Lakes Coastal Flood Study

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

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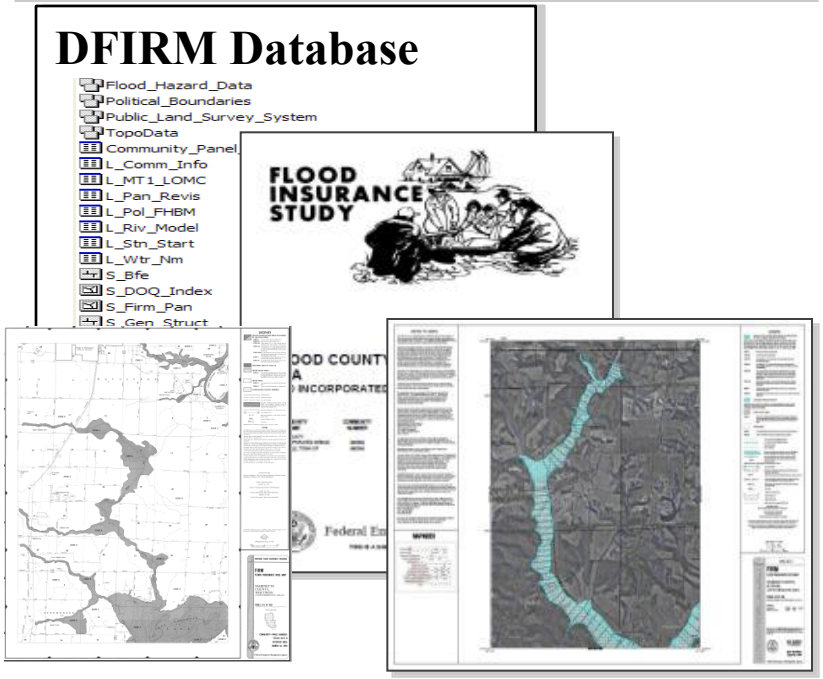
Products and Datasets: Regulatory and Non-regulatory

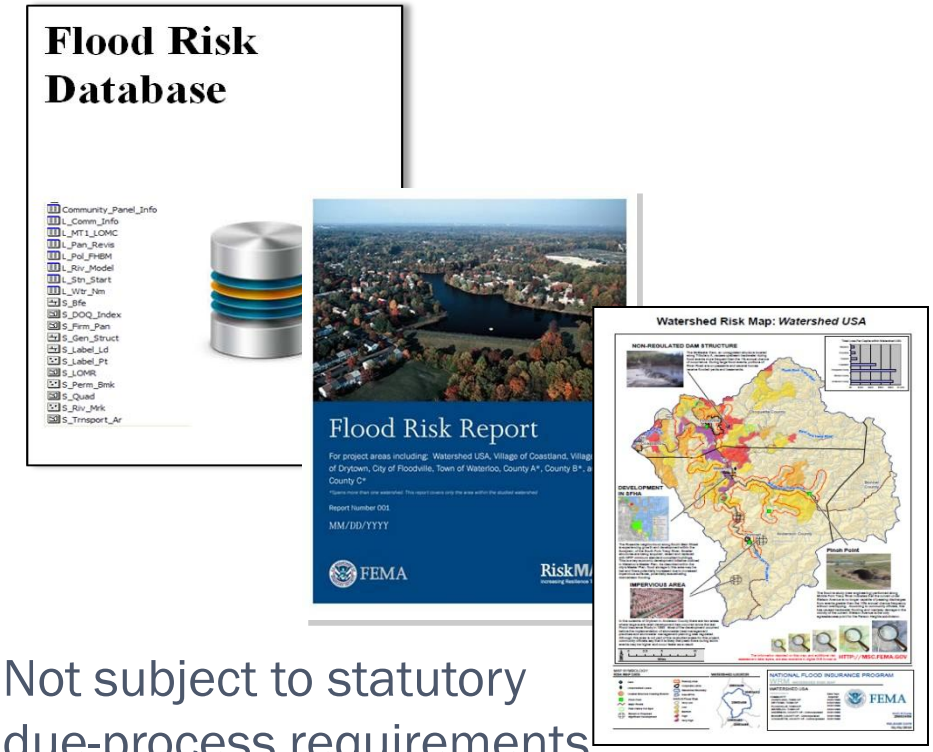
FEMA

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

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Great Lakes Coastal Flood Study
greatlakescoast.org

Products and Datasets: Coastal Products in Development

FEMA

Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline
Reference

Shoreline Feature

Upper Peninsula Shoreline
Reference

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greatlakescoast.org

Risk MAP Overview: Shoreline Features Database

FEMA

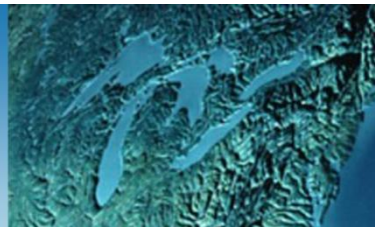
Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

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

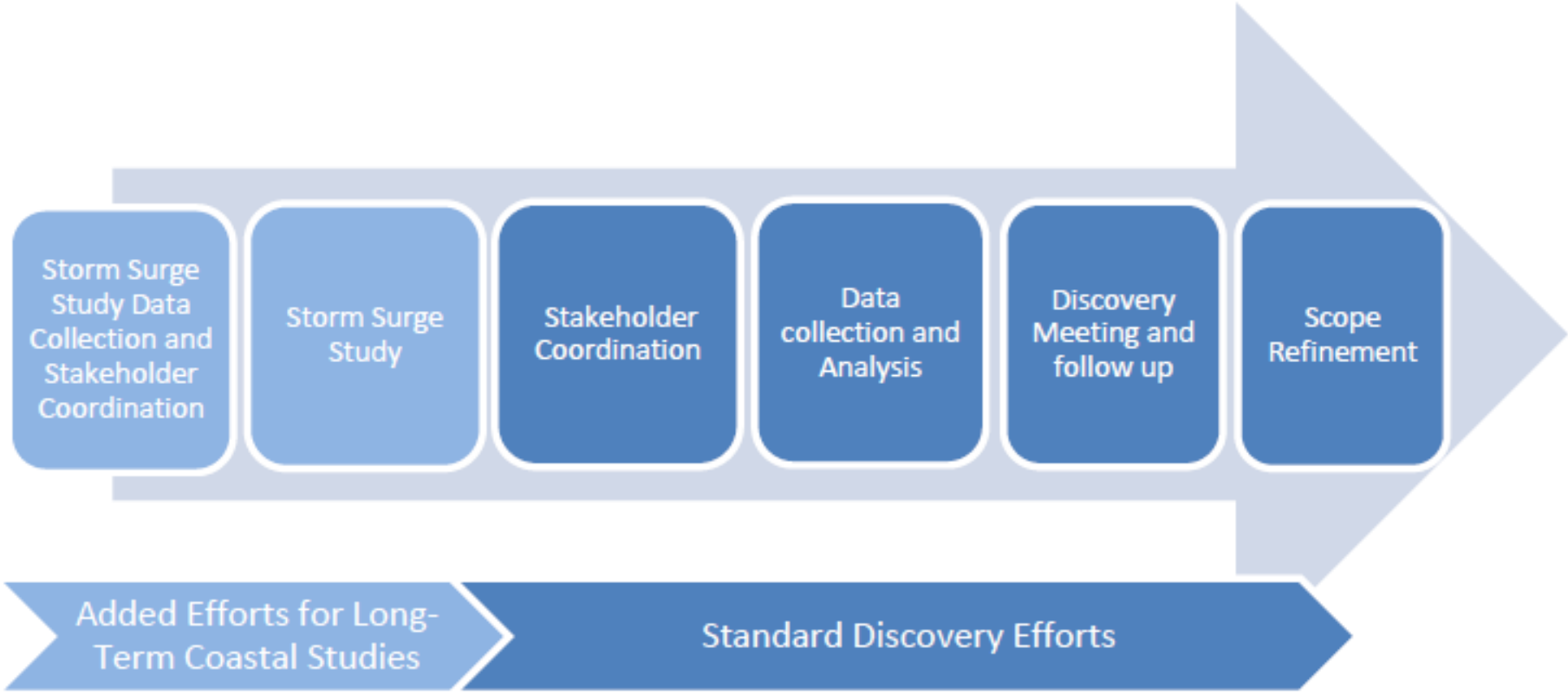
Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

- 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
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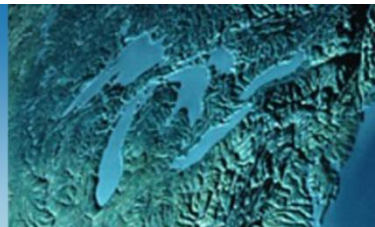
Great Lakes Coastal Flood Study
greatlakescoast.org



Great Lakes Coastal Flood Study
Discovery Meeting

FEMA

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
Ottawa County Fillmore Street Complex Board Room	12220 Fillmore Street, Rm 310 West Olive, Michigan 49460	Tuesday 09/11/2012; 9:00 - 11:00 AM ET

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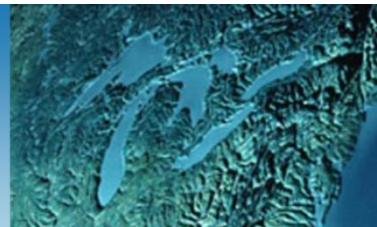
Great Lakes Coastal Flood Study
greatlakescoast.org



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

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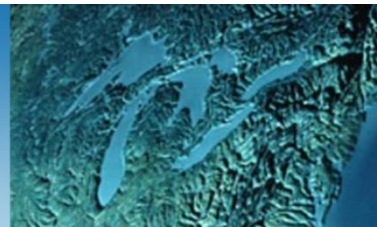
Increasing Resilience Together

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**



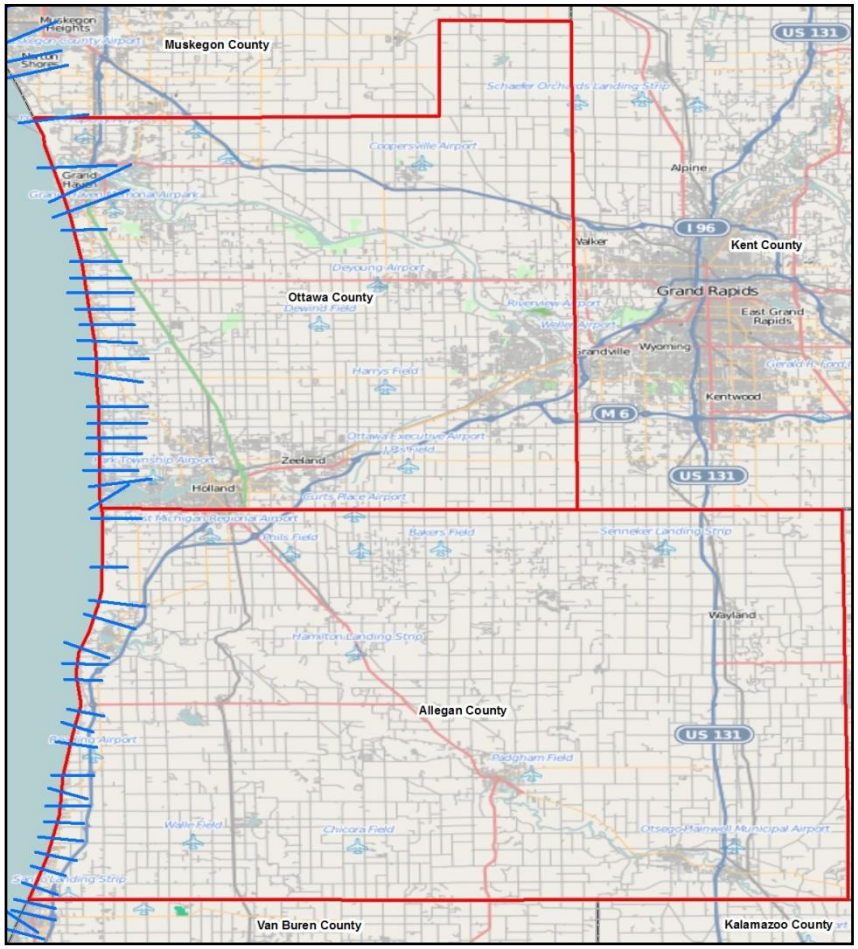
Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Lake Michigan coastal communities in Ottawa and Allegan Counties, Michigan

Ottawa County
City of Ferrysburg
City of Grand Haven
Grand Haven Charter Twp
City of Holland
Park Township
Port Sheldon Township
Spring Lake Township

Allegan County
City of Allegan
Casco Township
Douglas City
Ganges Township
Laketown Township
City of Saugatuck
Saugatuck Twp
City of South Haven



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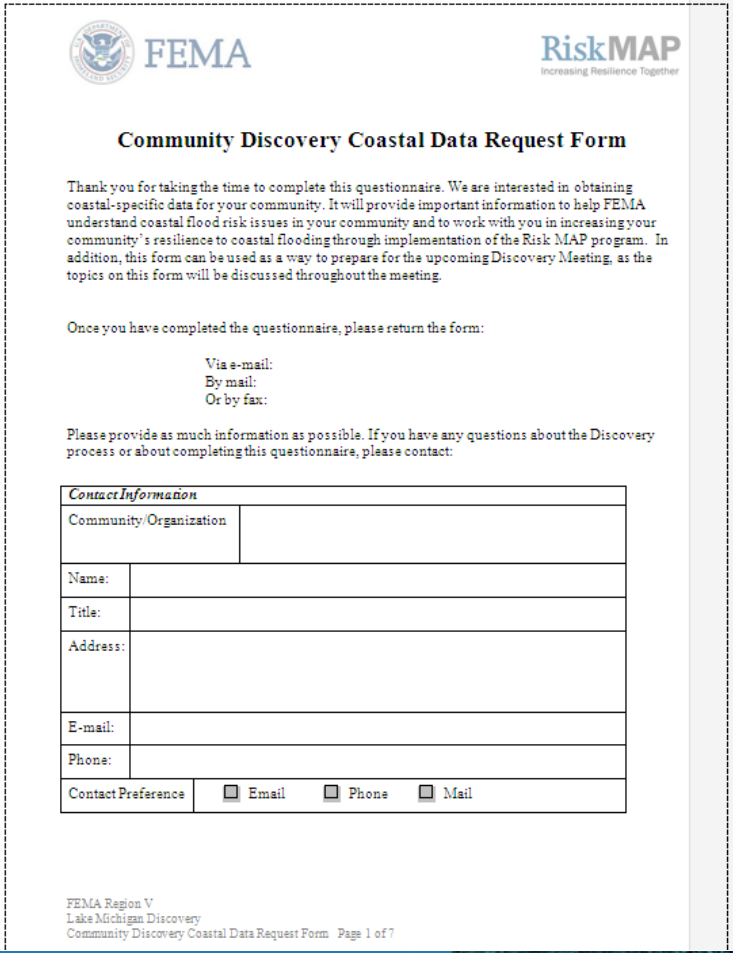
Great Lakes Coastal Flood Study
greatlakescoast.org

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	4/26/1975	4/26/1975	Allegan (County)
Flood	9/30/1975	9/30/1975	Allegan (County)
Flood	9/30/1975	9/30/1975	Ottawa (County)
Severe Storm(s)	3/19/1976	3/19/1976	Allegan (County)
Severe Storm(s)	3/19/1976	3/19/1976	Ottawa (County)
Flood	9/8/1980	9/8/1980	Allegan (County)
Flood	9/8/1980	9/8/1980	Ottawa (County)
Flood	9/10/1986	10/10/1986	Allegan (County)
Flood	9/10/1986	10/10/1986	Ottawa (County)
Severe Storm(s)	5/20/2004	6/8/2004	Ottawa (County)
Severe Storm(s)	6/6/2008	7/13/2008	Allegan (County)
Severe Storm(s)	6/6/2008	7/13/2008	Ottawa (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!

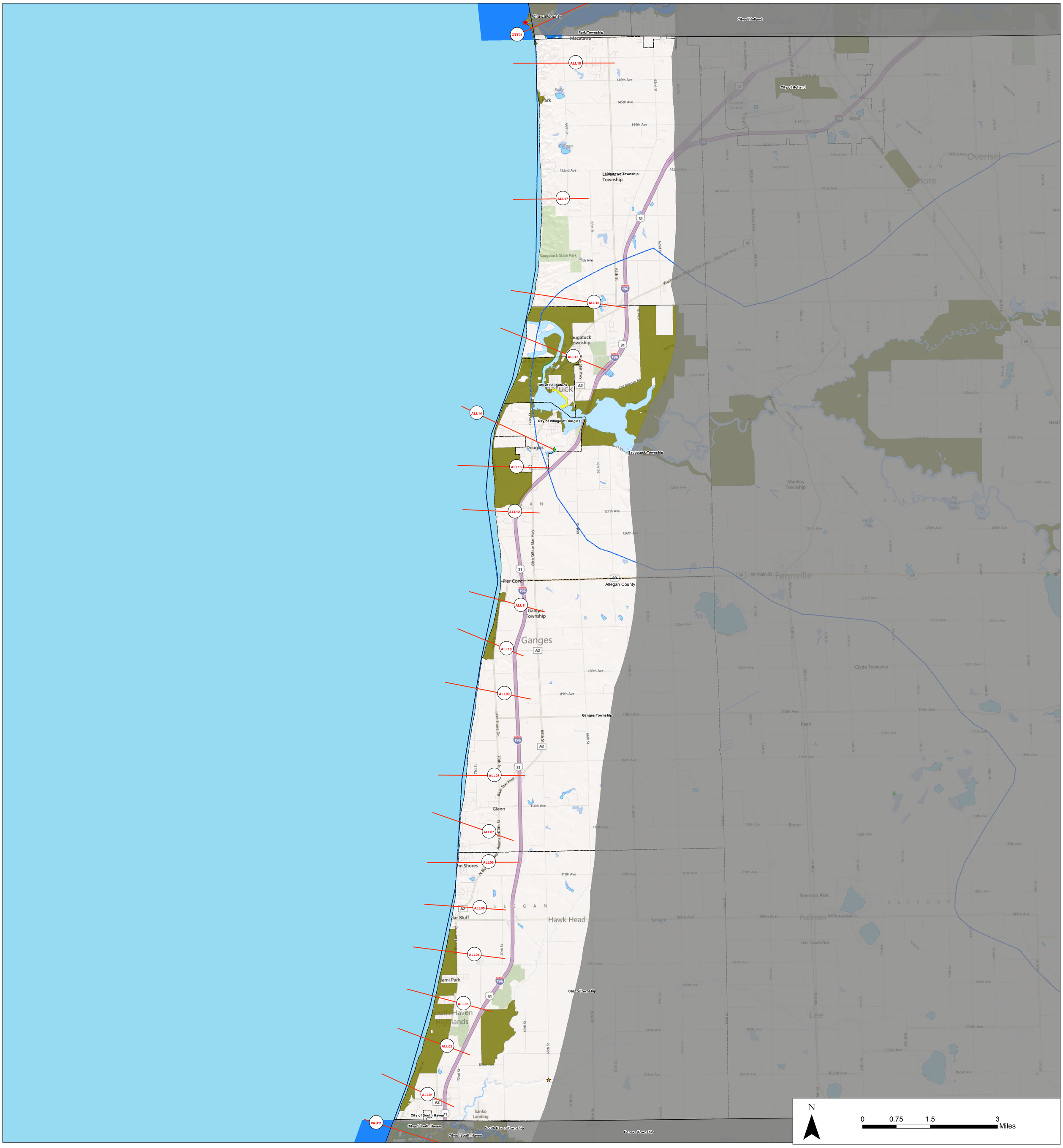
Who to Contact

- **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.

Allegan 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+

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map

LAKE MICHIGAN COASTAL STUDY

ALLEGAN COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

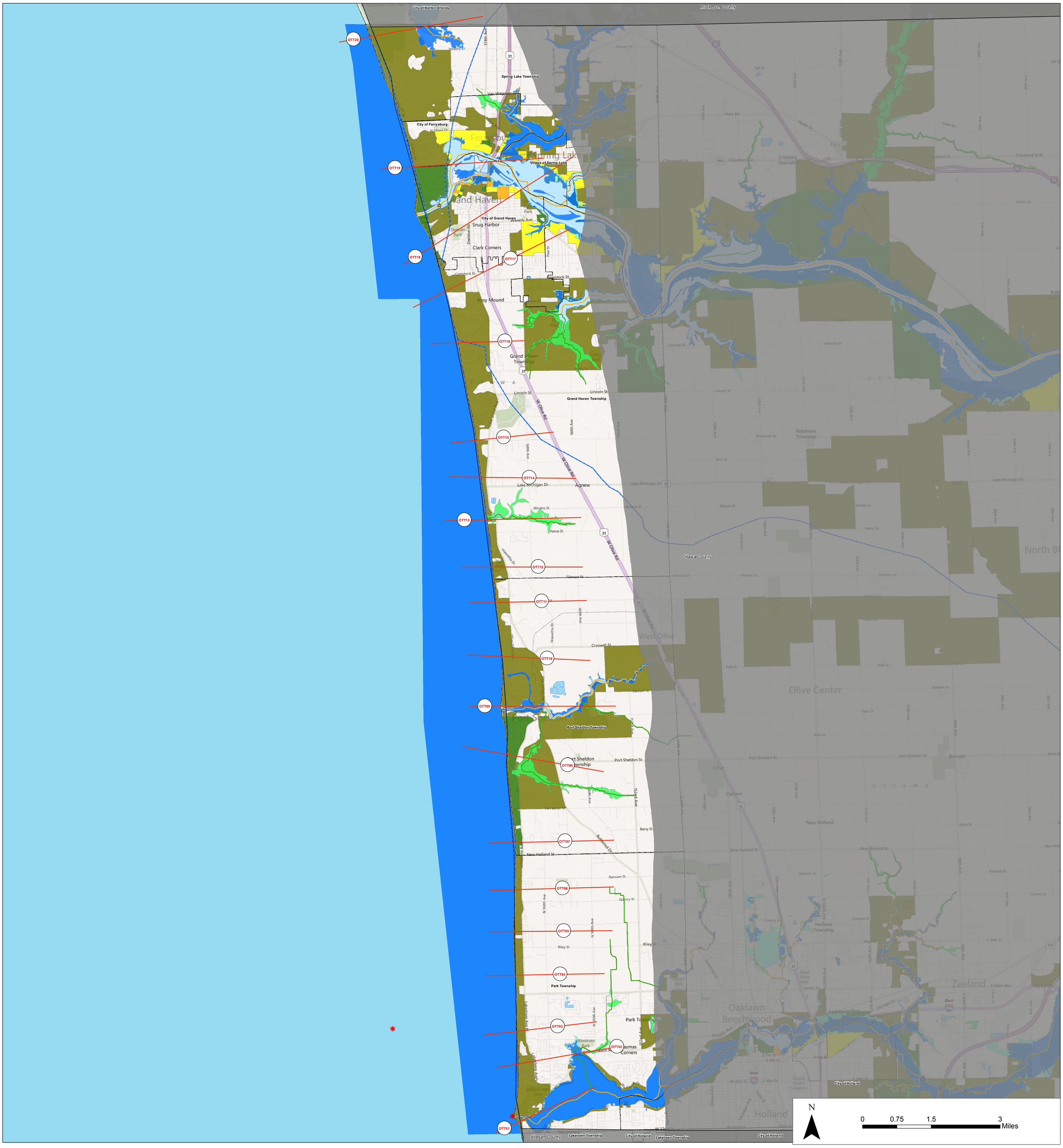
City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
Township of Laketown
City of Saugatuck
Township of Saugatuck
City of South Haven

STARR

FEMA

Attachment D.

Ottawa 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+

Effective SFHA

- 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

OTTAWA COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

STARR

FEMA

Attachment E.

Allegan and Ottawa Counties Proposed Transects

1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan	City of Saugatuck
Township of Casco	Township of Saugatuck
City of Douglas City	City of South Haven
Township of Ganges	Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 1 of 11

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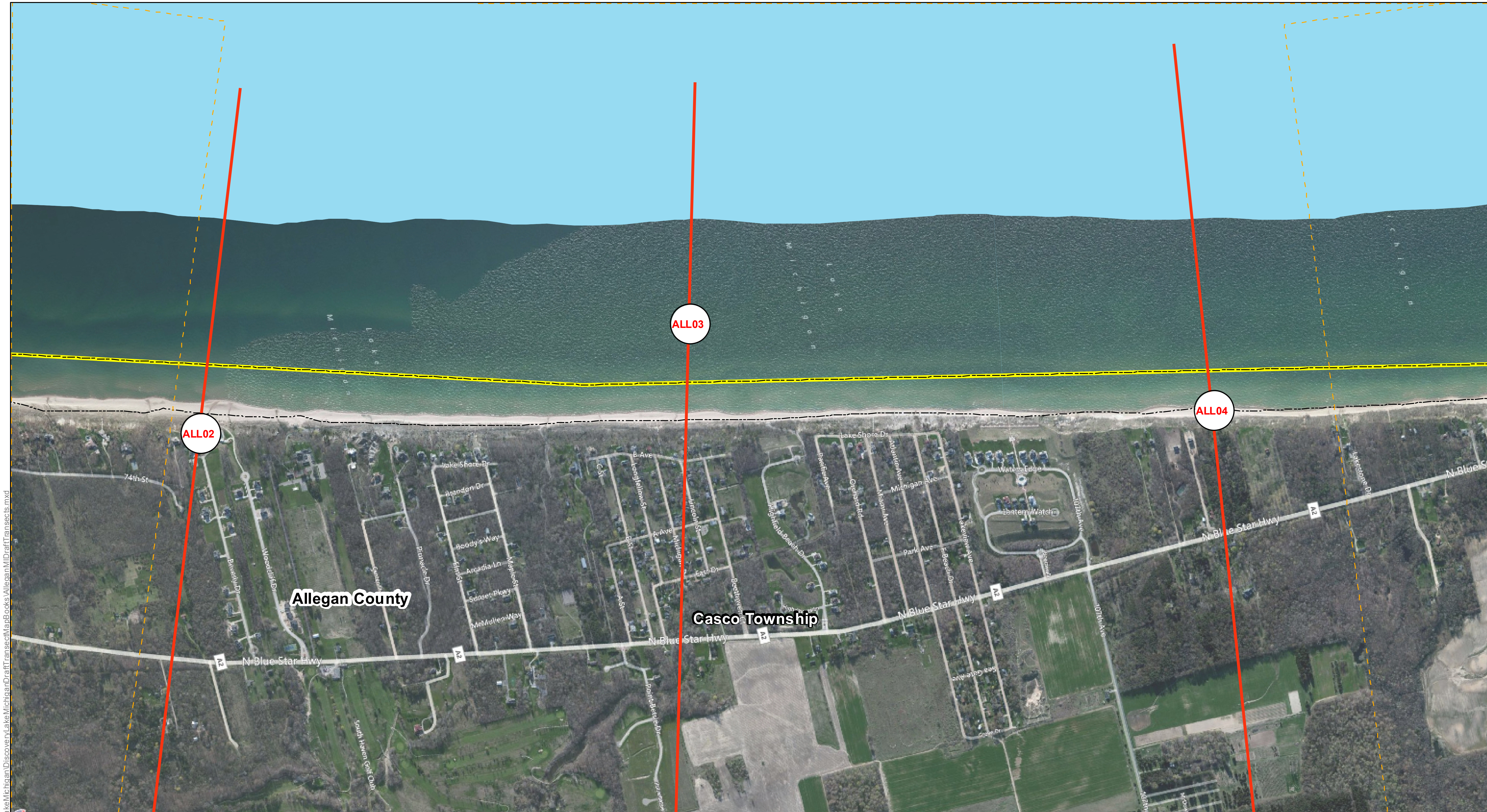

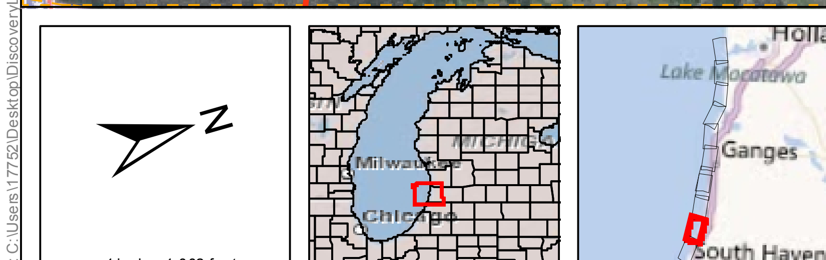

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan	City of Saugatuck
Township of Casco	Township of Saugatuck
City of Douglas City	City of South Haven
Township of Ganges	Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 2 of 11

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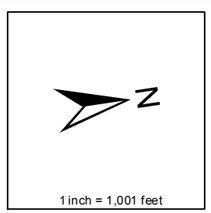

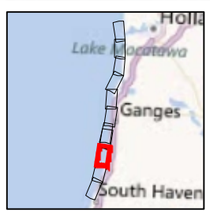

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 3 of 11

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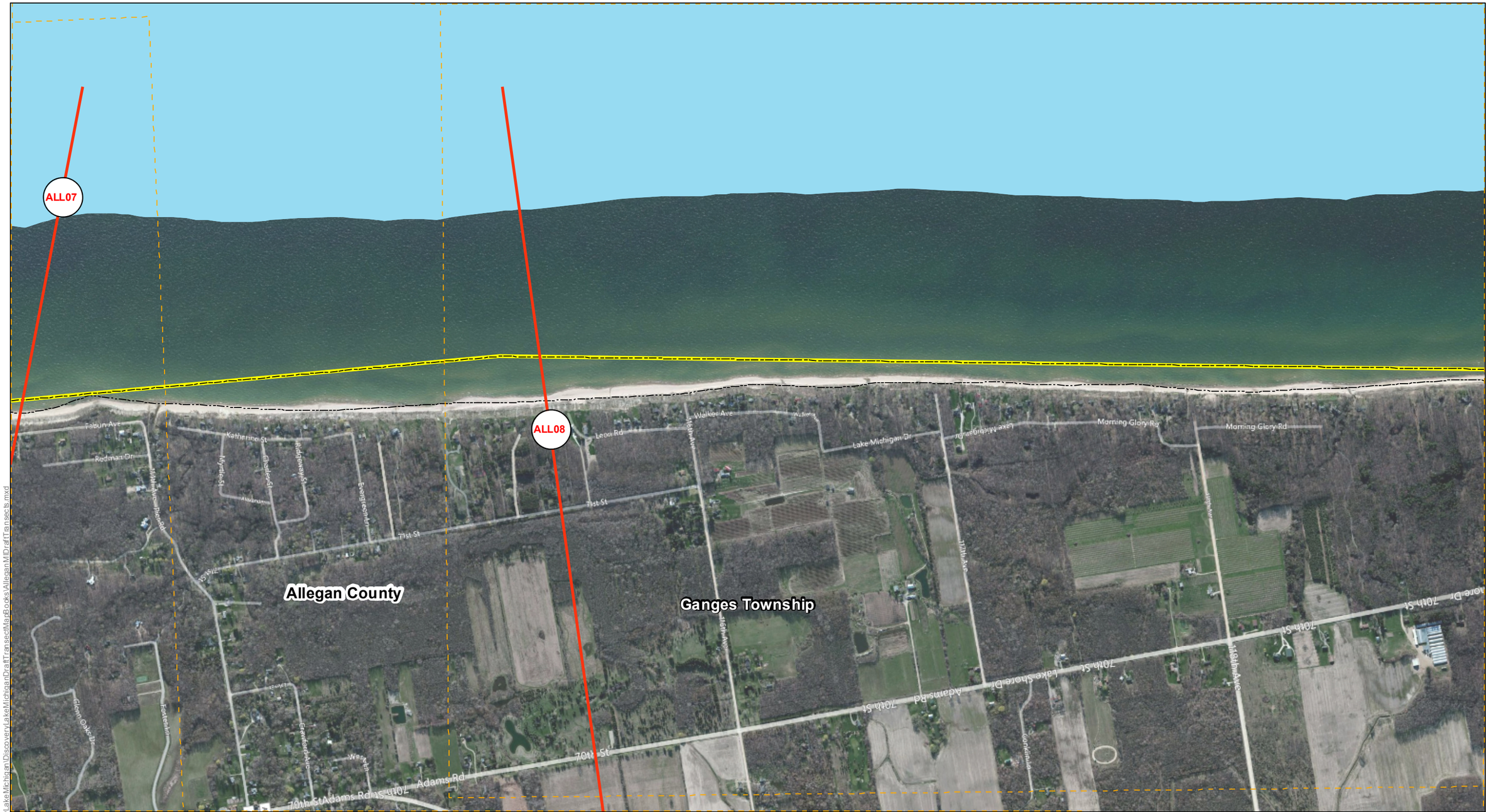

1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 4 of 11

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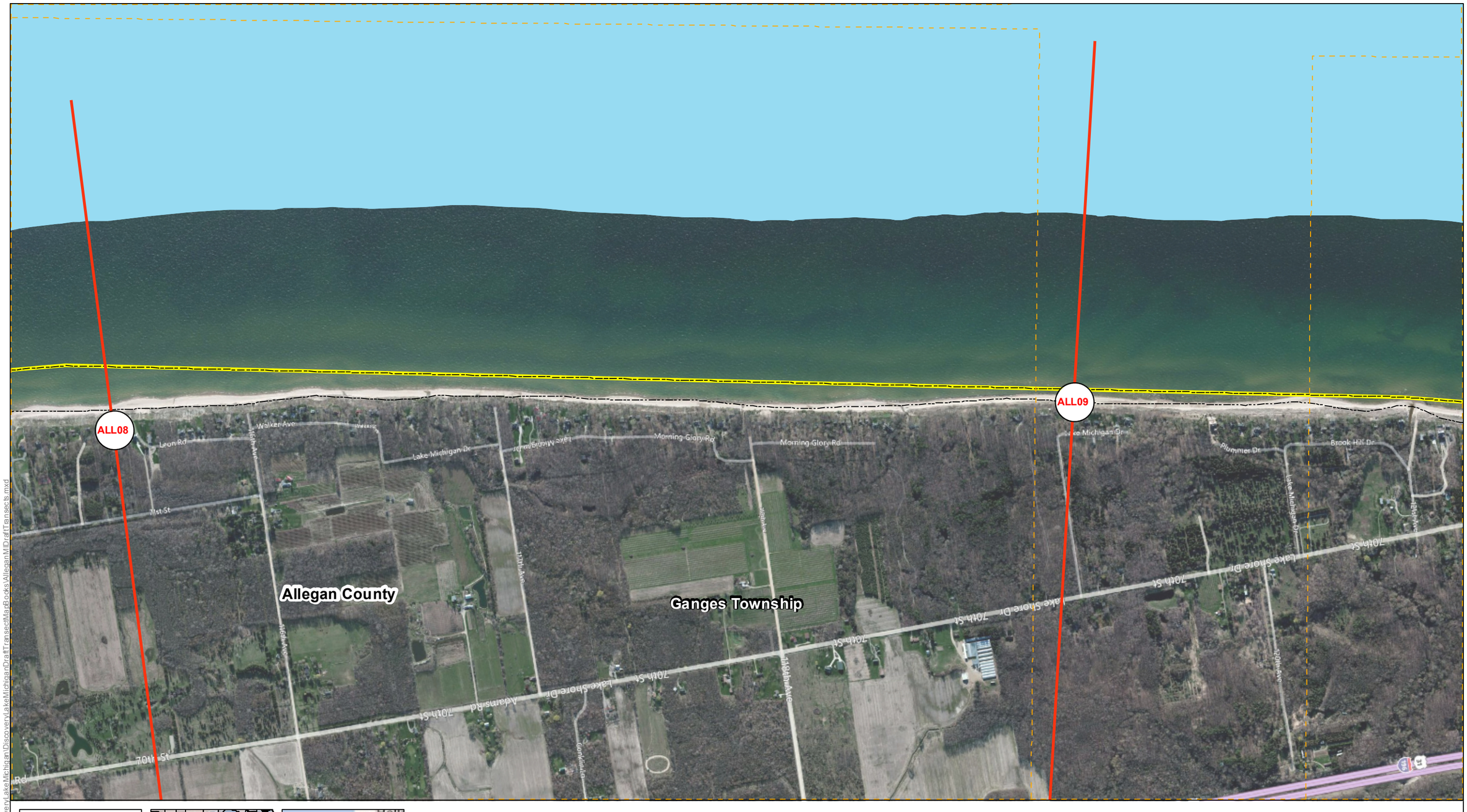

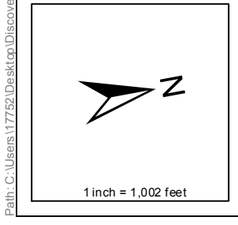

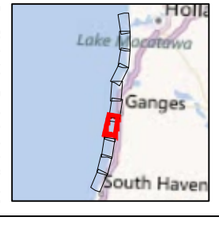

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 5 of 11

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ALL10

ALL11

Allegan County

Ganges Township

Saugatuck Township

Brook Hill Dr

70th St

Lake Shore Dr

Mary St

Blue Star Hwy

68th St

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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

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 6 of 11

ALL12

ALL13

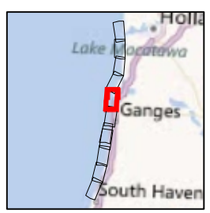
ALL14

Allegan County

Saugatuck Township

City of Village of Douglas

1 inch = 1,002 feet



Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 7 of 11

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ALL14

ALL15

City of Village of Douglas

Allegan County

City of Saugatuck

Saugatuck Township

1 inch = 1,003 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 8 of 11

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N

1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 9 of 11

1 inch = 1,001 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

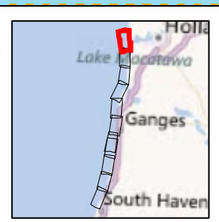
STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 10 of 11

N

1 inch = 1,002 feet



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

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Allegan
Township of Casco
City of Douglas City
Township of Ganges
City of Saugatuck
Township of Saugatuck
City of South Haven
Township of Laketown

Allegan County, Michigan
DRAFT TRANSECTS
Panel 11 of 11

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N

1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 1 of 10

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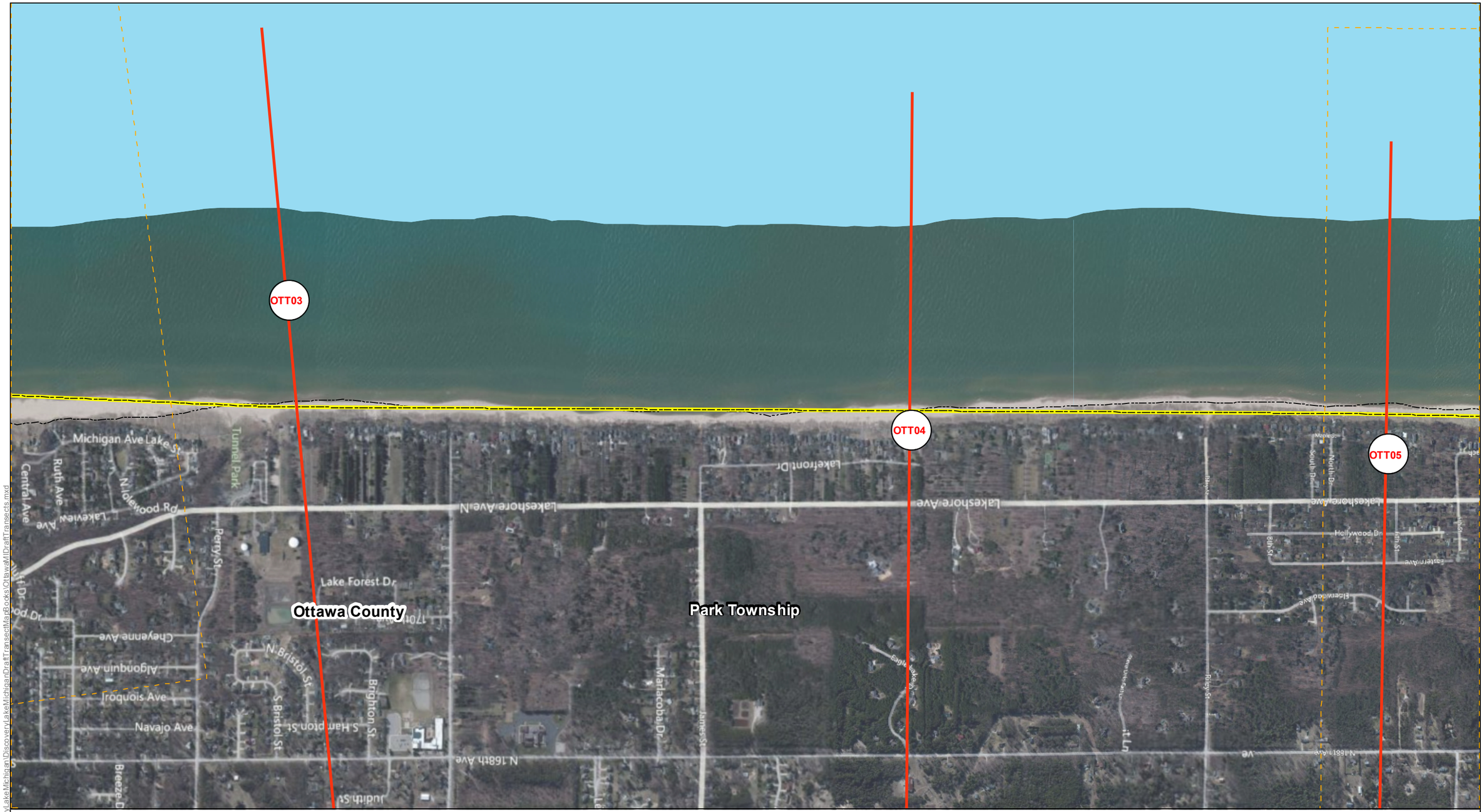

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N

1 inch = 1,001 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 2 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

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 3 of 10

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N

1 inch = 1,003 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 4 of 10

Grand Haven Township

Ottawa County

Port Sheldon Township

Lake Shore Ave

Olive Shore Ave

Olive Trail

Hiawatha Dr

Fillmore St

Hidden Treasure Dr

Rolling Dunes Dr

Sheldon Dunes Dr

Whitney Ridge

Sheldon St

Henry Hollow

Algonquin Dr

Croswell St

Lake Shore Ave

Polk St

Margaret Ave

OTT10

OTT11

OTT12

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N

1 inch = 1,003 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

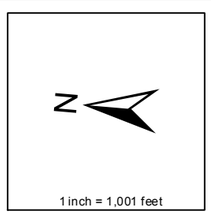
STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan

DRAFT TRANSECTS

Panel 5 of 10



Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 6 of 10

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N

1 inch = 1,001 feet

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

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 7 of 10

Ottawa County

City of Grand Haven

Grand Haven Township

OTT16

OTT17

OTT18

1 inch = 1,002 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 8 of 10

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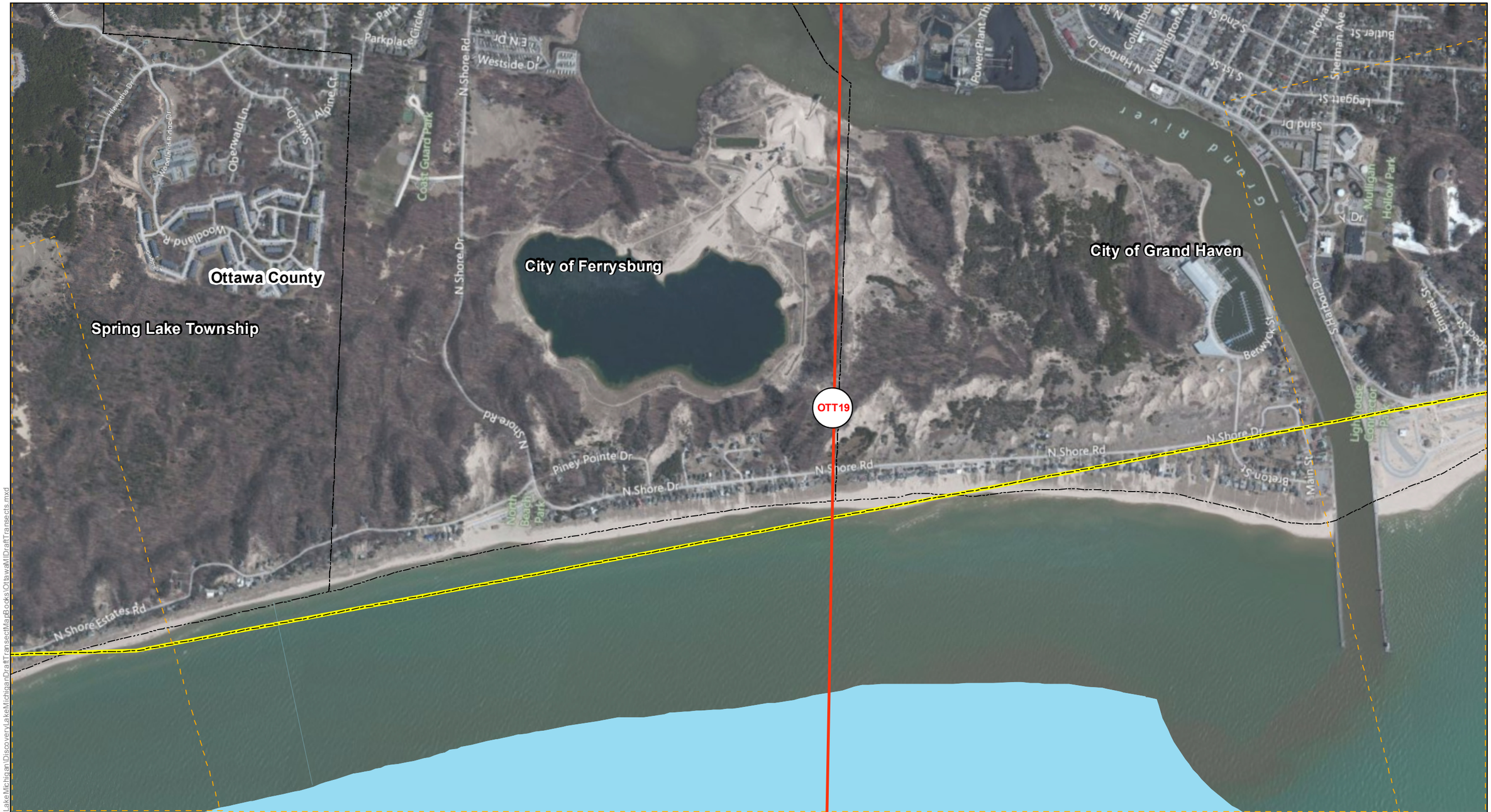

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan
DRAFT TRANSECTS
Panel 9 of 10

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Muskegon County

City of Norton Shores

PJ Hoffmaster State Park

Ottawa County

Spring Lake Township

Hoffma

Sioux Dr

Iroquois Dr

Pawnee

Aztec Dr

N Shore Estates Rd

N Shore Estates Rd

OTT20

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N

1 inch = 1,002 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Ferrysburg
City of Grand Haven
Township of Grand Haven Charter
City of Holland
Township of Park
Township of Port Sheldon
Township of Spring Lake

Ottawa County, Michigan

DRAFT TRANSECTS

Panel 10 of 10

Attachment F.

Allegan and Ottawa 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:	Tuesday, September 11, 2012
Time:	9:00am – 11:00am
Location:	Ottawa County Fillmore Street Complex Board Room
Address:	12220 Fillmore Street, Room 310, West Olive, Michigan 49460

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:	Tuesday, August 7, 2012
Time:	10:00am – 11:00pm EST
Link to WebEx:	https://www.webex.com/login/attend-a-meeting
Meeting No:	654 116 201
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

Tuesday, September 11, 2012
9:00am - 11:00am ET
Ottawa County Fillmore Street Complex Board Room
12220 Fillore Street, Rm 310
West Olive, MI 49460

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
1		City of Grand Haven	Planning and Community Development	Kristin	Turkelson	20 N Fifth Street Grand Haven, MI 49417	(616) 847-3490	kturkelson@grandhaven.org
2		Spring Lake Township	Community Development Director	Lukas	Hill	106 S. Buchanan St.Lake, MI 49456	(616) 844-2110	LHill@springlaketwp.org
3		City of Holland	Zoning Administrator	Dan	Theile	270 S. River Avenue Holland, MI 49423	(616) 355-1340	d.theile@cityofholland.com
4		City of Ferrysburg	Zoning Administrator	Craig	Bessinger	17290 Roosevelt Road, P.O. Box 38 Ferrysburg, MI 49409	(616) 842-5803	cbessinger@ferrysburg.org
5		Port Sheldon Township	Township Supervisor	Howard	Baumann	16201 Port Sheldon St. West Olive, MI 49460	(616) 399-6121	howard@portsheldontwp.org
6		FEMA	FEMA Region V	Ken	Hinterlong	536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5529	Ken.Hinterlong@fema.dhs.gov
7		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
8		STARR	Project Manager/Coastal Engineer	Stacey	Roberts		(850) 580-7896	stacey.roberts@starr-team.com
9		STARR	Outreach Coordinator	Holly	Davis		(904) 363-8451	holly.davis@atarr-team.com
10		STARR	Sr. Technical Coordinator	Janet	Luce		(321) 242-4942	janet.luce@atkinsglobal.com

Tuesday, September 11, 2012
9:00am - 11:00am ET
Ottawa County Fillmore Street Complex Board Room
12220 Fillore Street, Rm 310
West Olive, MI 49460

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
11	MG	F&V ENGINEERING	SURVEY GROUP MANAGER	MAX	GEORGE	2960 LUCERNE DR SE GRAND RAPIDS, MI 49546	616-977-1000	MGEORGE@FVENG.COM
12		OTTAWA DRAIN	DRAIN COMMISH.	PAUL	GEERLINGS	12220 FILLMORE ST Room 141 WEST OLIVE, MI 49460	616-994 4530	PGeerlings@miottawa.org
13		LAKETOWN TWP	MANAGER	AL	MESKEN	4336 BASELINE HOLLAND, 49423	616-335 3350	AL@LAKETOWNTWP.ORG
14	SP	Ottawa County GIS	GIS System Analyst	Shane	Pavlak	12220 Fillmore St Suite 200 west Olive, mi 49460	616-738-4602	Spavlak@miottawa.org
15	ED	Park Township	Building Services Director	Eric	Davis	52 152nd Ave. Holland, MI 49424	616-738-4294	edavis@parktownship.org
16		City of Grand Haven	City Mgr	Pat	McGinnis	519 Washington Grand Haven 49417	616 847-4888	pmcginnis@grandhaven.org
17	KT	City of Grand Haven	City Planner	Kristin	Turkelson	519 Washington	616 935 3276	kturkelson@grandhaven.org
18	MV	City of Grand Haven	GIS Tech	Matt	VanPortfliet	519 Washington	616-935-3210	mvanportfliet@grandhaven.org
19	WH	CGH	Director	Bill	Hunter	519 Washington	847 3493	bhunter@grandhaven
20	AGV	County of Ottawa	County Administrator	Al	Vanderberg	12220 Fillmore St West Olive MI 49460	616-738-4068	aVanderberg@miottawa.org

Tuesday, September 11, 2012
9:00am - 11:00am ET
Ottawa County Fillmore Street Complex Board Room
12220 Fillore Street, Rm 310
West Olive, MI 49460

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
21	JAS	Ottawa County Parks	Director	John	Schalk	12220 Fillmore	616-738-4809	jschalk@miottawa.org
22	M.O.	MDEQ	Floodplain Engineer	Matt	Occhipinti	350 OTTAWA GR MI 49503	616-356-0207	occhipintim@michigan
23	BJW	CITY OF HOLLAND	CITY ENGINEER	BRIAN	WHITE	353 WASHINGTON AVE	616-928-2448	b.white@cityofholland.com
24								
25								
26								
27								
28								
29								
30								

Meeting Schedule: Tuesday, September 11, 2012 9:00 – 11:00 am (ET)
Meeting Location: Ottawa County Fillmore Street Complex Board Room, West Olive, MI

PARTICIPANTS

FEMA
Ken Hinterlong, FEMA Region V
Erin Maloney, FEMA Region V

Michigan DEQ
Matt Occhipinti, DEQ

STARR Contractor
Stacey Roberts, STARR
Wayne Lasch, 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. How do you take into account the lake levels and the 1% chance annual storm event? *Using the documented methodology, included in Appendix D.3 – the Brun Rule is used to estimate the eroded profiles as taken from the new LIDAR data, a collective effort with NOAA and USACE.*
   2. How far inland will the LIDAR go*? Approximately 500 meters.*
   3. What is the resolution the LIDAR currently being flown*? Points will be provided by the USACE on a spacing of 1 meter.*

B. Questions/comments raised during the discussion and break out session
   1. The communities mentioned that the USACE is holding public meetings to discuss existing jetties/piers and what would happen if they fail (e.g., effects on flooding). This is in association with the USACE Coastal Structures Inventory Assessment.
   2. Saugatuck State Park – Remnant derelict structures along the shoreline.
   3. Several notes were made on the draft maps (see maps.)

C. General notes
   1. None for this meeting

FEATURES NOTED ON MAPS:

State	County	Community	FIPS	CID	Comment	Type
Michigan	Allegan	City of Saugatuck	26005	260305	State Park	General Comment
Michigan	Allegan	Laketown Township	26005	260253	Residential houses (less than 20 houses).	General Comment
Michigan	Allegan	Macatowa	26005		Dense residential	General Comment
Michigan	Ottawa	City of Ferrysburg	26139	260184	County park.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	Old structure (buried) put in years ago. USACE constructed the structure. Periodically inspected.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	Condo with issues - floods now.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	Active (buried) water intake.	General Comment
Michigan	Ottawa	City of Grand Haven	26139	260269	20-inch water main that crosses Grand Lake River and runs along street.	General Comment
Michigan	Allegan	Laketown Township	26005	260253	Transect 13; nearly no development, most development near 14 - may want to adjust transects	Transect Comment
Michigan	Allegan	Laketown Township	26005	260253	Request to move transect 14 south	Transect Comment

ACTIONS:

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

FEMA

Lake Michigan Discovery

Allegan County, MI
Ottawa County, MI

September 11, 2012
9am to 11am ET

Ottawa County Fillmore Street
Complex Board Room
West Olive, 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

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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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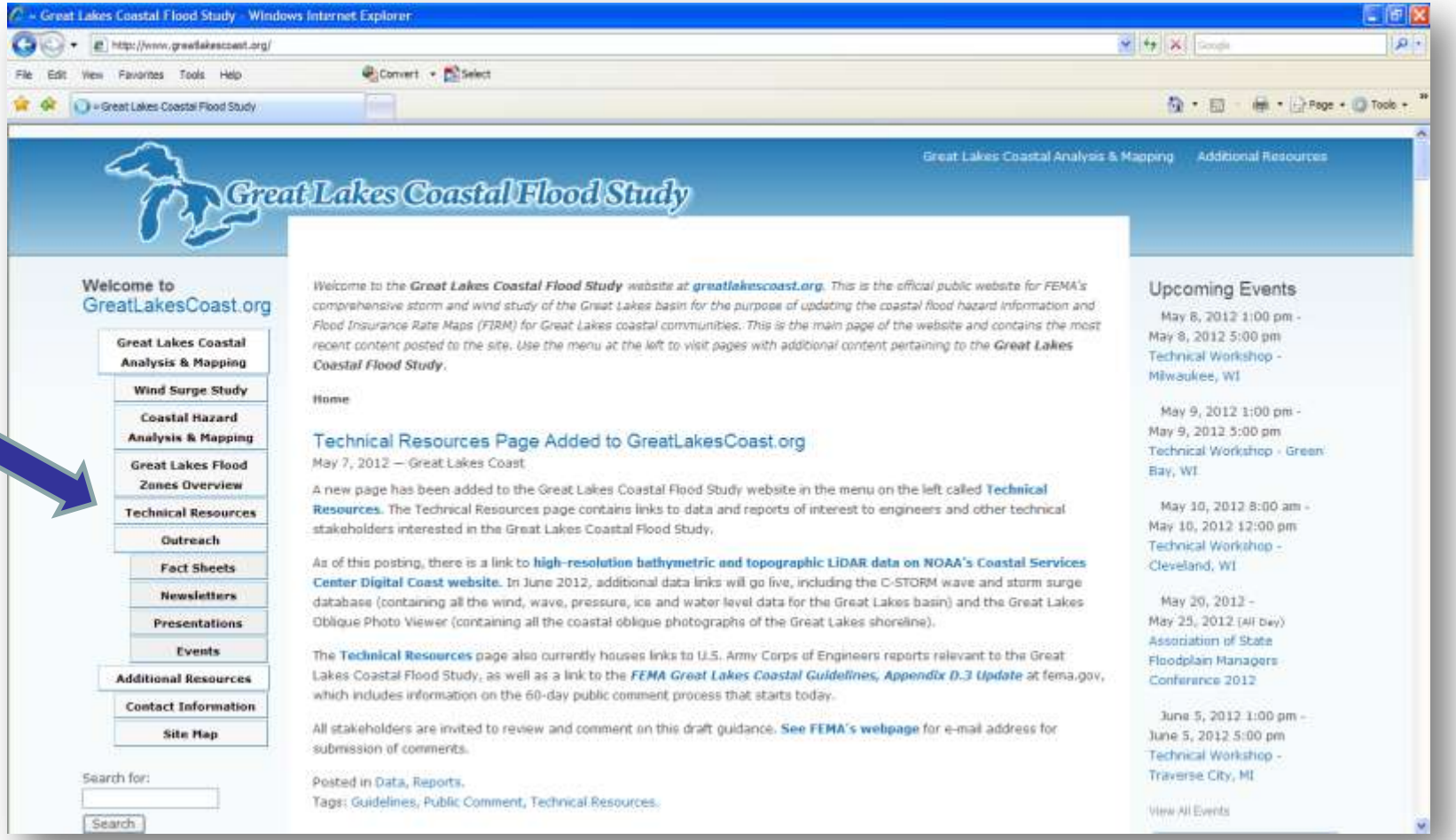
Technical Resources



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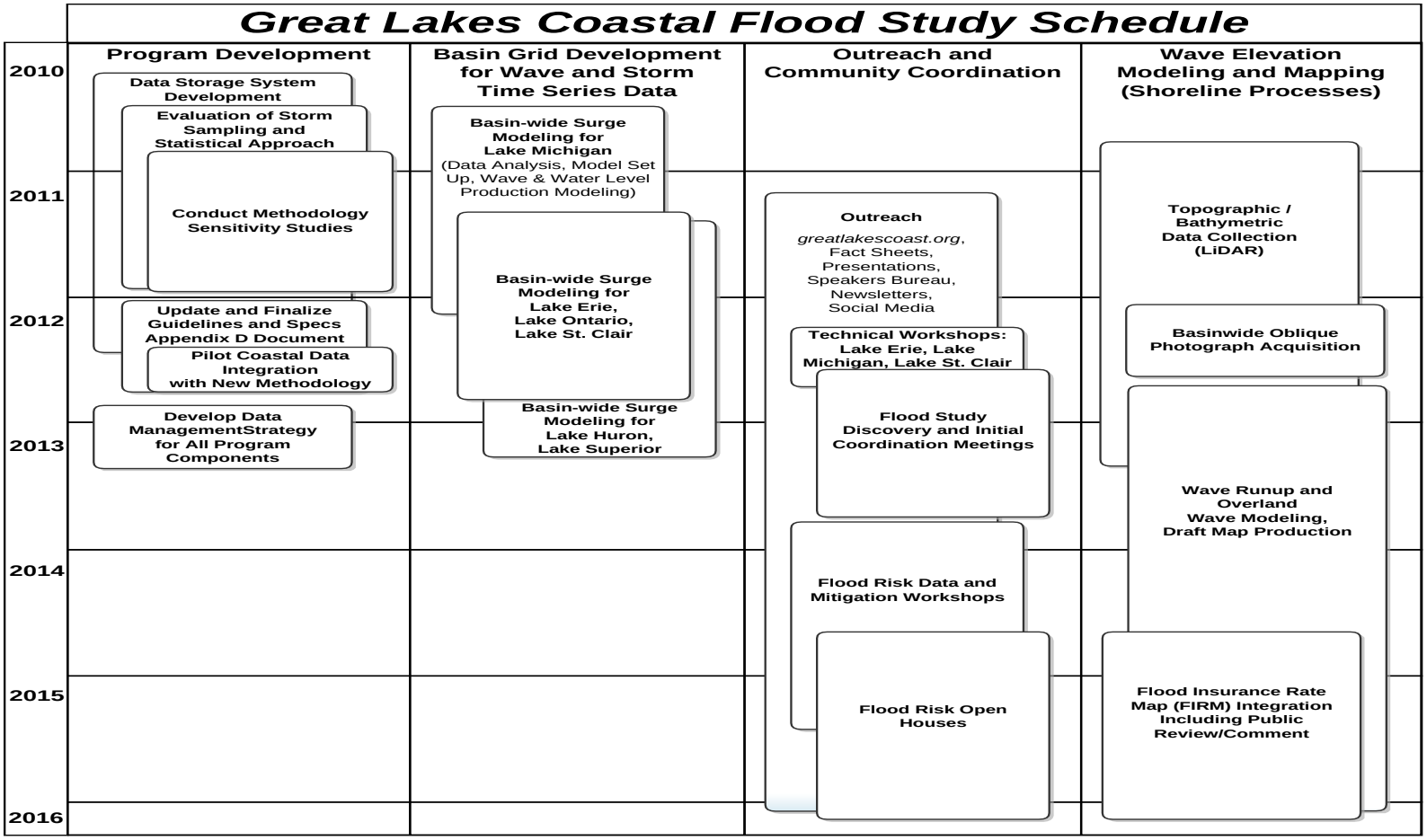
Great Lakes Coastal Flood Study Schedule

FEMA



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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 Allegan and Ottawa Counties:

Allegan County	Ottawa County
Allegan, City of	Ferrysburg, City of
Casco, Township of	Grand Haven , City of
Douglas City, City of	Grand Haven Charter, Township of
Ganges, Township of	Holland, City of
Laketown, Township of	Park, Township of
Saugatuck, City of	Port Sheldon, Township of
Saugatuck, The Charter Township of	Spring Lake, Township of
South Haven, City of	

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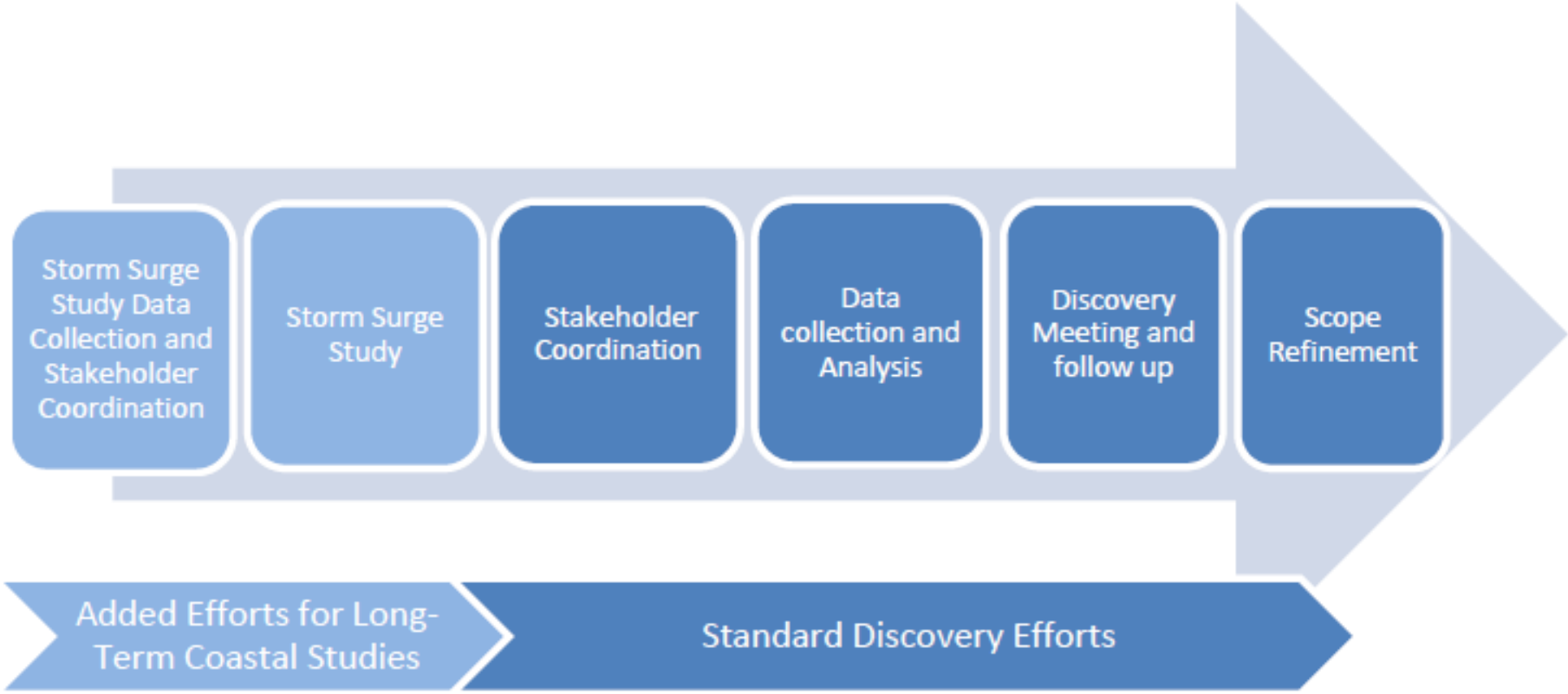
Discovery Schedule Overview



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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

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

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

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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)

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Draft Transect Layout
Allegan and Ottawa Counties

FEMA

County	# Shoreline Miles	# Transects
Allegan	23	14
Ottawa	42	16

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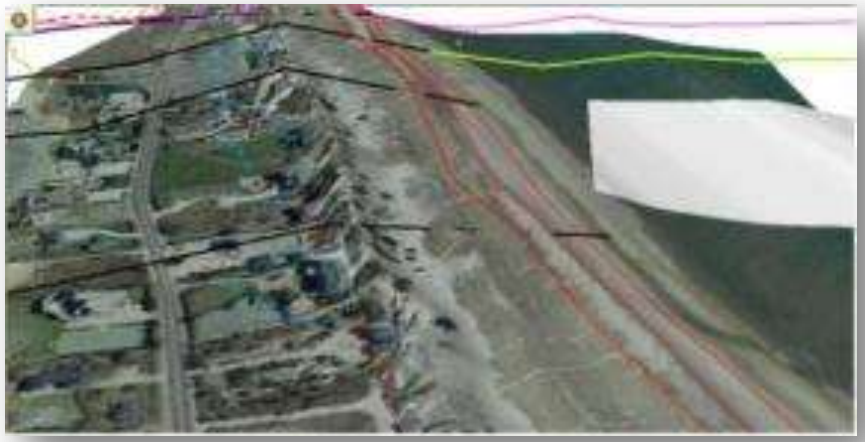
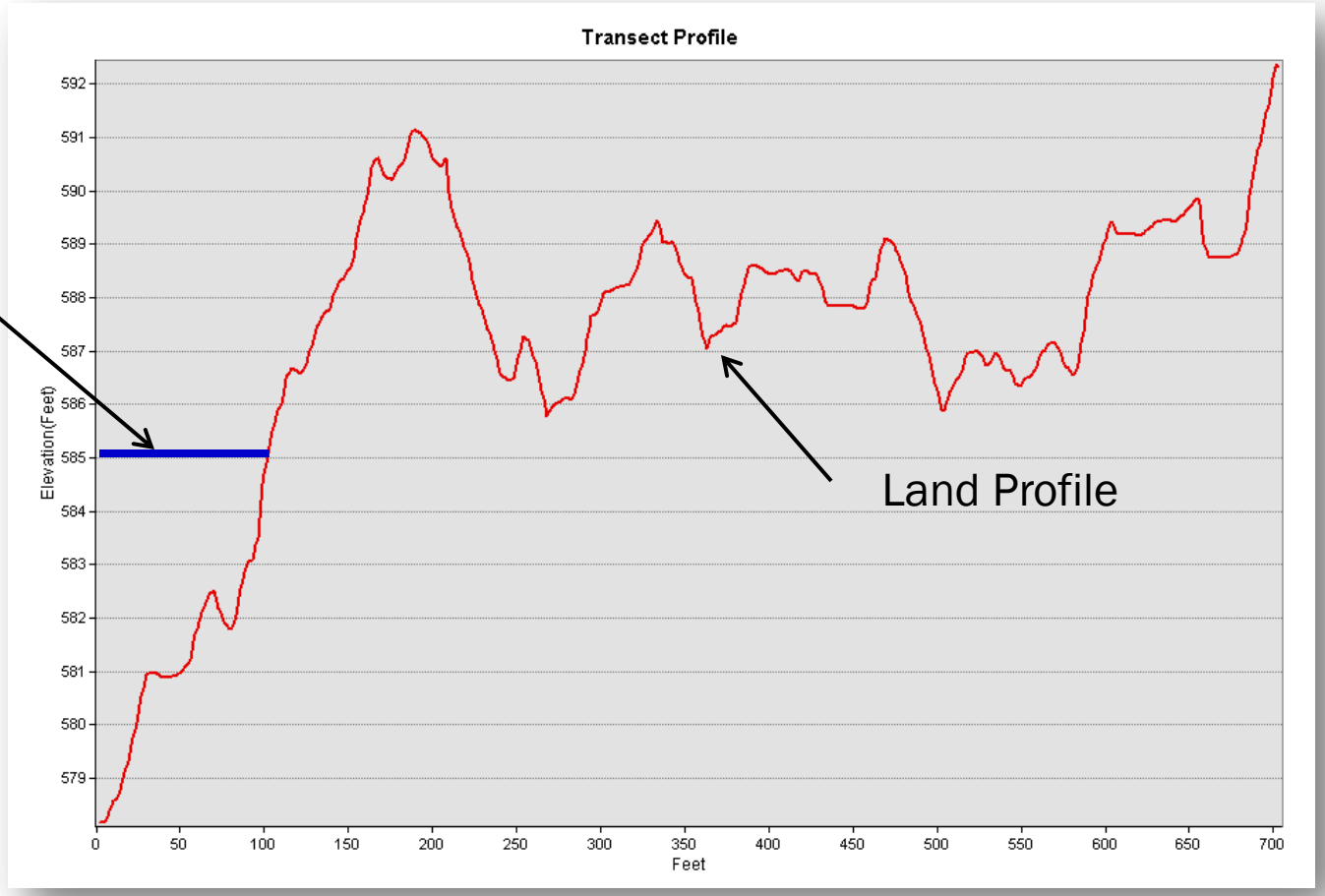
Transect Placement

- 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



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Basic Elements of a Coastal Hazard Analysis

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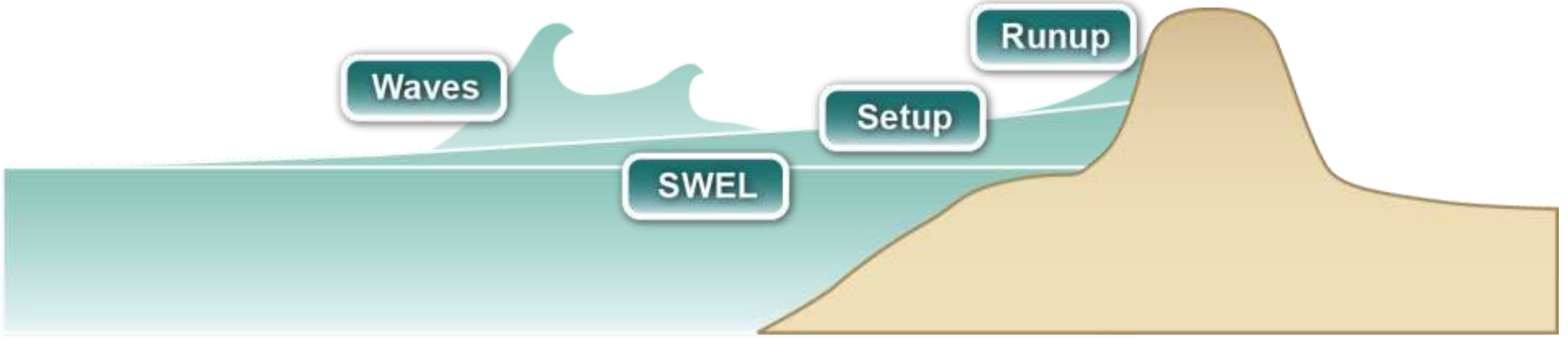
Base Flood Elevation (BFE) on FIRM includes 4 components:

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

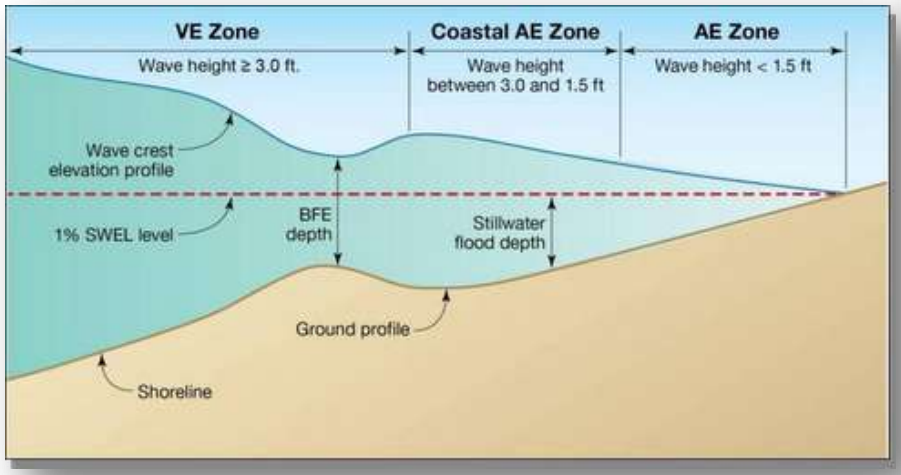
How is Limit of Moderate Wave Acton (LiMWA) Defined?

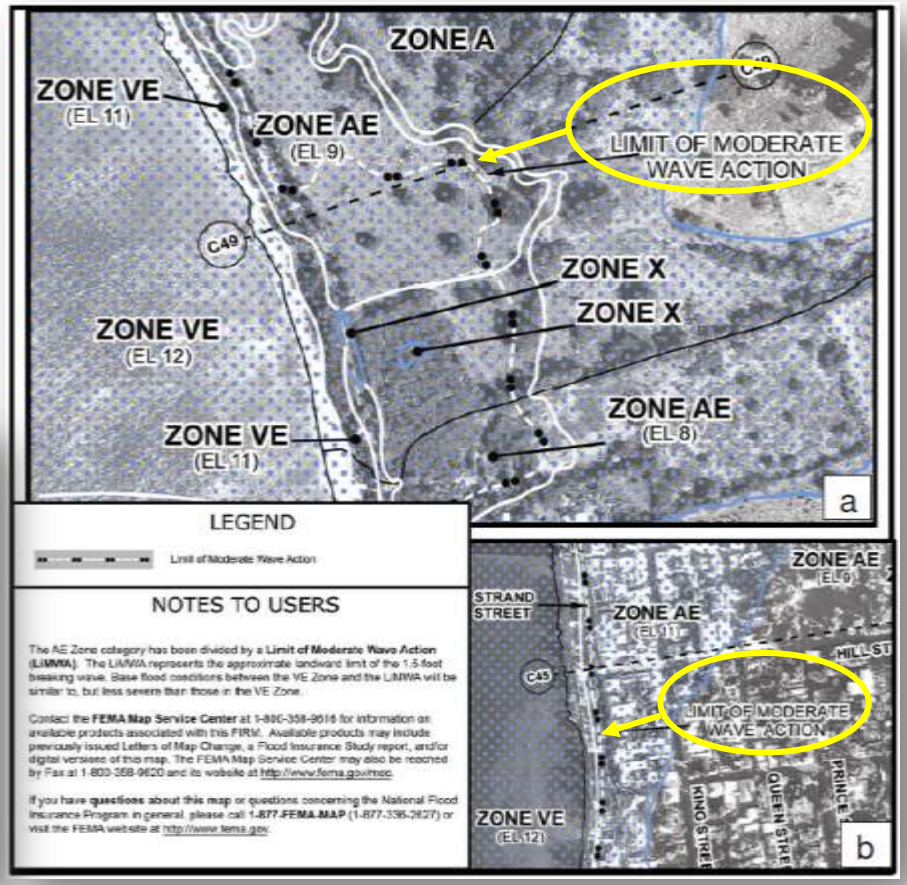
- LiMWA is the line mapped to delineate the inland extent of wave heights of at least 1.5 feet
  - Wave heights as small as 1.5 feet can cause significant damage to structures
- LiMWA is the same as coastal AE zones and can trigger coastal building codes for certain communities
- Community Rating System (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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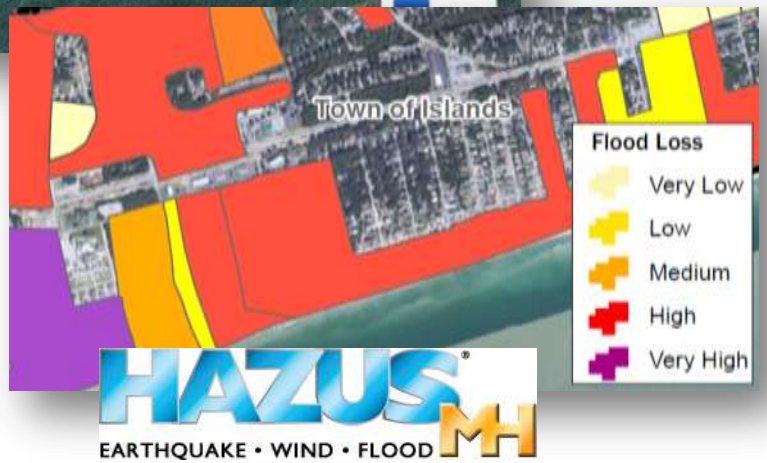
Standard Flood Risk Products

- 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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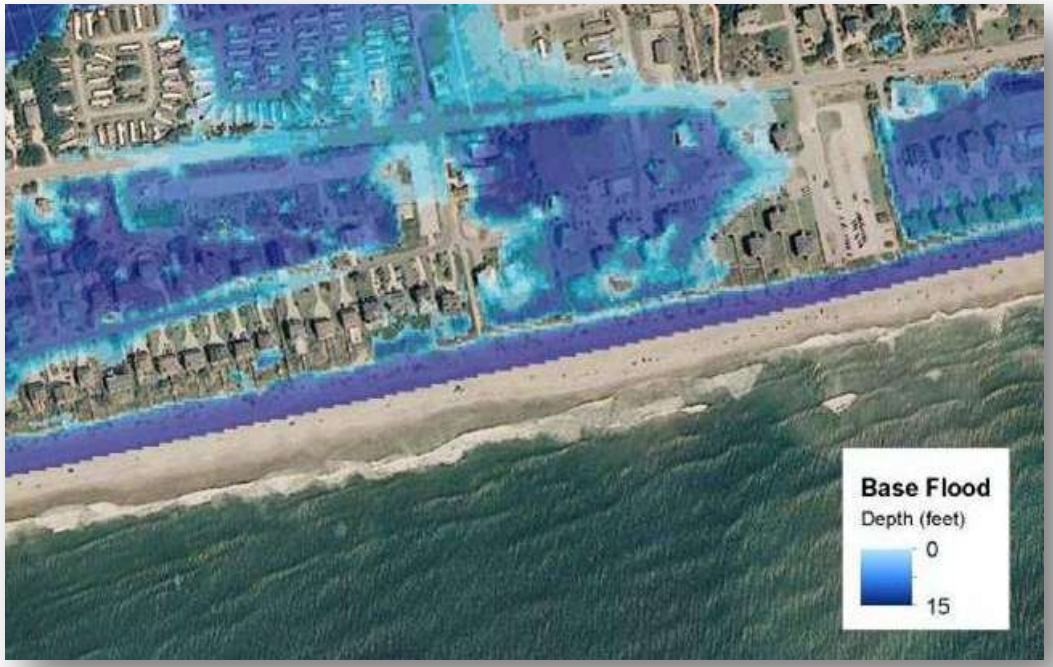
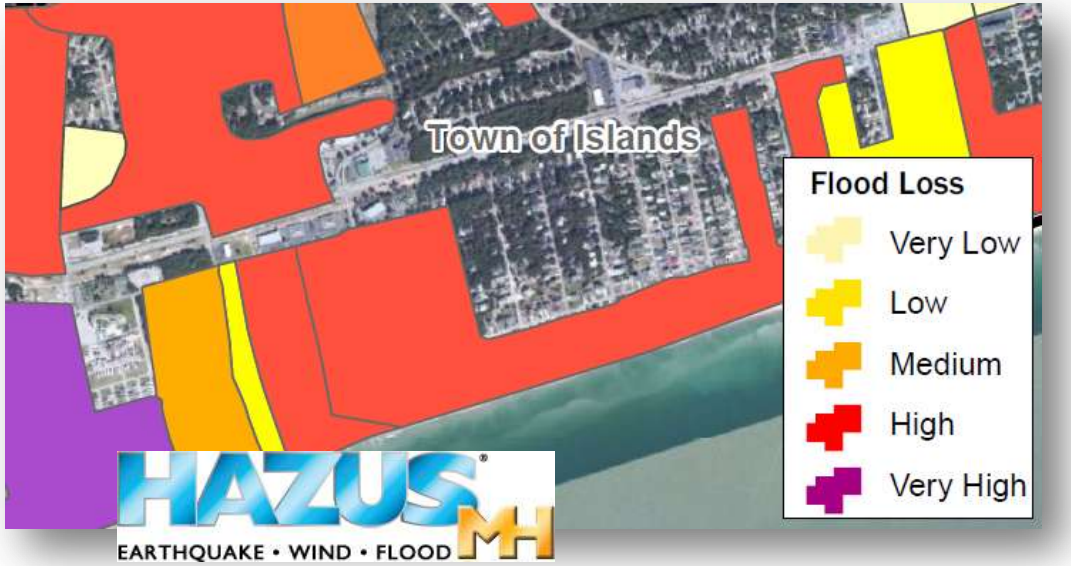
Coastal Depth Grid

- 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

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

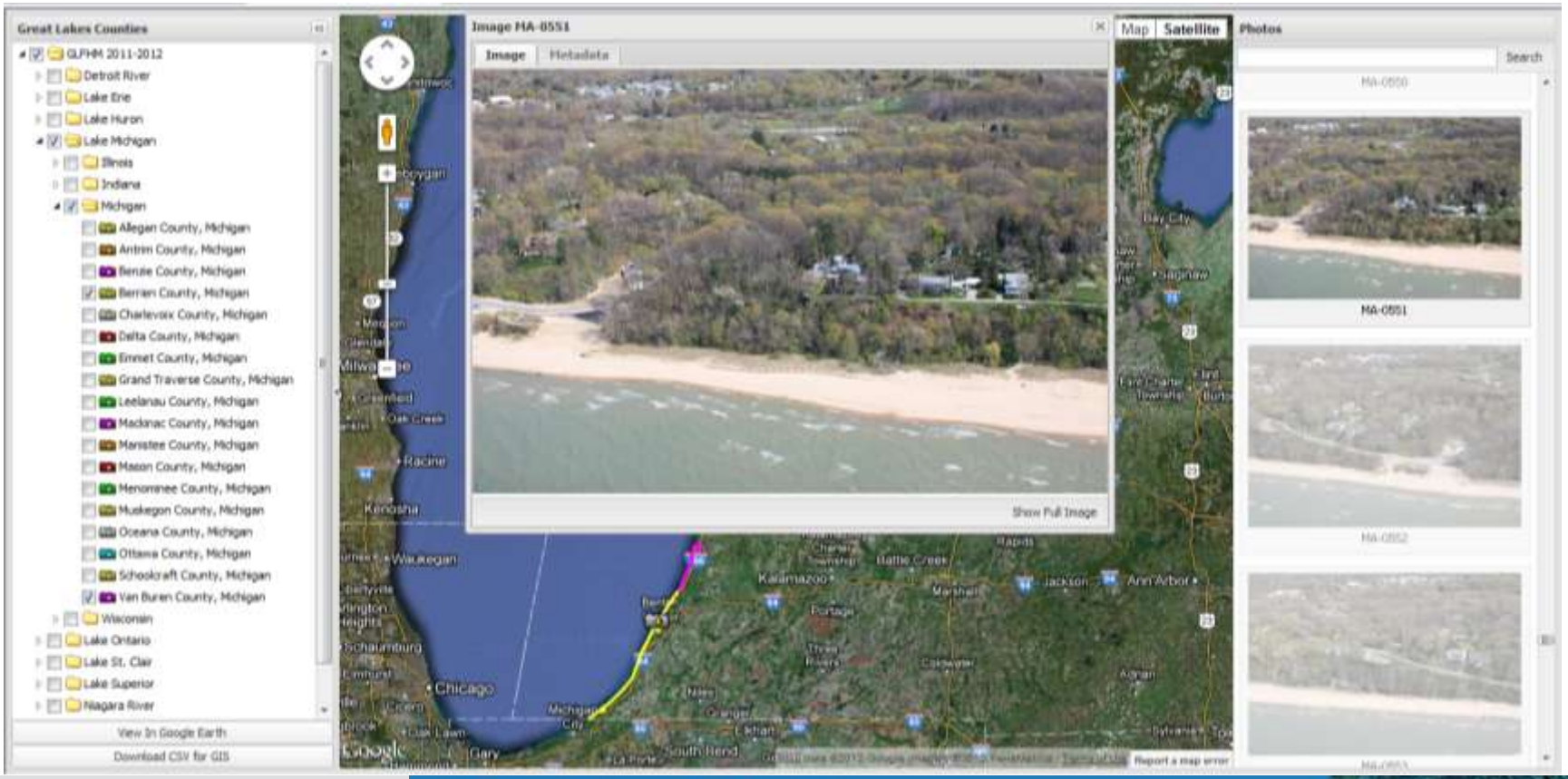
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

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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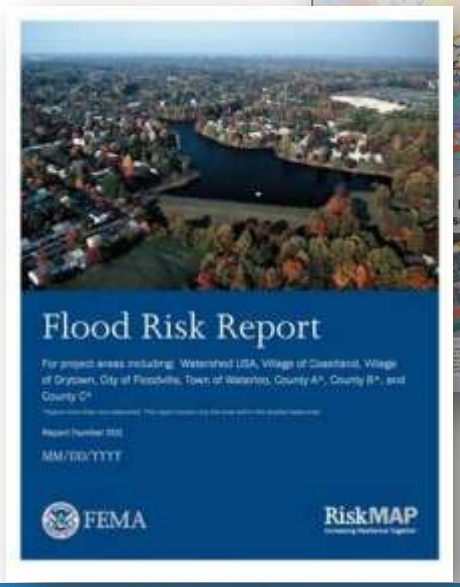
Coastal Flood Risk Map and Report

- 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

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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 asso

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 Su
☐ 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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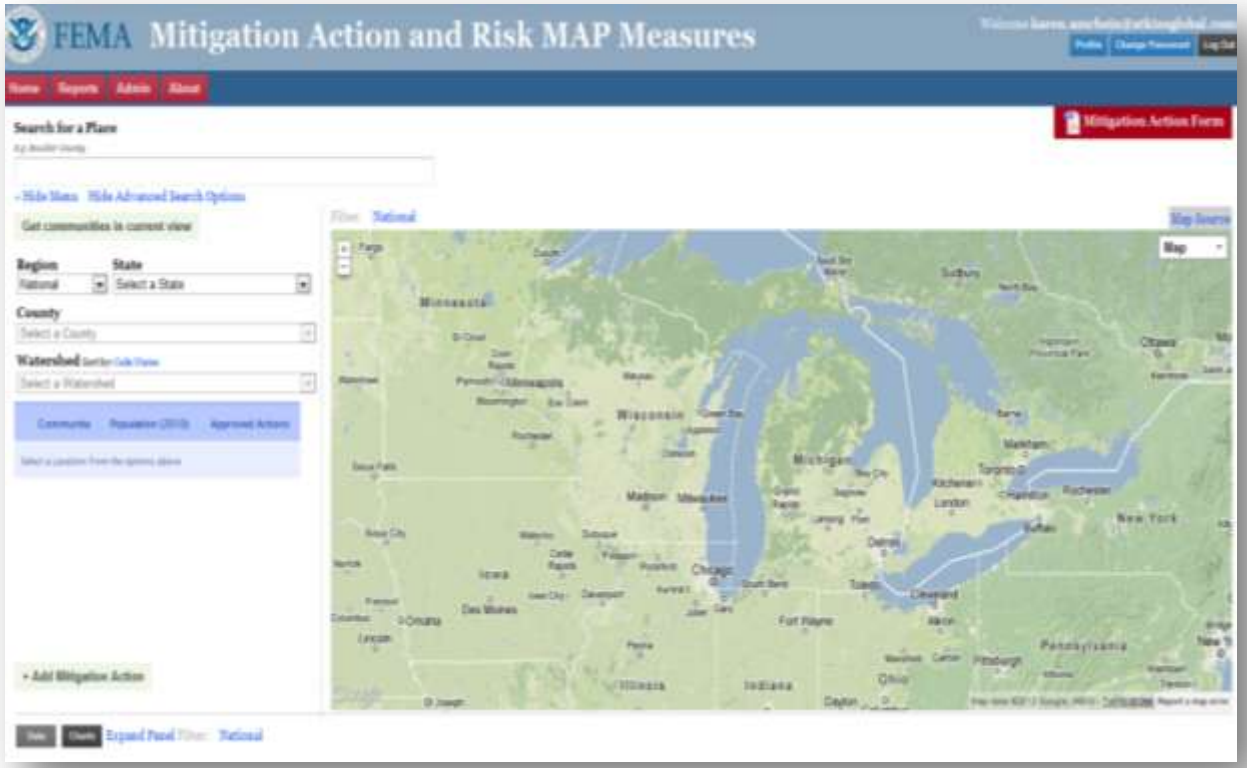
Action Tracker



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

- 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

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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

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Allegan County, MI
Discovery Map

FEMA

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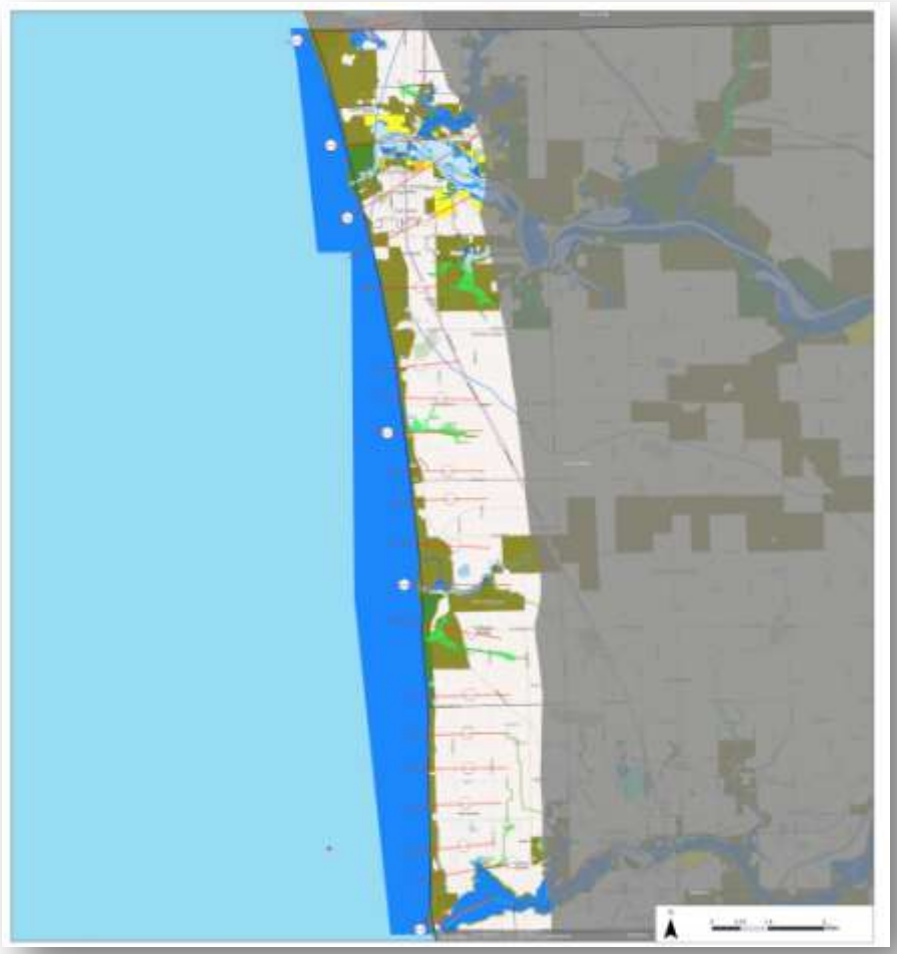
Ottawa County, MI
Discovery Map



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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

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.

Hazard Mitigation Actions for Allegan and Ottawa Counties, MI

Name of Plan	County	Hazard Mitigation Actions and Strategies
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Use available technology to identify potential hazard-event losses so as to mitigation them.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Ensure that necessary supplies are available for responders.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Assist state and federal agencies in flood mitigation efforts.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Enhance warning capabilities throughout the county.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Undertake structural projects to lessen flood damage.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Stockpile sandbags at strategic locations throughout the county.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Establish mutual aid agreements or contracts with sand suppliers to facilitate rapid filling of sandbags during flooding events.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Provide supplies (e.g. ATVs, medical supplies, etc.) to local officials/residents to provide access to isolated areas in the county to supplement first responder capabilities.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Provide assistance to the Federal Emergency Management Agency (FEMA), as requested, for the on-going flood map modernization project.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Purchase the necessary software to run new digital FEMA flood maps once the flood map modernization project is complete.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Provide training to local officials on the software purchased to run maps developed by the flood map modernization project.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Provide weather monitors (not just NOAA weather radios) to schools and nursing homes.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Research funding programs to increase staff with the county road commission to perform bridge inspections following flooding events.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Construct flood walls to protect vulnerable areas in the incorporated areas of the county.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Coordinate with the County Road Commission and the County Transportation Department to identify ways in which to prevent coastal erosion damage to township roadways.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Coordinate with the County Road Commission and the County Transportation Department to identify measures to take to protect local roadways from coastal erosion.
Allegan County 2005 Hazard Mitigation Plan	Allegan County	Coordinate with the County Road Commission and the County Transportation Department to identify measures to take to protect local roadways, particularly Lake Shore Drive, from coastal erosion.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Apply the principles of the Unified National Program for Floodplain Management to flood mitigation.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Modify human susceptibility to flooding: encourage and assist with floodproofing homes and businesses; improve flood forecasting and warning.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Modify the impact of flooding: raise awareness; make all levels of the community better prepared to respond to and recover from flooding.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Change the flooding itself: add floodwater storage; provide structural protection to developed areas where possible, without increasing flooding elsewhere.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Preserve and restore natural resources: stabilize riverbanks using natural means; improve the health of our rivers.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Reduce the impact of hazards on citizen life, health and economic well-being based upon a continuing hazard risk and vulnerability analysis.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Allendale Township is currently updating its 2003 master plan, and this plan should include a consideration of hazard mitigation concepts and strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems serving the township beyond the Grand Valley State University campus.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance, in addition to those potential improvements already studied/proposed for the Grand Valley State University campus.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Large portable generators for buildings with quick disconnect to operate buildings if they are out of power. A very large diesel generator that will be able to operate our main power building. Smaller portable lighting systems for areas on campus. A back-up lighting system for our stadium. On site generator for the police department in the event of power failure.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Upgrade the current radio console & repeater as it is 30 years old and parts are not available. Dedicated generator for the repeater & console that would activate when there is a power interruption. Additional radios on campus freq. to be used by staff.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Additional storm water management of our ravine areas.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	The boat house road is occasionally washed out due to flooding of the river. Gravel is currently added to the road bed to raise the level. It would be better to raise the roadbed level higher to eliminate the flooding problem. In addition, the boat house structure needs to be raised above the flood stage.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Upgrade the current radio console and repeater—now 30 years old (replacement parts not available). Obtain a dedicated generator for the repeater and console that would activate when there is a power interruption. Additional radios on a campus frequency could be used by staff, in the event of an emergency.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Use new stormwater techniques including porous pavement for parking lots and roadways. Additional porous pavement, water gardens, and inground water retention ponds and cisterns. Cisterns could also be used for fire fighting as they would be a source of water.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Additional storm water management and slope controls in ravine areas.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The last master plan was completed in 2009, and thus is scheduled for update by 2014. During the next planning process, the Blendon Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future).
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Secure funding for a low band radio system and Ham radio system.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	A sewer system is needed at Crockery Lake.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The last master plan update process was in 2008, so a new process should occur in the near future. During that process, the Chester Township Zoning and Planning Department should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. During that update process, the Coopersville Planning and Zoning Department (and/or any consultant being used) should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. During the next master plan development process, Crockery Township should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. During the next update process, the Ferrysburg Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A new master plan was just completed in 2010. During the next plan update process, the Georgetown Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The last master plan was completed in 2010. During the next master plan update process, the Grand Haven Planning and Community Development Department should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	OCCDA has initiated a back-up to the main dispatch facility at the Emergency Operations Center (EOC) in the Emergency management Division at the Ottawa County Fillmore facility . In addition, back-up radio capabilities are in place throughout the County. (Further information can be obtained from Ottawa County Central Dispatch Authority.)
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. During the next update process, the Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The city has referred to continually updating its 1992 master plan. The Holland Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Relocate the portion of the storm sewer that is currently located under buildings (Holland USA, commercial building on the north side of West 17th Street between Homestead and Diekema).

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	18th and 19th Between Central and Columbia Ave Area is prone to flooding; a mitigation strategy needs to be developed.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Improve or replace crossing to improve drainage Crossing on Azalea at South Shore Drive Crossing on Azalea at South Shore Drive. Improvements to drain to prevent flooding.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Improve the Holland Heights Drain, from approximately East 12th and Cambridge and running westerly to US-31.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Hope Avenue between East 8th and East 16th: Tie this portion of Hope Ave storm sewer into Paw Paw Relief Drain
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Reduce or prevent flooding in the area of Lela Intercounty Drain, from its north outlet into Lake Macatawa (north of Graafschap Road) to the south terminus at 40th and Columbia. Maplewood Intercounty Drain, South of East 24th Street.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Add detention capacity in several locations from East 24th Street south to the M-40 Midway Drain, located between Myrtle and Old Orchard (on the east and west), on streets such as Bay, Blackbass, Midway, Central Bay and South Shore Drive. Reduce or prevent flooding potential in these areas.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Pine Avenue North of West 7th Street: Address flooding problems and critical infrastructure threats as a result to the HBPW Power Generating Station.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	The Tulip Intercounty Drain from the southern city limits (Ottawa Avenue, south of US-31) to the northern city limits (Country Club between East 16th and East 24th Streets); and "old" drainage course north of US-31 between Ottawa Avenue and US-31 (Rolling Meadows): Reduce or prevent flooding in these areas as a result of current conditions in the drains.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	East branch of the Weller Drain—beginning south of West 32nd Street on the west side of the Clarewood Condominiums between Graafschap and Lugers, to a point north of 32nd Street where it joins the west branch of the Weller Drain: Reduce or prevent flooding in this area and associated sections as a result of the current.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas, to generate future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Provide early warning assistance as needed.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop automatic community wide flood assistance program to assist residents after an event.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Provide maintenance and improvements on all drains to Lake Macatawa.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Educate residents on basement flood prevention strategies and improvements that can be made to prevent or minimize basement flooding.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A master plan was completed in 2006, and therefore a new update should be completed in the near future. During the plan update process, the Community Development Department (Planning) of the township should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas to generate future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A master plan was completed in late 2007, so an updated master plan process should be either ongoing or scheduled for the near future. During that update process, the Hudsonville Planning/Zoning Department should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The township completed a general development plan in 2006, so an update should be underway at the present time or in the near future. During such an update process, the township should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A master plan for the township was recently completed in 2009. During a future update process, the Olive Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust its master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Take measures to mitigate flood damage and reduce vulnerability to existing structures.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify and enforce existing building and zoning regulations to limit and manage new construction and alterations in flood plains.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify infrastructure vulnerabilities.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Work with local telephone and cable utilities to develop a plan for dealing with the communication disruptions.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Communications tower is needed to assure coordination for public safety purposes at the OCRC North Holland garage.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Implement measures identified in the plan.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the master plan and associated zoning maps throughout the county's numerous subjurisdictions. Since this strategy can only be implemented at the township, city, or village level, its mention here concerns the giving of information and encouragement by the county, to support such local plan revisions. The various involved local agencies should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies, on a schedule that is appropriate for each jurisdiction.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Take measures to mitigate flood damage and reduce vulnerability to existing structures (specifics may vary) - Identify and enforce existing building and zoning regulations to limit and manage new construction and alterations in flood plains by hiring a code enforcement officer.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A master plan was developed in 2004, and may be scheduled for update at the present time or in the near future. During any such update process, the Park Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The township's latest master plan was completed in 2009. During the next plan update process, the Polkton Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	plan and associated zoning maps. The township has a master plan from 2003, which should now be due for update. During such an update process, the Port Sheldon Township Planning Commission and Planning and Zoning Department should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Purchase property vulnerable to flooding as funds become available.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The township had produced and adopted a FEMA-approved flood mitigation plan, but it is not clear whether a recent master plan is in place or is being updated soon. During any future master plan update process, the Robinson Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Purchase property vulnerable to flooding as funds become available 130,000 x 54. 2 homes on Limberlost 16 properties on Van Lopik and an additional 6 purchased by MDOT. Six homes have been elevated. Elevate homes prone to flooding when loans for homeowners become available. Purchase property along river and remove approximately 30 homes. Turn the area into a riverside park or raise all homes above the 100-year floodplain. Further study potential flood areas and develop specific future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Blacktop and raise Buchann St. near and east of 112th Ave above the high water level. Also, Johnson St. east of the 11500 block to 104th Ave and Pierce St. between 120th and 112th Ave. The roads east and west of these locations are higher than high water levels.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Install public water and sewage system along two river roads on Van Lopik and Limberlost Lanes. Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Dredge the river from the railroad bridge east to 104th.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A master plan was developed in 2006, and therefore an update should be occurring soon. During such an update process, the Spring Lake Village Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A township master plan was developed in 2008. During the next plan update process, the Spring Lake Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The township has a master plan and its zoning map was revised in 2008. During the next master plan update process, the Tallmadge Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems. Additional note from the Wright-Tallmadge Fire Department: Weather alerts through radio and television.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. The township's master plan was updated in 2008. During the next update process, the Wright Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems. Extra note from the Wright-Tallmadge Fire Department: Weather alerts through radio and television.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Replace culvert at 104th Avenue.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	We would like to replace the culvert at 104th Street. Our experience shows that the cross-sectional area of the culverts would have to be increased. A bridge span would be appropriate in this project. Using a prefabricated bridge section, an estimated cost of $500,000 is appropriate. This should help eliminate some "upstream" flooding that we have experienced in the past.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Cleaning ditch banks and ditching: 215 N. Centennial to 373 N. State, 245 S. Woodlawn Ct. to 279 So. Division, 250 South Jefferson, 277-104th Avenue, 420 East Riley, 475 No. Centennial to 555 No. State, 509 E. Washington to 215 N. Centennial.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Drain commissioner & engineers to review and update the flood plain maps: Huizenga subdivision
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Floodplain benching in vacant lot. Provide more stormwater storage to avoid flooding, Parcels #70-16-24-400-008, #70-17-18-300-047, #70-17-18-400-047, and #70-17-17-300-026. Enlarge ex pond to provide more stormwater storage to avoid flooding, Parcel #70-16-24-400-050. Regional pond to provide more stormwater storage to avoid flooding, Parcel #70-17-17-101-023. Floodplain benching along ditch 1,500 ft.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A new master plan update was completed in 2011. During the next plan update process, the Zeeland Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Study potential flood areas for consideration of future flood mitigation field projects.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Give consideration to hazard mitigation needs and concepts in the next update of the community's master plan and associated zoning maps. A township master plan was updated in 2006, and therefore should soon be in the process of being updated again. During such an update process, the Zeeland Township Planning Commission should give consideration to hazard mitigation concepts and concerns, and adjust the master plan to accommodate viable hazard-related strategies.

Name of Plan	County	Hazard Mitigation Actions and Strategies
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Develop actions to strengthen and maintain emergency notification systems (as detail is found, this strategy might be elevated to HIGH priority in the future). Coordinate as needed to bolster the dependability of emergency communication systems.
Hazard Mitigation Plan for Kent and Ottawa Counties 2012	Ottawa County	Identify potential improvements or projects to strengthen the area's infrastructure (of all kinds) to increase its hazard-resistance.