APPENDIX C

Macomb County Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake St. Clair

Macomb County, Michigan Individual Report

Report Number 01

February 2013

FEMA

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Federal Emergency Management Agency Region V
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Project Area Community List

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.

Macomb County
Charter Township of Clinton
Chesterfield, Township of
Harrison, Township of
Mount Clemens, City of
New Baltimore, City of
St. Clair Shores, City of

Note to Users: For the purposes of this Discovery process, information for the Village of Grosse Pointe Shores, a Michigan City, has been included in the Wayne County Individual Discovery Report only; however, a portion of Grosse Pointe Shores does fall within Macomb County.

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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 GLCFS 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 Floodplain 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 included 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. The process allowed 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 a project that will successfully identify the risks associated with Great Lakes flooding.

This Discovery Report discusses the communities potentially affected by coastal flooding in Macomb County, Michigan. This Discovery process helped FEMA to better identify the types of datasets or products that will be 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 the Great Lakes flood study include updated FIRMs and FISs, 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 dependent not only on the coastal flood study analysis results, but also on the type of datasets, local and national, that are available.

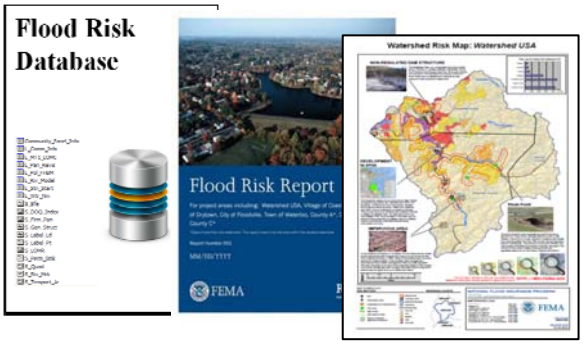
The following section describes the coastal flood risk products that a community may receive as part of a Risk MAP flood study, as well as some products that are under development for the Great Lakes study areas.

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 fiscal year funding.

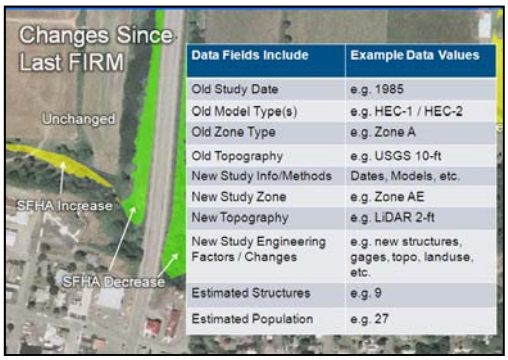
The three products are:

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

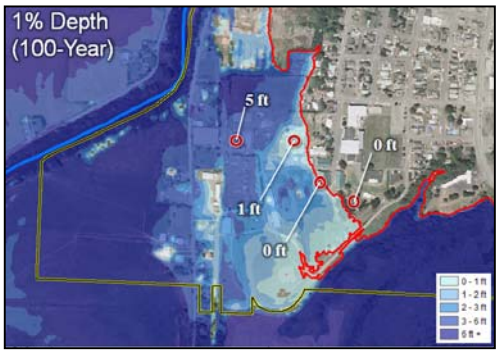


These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below.

- **Changes Since Last FIRM (CSLF)**
  - The CSLFs serve the following purposes: Identifies areas and types of flood zone change:
    - Compares current effective (previous) with proposed (new) flood hazard mapping
    - Categorizes and quantifies flood zone changes
  - 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)**
  - Flood Depth and Analysis Grids (DAGs) will be created for the 1-percent-annual-chance event of the coastal 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 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

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.

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, fiscal year funding, and partnerships with local communities. Therefore, all communities may not 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 St. Clair Discovery Stakeholder Coordination

Meetings, emails, telephone calls, and letters are essential to communicate effectively throughout the life of this Lake St. Clair 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, NOAA, ASFPM, the State NFIP Coordinator, the State Hazard Mitigation Officer (SHMO), and State Engineers. The core stakeholders reviewed the Discovery plan, objectives, and key outcomes for Lake St. Clair Discovery with FEMA, provided suggestions for outreach and communication, and raised any concerns as it related to Lake St. Clair 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 Macomb County portions of the Lake St. Clair Coastal Flood Study project. In addition, an email invitation was sent to a larger list of stakeholders including, but not limited to, the core stakeholders, other federal agencies, universities, watershed groups, Great Lakes associations, technical stakeholders, and emergency management agencies. Representatives from the local governments, including cities, townships, and villages, were considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of this project area.

The Discovery Meeting invitations also included a Coastal Data Request Form (Attachment A). Communities were asked to provide information on data that they had 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 the 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 the 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.

The core stakeholder documents, "Information Exchange Session" documents, stakeholder contact list, and Discovery Meeting invitations can be found in Attachment B, Macomb County Pre-Meeting Correspondence.

III. Macomb County Discovery Meeting

The Discovery Meeting for Macomb County was held on August 20, 2012 in Clinton Township, Michigan. Communities affected by coastal flooding in Macomb County 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 Great Lakes Coastal Flood Study and schedule
- Review of the Discovery process and outcomes
- Discussion of coastal mapping and flood risk topics to be aware of
- Discussion of how the study may affect the 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

A draft Discovery Map for Macomb County (Attachment C) was displayed and utilized during the meeting to encourage the 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]
- Coordinated Needs Management Strategy (CNMS)[2] Data- riverine only
- Proposed Transects
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Shoreline
- Streams
- USGS Gages
- Watershed Boundaries

Tabular Data:

- Declared Disasters
- Flood Insurance Data
- Potential Mitigation Actions (from local Hazard Mitigation Plans)
- Summary of Shoreline Data (Type and Coverage)

Participants at the Discovery Meeting were asked to cooperatively identify Areas of Concern and Areas of Mitigation Interest (AoMIs) within the Macomb County Lake St.

[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.

[2] CNMS is FEMA's strategy for coordinating the management of mapping needs using modern geospatial technologies and current policies, requirements, and procedures. CNMS makes information related to mapping needs readily accessible and more usable. CNMS is only for riverine studies at this time. It is expected coastal needs will be captured in this system in the future.

Clair 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 transects around Macomb County were available for review and comment. Stakeholders were encouraged to review the proposed transects and provide comments related to the location of the transects. The proposed transect maps that were available at the Discovery Meeting for Macomb County can be found in Attachment D. A sample map is shown below as Figure 1.

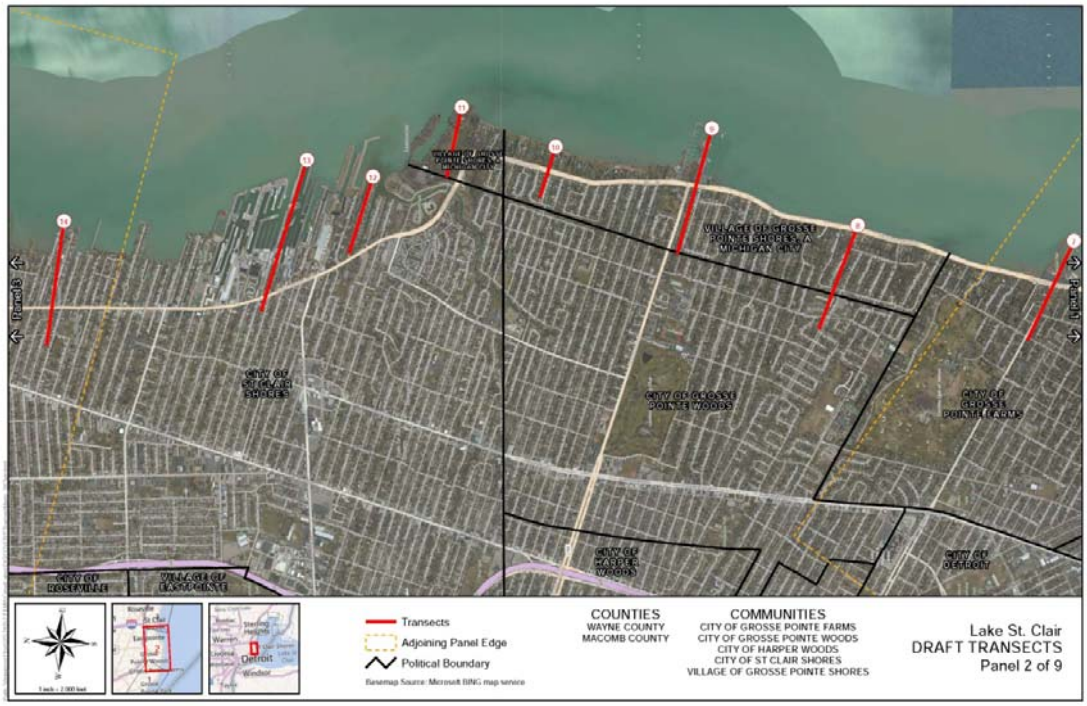


Figure 1: Sample Proposed Transect Figure

All comments that were provided during the Macomb County Discovery Meeting on the draft Discovery Map and transect figures have been compiled into geospatial layers and associated tables. The layers, titled "Stakeholder General Comments" and "Stakeholder Transect Comments", can be found on the Final Discovery Map in Appendix F of the basin-wide Lake St. Clair Discovery Report (Federal Emergency Managment Agency, 2012). Each comment collected for Macomb County is captured in the table below, along with a map identification number (if one exists) that correlates to its location on the Final Discovery Map. In Table 1 and on the Final Discovery Map, the identification of a comment (ID) categorized as a "Stakeholder General Comment" is represented by using first three letters of the county name followed by a unique number (i.e. MAC – 1, MAC - 2). The identification of a comment (ID) categorized as a "Stakeholder Transect

Comment" is represented by using the first three letters of the county name, followed by "TR", followed by a unique number (i.e. MAC-TR-1, MAC-TR-2).

Table 1. Stakeholder General Comments and Transect Comments

ID	State	County	Location of Comment	FIPS	CID	Comment
MAC-1	Michigan	Macomb	Township of Harrison	26099	N/A	Area to be developed
MAC-2, MAC-TR-1, and MAC-TR-2	Michigan	Macomb	Township of Harrison	26099	260123	User indicated suggested transect location; sloping rock wall; area to be developed
MAC-3	Michigan	Macomb	City of St. Clair Shores	26099	260127	User indicated suggested transect location; Critical lift facility - Critical Facility
N/A	Michigan	All	Macomb, St. Clair, and Wayne Counties	26099, 26147, 26163	N/A	Requested the effective transects be used for Lake St Clair

FIPS = Federal Information Processing Standards
CID = Community Identification Number

Discovery meeting minutes, sign in sheets, PowerPoint presentation, marked up draft Discovery Maps, and correspondence documentation have been included in Attachment E, Macomb County Discovery Meeting Documents.

IV. Summary of Data Analysis

During this Discovery portion of the Lake St. Clair Coastal Flood Study project, a collection of tabular and spatial data was conducted for all the coastal communities from Federal and State sources, as well as information collected through phone conversation, the information exchange session conference call, the Discovery Meeting, and the Discovery Coastal Data Request Forms sent to each coastal community. This section lists the types of data and their sources that were collected for the Macomb County study area, including information collected during and after the Discovery Meeting. The data analysis that follows Table 2 is divided into two sections: one section listing the data that can be used for Risk MAP product development and the other section listing the information that helped the study team to form a better understanding of the Macomb County Lake St. Clair Project Area prior to moving forward with the coastal flood study.

Table 2. Data Collected for Macomb County

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
Bathymetry and Topography	Discovery Report	USACE	2012	Lakewide
Census Blocks	Discovery Map	U.S. Census Bureau	June 2012	Countywide
Coastal Data Request Form	Discovery Report	Community and County Stakeholders	July 2012	Countywide
Contacts	Discovery Report	Local Community Websites, State/FEMA updates	June 2012	Countywide
Community Assistance Visits (CAVs)	Discovery Report	FEMA Community Information System (CIS)	July 2012	Countywide
Community Rating System (CRS)	Discovery Report	FEMA's "Community Rating System Communities and Their Classes"	July 2012	Nationwide
Comprehensive Plans	Discovery Report	Local Community Websites	July 2012	Countywide
Coastal Barrier Resources System (CBRS)	Discovery Map	U.S. Fish and Wildlife Service	July 2012	Nationwide
Coastal Structures	Discovery Map/Tabular Data	U.S. Army Corps of Engineers (USACE)	August 2012	Nationwide
Coordinated Needs Management Strategy (CNMS)	Discovery Map	FEMA	July 2012	Countywide
Critically Eroded Beach Areas	None Identified	None Identified	N/A	Countywide
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
Flood Insurance Policies	Discovery Report	FEMA CIS	July 2012	Nationwide
Hazard Mitigation Plans and Status	Discovery Report	Local Mitigation Plans	July 2012	Countywide

Table 2. Data Collected for Macomb County

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
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	Discovery Report, Tabular Data	Effective Flood Insurance Study (FIS)	August 2012	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 Sub grantee Summary"	June 2012	Nationwide
Local Data	Discovery Report	Coastal Data Request Form completed by communities	August 2012	Countywide
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
Oblique Imagery	Discovery Report	USACE	2012	Lakewide
Ordinance Status	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
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

During the Discovery process, the project team created a database of available flood hazard and flood risk assessment data. This database not only provides an inventory of available data, but helps identify gaps in the flood hazard data. State, county, and government geographic information system (GIS) websites can provide some of the pertinent data, but local knowledge of flooding and mitigation projects is critical to help accurately determine flood risks and mapping needs. Therefore, local and regional data were also used where available.

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 frequency of flood events within a county 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, a free risk assessment software application from FEMA, is the most widely used flood risk assessment tool available. Hazus can run different scenario floods (riverine and coastal) to determine how much damage might occur as a result. Hazus can also be used by community officials to evaluate flood damage that can occur based on new/proposed mitigation projects or future development patterns and practices, and it can run specialized risk assessments, such as what happens when a dam or levee fails.

Hazus-MH includes national datasets that can be supplemented with local data. If local detailed data are available, users may consider using this data to perform more refined Hazus analyses. Hazus-MH is flexible and allows users to update Hazus-MH with local data or use a combination of both local and national. Augmenting the Hazus-MH provided 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 used in this report is based on approximate flood boundaries and national datasets. The calculation is based on flood elevation estimates using the 10-meter Digital Elevation Model (DEM) on streams with drainage areas of at least 10 square miles.

The results are shown in the Table 3. 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 Map (Attachment C).

Table 3. Hazus AAL Data for Macomb County

County	FIPS Code	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
Macomb	26099	1,312,292	620,789	647,293

Source: FEMA
FIPS = Federal Information Processing Standards

I.IV.i.2 Coastal Recession

Coastal erosion is the recession of land and the removal of beach or dune sediments. It affects all of the beaches and coasts in the world, including those of Lake St. Clair. Important factors in coastal erosion are the types of rock or soil being eroded, the presence or absence of beaches or human-made structures, and how the shore is oriented with respect to prevailing winds and waves, water levels, climatology, and groundwater and surface drainage.

In Michigan, areas prone to erosion along the shoreline, including Lake St. Clair, are subject to special setback requirements established by the Michigan Department of Environmental Quality (MDEQ). From the MDEQ's website, high risk erosion areas are those shorelands of the Great Lakes and connecting waters where recession of the zone of 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 shoreline are classified as high risk erosion area in Michigan. 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.

For the Lake St. Clair study area, high risk erosion area maps were provided by MDEQ as part of this Discovery process for the Township of Fort Gratiot (part of Lake Huron study) and the City of Port Huron (St. Clair County). The maps depict the high risk erosion areas and show the number, in feet, of the 30-year projected recession distance and 50-year projected recession distance. No high risk erosion areas were identified along Macomb County shoreline.

Additional information can be found at the MDEQs High Risk Erosion Areas website at http://www.michigan.gov/deq/0,1607,7-135-3313_3677_3700-10860--,00.html .

If users of this Discovery Report have any additional erosion or recession data or photographs that you would like to submit, please contact FEMA Region V Mitigation Division.

I.IV.i.3 Federal Land

Federal lands data were obtained from the National Atlas at http://nationalatlas.gov/mld/fedlanp.html. This data is also available from the National Discovery Data Repository located on FEMA's Mapping Information Platform (MIP) at https://hazards.fema.gov. 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.

In the Macomb County project area, Selfridge Air Force Base was identified as federal land along the Lake St. Clair Shoreline.

I.IV.i.4 Jurisdictional Boundaries

Macomb County jurisdictional boundaries were obtained from the December 4, 2012 effective FIRM database. The source of that data is the "Michigan Geographic Framework" dataset available through Michigan CGI (Center for Geographic Information) at http://www.mcgi.state.mi.us/mgdl/.

I.IV.i.5 Local Data

As part of this Discovery process, communities were asked to fill out a Coastal Data Request Form and provide information on data that they had available at the local level that may useful during the coastal flood study analysis. The Coastal Data Request Form (Attachment A) included data requests for base map data, coastal data, historic flood data, risk assessment information, mitigation information, and community plans and projects.

In summary, Macomb County project area stakeholders noted they have property information available in digital format. The Southeast Michigan Council of Governments (SEMCOG) also noted they maintain a large set of digital data for the area, including LiDAR, contours, and 2010 building footprints.

On a state-level, Michigan CGI Geographic Data Library Catalog at http://www.mcgi.state.mi.us/mgdl/ serves as the state's repository of digital geographic information. Michigan State University Map Library at http://www2.lib.msu.edu/branches/map/index.jsp provides coverage of state boundary data, historical county boundary data, elevation data, and environmental data.

Table 4 compiles all the information collected for Macomb County from the Coastal Data Request Forms completed by stakeholders.

Table 4. Macomb County Local Data Collection

CONTACT INFORMATION							BASE MAP DATA		COASTAL DATA							OTHER DATA					HISTORICAL FLOOD DATA	RISK ASSESSMENT	
Community, County or State Organization	**County**	**State**	**FIPS**	**CID**	**Contact Name**	**Contact Title**	**Topography**	**Property Information (Building Footprints, Parcel Data, Tax Assessor's Data)**	**Coastal Structure Inventory (Seawalls, Jetties, etc)**	**Coastal Feature Inventory (dunes, bluffs, etc)**	**Shoreline Change Data**	**Locations of beach nourishment or dune restoration projects**	**Areas of significant beach or dune erosion**	**Mean high water**	**Mean lake level**	**Hydraulic Structures (i.e. bridges, culverts, levees, dams) with inspection status, if available**	**Elevated roads**	**Critical Facilities**	**Other known hazards with geographical boundaries, i.e., landslide hazard areas, storm surge inundation zones, wildfire hazard areas, etc.**	**Other relevant data**	**Are you aware of any coastal flooding issues not represented on effective FIRMs:**	**Does your community have HAZUS-based loss estimates from average annualized loss?**	**Does your community have other risk assessment data?**
Charter Township of Clinton	Macomb	MI	26099	260121	Mike Gentry	Superintendent, Building Dept.															No	No	No?
Macomb County Office of Emergency Management	Macomb	MI	26099		Peter M. Locke	Emergency Management Aide	Digital	Digital													No	No	Yes - Macomb County Hazardous Mitigation Plan, 2010-2015
Southeast Michigan Council of Governments (SEMCOG)	SEMCOG	MI	N/A	N/A	Ann Burns (AB)/Bill Parkus (BP)	Not provided	LiDAR & Contour data	Building footprints															

Table 4. Macomb County Local Data Collection

CONTACT INFORMATION							FLOOD MITIGATION INFORMATION										COMMUNITY PLANS AND PROJECTS							GIS DATA	
Community, County or State Organization	**County**	**State**	**FIPS**	**CID**	**Contact Name**	**Contact Title**	**Does your community have a hazard mitigation plan?**	**Does the plan reflect any coastal flood hazards?**	**Does the hazard mitigation plan indicate any data deficiencies for flood hazards that could be addressed through a flood study, especially near coastal zones?**	**Does your community have on-going mitigation projects, such as acquisition, elevation, flood control, soil stabilization, natural systems restoration, floodproofing, etc.**	**Any specific coastal mitigation projects?**	**Does your community have experience with coastal flood disasters and flood disaster recovery?**	**Does your community coordinate floodplain management programs with programs for the management and planning of open space? If possible, any coastal specific?**	**Have you had any prior proactive mitigation actions and planning efforts that resulted in reduced losses? If possible, any coastal specific?**	**Has your community applied and granted Individual Assistance/Public Assistance grants for declared disasters?**	**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?**	**How would you rank the community's ability to implement mitigation actions and to communicate flood risk to citizens?**	**Does your community have a comprehensive plan?**	**Does your community's comprehensive plan have a special consideration for coastal areas?**	**Does your community have a coastal zone management 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?**	**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):**	**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.)**	**Any other comments/ concerns based on local knowledge:**	**Other GIS Data Available - be specific if possible, include type of data, date of data, data sources, etc**
Charter Township of Clinton	Macomb	MI	26099	260121	Mike Gentry	Superintendent, Building Dept.	Yes - in review	No	No	No	No	No	Yes - Non-coastal	No	No	No	Medium	No	No	No	Yes - Floodplain Ordinance along with daily review of building permit applications as it	No	No		
Macomb County Office of Emergency Management	Macomb	MI	26099		Peter M. Locke	Emergency Management Aide	Yes - it has been adopted	No	No	No	No	No	Yes - Every community has a master plan and within that plan are details for their flood plain usage and management.	Yes - 2001 Patnick Drive Mitigation Project removed 5 houses from the flood plain resulting in no further property damage since then.	No - Public Assistance was granted to Macomb County and local jurisdictions for the following presidential declared disasters:	Yes - 2001 Patnick Drive Mitigation Project #A12346.50 [Removal of 5 structures from a known flood	High	No	No	No	Yes - EPA Phase II Watershed Management Groups; Open Space	No	No		
Southeast Michigan Council of Governments (SEMCOG)	SEMCOG	MI	N/A	N/A	Ann Burns (AB)/Bill Parkus (BP)	Not provided																		SEMCOG can also provide generalized master	

I.IV.i.6 Publicly Owned Land

The Michigan CGI Geographic Data Library Catalog at http://www.mcgi.state.mi.us/mgdl/ currently contains over 60 unique statewide datasets including the state's base map, aerial imagery, geology, hydrography, land ownership, topography, and much more. Publicly owned lands (national, state, and local parks, forests, etc.) was found in "DNR Land and Mineral Ownership" dataset available through Michigan CGI.

While this dataset indicated there are various parcels scattered throughout the county with DNR mineral and/or land ownership, no publicly-owned lands of a large land mass were found along the shoreline of Macomb County within the study area.

I.IV.i.7 Shoreline Information

A shoreline feature dataset was generated by USACE Detroit District (U.S. Army Corps of Engineers, 2012) using 2012 oblique photographs (see "Topography, Bathymetry, and Oblique Imagery" subsection in this report). The dataset captures shoreline types, land uses, coverage, and vegetation types along the entire Great Lakes shoreline, including Lake St. Clair. The dataset includes identification of "artificial" shoreline, which may be indicative of local coastal flood protection structures. This dataset does not identify the level of protection of any coastal structures, and it does not validate whether or not a coastal structure exists. The current dataset contains data at one-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection. The dataset can be downloaded from http://www.greatlakescoast.org/ under the "Technical Resources" section.

From this dataset, the approximate shoreline along Macomb County that is covered by this Great Lakes Coastal Flood Study totals 34.2 miles. The shoreline classification information for Macomb County is summarized in Tables 5 through 8, including shoreline types, land uses, coverage, and vegetation types, respectively.

Table 5. 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)
Macomb County	34.2	28.7	5.5	--	--	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 6. Summary of Shoreline by Land Use

County	Total Shoreline (mile)	Commercial/Industrial (mile)	Farm Land (mile)	Forested (mile)	High Density Residential (mile)	Low Density Residential (mile)	Moderate Density Residential (mile)	Park Land (mile)
Macomb County	34.2	6.9	--	--	23.1	--	0.6	3.6

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 7. Summary of Shoreline Coverage

County	Total Shoreline (mile)	Bluff 2'-10' (mile)	Coastal Wetland	Dune 2'-10' (mile)	Flat Coast (mile)	High Bluff 10'+ (mile)	High Dune 10'+ (mile)
Macomb County	34.2	--	--	--	34.2	--	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 8. 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)
Macomb County	34.2	--	--	32.4	1.8	--	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

Stream lines and water areas for Macomb County were acquired from the December 4, 2012 effective FIRM database for Macomb County. The source of that data is the National Hydrography Dataset (NHD) available through USGS at http://nhd.usgs.gov. The NHD is a digital vector dataset used by 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 in the analysis of surface-water systems.

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

New Data Collected for Great Lakes Coastal Flood Study:

As part of the GLCFS, Light Detection and Ranging (LiDAR) was collected to develop topographic and bathymetric data along the Lake St. Clair 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.

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 3-dimensional representation of the terrain's surface.

The LIDAR data for this study was collected within a 1500 meter buffer (500 meters inland and 1000 meters 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.

For quality control purposes, one cross line was used every 25 miles along shore or more frequently to ensure 90% of all planned lines within the area were crossed by a cross line. In areas of the coast where natural or artificial barriers prevent aircraft operations, the cross line(s) were collected at the nearest possible location to the required interval, but no closer than five (5) miles to an adjacent planned cross line. Overlapping lines and datasets were compared to each other and to cross lines and the differences calculated.

At the time this report was generated, the quality control process was not yet completed on the LiDAR dataset. However, as part of that process, the vertical difference between the LiDAR and ground truth data will be calculated. Ground truth refers to a process in which a pixel on a satellite image is compared to what is there in reality. This is especially important in order to relate LiDAR data to real features and materials on the ground. The collection of ground truth data enables calibration of the LiDAR data, and aids in the interpretation and analysis of what is being sensed. Using this process, all systematic errors will be identified and eliminated and remaining errors should have a normal distribution. Differences between a DEM created from the LiDAR data representing bare ground and the ground truth data will be unbiased and within +/-15 cm (RMSE3) in flat terrain and within +/-30 cm (RMSE) in hilly terrain. Horizontal positions will be accurate to +/- 1.5m (RMSE). Data will be processed to 2ft contours.

The processing of the bathymetric data for this study will be performed based on the strongest return of each LiDAR pulse, assuming this depth represents the bottom. Data will be processed to produce bottom reflectance data from the LiDAR data.

As of the date of this report, the LiDAR data is expected to become available in the spring of 2013 for this study area. There is a delay in the schedule to collect new bathymetric data; therefore, existing bathymetric data may be used for the transect-based coastal flood hazard analysis. Existing high-resolution bathymetric and topographic data is currently available at http://csc.noaa.gov .

As part of the GLCFS, USACE 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 identification of shoreline types and obstructions; and management of assets, critical facilities, and public properties along the Lake St. Clair shoreline. The oblique imagery is current available via a web-based browser at http://greatlakes.usace.army.mil/.

[3] Root-mean-square-error is a measure of the differences between values predicted by a model or an estimator and the values actually observed.

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 .

A compilation of State and local-level topographic and bathymetric data available in Macomb County is listed below:

- SEMCOG Aerial Imagery Collection:

  http://www.semcog.org/Aerials.aspx
  SEMCOG was awarded an ARRA (American Recovery and Reinvestment Act) grant to acquire LiDAR data at 1.5-meter average post spacing for the Livingston, Macomb, Monroe, and St. Clair Counties in Spring 2010. The base resolution for the seven county region is one-foot pixel resolution. In addition, 2009 LiDAR was captured for Washtenaw and Wayne Counties.

  LiDAR Acquisition information is listed by county at http://www.semcog.org/uploadedFiles/Data_and_Maps/Aerials/2010productcontacts.pdf

- Michigan Department of Technology, Management & Budget (DTMB):

  http://www.mcgi.state.mi.us/mgdl/?action=thm
  DTMB lists various data including Digital Elevation Models (DEMs), Digital Raster Graphics (DRGs), Great Lakes Bathymetric Contours, Great Lakes Bathymetry, and Topo Quad Boundaries.

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".

In addition, transportation data was obtained from the Macomb County December 4, 2012 effective FIRM database. The source of that data is the "Michigan Geographic Framework" dataset available through Michigan CGI (Center for Geographic Information) at http://www.mcgi.state.mi.us/mgdl/.

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" at http://nationalatlas.gov/atlasftp.html.

Macomb County project area contains portions of three HUC-8 watersheds: Lake St. Clair (04090002), Clinton (04090003) and St. Clair (04090001).

ii. Other Data and Information

Macomb County is located in the southeastern portion of the lower peninsula of Michigan. It is bordered on the south by Wayne County; on the west by Oakland County; on the north by Lapeer and St. Clair Counties; and in the east by Lake St. Clair.

The 2010 census population of Macomb County was reported to be 840,978, an increase from the 2000 population of 788,149 (U.S. Census Bureau, 2010).

As is the case for most of Michigan, the climate of Macomb County is affected by the moderating influence of the Great Lakes. The heat storage capacity of the lakes tends to delay seasonal changes and lessen climatic extremes. Lake breezes can lower daily maximum temperatures by as much as 15 °F relative to the areas not under their influence. The large urban industrial area of the county also affects the climate by creating an urban "heat island". The difference in minimum temperatures between urban and rural areas can exceed 10 °F under extreme conditions.

On average, the warmest month is July, with an average maximum temperature of 81.8°F, as recorded at the National Weather Service station Mount Clemens ANG Base (Midwestern Regional Climate Center, 2000). The lowest average daily minimum temperature occurs in January and averages 18°F. The average total annual precipitation is 33.00 inches, with the greatest amounts occurring April through September. Average annual snowfall is about 41 inches, with most falling in December and January.

Macomb County is largely drained by the Clinton River and its tributaries. The strip of land along Lake St. Clair drains directly into the lake through several small tributaries. A small portion of the northeastern comer of the county is drained by the Belle River.

Several ice sheets advanced and retreated over Macomb County during the glacial period. As the last ice sheets melted they deposited glacial rock and soil material over parts of the county. As a result, moraines and other distinctive geological features were formed. All except the northwestern most part of the county was once part of the basin of glacial lakes that were forerunners of the Great Lakes. Distinctive beach ridges from some of these early lakes can still be found. This area is generally flat with shallow slopes. The soil, which is often clay loam or loamy sand, is underlain by sand and gravel. The northwestern comer of the county is part of the Birmingham moraine and is more undulating, with higher elevations and steeper slopes (U.S. Department of Agriculture, Soil Conservation Service, 1974).

I.IV.ii.1 Coastal Barrier Resources Systems

Coastal barriers are unique land forms that protect distinct aquatic habitats and serve as the mainland's first line of defense against damage from coastal storms and erosion. The

Coastal Barrier Resources System (CBRS) defines a coastal barrier as a landform composed of unconsolidated shifting sand or other sedimentary material that is generally long and narrow and entirely or almost entirely surrounded by water. They are sufficiently above normal tides so that they usually have dunes and terrestrial vegetation. The CBRS boundaries were downloaded from U.S. Fish and Wildlife Service http://www.fws.gov/CBRA/Maps/Data_Disclaimer_Shapefiles.html and are dated June 15, 2010.

There are no designated units of the coastal barriers along the Lake St. Clair shoreline, including this Macomb County study area.

I.IV.ii.2 Coastal Flood Protection Measures

Coastal structures along Lake St. Clair will be reviewed in more detail during the engineering analysis portion of the Lake Clair study and were not analyzed as part of this Discovery process. A summary of information collected regarding existing coastal structures and flood protection measures is described below.

Much of the shoreline along Lake St. Clair has steel, concrete, and wood seawalls and breakwaters to protect from flooding and erosion. However, most of these protective works have been inadequate and easily topped by flood waters. It's important to note that these shore protection measures are multi-purpose in nature and do not necessarily offer protection from the 1-percent annual chance of occurrence flood elevations; however, they may protect from most ice damage and from floods of lesser magnitude.

During 1972 and 1973, USACE took emergency measures with Operation Foresight. This program was a cooperative effort between Federal, State, and local governments. With the help of the USACE, most of the shore and canal properties were protected by dikes of sandbags and cribbing under cooperation of residents and volunteers. At that time, at a lakefront elevation of 582.1 feet (NAVD88) in Macomb County, the crib top was approximately 4.6 feet above the highest recorded instantaneous static elevation level and appeared to be adequate protection from wave damage (U.S. Army Corps of Engineers, 1974).

The design for Operation Foresight was for a temporary measure and the dikes and other structures have since been partially removed by home owners. The protection measures were constructed to meet immediate flood threats and were never considered to be permanent. Earth-filled dikes may provide protection from wave action and spray, however, when they are breached or overtopped, they tend to entrap water behind the wall and do not permit drainage back into the Lake (U.S. Army Corps of Engineers, 1974).

Many local property owners use seawalls, revetments, riprap, and/or groins to prevent storm damage and beach erosion along Lake St. Clair. Concrete and steel sheet piling at the bank level protect against erosion. (Federal Emergency Managment Agency, 2010).

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.

Coastal structure data for Macomb County along Lake St. Clair was extracted from the Enterprise Coastal Inventory Database from the Engineer Research and Development Center (ERDC) through USACE. Table 9 lists the coastal structures found near the Macomb County shoreline that are maintained by USACE.

Table 9. USACE Coastal Inventory Database

USACE Office	Coastal Structure Name	State	Completion Date	Type	Length (m)	Length (ft)
Detroit	Clinton River Breakwater	MI	1966	Laid Stone	426.7	1400
Detroit	Clinton River Earth-Fill	MI	1966	Rock Rubble	1127.8	3700

USACE has recently performed condition assessments to obtain average overall condition of each structure. The Clinton River structures have been given a "B" rating, which indicates low risk of failure.

FEMA's Midterm Levee Inventory (MLI) project compiled a database of structures that were designed to provide at least the minimum level of protection from the base flood level (1- percent-annual-chance flood). For this Discovery process, the November 2011 MLI Status Report published by FEMA was reviewed. The MLI Levee database showed no levee segments along the Macomb County shoreline that provide protection from the base flood.

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 FEMA's Community Information System (CIS) at https://portal.fema.gov in July 2012. Table 10 shows the most recent CAV date by community in this project area.

Table 10. Summary of Community Assisted Visits

Community	CID	CAV Date
Chesterfield, Township of	260120	4/28/2011
Clinton, Charter Township of	260121	3/8/2006
Harrison, Township of	260123	8/24/2005
Mount Clemens, City of	260124	3/25/2003
New Baltimore, City of	260125	5/1/2008
St. Clair Shores, City of	260127	7/15/2011

CID = Community Identification
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, which was accessed in July 2012.

No communities along the Lake St. Clair shoreline in Macomb County currently 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.

The Macomb County Comprehensive Plan can be downloaded here:
http://www.macombcountymi.gov/mcped/pm_projectoverviews.htm

Comprehensive plans were not collected or provided during this Discovery process for the individual communities along the Lake St. Clair shoreline in Macomb County.

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 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 FEMA's Map Modernization program were automatically determined to be "Valid" and the remaining studies went through a 17-element validation process with 7 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" (Federal Emergency Managment Agency, 2010).

Table 11 below summarizes the draft results of the validation analysis obtained from CNMS in June 2012. CNMS only captures riverine studies at this time.

Table 11. CNMS Status for Macomb County

County	FIPS	Stream Miles			
		Unknown	Unverified	Valid	Total
Macomb	26099	1	101	279	381

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 Macomb County, 1-percent of critical facilities and 3-percent of road miles (or 121 miles) are within a floodplain (National Oceanic & Atmospheric Administration, 2009).

Location of critical facilities within 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/ .

The assessment of the flood risk posed to critical facilities is an important aspect of a hazard mitigation plan. Information on critical features can be found in the Macomb County Hazard Mitigation Plan, but were not compiled as part of this report.

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

According to the Critical Dune Area Maps maintained by MDEQ at http://www.michigan.gov/deq/0,4561,7-135-3311_4114_4236-70207--,00.html (accessed July 2012), there are no critical dune areas along Lake St. Clair.

Critically eroded beaches and beach nourishment/dune replacement projects were not identified in Macomb County during this Discovery process.

I.IV.ii.9 Dams

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

The NID is available at the USACE website https://nid.usace.army.mil/. At the time this report was compiled, the NID identified five (5) dams in Macomb County, though none were identified within the coastal flood study project area. The locations of the dams are shown on the Discovery Map.

I.IV.ii.10 Declared Disasters

The FEMA Disaster Declarations Summary is a summarized 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 at http://www.fema.gov/data-feeds and also by county through https://explore.data.gov/Other/FEMA-Disaster-Declarations-Summary/uihf-be6u. Table 12 lists the major disaster declarations that have been declared in all of Macomb County.

Table 12. Declared Disasters in Macomb County, MI

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
Macomb (County)	363	12/1/1972	Flood	Severe storms & flooding
Macomb (County)	371	4/12/1973	Flood	Severe storms & flooding
Macomb (County)	465	4/26/1975	Flood	Severe storms, high winds & flooding
Macomb (County)	495	3/19/1976	Severe Storm(s)	Severe storms, tornadoes, icing & flooding
Macomb (County)	774	9/18/1986	Flood	Severe storms & flooding
Macomb (County)	1181	7/11/1997	Severe Storm(s)	Severe storms, tornadoes, and flooding
Macomb (County)	1237	8/5/1998	Severe Storm(s)	Severe storms and high winds
Macomb (County)	1527	6/30/2004	Severe Storm(s)	Severe storms, tornadoes, and flooding
Macomb (County)	3057	1/27/1978	Snow	Blizzards & snowstorms
Macomb (County)	3137	1/27/1999	Snow	MI - severe weather 1/2 /99
Macomb (County)	3160	1/10/2001	Snow	Snow
Macomb (County)	3189	9/23/2003	Other	Power outage
Macomb (County)	3225	9/7/2005	Hurricane	Hurricane katrina evacuation*

*Refers to the federal disaster aid that was made available to Michigan to supplement its efforts to assist evacuees from areas struck by Hurricane Katrina.

I.IV.ii.11 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 process, data on flood insurance policies were also gathered.

Table 13 summarizes the number of insurance policies, their premiums, the total coverage, the number of claims, and dollar amounts of paid losses in the coastal communities of

Macomb County. The data were based on Community Summary Reports that were extracted from FEMA's CIS website (https://portal.fema.gov/) in July 2012.

Table 13. Summary of Flood Insurance Policies and Claims

Community	CID	Number of Policies	Total Premium	Total Coverage	Number of claims since 1978	Dollar ($) paid for claims since 1978
Chesterfield, Township of	260120	305	$ 288,204	$ 61,298,500	98	$ 339,370
Clinton, Charter Township of	260121	108	$ 108,427	$ 23,646,300	50	$625,718
Harrison, Township of	260123	1,208	$1,159,156	$228,993,800	301	$514,827
Mount Clemens, City of	260124	13	$ 12,366	$ 2,860,800	65	$ 223,928
New Baltimore, City of	260125	65	$ 58,516	$ 12,744,000	59	$110,957
St. Clair Shores, City of	260127	771	$703,379	$124,352,500	387	$ 424,609

CID = Community Identification
Source: FEMA's CIS "Community Disaster Detail – Flood Insurance" report

I.IV.ii.12 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 to help meet these needs. 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 shows the meteorological station identification number and location for the gages in Macomb County study area.

Table 14. Meteorological Stations in Macomb County

County	Station ID	Location	Owner	Data	Years of Historical Data
Macomb	CLSM4	St Clair Shores, MI	National Weather Service (NWS)	Meteorological Observation	2007-Present

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

Stream Gages

The USGS National Water Information System Web Interface http://waterdata.usgs.gov/nwis (accessed July 2012) provides real-time data for any given stream gage location. Table 15 shows the gage identification numbers and locations for the gages in the study areas of Macomb County. USGS stream gage locations are shown on the Discovery Map.

Table 15. Stream Gage Stations in Macomb County

Gage ID	Begin Date	End Date	Gage Location
04159488	1978/01/01	1982/10/04	Silver Creek near Jeddo, MI
04159492	1944/03/01	2000/09/30	Black River near Jeddo, MI
04159500	1944/03/01	1991/09/30	Black River near Fargo, MI
04159900	1963/04/01	2000/09/30	Mill Creek near Avoca, MI
04160000	1947/06/01	1964/09/30	Mill Creek near Abbottsford, MI
04160050	1932/10/01	1943/12/31	Black River near Port Huron, MI

Water Level Station

NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) maintains several water level stations along Lake St. Clair. CO-OPS' primary motivation is the collection and dissemination of high quality and accurate measurements of lake level for scientific studies.

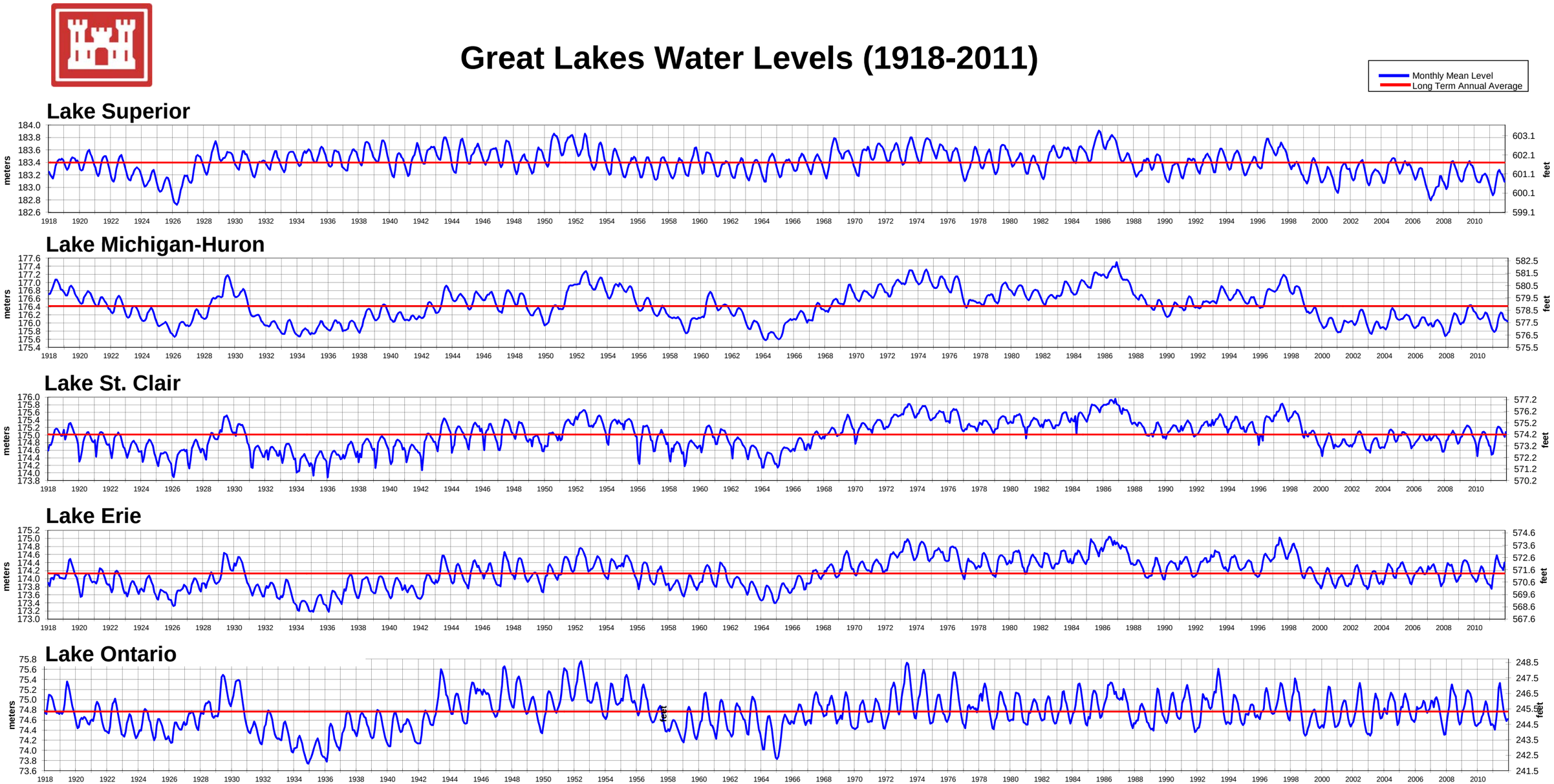
Great Lakes water levels constitute one of the longest high quality hydrometeorological data sets in North America with reference gage records beginning about 1860 with sporadic records back to the early 1800's. Table 16 lists the water level stations along Lake St. Clair.

Table 16. Water Level Stations

Station Number	Station	Latitude	Longitude	Hourly Records	6-minute Records
9014070	Algonac, MI	42° 37.2' N	82° 31.6' W	1/1975 – 1/2010	1/1996 – 2010
9034052	St. Clair Shores, MI	42° 28.3' N	82° 52.3' W	1/1975 – 1/2010	1/1996 – 2010
9044036	Fort Wayne, MI	42° 17.9' N	83° 50.5' W	1/1975 – 1/2010	1/1996 – 2010
9044049	Windmill Point, MI	42° 21.4' N	82° 55.8' W	1/1975 – 1/2010	1/1999 – 2010

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=St.+Clair+River&id1=841. The monthly high and low water level data from the year 1918 to 2011 at Lake St. Clair are available at the USACE website: http://www.lre.usace.army.mil/greatlakes/hh/greatlakeswaterlevels/. Figure 2 is USACE's graphic that shows Historic Great Lakes Water Levels from 1918 to 2011 (U.S. Army Corps of Engineers, 2012).

Great Lakes Water Levels (1918-2011)



The monthly average levels are based on a network of water level gages located around the lakes.

Elevations are referenced to the International Great Lakes Datum (1985).

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

Wave Gage/Buoy Stations

The 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 C-MAN stations to help meet these needs. In addition to standard meteorological observation, all buoy stations, and some C MAN stations, measure sea surface temperature and 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.13 Hazard Mitigation Plans

Hazard mitigation plans 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 (HMA) grant programs. The status of current hazard mitigation plans is shown in the Table 17. The data was obtained from FEMA's Plan Approval Status Report based on Regional reports for the end of June 2012 (Federal Emergency Management Agency, May 2012).

Table 17. Hazard Mitigation Plan Status

Jurisdiction	Approval date	Expiration date
Macomb County	11/9/2010	11/9/2015

I.IV.ii.14 Hazard Mitigation Grant Program

After a major disaster declaration, the Hazard Mitigation Grant Program (HMGP) provides grants to states and local governments to implement long-term hazard mitigation measures. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster.

A variety of hazard mitigation projects have been submitted to FEMA's HMGP. A list of projects that have been closed, approved, withdrawn, or denied in Macomb County is included in Attachment F. A summary of HMGP projects can also be downloaded from https://explore.data.gov/catalog/raw .

I.IV.ii.15 Historical Flooding & High Water Marks

The information below has been compiled from FEMA's historic *Flood Insurance Study, Macomb County, Michigan*, dated 2006, and FEMA's effective *Flood Insurance Study, Macomb County, Michigan*, dated 2012.

For the portion of the county that borders on Lake St. Clair, the combination of high lake levels and easterly winds produces conditions favorable for flooding. The general desire to live along the shoreline has concentrated development and consequently increased potential flooding damage. The area fronting the lake and immediate canal areas are particularly susceptible to erosion and damage from wave action. Another factor in lower areas being favorable for flooding is sewer backup associated with high wind tides. Records for the past century show that the rise and fall of the average water surface levels of Lake St. Clair have a cyclic variation between 1.8 feet below to 4.6 feet above the low water datum set in 1933 (Federal Emergency Managment Agency, 2006).

Lake flooding is not generally the result of a single storm event, but rather it is the result of a series of causative factors. One such factor occurs when the wind, blowing over large water surface areas, transfers large amounts of energy to the water surface by shear stress. As a result of these stresses acting over a period of time, the water surface is tilted. This tilt will last until the wind velocity is appreciably reduced or the wind changes direction. This phenomenon is called wind tides and the magnitude of the tilt between two locations is known as the wind set up. The magnitude of the wind tide depends primarily on the wind speed, the fetch length over which the wind acts, and the depth of the lake. Lake St. Clair, because of its shallowness and surface area, can react quickly to strong wind forces. Storm waves are another factor that affects the western shore of the lake. These wind generated waves can reach a height of 4 feet and cause floodwaters to rise higher than recorded flood levels indicate (Federal Emergency Managment Agency, 2012).

Historically, the most damaging flooding has occurred along this coast in 1973 and again in 1985 and 1986 (U.S. Army Corps of Engineers, 1989; U.S. Army Corps of Engineers, 1974). Storms on March 31, 1985, and April 4 and 6, 1985, with high easterly and northeasterly winds, drove the already high waters of Lake St. Clair on shore, inundating portions of all the coastal communities in Macomb County. This included portions of the

Village of Grosse Pointe Shores, the City of St. Clair Shores, Harrison Township, Chesterfield Township, and the City of New Baltimore. Some of the worst damage was caused by water flowing through gaps in dikes built by the USACE under Operation Foresight in 1973-1974, which were subsequently lowered or removed in the late 1970's by some residents to facilitate access to Lake St. Clair. The three 1985 storms collectively caused about $4.7 million in damages in Macomb County, with 985 homes and 31 businesses reporting flood damages. Instantaneous high still water levels recorded at the St. Clair Shores gage for the 1973, 1985, and 1986 periods are shown in the table below. Still water levels reflect lake setup, but not wave run-up during a storm (U.S. Army Corps of Engineers, 1974).

Table 18. High Water Marks

County	Flooding Source	Date	Elevation (NAVD88)
Macomb County	St. Clair Shores - Still water levels	March, 1973	577.7
Macomb County	St. Clair Shores - Still water levels	March, 1985	577.6
Macomb County	St. Clair Shores - Still water levels	October, 1986	577.9

NAVD88 = North American Vertical Datum of 1988

If local stakeholders have additional available high water mark data or historic photographs, they are encouraged to submit them to FEMA Region V Mitigation Division.

I.IV.ii.16 Land Use

Although a large part of the county is urban/suburban, much of the northern portion of Macomb County is still undeveloped. Main highways within the county include I-94, I-696, M-59 and M-53. Predominate land uses in the county are undeveloped or cultivated, accounting for about 48-percent of the 309,643 acres. Residential property accounts for 31-percent of the land use (Southeast Michigan Council of Governments, 2000).

2008 land use data is available for download in GIS format from Southeast Michigan Council of Governments at http://www.semcog.org/MapCatalog.aspx. The GIS land use data was created at the parcel level by assigning each parcel to one of eleven land use classifications. The 11 land use classifications are airport, agricultural, single-family residential, multiple-family residential, commercial, industrial, governmental/institutional, park recreation and open space, transportation, communication, and utility (TCU) and water.

The land use data can also be viewed as part of SEMCOG's interactive "Transportation Data Map" located at http://www.semcog.org/Data/Maps/roads.map.cfm?theme=landuse.

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. The lists of LOMC cases were obtained from the FEMA Mapping Information Platform Website (https://hazards.fema.gov/femaportal/wps/portal) in June 2012.

Table 19 lists the number of LOMCs in the county. 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.

Table 19. Summary of LOMC cases in Macomb County project area

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
Macomb	2,885	137	29	0

I.IV.ii.18 Locally Identified Mitigation Actions

Table 20 lists the mitigation actions that were extracted from the current Hazard Mitigation Plan for Macomb County (Macomb County Local Emergency Planning Committee, 2010).

Table 20. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood proof homes
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate basement flooding on 34 Mile Road.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of roads over M-53
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Pass an ordinance to require all new utility installations or power lines to be placed underground.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of Canal, south of Field Street - Section 32
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of eleven Residences in Section 32
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 106 residences along shoreline - section 32
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding 13 residences on Cotton Road - Section 28
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 36 residences along Sugarbush Road - Section 27

Table 20. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of structures west of Jefferson; north of Anchor - Section 32
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 4 apartment buildings - Section 22
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 17 residences on Auvase Creek - Section 28
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 2 residences near Salt River - Section 23
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of businesses - Section 15
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of a single residence within Moravian Manor
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of property adjacent to Frank H. Budd Park
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of Clinton River Road
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of Groesbeck, South of 16 Mile Road
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of Kelly Road, between 15 & 16 Mile Roads
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of residence in Section 15
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of properties along River Lane.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of properties along Belleview
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Develop disaster mitigation/emergency response GIS.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate basement flooding in South East Fraser.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation to properties adjacent to Clinton River Spillway.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 3 residences
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of mobile home park
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 350 residences

Table 20. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 569 residences south of Clinton River
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 294 structures and residences
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation to basements for 7 residences
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation to Lowe Plank Road
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding to 4 residences in Section 35
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of North Avenue.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood monitoring equipment project - install flood sensors at key points in the City along the Clinton River to warn of high water levels and eventual flooding of pre-determined areas of the city.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Improve drainage throughout the Northridge subdivision
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 17 residences along Base Street, east of Front Street
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 18 residences along Base Street, west of Front Street
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 1 residence at far eastern border of new Baltimore.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Revise FIRM for Crapaud Creek
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 10 residences near Shook Drain.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 9 residences at North and 29 Mile Roads
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 4 residences at North and 26 Mile Roads.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 26 Mile Road.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 31 Mile Road

Table 20. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate flooding of 20 structures along Lake St. Clair shoreline.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 150 residences, East of Jefferson and Statler Street
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Mitigate basement flooding in Section 30 of Township
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Storm water retention pond upgrades
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Street drain upgrade - Almont East and West Drives
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Clinton River Project - clear a portion of the Clinton River in order to maintain the proper flow of this estuary. A second project could also include riverbank stabilization and restoration to the parts of the riverbanks to prevent future floodwater erosion of the stream bank.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 61 structures in South Utica
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Clinton River Flood Mitigation Projects - proposed dredging, riverbank stabilization, debris removal, retention basin construction, early flood warning systems.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of 12 residences at Autumn Lane & Jane Court.
Macomb County Hazard Mitigation Plan, 2010-2015	Macomb County	11/9/2015	Flood mitigation of city residences

I.IV.ii.19 Ordinances

Local regulations regarding development within known flood hazard areas can range from ordinances with minimum NFIP requirements to strong, pro-active ordinances that 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 caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests.

Title 44 of the Code of Federal Regulations Sections 60.3(a)–(e) describes the NFIP floodplain ordinance levels and provides the minimum requirements for community participation in the NFIP. The proper ordinance level for each community is determined by the type of flooding that is present within the community. Ordinance levels are shown in the table below:

Ordinance Level	Description
A	Floodplains have not been identified
B	Floodplains with no base flood elevations (BFEs)
C	Floodplains with BFEs or coastal flooding with no high-hazard areas (Zone V)
D	Floodplains with BFEs and floodways
E	Coastal high-hazard areas identified, but no floodways
D & E	Both floodways and coastal high-hazard areas

Ordinance information for Macomb County communities within the project area is shown in Table 21.

Table 21. Program Status and Ordinance Level

Community	CID	FIRM Date	NFIP Status	Ordinance Level
Chesterfield, Township of	260120	12/4/2012	Participating	D
Clinton, Charter Township of	260121	12/4/2012	Participating	D
Harrison, Township of	260123	12/4/2012	Participating	D
Mount Clemens, City of	260124	12/4/2012	Suspended*	N/A
New Baltimore, City of	260125	12/4/2012	Participating	D
St. Clair Shores, City of	260127	12/4/2012	Participating	D

CID = community identification
*Additional information on community suspension from the NFIP can be found by visiting http://www.fema.gov/national-flood-insurance-program-2/suspension

I.IV.ii.20 Proposed Draft Transects

Transects are profiles along which coastal flooding analysis is performed. Transects are used to transform offshore conditions to the shoreline and are used to define coastal flood risks inland of the shoreline. They are placed to define representative profiles for a shoreline reach. The transect layout for coastal hazards 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. The base maps listed earlier in this section (i.e. LiDAR, bathymetry) were reviewed, or will be reviewed once available, to determine revisions to the draft placement for hazard modeling transects along the Lake St. Clair shoreline.

The original proposed draft transect layout is shown on the draft Discovery Map for Macomb County (Attachment C) and includes an identification number per transect. Note that these identification numbers will change as the draft transects are revised in the future.

Stakeholders were provided with the proposed transect shapefiles (GIS digital data) upon request, and the proposed draft transects (Attachment D) were also reviewed during the Discovery Meeting. Input from local officials was requested regarding the placement and the number of transects. Table 22 is a compilation of the comments received regarding the proposed draft transects along Lake St. Clair in Macomb County. Please refer to the draft Discovery Map (Attachment C) or to the proposed draft transect figures (Attachment D) to identify the location of the comment based on the transect number listed in Table 22.

Table 22. Transect Comments

Transect Number (on draft Discovery Map)	Stakeholder	Comment
All	Michigan Department of Environmental Quality	Requested the effective transects be used for Lake St Clair
27	Selfridge Air National Guard Base, Engineering Division	Suggest moving (or adding) proposed transect number 27 just north to represent the existing vertical wall
28	Selfridge Air National Guard Base, Engineering Division	Suggest moving (or adding) proposed transect number 28 to just south to represent the sloping rock wall that is behind the planned development area

Based on the comments captured throughout the Discovery process and during the Discovery Meeting, proposed draft transects for Lake St. Clair have been revised to incorporate placement comments and the request to incorporate effective transects where possible. The revised proposed transects can be seen on the Final Discovery Maps, located in Appendix F of the basin-wide Lake St. Clair Discovery Report (Federal Emergency Managment Agency, 2012). These transects are subject to change based on the future coastal analysis and should not be considered final at this time.

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 Public Assistance (PA) Grant Program

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.

Detailed project descriptions for completed PA projects can be downloaded from https://explore.data.gov/catalog/raw.

I.IV.ii.23 Regulatory Mapping

The effective mapping for coastal communities within Macomb County is listed in Table 23 by community.

Table 23. Effective Mapping Status

Community	CID	Initial FIRM	Previously effective FIRM	Effective FIRM Date	Program Status
Chesterfield, Township of	260120	07/03/1978	09/29/2006	12/04/2012	Participating
Clinton, Charter Township of	260121	08/01/1979	09/29/2006	12/04/2012	Participating
Harrison, Township of	260123	05/05/1981	09/29/2006	12/04/2012	Participating
Mount Clemens, City of	260124	07/16/1980	09/29/2006	12/04/2012	Suspended*
New Baltimore, City of	260125	09/01/1978	09/29/2006	12/04/2012	Participating
St. Clair Shores, City of	260127	08/01/1979	09/29/2006	12/04/2012	Participating

CID = community identification

*Additional information on community suspension from the NFIP can be found by visiting http://www.fema.gov/national-flood-insurance-program-2/suspension

For the previously effective (historic) 2006 Macomb County FIS, detailed studies were performed along East Pond Creek, from downstream corporate limit at Grand Trunk Western Railroad to 34 Mile Road in the Township of Bruce, and along North Branch Clinton River from Wolcott Road to 26 Mile Road in the Townships of Macomb and Ray, and from 33 Mile Road to Bordman Road in the Township of Bruce. No new studies were performed along Lake St. Clair in that 2006 study.

New FIRM panels and FIS for Macomb County went effective on December 4, 2012. For the December 4, 2012 revision, analyses for Lake St. Clair and Anchor Bay were performed by USACE Detroit District. The detailed study along Lake St. Clair included

the cities of St. Clair Shores and New Baltimore, the Townships of Chesterfield and Harrison, and the Village of Grosse Pointe Shores (a Michigan City). Updated FEMA Guidelines and Specification (G&S) for coastal studies along the Great Lakes was not available at the time that study was performed. Moving forward, Great Lakes studies are expected to follow guidance within FEMA's *Draft Guidelines and Specifications for Coastal Studies Along the Great Lakes, issued on May 8, 2012* (Federal Emergency Management Agency, 2012).

Effective and historic FIRMs and FISs can be downloaded from FEMA's Map Service Center (MSC) at https://msc.fema.gov .

I.IV.ii.24 Repetitive Loss Properties

A Repetitive Loss (RL) property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978. A RL property may or may not be currently insured by the NFIP. There are currently over 122,000 repetitive loss properties nationwide.

Structures that flood frequently strain the National Flood Insurance Fund. In fact, the RL properties are the biggest draw on the Fund. FEMA has paid almost $3.5 billion dollars in claims for RL properties. RL properties not only increase the NFIPs annual losses and the need for borrowing funds from Congress, they drain funds needed to prepare for catastrophic events. Community leaders and residents are also concerned with the RL problem because residents' lives are disrupted and may be threatened by the continual flooding.

Over the years, there have been a number of efforts aimed at addressing repetitive losses. Depending on individual circumstances, appropriate mitigation measures commonly include elevating buildings above the level of the base flood, demolishing buildings, and removing buildings from the SFHA as part of a flood control project. Sometimes, mitigation takes the form of a local drainage-improvement project that meets NFIP standards and removes a property or properties from RL or Repetitive Loss Target Group (RLTG) status.

The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for FEMA to provide RFC funds to assist states and communities reduce flood damages to insured properties that have had one or more claims to the NFIP. Additional information on this program and other related programs is available at http://www.fema.gov/hazard-mitigation-assistance.

Repetitive losses were filed in several communities in Macomb County project area, as shown in Table 24.

Table 24. Repetitive Losses

Community	CID	Number of Repetitive Loss Structures	Total Repetitive Loss Payment
Chesterfield, Township of	260120	2	$38,523
Clinton, Charter Township of	260121	3	$153,967
Harrison, Township of	260123	8	$153,527
Mount Clemens, City of	260124	1	$66,970
New Baltimore, City of	260125	3	$72,035.17
St. Clair Shores, City of	260127	5	$89,856

CID = community identification
Source: FEMA's CIS "Community Disaster Detail – Flood Insurance" report

I.IV.ii.25 Socio-Economic Analysis

In Macomb County, the economy is primarily sales and service oriented, accounting for 65 percent of jobs in the county, while about 29 percent of the jobs are in manufacturing.

In 2009, lake-related businesses provided 1.5 percent of the total jobs in Macomb County. This accounted for just over 4,000 jobs, $135 million in wages, and $227 million in goods & services. This represents a 7 percent decrease in lake jobs since 2005 (National Oceanic & Atmospheric Administration, 2009).

The more homes and people located in a floodplain, the greater the potential for harm from flooding. Impacts are likely to be even greater when additional risk factors (age, income, capabilities) are involved, since people at greatest flood risk may have difficulty evacuating or taking action to reduce potential damage. In Macomb County, approximately 5 percent of the population is inside a FEMA floodplain (National Oceanic & Atmospheric Administration, 2009).

I.IV.ii.26 State-level Datasets, Programs, and Information

The information in this section was compiled by the project team throughout this Discovery process based on research of the project area and discussions with local and regional stakeholders.

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/coastalmanagement provides 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

Integrated Coastal Management Tool
http://www.glc.org/habitat/lsc/icm/

The Integrated Coastal Management Tool is a software program designed to assess or estimate coastal habitat change and thereby promote more informed coastal resource management decision-making. Existing data sets for coastal Lake St. Clair are available with the tool, which can be used to:

- Inventory habitats
- Assess land and water habitat conditions
- Identify and rank potential restoration and conservation sites
- Analyze "what if" scenarios for proposed changes in land use or land cover
- Create maps, reports, and data tables

The tool uses existing GIS data layers such as land cover, streams, invasive species, threatened or endangered species, shoreline hardening and others to calculate habitat statistics.

The Integrated Coastal Management Tool was designed with the local planner, the coastal conservation group, and the coastal manager in mind. Altering the scenarios is easy, which allows the user to quickly compare how different management decisions or actions will affect coastal habitat.

SEMCOG - Restoring and Protecting Lake St. Clair
http://www.semcog.org/lakestclair.aspx

SEMCOG facilitates the Lake St. Clair/St. Clair River Protection and Restoration Partnership. The Partnership contains representatives of 36 organizations including local, state, regional and federal government agencies, non-governmental organizations,

business, universities and associations. The goal of the partnership is to implement the management plan resulting in protection and restoration of the river and lake.

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 at http://www.miseagrant.umich.edu/explore/restoration/.

V. Risk MAP Projects and Needs

This section provides information about the planned next steps for the Lake St. Clair coastal flood study, including information about the upcoming coastal study, potential for mitigation technical assistance within the project area, possible 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 the Lake St. Clair Discovery effort and provided in this report will be utilized in the upcoming GLCFS for Lake St. Clair.

A summary of the GLCFS project, as well as project updates, can be found at http://www.greatlakescoast.org/ under the "Great Lakes Coastal Analysis & Mapping" section.

The following work is expected to be performed for Lake St. Clair as part of the GLCFS, pending congressional funding. The scope of work described in this section is therefore subject to change and may not be performed within all Lake St. Clair communities.

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). The upcoming study is expected to include the following tasks: creation of bathymetric and topographic data, base map acquisition, coastal flood hazard analysis, and risk assessment product development. A summary is provided below and additional detail may be found in FEMA's basin-wide Lake St. Clair Discovery Report (Federal Emergency Managment Agency, 2012).

Engineering & Mapping:
Coastal flood hazard analyses for the coastal communities of the United States located along the Lake St. Clair 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.

Draft coastal flood maps (or workmaps) will be produced for the study area. The workmaps will include the 1-percent- and 0.2-percent-annual chance flood hazard areas, Coastal High Hazard (VE Zone) and Coastal A Zone (AE Zone), Base Flood Elevations (BFEs), and Limit of Moderate Wave Action (LiMWA) boundary. The LiMWA boundary identifies the 1.5-foot wave height line and alerts property owners that although their property is in a Zone AE area, it may also be affected by waves 1.5 feet or higher. Communities will be provided with an opportunity to review the workmaps after the coastal analysis is complete and prior to FIRM production.

National Flood Insurance Program Integration:
Regulatory FIRM files may 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.

The final production and distribution of updated FIRMs will be dependent on the results of the coastal analysis, discussions with the communities, and congressional funding. Therefore, it cannot be identified at this time the exact communities that will receive updated FIRMs that may require adoption. The risk assessment products and their distribution, discussed below, are also dependent on the results of the coastal analysis and further community discussions and are subject to change.

Risk Assessment Products:
Depending on available data, results of coastal analysis, local needs identified, local partnerships, and fiscal year funding, the coastal flood risk products such as Flood Risk Map, Flood Risk Report, Changes Since Last FIRM (CSLF), Flood Depth and Analysis Grids, and Hazus-MH analyses may be generated for identified coastal communities in Macomb County. Optional Flood Risk Assessment products such as coastal wave height grids, erosion risk determination, and wave hazard severity area datasets have not yet been funded. Table 25 summarizes the products projected for the coastal communities.

Table 25. Potential Flood Risk Products

County	State	Flood Risk Map and Flood Risk Report?	Changes Since Last FIRM?	Flood Depth and Analysis Grids?	Hazus-MH?	Optional Flood Risk Assessment Products?
Macomb	MI	✓	✓	✓	✓	Not yet funded

ii. Potential for Mitigation Assistance

As part of a Risk MAP project, Mitigation Planning Technical Assistance (MPTA) may available to help communities plan for and reduce risks by providing communities with specialized assistance. MPTA includes risk assessment, mitigation planning, and traditional hazard identification (flood mapping) activities. Technical assistance through MTPA can be performed at any time during the hazard mitigation planning process.

Determining which communities receive MPTA is dependent on identification of a need, the willingness of a community to partner with FEMA, local resources and data availability, and federal funding availability. Unfortunately, not every community will be able to 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 activities should be based on the needs of the community and assist with already established capabilities.

Some technical assistance 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 deficiencies that should be corrected.

At the time this report was completed, specific potential future mitigation projects were not identified during the Discovery Meeting or Discovery process for Macomb County communities. 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 tools to determine a community's compliance with the minimum regulations of the NFIP. Among them are Community Assisted Contacts (CACs), 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.

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.

After coastal analysis is completed for this study, communities may be faced with adopting new regulations related to coastal high hazard areas. An understanding of regulations associated with coastal areas will be important so that communities remain compliant. 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 compliance topics, including coastal Special Flood Hazard Areas (SFHAs), building requirements in VE Zones, and Limit of Moderate Wave Action (LiMWA), are discussed in detail at http://www.greatlakescoast.org and in the basin-wide Lake St. Clair 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.

Throughout this study process, Federal, State, and local stakeholders will be kept informed via email, phone calls, letters, newsletters, and meetings as appropriate. A dedicated email account was created (GreatLakesFloodStudy@STARR-Team.com) to distribute project information, meeting reminders, and summaries.

Stakeholder involvement will continue to be important through the remainder of the project. The GLCFS 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 flood study projects, data collection, upcoming meetings, new technical reports, the latest methodologies, factsheets, and additional information.

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

v. Unmet Needs

The Macomb County Discovery process did not identify specific needs that would not be met during the coastal flood study. All stakeholder comments were addressed and will continue to be addressed throughout the coastal flood study.

During the Discovery Meeting and throughout the Discovery process, Lake St. Clair stakeholders did note general 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 throughout this Discovery process. During the upcoming engineering and mapping tasks, workmaps designed to give local stakeholders an opportunity to review and comment on flood risk data and revised SFHAs will be distributed before the data is carried into NFIP FIRM maps.

In addition, comments related to the proposed transects were raised during the Discovery Meeting by State and county representatives. It was suggested the effective transects along Lake St. Clair be used. As a result, the Macomb County effective transects were incorporated into the proposed draft transect layout. It should be noted that the transects proposed in this report remain subject to change pending further coastal analysis.

VI. Close

Federal, State, and local stakeholders were interested in the Discovery processes and in providing local data that may assist in the upcoming Lake St. Clair coastal flood study. 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 Lake St. Clair flood study. The information gathered in this Discovery process will provide invaluable information as the Lake St. Clair Coastal Flood Study proceeds.

VII. References

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VIII. Attachments

Discovery data and information, as well as this report and appendices, have been stored digitally on FEMA's Mapping Information Platform (MIP) Discovery Data Repository at J:\FEMA\DISCOVERY_DATA_REPOSITORY\R05_DATA\MICHIGAN_MI_26 and can be accessed by FEMA authorized users. The MIP can be accessed from https://hazards.fema.gov/. A username and password is required to access certain data within the MIP.

The final Discovery Report and appendices are also available for download from http://www.greatlakescoast.org/.

Attachment A: Coastal Data Request Form Compilation
Attachment B: Macomb County Pre-Meeting Correspondence
Attachment C: Draft Discovery Map
Attachment D: Proposed Transects
Attachment E: Macomb County Discovery Meeting Documents
Attachment F: Macomb County Hazard Mitigation Grant Program 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: Scott Banjavcic
CDM Smith/STARR
125 S. Wacker Drive, Suite 600
Chicago, IL 60606

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

Laura Keating, Laura.Keating@starr-team.com, 925-296-8048

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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536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

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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Chicago, IL 60605
FEMA

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

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536 S. Clark St. 6th Floor
Chicago, IL 60605
FEMA

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

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Chicago, IL 60605
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

MACOMB COUNTY PRE-MEETING CORRESPONDENCE

Core Stakeholder Pre-Meeting Documents

Information Exchange Session Documents

CEO/FPA Mailing List

Hard Copy Discovery Meeting Invitations

Lake St. Clair Email Distribution List

Email Discovery Meeting Invitation

Keating, Laura

Subject:	FEMA Invitation to Lake Michigan/Lake St. Clair Discovery Kickoff Meeting WebEx for Michigan Core Stakeholders
Location:	NEW Phone: (877) 537-6647 Conference ID: 31578 and NEW WebEx
Start:	Thu 6/21/2012 11:00 AM
End:	Thu 6/21/2012 12:30 PM
Recurrence:	(none)
Meeting Status:	Meeting organizer
Organizer:	Keating, Laura
Required Attendees:	'Alan Lulloff'; 'Byron Lane (MDEQ)'; 'Catrina Covino'; 'Eric Kuklewski'; 'Erin Maloney'; 'Ernie Sarkipato (MDEQ)'; 'Greg Mausolf (USACE)'; 'Heather Stirratt (NOAA)'; Hillier, Timothy; 'Holly Davis'; 'Jennifer Day (NOAA)'; 'Jerry Fulcher (MI CZM)'; 'Joel Pepper'; 'Julie Tochor'; Keating, Laura; 'Ken Hinterlong'; 'Les Thomas (MDEQ)'; 'Linda Burke (MDEQ)'; 'Maria Zingas (MDEQ)'; 'Mary Weidel (USACE)'; 'Matt Occhipinti (MDEQ)'; 'Matt Schnepp'; 'Michelle Hohn'; 'Mike Hanke'; 'Patrick Durack (MDEQ)'; Randhawa, Jaspreet; 'Richard Foody'; 'Sheila Meier (MDEQ)'; 'Stephen Aichele (USGS)'; 'Susan Conradson (MDEQ)'; 'Tom Smith'; 'Wayne Lasch'; breederl@msu.edu; 'Roberts, Stacey'; Denick, Roger (Roger.Denick@stantec.com); jread@glos.us
Optional Attendees:	Luce, Janet K; Breederland, Mark; Tabar, Jeffrey R
Categories:	Red Category

Good Afternoon,

In preparation for this call tomorrow at 1pm CT/2pm ET, please find attached the agenda, as well as a couple handouts that we will discuss during the call.


Michigan_Core_Stakeholder_preD...


LCFS_ LiMWA Fact Sheet.pdf


MAF-Form.pdf

Also, please note the updated WebEx and call-in number:

WebEx information:

Participant Join URL: https://atkinsglobalna.webex.com/atkinsglobalna/j.php?J=652104155

Meeting Number: 652 104 155
Meeting Password: This meeting does not require a password.

Audio Conference information:
Phone: (877) 537-6647
Conference ID: 31578

Thanks,
Laura Keating

Good Afternoon,

Please note the date change that was made to better accommodate schedules.

As you may know, the Federal Emergency Management Agency (FEMA), in cooperation with the U.S Army Corps of Engineers (USACE), the Association of State Floodplain Managers (ASFPM), and other partners, is conducting a comprehensive study of flood hazards for Lake Michigan coastal communities and along the United States shoreline in other areas of the Great Lakes system. Data from this study will eventually be used to revise Flood Insurance Rate Maps (FIRMs) for coastal communities throughout the region.

As part of the Great Lakes Coastal Flood Mapping and Outreach initiative, STARR (which stands for Strategic Alliance for Risk Reduction) has been contracted by FEMA to perform Discovery for all Lake Michigan coastal communities within Wisconsin, Illinois, Indiana, and Michigan. In addition, STARR will perform Discovery for St. Clair, Macomb and Wayne Counties along Lake St. Clair in Michigan. The Discovery process allows us to engage the communities and other local stakeholders to initiate risk discussions and increase visibility of flood risk information.

You have been identified as a Core Stakeholder for the Lake Michigan and Lake St. Clair Discovery Projects in the State of Michigan. FEMA and STARR would like to hold a one-hour Kickoff Meeting via WebEx/conference call to introduce you to the Discovery process, including identifying Discovery goals and objectives for the Lake Michigan and Lake St. Clair coastal communities in the State of Michigan. We will also review the Lake Michigan and Lake St. Clair Discovery Meeting Plan and discuss State-specific requirements.

You may have recently received a similar Discovery Kickoff Meeting invitation for another State. Although some of the information presented at the other WebEx meetings will be the same, we will be discussing items specific to those counties in Michigan and request that you attend this WebEx as well.

In the past few months, STARR may have already contacted you to participate in a Lake Michigan or Lake St. Clair Technical Workshops. Discovery is another part of the project, and we require your input and feedback to ensure study success. The community-based Discovery Meetings are held following Technical Workshops. Below are the tentative Lake Michigan and Lake St. Clair Discovery Meeting dates for the State of Michigan:

Lake Michigan:

Counties	Venue	Address	Date, Time
Vanburen Berrien	Berrien County Administrative Building	701 Main Street St. Joseph, MI 49085	Monday 09/10/2012 3:00 - 5:00 pm
Ottawa Allegan	Ottawa County Fillmore Street Complex Board Room	12220 Fillmore Street, Rm 310 West Olive, MI 49460	Tuesday 09/11/2012 3:30 - 5:30 pm

Oceana Muskegon	Louis A. McMurray Conference and Transportation Center	2624 Sixth Street Muskegon Heights, MI 49444	Wednesday 09/12/2012 9:00 - 11:00 am
Manistee Mason	Community Room	400 S. Harrison Street Ludington, MI 49431	Wednesday 09/12/2012 3:00 - 5:00 pm
Grand Traverse Benzie Leelanau	Training Room	400 Boardman Avenue Traverse City, MI 49684	Thursday 09/13/2012 1:00 - 3:00 pm
Antrim Charlevoix Emmet	Bellaire Community Hall	202 North Bridge Street Bellaire, MI	Friday 09/14/2012 9:00 - 11:00 am
Mackinac	TBD	TBD	Tentatively planned - Monday 08/13/2012; 3:00 - 5:00 pm
Delta Schoolcraft Menominee	Bay de Noc Community College, Rooms 958 & 962, Escanaba, MI	2001 N. Lincoln Road, Escanaba, MI 49829	Tuesday 08/14/20012; 3:00 - 5:00 PM

Lake St. Clair

Counties	Venue	Address	Date, Time
St. Clair	TBD	TBD	Tentatively planned - 8/20/2012; 9:00 - 11:00 AM
Macomb	Macomb County Verkuilen Building - Tentative as of 3/27/2012	21885 Dunham Rd., Clinton Twp, MI 48036	8/20/2012; 3:00 - 5:00 PM
Wayne	TBD	TBD	Tentatively planned - 8/21/2012; 9:00 - 11:00 AM

Please let me know if the proposed time on this meeting invitation **(1pm CDT/2pm EDT)** is acceptable. We are trying to determine the best time for everyone to participate in the Lake Michigan and Lake St. Clair Discovery Kickoff Meeting WebEx for the State of Michigan.

We look forward to discussing this project with you during the call. Please do not hesitate to contact me if you have any questions.

Sincerely,

Laura Keating, CFM
STARR

Laura.Keating@starr-team.com
Phone/fax: 925-296-8048

NEW WebEx information:

Participant Join URL: https://atkinsglobalna.webex.com/atkinsglobalna/j.php?J=652104155

Meeting Number: 652 104 155
Meeting Password: This meeting does not require a password.

Project Name:	Lake Michigan/Lake St. Clair Discovery Project
Meeting:	Lake Michigan/Lake St. Clair Pre-Discovery Kickoff Meeting for Michigan Core Stakeholders
Date and Time:	Thursday, June 21, 2012 at 1pm CDT/2pm EDT
Place:	**Audio Conference information:** Phone: (877) 537-6647 Conference ID: 31578 Participant Join URL: https://atkinsglobalna.webex.com/atkinsglobalna/j.php?J=652104155 Meeting Number: 652 104 155 Meeting Password: This meeting does not require a password.
Facilitator:	FEMA, STARR

Core Stakeholder Pre-Discovery Kickoff Meeting Agenda

Great Lakes Coastal Flood Study Overview

- Objectives
- Status
- Schedule

Hazard Mitigation Resources, Strategies, and Actions

- Improving Mitigation Strategies
- Introduction to Mitigation Action Form

Discovery Process Overview

- Scope and Schedule
- Discovery Meeting Outcomes
- Introduction to Discovery-phase Data Collection Activities
- Final Discovery Products

Coastal Focus – Information to be Aware Of

- Coastal Flood Risk Datasets
- Transects
- Erosion and Erosion Control Revetments
- LiMWA
- Coastal Zone Mapping

Next Steps

- Community contact lists, draft transects, meeting minutes
- Stakeholder Input

Questions/Comments?

FEMA

Core Stakeholders
Lake Michigan/Lake St. Clair
Pre-Discovery Kickoff Meeting

State of Michigan

June 21, 2012

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Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
Discovery "Kick-off"

Core Stakeholders – Who's here?

- State partners & stakeholders
  - MDEQ – State CTP
  - MDEQ – State NFIP Coordinator
  - MDHS – SHMO
  - MDEQ – Coastal Zone Management
- Other Core Stakeholders
  - Sea Grant – Michigan
  - Others?

- Risk MAP Project Team
  - FEMA / STARR
  - USACE
  - ASFPM
  - NOAA

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Great Lakes Coastal Flood Study
Discovery "Kick-off"

Today's Agenda

- Review Great Lakes study objectives and status
- Hazard Mitigation Resources, Strategies and Actions
  - Introduce Mitigation Action Form
- Discovery Process Overview
  - Scope and Schedule, Discovery Meeting Outcomes, Information Exchange Calls, and Pre-Discovery Meeting Data Collection.
- Coastal Focus
  - Coastal Flood Risk Datasets, Transects, Erosion, LiMWA, Coastal Zone Mapping
- Next steps
  - Identify issues for discovery meeting preparations
  - Identify issues/actions for Core Stakeholder follow-up

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Great Lakes Coastal Flood Study
Program Overview

- **Latest models, data, and technology**
  - Includes basin-wide water surface grids and storm sampling, built from continuous record of 50 years of meteorological, water level, and ice field data (1960 - 2009).
  - Includes changes to run-up computational approach
  - Updated version of Appendix D.3 (FEMA Guidelines and Standards) will be introduced for comment in May 2012
- **Deliver updated flood maps**
- **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**

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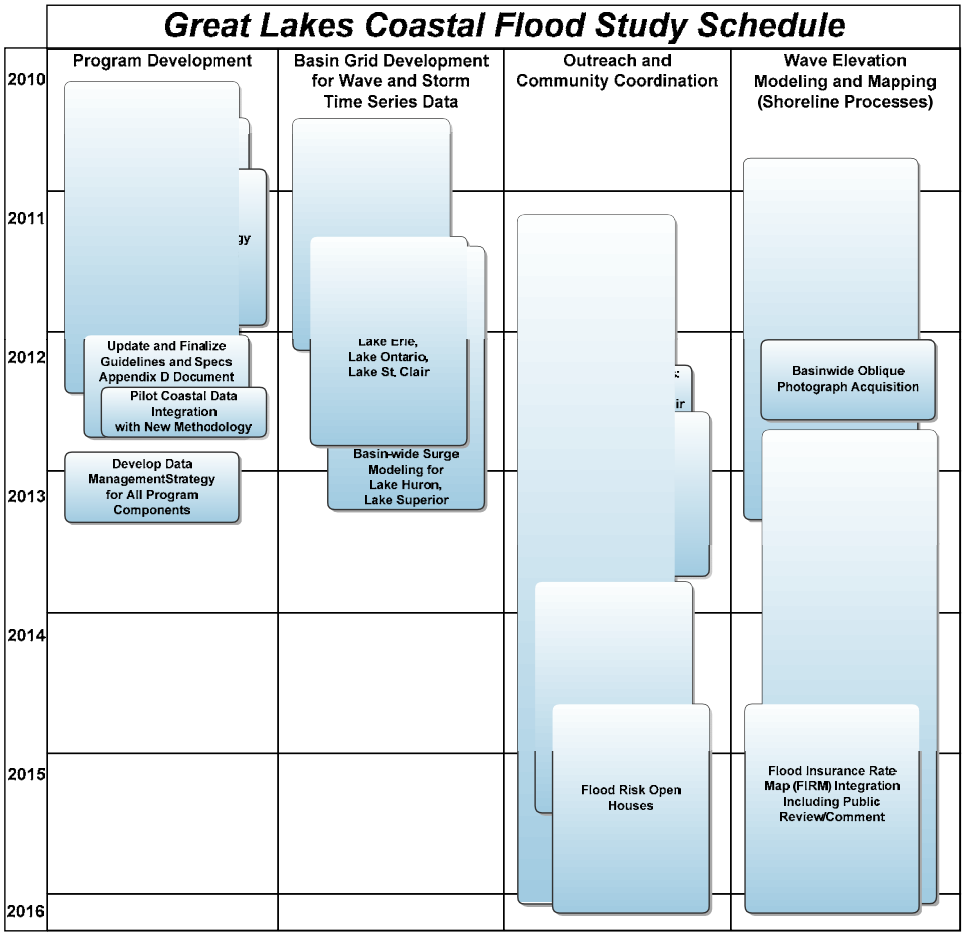
Program Overview

Methodology Focus points from 2009 Stakeholder Meeting:

- Employ a response (or extremal) approach to run-up computation, not the old process of event-based computations, where wind set-up was treated as a separate computational component at shoreline.
- Consider new wave run-up processes through continuation of response-based modeling at shoreline, and transitions to better utilization of WHAFIS and ST-Wave methodologies.

Great Lakes Coastal Flood Study
Program Status and Schedule

- FY11 task orders funded 2012 outreach actions along Lake Michigan, Lake St. Clair and Lake Erie
- FY12 contracting processes will fund major production along these same lakes - including wave height computations, draft inundation mapping and significant PMRs
- FY13 contracting will play catch-up on PMRs, and run new production Lakes Superior, Huron



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Great Lakes Coastal Flood Study
HM Resources, Strategies & Actions

Obtaining Mitigation Action Gains through the Great Lakes Study Program:

- Leverage conversations with local communities while working Discovery meetings and "Risk Data and Mitigation Workshops"
- Build a Mitigation Actions strategy through participation with Core Stakeholders
    - Involvement by State partners is critical --- funding can be considered under fy12 CTP Program Management
    - STARR will likely lead under fy12 Task Order
    - Conversations will start sometime in October, with strategy and small tool development to be complete by April 2013

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Great Lakes Coastal Flood Study
HM Resources, Strategies & Actions

- 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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Great Lakes Coastal Flood Study
HM Resources, Strategies & Actions

MSP/EMHSD Pub. 106
March 2011
EMERGENCY MANAGEMENT AND
HOMELAND SECURITY DIVISION
Michigan Department of State Police

Michigan Hazard Mitigation Plan
(Updated March 2011 edition)

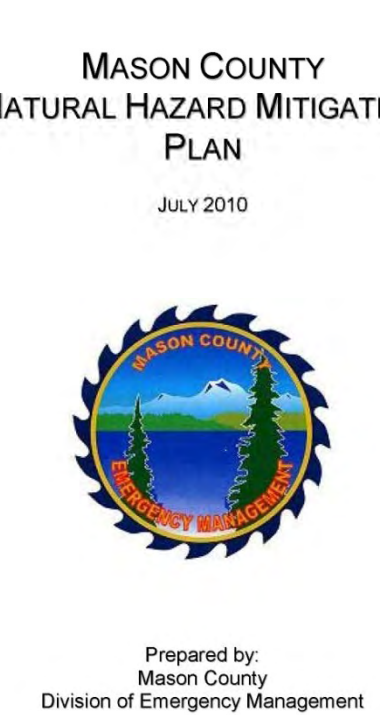
Reducing hazard risks and vulnerabilities through education, planning, physical improvements, early warning, and coordination of programs and resources.

Prepared by:

Emergency Management and Homeland Security Division
Michigan Department of State Police

And

The Michigan Citizen-Community Emergency Response Coordinating Council



MASON COUNTY
NATURAL HAZARD MITIGATION
PLAN

JULY 2010

Prepared by:
Mason County
Division of Emergency Management

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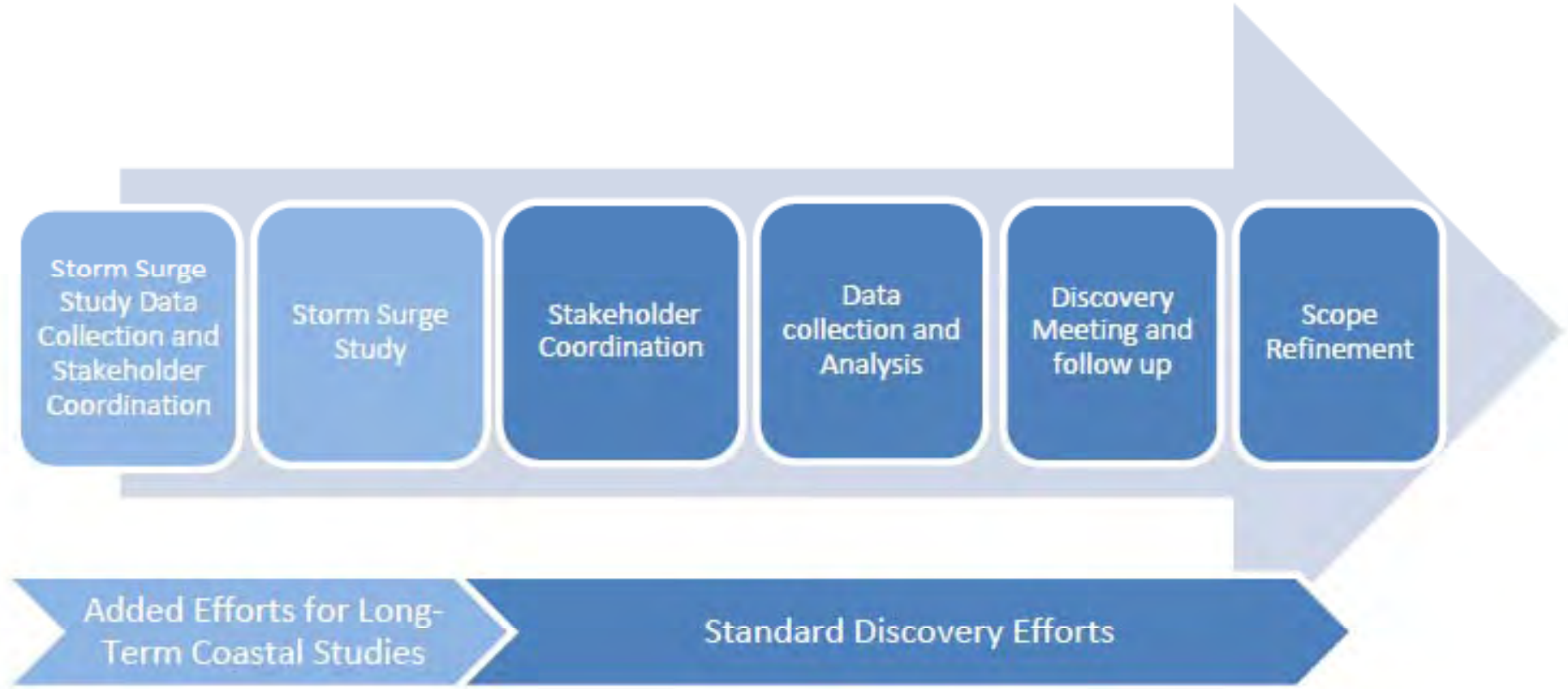
Great Lakes Coastal Flood Study
Discovery Process Overview



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Great Lakes Coastal Flood Study
Lake Michigan Discovery

- 18 Michigan counties
  - Menominee
  - Delta
  - Schoolcraft
  - Mackinac
  - Emmet
  - Charlevoix
  - Grant Traverse
  - Antrim
  - Leelanau
  - Benzie
  - Manistee
  - Mason
  - Oceana
  - Muskegon
  - Ottawa
  - Allegan
  - Van Buren
  - Berrien
- 197 coastal communities

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Great Lakes Coastal Flood Study
Lake St. Clair Discovery

- 3 Michigan counties
  - St. Clair
  - Macomb
  - Wayne
- 31 coastal communities

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Great Lakes Coastal Flood Study
Lake Michigan/Lake St. Clair Discovery

Schedule of Activities

- Identify Draft Transect Locations – Completed
- Research available data – In Progress
- Information Exchange with Community Stakeholders – early July 2012
- Prepare draft Discovery Maps and Reports – July 2012
- Establish inventory of coastal structures based on oblique imagery – July/August 2012
- Facilitate Discovery Meetings – August/September 2012
- Final Discovery Report and Maps – December 2012
- Create library of digital data – December 2012

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Great Lakes Coastal Flood Study
Lake Michigan Discovery

FEMA

Flood Risk Discovery and Initial Coordination - 8 Meetings Planned for Lake Michigan

Michigan

Counties	Tentative Venue	Address	Date, Time
Vanburen Berrien	Berrien County Administrative Building	701 Main Street St. Joseph, MI 49085	Monday 09/10/2012 2:00 - 5:00 pm
Ottawa Allegan	Ottawa County Fillmore Street Complex Board Room	12220 Fillmore Street, Rm 310 West Olive, MI 49460	Tuesday 09/11/2012 9:00 - 12:00 pm
Oceana Muskegon	Louis A. McMurray Conference and Transportation Center	2624 Sixth Street Muskegon Heights, MI 49444	Wednesday 09/12/2012 9:00 - 12:00 pm
Manistee Mason	Community Room	400 S. Harrison Street Ludington, MI 49431	Wednesday 09/12/2012 3:00 - 6:00 pm

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Great Lakes Coastal Flood Study
Lake Michigan Discovery cont'd…

Flood Risk Discovery and Initial Coordination - 8 Meetings Planned for Lake Michigan

Michigan

Counties	Tentative Venue	Address	Date, Time
Grand Traverse Benzie Leelanau	Training Room	400 Boardman Avenue Traverse City, MI 49684	Thursday 09/13/2012 1:00 - 4:00 pm
Antrim Charlevoix Emmet	Bellaire Community Hall	202 North Bridge Street Bellaire, MI	Friday 09/14/2012 9:00 - 12:00 pm
Mackinac	TBD	TBD	Tentatively planned - Monday 08/13/2012; 3:00 - 5:00 pm
Delta Schoolcraft Menominee	Bay de Noc Community College Rooms 958 & 962	2001 N Lincoln Road Escanaba, MI 49829	Tuesday 08/14/20012; 3:00 - 5:00 PM

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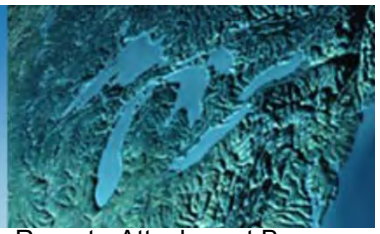

Great Lakes Coastal Flood Study
Lake St. Clair Discovery

Flood Risk Discovery and Initial Coordination - 3 Meetings Planned for Lake St. Clair

Michigan

Counties	Tentative Venue	Address	Date, Time
St. Clair	TBD	TBD	Tentatively planned 8/20/2012; 9:00 - 11:00 AM
Macomb	Macomb County Verkuilen Building - Tentative as of 3/27/2012	21885 Dunham Rd., Clinton Twp, MI 48036	8/20/2012; 3:00 - 5:00 PM
Wayne	TBD	TBD	Tentatively planned 8/21/2012; 9:00 - 11:00 AM

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Great Lakes Coastal Flood Study
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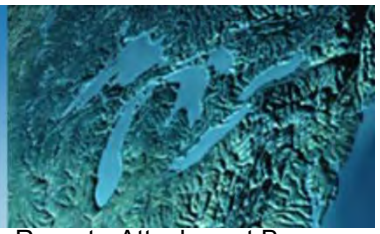


Discovery Outcomes

Outcome #1 - Encourage community participation

- Vet transect locations
- Identify reaches requiring special attention
- Document local data sources that will help improve study
- Identify local coastal management issues

Discovery Outcomes

Outcome #2 - Explain study process and timelines

- High-level – Steps involved in study, and timeline
- Regulatory and non-regulatory products
- NFIP changes – Map revision objectives
- New concepts like LiMWA
- Where to find data and reports

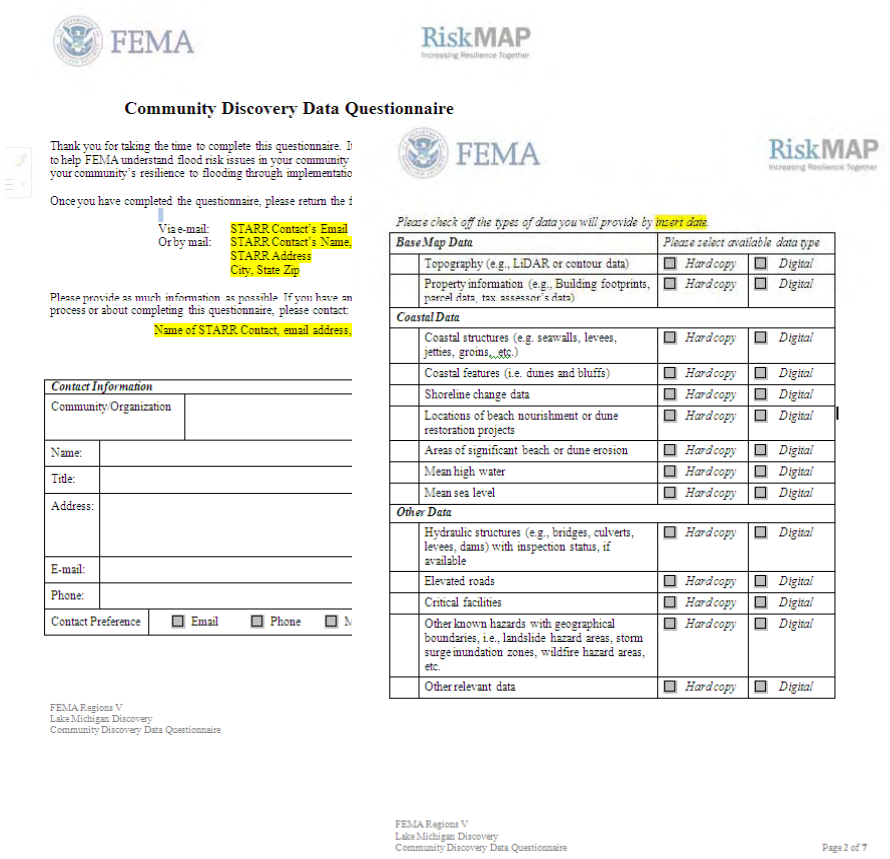
Outcome #3 - Introduce Mitigation Action Goals

- Distribute and discuss mitigation action form
- Develop Mitigation strategies and options
    - Land Use Ordinances
    - Local Building Codes
    - Management Best Practices
    - Traditional HM Projects
    - Community Planning and Programs
- Evaluate opportunities to build storm response erosion data to enhance local planning objectives and processes

Great Lakes Coastal Flood Study
Lake Michigan/Lake St. Clair Discovery

Info Exchange Calls

- Discovery meeting Invitations sent out week of July 2 (5-6 weeks prior to meeting date)
- Calls start week of July 9 or 16
- Data Questionnaire to request:
  - *Basemap Data*
  - *Coastal Data*
  - *Other Data*
  - *Historical Flood Data*
  - *Risk Assessment*
  - *Flood Mitigation Information*
  - *Community Plans and Projects*



FEMA RiskMAP

Community Discovery Data Questionnaire

Thank you for taking the time to complete this questionnaire. I
to help FEMA understand flood risk issues in your community
your community's resilience to flooding through implementatio

Once you have completed the questionnaire, please return the f

Via e-mail: STARR Contact's Email
Or by mail: STARR Contact's Name,
STARR Address
City, State Zip

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

Name of STARR Contact, email address,

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

FEMA Regions V
Lake Michigan Discovery
Community Discovery Data Questionnaire

FEMA RiskMAP

Please check off the types of data you will provide by insert date.

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 sea 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*

FEMA Regions V
Lake Michigan Discovery
Community Discovery Data Questionnaire
Page 2 of 7

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Standard data inventory

- High-resolution digital topography
- Bathymetry Data – NOAA National Geophysical Data Center
- FIS reports
- Letters of Map Amendment and/or Letters of Map Revision
- Flood insurance policies and claim information
- CRS data
- Federal and State disaster information
- CAV information
- Repetitive loss data
- Census data
- Basemap data (roads, railroads, etc)

Additional data to be collected

- FEMA-approved Hazard Mitigation Plans
- CBRS areas
- Building footprints/parcels
- Coastal data (structures, limit of PFD, shoreline change data, mean high water, mean sea level, tide gauge info, wind station data, wave buoy, areas of sig. beach/dune erosion)
- Data from other Federal/State agencies
  - Erosion rates

Great Lakes Coastal Flood Study
Lake Michigan/Lake St. Clair Discovery

Flood Risk Discovery and Initial Coordination Draft Agenda

- Why are we here? (20 minutes)
  - Overview of study and explain role of discovery
- How is coastal flood risk being assessed for the Great Lakes? (30 minutes)
  - Review draft transects; coastal guidance updates; VE Zone Mapping and LiMWA; and coastal flood risk products
- How does this apply to my community? (20 min)
  - NFIP compliance and building codes; coastal planning and hazard mitigation opportunities; local coastal mitigation best practices; and hazard mitigation grant opportunities
- Interactive Session (40 minutes)
  - 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; and discuss mitigation action opportunities and introduce the mitigation action form
- Wrap-up and Next Steps (10 minutes)
- Optional Interactive Stations (60 minutes following meeting)
  - Draft Transect Location Reviews and Discussion; Mitigation Resources, Strategies, and Actions

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Discovery Meeting Invitees

- Compiled list of community and county officials, including:
  - Chief Executive Officers (CEOs)
  - Floodplain Administrators (FPAs)
- For communities: only CEOs will receive official mailed invitation to Discovery Meetings (with a cc to FPA, State SHMO, State NFIP Coordinator)
- Compiled list of Other Federal Agencies (OFAs), State partners, and associations
- Need your help to reach out to others who should be invited to Discovery Meetings
  - Local Planners, Engineers, GIS Staff, and Building Officials
  - Emergency Management staff
  - Other State and Local resources

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Great Lakes Coastal Flood Study
Lake Michigan/Lake St. Clair Discovery

- **Final Discovery Reports**
  - Single, comprehensive report for all of Lake Michigan, with appendices for each county
  - Single, comprehensive report for all of Lake St. Clair, with appendices for each 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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FEMA

Flood Risk Datasets

- Coastal Depth Grids and HAZUS
- Changes Since Last FIRM
- Erosion, Shoreline Features, and Lake Levels

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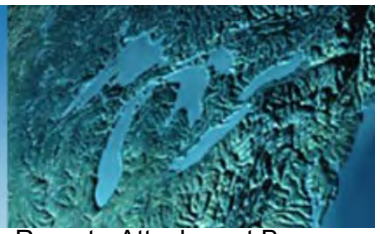
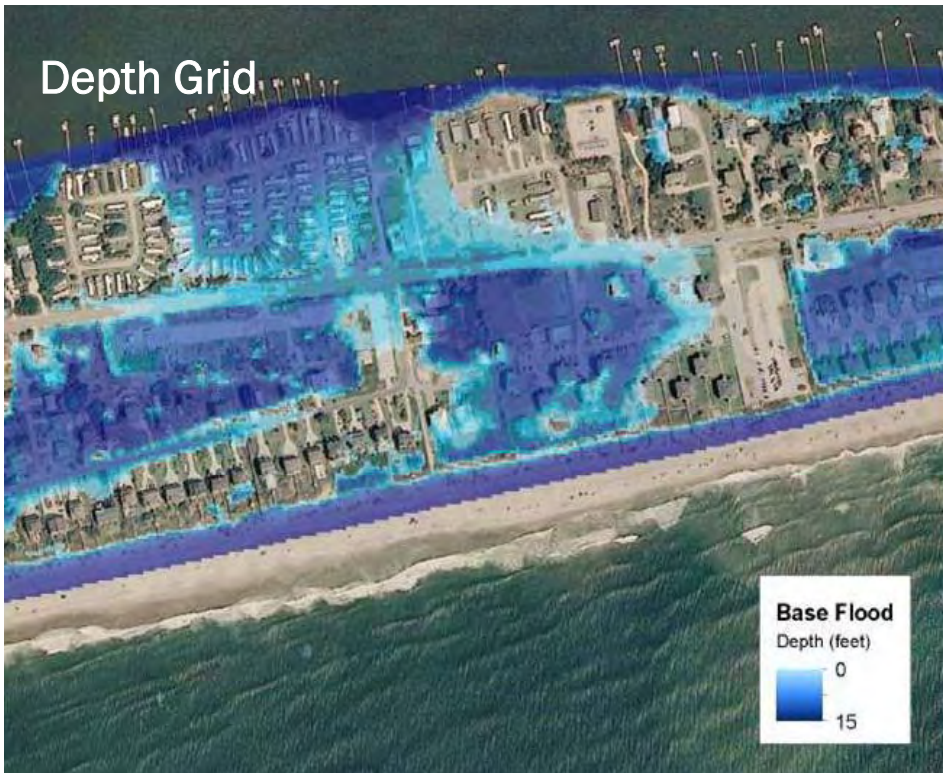


Standard Flood Risk Products

- Coastal Depth Grids
- Flood Risk Assessment (HAZUS)

HAZUS MH
EARTHQUAKE • WIND • FLOOD



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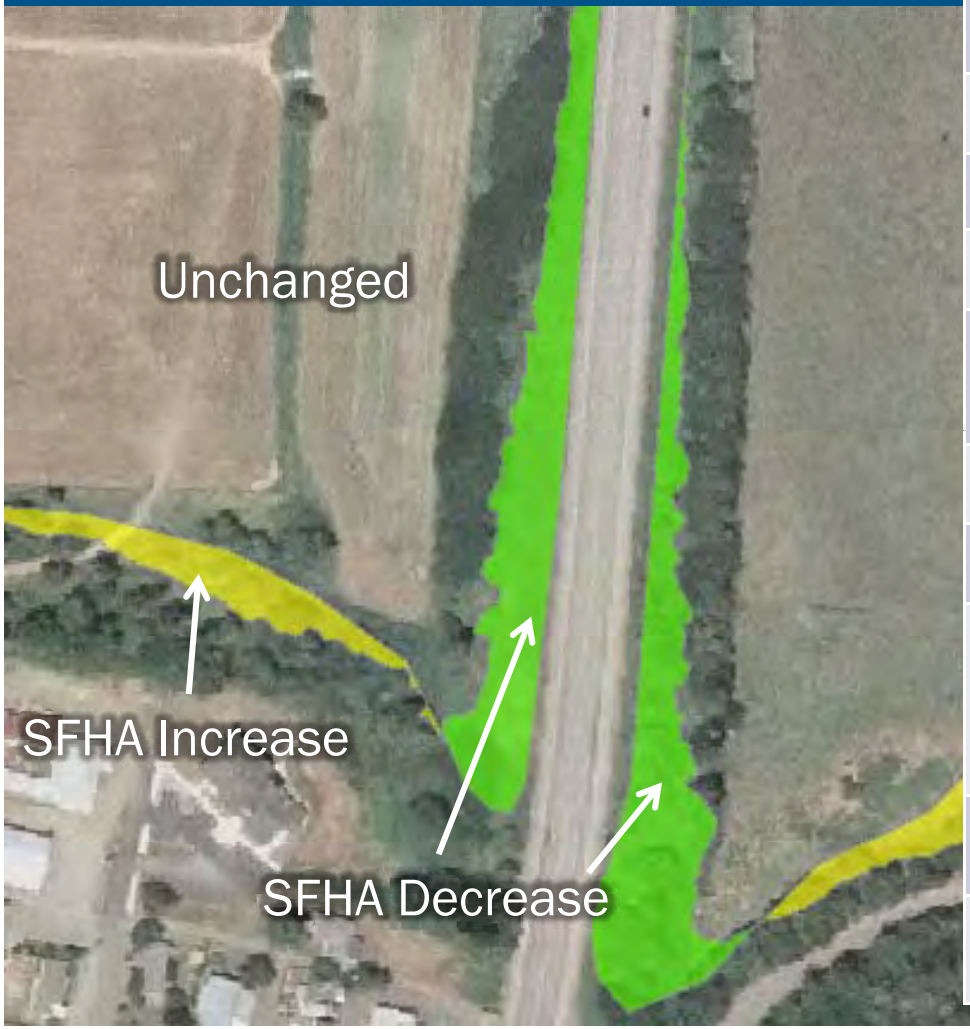
Changes Since Last FIRM



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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Great Lakes Flood Risk Products

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

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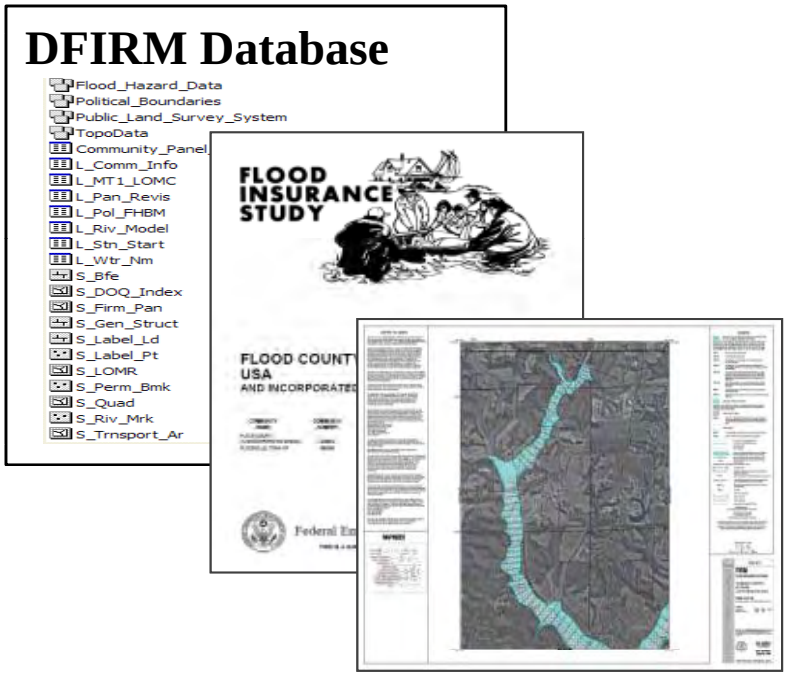
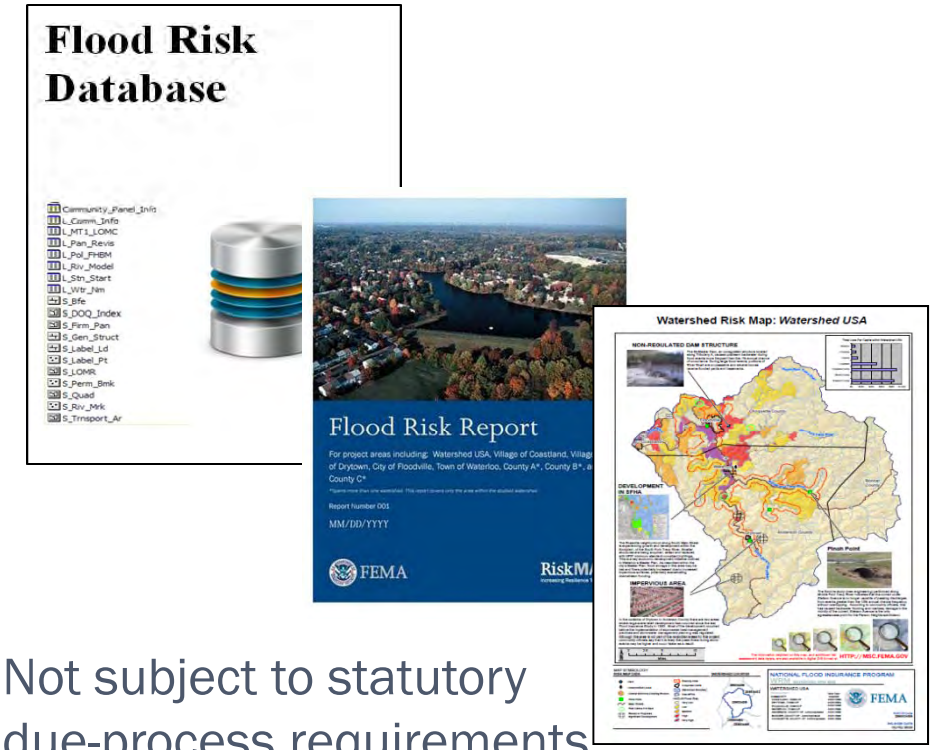
Program Product Comparisons

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

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Coastal Flood Hazard Zones

- Hazard Zones
  - VE Zone – Areas expected to be affected by wave impact in 100-year event
    - Base Flood Elevation established
  - AE Zone – Areas expected to be flooded by inundation in 100-year event
    - Base Flood Elevation established
  - X Zone – Areas not expected to be flooded in 100-year event
    - Shaded X – Areas expected to be flooded in 500-year event
    - Base Flood Elevations not established
  - LiMWA – Areas subject to wave heights of at least 1.5 feet
    - Non-Regulatory
- Gutters
  - Internal zone breaks where Base Flood Elevation changes
  - VE/AE Gutter - Location where risk of damage due to wave action diminishes

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How is LiMWA Defined?

- Coastal Zone Wave Heights
  - Zone VE includes wave heights equal to or greater than three feet
  - Zone AE includes wave heights less than three feet
- 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 alerts people that are not in the high wave hazard zone (VE Zone) that they may still be affected by wave action in the AE Zone

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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

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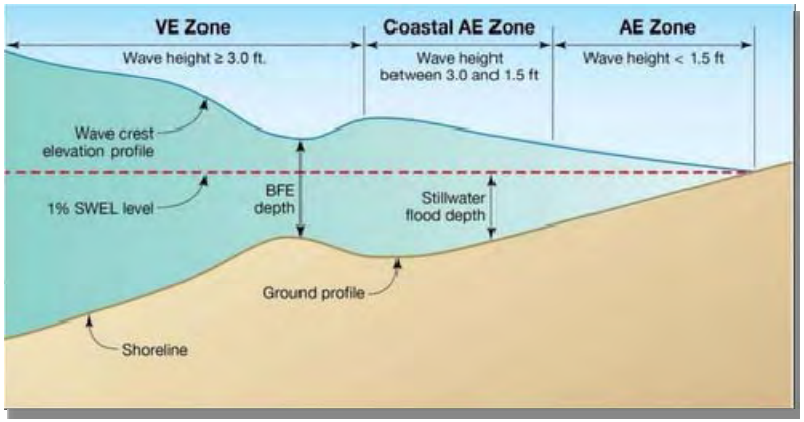
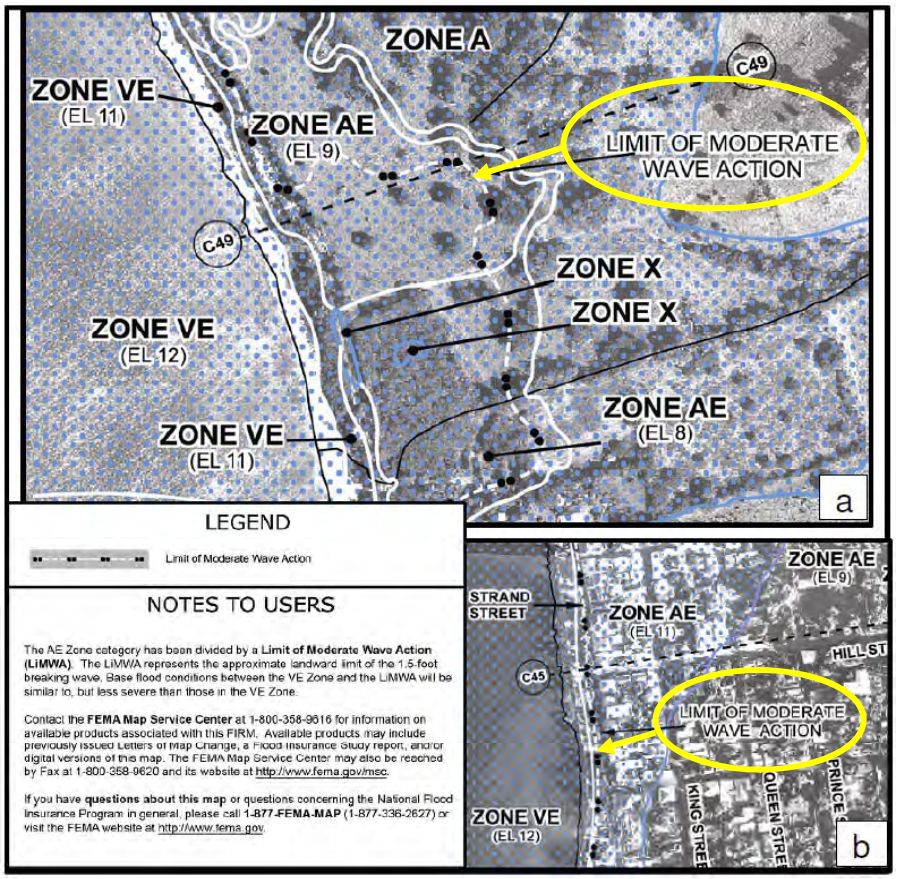
greatlakescoast.org

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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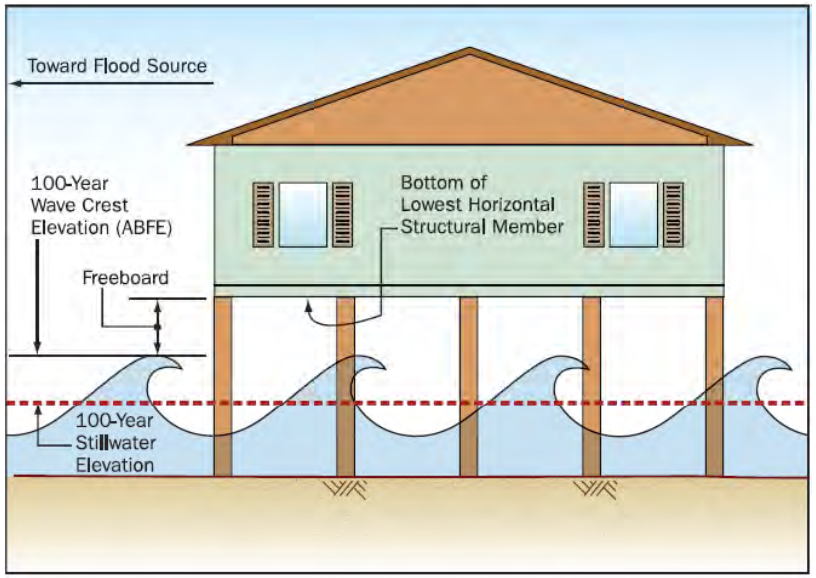
Coastal Zones and NFIP Compliance

- Must meet minimum NFIP and community coastal requirements
- NFIP design and construction requirements are more stringent in V zones due to wave, debris, and erosion hazards in V zones
- Recommendations for exceeding the minimum NFIP requirements (Coastal A Zones)
  - Can obtain CRS credits for Coastal A Zone Requirements
- Resources Available



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Transect

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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 1000 ft
  - Rural areas – Spacing can be 1-2 miles
- Transects are:
  - Profiles along which flooding analysis is performed
  - Used to transform offshore conditions to the shoreline
  - Use to define flood impacts upland to a particular shoreline type

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Draft Transect Layout – Lake Michigan, Michigan

- **Transect Estimates** - Michigan – 1,963 Miles

State	County	Proposed Draft Transects
Michigan	Emmet	41
	Charlevoix	30
	Antrim	20
	Grand Traverse	48
	Leelanau	68
	Benzie	10
	Manistee	15
	Mason	11
	Oceana	11
	Muskegon	15
	Ottawa	20
	Allegan	18
	Van Buren	11
	Berrien	38
	Mackinac	60
	Schoolcraft	40
	Delta	120
	Menominee	25
	Total	**601**

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Draft Transect Layout – Lake St. Clair, Michigan

- Transect Estimates
  - Michigan – 89 Miles

State	County	Proposed Draft Transects
Michigan	St. Clair	15
	Macomb	25
	Wayne	10
	Total	**50**

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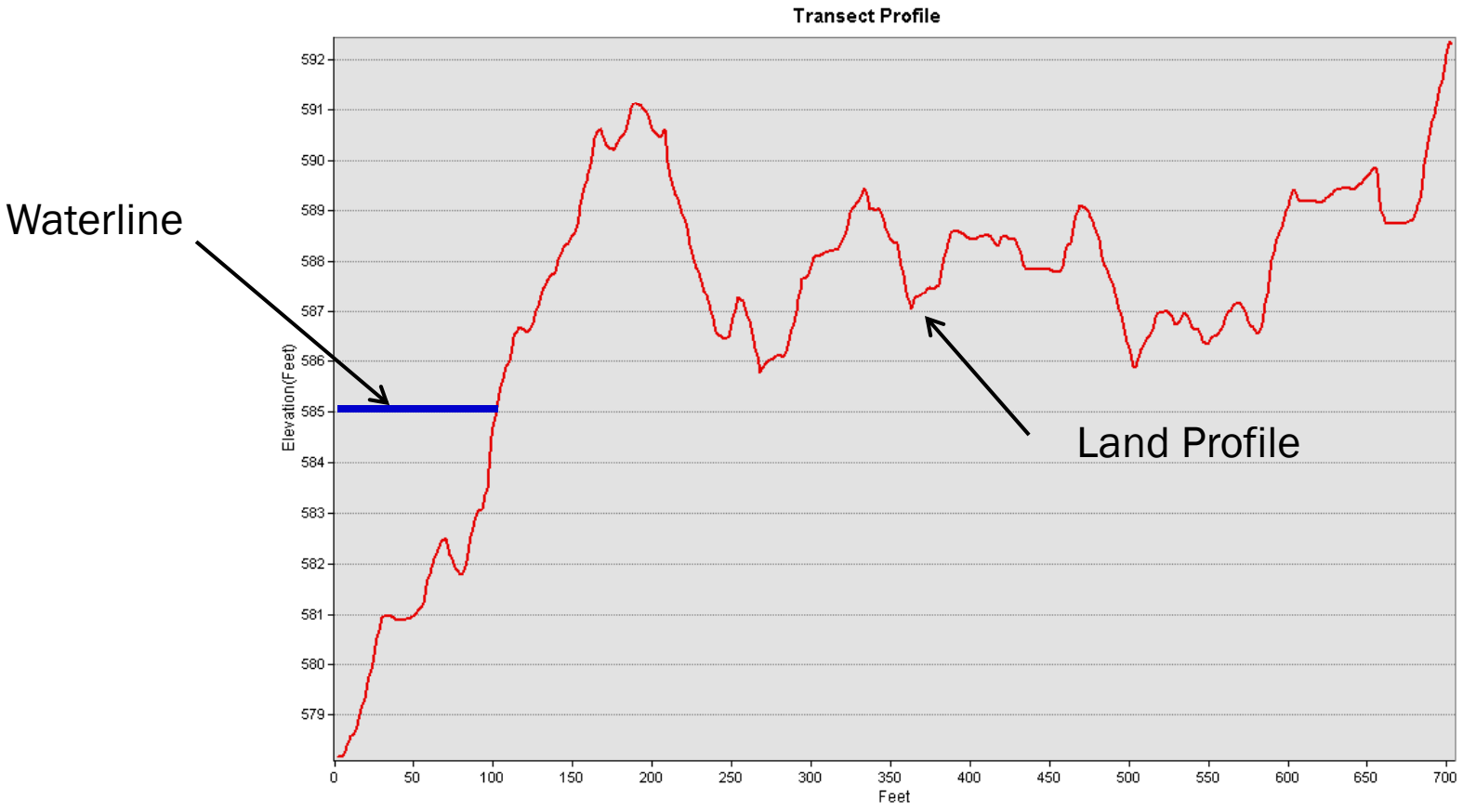
Profile from newest LiDAR



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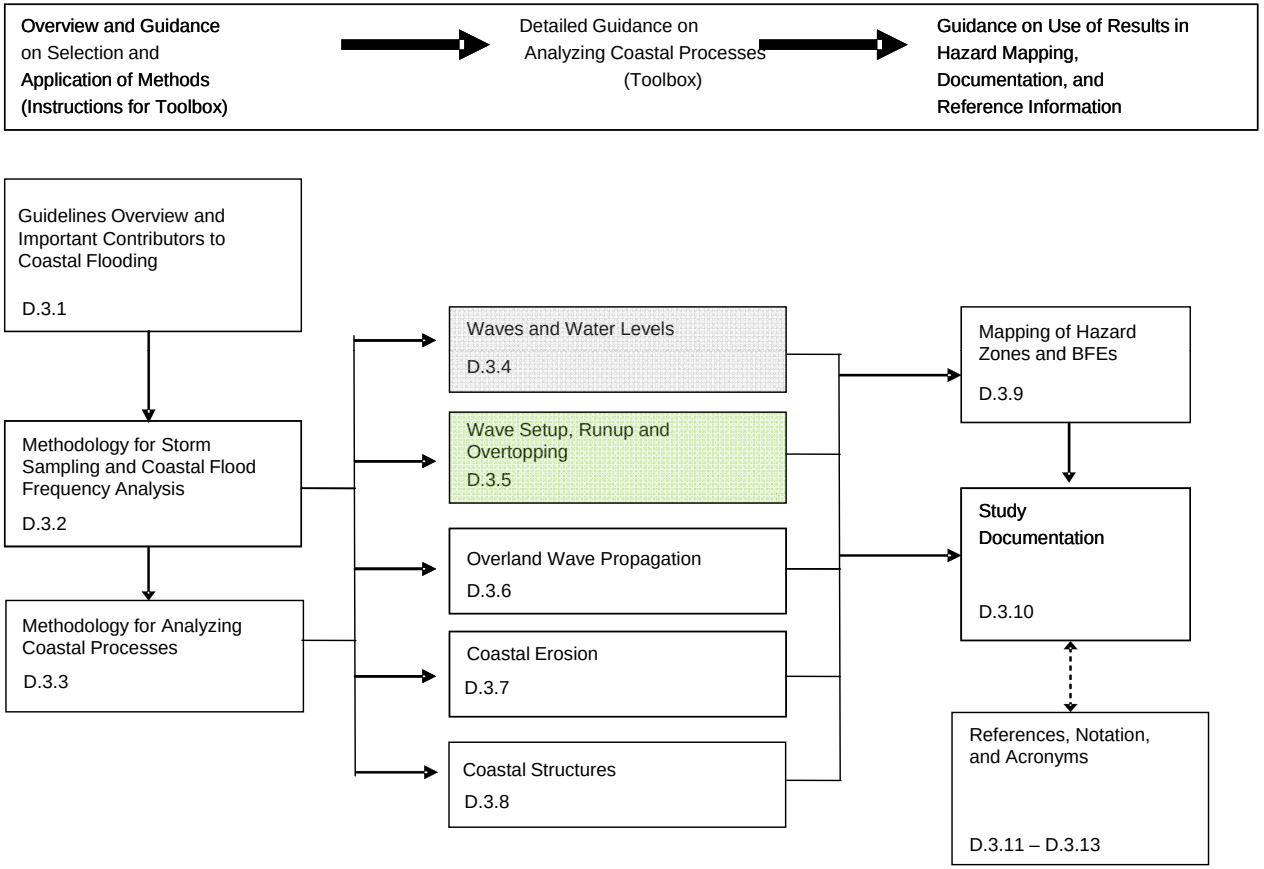
Coastal Analysis and Updates to Guidance



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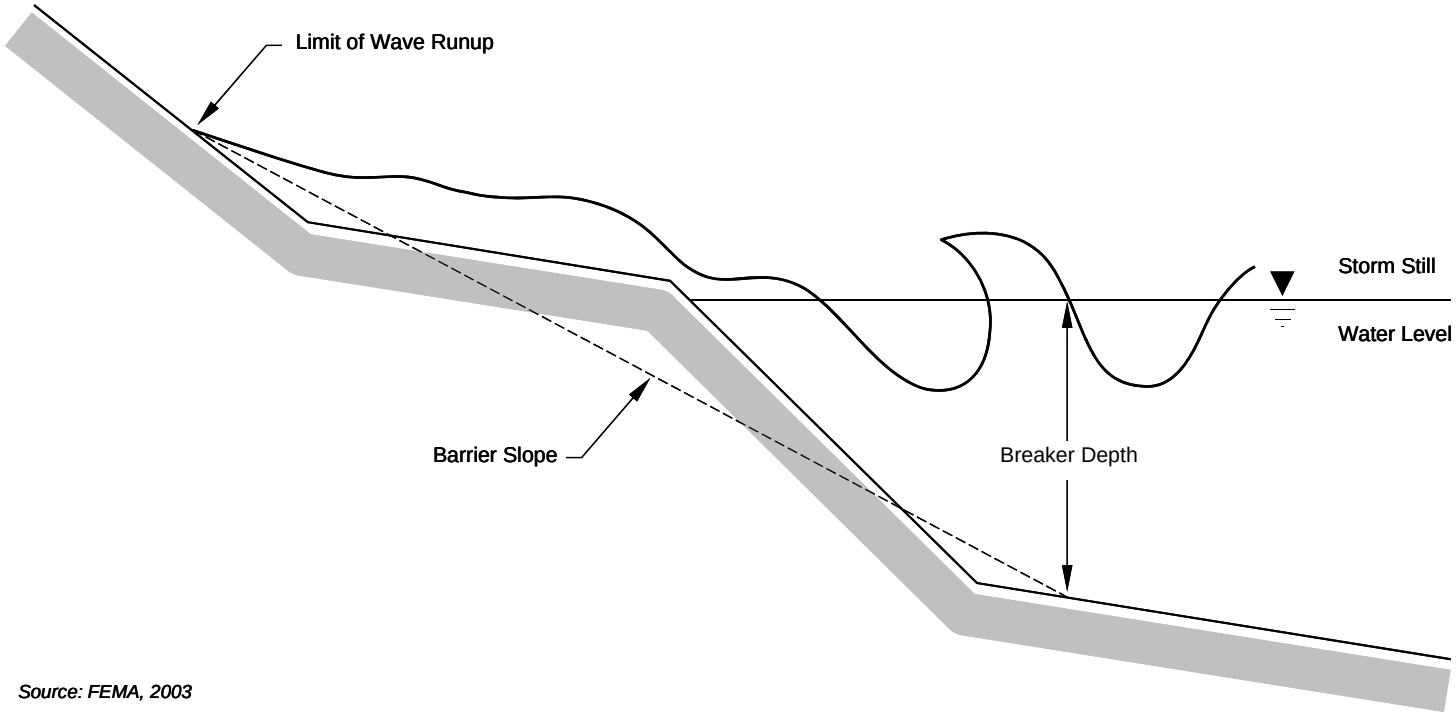
Wave Runup

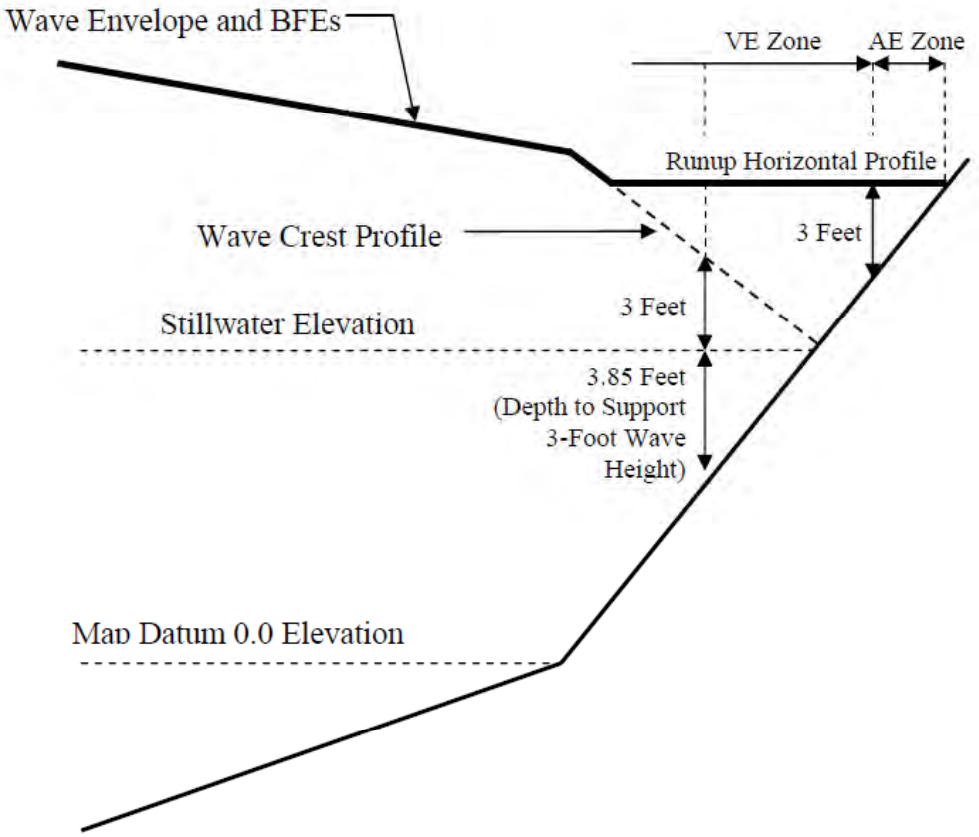


Source: FEMA, 2003

Figure D.3.5-5. Wave Runup Sketch

Wave Envelope

- Overland Wave Propagation
  - Wave crest is 3 feet above still water elevation
- Runup
  - Horizontal profile 3 feet above ground elevation



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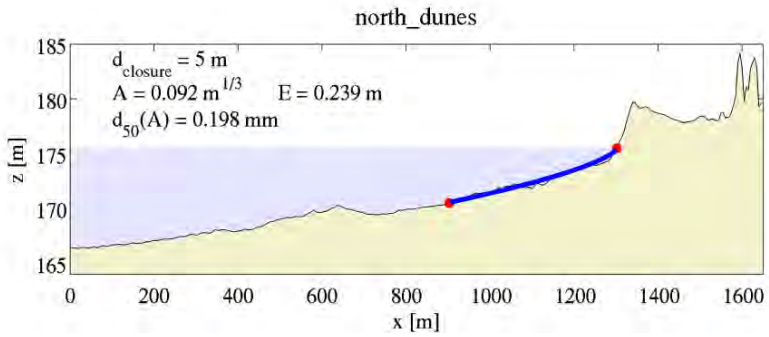
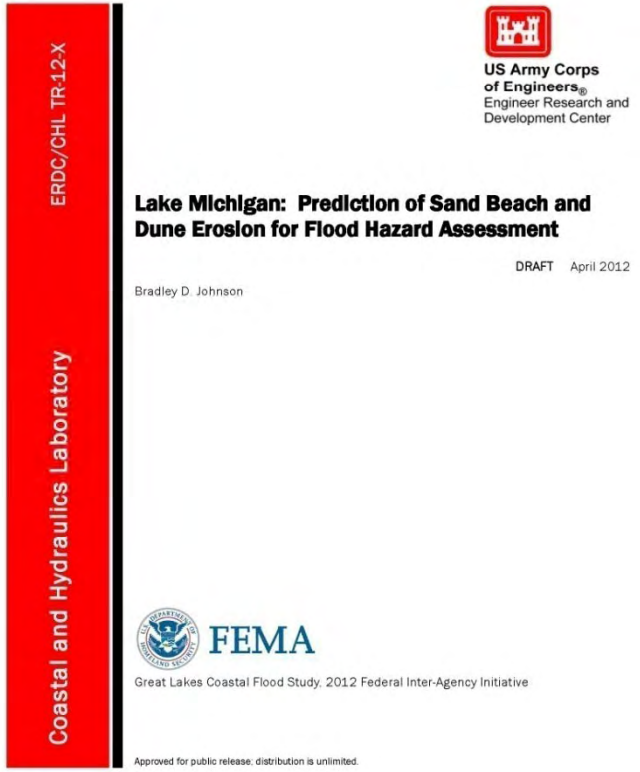
Erosion Assessment Methods

- 1-D surf zone dynamics model
  - CSHORE
  - SBEACH
  - COSMOS
- Requirements
  - Cross-shore profile
  - Sediment grain size





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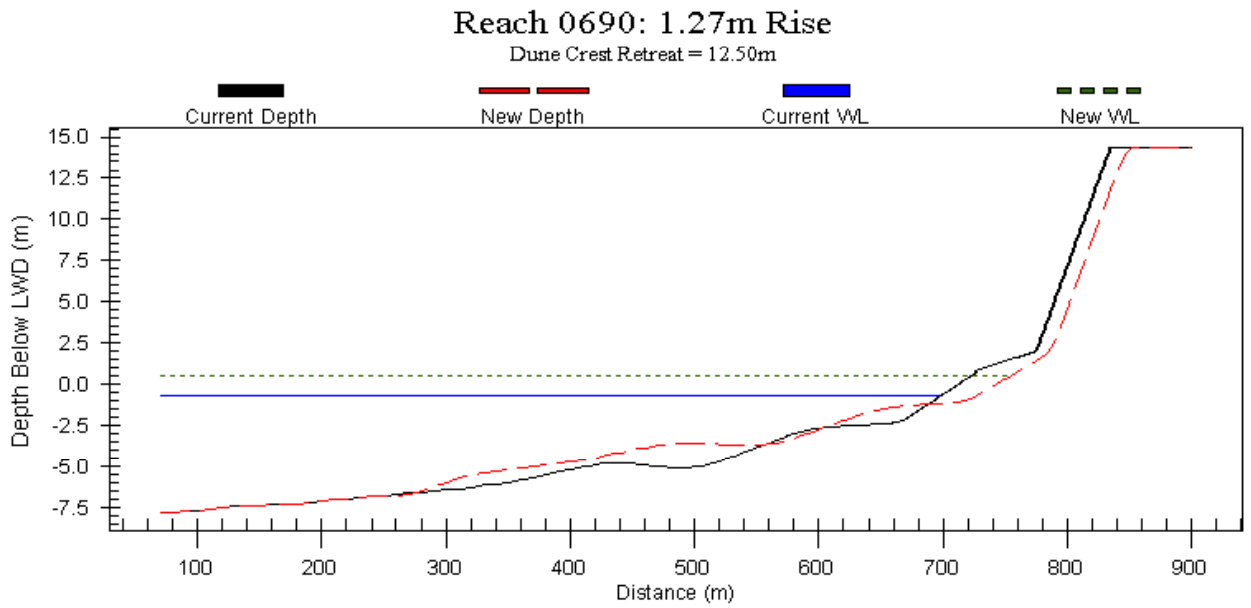
Profile Adjustment

- In lieu of historical cross-shore profiles
- Necessary for response-based approach
- Utilize Bruun Rule for rising or falling lake levels



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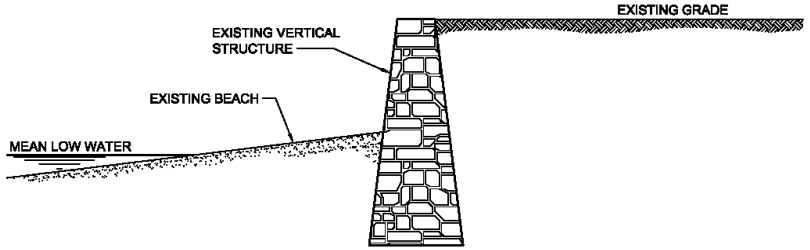
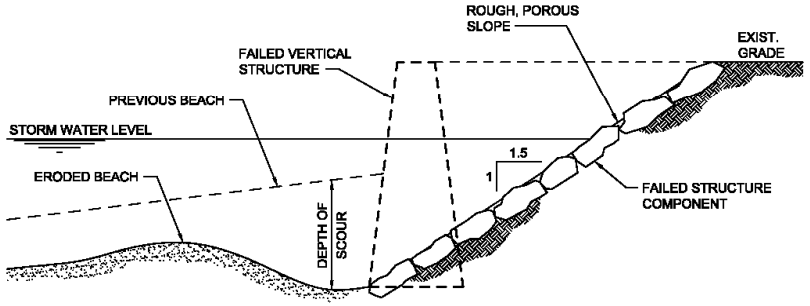
Vertical Structures



VERTICAL STRUCTURE GEOMETRY PRIOR TO FAILURE



VERTICAL STRUCTURE FAILURE GEOMETRY

PARTIAL FAILURE OF VERTICAL COASTAL STRUCTURE

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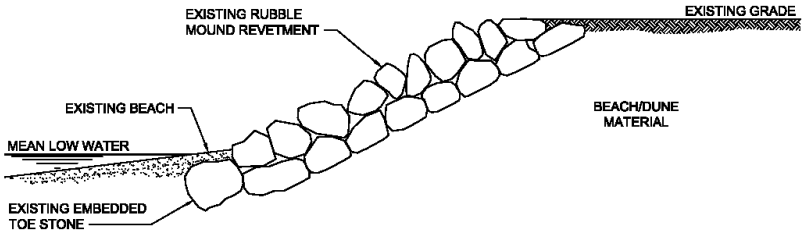
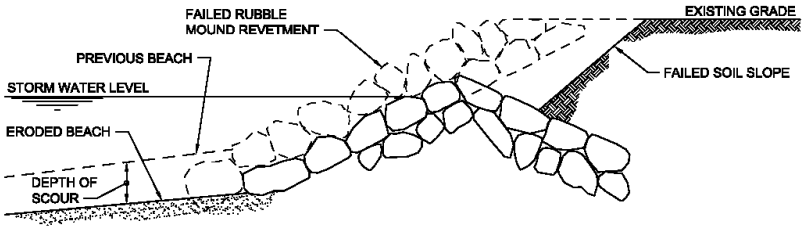
Sloped Structures



REVETMENT GEOMETRY PRIOR TO FAILURE



REVETMENT FAILURE GEOMETRY

PARTIAL FAILURE OF A SLOPING REVETMENT

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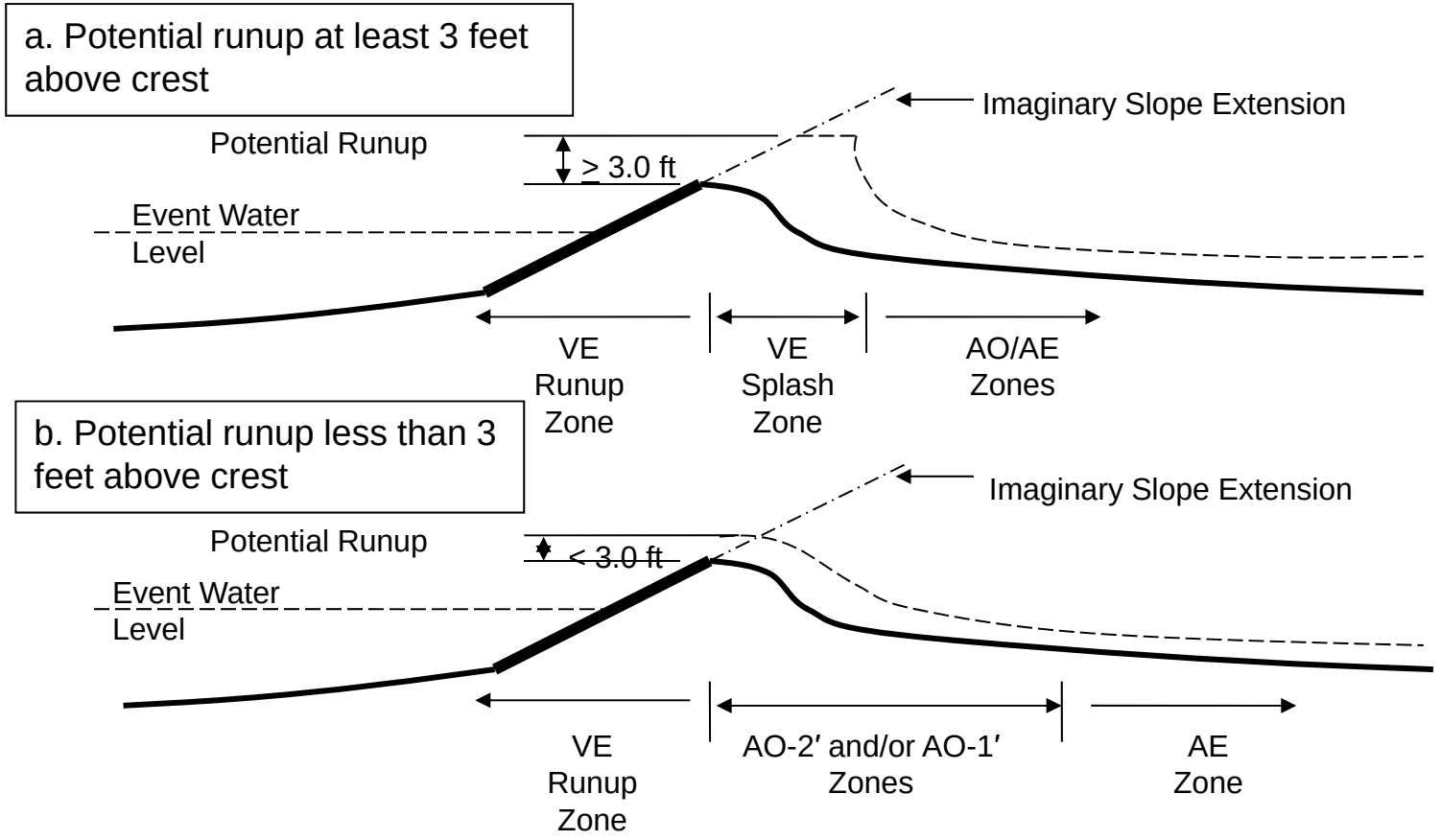
Interpretation of Wave Runup Results



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Transect Analysis to Mapping

- Flood zone extents are analyzed along representative shoreline transects
- Zones are drawn between transects by interpolation based on:
  - Topography
  - Upland Cover
    - Type
    - Density
  - Upland Development
    - Residential
    - Commercial
    - Open
  - Coastal Structures
    - Presence
    - Condition

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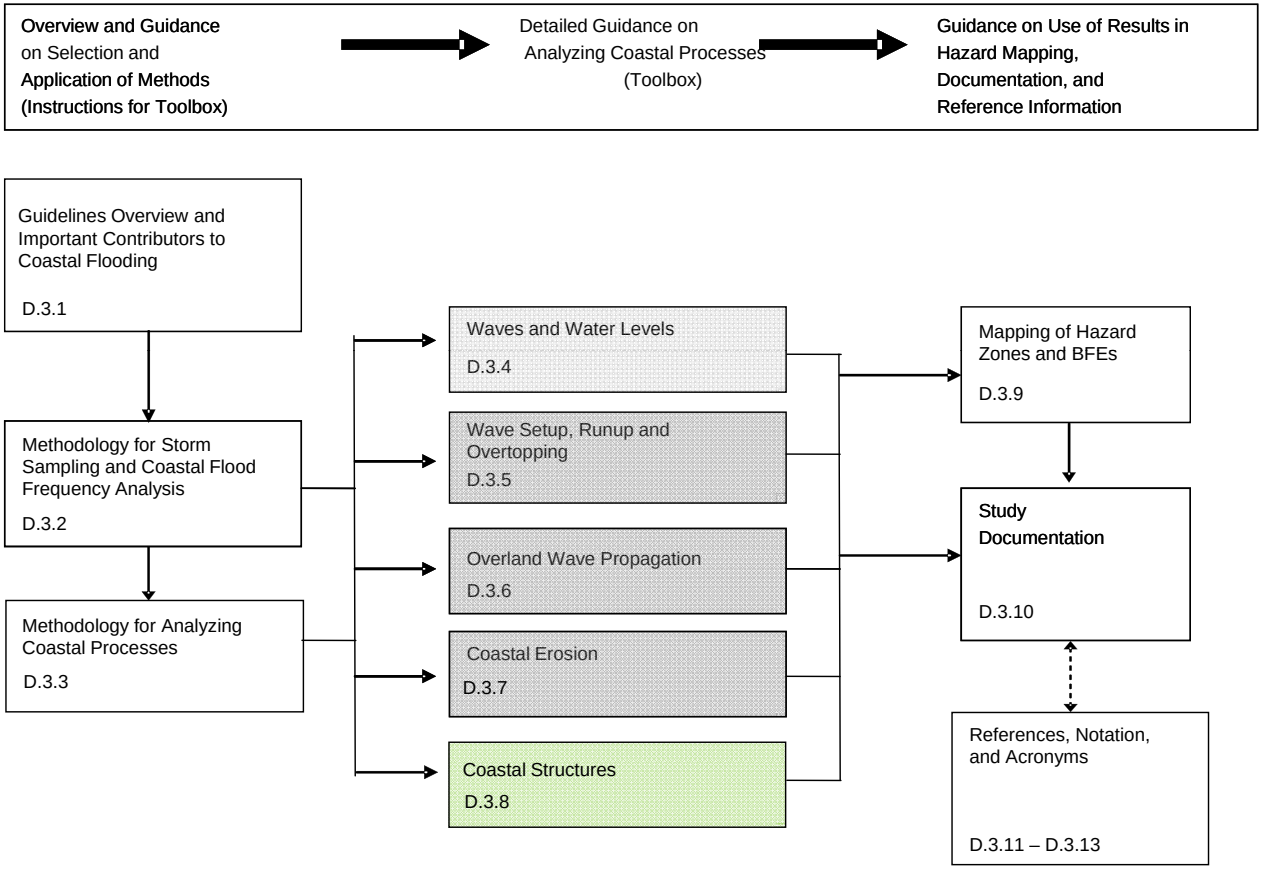
Updates to Guidance



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VE Zones in the Great Lakes

- **From the revised Appendix D.3:**
  - "VE zones may also be mapped where the engineering analysis indicates their presence"
  - "The typical study finding is a narrow VE zone, making its usefulness uncertain on maps at usual scales"
  - "Relatively small numbers of existing coastal buildings are likely to be affected by possible VE zone designations along some Great Lakes"
  - "Only with prior approval from the FEMA study representative should the VE zones be mapped"

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Lake Michigan Demonstration Projects

- Sites have been selected based on availability of historic data and assume a broad reflection of conditions throughout the lakes
- Lake Michigan demonstration data and associated reports will address two areas of ongoing evaluation:
  - Sensitivity of Erosion Prediction to Initial Beach Profile Conditions; and
  - Evaluation of Runup Computational Options (response- and event-based approaches) and an evaluation of CSHORE for predicting runup using mobile and fixed-bed assumptions.

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Next Steps

- **We will provide:**
  - Draft Transect Layouts
  - Community Contact List
  - Summary of Today's Meeting
    - Document discussions and outcomes
    - Action items
- **Work with you to:**
  - Gather additional data, such as:
    - Locations of coastal structures, areas of recent or proposed development, and beach nourishment or dune restoration projects
  - Verify community contacts to attend Information Exchange/Discovery Meetings
  - Select agency representatives to attend Discovery Meetings

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Contacts

FEMA

FEMA:

Ken Hinterlong
ken.hinterlong@fema.dhs.gov

Erin Maloney
erin.maloney@fema.dhs.gov

Tom Smith
Thomas.Smith6@fema.dhs.gov

STARR:

Holly Davis (Lake Michigan)
Holly.Davis@starr-team.com

Laura Keating (UP Lake Michigan and Lake St. Clair)
Laura.keating@starr-team.com

Stacey Roberts (Coastal)
Stacey.Roberts@starr-team.com

Jaspreet Randhawa
Jaspreet.Randhawa@starr-team.com

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Keating, Laura

From: Keating, Laura
Sent: Monday, July 30, 2012 3:09 PM
To: 'walby@scsmi.net'; 'chris@scsmi.net'; 'kverkest@harrison-township.org'; 'vparakh@harrison-township.org'; 'r.cannon@clintontownship-mi.gov'; 'mlovelock@chesterfieldtwp.org'; 'sshortt@chesterfieldtwp.org'; 'mayor@cityofnewbaltimore.org'; 'gnikkel@cityofnewbaltimore.org'; 'bdempsey@cityofmountclemens.com'; 'btingley@cityofmountclemens.com'; 'executive@macombgov.org'; 'jeff.schroeder@macombgov.org'; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com); 'peter.locke@macombgov.org'
Subject: Follow-up: RE: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for Macomb County

Good Afternoon,

Thank you for attending the call today. If you were unable to make it, please feel free to reach out to me with any questions you may have prior to the upcoming Discovery Meeting on August 20th.

I'm attaching a copy of the presentation, as well as the draft transects and the data request form as discussed during the meeting. Please note the transects are in GIS (shapefile format). Let me know if you would like this in pdf format instead.


LakeStClair_DraftTransects_Jun...


LAKE ST CLAIR Discovery Coasta...


MacombCounty_MI_Info Exchange ...

Thanks again,

Laura

Laura Keating, CFM
STARR
direct/fax: 925-296-8048
cell: 617-319-2472

-----Original Appointment-----
From: Keating, Laura
Sent: Wednesday, July 25, 2012 3:27 PM
To: Keating, Laura; 'walby@scsmi.net'; 'chris@scsmi.net'; 'kverkest@harrison-township.org'; 'vparakh@harrison-township.org'; 'r.cannon@clintontownship-mi.gov'; 'mlovelock@chesterfieldtwp.org'; 'sshortt@chesterfieldtwp.org'; 'mayor@cityofnewbaltimore.org'; 'gnikkel@cityofnewbaltimore.org'; 'bdempsey@cityofmountclemens.com'; 'btingley@cityofmountclemens.com'; 'executive@macombgov.org'; 'jeff.schroeder@macombgov.org'; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com)
Subject: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for Macomb County
When: Monday, July 30, 2012 2:00 PM-3:00 PM ET (US & Canada).
Where: Call in number: 1-866-398-2885 Participant Code: 197462 and WebEx

Good Afternoon,

You are receiving this meeting invitation because you have been identified as a ***Lake St. Clair*** 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 August, as well as this information exchange session, scheduled for ***Monday, July* 30th at 2pm 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/Time:	Monday, July 30, 2012; 2:00 - 3:00 pm, ET
Link to WebEx:	http://e-meetings.verizonbusiness.com/nc/join.php
Meeting Number:	445288484
Call in number:	1-866-398-2885
Participant Code:	197462

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 Monday, 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.

<< File: LAKE ST CLAIR Discovery Coastal Data Request Form - 07-18-2012.docx >>

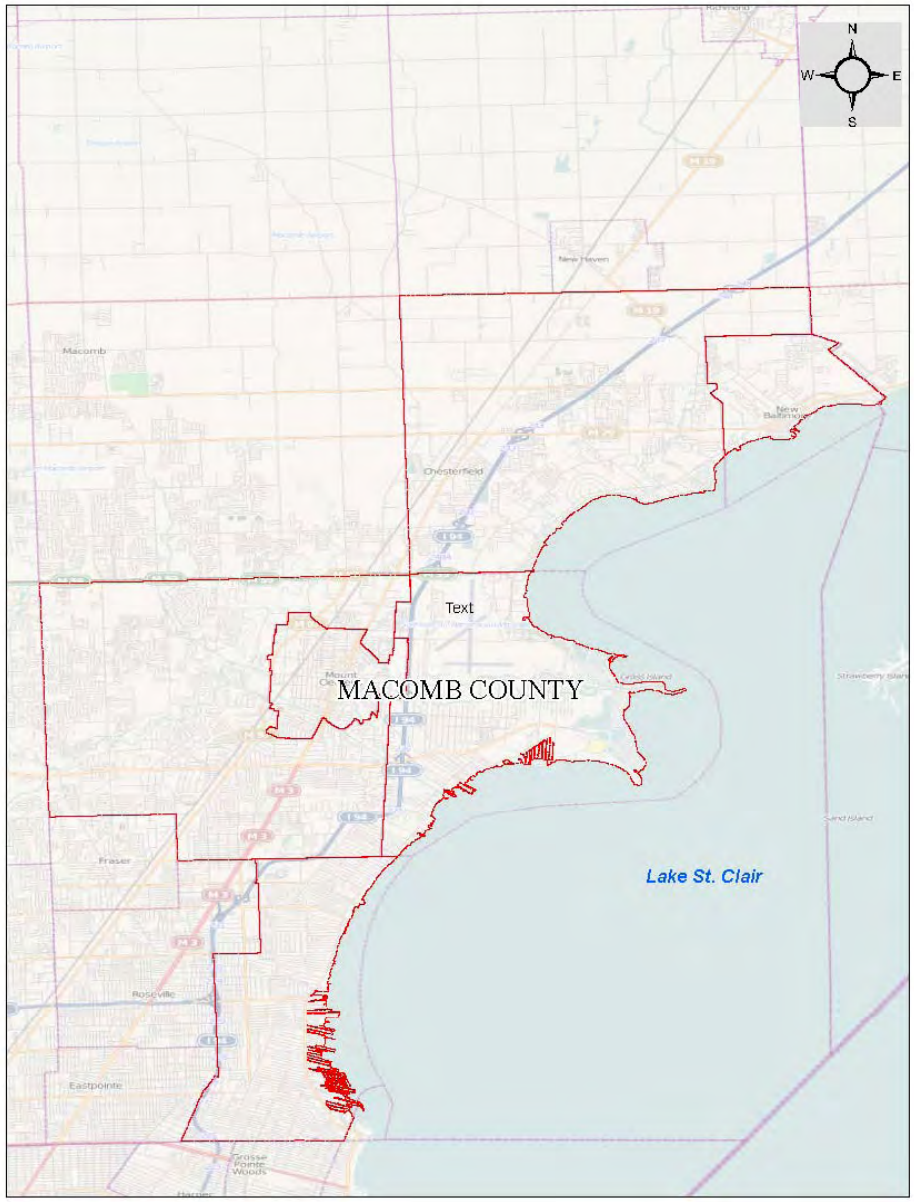
Thanks,
Laura

Laura Keating, CFM
STARR
direct/fax: 925-296-8048
cell: 617-319-2472

FEMA

Information Exchange Session for Lake St. Clair Discovery

Macomb County
July 30, 2012
2pm – 3pm



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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

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Risk MAP (Mapping, Assessment, and Planning) Vision

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

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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

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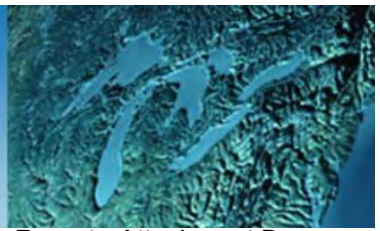

Hazard Mitigation Resources, Strategies & Actions

- 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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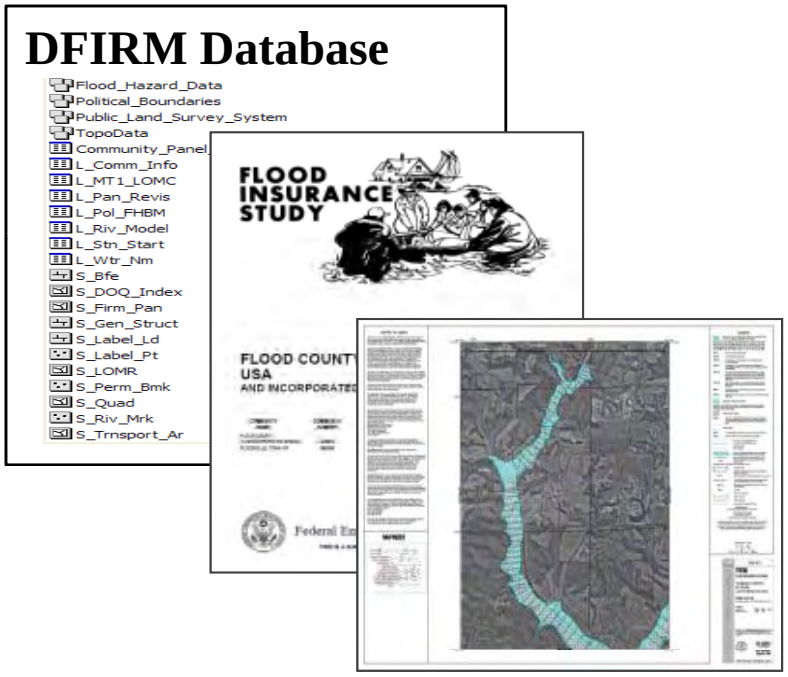
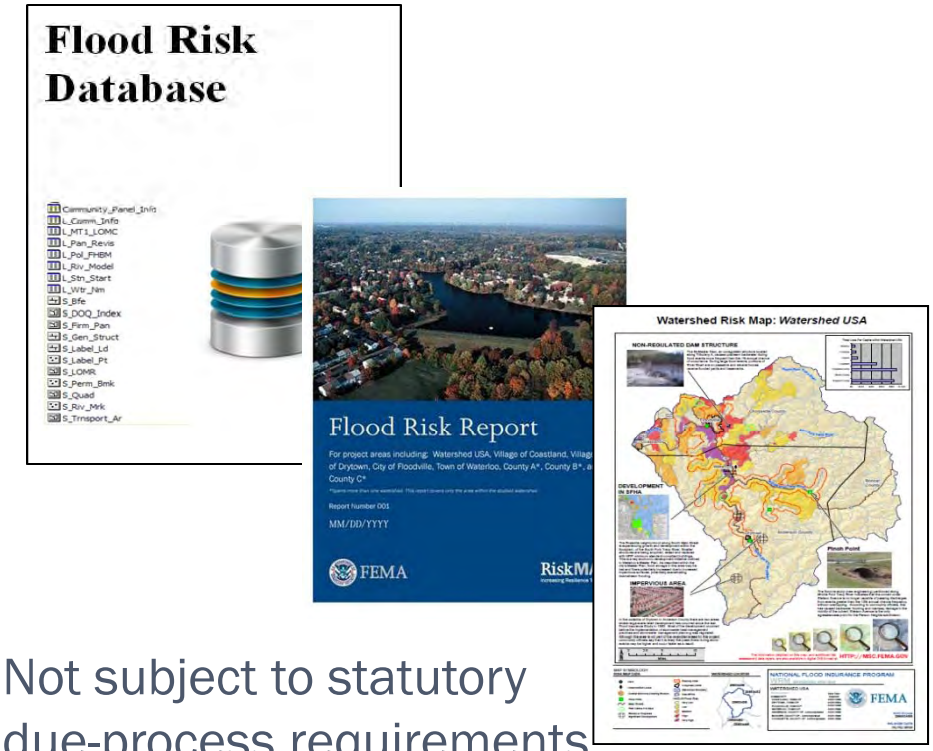
Products and Datasets: Regulatory and Non-regulatory

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

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Products and Datasets: Coastal 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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Risk MAP Overview: Shoreline Features Database

Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

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

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

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

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

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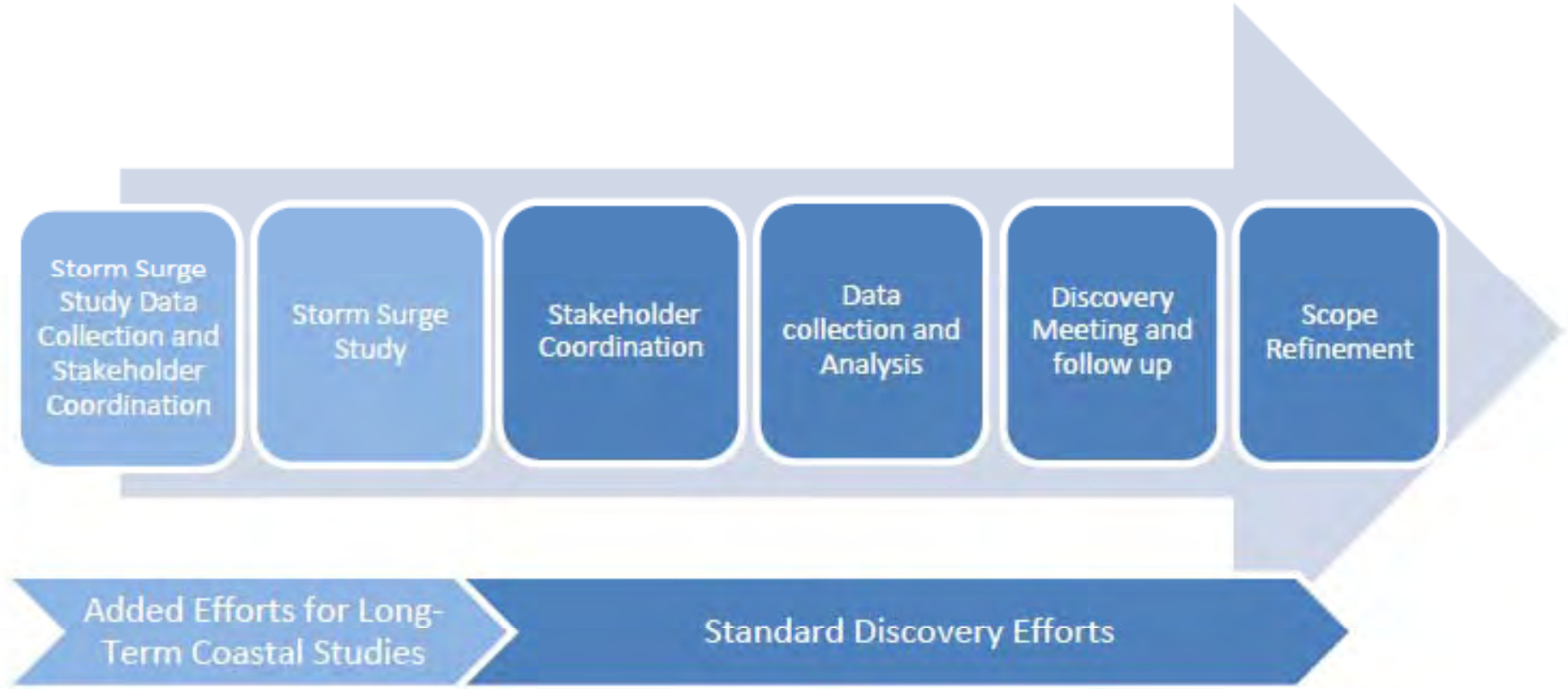
Great Lakes Coastal Flood Study
Discovery Process Overview



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Great Lakes Coastal Flood Study
Discovery Meeting

FEMA

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
Robert A. VerKuilen Building	21885 Dunham Road, Clinton Twp, MI 48036	Monday 8/20/2012; 2:00 - 4:00 pm

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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.

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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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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

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Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

<u>Lake St. Clair coastal communities in Macomb County:</u>

Macomb County
Charter Township of Clinton
Chesterfield
Harrison
Mount Clemens
New Baltimore
St. Clair Shores

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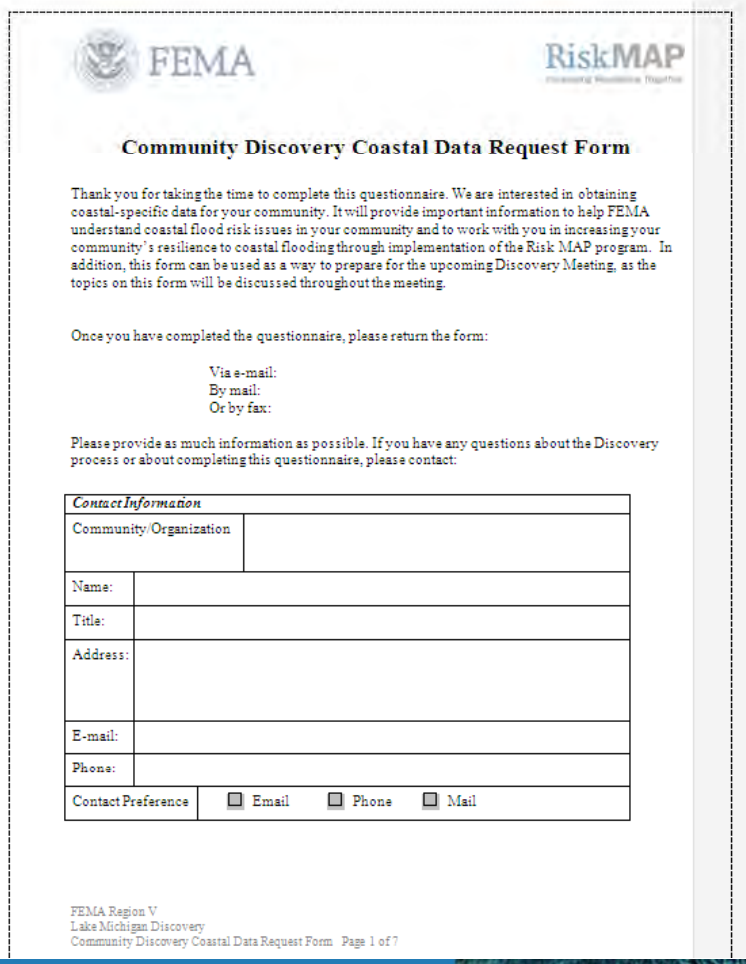
Great Lakes Coastal

Macomb County Discovery Report - Attachment B

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

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

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Review of Data Collected To Date

FEMA

- 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

Disaster Type	Incident Begin Date	Incident End Date
SEVERE STORMS & FLOODING	12/1/1972	12/1/1972
SEVERE STORMS & FLOODING	4/12/1973	4/12/1973
SEVERE STORMS, HIGH WINDS & FLOODING	4/26/1975	4/26/1975
SEVERE STORMS, TORNADOES, ICING & FLOODING	3/19/1976	3/19/1976
SEVERE STORMS AND FLOODING	6/21/1996	7/1/1996
SEVERE STORMS, TORNADOES, AND FLOODING	5/20/2004	6/8/2004
BLIZZARDS & SNOWSTORMS	1/27/1978	1/27/1978
SNOW	12/11/2000	12/31/2000
POWER OUTAGE	8/14/2003	8/17/2003

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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!

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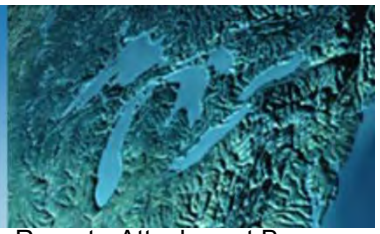

Who to Contact

- 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
  - Laura Keating @ laura.keating@starr-team.com
  - Jaspreet Randhawa @ Jaspreet.Randhawa@starr-team.com

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Questions?

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Community CEO/FPA List - Macomb County, MI - July 2012

County/City/Township	First/ Last Name	Title	Address	Address	ZIP
St. Clair Shores, City	Kip C. Walby	Mayor	City Hall	27600 Jefferson Circle Drive, St. Clair Shores, MI	48081
	Christopher Rayes	Director of Community Development	City Hall	27600 Jefferson Circle Drive, St. Clair Shores, MI	48081
Harrison, Township	Kenneth J. Verkest	Supervisor		38151 L'Anse Creuse, Harrison Township, MI	48045
	Vijay Parakh	Building Official (FPA)		38151 L'Anse Creuse, Harrison Township, MI	48045
Clinton Charter, Township	Robert J. Cannon	Supervisor		40700 Romeo Plank Road, Clinton Township, MI	48038
	Mary Bednar	Township Engineer (FPA)		40700 Romeo Plank Road, Clinton Township, MI	48038
Chesterfield, Township	Michael E. Lovelock	Township Supervisor	Municipal Offices	47275 Sugarbush Road, Chesterfield, MI	48047
	Shawn Shortt	Building Administrator (FPA)	Municipal Offices	47275 Sugarbush Road, Chesterfield, MI	48047
New Baltimore, City	Larry Smith	Mayor		36535 Green St., New Baltimore, MI	48047
	Greg Nikkel	Building Inspector (FPA)		36535 Green St., New Baltimore, MI	48047
Mount Clemens, City	Barb Dempsey	Mayor	City Hall	One Crocker Boulevard, Mount Clemens, MI	48043
	Brian Tingley	Community Development Director (FPA)	City Hall	One Crocker Boulevard, Mount Clemens, MI	48043
Macomb, County	Mark Hackel	County Executive		One South Main Street, 8th Floor, Mount Clemens, MI	48043
	Jeff Schroeder	Planning and Economic Development Department		One South Main Street, 7th Floor, Mount Clemens, MI	48043

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

July 19, 2012

The Honorable Kip Walby
Mayor, City of St. Clair Shores
City Hall
27600 Jefferson Circle Drive
St. Clair Shores, Michigan 48081

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mayor Walby:

The Federal Emergency Management Agency (FEMA) is conducting a comprehensive study of flood hazards for Lake St. Clair and 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/Time:	Monday, August 20, 2012; 2:00 - 4:00 pm ET
Location:	Robert A. VerKuilen Building
Address:	21885 Dunham Road Clinton Township, Michigan 48036

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) Scott

Banjavcic at (312) 780-7755 or email to GreatLakesFloodStudy@starr-team.com no later than **August 6, 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/Time:	Monday, July 30, 2012; 2:00 - 3:00 pm ET
Link to WebEx:	http://e-meetings.verizonbusiness.com/nc/join.php
Meeting Number:	445288484
Call in number:	1-866-398-2885
Participant Code:	197462

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 6, 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:	Scott Banjavcic CDM Smith/STARR 125 S. Wacker Drive, Suite 600 Chicago, Illinois 60606

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: Christopher Rayes, Director of Community Development, City of St. Clair Shores
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

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

FEMA

July 19, 2012

Mr. Kenneth Verkest
Township Supervisor, Harrison Township
38151 L'Anse Creuse
Harrison Township, Michigan 48045

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mr. Verkest:

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Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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cc: Vijay Parakh, Building Official, Harrison Township
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

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

FEMA

July 19, 2012

Mr. Robert Cannon
Township Supervisor, Clinton Charter Township
40700 Romeo Plank Road
Clinton Township, Michigan 48038

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mr. Cannon:

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Christine Stack

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Division Director
Mitigation Division, FEMA Region V

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cc: Mary Bednar, Township Engineer, Clinton Charter Township
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

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

July 19, 2012

Mr. Michael Lovelock
Township Supervisor, Chesterfield Township
Municipal Offices
47275 Sugarbush Road
Chesterfield, Michigan 48047

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mr. Lovelock:

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Division Director
Mitigation Division, FEMA Region V

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cc: Shawn Shortt, Building Administrator, Chesterfield Township
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

U.S. Department of Homeland Security
536 S. Clark St. 6th Floor
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FEMA

July 19, 2012

The Honorable Larry Smith
Mayor, City of New Baltimore
36535 Green St.
New Baltimore, Michigan 48047

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mayor Smith:

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536 S. Clark St. 6th Floor
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FEMA

July 19, 2012

The Honorable Barb Dempsey
Mayor, City of Mount Clemens
City Hall
One Crocker Boulevard
Mount Clemens, Michigan 48043

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mayor Dempsey:

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Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear Mr. Hackel:

The Federal Emergency Management Agency (FEMA) is conducting a comprehensive study of flood hazards for Lake St. Clair and 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/Time:	Monday, August 20, 2012; 2:00 - 4:00 pm ET
Location:	Robert A. VerKuilen Building
Address:	21885 Dunham Road Clinton Township, Michigan 48036

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) Scott

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
Alliance for the Great Lakes	Ecological	Jamie	Cross		jcross@greatlakes.org
Alliance for the Great Lakes - MI Office	Ecological	Sam	Lovall	Southeast Michigan Outreach Coordinator	slovall@greatlakes.org
Anderson, Eckstein, Westrick, Inc.	Engineer	Jeffrey	Bednar	Senior Project Engineer	jbednar@aewinc.com
Anderson, Eckstein, Westrick, Inc.	Engineer	John	Chown	Senior Project Engineer	jchown@aewinc.com
Burtchville Township	Local Official	Mike	Appel	Township Supervisor	btwpsupervisor@comcast.net
Burtchville Township	Local Official	Bill	Boesch	Zoning Adminstrator (FPA)	N/A
Centers for Ocean Sciences Education Excellence (COSEE Great Lakes)	Ecological	Rosanne W.	Fortner	Director, COSEE Great Lakes	fortner.2@osu.edu
Centers for Ocean Sciences Education Excellence (COSEE Great Lakes)	University	Jim	Diana	Michigan Sea Grant	jimd@umich.edu
Centers for Ocean Sciences Education Excellence (COSEE Great Lakes)	University	Steve	Stewart	Michigan Sea Grant	stew@msu.edu
Central Michigan University	University	Elizabeth	Alm		alm1ew@cmich.edu
Central Michigan University	University	Dave	Cuthrell		cuthrelld@michigan.gov
Central Michigan University	University	Tracy	Galarowicz		galar1tl@cmich.edu
Central Michigan University	University	Tom	Gehring		tom.gehring@cmich.edu
Central Michigan University	University	Mary	Montoye		monto1mj@cmich.edu
Central Michigan University	University	Don	Uzarski		uzars1dg@cmich.edu
Central Michigan University	University	David	Zanatta		zanat1d@cmich.edu
CH2M Hill	Engineer	Frank	Dillon		fdillon@ch2m.com
Chesterfield Township	Regional	Michael	Lovelock	Township Supervisor	mlovelock@chesterfieldtwp.org
Chesterfield Township	Regional	Shawn	Shortt	Building Administrator	sshortt@chesterfieldtwp.org
City of Algonac	Regional	Irene	Bird	Mayor	rpbird@yahoo.com
City of Algonac	Regional	William	Klaassen	Building Inspector	dmalear@algonac-mi.gov
City of Detroit	Mayor	Dave	Bing	Mayor	scheduling@detroitmi.gov
City of Detroit	Regional	Dave	Bing	Mayor	scheduling@detroitmi.gov
City of Detroit	Regional	Raymond	Scott	General Manager	scottr@detroitmi.gov
City of Escorse	Local Official	Jim	Hill	Building Inspector (FPA)	N/A
City of Escorse	Mayor	Darcel	Brown	Mayor	mayor@city-ecorse.org
City of Gibraltar	Mayor	Jim	Gorris	Mayor	gorrisj@cityofgibraltar.net
City of Grosse Point Park, MI	Mayor	Palmer T.	Heenan	Mayor	mayor@grossepointepark.org
City of Grosse Pointe Farms	Regional	Terry	Brennan	Public Service Director	tbrennan@grossepointefarms.org
City of Grosse Pointe Park	Regional	Dale	Krajniak	City Manager	gppkd@aol.com
City of Grosse Pointe Woods	Regional	Robert	Novitke	Mayor	mayornovitke@comcast.net
City of Grosse Pointe Woods	Regional	Gene	Tutag	Building Official	gtutag@gpwmi.us
City of Harper Woods	Regional	Leslie	Frank	Administrative Assistant, City Manager	admin@harperwoodsmi.net
City of Harper Woods	Regional	Kenneth	Poynter	Mayor	hwmayor@harperwoodsmi.net
City of Marysville	Local Official	Jason	Hami	City Engineer (FPA)	jhami@cityofmarysvillmi.com
City of Marysville	Local Official	Tom	Konik	Fire Chief/Emergency Manager	tkosnik@cityofmarysvillemi.com
City of Marysville	Mayor	Gary	Orr	Mayor	gw_orr@comcast.net
City of Mount Clemens	Mayor	Barb	Dempsey	Mayor	bdempsey@cityofmountclemens.com
City of Mount Clemens	Regional	Brian	Tingley	Community Development Director	btingley@cityofmountclemens.com
City of New Baltimore	Mayor	Larry	Smith	Mayor	mayor@cityofnewbaltimore.org
City of New Baltimore	Regional	Greg	Nikkel	Building Inspector	gnikkel@cityofnewbaltimore.org
City of Port Huron	Local Official	Sara	Montoya	Civil Engineer II	montoyas@porthuron.org
City of Port Huron	Regional	Kimberly	Harmer	Planning and Community Development Director	harmerk@porthuron.org
City of Port Huron	Regional	Pauline	Repp	Mayor	reppp@porthuron.org
City of River Rouge	Local Official	Troy	Newman	Building Inspector (FPA)	N/A
City of River Rouge	Mayor	Michael	Aowdler	Mayor	N/A
City of Riverview	Local Official	Dave	Scurto	Community Development Director (FPA)	dscurto@cityofriverview.com
City of Riverview	Mayor	Tim	Durand	Mayor	N/A
City of Rockwood	Local Official	Charles	Earl	Building Inspector (FPA)	beldgdept@rockwoodmi.org
City of Rockwood	Mayor	Daniel	Guzzi	Mayor	mayorguzzi@rockwoodmi.org
City of St. Clair	Local Official	Mike	Booth	City Manager (FPA)	mbooth@cityofstclair.com
City of St. Clair	Local Official	Diane	Cunningham	Building Clerk (FPA)	dcunningham@cityofstclair.com

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
City of St. Clair	Mayor	Bill	Cedar	Mayor	N/A
City of St. Clair Shores	Local Official	Bryan	Babcock	Director of Public Works/Water	babcockb@scsmi.net
City of St. Clair Shores	Local Official	Christopher	Rayes	Community Services Director	Chris@scsmi.net
City of St. Clair Shores	Regional	Christopher	Rayes	Director of Community Development	chris@scsmi.net
City of St. Clair Shores	Regional	Kip	Walby	Mayor	walby@scsmi.net
City of Trenton	Local Official	Virgil	Maiani	Building Inspector (FPA)	vmaiani@trenton-mi.com
City of Trenton	Mayor	Kyle	Stack	Mayor	kstack@trenton-mi.com
City of Wyandotte	Local Official	Mark	Kowalewski	City Engineer (FPA)	mkowalewski@wyan.org
City of Wyandotte	Mayor	Joseph	Peterson	Mayor	mayor@wyan.org
Clay Township	Regional	Thomas	Krueger	Supervisor	supervisor@claytownship.org
Clinton Charter Township	Regional	Robert	Cannon	Township Supervisor	r.cannon@clintontownship-mi.gov
Clinton River Watershed Council	Ecological	Tom	Quail	Clinton River Watershed Council	tom@crwc.org
Clinton River Watershed Council	Ecological	Anne	Vaara	Executive Director	contact@crwc.org
Cottrellville Township	Local Official	George	Kunnath	Zoning Administrator (FPA)	N/A
Cottrellville Township	Local Official	Tom	Raymond	Township Supervisor	N/A
Council of Great Lake Industries	Ecological	George	Kuper		straderco@aol.com
D.J. Case & Associates	Engineer	Phil	Seng		phil@djcase.com
Davenport University	University	Chuck	McKeown		mckeownc@msu.edu
Department of Environmental Quality: Office of the Great Lakes	Ecological	Patty	Birkholz	Director	birkholzp@michigan.gov
Department of Environmental Quality: Office of the Great Lakes	Ecological	Amy	Hicks	Executive Assistant (Patty)	hicksa@michigan.gov
DEQ - Office of Great Lakes	State/Reg Agency	Frank	Ruswick	Deputy Director	ruswickf@michigan.gov
DEQ: Office of Great Lakes	State/Reg Agency	Roger	Eberhardt	Senior Environmental Specialist	eberhardtr@michigan.gov
DEQ: Office of the Great Lakes- Areas of Concern Program	State/Reg Agency	Rick	Hobrla	Chief	hobrlar@michigan.gov
DEQ: Office of the Great Lakes- Coastal Management	State/Reg Agency	Alisa	Gonzales-Pennington	Coastal Management Coordinator - NW MI	gonzalesa@michigan.gov
DEQ: Office of the Great Lakes- Coastal Management	State/Reg Agency	Lynda	Krupansky	Coastal Management Coordinator - W and SE MI	krupanskyl@michigan.gov
Detroit Riverfront Conservancy	Ecological	Faye Alexander	Nelson	President & CEO	info@detroitriverfront.org
DLZ	Engineer	Natalie	Dingledine		ndingledine@dlz.com
DLZ	Engineer	Steve	Metzer		smetzer@dlz.com
DTE Energy	Engineer	M.	Gruelle		gruellem@dteenergy.com
DTE Energy	Engineer	Dennis	Leonard		leonardd@dteenergy.com
East China Township	Local Official	Jeff	Kern	Building Inspector (FPA)	N/A
East China Township	Local Official	John	Randolph	Township Supervisor	N/A
East Michigan Council of Governments	Regional	Sue	Fortune		sfortune@emcog.org
East Michigan Council of Governments	Regional	Anamika	Laad		alaad@emcog.org
Ecology and Environment	Ecological	Nick	Owens		nowens@ene.com
ECT	Engineer	Annette	DeMaria	Engineer	ademaria@ect.com
Eldean Development Group	Engineer	Eldean	Shipyard		wade@eldean.com
ENTRIX, Inc.	Engineer	John	Newsted		jnewsted@entrix.com
Environmental Consulting & Technology, Inc.	Engineer	Roy	Schrameck	Senior Engineer	rschrameck@ectinc.com
Environmental Consulting & Technology, Inc.	Engineer	Sanjiv	Sinha		ssinha@ectinc.com
EPA-GLNPO	Ecological	Pranas	Pranckevicius		pranckevicius.pranas@epa.gov
Essex Region Conservation Authority	Engineer	Jeremy	Wychreschuk	Director of Watershed Engineering	Jwyscreschuk@erca.org
Ferris State University	University	Gary	Noble		garynoble@ferris.edu
Fishbeck, Thompson, Carr & Huber, Inc.	Engineer	Fred	Cowles		fecowles@ftch.com
Fort Gratiot Township	Local Official	Jorja	Baldwin	Zoning Administrator (FPA)	jbaldwin@fortgratiottwp.org
Fort Gratiot Township	Local Official	Doug	Hannan	Township Supervisor	dhannan@fortgratiottwp.org
Georgia Pacific	Engineer	Garry	Griffith		gtgriffi@gapac.com
GLERL/NOAA	Fed Agency	Henry	Vanderploeg		henry.vanderploeg@noaa.gov
Grand Valley State University	University	Bopi	Biddanda		biddandb@gvsu.edu
Grand Valley State University	University	John	Koches		kochesj@gvsu.edu
Grand Valley State University	University	Richard	Rediske		redisker@gvsu.edu
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Lake St. Clair Email Distribution List
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Organization	Category	First Name	Last Name	Title	Email
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Great Lakes Commission	Ecological	Stuart	Eddy		seddy@glc.org
Great Lakes Commission	Ecological	Tim	Eder	Executive Director	teder@glc.org
Great Lakes Commission	Ecological	Julie	Hinderer		midaj@umich.edu
Great Lakes Commission	Ecological	John	Hummer		jhummer@glc.org
Great Lakes Commission	Ecological	Erika	Jensen		ejensen@glc.org
Great Lakes Commission	Ecological	David	Knight		dknight@glc.org
Great Lakes Commission	Ecological	Rebecca	Pearson		bpearson@glc.org
Great Lakes Commission	Ecological	Victoria	Pebbles	Program Director	vpebbles@glc.org
Great Lakes Environmental Research Laboratory - NOAA	Fed Agency	Craig	Stow		craig.stow@noaa.gov
Great Lakes Fishery Commission	Ecological	Mike	Hansen	Commissioner	info@glfc.org
Great Lakes Fishery Commission	Ecological	Dr. Charles	Krueger	Science Director	info@glfc.org
Great Lakes Information Network	Ecological	Christine	Manninen	Webmaster, Project Manager	manninen@glc.org
Great Lakes Observing System	Ecological	Kelli	Paige	Program Coordinator	kpaige@glos.us
Great Lakes Observing System	State/Reg Agency	Kelli	Paige	Program Coordinator	kpaige@glos.us
Great Lakes Observing System/Michigan Sea Grant	University	Jennifer	Read	Executive Director (GLOS)/ Acting Director (MI Sea Grant)	jread@glos.us
Great Lakes Outdoors Foundation / Michigan United Conservation Clubs (MUCC)	Ecological	Dennis	Muchmore	Executive Director	N/A
Great Lakes Regional Center of National Wildlife Federation	Ecological	Melinda	Koslow		koslowm@nwf.org
Grosse Ile Township	Local Official	Brian	Loftus	Township Supervisor	brianl@grosseile.com
Grosse Ile Township	Local Official	Lorrie	Zalewski	Community Development Manager (FPA)	lorriet@grosseile.com
Grosse Point Farms, MI	Mayor	James C.	Farquhar	Mayor	N/A
GVSU Annis Water Resources Institute	University	Janet	Vail		vailj@gvsu.edu
Hands & Associates, Inc.	Engineer	Charles	Barker		cfbarker@hands-assoc.com
Harrison Township	Regional	Vijay	Parakh	Building Official	vparakh@harrison-township.org
Harrison Township	Regional	Kenneth	Verkest	Township Supervisor	kverkest@harrison-township.org
Harsens Island St. Clair Flats Association	Ecological	Charles	Miller	Environmental Affiars Committee	c.miller@hiscfa.org
Healing Our Waters - Great Lakes Coalition	Ecological	Chad	Lord	Policy Director	clord@npca.org
Healing Our Waters - Great Lakes Coalition	Ecological	Jordan	Lubetkin	Regional Communications Manager	lubetkin@nwf.org
Healing Our Waters - Great Lakes Coalition	Ecological	Jeff	Skelding	Campaign Director	skeldingj@nwf.org
International Association for Great Lakes Research (IAGLR)	Ecological	Robert	Letcher	President	president@iaglr.org
Ira Township	Regional	Brian	Bayly	Building Inspector	buildingdept@iratownship.org
Ira Township	Regional	Robert	McCoy	Township Supervisor	supervisor@iratownship.org
Lake Superior State University	University	Ken	Hemming		khemming@lssu.edu
Lansing Emergency Management Office	State/Reg Agency	Ronda	Oberlin		roberlin@lansingmi.gov
Limno-Tech, Inc.	Engineer	Greg	Peterson		gpeterson@limno.com
Mackinac Island State Park Commission	State/Reg Agency	Diane	Dombroski		dombroskid1@michigan.gov
Macomb County	Local Official	Mark	Hackel	County Executive	executive@macombgov.org
Macomb County	Local Official	Jeff	Schroeder	Director of GIS and Mapping (FPA)	jeff.schroeder@macombgov.org
Macomb County	Regional	Mark	Hackel	County Executive	executive@macombgov.org
Macomb County	Regional	Jeff	Schroeder	Director of GIS and Mapping	jeff.schroeder@macombgov.org
Macomb County Health Department	Local Official	Stacey	McFarlane		stacey.mcfarlane@macombgov.org
Macomb County Office of Emergency Management	Local Official	Peter	Locke	Emergency Management Aide	peter.locke@macombgov.org
Macomb County Water Resources Advisory Council	Ecological	Gerard	Santoro	Program Manager	gerard.santoro@macombcountymi.gov
Marine City	Mayor	Charles	Browne	Mayor	cbrowne@marinecity-mi.org
Marine City	Regional	Brian	Bayly	Zoning Administrator	brianb@twp.stclair.mi.us
MDA - Environmental Stewardship Division	State/Reg Agency	Abby	Eaton	Environmental Resources Specialist	eatona@michigan.gov
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MDEQ	State/Reg Agency	Chris	Antieau		antieauc@michigan.gov
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MDEQ	State/Reg Agency	Cindy	Masterson		mastersonc@michigan.gov
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MDEQ	State/Reg Agency	JoAnne	Merrick		merrickj@michigan.gov
MDEQ	State/Reg Agency	Roxanne	Merrick		merrickr@michigan.gov
MDEQ	State/Reg Agency	James	Milne		milnej@michigan.gov
MDEQ	State/Reg Agency	Douglas	Morse		morsed@michigan.gov
MDEQ	State/Reg Agency	Colleen	O'Keefe		okeefec@michigan.gov
MDEQ	State/Reg Agency	Ann	Person		persona@michigan.gov
MDEQ	State/Reg Agency	Amy	Petersen	Surface Water Assessment Section	petersona1@michigan.gov
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MDEQ		Sheila	Meiers		MEIERS@michigan.gov
MDEQ		Joelle	Pepper		PepperJ@michigan.gov
MDEQ - Office of Geological Survey	State/Reg Agency	John	Esch		eschj@michigan.gov
MDEQ - Remediation Division	State/Reg Agency	Susan	Erickson		ericksons@michigan.gov
MDEQ - The Office of the Great Lakes	State/Reg Agency	Jim	Bredin		bredinj@michigan.gov
MDEQ - The Office of the Great Lakes - Lake Program	State/Reg Agency	Matt	Preisser		preisserm@michigan.gov
MDEQ - The Office of the Great Lakes - Lake Program	State/Reg Agency	John	Riley		rileyj2@michigan.gov
MDEQ - The Office of the Great Lakes - Lake Program	State/Reg Agency	Michelle	Selzer		selzerm@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Shannon	Briggs		briggss4@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Linda	Burke	Environmental Engineer	burkel4@michigan.gov
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MDEQ - Water Resources Division	State/Reg Agency	Kip	Cronk		cronkk@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Tom	Graf		graft@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Penny	Holt		holtp@michigan.gov
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MDEQ - Water Resources Division	State/Reg Agency	Bill	Larsen		larsenb@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Todd	Losee		loseet@michigan.gov
MDEQ - Water Resources Division	State/Reg Agency	Amy	Lounds		loundsa@michigan.gov
MDEQ-Marketing, Education & Technology Division	State/Reg Agency	Kevin	Frailey		fraileyk@michigan.gov
MDEQ-Marketing, Education & Technology Division	State/Reg Agency	Tom	Occhipinti		occhipintit@michigan.gov
MDEQ-Michigan natural Features Inventory	State/Reg Agency	Phyllis	Higman		higmanp@michigan.gov
MDEQ-MICHIGAN NATURAL FEATURES INVENTORY	State/Reg Agency	Mike	Penskar		penskarm@michigan.gov
MDEQ-Water Resource Division	State/Reg Agency	Charles	Bauer		bauerc@michigan.gov
MDEQ-Water Resources Division	State/Reg Agency	Dina	Klemans		klemansd@michigan.gov
MDNR - Recreation Division	State/Reg Agency	Cheri	Lee		leec1@michigan.gov
MDNR - Recreation Division	State/Reg Agency	Ron	Olson		olsonr@michigan.gov
MDNR - Wildlife Division	State/Reg Agency	Barbara	Avers		aversb@michigan.gov
MDNR - Wildlife Division	State/Reg Agency	Karen	Cleveland		clevelandk1@michigan.gov
MDNR - Wildlife Division	State/Reg Agency	Lori	Sargent		sargentl@michigan.gov
MFSA/STANTEC	Engineer	Christopher	Rybak	Vice Chair/Project Engineer	crybak@stantec.com

Lake St. Clair Email Distribution List
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Organization	Category	First Name	Last Name	Title	Email
Mich. Dept. of Technology, Management, and Budget	State/Reg Agency	Richard	Vance		rlgvance@yahoo.com
Michigan Department of Agriculture	State/Reg Agency	Michael	Gregg		greggm@michigan.gov
Michigan Department of Agriculture	State/Reg Agency	Stephen	Shine		shines@michigan.gov
Michigan Department of Agriculture and Rural Development	State/Reg Agency	Tom	Young		youngt1@michigan.gov
Michigan Department of Energy, Labor & Economic Growth	State/Reg Agency	Alice	Wood		wooda@michigan.gov
Michigan Department of Environmental Quality	State/Reg Agency	Linda	Burke		burkel4@michigan.gov
Michigan Department of Environmental Quality	State/Reg Agency	Les	Thomas	NFIP State Coordinator	thomasl@michigan.gov
Michigan Department of Environmental Quality	State/Reg Agency	Michael	Young		youngm1@michigan.gov
Michigan Department of Environmental Quality	State/Reg Agency; Ecological; Local FPM	Jerry	Fulcher	Floodplain Manager	fulcherg@michigan.gov
Michigan Department of Environmental Quality - Executive Division	State/Reg Agency	Jim	Sygo		sygoj@michigan.gov
Michigan Department of Environmental Quality - Southeast District	State/Reg Agency; Ecological; Local FPM	Patrick	Durack	Floodplain Manager/NFIP Coordinator	durackp@michigan.gov
Michigan Department of Environmental Quality - Southeast District	State/Reg Agency; Ecological; Local FPM	Maria	Zingas	Floodplain Manager/NFIP Coordinator	zingasm@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Jamie	Allen		allenj6@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Vicki	Anthes		anthesv@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Kristen	Bennett		bennettk@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Stephen	Beyer		beyers1@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	William	Boik		boikw@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Steve	Brisson		brissons@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Elizabeth	Brockwell-Tillman		brockwell-tillmane@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Jordan	Byelich	State Waterways Development Program Coordinator	byelichj@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Robert E.	Clancy		clancyr@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Sandra	Clark		clarkss@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Paul	Curtis		curtisp@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Michelle	Davis		davism1@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Michael	Evanoff		evanoffm@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Ray	Fahlsing		fahlsingr@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Lisa	Gamero		gamerol@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Joelle	Gehring		gehringj@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Blake	Gingrich		gingrichb@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Wade	Hamilton		hamiltonw2@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Christine	Hanaburgh		hanaburghc@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Sharon	Hanshue		hanshues@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Linda	Harlow		harlowl@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Richard	Hausler		N/A
Michigan Department of Natural Resources	State/Reg Agency	Elizabeth	Hay-Chmielewski		hay-chmielewskie@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Mark	Hoffman		hoffmanm@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Christopher	Hoving		hovingc@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Daria	Hyde		hyded@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Brian	Klatt		klattb@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Kevin	Klco		N/A
Michigan Department of Natural Resources	State/Reg Agency	Jennifer	Kleitch		kleitchj@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Dennis	Knapp		knappdj@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Mike	Kost		kostm@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	George	Lauinger		lauingerg@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Anne	LeClaire-Mitchell		leclaire-mitchella@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Carl	Lindell		lindellc@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Daniel	Lord		lordd1@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Laurel	Malvitz		malvitzl@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Ed	Meadows		meadowse@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Daniel	Mullen		mullend@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Mary	Nardo		nardom@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Tammy	Newcomb		newcombt@michigan.gov

Organization	Category	First Name	Last Name	Title	Email
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Michigan Department of Natural Resources	State/Reg Agency	Paul	Petersen	Waterways Grants Program Manager	petersenp@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	James	Radabaugh		radabaughj@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Raymond	Rustem		rustemr@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Ann	Sylvester		sylvesta@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Susan	Tangora		tangoras@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Michael	Terrell		terrellm1@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Leland	VerBerkmoes		N/A
Michigan Department of Natural Resources	State/Reg Agency	Scott	Whitcombs		whitcombs@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Wendy	Winkler		winklerw@michigan.gov
Michigan Department of Natural Resources	State/Reg Agency	Paul	Yauk		yaukp@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	Shamika	Akew		askews2@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	Christie	Bayus		bayusc@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	John	Cherry		cherryj3@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	Steve	DeBrabander		debrabanders@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	Earl	Flegler		fleglere@michigan.gov
Michigan Department of Natural Resources-Trust Fund	State/Reg Agency	Jule	Stafford		staffordj@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Bryan	Armstrong		armstrongb@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Margaret	Barondess		barondessm@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Pete	Hanses		N/A
Michigan Department of Transportation	State/Reg Agency	Larry	Karnes		karnesl@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Cynthia L.	Krupp		kruppc@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Molly	Lamrouex		lamrouexm@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Michael	Pennington		penningtonm@michigan.gov
Michigan Department of Transportation	State/Reg Agency	Ulrika	Zay		N/A
Michigan Economic Development Corporation	State/Reg Agency	George	Zimmermann		zimmermanng@michigan.org
Michigan Natural Features Inventory	State/Reg Agency	Pete	Badra		badrap@michigan.gov
Michigan Port Collaborative	State/Reg Agency	Carol	Linteau		linteauc@aol.com
Michigan Sea Grant Extension	State/Reg Agency	Josh	Gunn	Educator	gunnjosh@msu.edu
Michigan Sea Grant Extension	State/Reg Agency	Justin	Selden	Program Instructor	seldenju@anr.msu.edu
Michigan Sea Grant Extension	State/Reg Agency	Steve	Stewart	Senior Educator	stew@anr.msu.edu
Michigan State Housing Development Authority	State/Reg Agency	Dean	Anderson		andersond15@michigan.gov
Michigan State Housing Development Authority	State/Reg Agency	Laura	Ashlee		ashleel@michigan.gov
Michigan State Housing Development Authority	State/Reg Agency	Karen	Gagnon		gagnonk@michigan.gov
Michigan State Housing Development Authority	State/Reg Agency	Duane	Thelen		thelend4@michigan.gov
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Michigan State Police/Emergency Management	State/Reg Agency	Mike	Sobocinski	Main Editor for State HM Plan	SobocinM@michigan.gov
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Michigan State University	University	Zachary	Burton		burtont@msu.edu
Michigan State University	University	Elaine	Bush		bushe@msu.edu
Michigan State University	University	Deborah	Clark		clark1dj@cmich.edu
Michigan State University	University	John	Cummings		msue06@msu.edu
Michigan State University	University	Jim	Detjen		detjen@msu.edu
Michigan State University	University	James	Harding		hardingj@msu.edu
Michigan State University	University	Nicholas	Johnson		john2132@msu.edu
Michigan State University	University	Carol	McGeehan		cmcgeeha@davenport.edu
Michigan State University	University	Dan	O'Keefe		okeefed@msu.edu
Michigan State University	University	Scott	Peacor		peacor@msu.edu
Michigan State University	University	Dave	Poulson		poulson@msu.edu
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Lake St. Clair Email Distribution List
July 2012

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Michigan State University	University	Howard	Wandell		wandellh@msu.edu
Michigan State University	University	Howard	Wetters		wettersh@msu.edu
Michigan State University - County	University	Hal	Hudson		msue.tuscola@county.msu.edu
Michigan State University - Planning & Zoning Center	University	Mark	Wyckoff		wyckoff@pzcenter.msu.edu
Michigan State University-Institute of Agricultural Technology	University	Thomas	Coon		coontg@anr.msu.edu
Michigan Technological University	University	Margaret	Gale		mrgale@mtu.edu
Michigan Technological University	University	Mark	Maroste		mmaroste@mtu.edu
Michigan Technological University	University	Research	MTU		rsch@mtu.edu
Michigan Technological University	University	Joan	Schumaker-Chadde		jchadde@mtu.edu
Michigan Technological University	University	Robert	Shuchman		shuchman@mtu.edu
MSU	University	Mark	Breederland		breederl@anr.msu.edu
MSU - Institute of Water Research	University	Jon	Bartholic		bartholi@msu.edu
National Weather Service - Grand Rapids	Fed Agency	Mark	Walton	Service Hydrologist	mark.walton@noaa.gov
NOAA	Fed Agency	Heather	Stirratt		Heather.Stirratt@noaa.gov
NOAA	Fed Agency	Jennifer	Day		jennifer.day@noaa.gov
NOAA / GLERL	Fed Agency; Ecological	Drew	Gronewald	Hydrologist/Physical Scientist	drew.gronewold@noaa.gov
NOAA / GLERL	Fed Agency; Ecological	David	Schwab	Physical Oceanographer	david.schwab@noaa.gov
NOAA Great Lakes Environmental Research Lab	Fed Agency	Brent	Lofgren		brent.lofgren@noaa.gov
NOAA Weather Service	Fed Agency	Danny	Costello	Hydrologist	Danny.costello@noaa.gov
Northeast Michigan Council of Governments	Regional	Richard	Deuell		rldeuell@nemcog.org
Northeast Michigan Council of Governments	Regional	Diane	Rekowski		drekowski@nemcog.org
Northeast Michigan Council of Governments	Regional	Nico	Tucker		ntucker@nemcog.org
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Northwestern Michigan College	University	Hans	Van Sumersen		hvansumeren@nmc.edu
Public Sector Consultants, Inc.	Engineer	Jack	Bails		jbails@pscinc.com
Public Sector Consultants, Inc.	Engineer	Mark	Coscarelli		mcoscarelli@pscinc.com
SEMCOG	Ecological	William	Parkus	Env. Planner	parkus@semcog.org
SEMCOG	Regional	Chuck	Hersey		hersey@semcog.org
Sierra Club (Michigan Chapter)	Ecological	Anne	Woiwode	State Director	anne.woiwode@sierraclub.org
Southeast Michigan Council of Governments	Regional	Amy	Mangus		mangus@semcog.org
Southeast Michigan Council of Governments	Regional	William	Parkus		parkus@semcog.org
Southeast Michigan Council of Governments	Regional	Paul	Tait		tait@semcog.org
Southeast Michigan Council of Governments	State Official	Ann	Burns		burns@semcog.org
Southwest Michigan Planning Commission	Regional	Marcy	Colclough		colcloughm@swmpc.org
Southwest Michigan Planning Commission	Regional	John	Egelhaaf		egelhaafj@swmpc.org
St Clair Shores Waterfront Enviornmental Committee	Ecological	Mark	Balon	Member	babsmrb@yahoo.com
St Clair Shores Waterfront Enviornmental Committee	Ecological	Joe	St. John	Chairperson	scswateradvisory@lycos.com
St. Clair County	Local Official	William	Kauffman	County Administrator	bkauffman@stclaircounty.org
St. Clair County	Local Official	David	Struck	Director of the Planning Department (FPA)	dstruck@stclaircounty.org
St. Clair County Health Department	Local Official	Kristen	O'Reilly	Storm Water Coordinator	koreilly@hd.stclaircounty.org
St. Clair County Metropolitan Planning Commission	Local Official	Geoffrey	Donaldson	Senior Planner	gdonaldson@stclaircounty.org
St. Clair County BOC	Local Official	Bill	Gratopp	Commissioner	bgratopp@stclaircounty.org
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St. Clair Township	Local Official	Brian	Mahaffy	Township Supervisor	brian@twp.stclair.mi.us
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Lake St. Clair Email Distribution List
July 2012

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The Central Upper Peninsula Regional Planning & Development	Regional	Peter	Van Steen		pvansteen@cuppad.org
The City of St. Clair Shores	Mayor	Robert A.	Hison	Mayor	hison@scsmi.net
The Nature Conservancy	Ecological	Nicole	Van Helden	Director of Conservation-Green Bay	nvanhelden@tnc.org
The Office of the Great Lakes - Area of Concerns	State/Reg Agency	Sharon	Baker		bakers9@michigan.gov
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U.S. Fish & Wildlife Service	Fed Agency	Craig	Czarnecki		craig_czarnecki@fws.gov
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University of Michigan: CILER - School of Natural Resources and the Environment (UM SNRE)	University; Ecological	Dmitry	Beletsky	Associate Research Scientist	beletsky@umich.edu
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USACE	Fed Agency	Eric	Tauriainen	Chief, HEB	eric.tauriainen@usace.army.mil
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USDA-NRCS	Fed Agency	Ruth	Shaffer		ruth.shaffer@mi.usda.gov
USGS	Fed Agency	Stephen	Aichele		saichele@usgs.gov
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Village of Grosse Pointe Shores	Regional	Ted	J. Kedzierski	Mayor	tjkpc@aol.com
Village of Grosse Pointe Shores	Regional	Tom	Krolczyk	Building Manager	Building@gpshoresmi.gov
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Wayne County Michigan State University Extension	University	Richard	Wooten	MSU Extension, Wayne County	wooten@msu.edu
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Wayne State University	University	David	Pitts		pitts@wayne.edu
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West Michigan Shoreline Regional Development Commission	Regional	Sandeep	Dey		sdey@wmsrdc.org
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West Michigan Shoreline Regional Development Commission	Regional	Erin	Kuhn		ekuhn@wmsrdc.org
West Michigan Shoreline Regional Development Commission	Regional		Nan		nemmer@wmsrdc.org
West Michigan Shoreline Regional Development Commission	Regional	Susan	Stine-Johnson		sstinejohnson@wmsrdc.org
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	Engineer	Bradford	Spencer		bs-spencer@comcast.net

Great Lakes Coastal Flood Study
Lake St. Clair – State of Michigan - Email Discovery Invitation Language
FINAL – JULY 26, 2012

Re: Invitation to Attend Community Meetings Regarding Lake St. Clair Coastal Flood Risk

Dear State of Michigan Lake St. Clair Coastal Flood Study Stakeholders:

The Federal Emergency Management Agency (FEMA) is conducting a comprehensive study of flood hazards for Lake St. Clair and 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. 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 local stakeholders will help FEMA to better understand local coastal flood risk data and needs, and characterize local conditions that contribute to coastal flood risk.

We would like to invite you to attend one of the following Discovery Meetings being held in Michigan for Lake St. Clair. Although each Discovery Meeting will give the same overall message, each meeting will be catered to the coastal communities within the counties listed below:

County	Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
St. Clair	Goodells County Park Community Center Meeting Room	8345 County Park Drive, Goodells, MI 48027	Monday 8/20/2012; 8:30 am - 10:30 am
Macomb	Robert A. VerKuilen Building	21885 Dunham Road, Clinton Twp, MI 48036	Monday 8/20/2012; 2:00 pm - 4:00 pm
Wayne	Grosse Pointe Public Library, Ewald Branch	15175 E. Jefferson Avenue, Grosse Pointe Park, MI 48230	Tuesday 8/21/2012; 2:00 pm – 4:00 pm

Please save this date on your calendar. At the meetings, we will review the coastal flood risk data we have gathered to date and discuss local coastal floodplains, mitigation plan and projects, coastal flood risk concerns, and coastal floodplain management activities. This discussion will allow us to better identify local 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

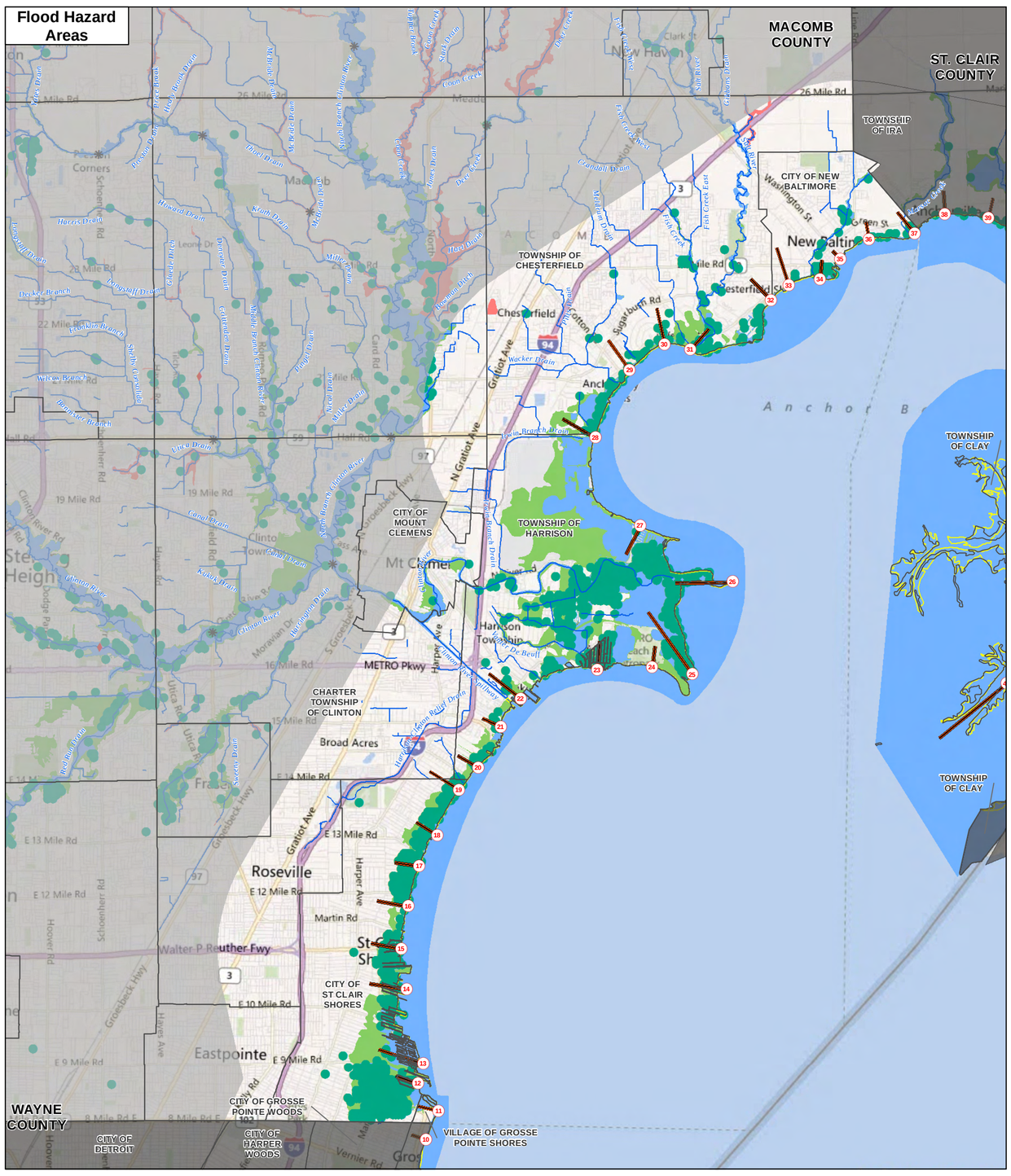
available to eligible communities. Please RSVP to FEMA's study contractor (STARR) Scott Banjavcic at (312) 780-7755 or email to GreatLakesFloodStudy@starr-team.com by **August 10, 2012.** Please reference the Discovery Meeting date and time in your RSVP.

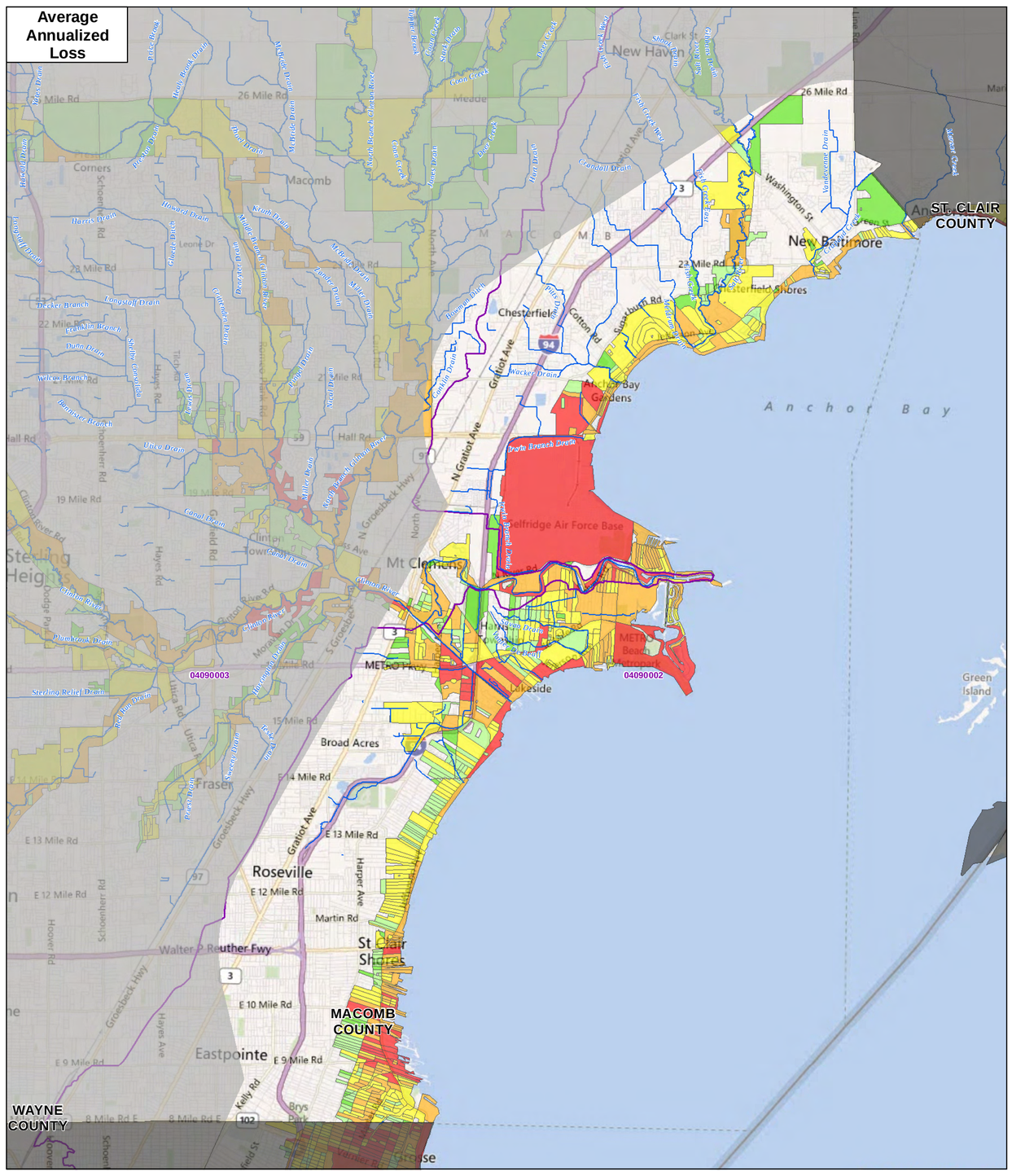
A attached Community Coastal Data Request Form was recently mailed to local community officials, along with the Discovery Meeting invitation. This form is also available online at http://www.greatlakescoast.org/pubs/forms/GLCFS_Discovery_Coastal_Data_Request_Form.pdf. If you have data or information that you would like to provide to FEMA or discuss with us in advance of the Discovery Meetings, please contact Laura Keating of STARR at (925) 296-8048 or by email at GreatLakesFloodStudy@starr-team.com.

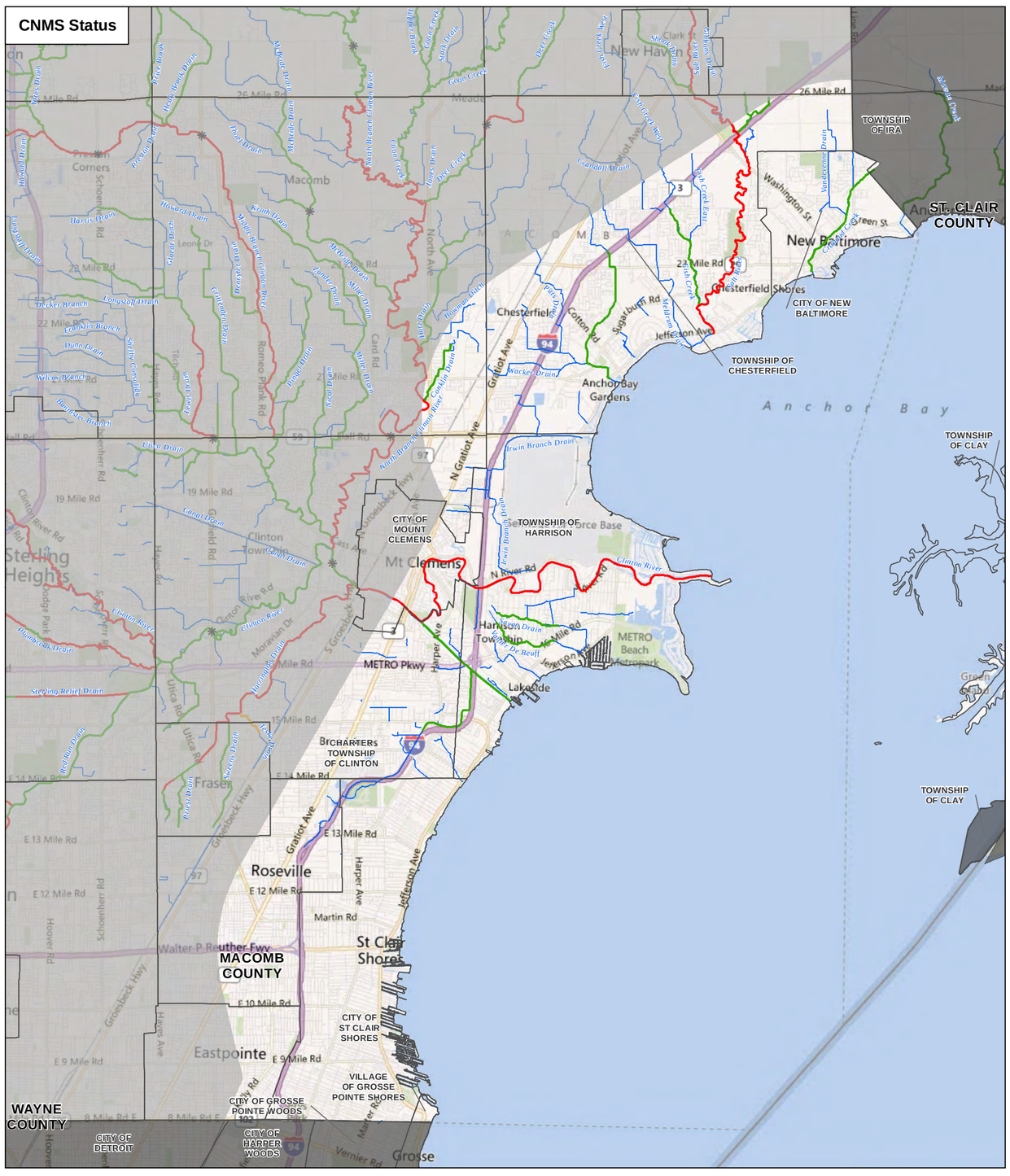
We look forward to working with you to reduce the risks associated with coastal flooding and increase resiliency for the long term. To learn more about Discovery, please visit http://www.fema.gov/library and search keywords "Discovery brochure" or contact Ken Hinterlong, FEMA Region V Senior Engineer,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

ATTACHMENT C

DRAFT DISCOVERY MAP







Declared Disasters

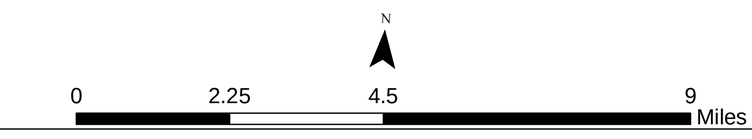
Lake	State	Declared County/Area	Declaration Date	Disaster Type	Incident Type	Description
Lake St. Clair	MI	Macomb (County)	12/1/1972	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Macomb (County)	4/12/1973	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Macomb (County)	4/26/1975	DR	Flood	SEVERE STORMS, HIGH WINDS & FLOODING
Lake St. Clair	MI	Macomb (County)	3/19/1976	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, ICING & FLOODING
Lake St. Clair	MI	Macomb (County)	9/18/1986	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Macomb (County)	7/11/1997	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING
Lake St. Clair	MI	Macomb (County)	8/5/1998	DR	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS
Lake St. Clair	MI	Macomb (County)	6/30/2004	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING
Lake St. Clair	MI	Macomb (County)	1/27/1978	EM	Snow	BLIZZARDS & SNOWSTORMS
Lake St. Clair	MI	Macomb (County)	1/27/1999	EM	Snow	MI - SEVERE WEATHER 1/2 /99
Lake St. Clair	MI	Macomb (County)	1/10/2001	EM	Snow	SNOW
Lake St. Clair	MI	Macomb (County)	9/23/2003	EM	Other	POWER OUTAGE
Lake St. Clair	MI	Macomb (County)	9/7/2005	EM	Hurricane	HURRICANE KATRINA EVACUATION

Summary of Shoreline Type

Total Shoreline (mile)	Artificial Shoreline (mile)	Boulders, Bedrock (mile)	Cohesive Clays and Silts (mile)	Sand (mile)	Shingles, Pebbles, Cobbles (Mile)	Other (mile)
34.2	28.7	5.5	0.0	0.0	0.0	0.0

Summary of Shoreline Coverage

Total Shoreline (mile)	Bluff 2'-10' (mile)	Coastal Wetland	Dune 2'-10' (mile)	Flat Coast (mile)	High Bluff 10'+ (mile)	High Dune 10'+ (mile)	Other (mile)
34.2	0.0	0.0	0.0	34.2	0.0	0.0	0.0



MAP SYMBOLOGY

LEGEND

- Dams
- LOMCs
- USGS Gages
- Transects
- Shoreline
- Streams
- Watersheds (HUC 8)
- Coastal Barrier Resource System
- Coastal Discovery Area
- Surrounding Counties
- Municipal Boundaries

EFFECTIVE SFHA

- A
- AE
- 0.2% PCT ANNUAL CHANCE FLOOD

AAL DATA
Total Average Annualized Losses per Census Block

- Less than $10,000
- $10,001 - $100,000
- $100,001 - $1,000,000
- $1,000,001 - $5,000,000
- Greater than $5,000,000

Coordinated Needs Management Strategy (CNMS)
Validation Status

- Unverified
- Unknown
- Valid

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM
Discovery Map

LAKE ST. CLAIR COASTAL STUDY

MACOMB COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Macomb County
Charter Township of Clinton
Chesterfield, Township of
Harrison, Township of
Mount Clemens, City of
New Baltimore, City of
St. Clair Shores, City of

STARR

FEMA

ATTACHMENT D

PROPOSED TRANSECTS

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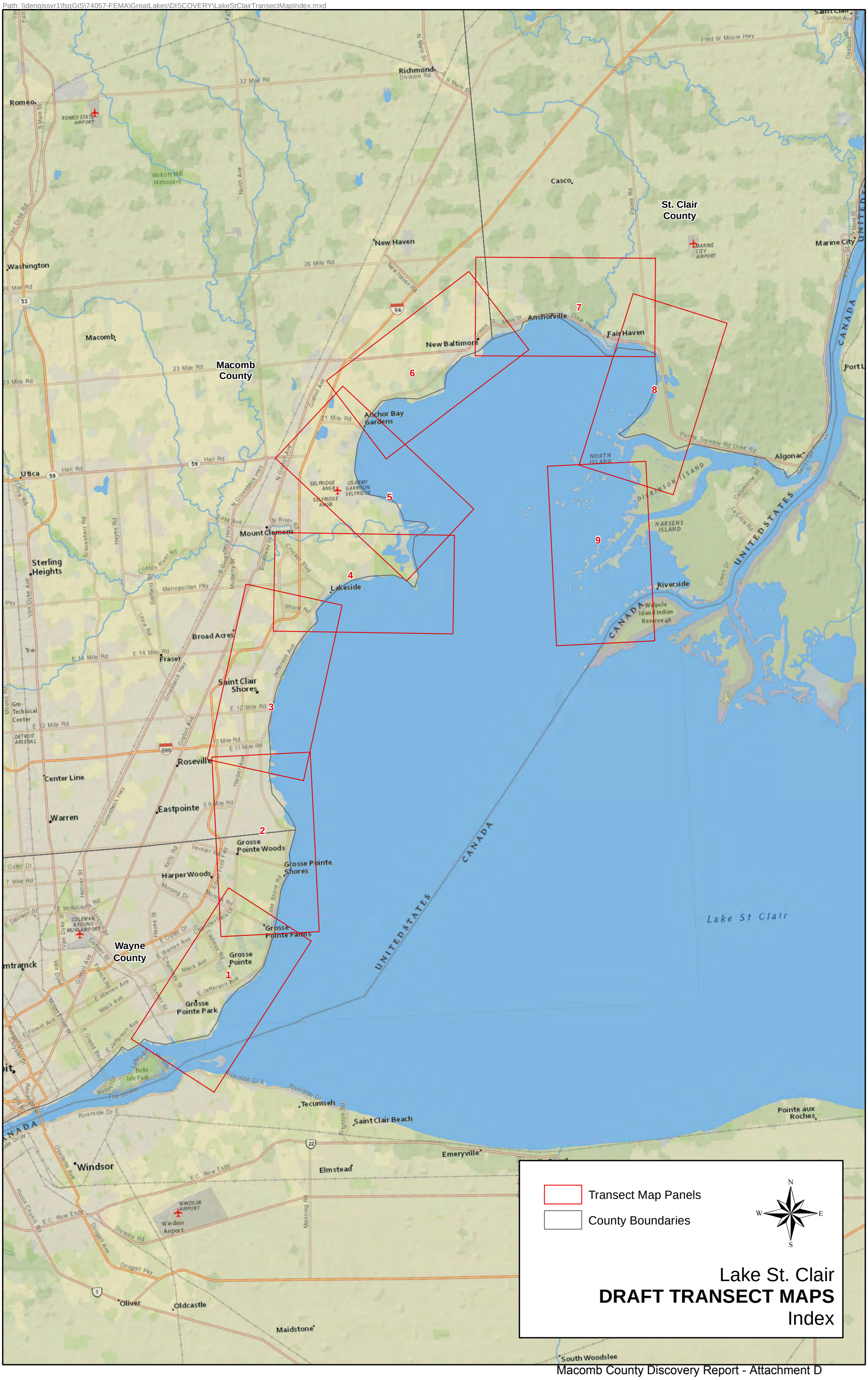

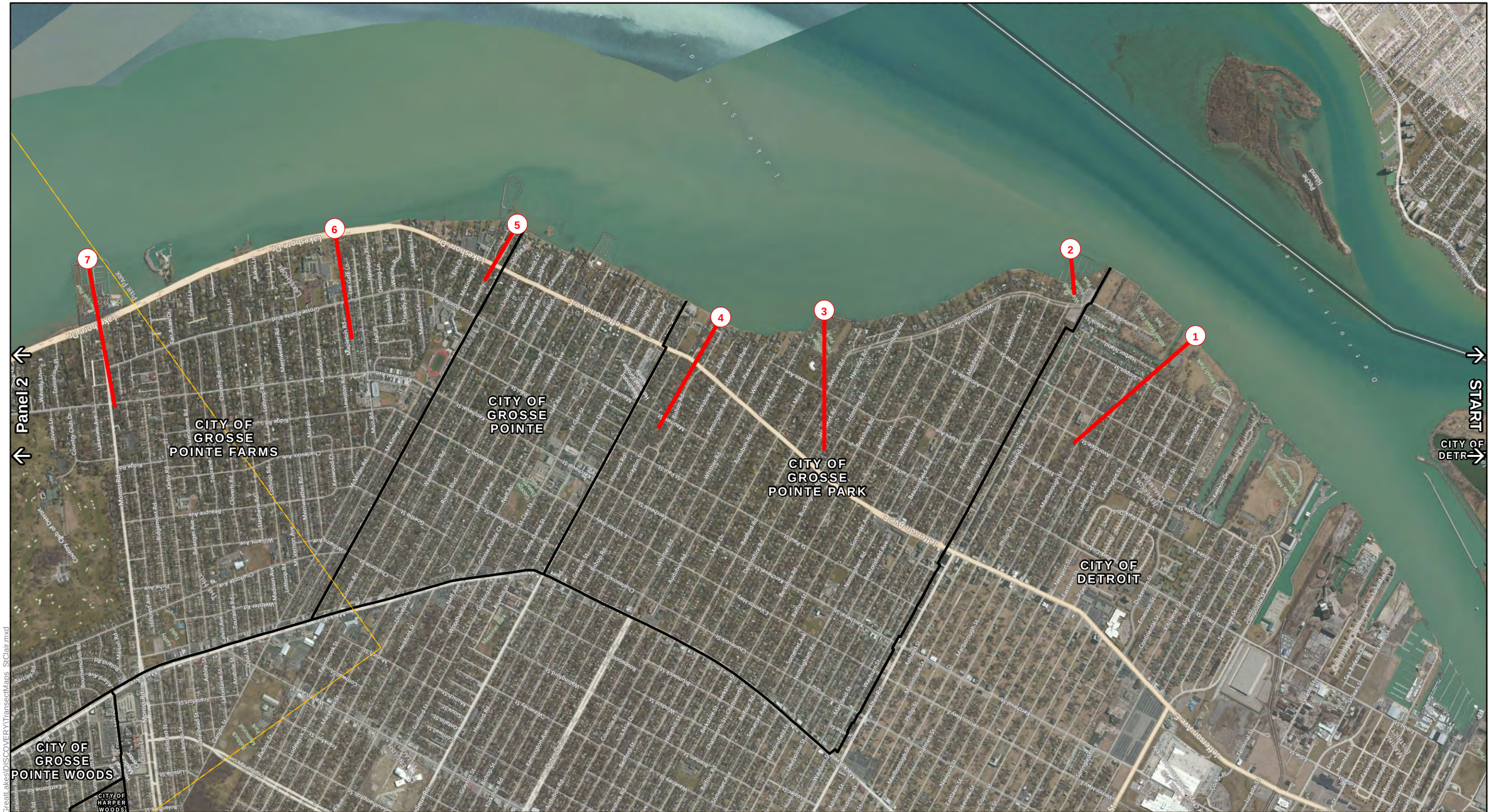

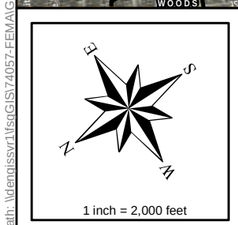

1 inch = 2,000 feet

Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES

WAYNE COUNTY

COMMUNITIES

CITY OF DETROIT
CITY OF GROSSE POINTE
CITY OF GROSSE POINTE FARMS
CITY OF GROSSE POINTE PARK
CITY OF GROSSE POINTE WOODS
CITY OF HARPER WOODS

Lake St. Clair

DRAFT TRANSECTS

Panel 1 of 9

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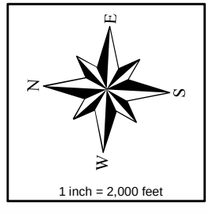

Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES

WAYNE COUNTY
MACOMB COUNTY

COMMUNITIES

CITY OF GROSSE POINTE FARMS
CITY OF GROSSE POINTE WOODS
CITY OF HARPER WOODS
CITY OF ST CLAIR SHORES
VILLAGE OF GROSSE POINTE SHORES

Lake St. Clair
DRAFT TRANSECTS
Panel 2 of 9

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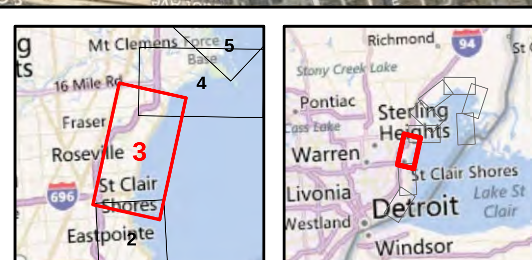

Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES

MACOMB COUNTY

COMMUNITIES

CHARTER TOWNSHIP OF CLINTON
CITY OF ROSEVILLE
CITY OF ST CLAIR SHORES
TOWNSHIP OF HARRISON

Lake St. Clair
DRAFT TRANSECTS
Panel 3 of 9

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Transects

Adjoining Panel Edge

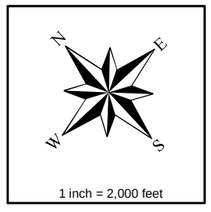
Political Boundary

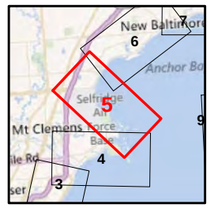
Basemap Source: Microsoft BING map service

COUNTIES
MACOMB COUNTY

COMMUNITIES
CHARTER TOWNSHIP OF CLINTON
CITY OF MOUNT CLEMENS
TOWNSHIP OF HARRISON

Lake St. Clair
DRAFT TRANSECTS
Panel 4 of 9





Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES

MACOMB COUNTY

COMMUNITIES

CHARTER TOWNSHIP OF CLINTON
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF HARRISON
TOWNSHIP OF MACOMB

Lake St. Clair

DRAFT TRANSECTS

Panel 5 of 9

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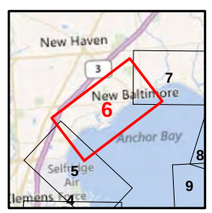
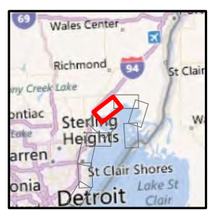
1 inch = 2,000 feet





Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES
MACOMB COUNTY
ST. CLAIR COUNTY

COMMUNITIES
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD

Lake St. Clair
DRAFT TRANSECTS
Panel 6 of 9

1 inch = 2,000 feet

Transects

Adjoining Panel Edge

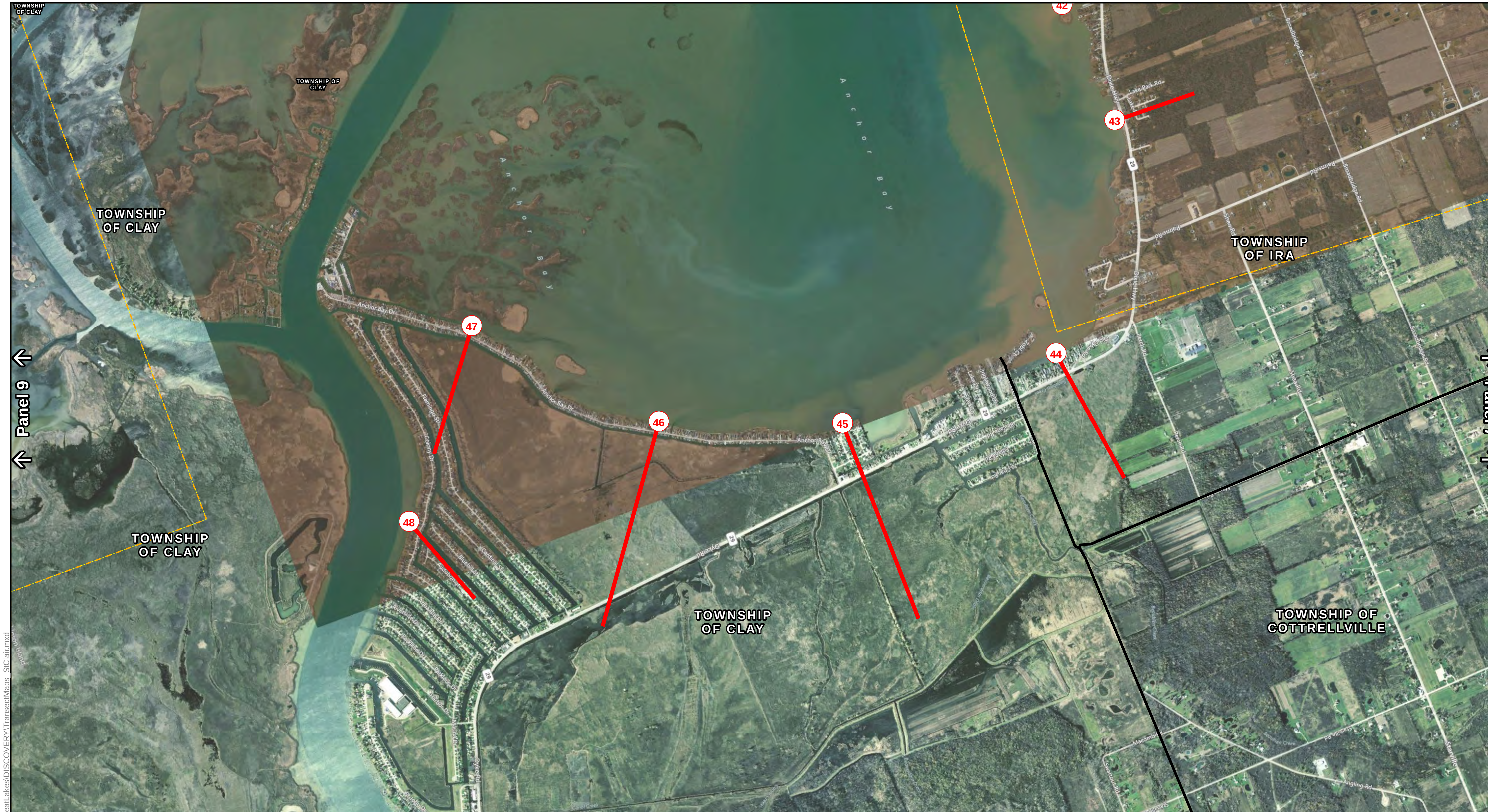
Political Boundary

Basemap Source: Microsoft BING map service

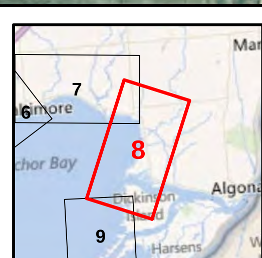
COUNTIES
MACOMB COUNTY
ST. CLAIR COUNTY

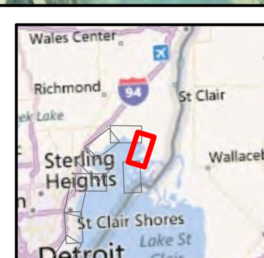
COMMUNITIES
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF IRA

Lake St. Clair
DRAFT TRANSECTS
Panel 7 of 9



1 inch = 2,000 feet





Transects
Adjoining Panel Edge
Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES
ST. CLAIR COUNTY

COMMUNITIES
TOWNSHIP OF CLAY
TOWNSHIP OF COTTRELLVILLE
TOWNSHIP OF IRA

Lake St. Clair
DRAFT TRANSECTS
Panel 8 of 9

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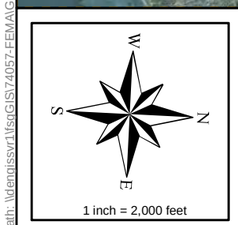

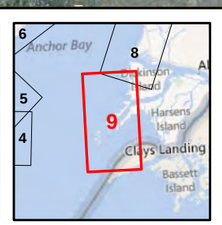

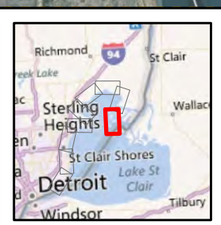

Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES
ST. CLAIR COUNTY

COMMUNITIES
TOWNSHIP OF CLAY

Lake St. Clair
DRAFT TRANSECTS
Panel 9 of 9

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ATTACHMENT E

MACOMB COUNTY DISCOVERY MEETING DOCUMENTS

Discovery Meeting Agenda

Discovery Meeting Sign-In Sheets

Discovery Meeting Minutes

Discovery Meeting Presentation

Marked-up Draft Discovery Maps

Project Name:	FEMA Region V Discovery
Meeting:	MACOMB COUNTY Great Lakes Coastal Discovery Meeting
Date and Time:	MONDAY, AUGUST 20, 2012; 2:00 – 4:00 PM ET
Place:	ROBERT A. VERKUILEN BUILDING
Facilitator:	ERIN MALONEY, FEMA BRIAN CAUFIELD, MATT REMBOLD, BRETT ADDAMS, STARR

Discovery Meeting Agenda

1. **Why are we here? (2:00 – 2:15 PM ET)**
   - Great Lakes Coastal Flood Study Overview and Schedule
   - Discovery Process and Outcomes

2. **Coastal mapping and flood risk topics to be aware of (2:15 – 2:40 PM ET)**

3. **How does this apply to my community? (2:40 – 2:50 PM ET)**

4. **Interactive Session A (2:50 – 3:15 PM ET)**
   - View and Discuss Local Coastal Areas of Concern Using the Discovery Map and Community Risk MAP Questionnaire

5. **Hazard mitigation opportunities and grant funding (3:15 – 3:25 PM ET)**

6. **Interactive Session B (3:25 – 3: 50 PM ET)**
   - Discuss Mitigation Action Opportunities
   - Introduce the Mitigation Action Form and Mitigation Action Tracker

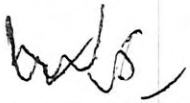
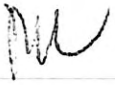
7. **Wrap Up (3:50 – 4:00 PM ET)**
   - Review of action items and next steps

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.*

August 20, 2012 MACOMB COUNTY DISCOVERY MEETING SIGN-IN SHEET

Please verify contact information and intial meeting attendance.

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
1		City of Warren	Emergency Manager	Brendan	Bronsnan		(586) 574-4853	bbrosnan@warrenpd.org
2		Harrison Township	Fire Chief	Michael	Lopez		(586) 466.1450	mlopez@harrison-township.org
3		Harrison Township	Building Official	Vijay	Parakh	38151 L'Anse Creuse Harrison Township, MI	586.446.1423	vparakh@harrison-township.org
4		Macomb County Office of Emergency Management	Emergency Management Aide	Peter	Locke	21930 Dunham Mount Clemens, MI 48043	586.469.5270	peter.locke@macombgov.org
5		Macomb County Planning and Economic Development	Program Manager Planning & Mapping Services	Jeff	Schroeder	One S. Main Street, 7th. Floor Mount Clemens, Michigan 48043	586.469-5064	jeff.schroeder@macombgov.org
6		Selfridge Air National Guard Base	Environmental Manager	Moe	Arif	28900 Selfridge Ave Selfridge ANGB MI 48045	(586) 239-6259	mohammad.arif@ang.af.mil
7		Selfridge Air National Guard Base	Engineering	Ken	Baker			
8		Selfridge Air National Guard Base	Engineering	Steve	Krajnik		586 239 2013	steve.krajnik@ang.af.mil
9		FEMA Region V	~~Senior~~ Engineer	~~Lee~~ Erin	~~Traeger~~ Maloney	536 South Clark St., 6th Floor Chicago, IL 60605	(312) 408-~~5500~~ 5435	~~lee.traeger@fema.dhs.gov~~
10		STARR	Engineer	Brian	Caufield	50 Hampshire Street Cambridge, MA 02139	(617) 452-6000	caufieldba@cdmsmith.com

August 20, 2012 MACOMB COUNTY DISCOVERY MEETING SIGN-IN SHEET
Please verify contact information and intial meeting attendance.

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
11		STARR	Engineer	Matt	Rembold	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	remboldmd@cdmsmith.com
12		STARR	GIS Specialist	Brett	Addems	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	addamsbh@cdmsmith.com
13		MI SEAGRANT	EXTENSION EDUCATOR	JOSH	GUNN	21885 DUNHAM RD STE. 12 CLINTON TWP, MI 48036	586-469-6087	gunnjosh@msu.edu
14		AEW for Chesterfield Sh. Clinf Shores	Engineer	Jeff	Bednar	5301 Schoenherr Shelby Twp. MI 48315	586-855-8560	jbednar@aewinc.com
15	KG	Macomb Co. Public Works	Chief Eng.	Keith	Graboske	21777 Dunham Rd. Clinton Twp, MI 48036	(586)307-8241	Keith.graboske@macombgov.org
16	JS	MC Planning	Prog. MGR. Planning & Map Services	Jeff	Schroeder	1 S Main 7th Fl Mt Clemens, MI 48043	586 469-5285	Jeff.Schroeder@Macombgov.org
17	KK	Macomb County Public Works	Engineer	Kelly	Kaufman	21777 Dunham Rd Clinton Twp MI 48036	(586) 307-8279	Kelly.Kaufman@macombcountymi.gov
18		Spalding DeDecker	Engineer	Jason	Matteo	905 South Blvd East Rochester Hills, 48307	248.762.0433	jmatteo@sda-eng.com
19		MDEQ	Engineer	Maria	Zingas	27700 Donald ct Warren, MI 48092	586-753-3872	Zingasm@michigan.gov

August 20, 2012 MACOMB COUNTY DISCOVERY MEETING SIGN-IN SHEET
Please verify contact information and intial meeting attendance.

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
20	J.S.	S.C.S. WATERFRONT RWV. COMM	CHAIR	JOE	ST. JOHN	22201 LAKESHIRE	(586) 774-4750	SCSWATERADVISORY@LYCOS.COM
21	FS	FEMA Region V	Natural Hazards Program Specialist	Frank	Shackley	536 S Clark 6th Fl. Chicago IL 60605	312-408-5321	frank.shackley@dhs.gov
22	JS	MISG	Program Instructor	Justin	Selden	21885 Dunham Rd STE 12 Clinton twp, MI 48036		seldenju@gnr.msu.edu
23								
24								
25								
26								
27								
28								
29								

Meeting schedule: Monday, August 20, 2012 2:00 – 4:00 pm (ET)
Meeting Location: Robert A. VerKuilen Building, Clinton Township, MI
Discovery Area: Coastal communities in Macomb County
Attendees: 19 people attended the Lake St. Clair Discovery Meeting. Please see attached sign-in sheet for a complete list of attendees.

FACILITATORS:

FEMA
Erin Maloney, FEMA-Region V
Frank Shockey, FEMA-Region V

STARR Contractor
Brian Caufield, STARR
Matt Rembold, STARR
Brett Addams, STARR

Michigan DEQ
Maria Zingas, MDEQ

ASFPM
Alan Lulloff, ASFPM

MEETING AGENDA:

1. **Why are we here? (15 minutes)**
   - Great Lakes Coastal Flood Study Overview and Schedule
   - Discovery Process and Outcomes

2. **Coastal mapping and flood risk topics to be aware of (25 minutes)**

3. **How does this apply to my community? (10 minutes)**

4. **Interactive Session A (25 minutes)**
   - View and Discuss Local Coastal Areas of Concern Using the Discovery Map and Community Risk MAP Questionnaire

5. **Hazard mitigation opportunities and grant funding (10 minutes)**

6. **Interactive Session B (25 minutes)**
   - Discuss Mitigation Action Opportunities
     Introduce the Mitigation Action Form and Mitigation Action Tracker

7. **Wrap Up (10 minutes)**
   - 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:

- *Question:* Is sediment deposition being examined as part of this study? *Answer:* B. Caufield stated that it was not being studied directly; however, the new LiDAR and bathymetry data will be able to capture current sediments. Any future deposition would not be examined as part of the study.
- *Question:* What is the value of additional transects – won't this cause additional zones to be mapped? *Answer:* B. Caufield explained that it could cause more zones to be mapped, but that the additional transects would provide a more precise answer (in terms of flooding extent) for the coastline that the transect intersected (i.e., the flooding extent would not have to be interpolated from nearby transects).
- *Discussion:* The question on mapping additional zones led to a discussion regarding the definition and variety of mapped flood zones in a coastal study as well as how zones are interpolated between transects. B. Caufield and A. Lulloff led the discussion.
- *Question:* Will a preliminary analysis be completed on transects (in their draft location) so that if the same flooding extent is determined as on the effective transect, the draft transect would be moved and a separate analysis completed? *Answer:* B. Caufield explained that the location of the draft transects would be finalized before the analysis begins. After the analysis, the transects will not move to a different location, even if the flooding extent does not change from the effective study. However, per FEMA's and STARR's discretion, "unmapped" transects can be modeled, whose results can be incorporated into the mapping. These unmapped transects can be used in areas where interpolating results between two transects may not be appropriate based on existing physical conditions.
- *Question:* Will the coastal analysis extend up through riverine areas? *Answer:* B. Caufield explained that the coastal analysis will extend up into riverine areas. He explained that after a certain point, the wave action would be removed from the analysis, and the riverine study would tie into the Lake's calculated SWEL value.
- *Question:* Will VE Zones (coastal high hazard zones) be instituted throughout the Great Lakes? *Answer:* B. Caufield and E. Maloney explained that this would be done on a case-by-case basis.
- *Discussion:* F. Shockey discussed some NFIP regulations with the officials – namely, that no basements were allowed in VE Zones; the lowest horizontal member of the structure must be elevated to at least the elevation listed on the VE Zone (freeboard may also be required over this elevation).

FEATURES NOTED ON MAPS:

- Critical facility (lift station) identified in the Village of Grosse Pointe Shores.
- Selfridge Air National Guard Base (represented by Ken Baker and Steve Krajnik of the Engineering Division):
  - Northern portion of the base to be developed (identified by smaller circle with leader).
  - Pointed out the shoreline characteristics, including a marina (not base property; adjacent to the base's southern property line), a vertical wall along the southern portion of the base's shoreline, and a sloping rock wall along the northern portion of the base's shoreline.
  - Suggested moving (or adding) draft transect #27 just north to represent the vertical wall.
  - Suggested moving (or adding) draft transect #28 just south to represent the sloping rock wall (behind which the new development is planned).

ACTIONS:

- Maria Zingas, MDEQ, may provide comments regarding the location of the draft transects at a later date.

FEMA

Lake St. Clair Discovery

Macomb County, MI

August 20, 2012
1400 to 1700

VerKuilen Building

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Introductions

Who's here?

- State Representatives
  - MDEQ
  - SHMO
- Risk MAP Project Team
  - FEMA
  - STARR
- Local Stakeholders
  - CEOs
  - Floodplain Administrators
  - Planners
  - Engineers
  - Emergency Managers
  - Community Leaders
  - Regional Planning Agencies
  - Coastal Organizations

RiskMAP
Increasing Resilience Together

Status of Macomb County studies

- Macomb – Lake St. Clair
  - LFD issued 6/4/2012
- Macomb – Township of Shelby
  - Preliminary issued 6/22/2012

RiskMAP
Increasing Resilience Together

Discovery Meeting Agenda

- Why are we here?
  - Risk MAP Program, Great Lakes Study, and Discovery
- Coastal mapping and flood risk topics
- 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/SHARPP
- Wrap Up
- Optional Interactive Stations

RiskMAP
Increasing Resilience Together

Risk Mapping, Assessment and Planning
Risk MAP

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

U.S. Army Corps of Engineers, Detroit District

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
Overview

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

RiskMAP
Increasing Resilience Together

Lake St. Clair Discovery

- 3 counties in Michigan
- 16 coastal communities
- 7 connecting channels communities

RiskMAP
Increasing Resilience Together

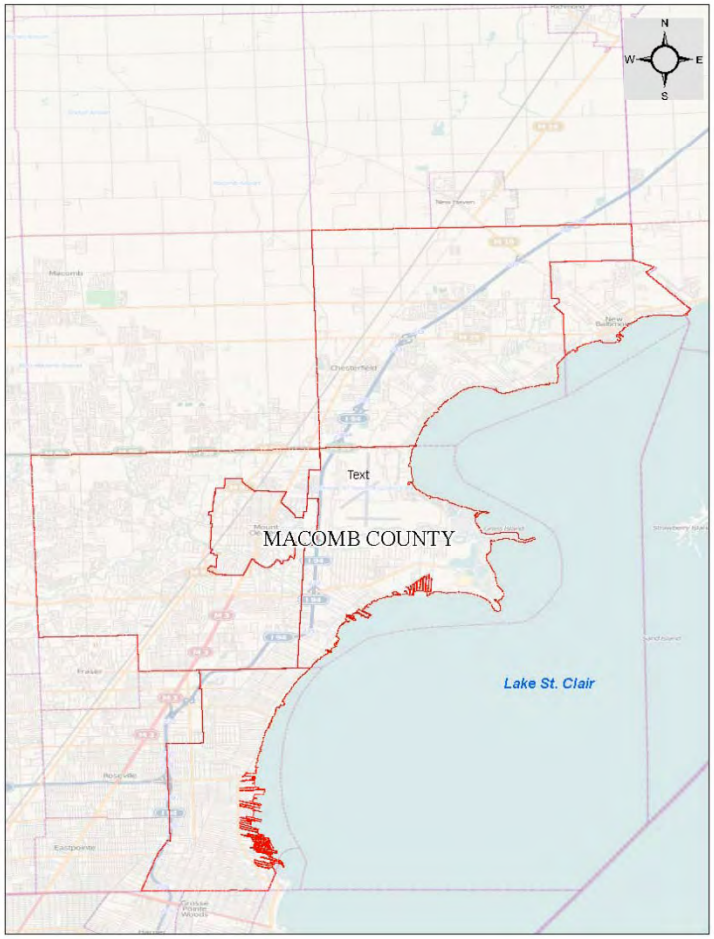
Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Lake St. Clair Communities:

- Macomb County
- Charter Township of Clinton
- Chesterfield
- Harrison
- Mount Clemens
- New Baltimore
- St. Clair Shores



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Great Lakes Coastal Flood Study
greatlakescoast.org

Discovery Meeting Objectives

- Continue and expand upon stakeholder engagement
- Discuss data inputs from Federal, state and local
- Identify local coastal flood hazard needs and areas of concern
- Identify products and datasets that best advance coastal mitigation action
- NFIP regulatory updates
- Discovery schedule and deliverables

RiskMAP
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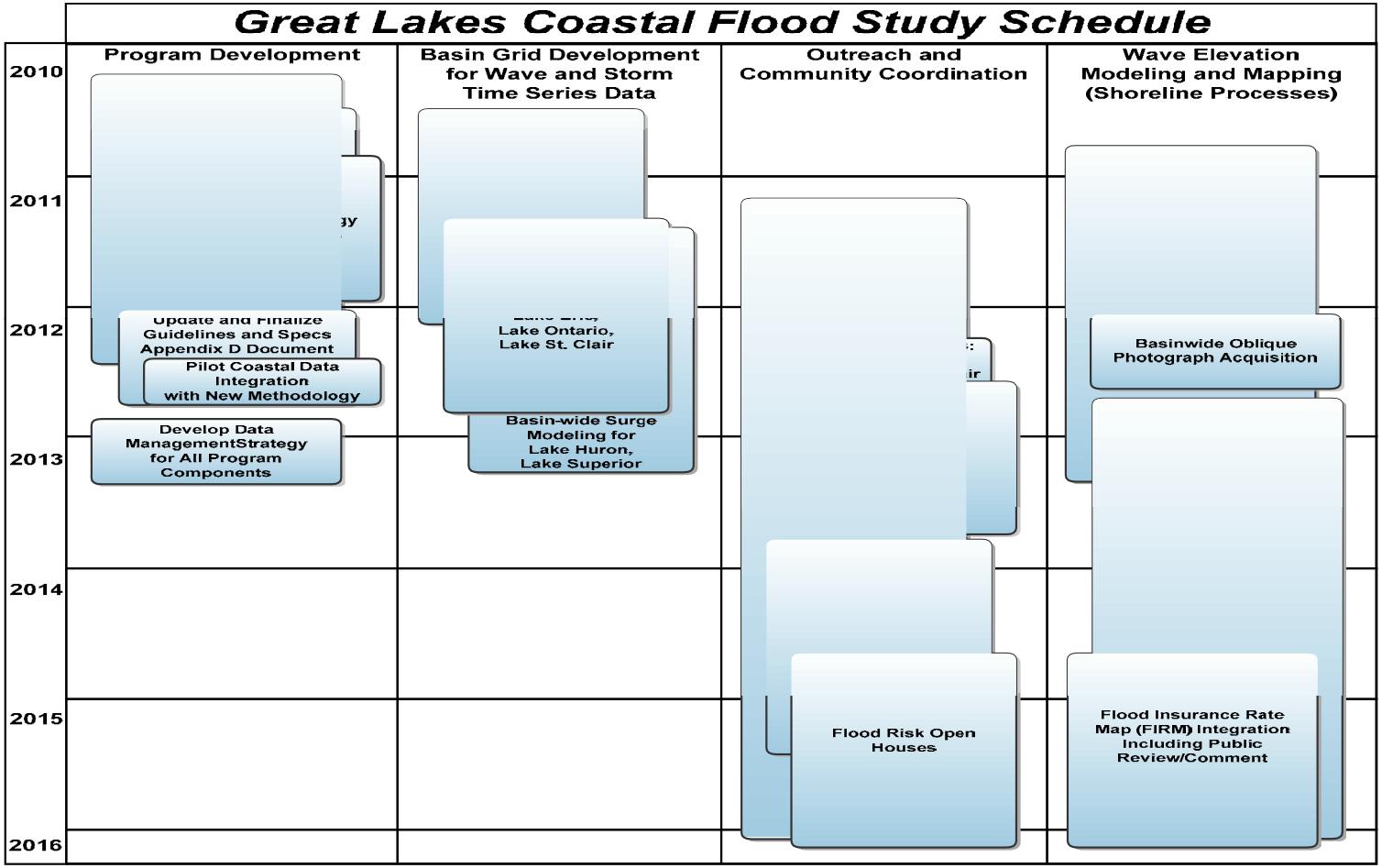
Stakeholder Engagement



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Great Lakes Coastal Flood Study
greatlakescoast.org

Data Inputs

- Updates to analysis and methodology guidance
- Proposed transect locations
- Topographic and Bathymetry data collected
- Bare Earth Imagery collected
- Identify reaches requiring special attention and data
- Document local data sources that will help improve study

RiskMAP
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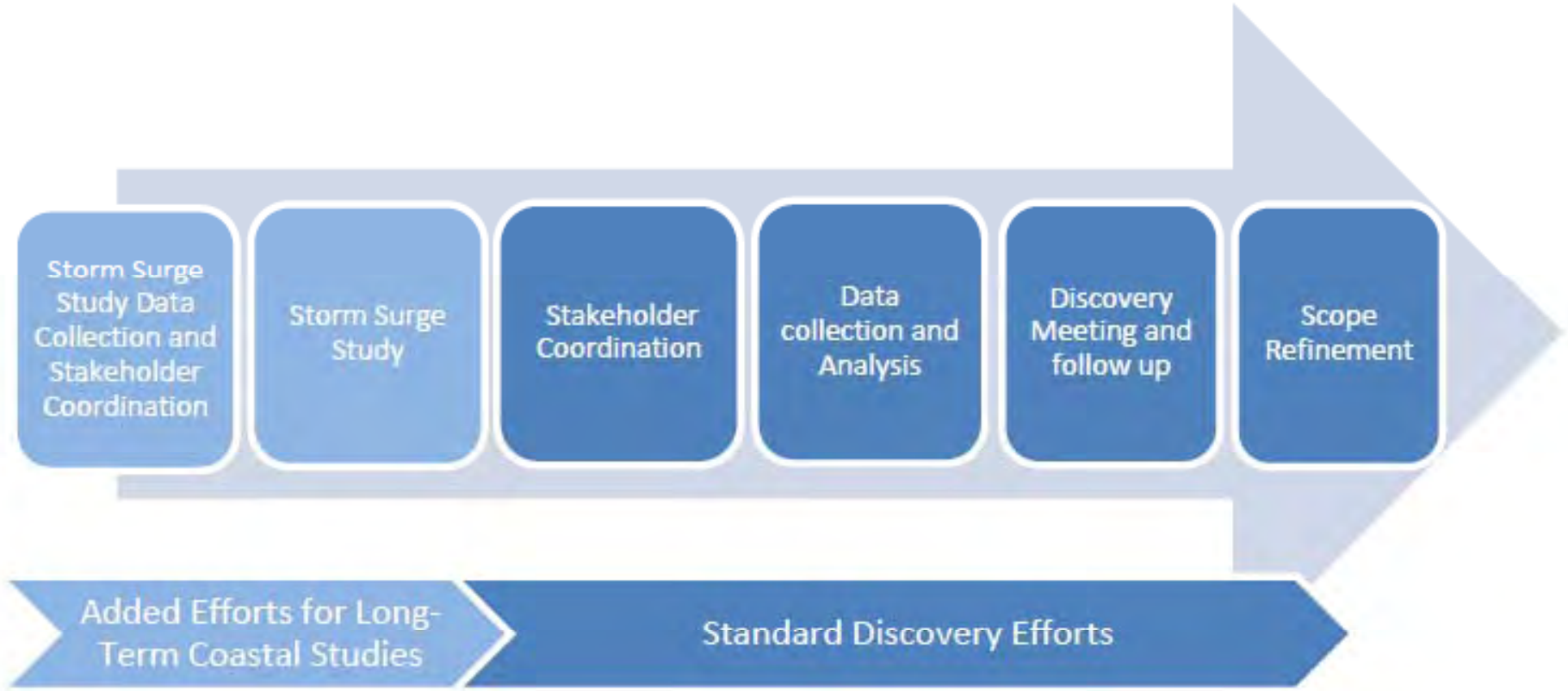
Discovery Schedule Overview



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Great Lakes Coastal Flood Study
greatlakescoast.org

Lake Michigan Discovery

Schedule of Activities

- Identify Draft Transect Locations – Completed
- Research available data – Completed
- Information Exchange with Community Stakeholders – July 2012
- Prepare draft Discovery Maps and Reports – August 2012
- Establish inventory of coastal structures based on oblique imagery – October 2012
- Facilitate Discovery Meetings – August/September 2012
- Final Discovery Report and Maps – November 2012
- Create library of digital data – November 2012

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Great Lakes Coastal Flood Study
Discovery Products

- **Final Discovery Report**
  - Single, comprehensive report for all of Lake St. Clair, 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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Great Lakes Coastal Flood Study
greatlakescoast.org

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

RiskMAP
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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

RiskMAP
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Data Gaps

- Building footprints
- Critically eroded beach areas
- Coastal construction control 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 or listed in CNMS

RiskMAP
Increasing Resilience Together

FEMA

Coastal Mapping and Flood Risk Topics

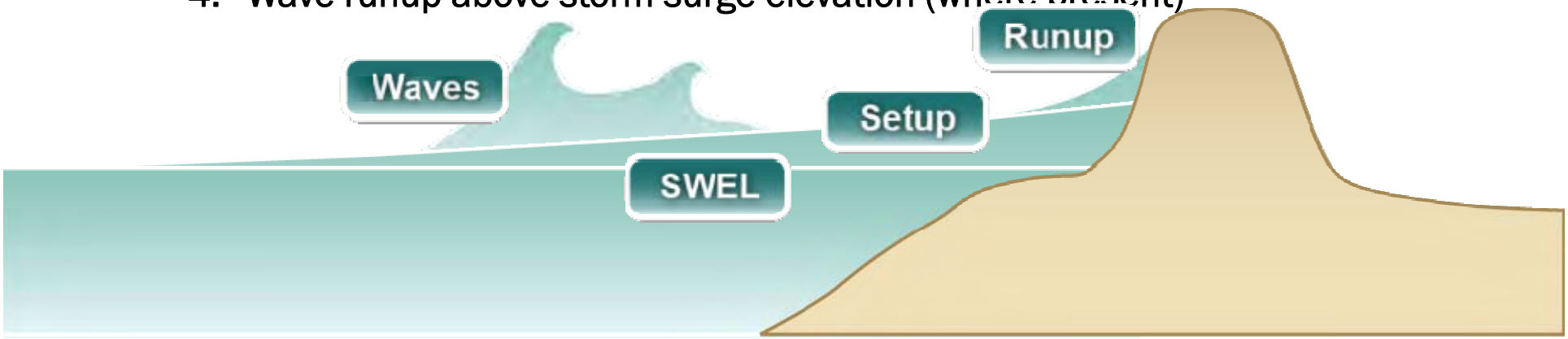
- Draft Transects
- Coastal Guidance Updates
- VE Zone Mapping and LiMWA
- Coastal Flood Risk Products

RiskMAP
Increasing Resilience Together

Basic Elements of a Coastal Hazard Analysis

Base Flood Elevation on FIRM includes 4 components:

1. Storm surge 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)



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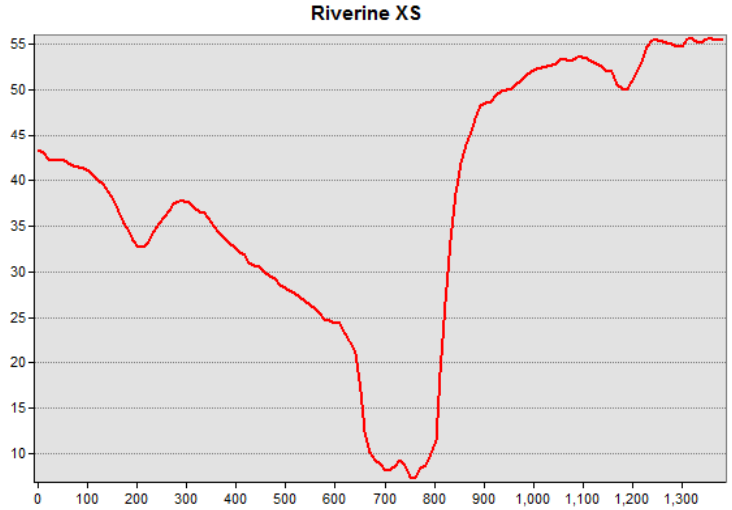
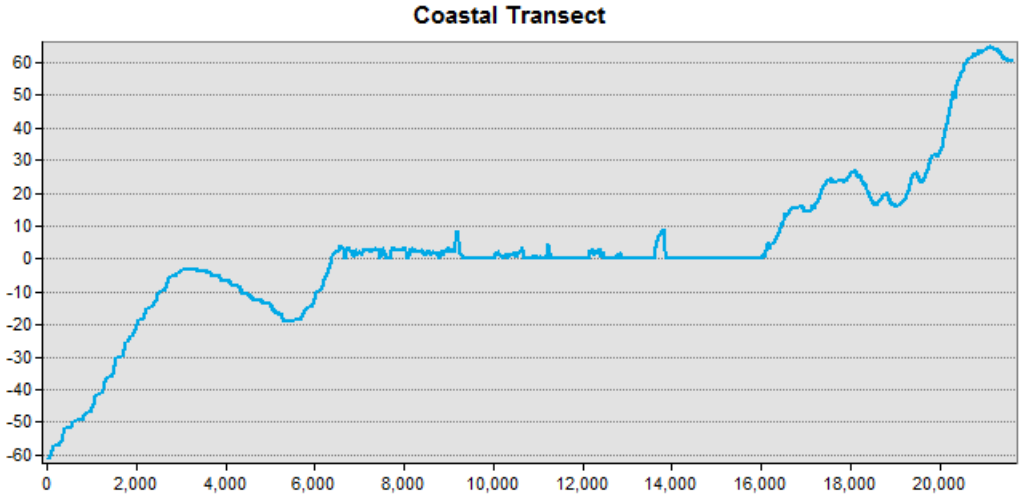
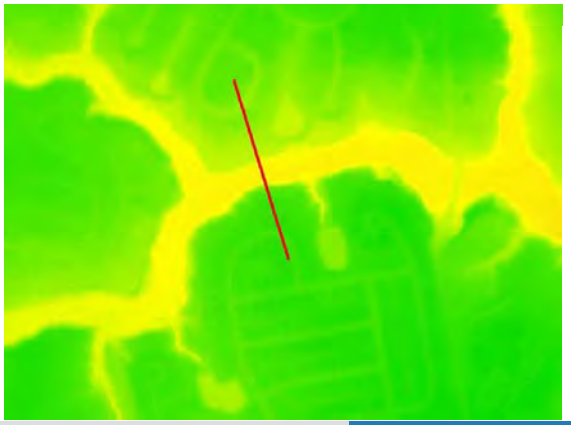
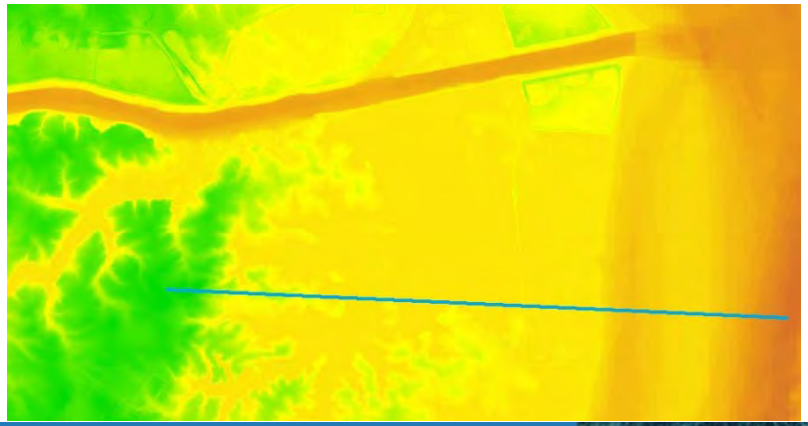
Riverine XS vs Coastal Transect









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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

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Draft Transect Layout
Macomb County

- 25 transects
- 29 miles of shoreline

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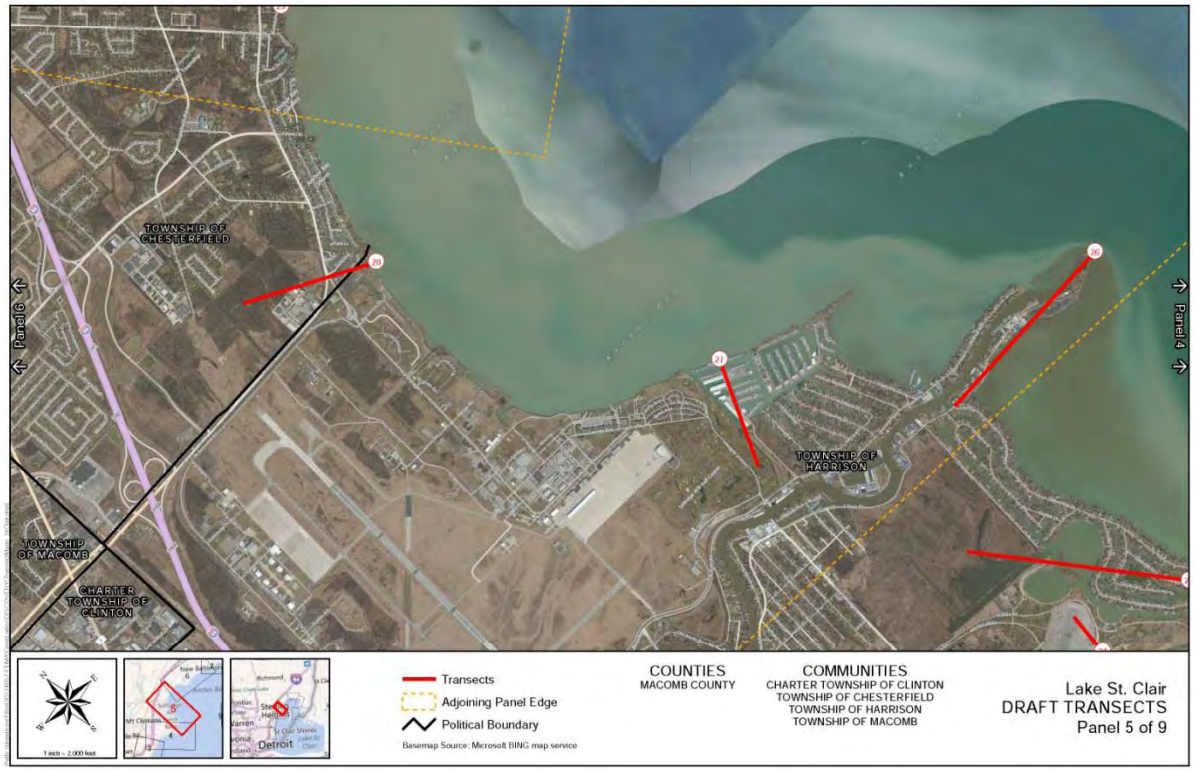

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Coastal Flood Hazard Zones

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

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VE Zones in the Great Lakes

- **From the revised Appendix D.3:**
  - "VE zones may also be mapped where the engineering analysis indicates their presence"
  - "The typical study finding is a narrow VE zone, making its usefulness uncertain on maps at usual scales"
  - "Relatively small numbers of existing coastal buildings are likely to be affected by possible VE zone designations along some Great Lakes"
  - "Only with prior approval from the FEMA study representative should the VE zones be mapped"

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How is 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 alerts people that are not in the high wave hazard zone (Zone VE) that they may still be affected by wave action in the Zone
- CRS benefit for communities requiring Zone VE construction standards in areas defined by LiMWA or areas subject to waves greater than 1.5 ft

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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

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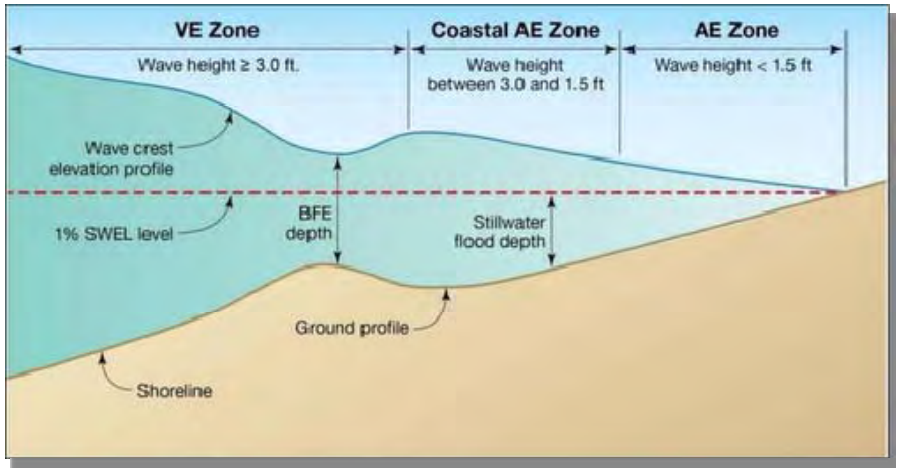
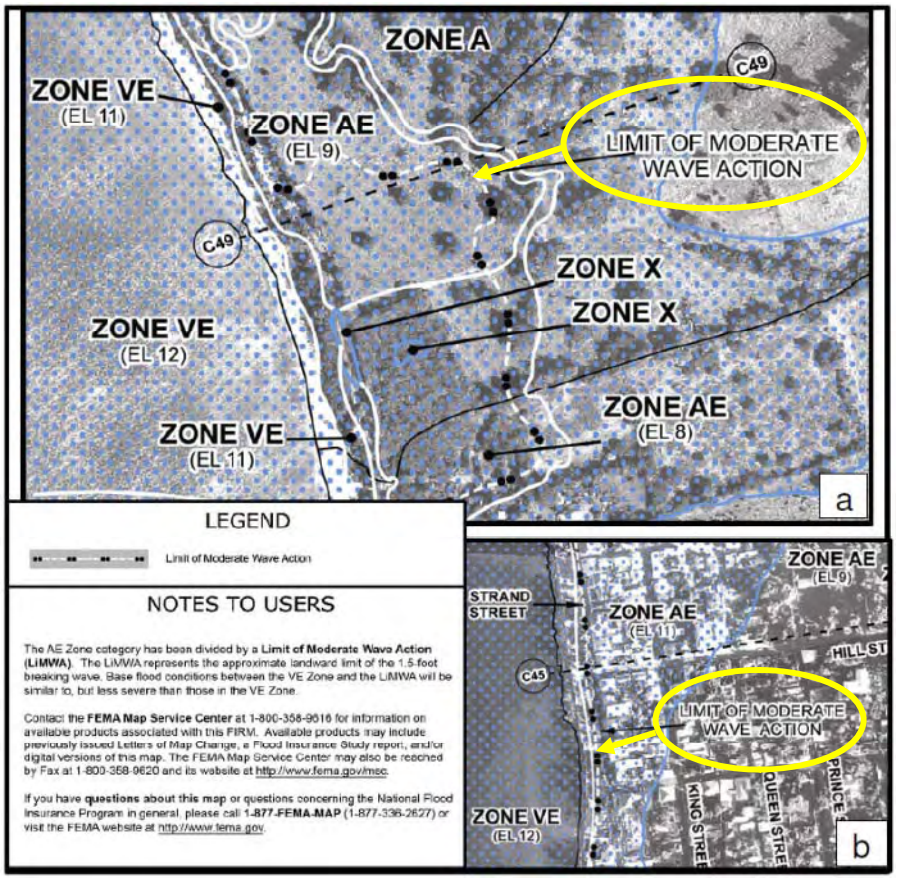
Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

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





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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)

HAZUS MH
EARTHQUAKE • WIND • FLOOD

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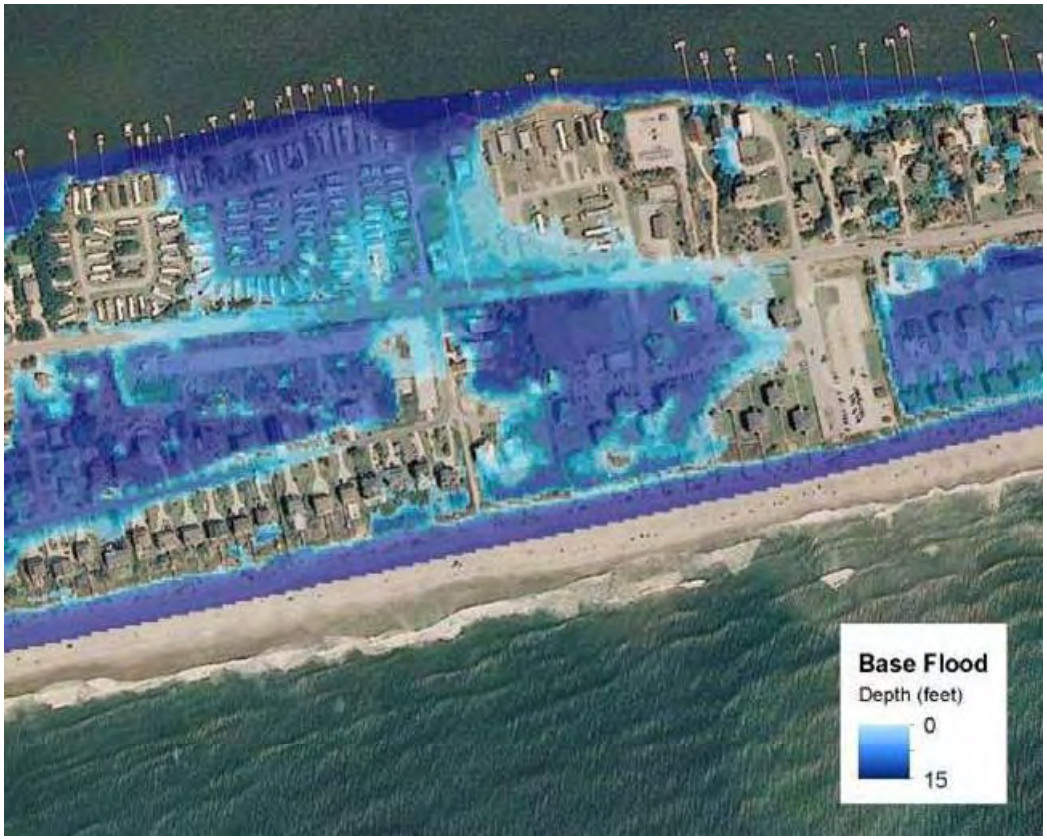
Coastal Depth Grid

- 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



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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

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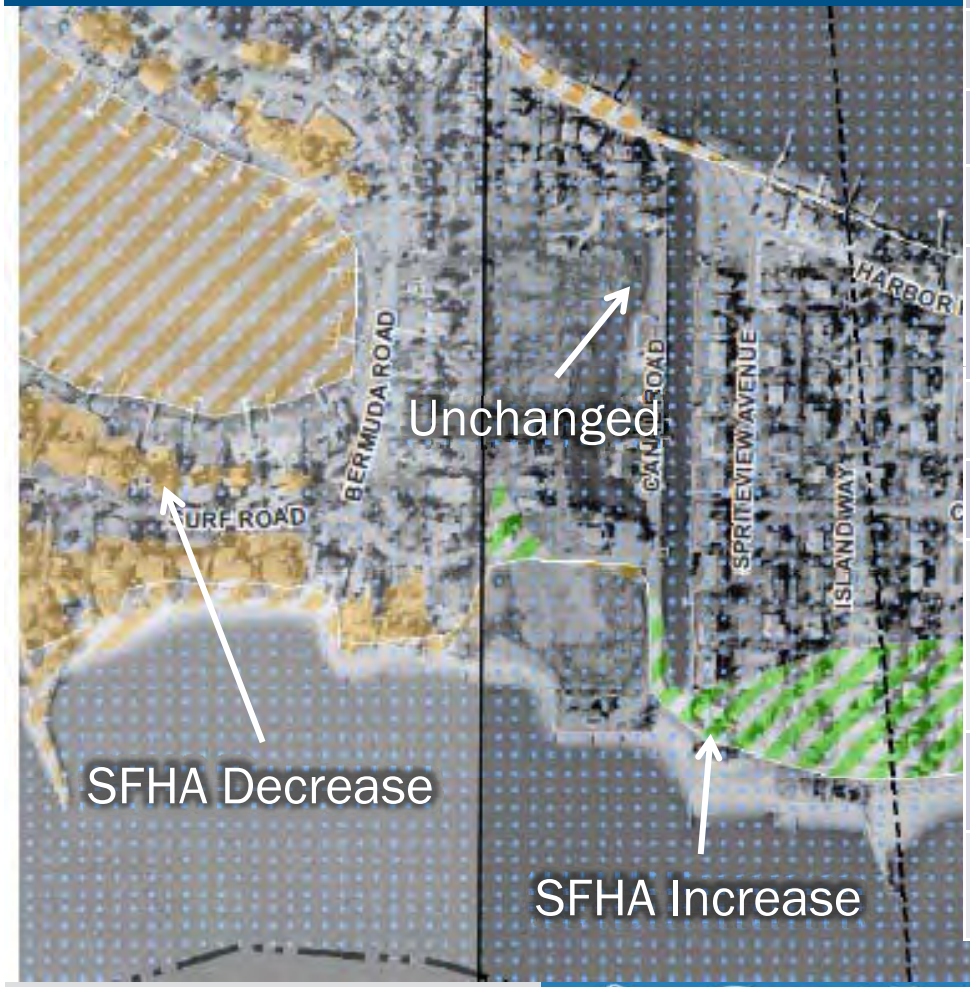
Changes Since Last FIRM



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 Non-Regulatory Products

- If and when are products produced?
  - Operating Guidance for the Selection of Enhanced Datasets
  - Availability of coastal analysis modeling information
  - Will the information be beneficial to the communities?
    - Increase risk awareness?
    - Facilitate mitigation actions?
- Products may be produced for the entire coastline or focused areas determined to be the most valuable
  - Discovery process should facilitate these selections
- Additions to Flood Risk Map, Flood Risk Database, & Flood Risk Report
- Datasets will not be recreated from existing data available outside of FEMA. Direction to such information will be provided in the Flood Risk Report.

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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

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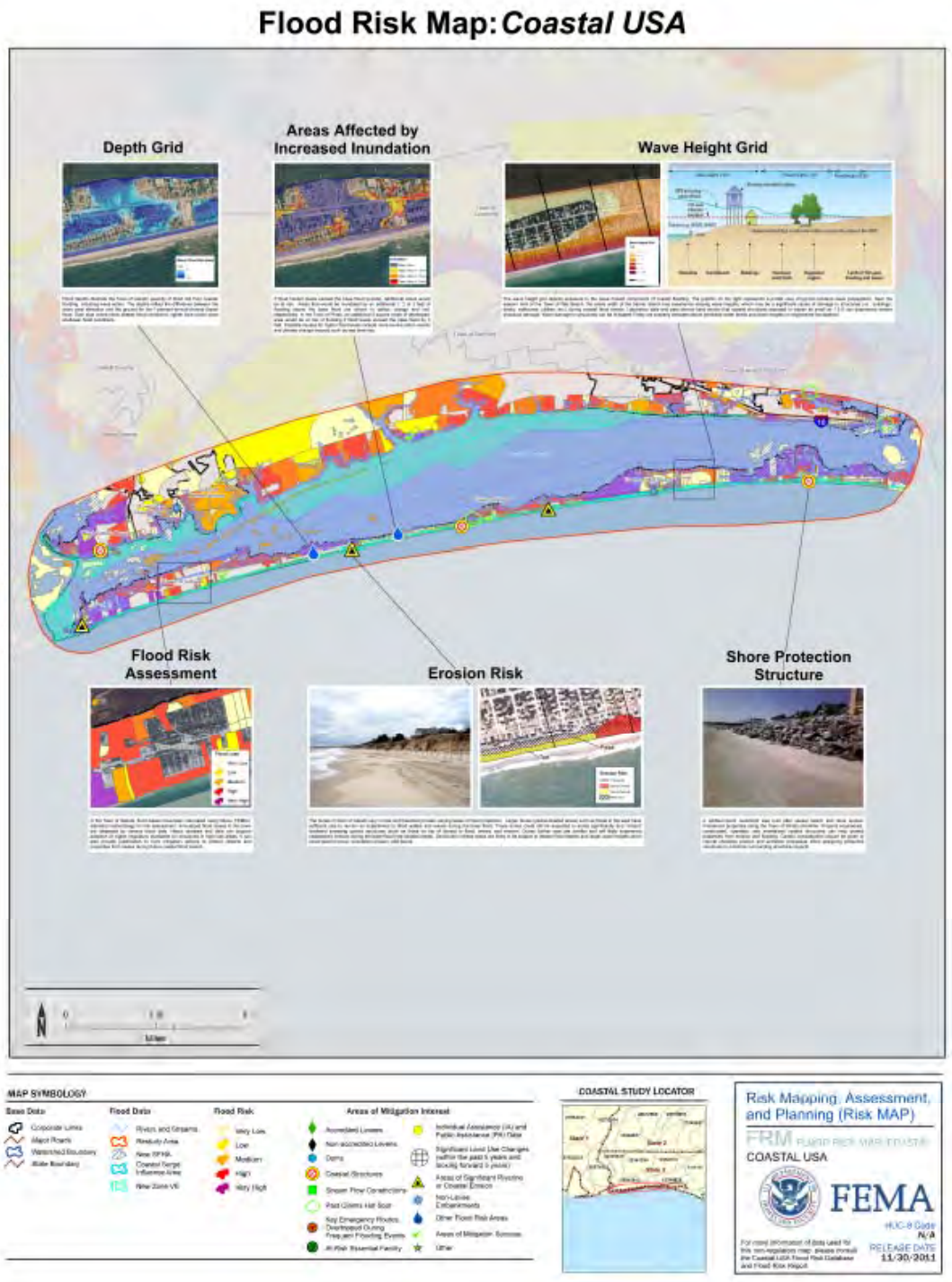
Coastal FRM

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



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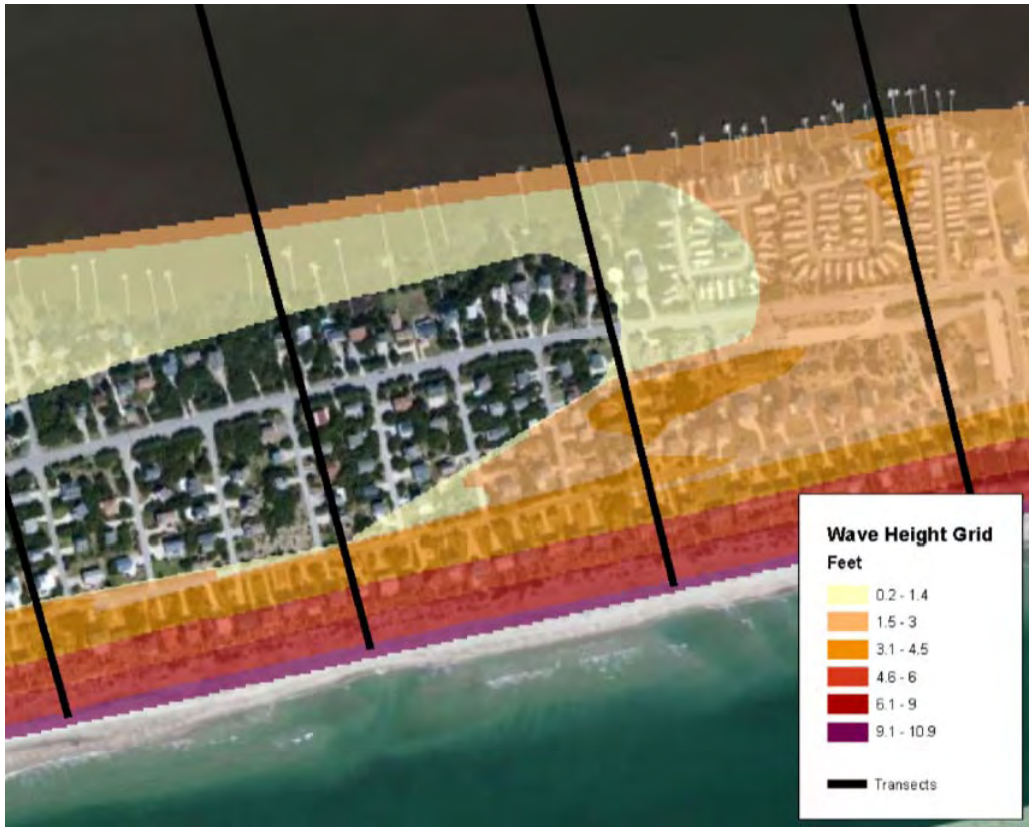
Coastal Wave Height Grid

- Dataset showing wave height information to greater detail than the Wave Hazard Severity Areas dataset by delivering within a raster dataset
- Represents the full wave height, not just the portion of the wave crest that lies above the stillwater elevation
- Wave damage to structures can be mitigated if they are properly elevated above predicted water levels and wave heights on engineered foundations



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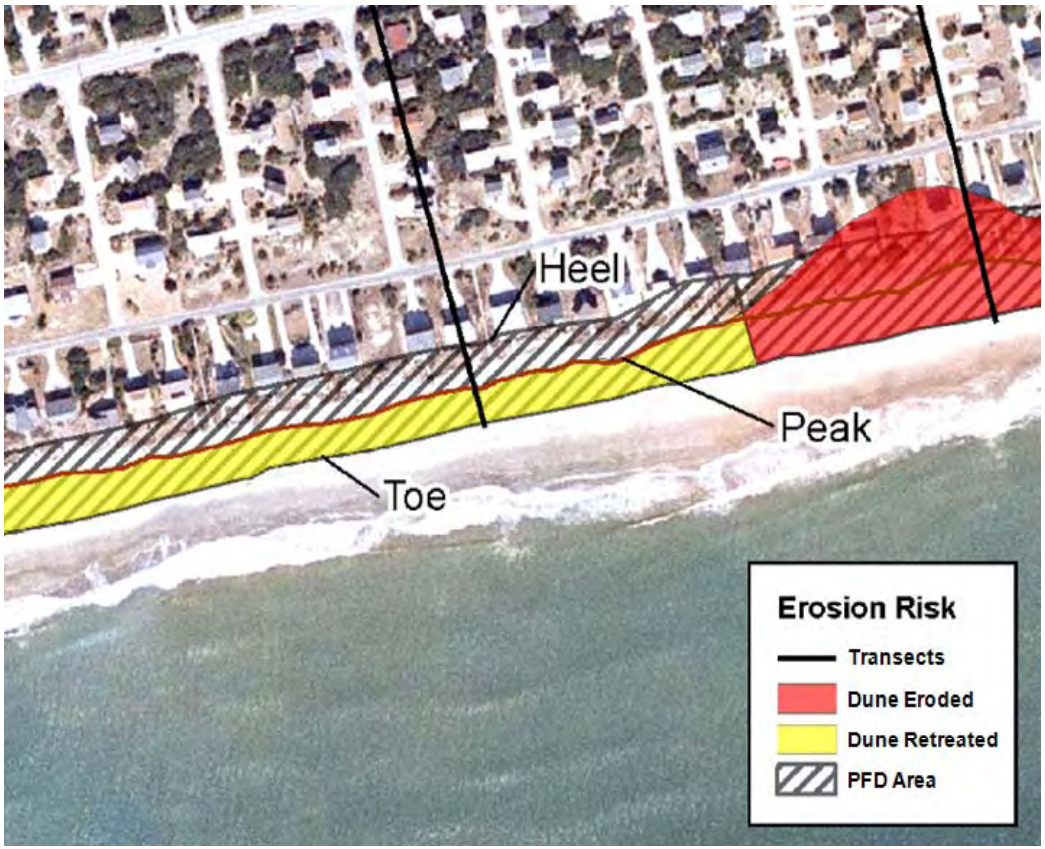
Erosion Risk Determination

- Polygons depicting the spatial extent of the regulatory Primary Frontal Dune (PFD), based on topography and/or shoreline survey data and augmented with aerial photos as needed
- Polygons can be further subdivided to show the spatial extent of the eroded ground as estimated from the erosion analysis conducted for the 1% annual chance flood



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Coastal Updates to Flood Risk Report

FEMA

- Explanations of coastal non-regulatory datasets and their use in risk communication and mitigation planning
- References to other publications and resources that provide information on coastal risks
- Captures and reports increases and decreases in Coastal High Hazard Areas (VE & V Zones) within the Changes Since Last FIRM tables in the FRR

Area of Study	Total Area (mi^2)	Increase (mi^2)	Decrease (mi^2)	Net Change (mi^2)
Within SFHA	*23.8*	*1.6*	*0.4*	*1.2*
Within Floodway	*1.4*	*0.2*	*0.0*	*0.2*
Within CHHA (VE or V Zone)	*7.8*	*0.9*	*0.5*	*0.4*

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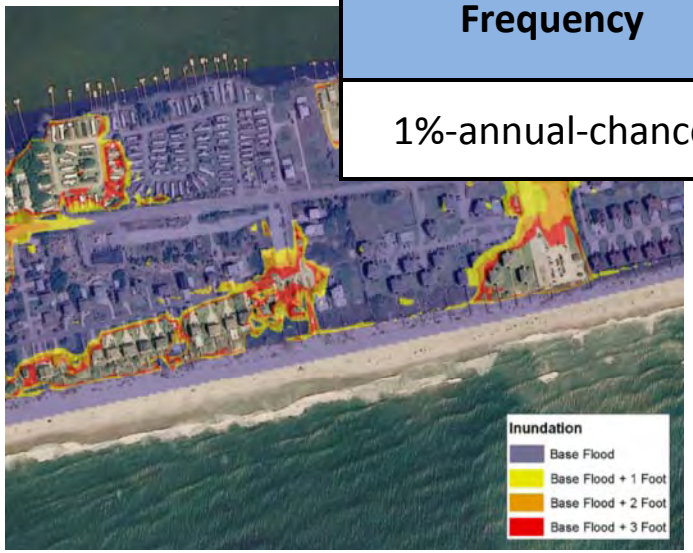
Coastal Updates to Flood Risk Report

- Captures and reports the additional areas that would be inundated, based on 1, 2, or 3 feet of increased inundation

Flood Event Frequency	Area of Additional Inundation (mi^2)				
	1-ft Increase	2-ft Increase		3-ft Increase	
		Newly Inundated	Total	Newly Inundated	Total
1%-annual-chance	0.6	0.8	1.4	1.2	2.6



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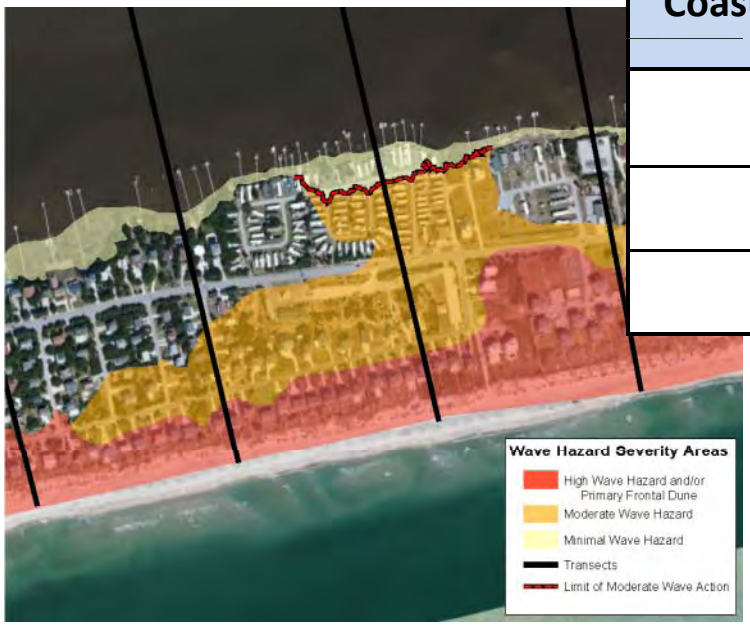
Coastal Updates to Flood Risk Report

- Captures and reports the total area and number of structures (if available) within each of the 3 different levels of wave hazard (High, Moderate, and Minimal)



Coastal Wave Hazard Severity	Total Area (mi^2)	# of Structures
High	0.4	15
Moderate	2.6	187
Minimal	3.3	296

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Non-Regulatory Product Usage and Action

- 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

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- 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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V Zones for Lake Michigan?

- Lake St. Clair communities currently do not have V/VE Zones. Majority of the communities have coastal A/AE zones.
- If costal 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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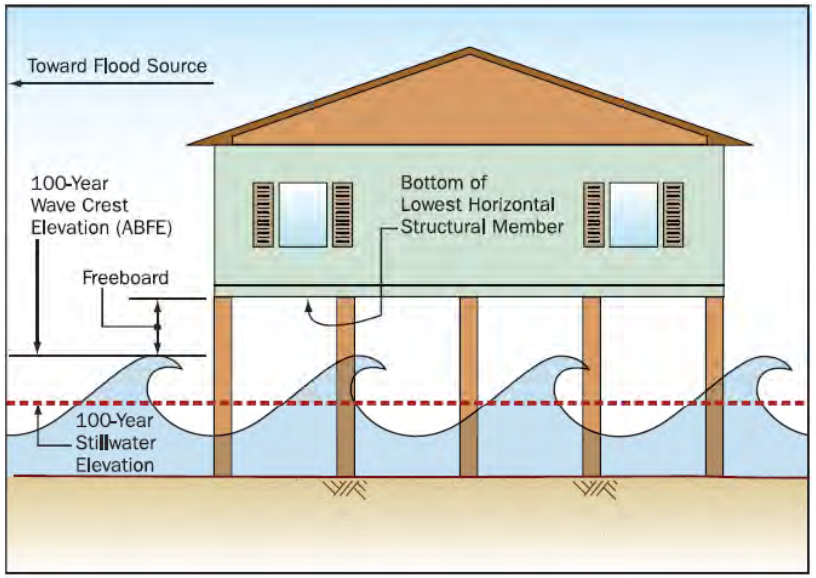
Coastal Zones and NFIP Compliance

- Must meet minimum NFIP and community coastal requirements
- NFIP design and construction requirements are more stringent in V zones due to wave, debris, and erosion hazards in V zones
- Recommendations for exceeding the minimum NFIP requirements (Coastal A Zones)
  - Can obtain CRS credits for Coastal A Zone Requirements
- Resources Available



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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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Interactive Session A

- View and Discuss Local Coastal Areas of Concern Using the Discovery Map

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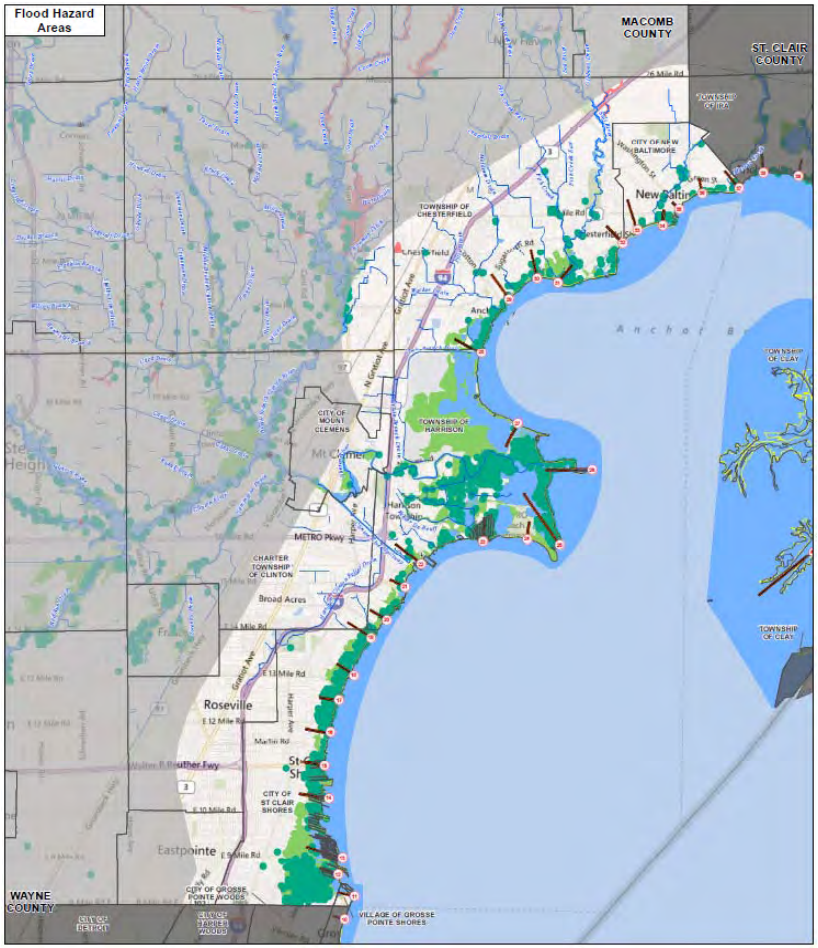
Macomb County, MI
Discovery Map – Flood Hazard Areas



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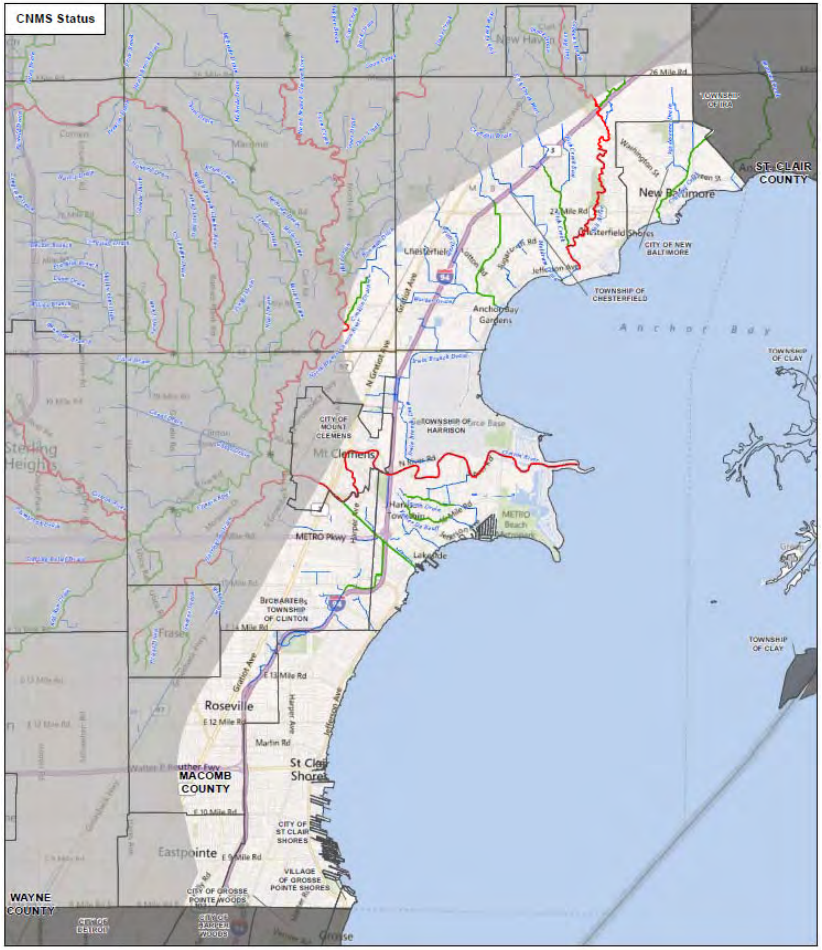
Macomb County, MI
Discovery Map – CNMS Status



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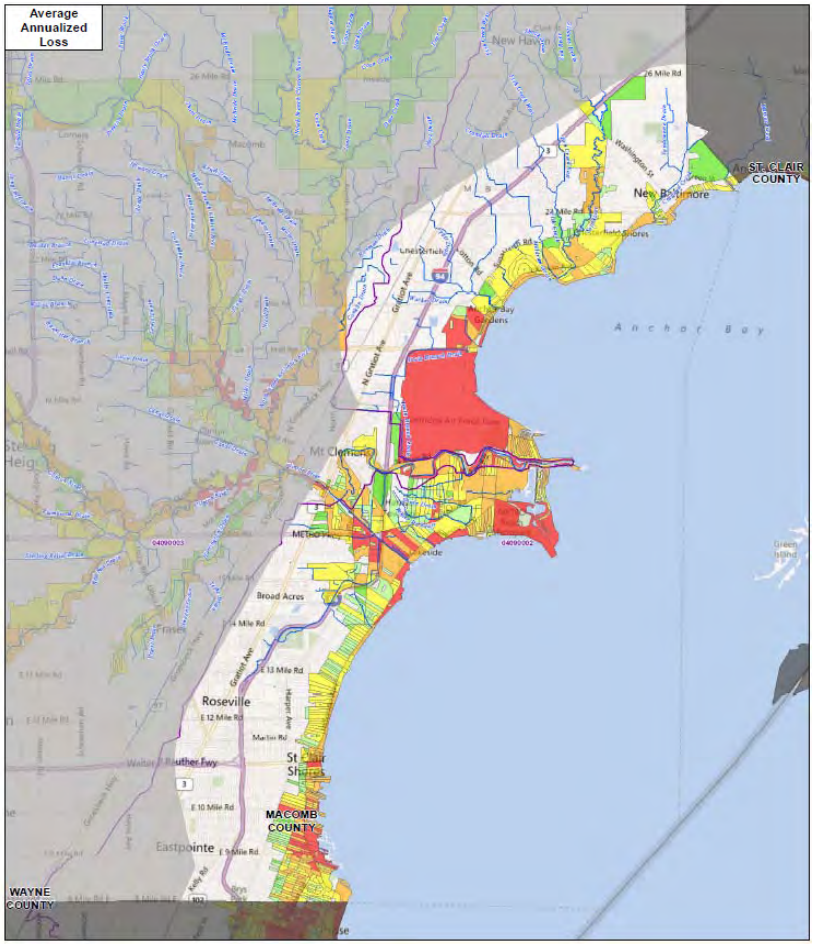
Macomb County, MI
Discovery Map – AAL and CBRS



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Hazard Mitigation

- Opportunities
- Grant Funding

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Local Hazard Mitigation Plans

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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)

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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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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: OFAs

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

US Army Corps of Engineers®

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

USDA

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

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Hazard Mitigation Resources, Strategies & Actions

- 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 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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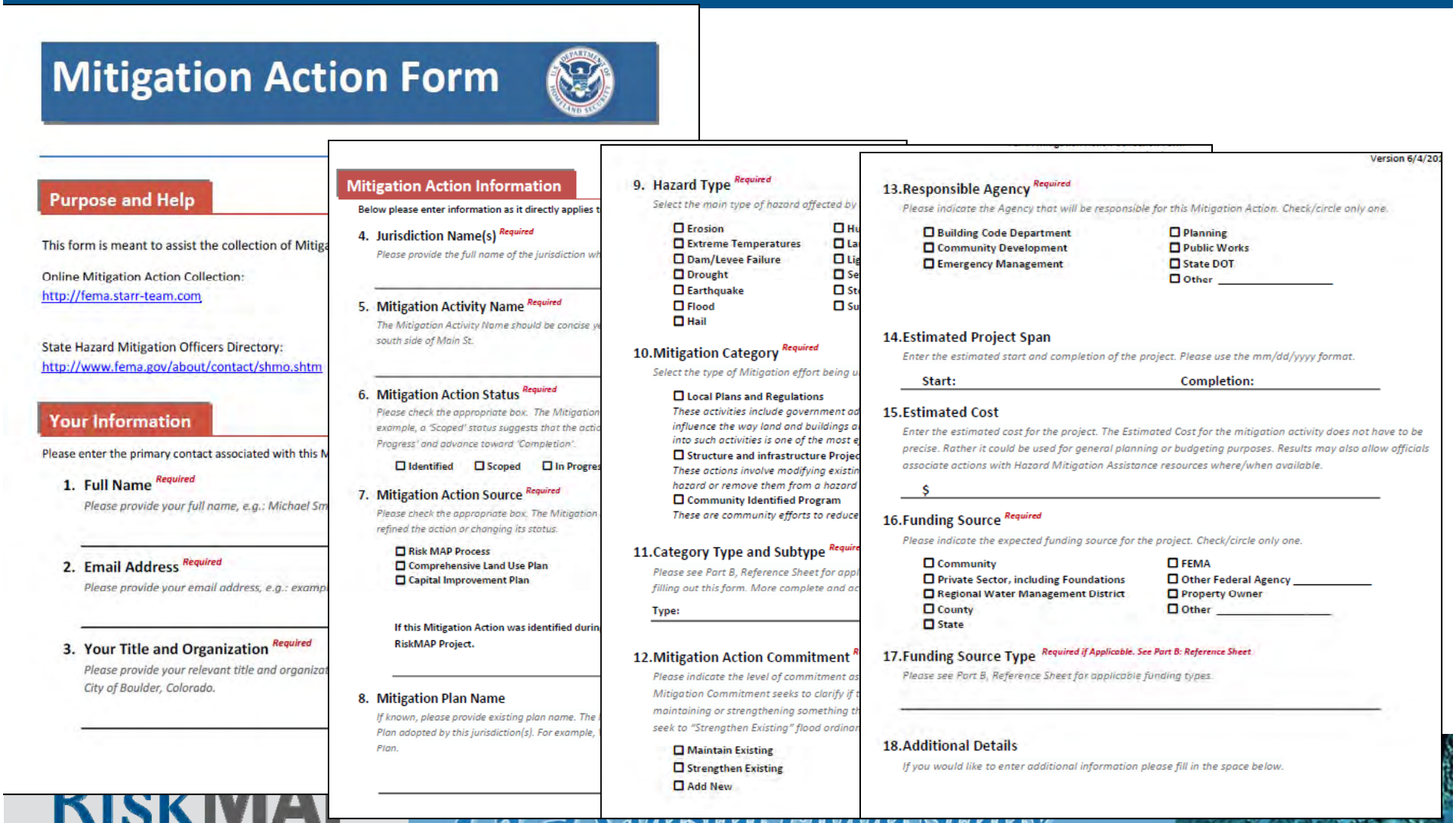
Meet the Action Form



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Interactive Session B

- Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form

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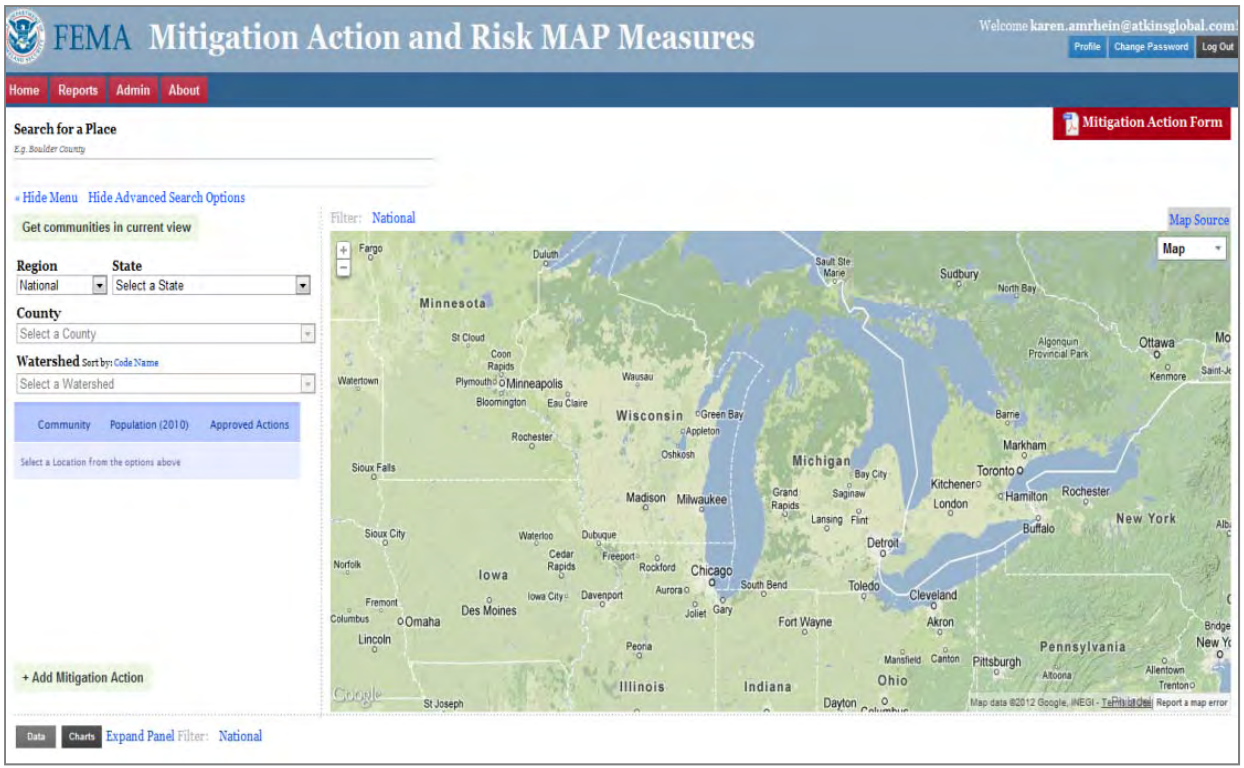
Action Tracker



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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Results from Interactive Sessions

- **Review and Clarify Communication, Planning, and Compliance Needs**
  - Local coastal areas of concern
  - Existing local coastal data
  - Mitigation Action opportunities
  - Mitigation Action form
  - Action Tracker

Next Steps

- **Communities:**
  - Provide data and Mitigation Action Forms to STARR with a target date of September 14, 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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Optional Interactive Stations

- **Draft Transect Map Station**
  - View draft transect locations and oblique imagery in data viewer
  - 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

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Contact

- FEMA Region V
  - Ken Hinterlong @ ken.hinterlong@fema.dhs.gov
  - Erin Maloney @ erin.maloney@fema.dhs.gov
- Michigan Partners
  - Les Thomas@ Thomasl@michigan.gov
- STARR
  - Brian Caufield (technical) @ caufieldba@cdmsmith.com
  - Jaspreet Randhawa (outreach) @ randhawajg@cdmsmith.com
- Online
  - info@greatlakescoast.org

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MACOMB COUNTY
Eastpointe
Roseville
Gratiot Ave
S Gratiot Ave
N Gratiot Ave
Kelly Rd
Harper Ave
Jefferson Ave
Little Mack Ave
Greater Mack Ave
Mack Ave
Metro Pkwy
Harrison Township
Chesterfield
New Haven
New Baltimore
Groesbeck Hwy
Romeo Plank Rd
North Ave
Castle Ave
Sylvia St
Baker Rd
Pine St
ST. CLAIR COUNTY
Lake St Clair
Anchor Bay
Critical lift facility


WAYNE COUNTY
MACOMB COUNTY
Eastpointe
Roseville
Gratiot Ave
S Gratiot Ave
N Gratiot Ave
Harper Ave
Kelly Rd
Pallister St
Greater Mack Ave
Harrison Township
Chesterfield
New Baltimore
Jefferson Ave
Anchor Bay
ST. CLAIR COUNTY
Critical lift facility

ATTACHMENT F

MACOMB COUNTY HAZARD MITIGATION GRANT PROGRAM PROJECTS

HAZARD MITIGATION GRANT PROGRAM (HMGP) PROJECTS
Macomb County, MI
As of July 2012

Disaster Number	Declaration Date	Incident Type	Disaster Title	Project Type	Project Description	Project Counties	Status
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	5% set aside project; Installation of decoder and receiver electronics in community emergency service provider dispatch facilities and encoder/decoder supported by receiver/transmitter electronics to facilitate activation of the Emergency Warning System in Macomb County consistent with the Southeast Michigan Area Emergency Warning System Plan. Project will affect over 750,000 citizens.	MACOMB	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	100.1: Public Awareness and Education (Brochures, Workshops, Videos, etc.)	mass mailing to all Macomb county addresses of information specific to warning system used in Macomb county jurisdictions, how end users may access mitigation information that will support protection of life, safety, property and the environment during severe weather. provide public with information consistent with prevention and protection methods and assistance available prior to disaster.	MACOMB	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	405.1: Other Minor Flood Control	BACKFLOW PREVENTION VALVES WILL BE INSTALLED INSIDE SHORELINE AT 10 STREET LOCATIONS. VALVES WILL BE INSTALLED IN PROTECTIVE CONCRETE CHAMBERS. BACKFLOW PREVENTERS WILL SOLVE THE PROBLEM OF NEIGHBORHOOD AND STREET FLOODING. PROJECT CANCELED AND WILL BE FUNDED BY THE ARMY CORPS OF ENGINEERS.	MACOMB	Not Approved / Denied
1226	06/24/1998	Severe Storm(s)	SEVERE STORMS	200.3: Acquisition of Public Real Property (Structures and Land) - Riverine	THIS PROJECT WILL ACQUIRE 4 STRUCTURES AND PROPERTIES IN THE CLINTON RIVER FLOODPLAIN IN CLINTON TOWNSHIP. OTHER PAGES OF INFORMATION ENTERED ACCIDENTALLY AS PROJECT 1226.0042.	MACOMB	Closed
1237	08/05/1998	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS	602.1: Other Equipment Purchase and Installation	INSTALLING LIGHTENING RODS	MACOMB	Closed
1237	08/05/1998	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS	602.1: Other Equipment Purchase and Installation	SEE PROJECT .0009 FOR DETAILS. PROJECTS .0009 AND .0010 WERE COMBINED INTO ONE OBLIGATION OF $22,500. HOWEVER, FUNDING ESTIMATES FOR THESE TWO PROJECTS SHOW RESPECTIVE SHARES OF THE OVERALL OBLIGATION.	MACOMB	Closed
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	602.1: Other Equipment Purchase and Installation	Macomb County Radio Alert Purchase	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	800.1: Miscellaneous	Streambank and road-crossing inventory study-RCOOK-05/18/2001 13:36 GMT	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	Bruce Township/Romeo Early Warning Sirens	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan) - Macomb Township	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan) - Shelby Township	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan) - Washington Township	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	401.1: Water and Sanitary Sewer System Protective Measures	Capacity Upgrade of Schmidt, Bridgewood and Murdock/Ballard Stormwater Pump Station	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine; 200.5: Acquisition of Vacant Land	Acquisition of six parcels (four with homes). This amendment is a change in scope of work from elevation to acquisition.	MACOMB	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	202.1: Elevation of Private Structures - Riverine	202.1: Elevation of Private Structures - Riverine	MACOMB	Approved
1527	06/30/2004	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING	600.1: Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	Warning Systems (as a Component of a Planned, Adopted, and Exercised Risk Reduction Plan)	MACOMB	Approved
1527	06/30/2004	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING	403.4: Stormwater Management - Detention/Retention Basins	403.4: Stormwater Management - Detention/Retention Basins	MACOMB	Withdrawn