

Discovery Report

Great Lakes Coastal Flood Study

Lake St. Clair

Basin-wide Report

Report Number 01

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FEMA

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Federal Emergency Management Agency Region V
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Preface

The Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information and tools that they can use to increase their resilience to flooding and better protect their citizens. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP has transformed traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This lake-wide Discovery Report provides users with a comprehensive and holistic understanding of the historical flood risk, existing coastal data, and current flood mitigation activities in the Lake St. Clair area. The report includes a summary of the data collected, including information that could influence flood risk decision-making, historical information, existing flood hazard data and information, and mitigation activities. County-based Discovery Reports and data can be found within the appendices of this lake-wide report.

This Discovery Report summaries FEMA's intent to proceed with a Risk MAP coastal flood study project based on the data available, data collected, and analysis performed to date.

Cover photograph: Flooding at Anchor Bay, Lake St. Clair, Michigan. Photograph taken by Carol Swinehard, Michigan Sea Grant Extension, March 28, 1986.

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Project Area Community List for Lake St. Clair

This list includes all communities within the Lake St. Clair 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 or updated FEMA Risk MAP products and datasets or FISs and FIRMs.

Macomb County, MI	St. Clair County, MI	Wayne County, MI
Macomb County	St. Clair County	Wayne County
Charter Township of Clinton	Algonac, City of	Detroit, City of
Chesterfield, Township of	Clay, Township of	Grosse Pointe Farms, City of
Harrison, Township of	Cottrellville, Township of	Grosse Pointe Park, City of
Mount Clemens, City of	East China, Township of	Grosse Pointe Shores, Village of
New Baltimore, City of	Ira, Township of	Grosse Pointe Woods, City of
St. Clair Shores, City of	Marine City, City of	Grosse Pointe, City of
	Marysville, City of	Harper Woods, City of
	Port Huron, City of	
	St. Clair, City of	
	St. Clair, Township of	

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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
GLCF	Great Lakes Coastal Flood 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

Executive Summary

The Federal Emergency Management Agency's (FEMA's) Lake St. Clair Discovery Report provides users with a comprehensive and holistic understanding of historical flood risk, existing coastal data, and current flood mitigation activities within the Lake St. Clair basin. The report also provides users with a summary of FEMA's intent to proceed with a coastal flood hazard study under FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program and the Great Lakes Coastal Flood Study (GLCFS) project.

The GLCFS is a comprehensive study of coastal flood hazards for all United States shoreline along the Great Lakes Basin, including Lake St. Clair. The study is being performed by FEMA in cooperation with the U.S. Army Corps of Engineers (USACE), the Association of State Floodplain Mangers (ASFPM), and other partners. The GLCFS project will put a wide range of data in the hands of communities along the Great Lakes including Lake St. Clair to promote long-term reduction in flood risk and enhance public safety.

Like all other Risk MAP projects, the GLCFS begins with a Discovery phase. The Discovery process for Lake St. Clair involved basin-wide extensive data collection and outreach efforts with Lake St. Clair stakeholders. The Lake St. Clair stakeholder group includes representatives from FEMA, other federal agencies, state agencies, local government, and several other technical focus groups. Data collection efforts under Discovery phase include base map data, coastal data, historic flood data, risk assessment, flood mitigation information, community plans and projects along the shoreline, and other comments based on local knowledge of flood risk. Additionally, certain useful datasets are being developed for use in this study. These datasets include oblique imagery, topography and bathymetry data, shoreline feature dataset to classify shoreline characteristics, a draft transect layout and a storm surge and wave study, all of which will feed into the coastal flood hazard analysis for Lake St. Clair.

The GLCFS for Lake St. Clair will include coastal flood hazard analysis for all communities located along the shoreline and will use the response-based computation approaches outlined in FEMA's *Draft Guidelines and Specifications for Coastal Studies along the Great Lakes, Appendix D.3 Update, May 2012*. The coastal flood hazard results will be transferred to workmaps and released to communities for review. Coastal flood risk assessment products may also be generated for identified Lake St. Clair coastal communities. These products may include Flood Risk Maps, Flood Risk Reports, Changes Since Last FIRMs, Flood Depth and Analysis Grids, and Hazus 2010 1-percent exposure, as well as some additional Great Lakes products that are under consideration.

The study may result in delineation of new Special Flood Hazard Areas (SFHAs), designation of VE Zones, and identification of Limits of Moderate Wave Action (LiMWAs) on the FIRM for the first time. Communities participating in the National Flood Insurance Program (NFIP) that will have mapped VE Zones as a result of this study

will be required to adopt floodplain management regulations that meet or exceed the minimum NFIP requirements for building in VE Zone. FEMA does not impose any additional floodplain management requirements based on the LiMWA. The LiMWA is provided to help communicate the higher risk that exists in that area compared to rest of Zone AE areas.

In addition to the identification and assessment of flood risk along the Great Lakes, the GLCFS project may provide tools and information to communities that encourage identification and implementation of mitigation actions to reduce risk. Mitigation provides a critical foundation on which to reduce loss of life and property by avoiding or lessening the impact of hazard events and it is an essential part of this coastal flood study process. As part of this Discovery process, local Hazard Mitigation Plans were reviewed to better understand existing flood risk within the Lake St. Clair communities, as well as the strategies and actions that have already been developed as part of the local planning processes to mitigate that risk. By first obtaining a better understanding of existing local risk and mitigation actions during this Discovery phase, it is FEMA's intent to begin to work with communities to identify new mitigation actions and strengthen existing actions throughout the coastal flood study. In addition, FEMA will seek to identify communities that could benefit from mitigation assistance through partnership with FEMA. To support the identification and attainment of mitigation actions, as well as local mitigation planning efforts during this coastal flood study, FEMA introduced the Mitigation Action Form and Mitigation Action Tracker to Lake St. Clair stakeholders during Discovery. The form and tracker demonstrate FEMA's effort to help track and identify local potential Areas of Mitigation Interest (AoMI) and new or improved mitigation actions that seek to reduce risk.

FEMA will continue to coordinate and communicate as future developments in the Lake St. Clair coastal flood study process occur. The GLCFS website http://www.greatlakescoast.org is an excellent resource where stakeholders can obtain up-to-date information about the status of this study, data collection, upcoming meetings, new technical reports, the latest methodologies, factsheets, and much more. FEMA encourages stakeholders to remain involved and will seek to identify partnership opportunities during the study.

I. Introduction

Lake St. Clair is a fresh-water lake that lies between the Province of Ontario and the State of Michigan. The Lake has approximately 430 square miles of water and is part of the Great Lakes System. It is a shallow Lake, averaging 10 feet deep, with a maximum depth of just over 21 feet. It is the smallest lake in the Great Lakes system (U.S. Army Corps of Engineers, 2004).

Historically, Lake St. Clair flooding is generally not the result of a single storm event, but rather it is the result of a series of contributing factors, such as wind speed and lake water level. In addition, the general desire to live along the Lake St. Clair shoreline has concentrated development and consequently increased potential flooding damage.

The most damaging flooding occurred along the Lake St. Clair coast in 1973, 1985, and 1986. 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 around the Lake. Much of the damage along Lake St. Clair shorelines has been caused by water flowing through gaps in dikes built under USACE's 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. Figure 1 provides an example of flooding that occurred at Anchor Bay on March 28, 1986.



Figure 1. Flooding at Anchor Bay, Lake St. Clair, MI
Photograph taken by: Carol Swinehard, Michigan Sea Grant Extension
March 28, 1986

The intent of this report is to provide users with a comprehensive and holistic understanding of historical coastal flood risk, existing coastal data, and current activities underway to mitigate coastal flood risk within the Lake St. Clair basin. In other words, this report can help users discover the current and historic state of the Lake St. Clair basin as it relates to coastal flood risk and mitigation activities. This report includes a summary of data collected from Lake St. Clair stakeholders throughout the discovery process, as well as a compilation of Lake St. Clair long-term issues and trends as it relates coastal flooding. This report also provides users with information about the intent to move forward with a new coastal flood risk study along the Lake St. Clair shoreline as part of the Great Lakes Coastal Flood Study (GLCFS) initiative. An updated coastal flood study is needed to obtain a better estimate of coastal flood hazards on Lake St. Clair.

The subsection below outlines the Federal Emergency Management Agency (FEMA) program, Risk Mapping, Assessment, and Planning (Risk MAP), under which the new coastal flood study will be performed.

i. Risk MAP Introduction

Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program that provides communities with flood information and tools they can use to enhance their mitigation plans and better protect their citizens against flood hazards. Through more accurate flood maps, risk assessment tools, and outreach support, Risk MAP strengthens local ability to make informed decisions about reducing flood risk.

Through collaboration with State, local, and tribal entities, Risk MAP will deliver quality data that increases public awareness and leads to action that reduces risk to life and property. FEMA intends to collaborate with Federal, State, and local stakeholders to achieve the following goals:



- Address gaps in flood hazard data to form a solid foundation for risk assessment and floodplain management.
- Ensure that a measurable increase of the public's awareness and understanding of risk results in a measurable reduction of current and future vulnerability.
- Lead and support States, local, and tribal communities to effectively engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from natural hazards.
- Provide an enhanced digital platform that improves management of Risk MAP, stores information produced by Risk MAP, and improves communication and sharing of risk data and related products to all levels of government and the public.
- Align programs and develop synergies to enhance decision-making capabilities through effective risk communication and management.

ii. Great Lakes Coastal Flood Study

Through the Risk MAP program and in cooperation with the U.S. Army Corps of Engineers (USACE), the Association of State Floodplain Managers (ASFPM), and other partners, FEMA has initiated a comprehensive study of flood hazard for all the United States shoreline along the Great Lakes Basin, including Lake St. Clair. Figure 2 provides an overview of the Great Lakes Basin. Throughout a Risk MAP project lifecycle, FEMA provides information to enhance local mitigation plans, improve community outreach, and increase local resilience to floods.



Figure 2. Great Lakes Basin Overview

The updated coastal flood study is intended to obtain a better estimate of coastal flood risk on the Great Lakes, including Lake St. Clair. Current, effective Flood Insurance Rate Maps (FIRMs) may be outdated primarily due to the age of data and the coastal methodologies used to produce them. Major changes in National Flood Insurance Program (NFIP) policies and methodologies have been implemented since the effective date of many Flood Insurance Studies (FISs) in the area, creating the need for an update that will reflect a more detailed and complete flood risk determination.

The GLCFS is a multi-year project that will accomplish the following:

- Provide storm-induced flood elevations based on surge and wave modeling and storm sampling from recorded data for water level, meteorological, and ice field conditions.
- Deliver updated flood maps and flood risk products in identified communities.
- Provide oblique photos, high-resolution bathymetry[1], geospatial inventory of coastal land features and structures, and other coastal data to advance local, State, and Federal capability in public safety, hazard mitigation, and asset management initiatives.
- Enhance local planning processes.

[1] Bathymetry is the measurement of the depth of bodies of water, including lakes or oceans

FEMA manages the NFIP, which is the cornerstone of the national strategy for preparing communities for flood-related disasters. Emulating the NFIP and the Risk MAP program, the GLCFS will include a system-wide solution that provides a comprehensive analysis of storm and high-water events within the Great Lakes Basin. FEMA, along with USACE, ASFPM, State partners, and FEMA contractors, will collaborate to update the coastal methodology and flood maps and to create new flood risk products defined by FEMA's Risk MAP program.

The 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. The new coastal flood hazard analyses will utilize updated 1-percent-annual-chance (100-year) flood elevations obtained from the comprehensive storm surge study being developed by the USACE

Each Risk MAP project, including the GLCFS, begins with a Discovery phase, which is the intent of this report. Section II of this report provides a Discovery overview.

II. Discovery Overview

Prior to moving forward with a Risk MAP project, FEMA conducts a process called Discovery. During the Discovery phase, FEMA:

- Gathers information about local flood risk.
- Reviews mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities.
- Supports communities within the project 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 a Discovery Map and Report that summarizes and displays the Discovery findings.

The Discovery process involves coordination with stakeholders at all levels, data collection and analysis, conducting community interviews, a Discovery Meeting with stakeholders or those expected to be affected by the study, and developing potential recommendations that may modify the scope of the Risk MAP project based on an analysis of data and information gathered throughout the Discovery process. Figure 3 provides an overview of the coastal Discovery Process.

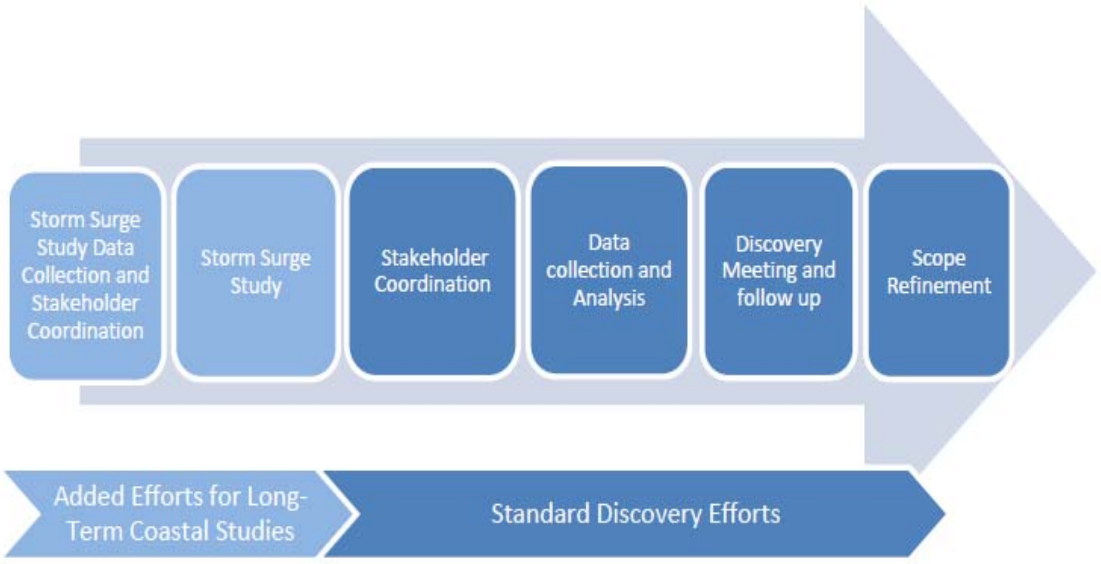


Figure 3. Discovery Process Overview

i. Purpose of Lake St. Clair Discovery

The purpose of the Lake St. Clair Discovery process and of this report is to perform basin-wide data collection and outreach efforts that lead to an informed assessment of lake-wide issues and long-term trends, which in turn will contribute towards the new coastal analysis, risk assessment, and mitigation strategy being developed for the current and potential future Lake St. Clair Risk MAP projects.

This report focuses on the Discovery efforts for Lake St. Clair coastal communities within Macomb, St. Clair, and Wayne Counties in Michigan. Figure 4 shows the counties included in the Lake St. Clair basin-wide project area, highlighted in orange.

The Lake St. Clair Discovery process will also help FEMA to better identify the types of datasets and 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 this Lake St. Clair flood study include updated FIRMs and FIS, coastal flood risk products, calibrated models for storm surge and wave analysis, and accurate depictions of water level and wave response of the lake occurring during hundreds of actual events. The type of product a community will receive during a Risk MAP study depends not only on the coastal flood study analysis results, but also on the type of data (local or national) that is available and the funding available in future years.



Figure 4. Lake St. Clair basin-wide project area

The Lake St. Clair Discovery process included tabular and spatial data collection, information exchange between governmental levels of stakeholders, cooperative discussion with stakeholders to better understand the Lake St. Clair area, and a collaborative approach on the project planning. This process has 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 Lake St. Clair flooding.

The results of this Discovery process and the next steps for the Lake St. Clair coastal flood study project are discussed in the remaining sections of this report.

III. Stakeholder Communication and Coordination

Communication and coordination with Federal, State, and local stakeholders are key to the success of the GLCFS. Much 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. The outreach goals are 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.

Throughout this GLCFS process, FEMA will seek to identify partnerships with stakeholders. By coordinating with stakeholders to identify local flood risk, data, and mitigation needs, FEMA can better understand types of flood risk products that may be beneficial to communities as they seek to further protect and inform their citizens against flood risk. Additional information about the coastal flood risk products that may be available to communities as a result of this study can be found in the county-based individual Discovery Reports under the "Coastal Flood Risk Products" section in Appendices C (Macomb County), D (St. Clair County), and E (Wayne County) of this report.

i. Lake St. Clair Stakeholder Coordination for Discovery

Meetings, webinars, 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, the Lake St. Clair Discovery Risk MAP Project Team [FEMA and Strategic Alliance for Risk Reduction (STARR)] identified a group of core stakeholders, including representatives from FEMA Region V, as well as ASFPM, USACE, National Oceanic and Atmospheric Administration (NOAA), 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 efforts with local stakeholder were initiated. A list of stakeholders within the project area covered by this Discovery Report (Lake St. Clair) has been established as part of Discovery and is included in Appendix A. This list includes the community elected officials (CEOs), floodplain administrators, planners, engineers, emergency managers, community leaders, regional planning agencies, coastal organizations, Great Lakes organizations, other federal agencies, and other key stakeholders. FEMA and STARR will continuously update this list throughout the life of this project.

Representatives from the local governments-including cities, townships, and villages- are considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of the project area.

Three Discovery Meetings were held for the Lake St. Clair project area. Discovery Meeting invitations were sent to local stakeholders within the Lake St. Clair Coastal Flood Study project area in Macomb, St. Clair, and Wayne County. In addition, an email invitation was sent to a larger list of stakeholders including, but not limited to, the core stakeholder group, other federal agencies, universities, watershed groups, Great Lakes associations, technical stakeholders, and emergency management agencies.

The Discovery Meeting letter invitations included a Coastal Data Request Form, which can be found in Appendix B following this report. The form requested communities 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. The Coastal Data Request Form listed requests for information and data, including:

- Base map data
- Coastal data
- Historic flood data
- Risk assessment
- Flood mitigation information
- Community plans and projects
- Other comments/concerns based on local knowledge

The individual Discovery Reports (one for each Discovery Meeting) are included in Appendix C (Macomb County), Appendix D (St. Clair County), and Appendix E (Wayne County) of this basin-wide report. A summary of the data and information collected via the completed Coastal Data Request Forms can be found in Section V, Summary of Data, of this report and can also be found in Attachment A of the individual Discovery Reports referenced above.

In addition to the hard copy letter invitations, and in order to improve the communication and data sharing leading up to the Discovery Meetings, FEMA offered local communities an opportunity to attend pre-Discovery Meeting conference calls, also termed “Information Exchange Sessions”. The Information Exchange 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 sessions were held to initiate the process of learning about local data availability and critical issues for the communities, and to review the Coastal Data Request Form. Copies of the presentations from the Information Exchange Session conference calls can be found in Attachment B of the individual Discovery Reports (Appendices C, D, and E).

The Discovery Meetings are discussed in greater detail in the next section of this report.

IV. Lake St. Clair Discovery Meetings

The Discovery Meetings for Lake St. Clair coastal communities and stakeholders were held on the following dates:

- Macomb County: Monday, August 20, 2012, 2-4pm EDT in Clinton Township, Michigan
- St. Clair County: Monday, August 20, 2012, 8:30-11:30am EDT in Goodells, Michigan
- Wayne County: Tuesday, August 21, 2012, 2-4pm EDT in Grosse Pointe Park, Michigan

Communities and stakeholders potentially affected by Lake St. Clair coastal flooding were invited to the Discovery Meetings. Figure 5 shows the meeting locations.

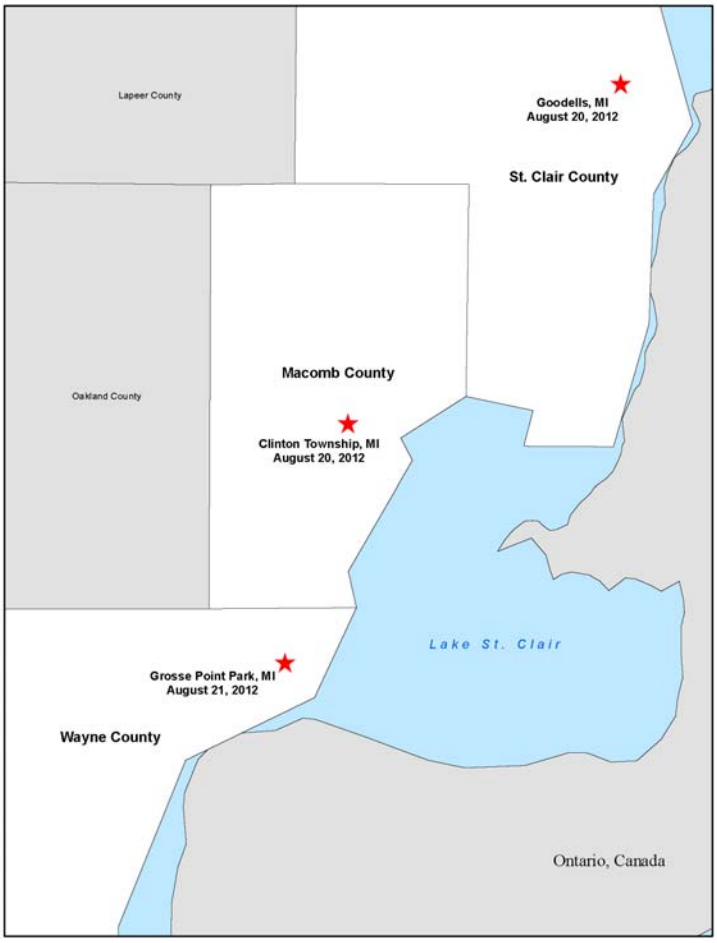


Figure 5. Lake St. Clair Discovery Meeting Locations

Below is a summary of the stakeholders in attendance, excluding FEMA, STARR, and State meeting facilitators:

- Attendees included, but were not limited to, planners, engineers, Geographic Information Systems (GIS) Specialists, natural hazard program specialists, educators, building inspectors, and conservation agents.
- Out of the 23 coastal communities included in this study area, seven (7) were represented at one (1) of the three (3) Discovery Meetings. A total of 14 community officials attended, including multiple representatives from a single community in some cases.
- There were 28 total attendees at the three Discovery meetings.
- In total, the meetings were represented by 39 percent community officials, 21 percent county officials, 11 percent local engineering firms, 8 percent State officials, 7 percent academic community, 7 percent community members and associations, and 7 percent from the Air National Guard.

Sign-in sheets for each meeting can be found within the individual Discovery Reports found in Appendices C (Macomb County), D (St. Clair County), and E (Wayne County). All stakeholders listed in Appendix A, Lake St. Clair Stakeholder List, were invited to attend these Discovery Meetings either via email or hard copy letter. Copies of the hard copy invitations, along with local community official contact lists, can be found in within the individual Discovery Reports in Appendices C, D, and E.

The objectives of the Discovery Meetings included:

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

The Discovery Meeting presentations included the following information:

- An overview of the GLCFS and schedule
- Review of the Discovery process and outcomes
- Discussion of coastal mapping and flood risk topics 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

Draft Discovery Maps (found in Attachments within individual Discovery Reports in Appendices C, D, and E) were displayed and utilized during the meetings to encourage discussion regarding areas of coastal flood risk concern and Areas of Mitigation Interest (AoMI). The draft Discovery Maps shown at the meetings included geospatial and tabular data that had been collected prior to the meetings, such as:



Geospatial Data:

- Average Annualized Loss (AAL) data
- Coastal Barrier Resources System (CBRS)[2]
- Coastal structures
- Coordinated Needs Management Strategy (CNMS)[3] Data (riverine only)
- Dams
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Proposed transects locations
- 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 material)

Participants at each of the Discovery Meetings were asked to cooperatively identify areas of concern related to hazards and Areas of Mitigation Interest (AoMIs) within the Lake St.

[2] 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.

[3] 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 draft Discovery Maps (Attachment C within Appendices C, D, and E) and through general discussion during the meetings.

In addition to the draft Discovery Maps, figures showing the location of initially proposed transects around Lake St. Clair were presented during the Discovery Meetings. Transects are profiles along which coastal flooding analysis is performed. They are used to transform offshore conditions to the shoreline and to define coastal flood risks inland of the shoreline. Transects are placed to define representative profiles for a shoreline reach. Stakeholders were encouraged to review the proposed transects and provide comments related to the location and orientation of transects. The proposed transect maps that were available at the Discovery Meetings can be found in Attachment D of the individual Discovery Reports located in Appendices C, D, and E. A sample map of the proposed transect layout presented at the Discovery Meetings is in Figure 6. Users should note that transects have since been revised and should refer to the updated proposed transect locations found on the Final Discovery Maps (Appendix F).

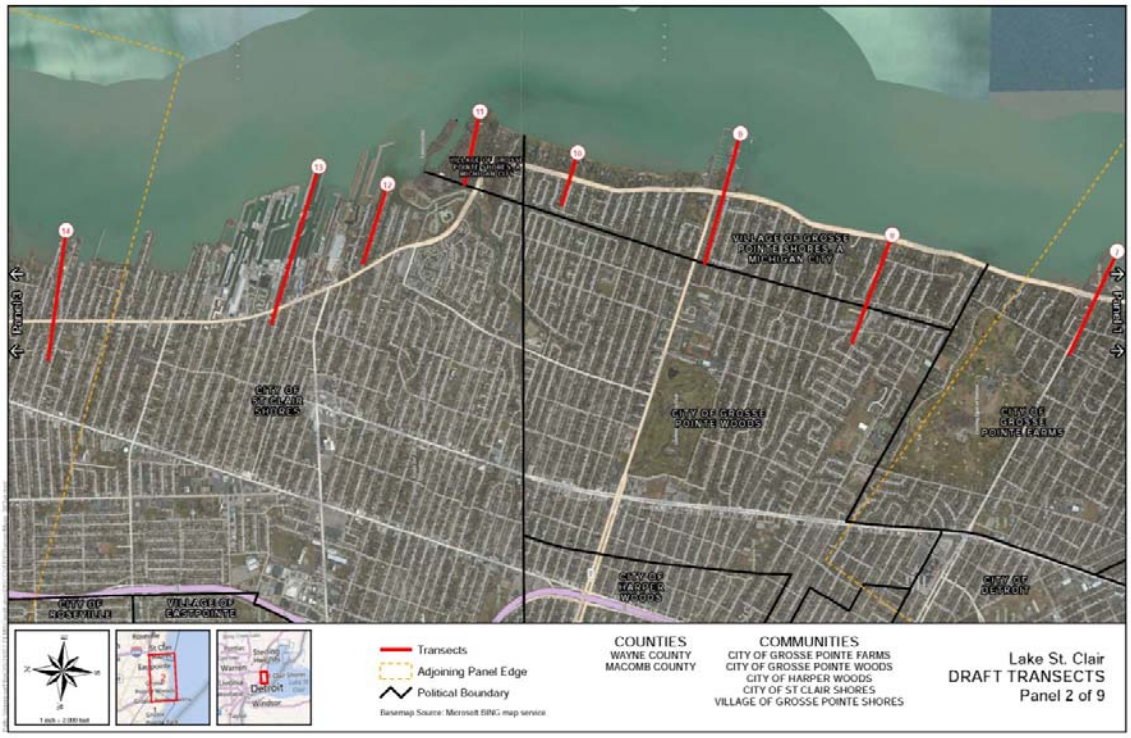


Figure 6. Sample Proposed Transect Figure (from Discovery Meeting)

All comments that were provided during the meetings on the draft Discovery Maps 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 Maps in Appendix F. A list of each comment collected for all Lake St. Clair counties is listed below, along with a map identification

number (if one exists), which correlates to its location on the Final Discovery Maps (Appendix F).

In Table 1 and on the Final Discovery Maps, the identification of a comment (ID) categorized as a "Stakeholder General Comment" is represented by using the 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).

A summary and analysis of the comments collected during each Discovery Meeting can be found in the individual Discovery Reports for Macomb County, St. Clair County, and Wayne County, located in Appendix C, D, and E, respectively, of this report.

Table 1. Stakeholder General Comments and Transect Comments Collected During Discovery Meetings

ID (See Final Discovery Map)	County	Location of Comment	FIPS	CID	Stakeholder Comment
MAC-1	Macomb	Township of Harrison	26099	N/A	To be developed
MAC-2, MAC-TR-1, and MAC-TR-2	Macomb	Township of Harrison	26099	260123	User indicated suggested transect location; sloping rock wall; to be developed
MAC-3	Macomb	City of St. Clair Shores	26099	260127	User indicated suggested transect location; Critical lift facility - Critical Facility
WAY-4	Wayne	City of Detroit	26163	260222	Water Works Park - Critical Facility; Transect suggested at Water Works Park along Detroit River
WAY-TR-4	Wayne	Belle Isle, City of Detroit	26163	260222	Transect suggested for the eastern tip of Belle Isle
N/A	All	Macomb, St. Clair, and Wayne Counties	26099, 26147, 26163	N/A	Requested the effective transect locations be used for Lake St Clair

FIPS = Federal Information Processing Standards
CID = Community Identification Number

Discovery Meeting documents, including meeting minutes, sign in sheets, presentations, coastal data request forms, and correspondence documentation, have been included in the attachments for each individual Discovery Report found in Appendices C (Macomb County), D (St. Clair County), and E (Wayne County).

Following the Discovery Meetings and prior to the issuance of this Final Discovery Report, Great Lakes stakeholders were provided with an opportunity to review a draft Lake St. Clair Discovery Report. The 45-day review period ended on November 30, 2012. No

comments related to this Discovery Report were received during that review period. Questions received from stakeholders that related to the upcoming GLCFS projects and upcoming coastal analyses were resolved on an individual basis or could not yet be resolved due to the nature of the question and the current status of the coastal flood study projects. Those questions will be revisited as the new coastal flood study progresses.

The next section summarizes the data and information collected for Lake St. Clair during this Discovery process.

V. Summary of Data

This section summarizes the data and information collected for Lake St. Clair during this Discovery process. A massive effort of collecting tabular and spatial data was conducted for all the coastal communities from Federal, State, and local sources. In addition, information was collected through phone conversations, information exchange session conference calls, the Discovery Meetings, and the Discovery Coastal Data Request forms sent to each coastal community. Table 2 is a comprehensive list of all the types of data that were collected for this Lake St. Clair study area.

Table 2. Data Collected for Lake St. Clair Discovery

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Average Annualized Loss Data (AAL)	Discovery Map/Tabular Data	Federal Emergency Management Agency (FEMA)	June 2012	Nationwide
Bathymetry and Topography	Discovery Report	USACE	2012	Lakewide
Census Blocks	Discovery Map/Tabular Data	U.S. Census Bureau	June 2012	Countywide
Coastal Data Request Form	Discovery Report/Tabular Data	Community and County Stakeholders	July 2012	Countywide
Contacts	Discovery Report/Tabular Data	Local Community Websites, State/FEMA updates	June 2012	Countywide
Community Assistance Visits (CAVs)	Discovery Report/Tabular Data	FEMA Community Information System (CIS)	July 2012	Countywide
Community Rating System (CRS)	Discovery Report/Tabular Data	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

Table 2. Data Collected for Lake St. Clair Discovery

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Coastal Structures	Discovery Map/Tabular Data	U.S. Army Corps of Engineers (USACE)	August 2012	Nationwide
Coordinated Needs Management Strategy (CNMS) – riverine only	Discovery Map	FEMA	July 2012	Countywide
Critically Eroded Beach Areas	None Identified	None Identified	N/A	Countywide
Critical Facilities	Discovery Report/Discovery Map	Local Mitigation Plan, Discovery Meeting	July 2012	Countywide
Dams	Discovery Map/Tabular Data	USACE, National Inventory of Dams, Flood Insurance Rate Map (FIRM) Database	July 2012	Countywide
Declared Disasters	Discovery Report/Tabular Data	FEMA's "Disaster Declarations Summary"	June 2012	Nationwide
Demographics, Industry	Discovery Report/Tabular Data	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/Tabular Data	FEMA CIS	July 2012	Nationwide
Hazard Mitigation Plans and Status	Discovery Report/Tabular Data	Local Mitigation Plans	July 2012	Countywide
Hazard Mitigation Assistance Program Grants Received	Discovery Report/Tabular Data	FEMA's "Hazard Mitigation Program Summary" Community Input	June 2012	Nationwide
Hazard Mitigation Projects	Discovery Report/Tabular Data	Local Mitigation Plans	July 2012	Countywide
High Water Marks	Discovery Report, Tabular Data	Effective Flood Insurance Study (FIS)	August 2012	Countywide
Historical Flooding & Storm Events	Discovery Report	Effective Flood Insurance Study (FIS), Local Mitigation Plans	July 2012	Countywide
Individual/Public Assistance	Discovery Report/Tabular Data	FEMA's "Public Assistance Sub-grantee Summary"	June 2012	Nationwide
Letters of Map Change (LOMCs)	Discovery Map/Tabular Data	FEMA's Mapping Information Platform	July 2012	Countywide

Table 2. Data Collected for Lake St. Clair Discovery

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Meteorological Gages	Discovery Map/Tabular Data	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/Tabular Data	FEMA CIS	July 2012	Countywide
Repetitive Loss	Discovery Report/Tabular Data	FEMA CIS	July 2012	Countywide
Shoreline Classification	Discovery Map/Tabular Data	USACE	July 2012	Regionwide
Stream Gages	Discovery Map/Tabular Data	USGS	July 2012	Countywide
Water Level Gages	Discovery Map/Tabular Data	NOAA Department of Fisheries and Oceans	July 2012	Regionwide
Wave Gages	Discovery Map/Tabular Data	NOAA	July 2012	Regionwide

Information and data collected for each county along Lake St. Clair was compiled into individual Discovery Reports and can be found in Appendices C (Macomb County), D (St. Clair County), and E (Wayne County) of this report. The data in the individual reports is divided into two sections: one section contains the data that can be used for Risk MAP products and the other section contains the information that helped the study team form a better understanding of the Lake St. Clair project area prior to moving forward with the GLCFS projects.

A list of local data and information collected from local stakeholders as part of this Discovery process through the Coastal Data Request Form (Appendix B) has been summarized for Lake St. Clair in Table 3.

Table 3. Lake St. Clair Local Data Collection
Base Map Data, Coastal Data, Other Data, and Historical Flood Data

			BASE MAP DATA		COASTAL DATA							OTHER DATA					HISTORICAL FLOOD DATA
Community, County or State Organization	County	State	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:
Charter Township of Clinton	Macomb	MI															No
Macomb County Office of Emergency Management	Macomb	MI	Digital	Digital													No
Southeast Michigan Council of Governments (SEMCOG)	SEMCOG	MI	LiDAR & Contour data	Building footprints													
City of Grosse Pointe Woods	Wayne	MI															No
City of Harper Woods	Wayne	MI	Available through Wayne County	Available through Wayne County													No

Table 3. Lake St. Clair Local Data Collection
Risk Assessment and Flood Mitigation Information

			RISK ASSESSMENT		FLOOD MITIGATION INFORMATION											
Community, County or State Organization	**County**	**State**	**Does your community have HAZUS-based loss estimates from average annualized loss?**	**Does your community have other risk assessment data?**	**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?**
Charter Township of Clinton	Macomb	MI	No	No?	Yes - in review	No	No	No	No	No	Yes - Non-coastal	No	No	No	Medium
Macomb County Office of Emergency Management	Macomb	MI	No	Yes - Macomb County Hazardous Mitigation Plan, 2010-2015	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. The reclaimed property was turned into a flood plain/non-buildable area.	No - Public Assistance was granted to Macomb County and local jurisdictions for the following presidential declared disasters: 2004/Flood; 1986/Flood; 1975/Flood; 1972/Flood; 2003/Electrical Failure; 1999/Blizzard; 1998/High Winds; 1997/Tornado; 1976/Tornado.	Yes - 2001 Patnick Drive Mitigation Project #A12346.50 [Removal of 5 structures from a known flood plain, returning that land to flood plain].	High
Southeast Michigan Council of Governments (SEMCOG)	SEMCOG	MI													
City of Grosse Pointe Woods	Wayne	MI	No	No	No	No	No	No	No	No	No				Low
City of Harper Woods	Wayne	MI	No		No	No	No	No	No	No	No	No	No	No	Low

Table 3. Lake St. Clair Local Data Collection
Community Plans and Projects and Other GIS Data

			COMMUNITY PLANS AND PROJECTS							GIS DATA
Community, County or State Organization	**County**	**State**	**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	No	No	No	Yes - Floodplain Ordinance along with daily review of building permit applications as it relates to the floodplain.	No	No		
Macomb County Office of Emergency Management	Macomb	MI	No	No	No	Yes - EPA Phase II Watershed Management Groups; Open Space	No	No		
Southeast Michigan Council of Governments (SEMCOG)	SEMCOG	MI							SEMCOG can also provide generalized master planning data	LiDAR, Contours, and 2010 building footprints available for counties within SEMCOG
City of Grosse Pointe Woods	Wayne	MI	Yes - Our community does have a Comprehensive Plan. No - Our community's Hazard Mitigation Plan was not coordinated with the Comprehensive Plan.	No	No	Yes - Our community has planning staff and/or planning/zoning commission and other measures, such as ordinances, administrative plans, and/or other programs contributing to effective administration of floodplain zoning, building codes, open space preservation, and coastal zone management.	No	No		
City of Harper Woods	Wayne	MI	No	No	No	No	No	No		

As the Risk MAP project for Lake St. Clair advances, FEMA will continue to work with local officials to determine partnerships that may be achieved based on local community or county-based data that has been identified as already available through this Discovery process. Available datasets may be used to create certain flood risk products or may be used to help initiate mitigation projects on a community-to-community basis. It will be important for study teams to refer to this list of available local data as the study moves forward.

i. New data for Lake St. Clair

In addition to data collected from local, state, and federal sources, several new datasets were developed specifically as part of the overall GLCFS effort, and include the Lake St. Clair project area. These datasets are summarized in the sections below:

I.V.i.1 Oblique Imagery

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/.

I.V.i.2 Topography and Bathymetry

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 percent 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 centimeters (RMSE[4]) in flat terrain and within +/-30 centimeters (RMSE[3]) in hilly terrain. Horizontal positions will be accurate to +/- 1.5m (RMSE). Data will be processed to 2-ft contours.

During Discovery outreach efforts, Lake St. Clair stakeholders raised concerns that phragmites, wetland grass that grows along the Lake St. Clair shoreline, may reduce the accuracy of the new bathymetry. The true shoreline location and depth of water may be compromised, especially in those extremely dense phragmites areas. 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 .

I.V.i.3 Shoreline Feature Dataset

The shoreline feature dataset was generated by USACE Detroit District (U.S. Army Corps of Engineers, 2012) using 2012 oblique photographs mentioned earlier in this section. The dataset captures primary and secondary 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

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

current dataset contains data at one-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection.

This dataset is shown on the Final Discovery Maps (Appendix F). The dataset (Great Lakes Shoreline Geodatabase) can also be downloaded from http://www.greatlakescoast.org/ under the "Technical Resources" section. Shoreline information specific to each county can be found in the individual Discovery Report in Appendices C, D, and E of this report.

I.V.i.4 Proposed Draft Transects

As discussed in earlier sections of this report, transects are cross-shore 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.

For Lake St. Clair, proposed draft transects were placed in advance of the Discovery Meetings and were provided to stakeholders for review and comment. The proposed draft transects were revised to incorporate comments captured throughout the Discovery process. The revised proposed draft transects can be seen on the Final Discovery Maps, located in Appendix F. These transects are subject to change based on the future coastal analysis and should not be considered final at this time.

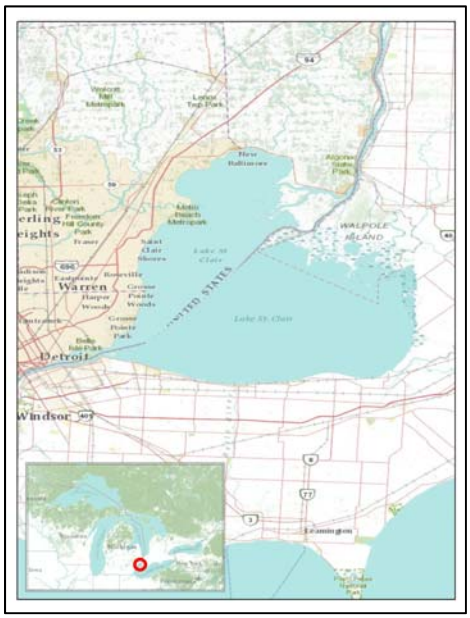
The final transect layout for a coastal hazards analysis and subsequent floodplain delineation is determined by physical factors such as changes in topography, bathymetry, shoreline orientation, and land cover data, in addition to societal factors such as variations in development and density.

I.V.i.5 Storm Surge and Wave Study

Lake level and wave climate are necessary to identify the coastal flood risks. Since there are few observations of lake levels and waves within Lake St. Clair, USACE modeled historical events (a process known as hindcasting). The hindcasted lake level and wave models are driven by wind and pressure fields on a grid defined by available bathymetric data. The resultant model outputs are available on a gridded basis within Lake St. Clair. Additional information can be found at http://www.greatlakescoast.org/ under the "Technical Resources" section.

VI. Lake-wide Issues and Long-term Trends

According to USACE's *St. Clair River and Lake St. Clair Comprehensive Management Plan*, Lake St. Clair (including St. Clair River) is a vital binational resource that provides an array of benefits to the nearly six million U.S. and Canadian residents who live in the watershed. With uses ranging from fishing, recreational boating, drinking water and commercial navigation, the lake and river are defining natural features of southeastern Michigan, as well as southwestern Ontario. They also are vital parts of the larger Great Lakes system. The lake and river are key connections between the upper and lower Great Lakes, both for commercial navigation as well as for fish and wildlife that reside or pass through the area. The St. Clair River- Lake St. Clair-Detroit River corridor is also the outlet for the three upper Great Lakes, contributing over 90 percent of the average annual water supply to Lake Erie and nearly 75 percent of the supply to Lake Ontario (U.S. Army Corps of Engineers, 2004)



The navigation channel within the Lake, which has been dredged for lake freighter passage and is maintained by the USACE, reaches a depth of approximately 27 feet. Human uses of Lake St. Clair have dramatically altered the natural processes of the system. Coastal wetlands have been drained and filled, the shoreline hardened, and a 27-foot-deep navigation channel dredged from the mouth of the St. Clair River to the head of the Detroit River. The vast majority of the watershed's original landscape has been replaced by residential, commercial, and agricultural development (U.S. Army Corps of Engineers, 2004).

Lake St. Clair is fed with fresh water flowing out of Lake Huron to its north via the St. Clair River, which has an extensive river delta. Thames River and Sydenham River flow into Lake St. Clair from Ontario, and the Clinton River flows into the Lake from Michigan. The outflow from Lake St. Clair flows from its southwestern end into the Detroit River and then into Lake Erie.

The time it takes for water to enter and leave Lake St. Clair, also known as the tarry time, averages about seven days, but this can vary from as little as two to as many as thirty days depending on the direction of the winds, the water circulation patterns, and the seasonal amount of water that is flowing out of Lake Huron. The time the water remains in the Lake is about two days if it flows through the navigation channel.

Microtopography has been formed by the dumping of excess material as a result of the dredging of the channel that extends across the lake. The Delta of the St. Clair River is the dominant feature of the Lake. This platform of deltaic deposits has been built out into the

Lake, the outer edge of which is bounded by foreset slopes extending downward from platform depths of less than one meter to greater than 3 meters depth (U.S. Army Corps of Engineers, 2004).

The subsections below detail trends and issues specific to Lake St. Clair, including water levels, historical flooding and high water marks, coastal flood protection measures, and coastal recession.

i. Water Levels

Coastal flooding along the Great Lakes is primarily the result of storm-induced surge and waves and is directly related to the long-term lake water levels. Variations in lake water levels due to decadal scale variations in precipitation and human activities affect the risk of flooding and will be taken into account during the upcoming GLCFS projects.

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 4 lists the water level stations along Lake St. Clair.

Table 4. Lake St. Clair 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.

From USACE's *St. Clair River and Lake St. Clair Comprehensive Management Plan*, water levels fluctuate significantly in Lake St. Clair due to climate variability upstream on the Lake Superior-Michigan-Huron basins and downstream on the Lake Erie watershed and short-term weather events across the region. Long-term changes in water levels on Lake St. Clair are usually the result of precipitation that is above or below average. Temperature and cloud cover are also factors (U.S. Army Corps of Engineers, 2004).

During the early 1960s, low water levels in the Great Lakes were due to several years of below-normal precipitation. In the late 1960s through early 1970s and again in the mid-1980s, heavy precipitation raised water levels to new record highs (U.S. Army Corps of Engineers, 2004).

Short-term changes in water levels on Lake St. Clair usually occur within a few days when heavy rains fall on the Thames River watershed in Ontario and the Clinton River watershed in Michigan. This also occurs when ice build-up occurs in the St. Clair and/or Detroit rivers (U.S. Army Corps of Engineers, 2004)

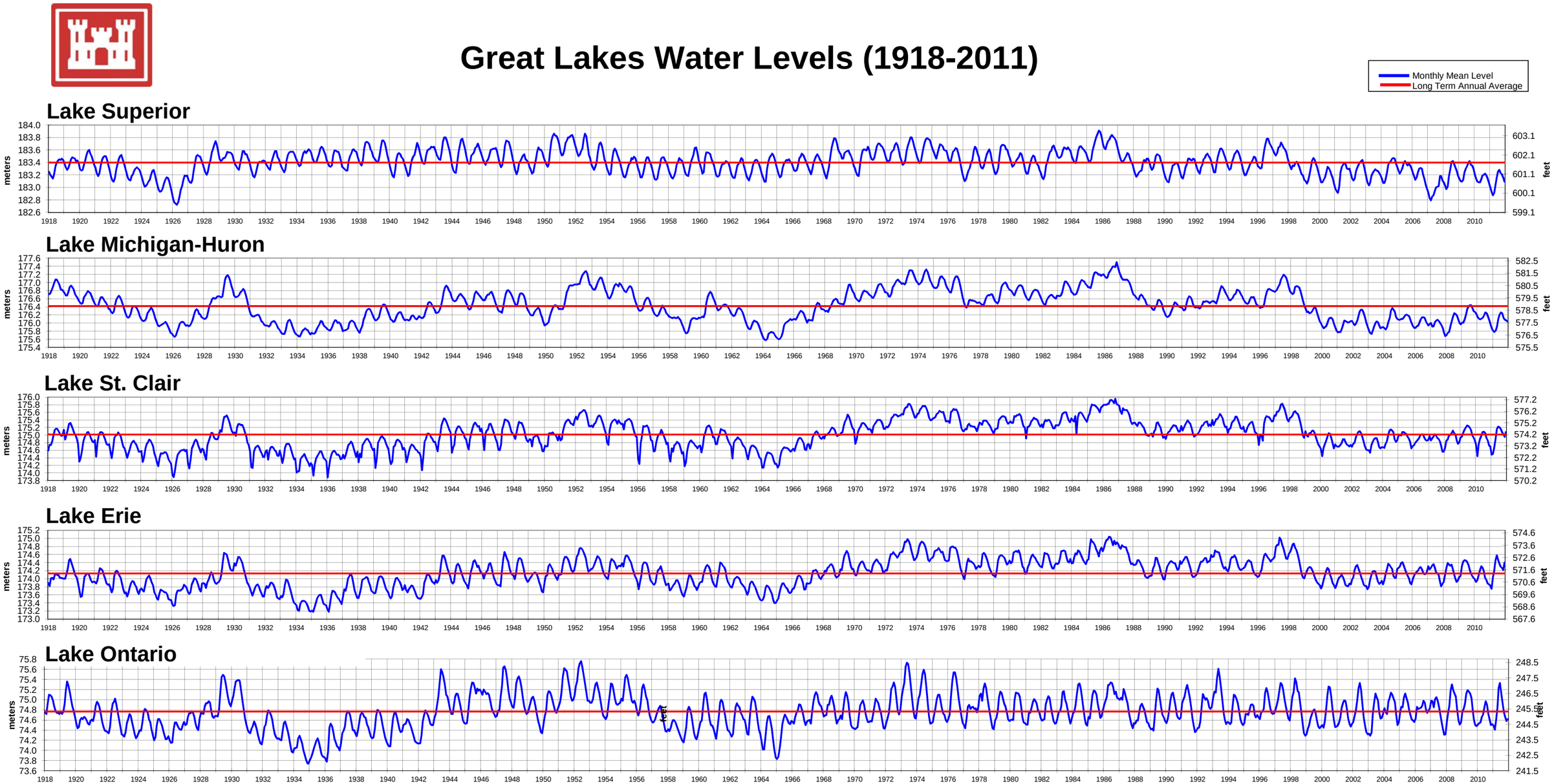
Lake levels on Lake St. Clair are also influenced by control of the Lake Superior outflows into St. Marys River at Sault Ste. Marie, Michigan and Ontario. The controls are managed by the International Joint Commission (IJC), in accordance with established criteria to minimize the extremes of levels that can occur on either Lake Superior or the combined Lake Michigan-Huron. This control does affect the magnitude and timing of flows into Lake St. Clair, though is secondary to the local climate causes (U.S. Army Corps of Engineers, 2004).

Geologic studies indicate that the upper Great Lakes have regular intervals of high and low levels. Short-term fluctuations usually occur every 30-35 years with long-term fluctuations occurring about every 150-160 years. Water levels have generally declined over the last several years. On average, the Lake's water level varies about 1.6 ft. (0.5 m) depending on the season, with low levels typically occurring in February and high levels occurring in July of each year (U.S. Army Corps of Engineers, 2004) .

The longest recorded time series for Lake St. Clair is at Windmill Point gage, and suggests a stationary lake level for the last 100 years. .

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 7 is USACE's graphic that shows Historic Great Lakes Water Levels from 1918 to 2011 (U.S. Army Corps of Engineers, 2012). Monthly mean level and long term annual water level elevations are shown in both feet and meters and are referenced to the International Great Lakes Datum (IGLD 1985).

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).

Recent developments in mathematical and computer modeling of storm winds, waves, and storm surge, combined with more extensive measurements, provide an opportunity to significantly improve the accuracy of flood risk maps along the Great Lakes (U.S. Army Corps of Engineers, October 2012). In USACE's October 2012 technical report, *Wave Height and Water Level Variability on Lake Michigan and Lake St. Clair*, the evaluation and assessment of lake levels were used as the basis for a proposed strategy for revising the flood risk maps for the Great Lakes. By evaluating long term lake levels, seasonal trends, and storm-induced changes in lake levels on Lake St. Clair, the statistical characteristics of the data was able to be analyzed in the context of computing flood risk.

To view USACE's analysis of the historical storm climatology and resulting measured waves and water levels, detailed history of water levels and wave time series, and flood map methodology proposed to seek improved accuracy to base flood elevation prediction along the Great Lakes, the October 2012 final technical report *Wave Height and Water Variability on Lakes Michigan and St. Clair* can be accessed from http://www.greatlakescoast.org/ under the "Technical Resources" section.

ii. Historical Flooding & High Water Marks

Floods are the result of a multitude of both naturally occurring and human induced factors, but can simply be defined as the accumulation of too much water in too little time in a specific area.

In the analysis of a flood event, often the high water mark is identified to determine the maximum elevation of floodwaters. If a high water mark on a tree, building, or other fixed object can be identified and measured following a flood event, the floodwater elevation and therefore the extent of flooding can be determined. Such high water mark information combined with storm data, lake level, and river stage data can be useful when modeling the extent of flooding associated with the 1-percent-annual-chance event during the upcoming coastal flood hazard studies.

Information on historical flooding and high water marks was collected during the Discovery data mining effort. Communities were also asked to provide this data through the Coastal Data Request Form and at the Discovery Meetings.

Table 5 lists the high water mark data that was identified from the effective Macomb County Flood Insurance Study (FIS) (Federal Emergency Managment Agency, 2012). Instantaneous high stillwater levels recorded at the St. Clair Shores gage for the 1973, 1985, and 1986 periods are shown. Stillwater levels reflect lake setup, but not wave run-up during a storm. No additional information on high water mark data was identified or provided during Discovery.

Table 5. High Water Marks

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

NAVD88 = North American Vertical Datum of 1988
Source: (Federal Emergency Managment Agency, 2012)

The historical flooding information provided below was compiled from effective FISs for Macomb (Federal Emergency Managment Agency, 2012), St. Clair (Federal Emergency Managment Agency, 2010), and Wayne (Federal Emergency Management Agency, 2012) counties.

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 significantly 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).

Continuous winds, blowing strongly from a southerly direction across Lake St. Clair, can create a wind setup or rise in lake level above the normal undisturbed water level along the north shore. Additionally, waves generated by these winds may induce wave run-up or a further increase in water-surface elevations above the setup level. These phenomena are of comparatively short duration and quickly subsides when the wind velocity lessens or the wind direction changes. An increase in the water-surface elevation of Lake St. Clair will be manifested by an attendant rise in the St. Clair River's stage (Federal Emergency Managment Agency, 2010).

For Lake St. Clair in Macomb County, 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 (Federal Emergency Managment Agency, 2012).

Flooding along Lake St. Clair in St. Clair County is experienced from rainstorms in the spring or early summer. The more severe flooding occurs in late winter or early spring from rainfall and/or snowmelt in conjunction with ice jams. Water-surface elevations on the Great Lakes vary from season to season and from year to year. Seasonal variations generally reach peak values during the period from May to July, then recede to a low value in the month of February (Federal Emergency Managment Agency, 2010).

Historically, the most damaging flooding has occurred along the Lake St. Clair coast in 1973 and again in 1985 and 1986 (U.S. Army Corps of Engineers, 1989). 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 around the Lake. 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 and Lake Erie. The three 1985 storms collectively caused about $4.7 million in damages in Macomb County, with 985 homes and 31 businesses reporting flood damages (Federal Emergency Managment Agency, 2012).

In Wayne County, the storms on March 31, 1985, and April 4 and 6, 1985, collectively caused about $2 million in damages, with approximately 1,300 homes reporting flood damages (U.S. Army Corps of Engineers, 1989). This included portions of the Charter Township of Brownstown; the Cities of Ecorse, Gibraltar, Grosse Pointe, and Grosse Pointe Park; the Township of Grosse Ile; and the extreme northeastern portion of the City of Detroit (Federal Emergency Management Agency, 2012).

For the portion of Wayne County that borders the Detroit River, Lake Erie, and Lake St. Clair, a combination of high lake and river levels along with easterly winds produces conditions favorable for flooding. Historically, the most damaging floods have occurred as a result of this combination. Severe flooding occurred along this shoreline in 1954, 1973, 1985, and 1986 (U.S. Army Corps of Engineers, 1989; U.S. Army Corps of Engineers, 1974). Flooding of record in the Township of Clay occurred during the period from March 15 to 19, 1973. Undisturbed water levels in Lake St. Clair were approximately 4.0 feet above low water datum at the time. Southwest winds created an additional wind setup along the northern shore of Lake St. Clair and raised both river and lake stages above overflow levels. Ponding of water was reported in houses, garages and yards in several of the residential areas. This flood had an estimated frequency of 200 years. Low lying areas along in the Township of Clay and the Township of Ira have been subject to periodic flooding caused by overflows of the St. Clair River or rises in the water levels of Lake St. Clair and the dredged waterways that are directly connected to Lake St. Clair (Federal Emergency Managment Agency, 2010).

Local stakeholders who may have historical flooding photographs and high water mark information are encouraged to submit them to the FEMA Region V Mitigation Division.

iii. Coastal Flood Protection Measures

Coastal structures and shoreline material along Lake St. Clair will be reviewed in more detail during the engineering analysis portion of the Lake St. Clair study and were not analyzed as part of this Discovery process. A summary of information collected regarding existing coastal structures, shoreline material, 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, the 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. In St. Clair County, under Operation Foresight, elevations of 580.8 feet (NAVD88) were established for lakefront dikes and 578.5 feet (NAVD88) for canal dikes. In Wayne County, these protection measures consisted of earthen dikes and sand or rock filled cribs in Charter Township of Brownstown and the Cities of Detroit, Ecorse, Gibraltar, Grosse Ile, Grosse Point, and Grosse Point Park (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)

In 1985, as part of the USACE Advance Measures initiative, additional clay dikes and sand filled cribs where constructed in the Charter Township of Brownstown (Wayne County). In response to flooding in 1985 and 1986, the City of Detroit (Wayne County) made substantial modifications to sheet piling in the vicinity of Fox Creek in the late 1980s. Numerous residential, commercial, and industrial areas along the shore have employed flood protection measures such as the filling of lower areas or the installation of sheet piling for bank stabilization and shore protection (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).

A levee exists in Wayne County along the Grosse Pointe Park Lake St. Clair shoreline. The current effective FIRMs for Wayne County, dated February 2, 2012, depict this levee as providing protection from the 1-percent-annual-chance flood event per a Provisionally Accredited Levee (PAL) agreement with FEMA. As of the date of this report, the PAL agreement has expired and thus the area designated as PAL behind the levee system, and mapped as a Zone X (shaded), is currently under review regarding the extent to which the levee provides protection from the 1-percent-annual-chance flood. Additional information on PALs can be found by visiting http://www.fema.gov/library/viewRecord.do?id=1987 . The regulatory requirements of the NFIP that apply to the evaluation and mapping of levee systems and levee-impacted areas are cited at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations. Interested parties may access Section 65.10 of the NFIP regulations through the FEMA website at http://www.fema.gov/library/viewRecord.do?id=2741 .

The USACE also maintains a large infrastructure of over 900 coastal structures in the United States. These coastal structures protect harbors and shore-based infrastructure, provide beach and shoreline stability control, provide flood protection to varying degrees, and protect coastal communities, roadways and bridges, etc. These maintained coastal structures include seawalls, bulkheads, revetments, dikes and levees, breakwaters, groins, sills/perched beaches, and jetties and piers.

The USACE coastal structure data for Lake St. Clair was extracted from the Enterprise Coastal Inventory Database (ECID) from the Engineer Research and Development Center (ERDC) through USACE. Additional information on this database can be found by visiting the website http://chl.erdc.usace.army.mil/chl.aspx?p=s&a=Projects;246.

Table 6 lists the coastal structures found within the Lake St. Clair basin that are maintained by the USACE.

Table 6. 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	4263.7	1400
Detroit	Clinton River Earth-Fill	MI	1966	Rock Rubble	1127.8	3700

As previously stated, it is important to note that these coastal structures do not necessarily protect areas from the 1-percent-annual-chance flood event. Many of these USACE coastal structures were built between 1860 and 1940 and low lake water levels since the

1990's have accelerated deterioration. The USACE recently launched 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. Please note that identified structures will be assessed in greater detail during the engineering portion of this coastal flood study and have not been assessed as part of this report.

Figure 8 shows the 2012 USACE Shoreline Feature Dataset, including identification of artificial shoreline material (which may include steel, concrete, or wood seawalls as described above), as well as the USACE Coastal Inventory within the Lake St. Clair basin.

iv. 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 (http://www.michigan.gov/deq/), 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. 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 for the Township of Fort Gratiot (part of Lake Huron study) and the City of Port Huron (St. Clair County) and can be found in Appendix G of this report. 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.

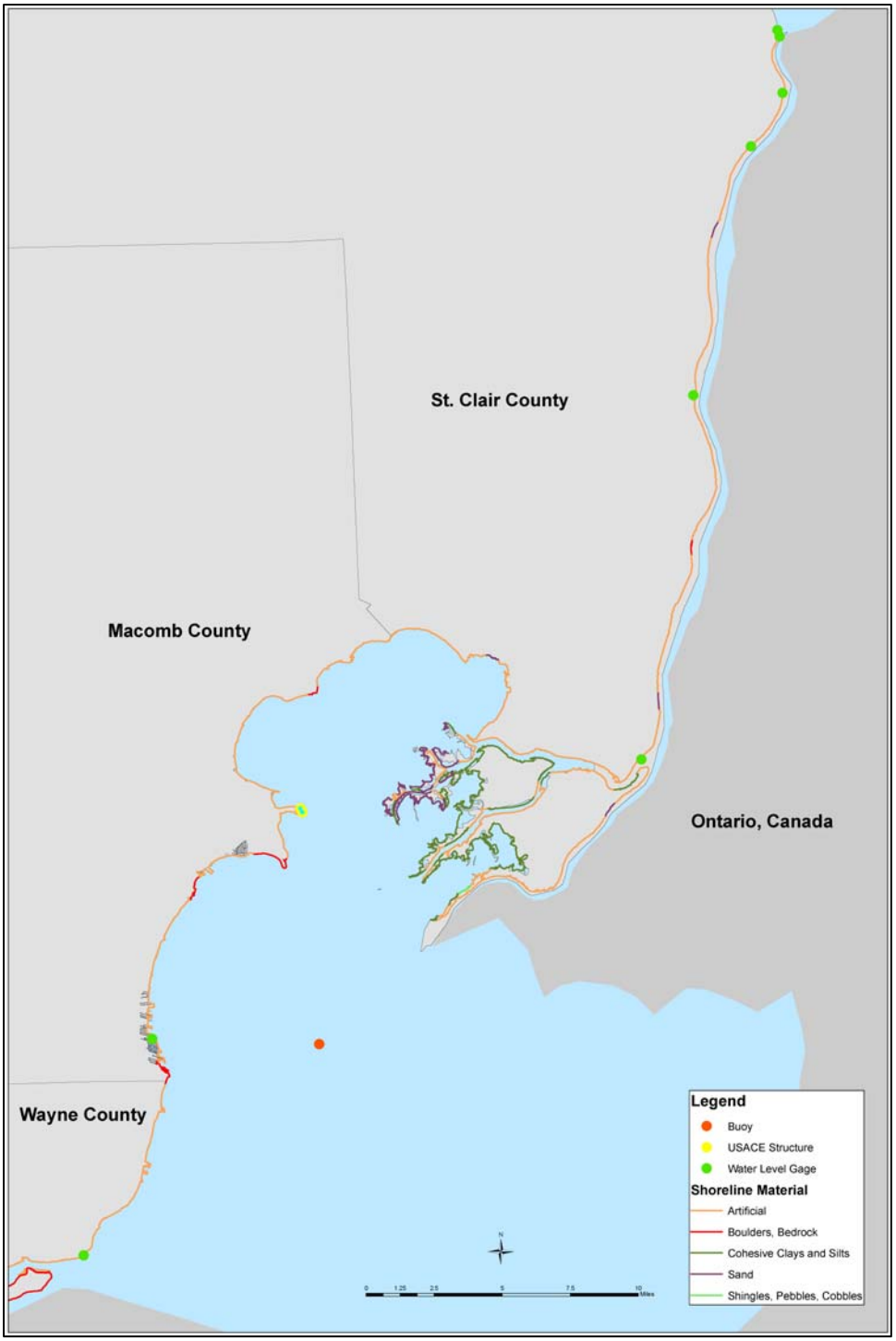


Figure 8. Lake St. Clair Shoreline Material and Coastal Structures

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 .

The next section discusses Hazard Mitigation resources that are available to stakeholders, the importance of hazard mitigation planning, and existing and potential strategies and actions around Lake St. Clair that seek to reduce flood risk.

VII. Hazard Mitigation Resources, Strategies, and Actions

Hazard mitigation resources, strategies, and actions were reviewed as part of this Discovery process and were discussed with Lake St. Clair stakeholders during the Information Exchange Sessions and the Discovery Meetings. This section provides general information about hazard mitigation, as well as mitigation topics specific to Lake St. Clair.

i. Hazard Mitigation Overview

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. This creates safer communities and facilitates resilience by enabling communities to return to normal function as quickly as possible after a hazard event. Once local officials understand risk from flooding and other hazards, the community is in a better position to identify potential mitigation actions that can reduce that risk to its people and property. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. Hazard mitigation planning helps communities develop strategies to reduce their risk to natural hazard events.

Hazard mitigation plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

Hazard mitigation plans are required by the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, as well as the National Flood Insurance Act of 1968, as amended by the Flood Insurance Reform Act of 2004 (Public Law 108-264). Under the Disaster Mitigation Act of 2000, governments have certain responsibilities including reviewing and updating effective mitigation plans every five (5) years.

The status of hazard mitigation plans in Macomb, St. Clair, and Wayne Counties is listed in Table 7.

Table 7. Hazard Mitigation Plan Status

Jurisdiction	Approval Date	Expiration Date
Macomb County (Multi-Jurisdictional)	November 9, 2010	November 9, 2015
St. Clair County (Multi-Jurisdictional)	May 9, 2006	May 9, 2011
Wayne County (City of Detroit)	March 22, 2007	March 22, 2012
Wayne County (Multi-Jurisdictional)	June 22, 2007	June 22, 2012

Source: FEMA Region V

From the previous table, St. Clair County, Wayne County, and the City of Detroit all have expired hazard mitigation plans. Currently, both St. Clair County and the City of Detroit have obtained planning grants and efforts are underway to update their respective hazard mitigation plans.

Figure 9 displays the status of local hazard mitigation plans, along with hazard mitigation projects that have been funded historically. In Lake St. Clair, several projects that involved the elevation of structures, labeled "Elevation Increase" in the figure below, occurred along the Macomb County shoreline.

As part of this Discovery process, existing hazard mitigation plans in the study area were reviewed to better understand flood risks within the Lake St. Clair communities and the strategies and actions that have already been developed as part of their planning process. By obtaining a better understanding of efforts made at the local level to reduce risk, FEMA can identify areas of need or areas where partnerships may be formed throughout this GLCFS process. As a part of this review process, potential mitigation actions and strategies were compiled from each plan and have been provided as tables within the individual Discovery Reports found in Appendices C (Macomb County), D (St. Clair County), and E (Wayne County). Table 8 contains a summary of common hazard mitigation actions related to flooding in Lake St. Clair coastal communities. Note that mitigation actions compiled in Table 8 may apply to all types of flooding, not just coastal.

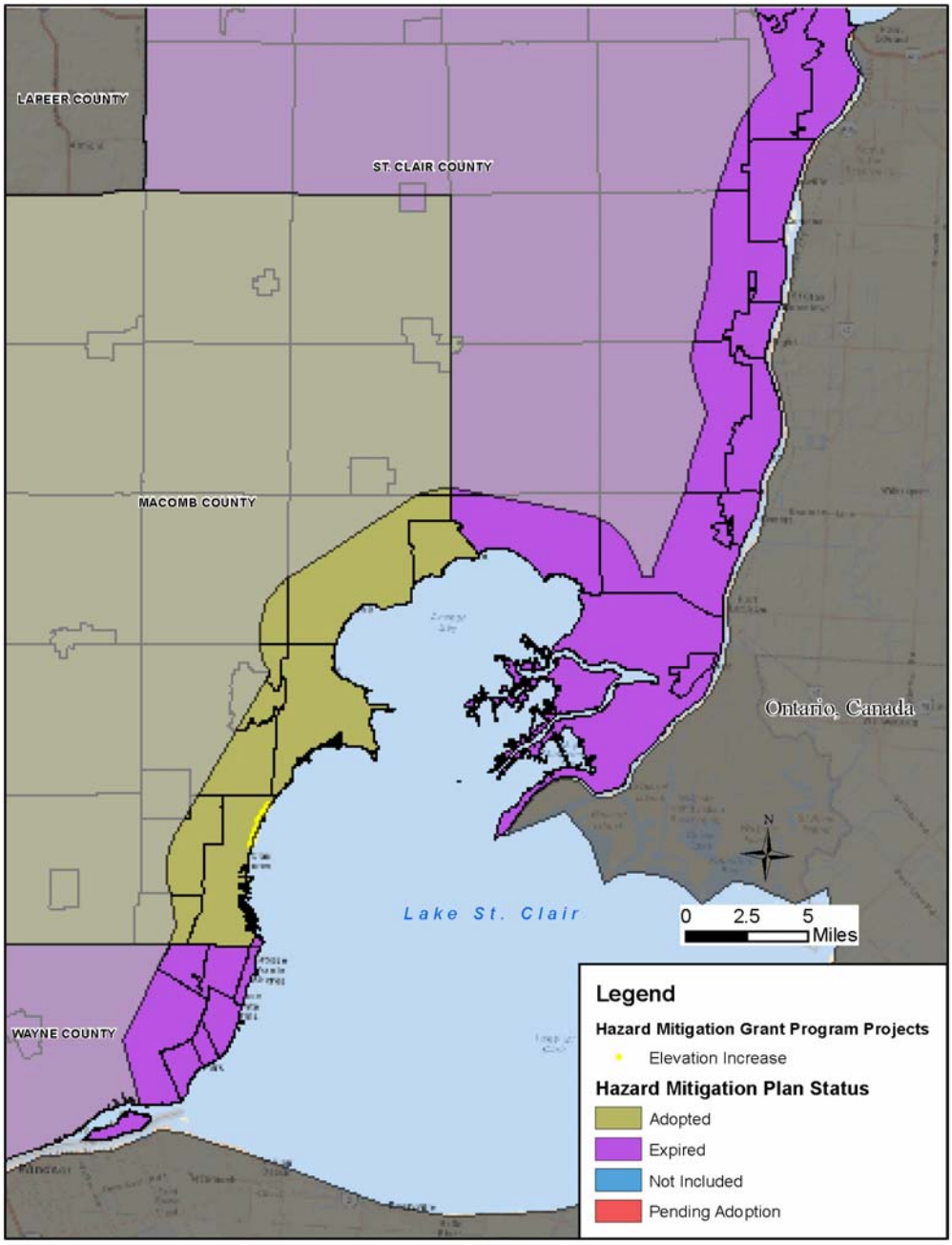


Figure 9. Hazard Mitigation

Table 8. Summary of Mitigation Actions and Strategies from Local Hazard Mitigation Plans

Action Number	Hazard Mitigation Action or Strategy
1	Floodproof homes
2	Mitigate flooding of roads
3	Mitigate flooding of residences along shoreline
4	Develop disaster mitigation/emergency response GIS. Continue to enhance the capabilities of GIS systems to function as a planning tool to aid in regulatory efforts to mitigate hazard events.
5	Install flood monitoring equipment
6	Riverbank stabilization and restoration to the parts of the riverbanks to prevent future floodwater erosion of the streambank.
7	Proposed dredging, riverbank stabilization, debris removal, retention basin construction
8	Maintain updated floodplain mapping
9	Implement land use planning regulations in floodplain and coastal zone areas
10	Alleviate repetitive loss properties by: wet floodproofing of structures; dry floodproofing structures; acquisition of repetitive loss properties; purchase or transfer of development rights; conservation easements
11	Implement effective stormwater management
12	Use land development techniques, such as cluster housing, to preserve natural resources and features
13	Improve floodplain management by planning acceptable uses for these areas, involving drain commissioners, hydrologic studies, etc. in analyses and decisions

Source: Local Hazard Mitigation Plans for Macomb, St. Clair, and Wayne Counties

The next subsection discusses new Risk MAP tools introduced to communities during this Discovery process to support the identification and attainment of mitigation actions.

ii. The Mitigation Action Form and Action Tracker

As part of this Discovery process, FEMA introduced the Mitigation Action Form and Mitigation Action Tracker to Lake St. Clair stakeholders. The Mitigation Action Form and Action Tracker are new Risk MAP tools designed to supplement existing mitigation planning processes by tracking and identifying local potential Areas of Mitigation Interest (AoMI) and new or improved mitigation actions that seek to reduce risk. The Mitigation Action Form, which aligns with questions on the Action Tracker website, can be completed by anyone that has identified a potential AoMI.


Mitigation Action Form

Purpose and Help

This form is meant to assist the collection of Mitigation Actions.

Online Mitigation Action Collection:

State Hazard Mitigation Officers Directory:

Your Information

Please enter the primary contact associated with this Mitigation Action.

1. Full Name *Required*

2. Email Address *Required*

3. Your Title and Organization *Required*

Once in the Action Tracker, an AoMI can be tracked by a variety of entities, such as the community, county, state, and FEMA, for different uses such as:

- To identify all AoMIs in a community, State, or Region
- To document AoMIs in between mitigation plan updates
- To track progress on mitigation activities
- To assess the ability of the Risk MAP program to encourage communities to take action to reduce risk



FEMA uses the Action Form and Action Tracker website to document and track local mitigation needs and actions.

It is important to note that entering a potential Mitigation Action does not obligate a jurisdiction to fund or complete an identified action. When updating local hazard mitigation plans, local planning teams may find it useful to review the actions stored in the Mitigation Action Tracker, assess them, and consider adding them as new or modified actions during the planning process.

Through collaboration between Risk MAP project teams and communities, new actions can be identified and existing actions may be improved upon. In addition, funding and collaboration opportunities to implement mitigation actions may be identified.

Stakeholders who attended the Discovery Meetings were provided with the Mitigation Action Form (Appendix H) and were encouraged to complete and return the form to FEMA Region V. Although no forms for the Lake St. Clair project area had been returned to FEMA at the time this report was created, there was discussion throughout the discovery process between the local stakeholders and FEMA regarding the intent to update the expired hazard mitigation plans in St. Clair County and Wayne County in the near future. The updating of hazard mitigation plans is considered to be an identified action.

The Mitigation Action Tracker can be accessed at: http://fema.starr-team.com. Stakeholders are encouraged to visit the site and add in new potential actions or revise and update existing actions. The Mitigation Action Form template can be downloaded and printed at http://fema.starr-team.com/MAF-Form.pdf.

FEMA is undertaking an effort in 2013, with support from state partners and a core stakeholder group, to identify a strategy that defines hazard mitigation actions to reduce loss of life and property and build resilience throughout the coastal communities of the Great Lakes regions.

FEMA's Mitigation Planning Technical Assistance (MPTA) may also be available to help communities plan for and reduce risks by providing communities with specialized assistance. MPTA is a part of the Risk MAP program and includes risk assessment, mitigation planning, and traditional hazard identification (flood mapping) activities. Additional information on MPTA and how it applies to the Lake St. Clair Coastal Flood Study is included in Section VIII of this report under "Potential for Mitigation Assistance".

The next subsection provides a description of various types of mitigation actions.

I.VII.ii.1 Types of Mitigation Actions

Hazard mitigation actions include adoption of local plans and regulations, creation of community identified programs that may help to reduce flood risk or other risks within a community, and structure and infrastructure projects. The FEMA Mitigation Action Form requests the identification of potential mitigation actions in one of these three categories. The outline presented below lists the types of potential actions that fall within each category.

Local Plans and Regulations:

- *Building codes.* The use and enforcement of building codes and development standards can ensure structures are safe from flooding.
- *Planning and land use regulations.* These regulations can mitigate flooding by influencing development. Consider updating and aligning Comprehensive and Master Plans, as well as other local plans to ensure that risk is considered at all levels of community planning.
- *Stormwater management plan.* Rainwater and snowmelt can cause flooding and erosion in developed areas and the plan can seek to mitigate that risk.
- *Floodplain management*. Through enforcement and adoption of NFIP floodplain management requirements, communities can reduce risk for new developed areas, and property owners in participating communities may purchase insurance protection against flood losses.

Community Identified Programs:

- *Funding mechanisms.* Mechanisms can be developed for local risk reduction.
- *Incentives for local risk reduction.* Studies have shown that many people are willing to take actions to reduce their risk if they believe they are actually at risk.
- *Mitigation Program.* Regular maintenance will help drainage systems and flood control structures to continue functioning properly.

Structure and Infrastructure Projects:

- *Structure Protection.* There are many ways to protect residential and non-residential structures from flood damage, such as flood proofing and elevation.
- *Infrastructure and Critical Facility Protection.* Techniques can be used to protect infrastructure and critical facilities from flood events.
- *Flood Control Structures.* These structures can be built to prevent flood damage.

- *Natural Systems.* Natural systems can provide floodplain protection, riparian buffers, and other ecosystem services that mitigate flooding.
- *Soil Stabilization or Erosion Control.* These processes can stabilize slopes that may be susceptible to erosion.

To learn more about mitigation planning, mitigation actions, and mitigation best practices, we recommend you visit http://www.fema.gov/hazard-mitigation-planning-resources .

The next section discusses funding opportunities that may be available to assist local officials in implementing hazard mitigation planning and projects.

iii. Hazard Mitigation Programs and Assistance

Not all mitigation activities require funding, and those that do are not limited to outside funding sources. For those mitigation actions that require assistance through funding or technical expertise, several state and federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.



Communities can link hazard mitigation plans and actions to the right FEMA grant programs to fund flood risk reduction. More information about FEMA HMA programs can be found at http://www.fema.gov/hazard-mitigation-assistance

FEMA, as well as other federal agencies, award many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding.

The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed in Table 9. State and local mitigation plans are a requirement for most FEMA HMA project grant funding.

Table 9. FEMA Hazard Mitigation Assistance Program

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	To reduce or eliminate claims against the NFIP

Table 9. FEMA Hazard Mitigation Assistance Program

Mitigation Grant Program	Authorization	Purpose
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	A national competitive program focused on mitigation project and planning activities that address multiple natural hazards
Repetitive Flood Claims (RFC)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Seeks to reduce flood claims against the NFIP through flood mitigation; properties must be currently NFIP insured and have had at least one NFIP claim
Severe Repetitive Loss (SRL)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Seeks to reduce or eliminate the long-term risk of flood damage to SRL residential structures currently insured under the NFIP

The HMGP and PDM programs, described in the table above, offer funding for mitigation planning and project activities that address multiple natural hazard events. The FMA, RFC, and SRL programs focus funding efforts on reducing claims against the NFIP. Funding under the HMA programs is subject to availability of annual appropriations and HMGP funding is also subject to the amount of FEMA disaster recovery assistance provided under a presidential major disaster declaration.

FEMA's HMA grants are awarded to eligible states, tribes, and territories (applicant) that, in turn, provide sub-grants to local governments and communities (sub-applicant). The applicant selects and prioritizes sub-applications developed and submitted to them by sub-applicants and submits them to FEMA for funding consideration. Prospective sub-applicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers (SHMO) is available on the FEMA website at www.fema.gov.

Some examples of other Federal programs that include funding available for hazard mitigation are displayed in Table 10. Several of these agencies, such as USACE, USGS, Natural Resource Conservation, and NOAA, have specialists on staff and can offer further information on flood hazard mitigation programs. The State NFIP Coordinator and SHMO are State-level sources of information and assistance.

Table 10. Other Agency Mitigation Program and Assistance

Mitigation Program or Assistance	Agency	Purpose
Coastal Services Center Cooperative Agreements	National Oceanic & Atmospheric Administration (NOAA)	Funds for coastal wetlands management and protection, natural hazards management, public access improvement, reduction of marine debris, special area management planning, and ocean resource planning. http://www.csc.noaa.gov/funding /
Coastal Services Center Grant Opportunities	National Oceanic & Atmospheric Administration (NOAA)	Formula and program enhancement grants for implementing and enhancing Coastal Zone Management programs that have been approved by the Secretary of Commerce. http://www.csc.noaa.gov/funding//
Coastal Zone Management Program	National Oceanic & Atmospheric Administration (NOAA)	The Office of Ocean and Coastal Resource Management (OCRM) provides federal funding and technical assistance to better manage our coastal resources. http://coastalmanagement.noaa.gov/funding/welcome.htmll
Marine and Coastal Habitat Restoration	National Oceanic & Atmospheric Administration (NOAA)	Funding for habitat restoration, including wetland restoration and dam removal. http://www.nmfs.noaa.gov/habitat/recovery//
Planning Assistance to States (PAS)	U.S. Army Corps of Engineers (USACE)	Fund plans for the development and conservation of water resources, dam safety, flood damage reduction and floodplain management. http://www.lre.usace.army.mil/planning/assist.htmll
Emergency Streambank and Shoreline Protection	U.S. Army Corps of Engineers (USACE)	To prevent erosion damages to public facilities by the emergency construction or repair of streambank and shoreline protection works. www.usace.army.mill
Environmental Laboratory	U.S. Army Corps of Engineers (USACE)	Guidance for implementing environmental programs such as ecosystem restoration and reuse of dredged materials. http://el.erdc.usace.army.mil/index.cfmm
Small Flood Control Projects	U.S. Army Corps of Engineers (USACE)	To reduce flood damages through small flood control projects not specifically authorized by congress. www.usace.army.mill
Coastal Wetlands Conservation Grant Program	U.S. Fish & Wildlife Service	Matching grants to states for acquisition, restoration, management or enhancement of coastal wetlands. http://ecos.fws.gov/coastal_grants/viewContent.do?viewPage=homee
Disaster Recovery Assistance	U.S. Department of Housing and Urban Development (HUD)	Disaster relief and recovery assistance in the form of special mortgage financing for rehabilitation of impacted homes. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/dri

Table 10. Other Agency Mitigation Program and Assistance

Mitigation Program or Assistance	Agency	Purpose
Neighborhood Stabilization Program	U.S. Department of Housing and Urban Development (HUD)	Funding for the purchase and rehabilitation of foreclosed and vacant property in order to renew neighborhoods devastated by the economic crisis. http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs/neighborhoodspg
USDA Smith-Lever Special Needs Funding	U.S. Department of Agriculture (USDA)	Grants to State Extension Services at 1862 Land-Grant Institutions to support education-based approaches to addressing emergency preparedness and disasters. http://www.csrees.usda.gov/funding/rfas/smith_lever.html
Community Facilities Direct Loans	U.S. Department of Agriculture (USDA)	Loans for essential community facilities. http://www.rurdev.usda.gov/HCF_CF.html
Community Facilities Direct Grants	U.S. Department of Agriculture (USDA)	Grants to develop essential community facilities. http://www.rurdev.usda.gov/HCF_CF.html
Farm Service Agency Disaster Assistance Programs	U.S. Department of Agriculture (USDA)	Emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland and livestock damaged by natural disasters. http://www.fsa.usda.gov//
Small Business Administration Loan Program	U.S. Small Business Administration (SBA)	Low-interest, fixed rate loans to small businesses for the purpose of implementing mitigation measures to protect business property from damage that may be caused by future disasters. Also available for disaster damaged property. http://www.sba.gov/about-sba-services/208

The programs described above may require a local match or have requirements that must be met in order for one to be eligible. To learn more about these programs and assistance, please contact your SHMO as they are the state-level source of information and assistance. A listing of SHMOs can be found by visiting http://www.fema.gov/state-hazard-mitigation-officers .

VIII. 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.

I.VIII.i.1 Engineering and Mapping

Coastal flood hazard analyses and mapping for all communities of the United States located along the Lake St. Clair shoreline will be performed. Below is a summary of data that will be collected and analysis that will be performed:

1) Creation of Bathymetric and Topographic Map Data Inventory.
   New bathymetric LiDAR, RGB Imagery, and Hyperspectral Imagery will be used for the coastal study areas. Topographic data for the coastal areas to be studied will be used for coastal analysis, floodplain boundary delineation and/or testing of floodplain boundary standard compliance. The topographic data used will be based on the data collected as part of this Discovery process, and will depend on the ability to gather currency and accuracy information for existing topographic data. Only topographic data that is of better quality than that of the original study or effective studies will be used. New topographic and bathymetric LiDAR, RGB Imagery, and Hyperspectral Imagery will be used for the coastal study areas and will replace the existing datasets.

2) Base Map Acquisition.
   Base map data for all counties, including data collected during this Discovery process as an initial inventory, will be collected and organized. The necessary permission from the map sources will be obtained to allow FEMA to use and distribute hardcopy and digital map products using the digital base map. Base map data must comply with FEMA G&S (Federal Emergency Managment Agency, 2003).

3) Coastal Flood Hazard Analysis.
Response-based computational approaches outlined in FEMA G&S Appendix D.3 draft dated May 2012 will be used to perform coastal flood hazard analysis for the Lake St. Clair shoreline and areas subject to coastal flooding. The coastal flood hazard analyses include the following components:

- Wave setup
- Erosion
- Wave runup
- Wave overtopping
- Overland wave propagation
- Primary frontal dune identification (where applicable).

A transect-based approach for assessing coastal flood risks along Lake St. Clair will be used. The Lake St. Clair study will include the St. Clair River included within the model domain defined by USACE ERDC for Lake St. Clair.

The 1.5 foot breaking wave height will be selected from the Wave Height Analysis for Flood Insurance Studies (WHAFIS) results and used to define the Limit of Moderate Wave Action (LiMWA) as described in FEMA Procedural Memorandum No. 50 updated in 2012.

The coastal flood hazard results will be transferred to topographic work maps. Topographic data provided by the USACE in 2012 and early 2013 will be utilized. Coastal flood hazards will be mapped as outlined in FEMA's G&S Appendix D.3 draft dated May 2012 (Federal Emergency Management Agency, 2012). Flood hazard mapping will extend to the landward limit of coastal flooding as a result of waves and storm surge.

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 Special Flood Hazard Area (SFHA), Coastal High Hazard (VE Zone) and Coastal A Zone (AE Zone), Base Flood Elevations (BFEs), and LiMWA. Communities will be provided with an opportunity to review the workmaps after the coastal analysis is complete and prior to FIRM production.

I.VIII.i.2 National Flood Insurance Program Data Integration

Regulatory FIRM files may be updated through FEMA's Physical Map Revision (PMR) process using the floodplain delineations created from the work performed in the Engineering and Mapping tasks. For areas adjacent to updated coastal analysis, tie-ins will be resolved between coastal and riverine floodplains using the topographic data acquired.

Data collected as part of the coastal analysis will be put into FIRM database format and reviewed per FEMA's G&S Procedural Memorandum No. 42 for Quality Control Requirements in the FIRM Production Process.

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

I.VIII.i.3 Risk Assessment Product Development

Depending on available data, results of coastal analysis, local needs identified, local partnerships, and fiscal year funding, 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, St. Clair, and Wayne Counties. 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 11 summarizes the products projected for coastal communities by county.

Table 11. Potential Flood Risk Products for Lake St. Clair Communities

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
St. Clair	MI	✓	✓	✓	✓	Not yet funded
Wayne	MI	✓	✓	✓	✓	Not yet funded

Below is a brief description of each flood risk product and its uses:

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

- 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.

HAZUS 2010: 1-Percent Exposure

- The 2010 HAZUS national dataset for 1-percent exposure data will be used to tabulate the results by identified communities.

For additional information regarding coastal flood risk products, users may review the individual Discovery Reports found in Appendices C, D, and E of this report or visit http://www.fema.gov .

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 definiencies that should be corrected.

During the Discovery process, FEMA (and STARR) met with the communities and discussed their recent and current mitigation actions and projects. I t was identified that St. Clair County and City of Detroit (Wayne County) have received planning grants and are in

the process of updating their hazard mitigation plans. Wayne County's plan has expired and plans to update were unknown at the time this report was developed. It is recommended additional discussion occur between FEMA and these stakeholders as this coastal flood study moves forward to see if MPTA would be an appropriate and beneficial option.

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.

The CAC is a telephone call or brief visit by a FEMA staff member (or staff of a State agency on behalf of FEMA) verifying the community's floodplain management contact. The CAC can be used as a way to screen for potential floodplain management issues in communities that would require a CAV.

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

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

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

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 topics, including coastal SFHAs, building requirements in VE Zones, and LiMWA, are compiled below and discussed in greater detail.

I.VIII.iii.1 Coastal Special Flood Hazard Areas (SFHAs)

The Lake St. Clair Coastal Flood Hazard study analysis may result in new SFHAs, which are defined as areas that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs labeled as Zone AE have been studied by detailed methods and show BFEs. SFHAs labeled as Zone VE are along coasts and are subject to additional hazards due to storm-induced velocity wave action. BFEs derived from detailed hydraulic analyses are shown within these zones.

The NFIP shows coastal flood hazards in two different zones on its FIRMs:

- Zone VE, where the delineated flood hazard includes wave heights equal to or greater than three feet; and
- Zone AE, where the delineated flood hazard includes wave heights less than three feet.

During the Discovery Meetings these zones were discussed in greater detail as the updated coastal analysis results may show that these flood risks exist along the Lake St. Clair shoreline.

Additional information on coastal SFHAs can be found at http://www.greatlakescoast.org under the "Great Lakes Flood Zones Overview" section.

I.VIII.iii.2 Building Requirements in VE Zones

The zone designation and the BFE are critical factors in determining what requirements apply to a building and, as a result, how it is built. The NFIP minimum requirements for buildings built in Zone VE (coastal high hazard areas) are:

1) The building must be elevated on pile, post, pier, or column foundations,
2) The building must be adequately anchored to the foundation,
3) The building must have the bottom of the lowest horizontal structural member at or above the BFE,
4) The building design and method of construction must be certified by a design professional,
5) The area below the BFE must be free of obstructions,

6) If enclosed, the enclosure must be made of lightweight wood lattice, insect screening, or breakaway walls.

Communities participating in the NFIP that have mapped VE Zones must adopt floodplain management regulations that meet or exceed these minimum NFIP requirements, as described above.

I.VIII.iii.3 Limit of Moderate Wave Action

Post-storm field visits and laboratory tests have confirmed that wave heights as small as 1.5 feet can cause significant damage to structures when constructed without consideration to the coastal hazards. Additional flood hazards associated with coastal waves include floating debris, high velocity flow, erosion, and scour, which can cause damage to Zone AE-type construction in these coastal areas.

To help community officials and property owners recognize this increased potential for damage due to wave action in the AE zone, FEMA issued Procedure Memorandum No. 50 in December of 2008, which provides guidance on identifying and mapping the 1.5-foot wave height line, referred to as the Limit of Moderate Wave Action, or LiMWA. The LiMWA 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. Consequently, it is important to be aware of the area between this inland limit and the Zone VE boundary as it still poses a high risk, though not as high of a risk as Zone VE. Figure 10 helps to explain the LiMWA zone location.

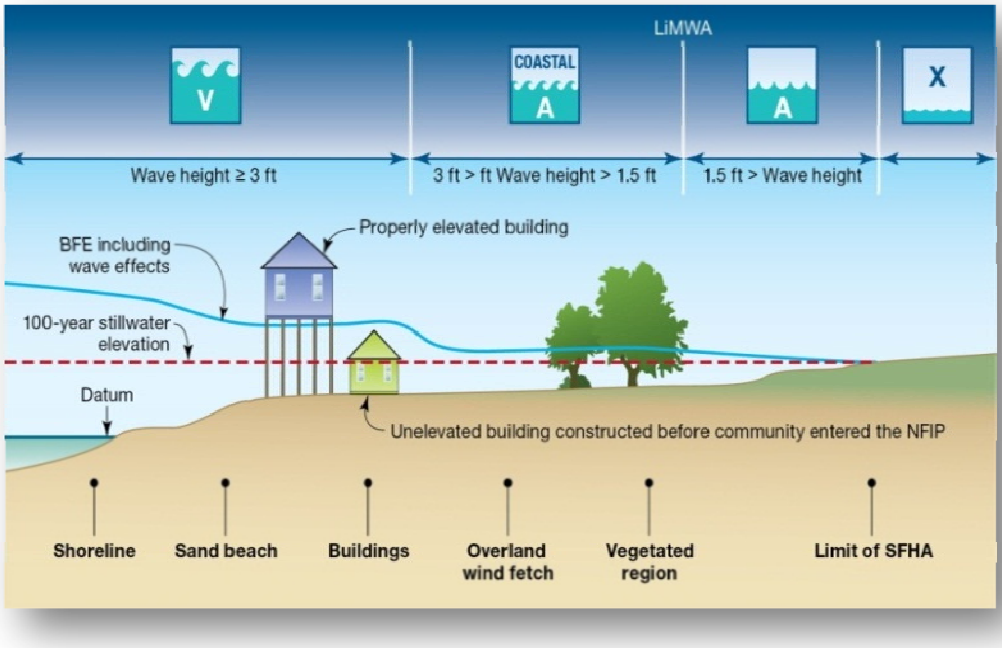


Figure 10. Limit of Moderate Wave Action

If areas that are subject to waves between 3-ft and 1.5-ft are identified, then FEMA will delineate the inland extent of the 1.5-ft wave as the LiMWA when producing new FIRMs. A new line layer will be added to the FIRM Database to accommodate the LiMWA features and will be depicted on updated FIRMs as two black dots and three white dash lines in a sequential pattern. The LiMWA will be identified in the FIRM legend as "Limit of Moderate Wave Action" and a note will be included in the "Notes to Users" section on the map panel to explain the LiMWA boundary.

Although not labeled as such on FIRMs, the areas between the LiMWA and the Zone V boundary (or shoreline) are also referred to as "Coastal A Zones". Current effective FIRMs may not show a LiMWA, however future maps may include the LiMWA boundary if the data supports it.

Figure 11 is an example FIRM showing the delineated LiMWA. The area in Map A shows the delineation of the LiMWA in an area where the predominant coastal flood hazard is overland wave propagation. Map B shows delineation of the LiMWA in a region where the major coastal flood hazard is wave breaking and run-up.

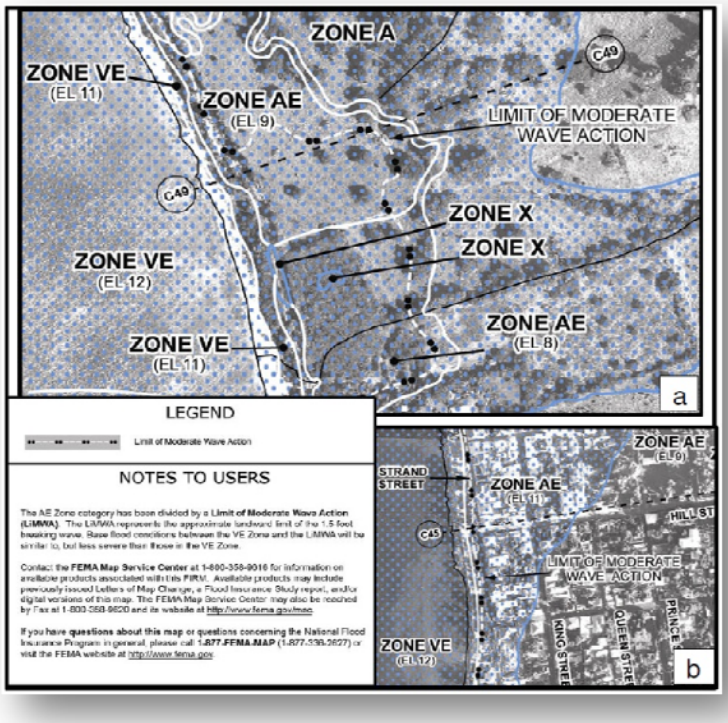


Figure 11. Example FIRM showing LiMWA

While FEMA does not impose floodplain management requirements based on the LiMWA, the LiMWA is provided to help communicate the higher risk that exists in that area. Because the 1.5-foot breaking wave in the LiMWA zone can potentially cause

foundation failure, communities are encouraged to adopt building construction standards similar to Zone VE in those areas. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. CRS credits can lower insurance premiums for residents and business owners. For additional information on CRS, please visit http://www.fema.gov/national-flood-insurance-program/community-rating-system .

Starting in 2009, flood-resistant provision and floodplain management requirements began to be incorporated into model building codes, such as the International Building Code (IBC), the International Residential Code (IRC), and the National Fire Protection Association (NFPA). If a local community has adopted a recent version of these codes, specifically the IBC, without amending the code to remove the flood provision then the community must enforce flood-resistant design and construction requirements based on the IBC, as well as the floodplain management ordinance that must be adopted to meet minimum requirements per the NFIP. It is important for local communities to note that some Coastal A Zone practices, specifically practices that go above the minimum NFIP requirements, may be required by the IBC through its reference to American Society of Civil Engineers (ASCE) Flood Resistant Design and Construction (24-98). In ASCE 24-98 (issued in 2000), there are basic building requirements related to high risk flood areas and flood hazard areas subject to high velocity wave action. In addition, ASCE has issued an update in 2006, Flood Resistant Design and Construction (24-05), which includes basic requirements for flood hazard areas including high-risk flood hazard areas, coastal high-risk hazard areas, and Coastal A Zones.

Mapping the LiMWA, or Coastal A Zone, will provide community officials and other stakeholders with additional important flood risk details to consider when buying/developing, mitigating, or enforcing floodplain management regulations in the coastal flood hazard areas.

Residents and business owners living or working in the LiMWA, or Coastal Zone A, should be aware of the potential wave action along with floating debris, erosion, and scour that could cause significant damage on their property. They are encouraged to build safer and higher than minimum local requirements to reduce the risk to life and property. Additional guidance for design and construction in Coastal A Zones can be found in FEMA 499, Home Builder's Guide to Coastal Construction (http://www.fema.gov/fima/mat/fema499.shtm).

While the risk of damage is higher between the LiMWA line and the Zone VE line than other parts of the coastal AE zone, the NFIP flood insurance rates currently do not differ from other AE zone rates. The Federal mandatory purchase requirement does apply in these zones and property owners are encouraged to carry coverage equivalent to the replacement cost of their building and to include contents coverage.

For additional background information on LiMWA, please refer to FEMA Procedure Memorandum No. 50 at www.fema.gov/library/viewRecord.do?id=3481.

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. As a result of communication to date, several new stakeholders have been identified and added to the master contact database for this study.

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.

Social media sites such as Twitter (http://www.twitter.com/GreatLakesCoast) and Facebook (http://www.facebook.com/pages/Great-Lakes-Coastal-Flood-Mapping-Program/225293657496579) will also be important communication tools to keep stakeholders informed and engaged throughout this process.

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

v. Unmet Needs

During this Discovery process, stakeholders provided FEMA with a wide variety of information. Some of the information, while valuable, may not be able to be utilized in the upcoming coastal study. In addition, some questions may be unresolved as of the end of this Discovery process. This section seeks to summarize those unmet needs and to provide the steps that may be taken to address them in the future.

During the Discovery Meetings and throughout the Discovery process, Lake St. Clair stakeholders were concerned about what to expect in terms of extent of new SFHA boundaries, the possible introduction of VE Zones, the number of property owners who would be affected, and the additional NFIP requirements and flood insurance costs that may go along with a flood map revision. FEMA acknowledged this concern, adding that upcoming engineering and mapping tasks include the distribution of workmaps and other

flood risk products designed to give local stakeholders an opportunity to review and comment on flood risk data before the data is carried into NFIP FIRM maps.

Concerns were also expressed relative to density of near-shore vegetation, particularly phragmites, which may compromise accuracy of new LiDAR bathymetry being collected as part of the Lake St. Clair study. St. Clair County stakeholders suggested it would be helpful to photograph potential problem areas and build site-specific datasets to enhance ground-truthing techniques. There was an offer to consider local resources in obtaining survey points and photographs of the shoreline for ground verification and independent validations.

Comments and questions related to the proposed draft transects were discussed during the Discovery Meeting by State, county, and community representatives. It was suggested by stakeholders that the effective transects along Lake St. Clair be used where possible. This request was incorporated into the revised proposed draft transects where possible, however, it should be noted that the transects proposed in this report remain subject to change pending further coastal analysis.

IX. Close

Federal, State, and local stakeholders that were involved in this Discovery process contributed valuable information about Lake St. Clair, including information and data that may be utilized in the upcoming Lake St. Clair coastal flood study. The data and opportunities presented in this report will be considered as the study process moves forward and will assist the project team as the Lake St. Clair coastal flood study proceeds. FEMA encourages continued participation and engagement from stakeholders throughout this coastal flood study.

The ultimate goal of this Discovery process and the future coastal flood study is to provide updated flood risk information to local stakeholders and to increase awareness of those flood risks, which in turn leads to actions that reduce risk.

X. References

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XI. Appendices

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/.

Appendices for this report include:

Appendix A: Lake St. Clair Stakeholder List
Appendix B: Coastal Data Request Form
Appendix C: Macomb County Discovery Report (with attachments)
Appendix D: St. Clair County Discovery Report (with attachments)
Appendix E: Wayne County Discovery Report (with attachments)
Appendix F: Final Discovery Maps
Appendix G: High-Risk Erosion Figures (MDEQ)
Appendix H: Mitigation Action Form

APPENDIX A
Lake St. Clair Stakeholder List

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
Selfridge Air National Guard Base	Mohammad	Arif	State & Federal	Fed Agency
Selfridge Air National Guard Base	Ken	Baker	State & Federal	Fed Agency
Selfridge Air National Guard Base	Steve	Krajnik	State & Federal	Fed Agency
Macomb County	Keith	Graboske	Community & Property Stakeholder	Local Official
Macomb County	Jeff	Schroeder	Community & Property Stakeholder	Local Official
Macomb County	Kelly	Kaufman	Community & Property Stakeholder	Local Official
Spaulding DeDecker	Jason	Matteo	Community & Property Stakeholder	Engineer
Clay Township	Tom	Krueger	Community & Property Stakeholder	Local Official
HISCFA	Whitey	Simon	Community & Property Stakeholder	
HRC	Karyn	Stickel	Community & Property Stakeholder	Engineer
U.S. Representative Miller	Don	Brown	Stakeholder	
City of Detroit	Min	Yang	Community & Property Stakeholder	Local Official
	Jon	Hartz	Community & Property Stakeholder	
City of Detroit Homeland Security	Robert	Brown	Community & Property Stakeholder	Local Official
	William	Boesch	Technical Stakeholder	Engineer
	Bradford	Spencer	Technical Stakeholder	Engineer
AECOM	Michael	Adams	Technical Stakeholder	Engineer
AECOM	James	Tolbert	Technical Stakeholder	Engineer
Air National Guard	Kevin	Marek	Core Stakeholder	Fed Agency
Alliance for the Great Lakes	Joel	Brammeier	Technical Stakeholder	Ecological
Alliance for the Great Lakes	Jamie	Cross	Technical Stakeholder	Ecological
Alliance for the Great Lakes	Angela	Larsen	Technical Stakeholder	Engineer
Office	Sam	Lovall	Technical Stakeholder	Ecological
Anderson, Eckstein, Westrick, Inc.	Jeffrey	Bednar	Technical Stakeholder	Engineer
Anderson, Eckstein, Westrick, Inc.	John	Chown	Technical Stakeholder	Engineer
Applied Ecological Services	Ed	Retherford	Technical Stakeholder	University
Birchler & Arroyo Associates	David	Birchler	Technical Stakeholder	Engineer
Bristol Tech	Charlie	Bristol	Technical Stakeholder	Engineer
Products and Services (CO-OPS)	Laurita	Brown	Core	Fed Agency
Excellence (COSEE Great Lakes)	Jim	Diana	Technical Stakeholder	University
Excellence (COSEE Great Lakes)	Rosanne W.	Fortner	Technical Stakeholder	Ecological
Central Michigan University	Dave	Cuthrell	Technical Stakeholder	University
Central Michigan University	Tracy	Galarowicz	Technical Stakeholder	University
Central Michigan University	Tom	Gehring	Technical Stakeholder	University
Central Michigan University	Mary	Montoye	Technical Stakeholder	University
Central Michigan University	Don	Uzarski	Technical Stakeholder	University
Central Michigan University	David	Zanatta	Technical Stakeholder	University
Central Michigan University	Elizabeth	Alm	Technical Stakeholder	University
CH2M Hill	Frank	Dillon	Technical Stakeholder	Engineer
City of Grosse Point Park, MI	Palmer T.	Heenan	Community & Property	Mayor
City of Marysville	Tom	Konik	Community & Property Stakeholder	Local Official
City of Marysville	Gary	Orr	Community & Property Stakeholder	Mayor
City of Marysville	Jason	Hami	Community & Property Stakeholder	Local Official
City of Mount Clemens	Barb	Dempsey	Community & Property	Mayor
City of New Baltimore	Larry	Smith	Community & Property	Mayor
City of Port Huron	Sara	Montoya	Community & Property Stakeholder	Local Official
City of St. Clair	Bill	Cedar	Community & Property Stakeholder	Mayor

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
City of St. Clair	Mike	Booth	Community & Property Stakeholder	Local Official
City of St. Clair	Diane	Cunningham	Community & Property Stakeholder	Local Official
City of St. Clair Shores	Christopher	Rayes	Community & Property Stakeholder	Local Official
City of St. Clair Shores	Bryan	Babcock	Community & Property Stakeholder	Local Official
Clinton River Watershed Council	Anne	Vaara	Technical Stakeholder	Ecological
Clinton River Watershed Council	Tom	Quail	Technical Stakeholder	Ecological
Coastal America	Arturo	Herrera	Community & Property	Ecological
Coastal States Organization	Kristen	Fletcher	Technical Stakeholder	CZM
Coastal States Organization	Diana	Bowen	Technical Stakeholder	CZM
Partnership	John	Mackenzie	State & Federal Legislative	State/Reg Agency
Cottrellville Township	Tom	Raymond	Community & Property Stakeholder	Local Official
Cottrellville Township	George	Kunnath	Community & Property Stakeholder	Local Official
Council of Great Lake Industries	George	Kuper	Technical Stakeholder	Ecological
Council of Great Lakes Governors	David	Naftzger	State & Federal Legislative	State/Reg Agency
Council of Great Lakes Governors	Laura	Seaman	State & Federal Legislative	State/Reg Agency
D.J. Case & Associates	Phil	Seng	Technical Stakeholder	Engineer
Davenport University	Chuck	McKeown	Technical Stakeholder	University
Defenders of Wildlife	Judith	Boshoven	State & Federal Legislative	State/Reg Agency
Office of the Great Lakes	Patty	Birkholz	Technical Stakeholder	Ecological
Office of the Great Lakes	Amy	Hicks	Technical Stakeholder	Ecological
Areas of Concern Program	Rick	Hobrla	Stakeholder	State/Reg Agency
Coastal Management	Lynda	Krupansky	Stakeholder	State/Reg Agency
DEQ - Office of Great Lakes	Frank	Ruswick	Stakeholder	State/Reg Agency
DEQ - Office of Great Lakes	Roger	Eberhardt	Stakeholder	State/Reg Agency
Detroit Riverfront Conservancy	Faye Alexander	Nelson	Technical Stakeholder	Ecological
Dewberry	Jeffrey	Gangai	Technical Stakeholder	Engineer
DHI	Bo	Juza	Core	Contractor
DHS/FEMA RIV	Robert	Lowe	Core	Fed Agency
DLZ	Natalie	Dingledine	Technical Stakeholder	Engineer
DLZ	Steve	Metzer	Technical Stakeholder	Engineer
DOC	Lelei	Peau	Core	Fed Agency
DOC NOAA	Christopher	Yates	Core	Fed Agency
DOI	Laura	Daniel - Davis	Core	Fed Agency
DOI	Terry	Holman	Core	Fed Agency
DTE Energy	M.	Gruelle	Technical Stakeholder	Engineer
DTE Energy	Dennis	Leonard	Technical Stakeholder	Engineer
Ducks Unlimited	Russel	Terry	Technical Stakeholder	Ecological
Dynamic Solutions	Gaurav	Savant	Core	Fed Agency
Earth Resources Technology, Inc.	Katya	Wowk	Core	Fed Agency
East China Township	John	Randolph	Community & Property Stakeholder	Local Official
East China Township	Jeff	Kern	Community & Property Stakeholder	Local Official
Planning & Development Commission	Jeff	Hagen	Community & Property Stakeholder	Regional
Governments	Sue	Fortune	Community & Property Stakeholder	Regional
Governments	Anamika	Laad	Community & Property Stakeholder	Regional
Ecology and Environment	Nick	Owens	Technical Stakeholder	Ecological
ECT	Annette	DeMaria	Technical Stakeholder	Engineer
EDF	Nicole	Smith	Technical Stakeholder	Ecological

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
EDF	Daniel	Whittle	Technical Stakeholder	Ecological
Eldean Development Group	Eldean	Shipyard	Technical Stakeholder	Engineer
USACE	Andrew	Morang	Technical Stakeholder	Fed Agency
ENTRIX, Inc.	John	Newsted	Technical Stakeholder	Engineer
Technology, Inc.	Roy	Schrameck	Technical Stakeholder	Engineer
Technology, Inc.	Sanjiv	Sinha	Technical Stakeholder	Engineer
Environment Canada - Ontario	Greg	Mayne	Core Stakeholder	IJC
EPA	Pranas	Pranckevicius	Technical Stakeholder	Ecological
EPA	Chris	Korleski	State & Federal	Fed Agency
EPA	Thomas	Davenport	Core Stakeholder	Fed Agency
Essex Region Conservation Authority	Jeremy	Wychreschuk	Technical Stakeholder	Engineer
FEMA	Mark	Crowell	Core	Fed Agency
FEMA	David	Thomas	Core	Fed Agency
FEMA Region V	Ken	Hinterlong	Core Stakeholder	Fed Agency
Ferris State University	Gary	Noble	Technical Stakeholder	University
Inc.	Fred	Cowles	Technical Stakeholder	Engineer
Georgia Pacific	Garry	Griffith	Technical Stakeholder	Engineer
Grand Valley State University	John	Koches	Technical Stakeholder	University
Grand Valley State University	Richard	Rediske	Technical Stakeholder	University
Grand Valley State University	Bopi	Biddanda	Technical Stakeholder	University
Initiative	Dave	Ullrich	Technical Stakeholder	Ecological
Great Lakes Coalition	Tim	Eder	Technical Stakeholder	Ecological
Great Lakes Coalition	Christine	Manninen	Technical Stakeholder	Ecological
Great Lakes Commission	Mike	Hansen	Stakeholder	Ecological
Great Lakes Commission	Stuart	Eddy	Technical Stakeholder	Ecological
Great Lakes Commission	Victoria	Pebbles	Technical Stakeholder	Ecological
Great Lakes Commission	Cassie	Bradley	Technical Stakeholder	Ecological
Great Lakes Commission	Heather	Braun	Technical Stakeholder	Ecological
Great Lakes Commission	Thomas	Crane	Technical Stakeholder	Ecological
Great Lakes Commission	Julie	Hinderer	Technical Stakeholder	Ecological
Great Lakes Commission	John	Hummer	Technical Stakeholder	Ecological
Great Lakes Commission	Erika	Jensen	Technical Stakeholder	Ecological
Great Lakes Commission	David	Knight	Technical Stakeholder	Ecological
Great Lakes Commission	Rebecca	Pearson	Technical Stakeholder	Ecological
Great Lakes Fishery Commission	Dr. Charles	Krueger	Technical Stakeholder	Ecological
Great Lakes Legislative Caucus	Tim	Anderson	State & Federal Legislative	State/Reg Agency
Great Lakes Observing System	Jennifer	Read	Technical Stakeholder	University
Great Lakes Observing System	Kelli	Paige	State & Federal Legislative	State/Reg Agency
Michigan United Conservation Clubs	Dennis	Muchmore	Technical Stakeholder	Ecological
Great Lakes Shipyard	Timothy	Singer	Technical Stakeholder	Ecological
Grosse Point Farms, MI	James C.	Farquhar	Community & Property	Mayor
Institute	Janet	Vail	Technical Stakeholder	University
Habitat Solutions NA	Scudder	Mackey	Technical Stakeholder	Ecological
Hands & Associates, Inc.	Charles	Barker	Technical Stakeholder	Engineer
Association	Charles	Miller	Technical Stakeholder	Ecological
Coalition	Chad	Lord	Technical Stakeholder	Ecological
Huron Consultants	Fred	Fuller	Technical Stakeholder	Engineer

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
I.M. Systems Group NOAA CSC	Adrianne	Harrison	Core	Fed Agency
I.M. Systems Group NOAA CSC	Brian	Smith	Core	Fed Agency
I.M. Systems Group NOAA CSC	Margaret	Allen	Core	Fed Agency
Management (IDEM)	Thomas	Easterly	Stakeholder	State/Reg Agency
Lakes Research (IAGLR)	Robert	Letcher	Technical Stakeholder	Ecological
International Joint Commission	Mark	Colosimo	Stakeholder	IJC
International Joint Commission	Frank	Bevacqua	Stakeholder	IJC
International Joint Commission	Bob	Reynolds	Stakeholder	IJC
International Joint Commission	Michael	Laitta	Stakeholder	IJC
International Joint Commission	John	Nevin	Stakeholder	IJC
Windsor	P.	Boyer	Stakeholder	IJC
Windsor	Doug	Alley	Stakeholder	IJC
Windsor	Doug	Bondy	Stakeholder	IJC
J. F. New & Assoiciate, Inc.	Scott	Dierks	Technical Stakeholder	Engineer
J. F. New & Assoiciate, Inc.	Brian	Majka	Technical Stakeholder	Engineer
J. F. New & Assoiciate, Inc.	Steve	Rice	Technical Stakeholder	Engineer
JJR	Douglas	Denison	Technical Stakeholder	Engineer
JJR	Patrick	Doher	Technical Stakeholder	Engineer
JJR	Mark	O'Leary	Technical Stakeholder	Engineer
Johnson & Anderson, Inc.	John	Emig	Technical Stakeholder	Engineer
Joint Ocean Commission Initiative	Bill	Ruckelshaus	Technical Stakeholder	Ecological
Lake Shore Environmental	W.	Roman	Technical Stakeholder	Engineer
Lake Superior State University	Ken	Hemming	Technical Stakeholder	University
Land Trust Alliance	Renee	Kivikko	Technical Stakeholder	Ecological
Office	Ronda	Oberlin	State & Federal Legislative	State/Reg Agency
Lapham Associates	Don	Hamilton	Technical Stakeholder	Engineer
Limno-Tech, Inc.	Greg	Peterson	Technical Stakeholder	Engineer
Little River Band of Ottawa	Frank	Beaver	Technical Stakeholder	Ecologicial
Little River Band of Ottawa	Dan	Shepard	Technical Stakeholder	Ecologicial
Commission	Diane	Dombroski	Stakeholder	State/Reg Agency
Macomb County Health Department	Stacey	McFarlane	Community & Property Stakeholder	Local Official
Management	Peter	Locke	Community & Property Stakeholder	Local Official
Advisory Council	Gerard	Santoro	Technical Stakeholder	Ecological
Mactec	Garret	Bondy	Technical Stakeholder	Engineer
Mactec	Mary	Miller	Technical Stakeholder	Engineer
Marine City	Charles	Browne	Community & Property Stakeholder	Mayor
Division	Abby	Eaton	Stakeholder	State/Reg Agency
Division	James	Johnson	Stakeholder	State/Reg Agency
MDEQ	Judy	Andersen	Stakeholder	State/Reg Agency
MDEQ	Chris	Antieau	Stakeholder	State/Reg Agency
MDEQ	Jennifer	Bolt	Stakeholder	State/Reg Agency
MDEQ	Robert	Day	Stakeholder	State/Reg Agency
MDEQ	Dave	Drullinger	Stakeholder	State/Reg Agency
MDEQ	Kim	Fish	Stakeholder	State/Reg Agency
MDEQ	Andrew	Hartz	Stakeholder	State/Reg Agency
MDEQ	Anne	Hokanson	Stakeholder	State/Reg Agency
MDEQ	Rhonda	Klann	Stakeholder	State/Reg Agency

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Organization	First Name	Last Name	Stakeholder Group	Category
MDEQ	Cindy	Masterson	Stakeholder	State/Reg Agency
MDEQ	Mike	Masterson	Stakeholder	State/Reg Agency
MDEQ	JoAnne	Merrick	Stakeholder	State/Reg Agency
MDEQ	Roxanne	Merrick	Stakeholder	State/Reg Agency
MDEQ	James	Milne	Stakeholder	State/Reg Agency
MDEQ	Douglas	Morse	Stakeholder	State/Reg Agency
MDEQ	Colleen	O'Keefe	Stakeholder	State/Reg Agency
MDEQ	Ann	Person	Stakeholder	State/Reg Agency
MDEQ	Amy	Petersen	Stakeholder	State/Reg Agency
MDEQ	Joseph	Rathbun	Stakeholder	State/Reg Agency
MDEQ	Brian	Rudolph	Stakeholder	State/Reg Agency
MDEQ	Luis	Saldivia	Stakeholder	State/Reg Agency
MDEQ	Katherine	Tetzlaff	Stakeholder	State/Reg Agency
MDEQ	Mary	Vanderlaan	Stakeholder	State/Reg Agency
MDEQ	Robert	Zbiciak	Stakeholder	State/Reg Agency
Technology Division	Kevin	Frailey	Stakeholder	State/Reg Agency
Technology Division	Tom	Occhipinti	Stakeholder	State/Reg Agency
Inventory	Phyllis	Higman	Stakeholder	State/Reg Agency
FEATURES INVENTORY	Mike	Penskar	Stakeholder	State/Reg Agency
MDEQ - Office of Geological Survey	John	Esch	Stakeholder	State/Reg Agency
MDEQ - Remediation Division	Susan	Erickson	Stakeholder	State/Reg Agency
Lakes	Jim	Bredin	Stakeholder	State/Reg Agency
Lakes - Lake Program	Matt	Preisser	Stakeholder	State/Reg Agency
Lakes - Lake Program	John	Riley	Stakeholder	State/Reg Agency
Lakes - Lake Program	Michelle	Selzer	Stakeholder	State/Reg Agency
MDEQ-Water Resource Division	Charles	Bauer	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Shannon	Briggs	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	William	Creal	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Kip	Cronk	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Tom	Graf	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Penny	Holt	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Bill	Larsen	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Todd	Losee	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Amy	Lounds	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Linda	Burke	Stakeholder	State/Reg Agency
MDEQ - Water Resources Division	Byron	Lane	Stakeholder	State/Reg Agency
MDEQ-Water Resources Division	Dina	Klemans	Stakeholder	State/Reg Agency
MDNR - Recreation Division	Cheri	Lee	Stakeholder	State/Reg Agency
MDNR - Recreation Division	Ron	Olson	Stakeholder	State/Reg Agency
MDNR - Wildlife Division	Barbara	Avers	Stakeholder	State/Reg Agency
MDNR - Wildlife Division	Karen	Cleveland	Stakeholder	State/Reg Agency
MDNR - Wildlife Division	Lori	Sargent	Stakeholder	State/Reg Agency
MFSA/STANTEC	Christopher	Rybak	Technical Stakeholder	Engineer
Management, and Budget	Richard	Vance	Stakeholder	State/Reg Agency
Michigan Department of Agriculture	Michael	Gregg	Stakeholder	State/Reg Agency
Michigan Department of Agriculture	Stephen	Shine	Stakeholder	State/Reg Agency
and Rural Development	Tom	Young	Stakeholder	State/Reg Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
Labor & Economic Growth	Alice	Wood	Stakeholder	State/Reg Agency
Environmental Quality	Les	Thomas	Core Stakeholder	State/Reg Agency
Environmental Quality	Linda	Burke	Core Stakeholder	State/Reg Agency
Environmental Quality	Jerry	Fulcher	Core Stakeholder	Ecological; Local
Environmental Quality	Michael	Young	Stakeholder	State/Reg Agency
Environmental Quality - Executive	Jim	Sygo	Stakeholder	State/Reg Agency
Environmental Quality - Southeast	Maria	Zingas	Core Stakeholder	Ecological; Local
Environmental Quality - Southeast	Patrick	Durack	Core Stakeholder	Ecological; Local
Resources	Jordan	Byelich	State & Federal Legislative	State/Reg Agency
Resources	Mike	Kost	Stakeholder	State/Reg Agency
Resources	Anne	LeClaire-Mitchell	Stakeholder	State/Reg Agency
Resources	Carl	Lindell	Stakeholder	State/Reg Agency
Resources	Daniel	Lord	Stakeholder	State/Reg Agency
Resources	Laurel	Malvitz	Stakeholder	State/Reg Agency
Resources	Ed	Meadows	Stakeholder	State/Reg Agency
Resources	Daniel	Mullen	Stakeholder	State/Reg Agency
Resources	Jamie	Allen	Stakeholder	State/Reg Agency
Resources	Richard	Hausler	Stakeholder	State/Reg Agency
Resources	Mary	Nardo	Stakeholder	State/Reg Agency
Resources	Tammy	Newcomb	Stakeholder	State/Reg Agency
Resources	Paul	Petersen	Stakeholder	State/Reg Agency
Resources	James	Radabaugh	Stakeholder	State/Reg Agency
Resources	Raymond	Rustem	Stakeholder	State/Reg Agency
Resources	Ann	Sylvester	Stakeholder	State/Reg Agency
Resources	Susan	Tangora	Stakeholder	State/Reg Agency
Resources	Wendy	Winkler	Stakeholder	State/Reg Agency
Resources	Paul	Yauk	Stakeholder	State/Reg Agency
Resources	George	Lauinger	Stakeholder	State/Reg Agency
Resources	Jennifer	Olson	Stakeholder	State/Reg Agency
Resources	Michael	Terrell	Stakeholder	State/Reg Agency
Resources	Leland	VerBerkmoes	Stakeholder	State/Reg Agency
Resources	Scott	Whitcombs	Stakeholder	State/Reg Agency
Resources	Vicki	Anthes	Stakeholder	State/Reg Agency
Resources	Kristen	Bennett	Stakeholder	State/Reg Agency
Resources	Stephen	Beyer	Stakeholder	State/Reg Agency
Resources	William	Boik	Stakeholder	State/Reg Agency
Resources	Steve	Brisson	Stakeholder	State/Reg Agency
Resources	Elizabeth	Brockwell-Tillman	Stakeholder	State/Reg Agency
Resources	Robert E.	Clancy	Stakeholder	State/Reg Agency
Resources	Sandra	Clark	Stakeholder	State/Reg Agency
Resources	Paul	Curtis	Stakeholder	State/Reg Agency
Resources	Michelle	Davis	Stakeholder	State/Reg Agency
Resources	Michael	Evanoff	Stakeholder	State/Reg Agency
Resources	Ray	Fahlsing	Stakeholder	State/Reg Agency
Resources	Lisa	Gamero	Stakeholder	State/Reg Agency
Resources	Joelle	Gehring	Stakeholder	State/Reg Agency
Resources	Blake	Gingrich	Stakeholder	State/Reg Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
Resources	Wade	Hamilton	Stakeholder	State/Reg Agency
Resources	Christine	Hanaburgh	Stakeholder	State/Reg Agency
Resources	Sharon	Hanshue	Stakeholder	State/Reg Agency
Resources	Linda	Harlow	Stakeholder	State/Reg Agency
Resources	Elizabeth	Hay-Chmielewski	Stakeholder	State/Reg Agency
Resources	Mark	Hoffman	Stakeholder	State/Reg Agency
Resources	Christopher	Hoving	Stakeholder	State/Reg Agency
Resources	Daria	Hyde	Stakeholder	State/Reg Agency
Resources	Brian	Klatt	Stakeholder	State/Reg Agency
Resources	Kevin	Klco	Stakeholder	State/Reg Agency
Resources	Jennifer	Kleitch	Stakeholder	State/Reg Agency
Resources	Dennis	Knapp	Stakeholder	State/Reg Agency
Resources-Trust Fund	Shamika	Akew	Stakeholder	State/Reg Agency
Resources-Trust Fund	Christie	Bayus	Stakeholder	State/Reg Agency
Resources-Trust Fund	John	Cherry	Stakeholder	State/Reg Agency
Resources-Trust Fund	Steve	DeBrabander	Stakeholder	State/Reg Agency
Resources-Trust Fund	Earl	Flegler	Stakeholder	State/Reg Agency
Resources-Trust Fund	Jule	Stafford	Stakeholder	State/Reg Agency
Transportation	Bryan	Armstrong	Stakeholder	State/Reg Agency
Transportation	Margaret	Barondess	Stakeholder	State/Reg Agency
Transportation	Pete	Hanses	Stakeholder	State/Reg Agency
Transportation	Larry	Karnes	Stakeholder	State/Reg Agency
Transportation	Cynthia L.	Krupp	Stakeholder	State/Reg Agency
Transportation	Molly	Lamrouex	Stakeholder	State/Reg Agency
Transportation	Michael	Pennington	Stakeholder	State/Reg Agency
Transportation	Ulrika	Zay	Stakeholder	State/Reg Agency
Corporation	George	Zimmermann	Stakeholder	State/Reg Agency
Michigan Natural Features Inventory	Pete	Badra	Stakeholder	State/Reg Agency
Michigan Port Collaborative	Carol	Linteau	Stakeholder	State/Reg Agency
Michigan Sea Grant Extension	Steve	Stewart	State & Federal Legislative	State/Reg Agency
Michigan Sea Grant Extension	Josh	Gunn	State & Federal Legislative	State/Reg Agency
Michigan Sea Grant Extension	Justin	Selden	State & Federal Legislative	State/Reg Agency
Authority	Dean	Anderson	Stakeholder	State/Reg Agency
Authority	Laura	Ashlee	Stakeholder	State/Reg Agency
Authority	Karen	Gagnon	Stakeholder	State/Reg Agency
Authority	Duane	Thelen	Stakeholder	State/Reg Agency
Management	Mitch	Graham	State & Federal Legislative	State/Reg Agency
Management	Mike	Sobocinski	State & Federal Legislative	State/Reg Agency
Michigan State University	Alan	Arbogast	Technical Stakeholder	University
Michigan State University	B.	Barton	Technical Stakeholder	University
Michigan State University	Elaine	Bush	Technical Stakeholder	University
Michigan State University	Deborah	Clark	Technical Stakeholder	University
Michigan State University	John	Cummings	Technical Stakeholder	University
Michigan State University	Jim	Detjen	Technical Stakeholder	University
Michigan State University	Nicholas	Johnson	Technical Stakeholder	University
Michigan State University	Carol	McGeehan	Technical Stakeholder	University
Michigan State University	Dan	O'Keefe	Technical Stakeholder	University

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Organization	First Name	Last Name	Stakeholder Group	Category
Michigan State University	Scott	Peacor	Technical Stakeholder	University
Michigan State University	Dave	Poulson	Technical Stakeholder	University
Michigan State University	Joan	Rose	Technical Stakeholder	University
Michigan State University	Brandon	Schroeder	Technical Stakeholder	University
Michigan State University	Edi	Sonntag	Technical Stakeholder	University
Michigan State University	Howard	Wandell	Technical Stakeholder	University
Michigan State University	Howard	Wetters	Technical Stakeholder	University
Michigan State University	Zachary	Burton	Technical Stakeholder	University
Michigan State University	James	Harding	Technical Stakeholder	University
Michigan State University - County	Hal	Hudson	Technical Stakeholder	University
Agricultural Technology	Thomas	Coon	Technical Stakeholder	University
& Zoning Center	Mark	Wyckoff	Technical Stakeholder	University
Michigan Technological University	Mark	Maroste	Technical Stakeholder	University
Michigan Technological University	Joan	Schumaker-Chadde	Technical Stakeholder	University
Michigan Technological University	Robert	Shuchman	Technical Stakeholder	University
Michigan Technological University	Margaret	Gale	Technical Stakeholder	University
Michigan Technological University	Research	MTU	Technical Stakeholder	University
MSU - Institute of Water Research	Jon	Bartholic	Technical Stakeholder	University
National Ocean Industries Association	Randall	Luthi	Core	Fed Agency
National Park Service	Natalie	Franz	Core Stakeholder	Fed Agency
National Park Service	Karen	Gustin	Core Stakeholder	Fed Agency
National Park Service	Ruth	Heikkinen	Core Stakeholder	Fed Agency
National Park Service	Sue	Jennings	Core Stakeholder	Fed Agency
National Park Service	Barbara	Nelson-Jameson	Core Stakeholder	Fed Agency
National Park Service	Ethan	Scott	Core Stakeholder	Fed Agency
National Park Service	Diane	Banta	Core Stakeholder	Fed Agency
National Park Service	Jeff	Henquinet	Core	Fed Agency
National Park Service	Cliff	McCreedy	Core	Fed Agency
National Sea Grant Law Center	Nicholas	Lund	Core	Fed Agency
National Sea Grant Law Center	Terra	Bowling	Core	Fed Agency
National Wildlife Foundation	Jordan	Lubetkin	Technical Stakeholder	Ecological
National Wildlife Foundation	Jeff	Skelding	Technical Stakeholder	Ecological
National Wildlife Foundation	Melinda	Koslow	Technical Stakeholder	Ecological
National Wildlife Foundation	Marc	Smith	Core	Fed Agency
NatureServe	Sarah	Carr	Core	Fed Agency
NAVFAC Southwest	Cory	Scott	Core	Fed Agency
NOAA	David	Schwab	Stakeholder	Ecological
NOAA	Mark	Walton	Core	Fed Agency
NOAA	Drew	Gronewald	Stakeholder	Ecological
NOAA	Castellan	Allison	Core Stakeholder	Fed Agency
NOAA	Rina	Aviram	Core Stakeholder	Fed Agency
NOAA	Robin	Bruckner	Core Stakeholder	Fed Agency
NOAA	Rod	Ehler	Core Stakeholder	Fed Agency
NOAA	Matt	Gove	Core Stakeholder	Fed Agency
NOAA	Jeff	Gray	Core Stakeholder	Fed Agency
NOAA	Cathy	Green	Core Stakeholder	Fed Agency
NOAA	Russ	Green	Core Stakeholder	Fed Agency

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Organization	First Name	Last Name	Stakeholder Group	Category
NOAA	Craig	Stow	Stakeholder	Fed Agency
NOAA	John	Kuriawa	Core Stakeholder	Fed Agency
NOAA	Pat	Labadie	Core Stakeholder	Fed Agency
NOAA	Margaret	Lansing	Core Stakeholder	Fed Agency
NOAA	Josh	Lott	Core Stakeholder	Fed Agency
NOAA	Wayne	Lusardi	Core Stakeholder	Fed Agency
NOAA	Jean	Prevo	Core Stakeholder	Fed Agency
NOAA	Michael	Quigley	Core Stakeholder	Fed Agency
NOAA	Laurie	Rounds	Core Stakeholder	Fed Agency
NOAA	Elaine	Vaudreuil	Core Stakeholder	Fed Agency
NOAA	Dick	Wagenmaker	Core Stakeholder	Fed Agency
NOAA	Henry	Vanderploeg	Core	Fed Agency
NOAA	David	Easter	Core	Fed Agency
NOAA	Zdenka	Willis	Core	Fed Agency
NOAA	Nicole	Kurkowski	Core	Fed Agency
NOAA	David	Soroka	Core	Fed Agency
NOAA	John	Taylor	Core	Fed Agency
NOAA	Nelson	Vaz	Core	Fed Agency
NOAA	Bryan	Costa	Core	Fed Agency
NOAA	Elizabeth	Dieveney	Core	Fed Agency
NOAA	Peter	Edwards	Core	Fed Agency
NOAA	Andrew	Gilbert	Core	Fed Agency
NOAA	Joelle	Gore	Core	Fed Agency
NOAA	Valerie	Grussing	Core	Fed Agency
NOAA	Lucy	Hick	Core	Fed Agency
NOAA	Amy	Holman	Core	Fed Agency
NOAA	Susan	Holmes	Core	Fed Agency
NOAA	Stephen	Jameson	Core	Fed Agency
NOAA	Jessica	Keys	Core	Fed Agency
NOAA	John	King	Core	Fed Agency
NOAA	Louisa	Koch	Core	Fed Agency
NOAA	Lauren	Land	Core	Fed Agency
NOAA	Jennifer	Lukens	Core	Fed Agency
NOAA	Robert	Magnien	Core	Fed Agency
NOAA	Andrew	Mason	Core	Fed Agency
NOAA	Pat	Montanio	Core	Fed Agency
NOAA	Elizabeth	Mountz	Core	Fed Agency
NOAA	Patmarie	Nedelka	Core	Fed Agency
NOAA	Dana	Okano	Core	Fed Agency
NOAA	Linwood	Pendleton	Core	Fed Agency
NOAA	Susan	Pultz	Core	Fed Agency
NOAA	Larry	Robinson	Core	Fed Agency
NOAA	Brent	Schleck	Core	Fed Agency
NOAA	Robert	Scott	Core	Fed Agency
NOAA	Erica	Seiden	Core	Fed Agency
NOAA	Julie	Sims	Core	Fed Agency
NOAA	Paul	Taylor	Core	Fed Agency

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Organization	First Name	Last Name	Stakeholder Group	Category
NOAA	Elizabeth	Turner	Core	Fed Agency
NOAA	Sarah	van der Schalie	Core	Fed Agency
NOAA	Kenneth	Walker	Core	Fed Agency
NOAA	David	Whitall	Core	Fed Agency
NOAA	Andrew	Winer	Core	Fed Agency
NOAA	Michele	Winowitch	Core	Fed Agency
NOAA	Jessica	Winter	Core	Fed Agency
NOAA	Sally	Yozell	Core	Fed Agency
NOAA	Susan	Baker	Core	Fed Agency
NOAA	Nicole	Bartlett	Core	Fed Agency
NOAA	Jessica	Berrio	Core	Fed Agency
NOAA	Whitney	Blanchard	Core	Fed Agency
NOAA	Brendan	Bray	Core	Fed Agency
NOAA	Edward	Fenelon	Core	Fed Agency
NOAA	George	Graettinger	Core	Fed Agency
NOAA	Laura	Hamilton	Core	Fed Agency
NOAA	Susie	Holst	Core	Fed Agency
NOAA	Hendrik	Tolman	Core	Fed Agency
NOAA	Sonia	Joseph Joshi	Core	Fed Agency
NOAA	Brent	Lofgren	Core	Fed Agency
NOAA	Donna	Kashian	Core Stakeholder	Fed Agency
NOAA, National Weather Service	Michael	Sabones	Core	Fed Agency
Laboratory	Susan	Lovelace	Core	Fed Agency
NOAA/NOS/Coastal America	Virginia K.	Tippie	Core	Fed Agency
NOAA/NOS/CO-OPS	Cary	Wong	Core	Fed Agency
NOAA/NOS/NCCOS/CCMA	Kimani	Kimbrough	Core	Fed Agency
Lab	Richard	Patchen	Core	Fed Agency
NOAA/OCRM	Christa	Rabenold	Core	Fed Agency
&Restoration	Vicki	Loe	Core	Fed Agency
Conservation	Dan	Farrow	Core	Fed Agency
NOAA's Restoration Center	Perry	Gayaldo	Core	Fed Agency
NOAA \ Coast Survey	Kyle	Ward	Core	Fed Agency
Partnership	Carli	Bertrand	Core	Fed Agency
NOAA Climate Program Office	Adrienne	Antoine	Core	Fed Agency
NOAA Coastal and Marine Planning	Darci	Connor	Technical Stakeholder	Ecological
Program/TBG	Debbie	Butler	Core	Fed Agency
NOAA Coastal Service Center	Russell	Jackson	Core	Fed Agency
NOAA Coastal Services Center	Margaret	Davidson	Core	Fed Agency
NOAA Coastal Services Center	Sandy	Eslinger	Core	Fed Agency
NOAA Coastal Services Center	Hanna	Goss	Core	Fed Agency
NOAA Coastal Services Center	Linda	Hamalak	Core	Fed Agency
NOAA Coastal Services Center	Zachary	Hart	Core	Fed Agency
NOAA Coastal Services Center	Ginger	Hinchcliff	Core	Fed Agency
NOAA Coastal Services Center	Anthony	LaVoi	Core	Fed Agency
NOAA Coastal Services Center	Audra	Luscher-Aissaoui	Core	Fed Agency
NOAA Coastal Services Center	Doug	Marcy	Core	Fed Agency
NOAA Coastal Services Center	Donna	McCaskill	Core	Fed Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
NOAA Coastal Services Center	Betsy	Nicholson	Core	Fed Agency
NOAA Coastal Services Center	Jeff	Payne	Core	Fed Agency
NOAA Coastal Services Center	Gale	Peek	Core	Fed Agency
NOAA Coastal Services Center	Tricia	Ryan	Core	Fed Agency
NOAA Coastal Services Center	Rebecca	Smyth	Core	Fed Agency
NOAA Coastal Services Center	Heidi	Stiller	Core	Fed Agency
NOAA Coastal Services Center	Bill	Thomas	Core	Fed Agency
NOAA Coastal Services Center	Jeffery	Adkins	Core	Fed Agency
Lab	Janice	Eisenberg	Core	Fed Agency
NOAA CSC	Peter	Wiley	Core	Fed Agency
NOAA ERD	Cory	Riley	Core	Fed Agency
NOAA Fisheries	Terry	Heatlie	Core	Fed Agency
NOAA Fisheries	Steve	Lewis	Core	Fed Agency
NOAA Fisheries	Joel	Nohner	Core	Fed Agency
NOAA Fisheries	Nathaniel	Scholz	Core	Fed Agency
NOAA Fisheries	Kristy	Wallmo	Core	Fed Agency
Conservation	Garry	Mayer	Core	Fed Agency
NOAA Fisheries Service	Sarah	Garvin	Core	Fed Agency
NOAA Fisheries Service	Janine	Harris	Core	Fed Agency
NOAA Fisheries Service	Kirsten	Larsen	Core	Fed Agency
NOAA Fisheries Service	Jeff	Smith	Core	Fed Agency
NOAA Fisheries Service	Bill	Zahner	Core	Fed Agency
NOAA GLERL	Thomas	Bellino	Core	Fed Agency
NOAA GLERL	Alice	Rossignol	Core	Fed Agency
NOAA GLERL	Steve	Ruberg	Core	Fed Agency
NOAA GLHRP	Osvaldo	Sepulveda Villet	Core	Fed Agency
Research Lab	Marie	Colton	Core	Fed Agency
Network	Rochelle	Sturtevant	Core	Fed Agency
NOAA Marine Debris Division	Charlie	Henry	Core	Fed Agency
NOAA Marine Debris Division	Sarah	Morison	Core	Fed Agency
NOAA Marine Debris Division	Peter	Murphy	Core	Fed Agency
NOAA Marine Debris Division	Sarah	Opfer	Core	Fed Agency
NOAA Marine Debris Division	Courtney	Arthur	Core	Fed Agency
NOAA Marine Debris Program	Kris	McElwee	Core	Fed Agency
Center	Lauren	Wenzel	Core	Fed Agency
NOAA MDP	Nir	Barnea	Core	Fed Agency
Ocean Science	David	Kidwell	Core	Fed Agency
NOAA National Data Buoy Center	Richard	Crout	Core	Fed Agency
Service	Mark	Capelli	Core	Fed Agency
NOAA National Weather Service	Christine	Alex	Core	Fed Agency
Pacific Region	Edward H	Young Jr	Core	Fed Agency
NOAA NMFS	Erika	Ammann	Core	Fed Agency
NOAA NMFS	Christopher	Boelke	Core	Fed Agency
NOAA NMFS HCD	Mark	Sramek	Core	Fed Agency
NOAA NOS	Stephen	Gill	Core	Fed Agency
NOAA NOS	David	Kennedy	Core	Fed Agency
NOAA NOS	Lyon	Lanerolle	Core	Fed Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
NOAA NOS	Lynne	Mersfelder-Lewis	Core	Fed Agency
NOAA NOS CO-OPS	Lori	Fenstermacher	Core	Fed Agency
NOAA NOS CO-OPS	Jeffrey	Oyler	Core	Fed Agency
NOAA NOS CSDL	Micah	Wengren	Core	Fed Agency
Office	Arwen	Edsall	Core	Fed Agency
Office	Annie	Hillary	Core	Fed Agency
NOAA NOS NGS	John	Ellingson	Core	Fed Agency
NOAA NOS NGS	Marti	Ikehara	Core	Fed Agency
NOAA NOS OCRM	Diana	Olinger	Core	Fed Agency
NOAA NOS Special Projects	Nancy	Wallace	Core	Fed Agency
NOAA NOS Special Projects	Brent	Ache	Core	Fed Agency
NOAA NWS	Charles	Paxton	Core	Fed Agency
NOAA NWS	Laura	Furgione	Core	Fed Agency
NOAA NWS	Tracy	Rouleau	Core	Fed Agency
NOAA Ocean Service	Ralph	Cantral	Core	Fed Agency
NOAA OCRM	Hui	Rodomsky	Core	Fed Agency
NOAA OCRM	Terry	Augustus	Core	Fed Agency
Sanctuaries	Daniel J.	Basta	Core	Fed Agency
Sanctuaries	Ellen	Brody	Core	Fed Agency
Resource Management	Rebecca	Feldman	Core	Fed Agency
NOAA Office of Response	Ruth	Yender	Core	Fed Agency
NOAA Sea Grant	Heather	Triezenberg	Core	Fed Agency
Governments	Richard	Deuell	Community & Property Stakeholder	Regional
Governments	Nico	Tucker	Community & Property Stakeholder	Regional
Governments	Diane	Rekowski	Community & Property Stakeholder	Regional
Northwestern Michigan College	Tim	Nelson	Technical Stakeholder	University
Northwestern Michigan College	Hans	Van Sumersen	Technical Stakeholder	University
Governments	Matt	McCauley	Community & Property Stakeholder	Regional
Northwest Ottawa Water System	Joseph	VanderStel	Technical Stakeholder	Engineer
NOS	Davida	Remer	Core	Fed Agency
NOS	Peg	Steffen	Core	Fed Agency
NOS NOAA OCRM	Debra	Persons	Core	Fed Agency
NOS Special Projects	Kristen	Crossett	Core	Fed Agency
Ocean Conservancy	Sandra	Whitehouse	Technical Stakeholder	Ecological
Ocean Conservancy	Shaunna	McCovey	Technical Stakeholder	Ecological
Ohio State University	Joe	Lucente	Technical Stakeholder	University
Pacific Risk Management Ohana	Adam	Stein	Core	Fed Agency
Prein & Newof	Amy	Malek	Technical Stakeholder	Engineer
Public Sector Consultants, Inc.	Jack	Bails	Technical Stakeholder	Engineer
Public Sector Consultants, Inc.	Mark	Coscarelli	Technical Stakeholder	Engineer
Public Sector Consultants, Inc.	Ken	Sikkema	Technical Stakeholder	Engineer
Public Sector Consultants, Inc.		Stalberg	Technical Stakeholder	Engineer
Purdue University	Cary	Troy	Technical Stakeholder	University; Engineer
Restore America's Estuaries	Chris	Lyons	Technical Stakeholder	Ecological
Restore America's Estuaries	Jeffrey	Benoit	Technical Stakeholder	Ecological
SEMCOG	Chuck	Hersey	Community & Property Stakeholder	Regional
SEMCOG	William	Parkus	Technical Stakeholder	Ecological

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
Program)	Emily	Green	Technical Stakeholder	Ecological
Sierra Club (Michigan Chapter)	Anne	Woiwode	Technical Stakeholder	Ecological
Governments	Amy	Mangus	Community & Property Stakeholder	Regional
Governments	Paul	Tait	Community & Property Stakeholder	Regional
Governments	Ann	Burns	Community & Property Stakeholder	State Official
Commission	Marcy	Colclough	Community & Property Stakeholder	Regional
Commission	John	Egelhaaf	Community & Property Stakeholder	Regional
Southwick Associates	Rob	Southwick	Technical Stakeholder	Engineer
Spicer Group	Russ	Beaubien	Technical Stakeholder	Engineer
Spicer Group	Lori E.	Ettema	Technical Stakeholder	Engineer
Spicer Group	Rob	Eggers	Technical Stakeholder	Engineer
St. Clair County	William	Kauffman	Community & Property Stakeholder	Local Official
St. Clair County	David	Struck	Community & Property Stakeholder	Local Official
St. Clair County BOC	Bill	Gratopp	Community & Property Stakeholder	Local Official
St. Clair County Health Department	Kristen	O'Reilly	Community & Property Stakeholder	Local Official
Planning Commission	Geoffrey	Donaldson	Community & Property Stakeholder	Local Official
St. Clair Township	Brian	Mahaffy	Community & Property Stakeholder	Local Official
Stantec	Dima	El-Gamal	Technical Stakeholder	Contractor
Stantec	Brian	Simons	Technical Stakeholder	Contractor
State of Michigan	Charles	Allen	Stakeholder	State/Reg Agency
State of Michigan	Jordan	Kameron	Stakeholder	State/Reg Agency
State of Michigan	James	Riley	Stakeholder	State/Reg Agency
State of Michigan	Lee	Yuman	Technical Stakeholder	University
Enviornmental Committee	Joe	St. John	Technical Stakeholder	Ecological
Enviornmental Committee	Mark	Balon	Technical Stakeholder	Ecological
Surfrider Foundation	Kathy	Greer	Technical Stakeholder	Ecological
Surfrider Foundation	Angela	Howe	Technical Stakeholder	Ecological
Surfrider Foundation	Pete	Stauffer	Technical Stakeholder	Ecological
Tetra Tech, Inc.	Bob	Nelson	Technical Stakeholder	Engineer
Tetra Tech, Inc.	Steve	Pennington	Technical Stakeholder	Engineer
The Baldwin Group, Inc NOAA CSC	Lindsay	Goodwin	Core	Fed Agency
The Baldwin Group, Inc NOAA CSC	John	McCombs	Core	Fed Agency
The Baldwin Group, Inc NOAA CSC	Cyndi	McLean	Core	Fed Agency
The Baldwin Group, Inc NOAA CSC	Jacob	Sobin	Core	Fed Agency
The Baldwin Group, Inc NOAA CSC	Tashya	Allen	Core	Fed Agency
The Baldwin Group, Inc NOAA CSC	Danielle	Bamford	Core	Fed Agency
Regional Planning & Development	Lloyd	Matthes	Community & Property Stakeholder	Regional
Regional Planning & Development	Peter	Van Steen	Community & Property Stakeholder	Regional
The City of St. Clair Shores	Robert A.	Hison	Community & Property	Mayor
The Nature Conservancy	Jena	Carter	Technical Stakeholder	Ecological
The Nature Conservancy	Mary	Conley	Technical Stakeholder	Ecological
The Nature Conservancy	Jeffrey	DeQuattro	Technical Stakeholder	Ecological
The Nature Conservancy	Patrick	Doran	Technical Stakeholder	Ecological
The Nature Conservancy	Zach	Ferdana	Technical Stakeholder	Ecological
The Nature Conservancy	Laura	Geselbracht	Technical Stakeholder	Ecological
The Nature Conservancy	Ben	Gilmer	Technical Stakeholder	Ecological
The Nature Conservancy	Jennifer	Greene	Technical Stakeholder	Ecological

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
The Nature Conservancy	Lynne	Hale	Technical Stakeholder	Ecological
The Nature Conservancy	Shaun	Howard	Technical Stakeholder	Ecological
The Nature Conservancy	Jon	Kachmar	Technical Stakeholder	Ecological
The Nature Conservancy	Heather Nahaku	Kalei	Technical Stakeholder	Ecological
The Nature Conservancy	Mary	Khoury	Technical Stakeholder	Ecological
The Nature Conservancy	Michelle	Lennox	Technical Stakeholder	Ecological
The Nature Conservancy	Sally	McGee	Technical Stakeholder	Ecological
The Nature Conservancy	Christopher	McGuire	Technical Stakeholder	Ecological
The Nature Conservancy	Kameran	Onley	Technical Stakeholder	Ecological
The Nature Conservancy	Douglas	Pearsall	Technical Stakeholder	Ecological
The Nature Conservancy	Rachael Franks	Taylor	Technical Stakeholder	Ecological
The Nature Conservancy	Jay	Udelhoven	Technical Stakeholder	Ecological
The Nature Conservancy	Adam	Whelchel	Technical Stakeholder	Ecological
The Nature Conservancy	Bradley	Wong	Technical Stakeholder	Ecological
The Nature Conservancy	Michael	Beck	Technical Stakeholder	Ecological
The Nature Conservency	Nicole	Van Helden	Technical Stakeholder	Ecological
of Concerns	Sharon	Baker	Stakeholder	State/Reg Agency
Thomas M. Cooley Law School	C.	Shafer	Technical Stakeholder	University
U.S. Coast Guard	John	Oliver	Core	Fed Agency
U.S. Coast Guard	Steven	Tucker	Core	Fed Agency
U.S. Coast Guard	Eric	Vogelbacher	Core	Fed Agency
U.S. Department of Agriculture	Paula	Gromak	Core Stakeholder	Fed Agency
U.S. Department of Agriculture	Jim	Hergott	Core Stakeholder	Fed Agency
U.S. Department of the Interior	Eileen	Sobeck	Core	Fed Agency
U.S. DOI	Douglas	Mutter	Core	Fed Agency
U.S. EPA	Rose	Ellison	Core Stakeholder	Fed Agency
U.S. EPA	Tinka	Hyde	Core Stakeholder	Fed Agency
U.S. EPA	Linda	Jacobs	Core Stakeholder	Fed Agency
U.S. EPA	Jamal	Kadri	Core Stakeholder	Fed Agency
U.S. EPA	John	Perrecone	Core Stakeholder	Fed Agency
U.S. EPA	James	Schardt	Core Stakeholder	Fed Agency
U.S. EPA	Amy	Sauer	Technical Stakeholder	Fed Agency
U.S. EPA	Kristan	Uhlenbrock	Technical Stakeholder	Fed Agency
U.S. EPA	Jeremy	Martinich	Technical Stakeholder	Fed Agency
U.S. EPA	Marilyn	ten Brink	Technical Stakeholder	Fed Agency
U.S. EPA (ORISE)	Ashley	Greene	Core	Fed Agency
U.S. EPA GLNPO	Karen	Rodriguez	Technical Stakeholder	Ecological
U.S. Fish & Wildlife Service	Scott	Hicks	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	General	Email	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Don	Waye	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Anjanette	Bowen	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Craig	Czarnecki	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Christie	Deloria	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Jack	Dingledine	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Steve	Dushane	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Burr	Fisher	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	John	Hartig	Core Stakeholder	Fed Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
U.S. Fish & Wildlife Service	Jim	Hazelman	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Barb	Hosler	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Jim	Hudgins	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Albert	Manville	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Greg	Norwood	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Heather	Rawlings	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Michelle	Vander Haar	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Vince	Cavalieri	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Matt	Stuber	Core Stakeholder	Fed Agency
U.S. Fish & Wildlife Service	Brian	Huberty	Core	Fed Agency
U.S. Fish and Wildlife Service	Chris	Darnell	Core	Fed Agency
U.S. Fish and Wildlife Service	Jennifer	Greiner	Core	Fed Agency
U.S. Fish and Wildlife Service	Richard	Leopold	Core	Fed Agency
U.S. Fish and Wildlife Service	Douglas	Austen	Core	Fed Agency
U.S. Fish and Wildlife Service	James	Boase	Core	Fed Agency
U.S. Geological Survey	Matthew	Cimitile	Core	Fed Agency
U.S. Geological Survey	Alisa	Coffin	Core	Fed Agency
U.S. Geological Survey	Michael	Fienen	Core	Fed Agency
U.S. Geological Survey	Donna	Francy	Core	Fed Agency
U.S. Geological Survey	Lori	Fuller	Core	Fed Agency
U.S. Geological Survey	Zhongfu	Ge	Core	Fed Agency
U.S. Geological Survey	Norman	Grannemann	Core	Fed Agency
U.S. Geological Survey	Robert	Kay	Core	Fed Agency
U.S. Geological Survey	Jack	Kindinger	Core	Fed Agency
U.S. Geological Survey	David	Krabbenhoft	Core	Fed Agency
U.S. Geological Survey	James	Larson	Core	Fed Agency
U.S. Geological Survey	Michael	Lee	Core	Fed Agency
U.S. Geological Survey	James	McKenna	Core	Fed Agency
U.S. Geological Survey	Sandra	Morrison	Core	Fed Agency
U.S. Geological Survey	Elizabeth	Murphy	Core	Fed Agency
U.S. Geological Survey	Meredith	Nevers	Core	Fed Agency
U.S. Geological Survey	Lawrence	Poppe	Core	Fed Agency
U.S. Geological Survey	Howard	Reeves	Core	Fed Agency
U.S. Geological Survey	Dale	Robertson	Core	Fed Agency
U. S. Geological Survey	Frances	Lightsom	Core	Fed Agency
Science Center	Murulee	Byappanahalli	Core	Fed Agency
Water Science Center	Richard	Jodoin	Core	Fed Agency
U.S. Geological Survey/Midwest Area	Randolph	See	Core	Fed Agency
Science Center	Mark	Rogers	Core	Fed Agency
Science Center	Paul	Seelbach	Core	Fed Agency
NOAA Administrator	Jane	Lubchenco	Core	Fed Agency
UNH NERRS Science Collaborative	Kalle	Matso	Technical Stakeholder	University
United States Forest Service	Janet K.	Ekstrum	Core Stakeholder	Fed Agency
United States Forest Service	Jim	Gries	Core Stakeholder	Fed Agency
United States Forest Service	Dave	Maercklein	Core Stakeholder	Fed Agency
United States Forest Service	LeAnne	Marten	Core Stakeholder	Fed Agency
United States Forest Service	Steve	Sjogren	Core Stakeholder	Fed Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
University of Guelph	Merritt	Turetsky	Technical Stakeholder	University
Champaign	B. K.	Miller	Technical Stakeholder	University
University of Michigan	Guy	Meadows	Technical Stakeholder	University; Engineer
University of Michigan	Lisa	Brush	Technical Stakeholder	University
University of Michigan	Lorelle	Meadows	Technical Stakeholder	University
University of Michigan	R. K.	Norton	Technical Stakeholder	University
University of Michigan	Edward	Rutherford	Technical Stakeholder	University
School of Natural Resources and the	Dmitry	Beletsky	Stakeholder	Ecological
University of Michigan - Flint	Jonathan	Jarosz	Technical Stakeholder	University
University of New Hampshire	Dolores	Leonard	Technical Stakeholder	University
University of Wisconsin - Madison	Tuncer	Edil	Technical Stakeholder	University; Engineer
URS Corporation	Bill	Babcock	Technical Stakeholder	Engineer
USACE	Jim	Golloway	Core Stakeholder	USACE
USACE	Craig M.	Forget	Core Stakeholder	USACE
USACE	Dave	Gerczak	Core Stakeholder	USACE
USACE	Jack	Davis	Core	Fed Agency
USACE	Jennifer	Tate	Core	Fed Agency
USACE	Lauren	Dunkin	Core	Fed Agency
USACE	Molly	Reif	Core	Fed Agency
USACE	Susan	Durden	Core	Fed Agency
USACE	Paul	DeMarco	Core	Fed Agency
USACE	Idris	Dobbs	Core	Fed Agency
USACE	Martin	Durkin	Core	Fed Agency
USACE	Anthony	Eberhardt	Core	Fed Agency
USACE	Thomas	Fredette	Core	Fed Agency
USACE	Julie	Gorecki	Core	Fed Agency
USACE	Thomas	Hempfling	Core	Fed Agency
USACE	William	Hubbard	Core	Fed Agency
USACE	Kelly	Legault	Core	Fed Agency
USACE	Tate	McAlpin	Core	Fed Agency
USACE	Peter	Rabbon	Core	Fed Agency
USACE	Richard	Ruby	Core	Fed Agency
USACE	Paul	Bijhouwer	Core	Fed Agency
USACE	Marie	Strum	Core	Fed Agency
Resources	Lynn	Martin	Core	Fed Agency
USACE/JALBTCX	Charlene	Sylvester	Core	Fed Agency
Laboratory	John	McCormick	Core	Fed Agency
Hydraulics Laboratory	Robert	McAdory	Core	Fed Agency
USACE Institute for Water Resources	Laura	Herrmann	Core	Fed Agency
Resources	Judy	Soutiere	Core	Fed Agency
US Army Corps of Engineers	Paul	Stodola	Core	Fed Agency
US Army Corps of Engineers	Rena	Weichenberg	Core	Fed Agency
US Army Corps of Engineers	Candida	Bronson	Core	Fed Agency
Coastal PCX	Lawrence	Cocchieri	Core	Fed Agency
Development Center	Cynthia	Price	Core	Fed Agency
Development Center	Richard	Price	Core	Fed Agency
Development Center	Jennifer	Seiter	Core	Fed Agency

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
US Army Research & Dev Center	Lihwa	Lin	Core	Fed Agency
US Coast Guard	Patrick	Wycko	Core	Fed Agency
USDA/NRCS	Rand	Briggs	Core	Fed Agency
Conservation Service	Howard	Hankin	Core	Fed Agency
Conservation Service	Cheryl	Rice	Core	Fed Agency
Conservation Service	Vicki	Anderson	Core	Fed Agency
Conservation Service	Craig	Ficenec	Core	Fed Agency
Conservation Service	Tom	Krapf	Core	Fed Agency
Conservation Service	Eric	Allness	Core	Fed Agency
USDA NRCS	Sheldon	Hightower	Core	Fed Agency
USDA-NRCS	Ruth	Shaffer	Core Stakeholder	Fed Agency
USDA-NRCS	Paul	Sandstrom	Core	Fed Agency
USDA - Wildlife Services	John	Hartmann	Core	Fed Agency
US Department of the Interior/USGS	Ann	Tihansky	Core	Fed Agency
US Department of Transportation	Marvourneen	Dolor	Core	Fed Agency
US EPA	Pete	Cassell	Core	Fed Agency
US EPA	Paul	Cough	Core	Fed Agency
US EPA	Michael	Craghan	Core	Fed Agency
US EPA	Cara	Crawford	Core	Fed Agency
US EPA	Mario	Del Vicario	Core	Fed Agency
US EPA	Roberta	Miller	Core	Fed Agency
US EPA	David	Batson	Core	Fed Agency
Program Office	Brenda	Jones	Core	Fed Agency
US EPA-Great Lakes Program Office	Marc	Tuchman	Core	Fed Agency
US EPA - Office Of Water	Rose Anne	Galer	Core	Fed Agency
US EPA Region 1	Regina	Lyons	Core	Fed Agency
USEPA Region 10	Jonathan	Freedman	Core	Fed Agency
USEPA Region 5	Elizabeth	Poole	Core	Fed Agency
US Fish & Wildlife Service	Ted	Koehler	Core	Fed Agency
US Fish and Wildlife Service	Mark	Brouder	Core	Fed Agency
USFWS	Mark	Holey	Technical Stakeholder; Core	Ecological
USFWS	Dallas	Miner	Core	Fed Agency
USGS	Jana	Stewart	Core	Fed Agency
Village of Grosse Point Shores	James M.	Cooper	Community & Property	Mayor
WadeTrim	Fran	Brink	Technical Stakeholder	Engineer
WadeTrim	A.	Young	Technical Stakeholder	Engineer
Wayne County	Robert	Ficano	Community & Property Stakeholder	Local Official
Wayne County	Jerry	Spryfza	Community & Property Stakeholder	Local Official
University Extension	Richard	Wooten	Technical Stakeholder	University
Wayne State University	Mark	Baskaran	Technical Stakeholder	University
Wayne State University	David	Pitts	Technical Stakeholder	University
Wayne State University - Eng	Carol	Miller	Technical Stakeholder	University
Western Michigan University	David	Lemberg	Technical Stakeholder	University
Development Region	Kim	Stoker	Community & Property Stakeholder	Regional
Development Region 2	Lori	Hauswirth	Community & Property Stakeholder	Regional
Commission	Dave	Bee	Community & Property Stakeholder	Regional
Development Commission	Erin	Kuhn	Community & Property Stakeholder	Regional

Lake St. Clair Stakeholder List

Organization	First Name	Last Name	Stakeholder Group	Category
Development Commission		Nan	Community & Property Stakeholder	Regional
Development Commission	Nannette	Emmer	Community & Property Stakeholder	Regional
Development Commission	Sandeep	Dey	Community & Property Stakeholder	Regional
Development Commission	Susan	Stine-Johnson	Community & Property Stakeholder	Regional
NOAA MPA Center	Denise	Ellis-Hibbett	Core	Fed Agency

APPENDIX B
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*

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

U.S. Department of Homeland Security
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:

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

U.S. Department of Homeland Security
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:

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

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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:		

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

U.S. Department of Homeland Security
Federal Emergency Management Agency Region V
536 South Clark Street, 6th Floor
Chicago, Illinois 60605

SUBMITTED BY:



125 S. Wacker Drive, Suite 600
Chicago, IL 60606

Date Submitted: February 2013

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.

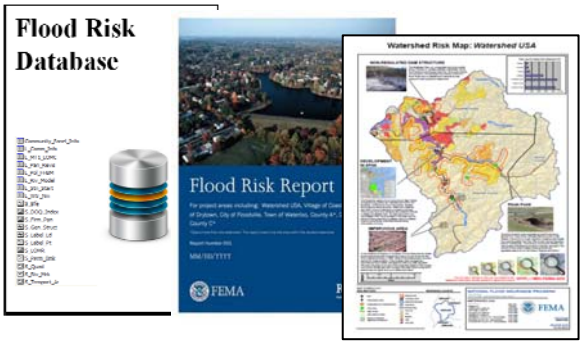
The following section describes the coastal flood risk products that a community may receive as part of a Risk MAP flood study, as well as some products that are under development for the Great Lakes study areas.

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.

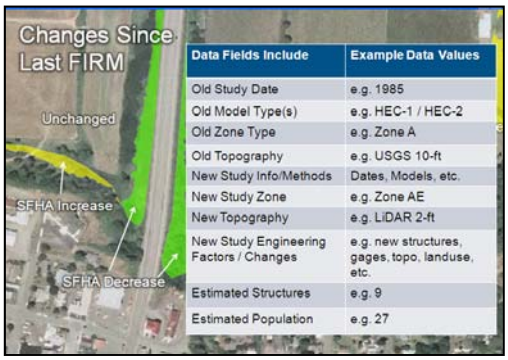
The three products are:

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

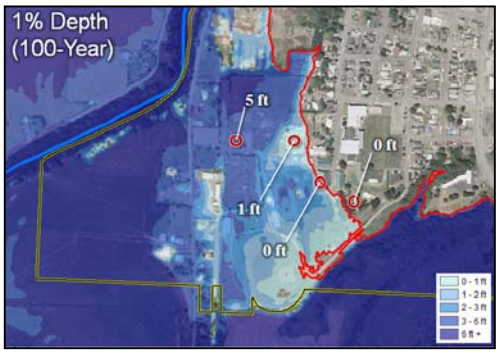


These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below.

- **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.

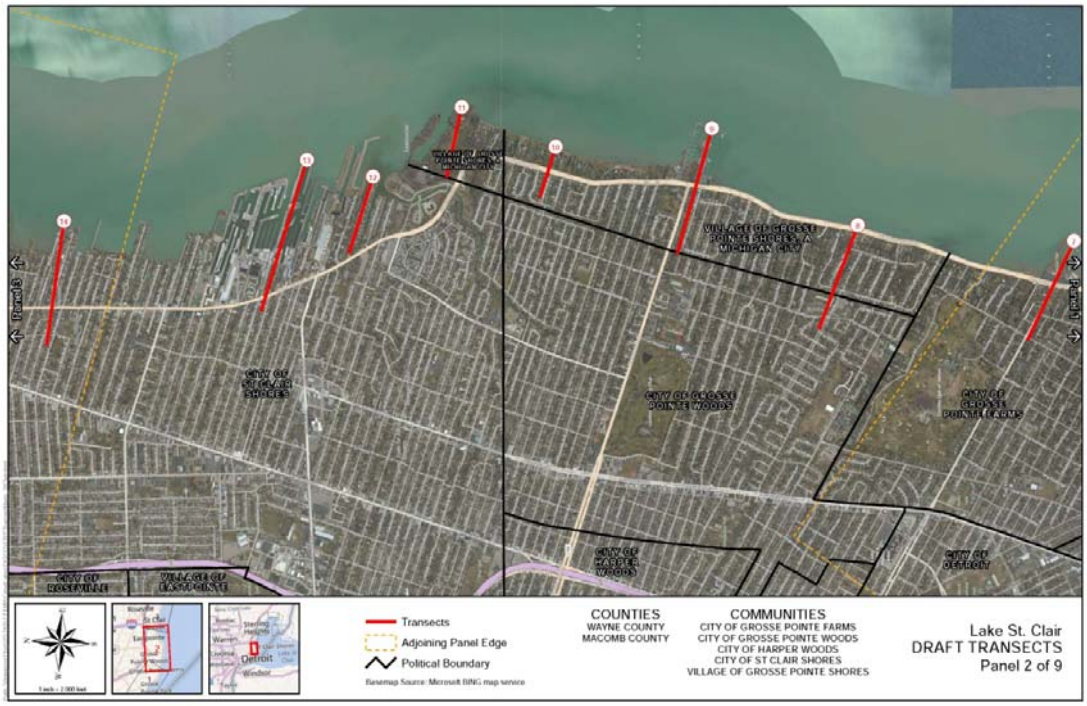


Figure 1: Sample Proposed Transect Figure

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.

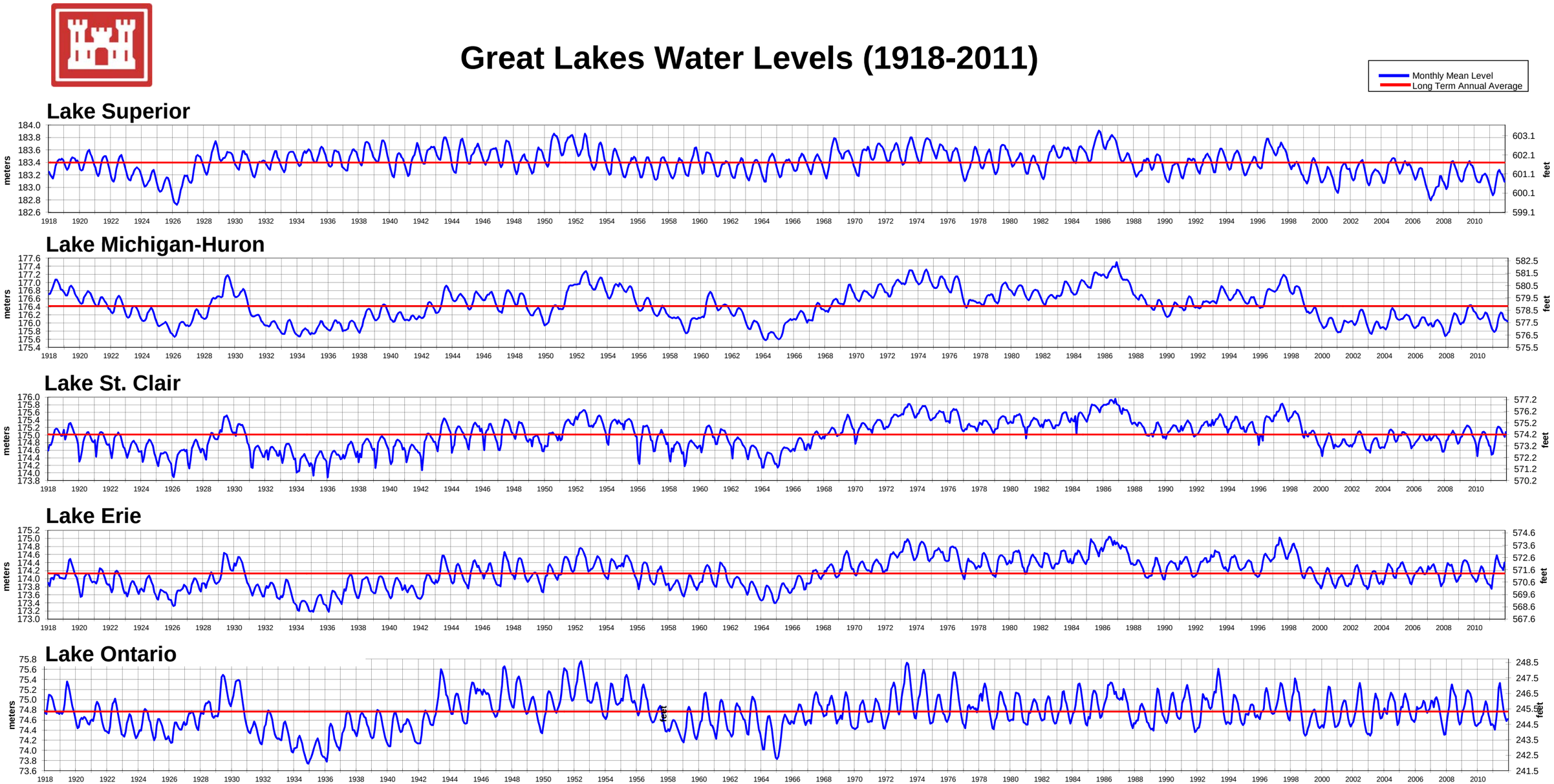
Great Lakes water levels constitute one of the longest high quality hydrometeorological data sets in North America with reference gage records beginning about 1860 with sporadic records back to the early 1800's. Table 16 lists the water level stations along Lake St. Clair.

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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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:

U.S. Department of Homeland Security
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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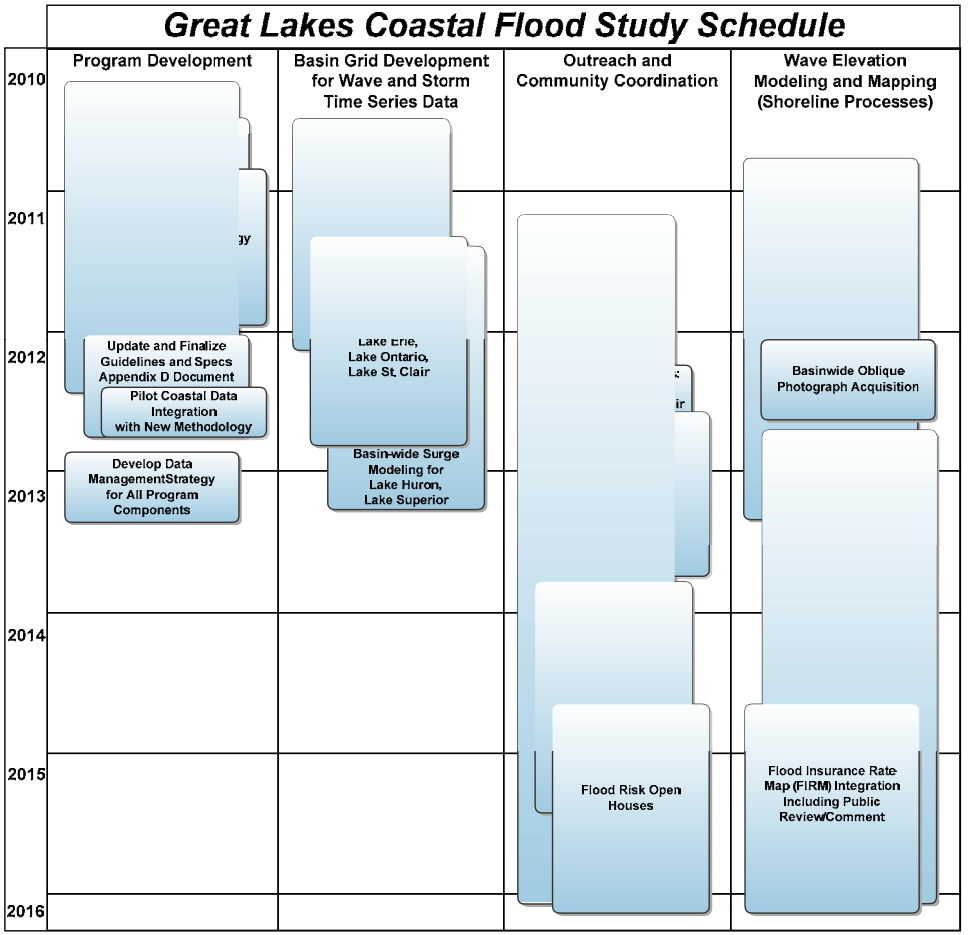
Program Overview

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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greatlakescoast.org

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)

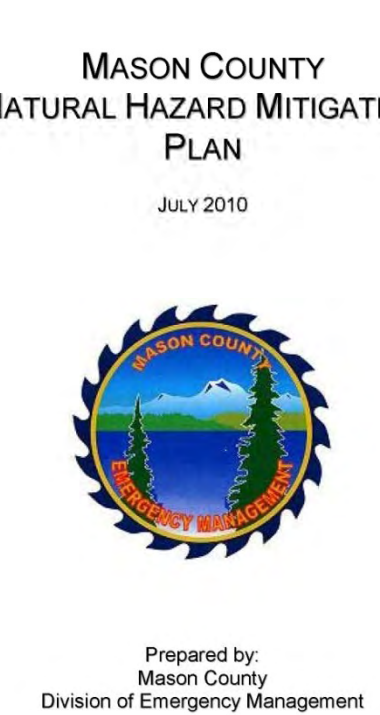
Reducing hazard risks and vulnerabilities through education, planning, physical improvements, early warning, and coordination of programs and resources.

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

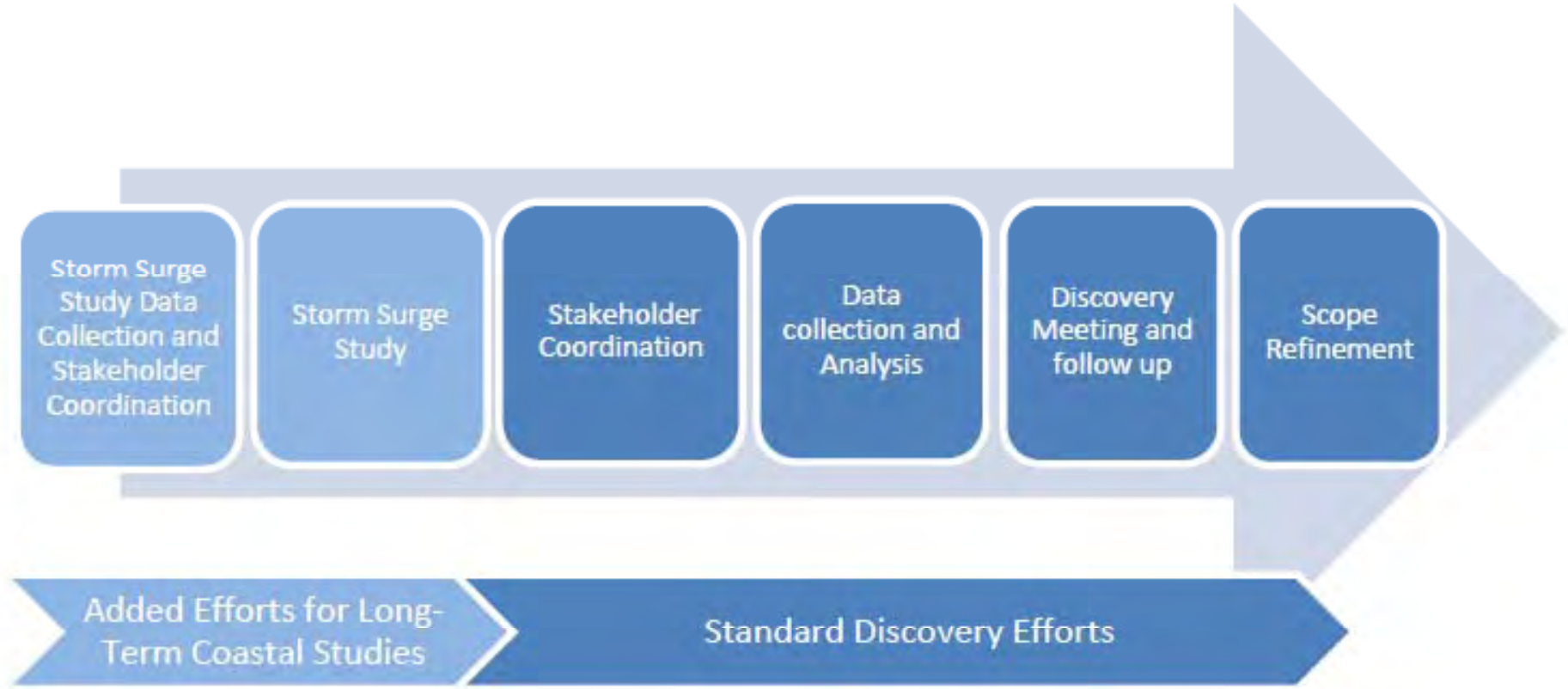
JULY 2010

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
greatlakescoast.org

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
greatlakescoast.org

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…

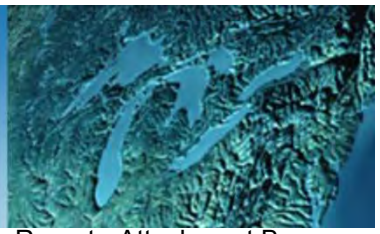
Flood Risk Discovery and Initial Coordination - 8 Meetings Planned for Lake Michigan

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

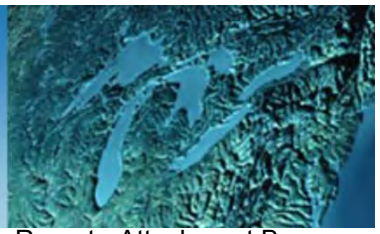
Flood Risk Discovery and Initial Coordination - 3 Meetings Planned for Lake St. Clair

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
greatlakescoast.org



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

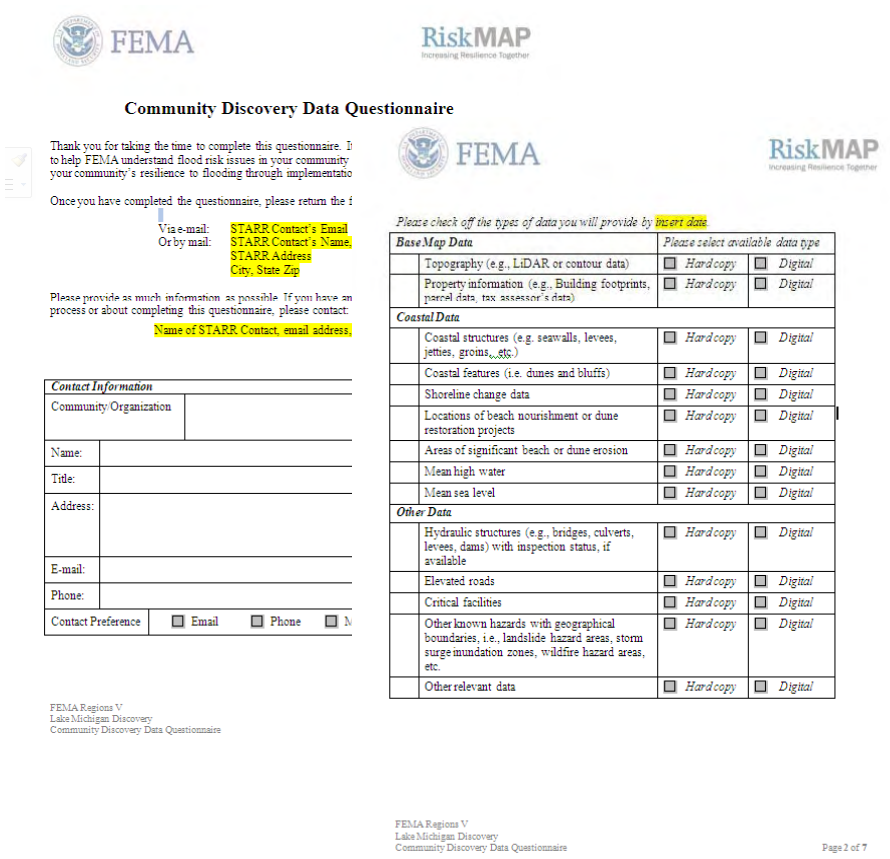
Outcome #3 - Introduce Mitigation Action Goals

- 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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Great Lakes Coastal Flood Study
greatlakescoast.org

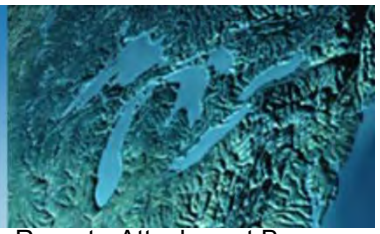
FEMA

Flood Risk Datasets

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

RiskMAP
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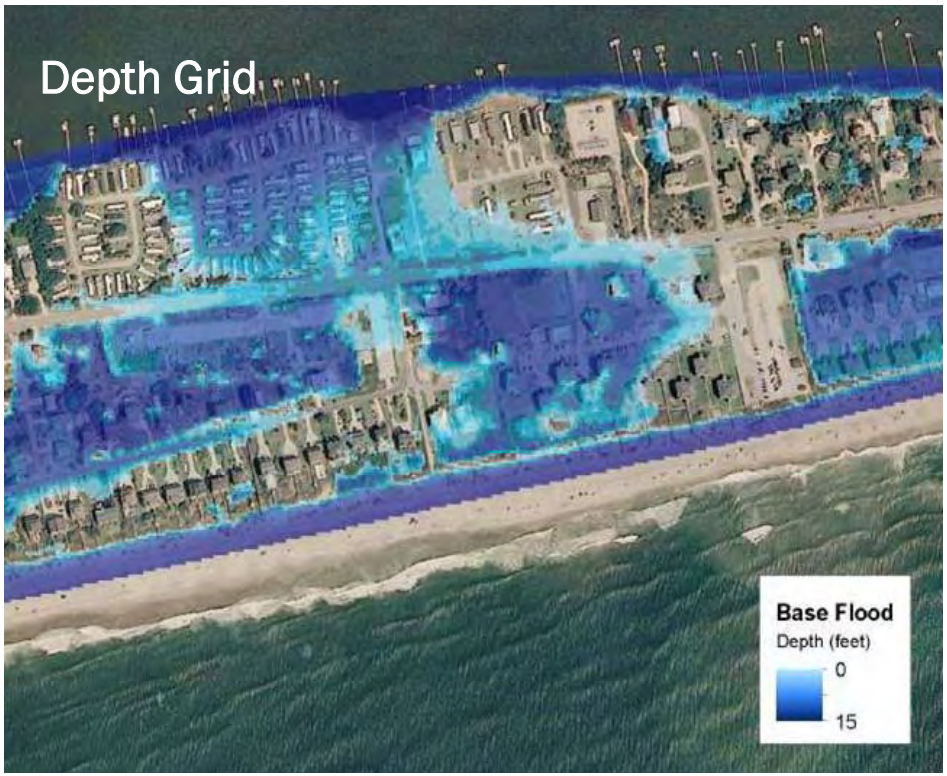
Great Lakes Coastal Flood Study
greatlakescoast.org



Standard Flood Risk Products

- Coastal Depth Grids
- Flood Risk Assessment (HAZUS)

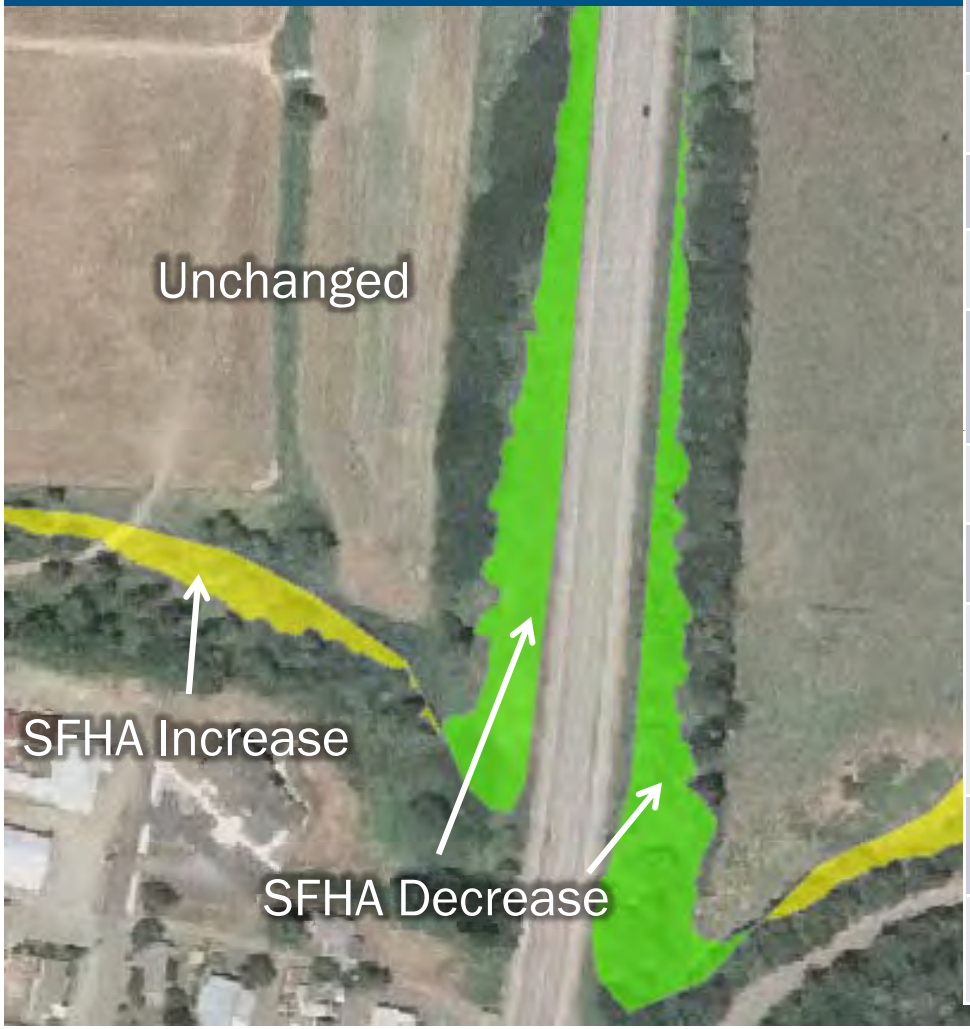
HAZUS MH
EARTHQUAKE • WIND • FLOOD



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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

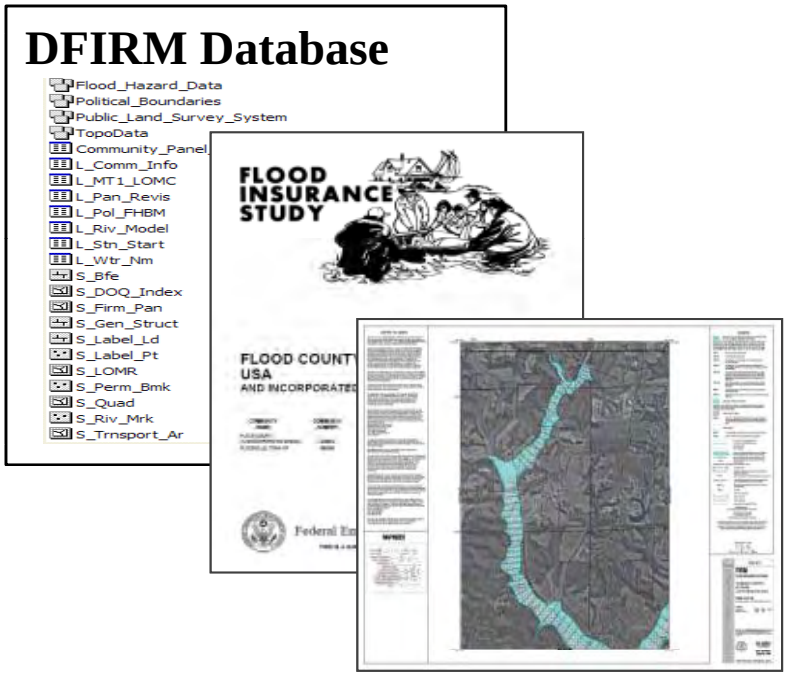
- Contains primary and secondary Land Use tables – same for coast type and vegetation.
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

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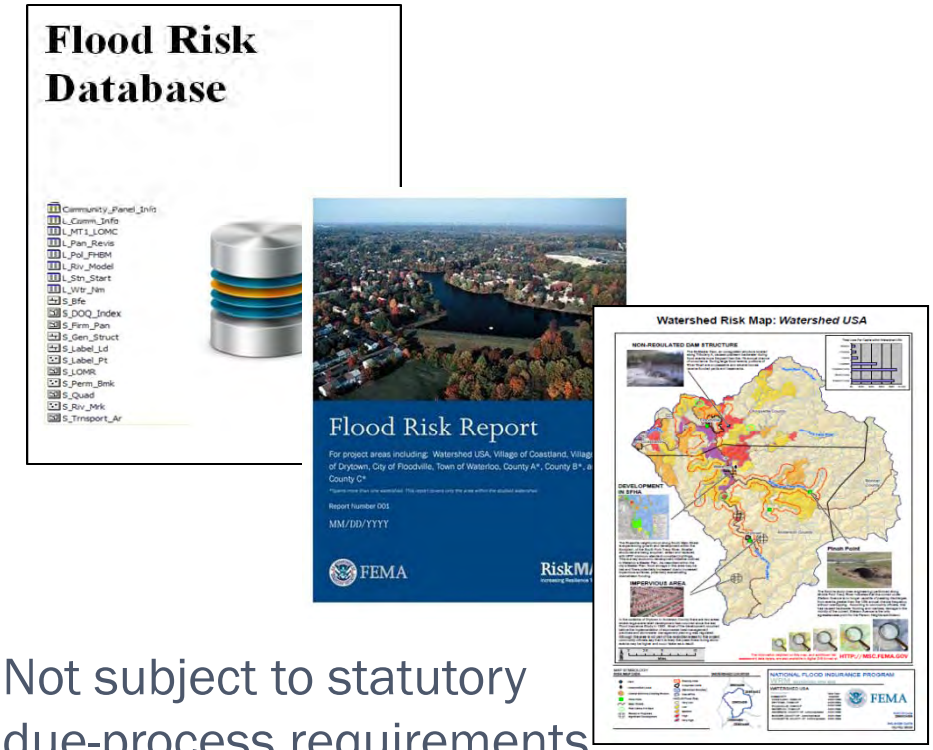
Program Product Comparisons

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

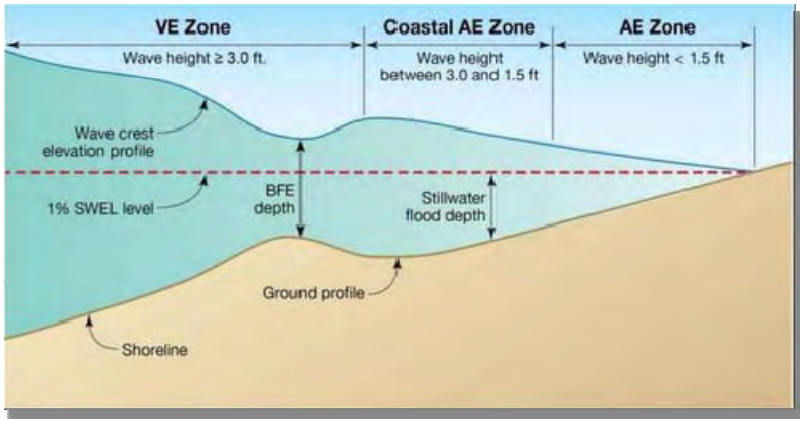
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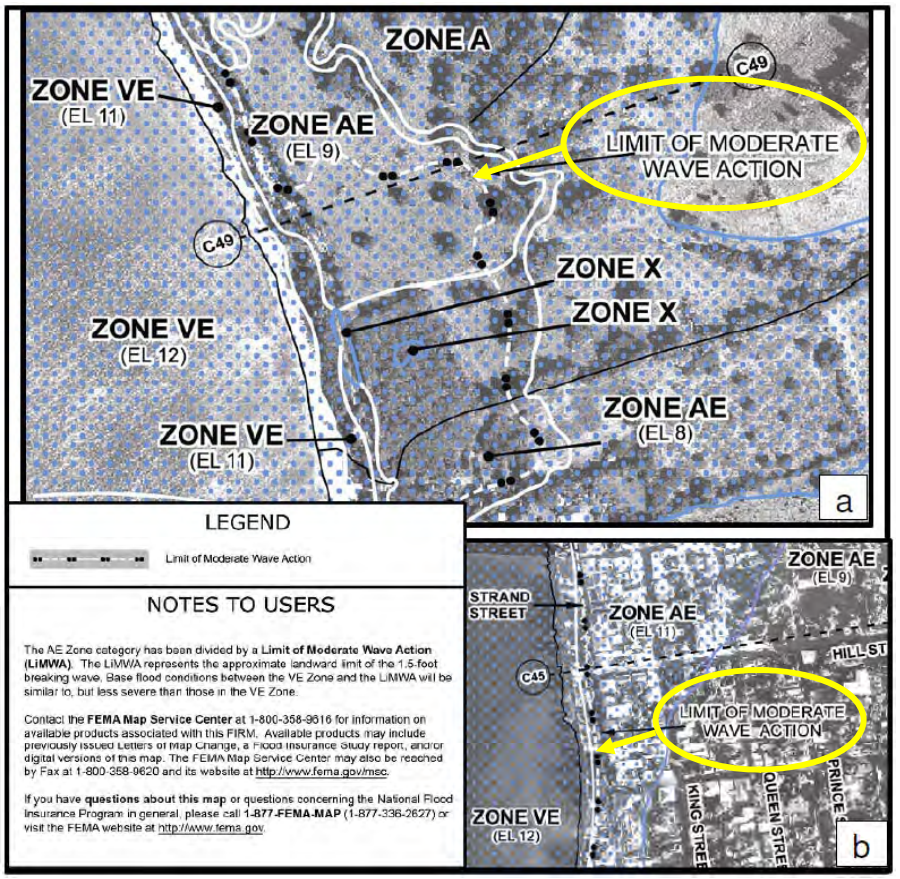
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Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

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



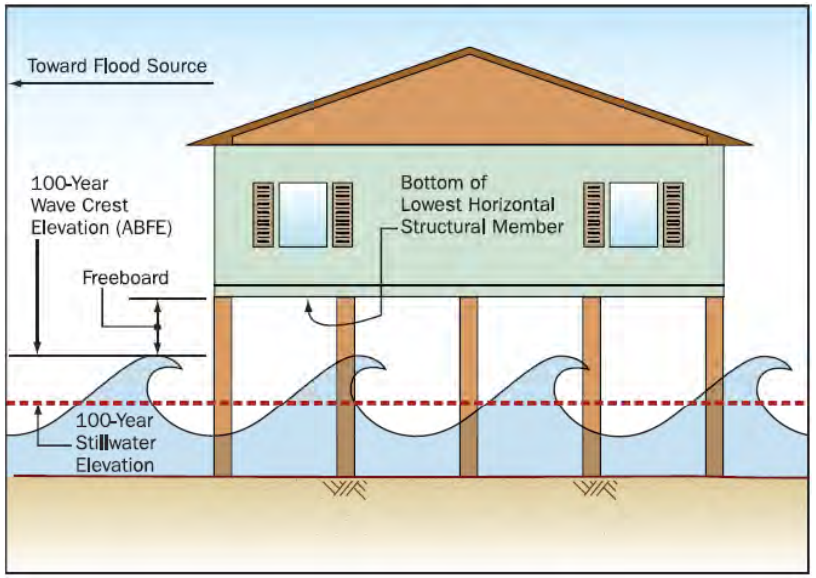


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Coastal Zones and NFIP Compliance

- 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

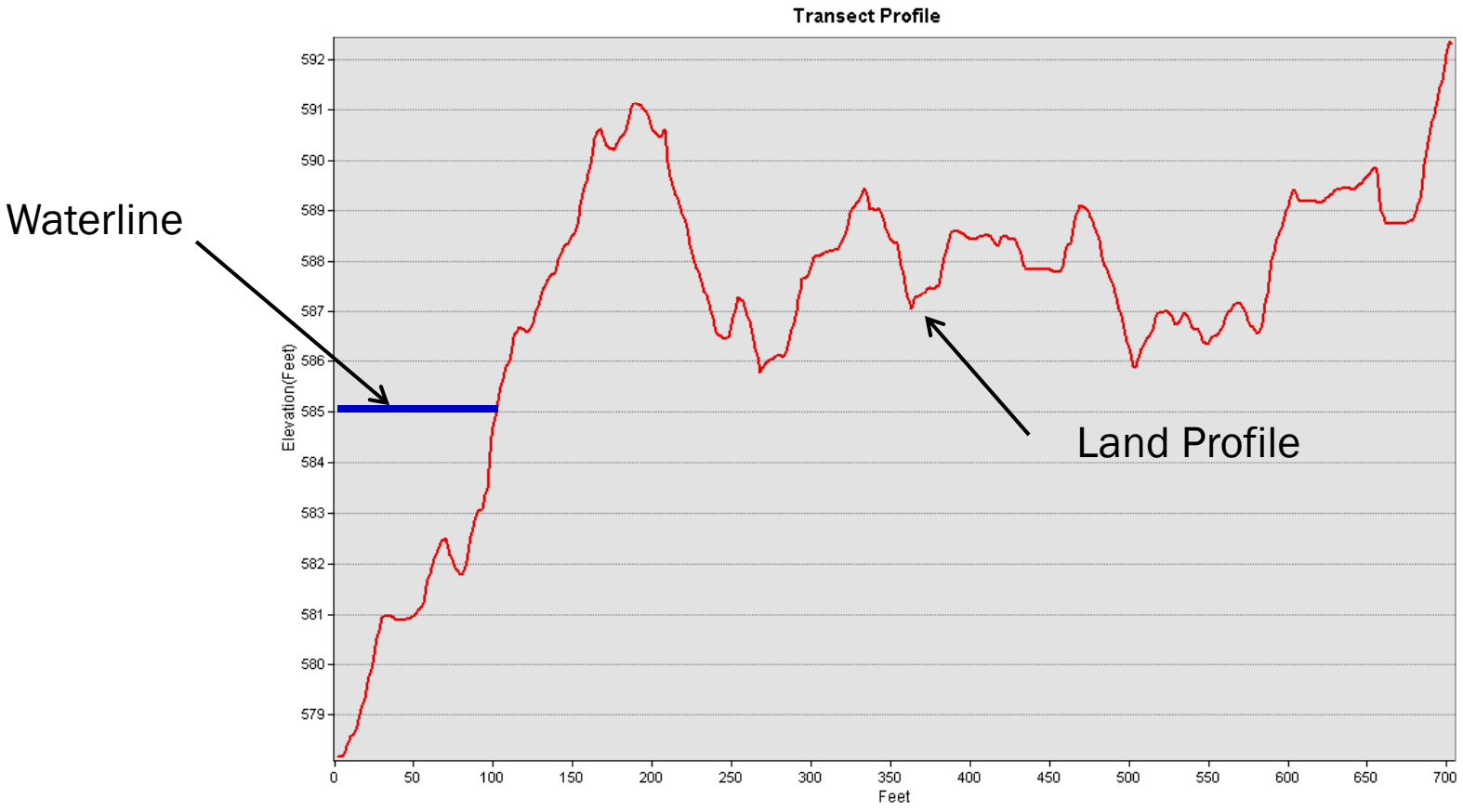
State	County	Proposed Draft Transects
Michigan	St. Clair	15
	Macomb	25
	Wayne	10
	Total	**50**



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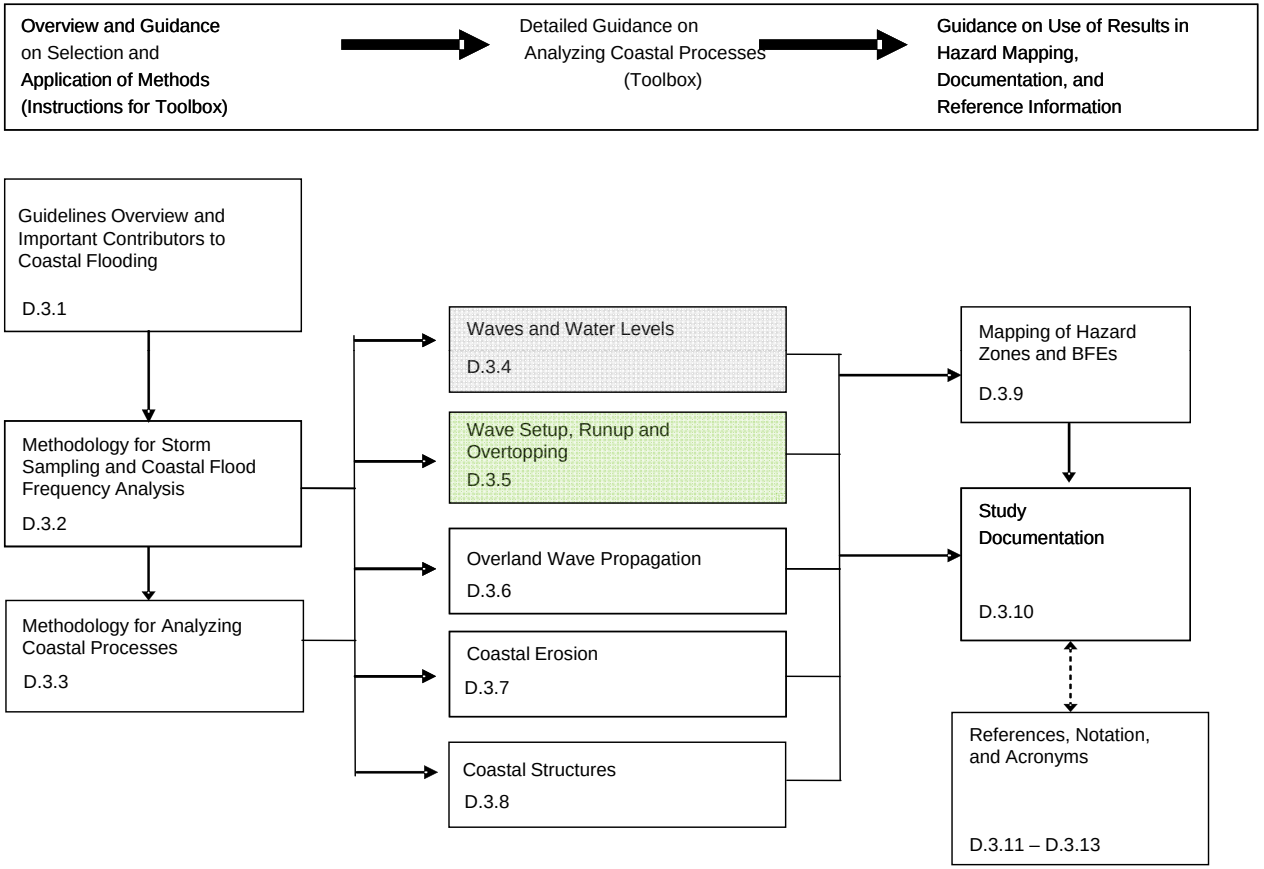
Profile from newest LiDAR



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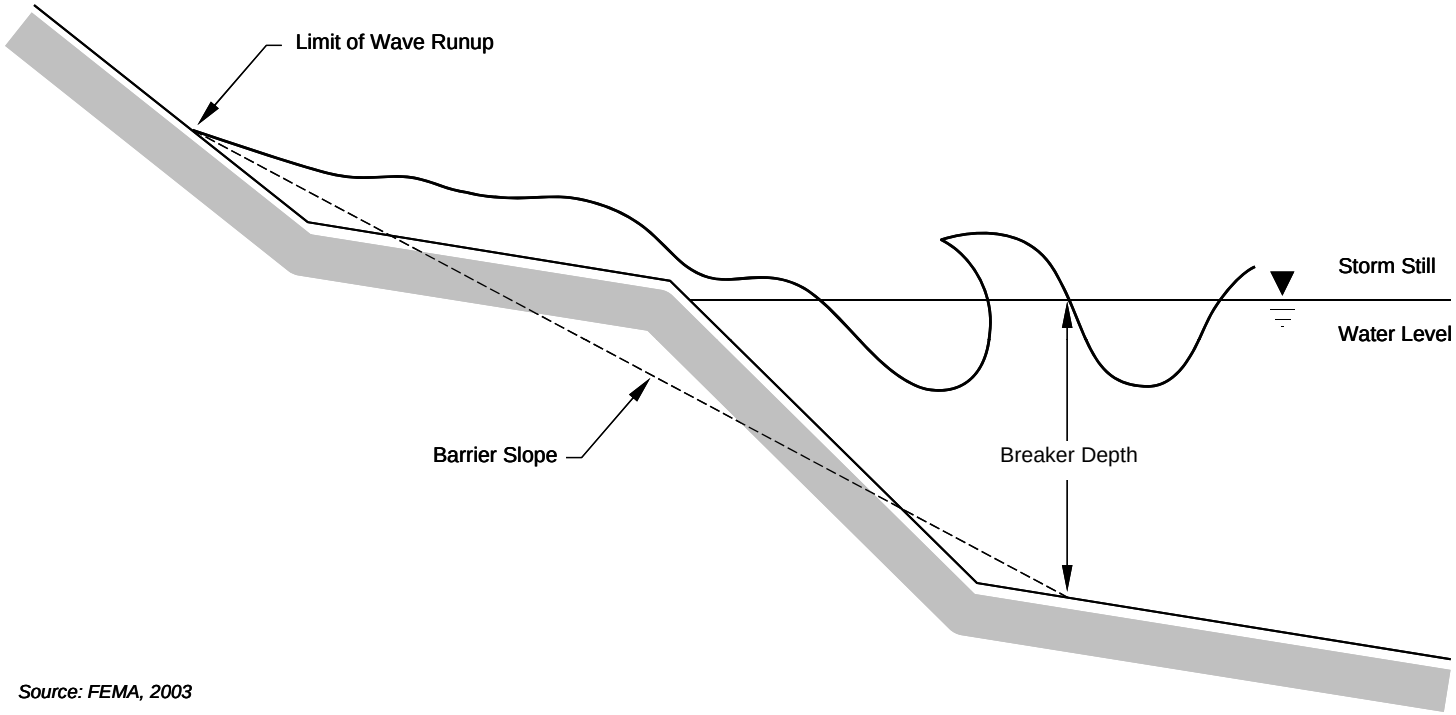
Coastal Analysis and Updates to Guidance



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Wave Runup

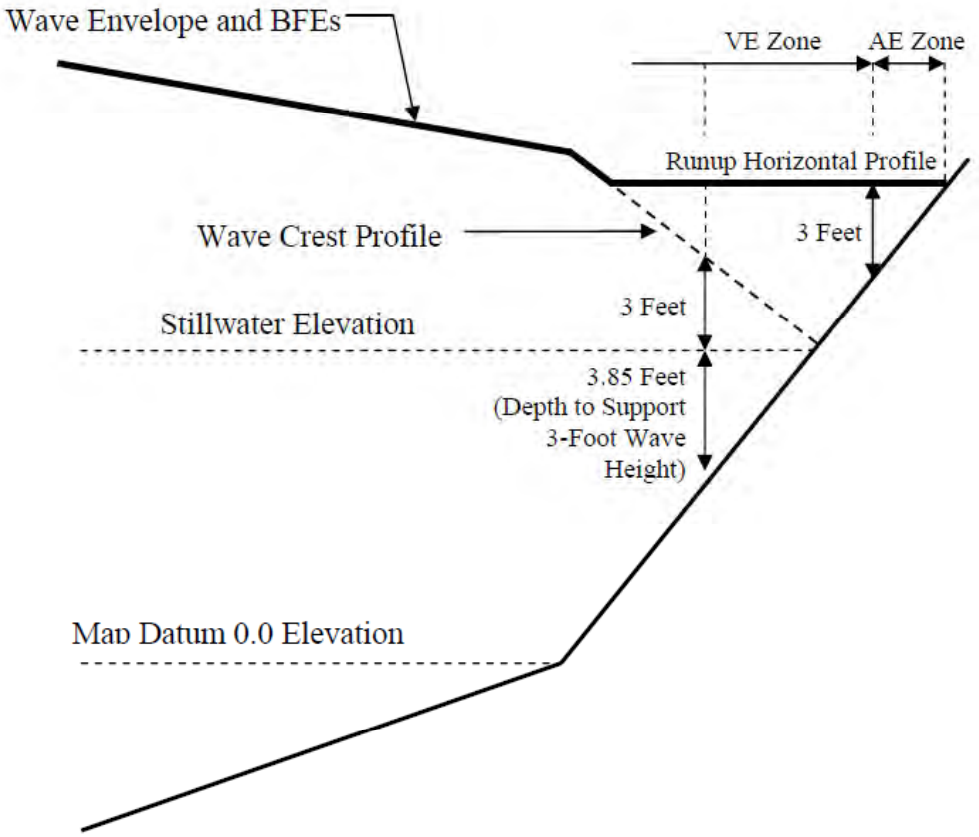


Source: FEMA, 2003

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

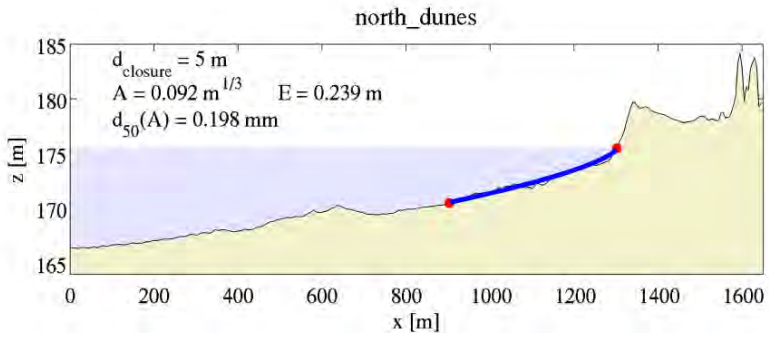


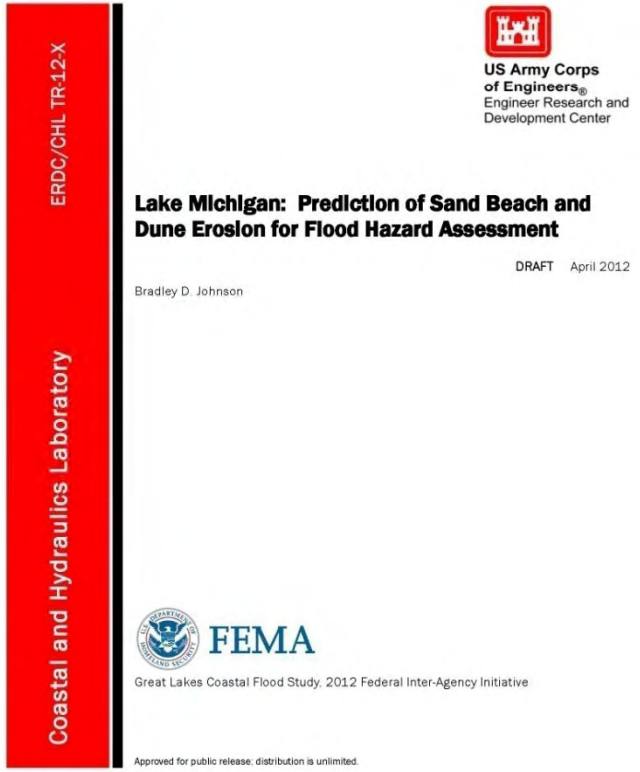
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Erosion Assessment Methods

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





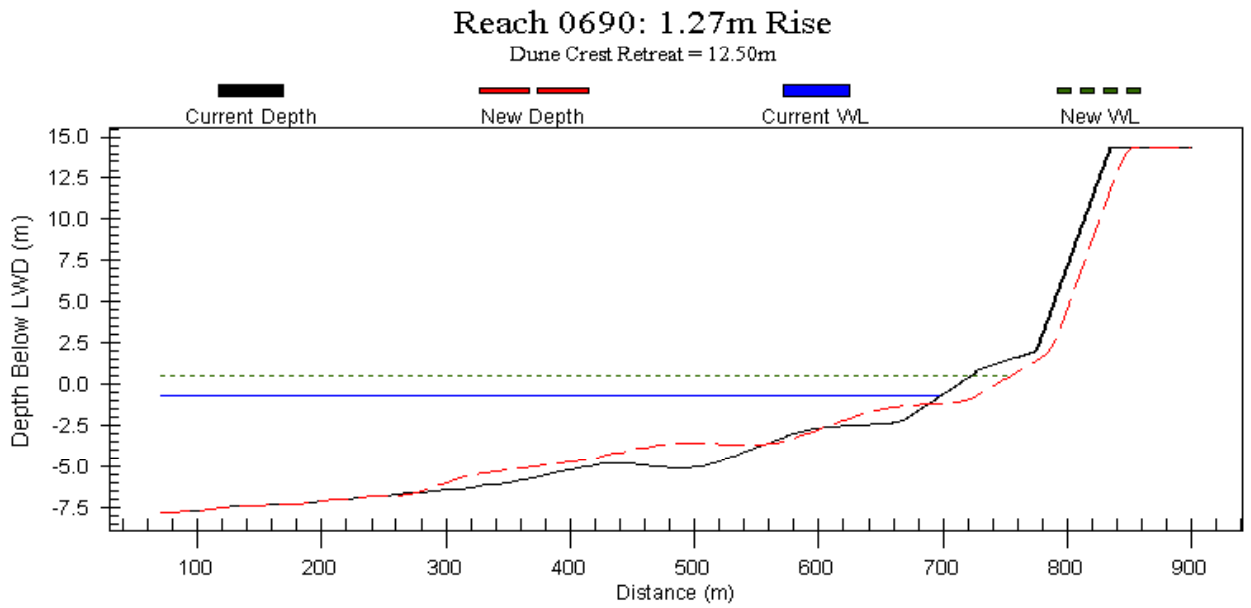
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Profile Adjustment

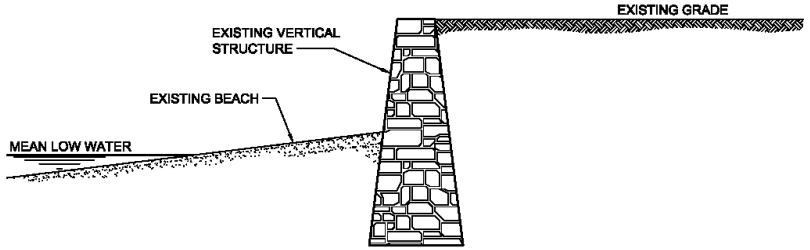
- In lieu of historical cross-shore profiles
- Necessary for response-based approach
- Utilize Bruun Rule for rising or falling lake levels



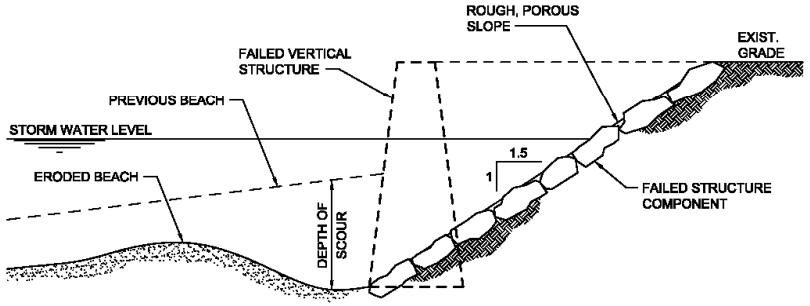
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Vertical Structures



VERTICAL STRUCTURE GEOMETRY PRIOR TO FAILURE



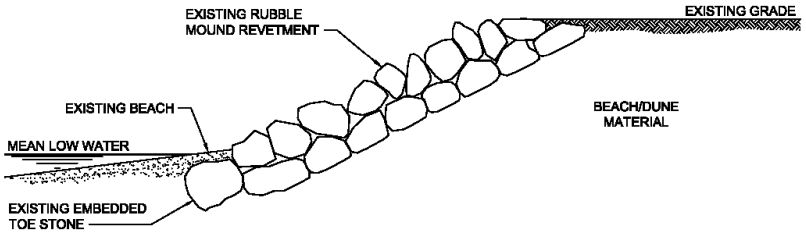
VERTICAL STRUCTURE FAILURE GEOMETRY

PARTIAL FAILURE OF VERTICAL COASTAL STRUCTURE

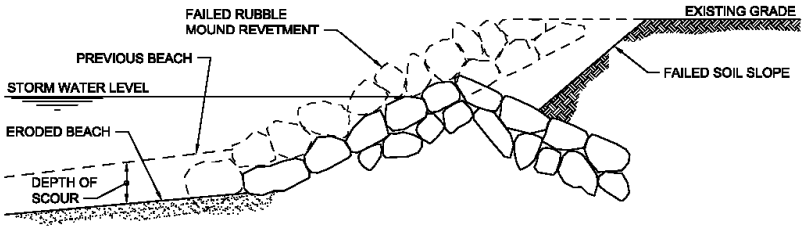
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Sloped Structures



REVETMENT GEOMETRY PRIOR TO FAILURE



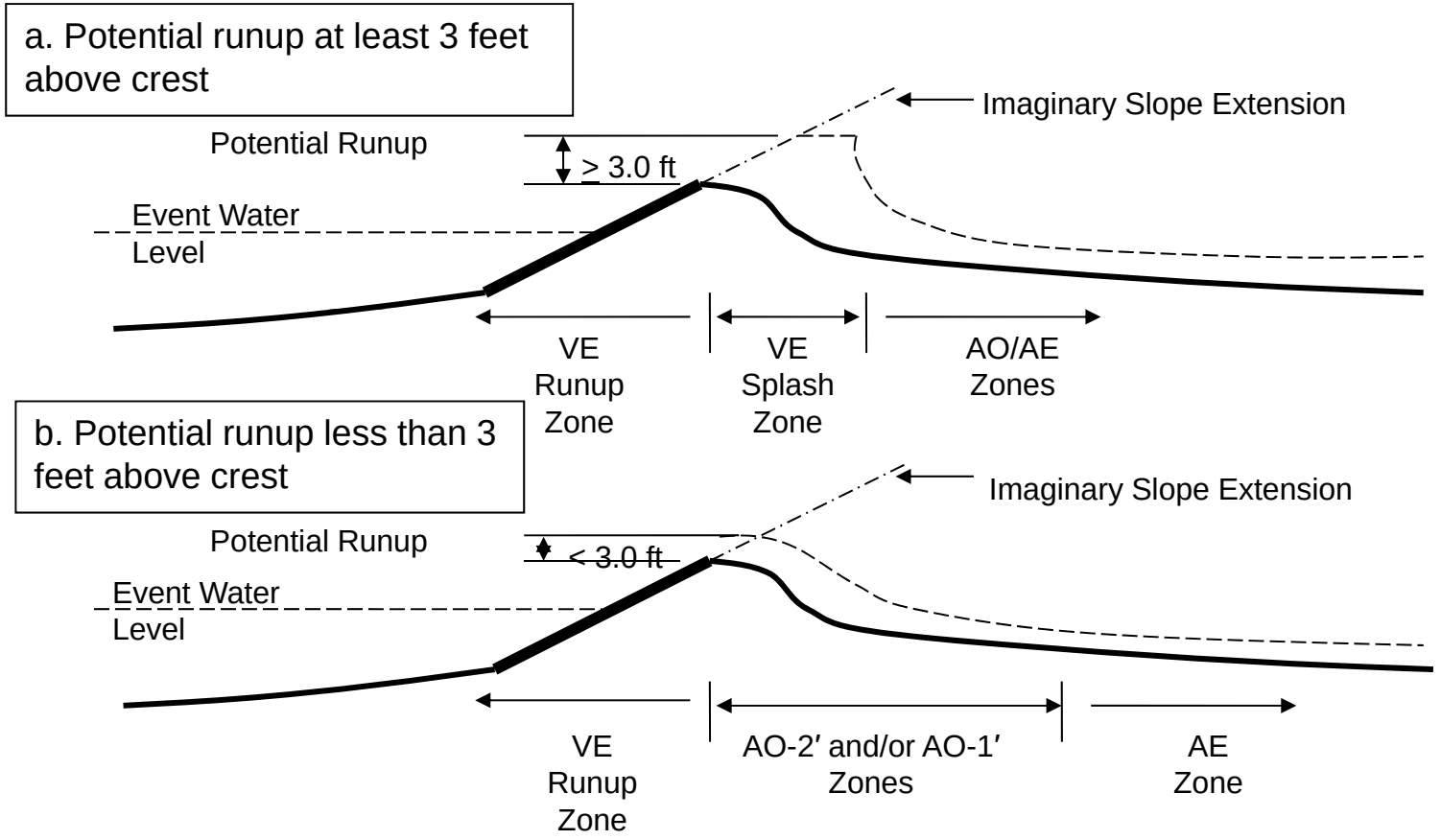
REVETMENT FAILURE GEOMETRY

PARTIAL FAILURE OF A SLOPING REVETMENT

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Interpretation of Wave Runup Results



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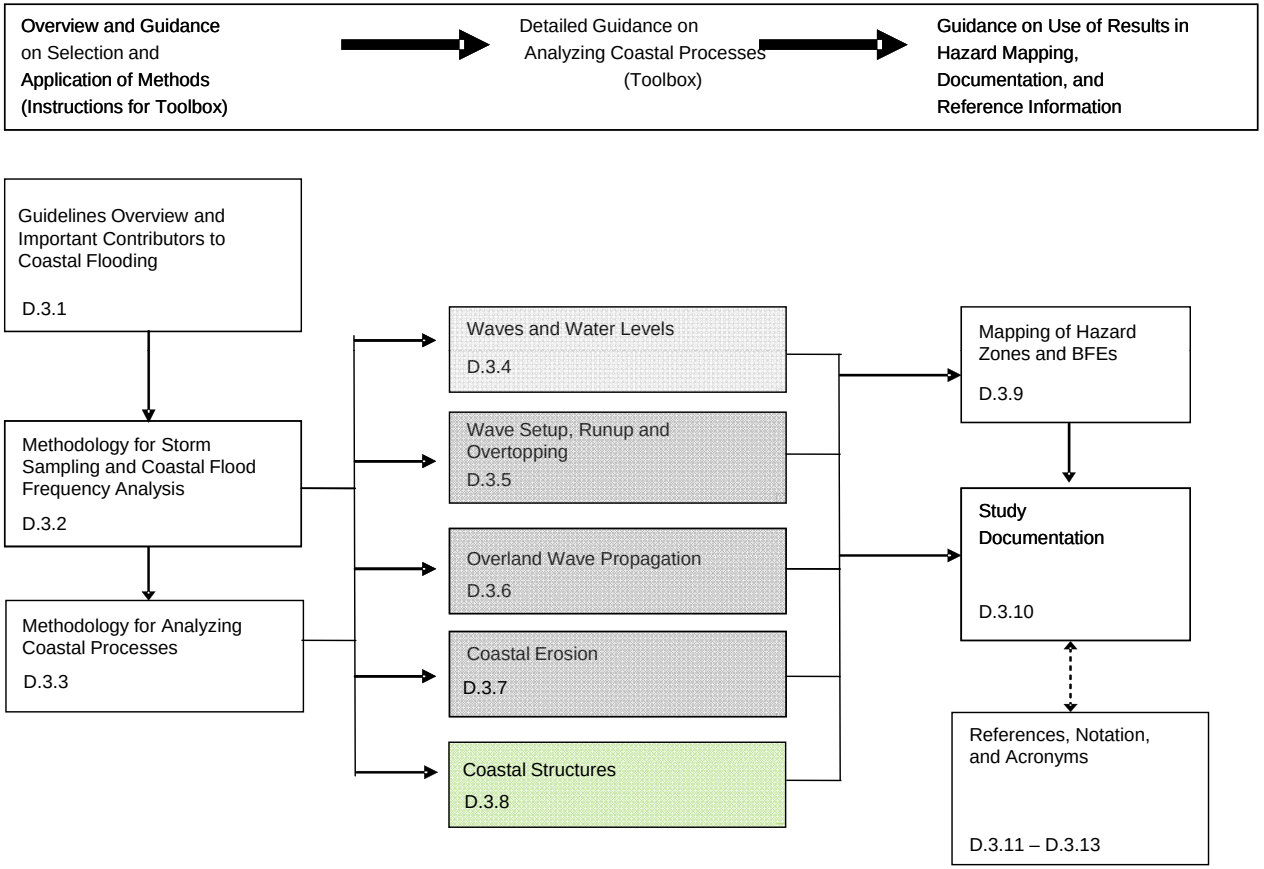
Transect Analysis to Mapping

- 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 >>

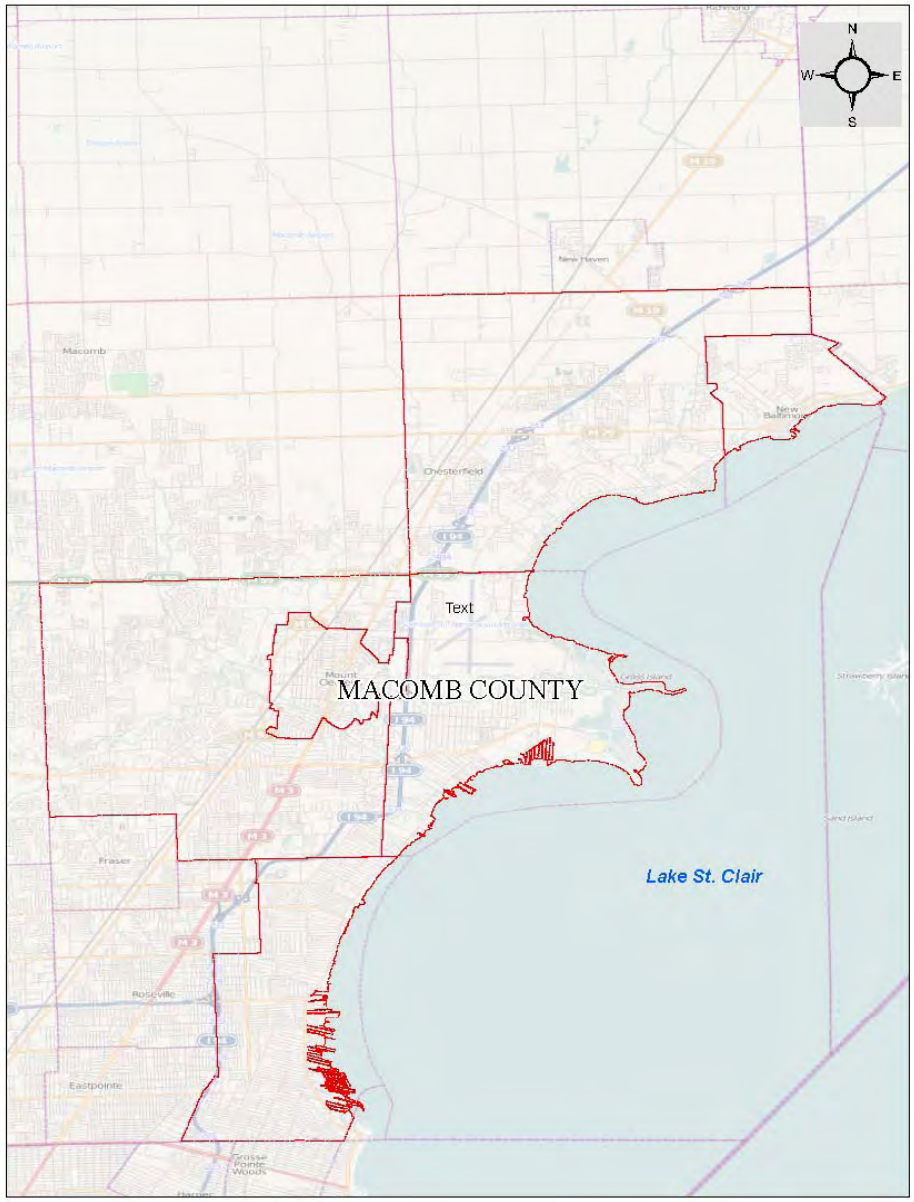
Thanks,
Laura

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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greatlakescoast.org

Purpose of Information Exchange

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



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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

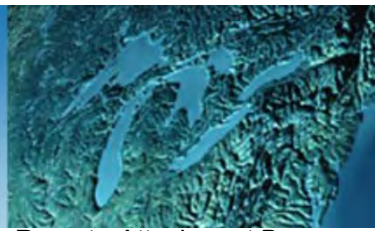
FEMA

- 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

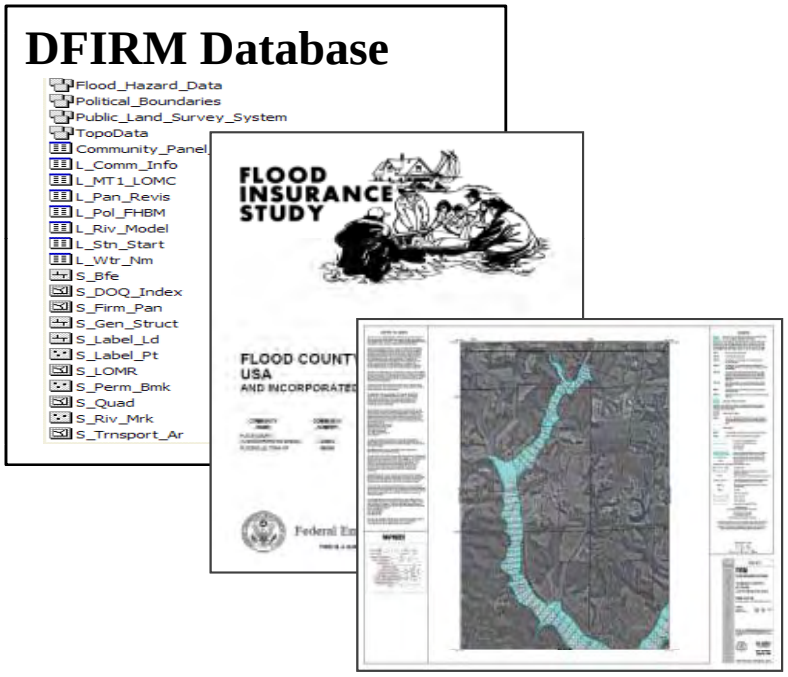
Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning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

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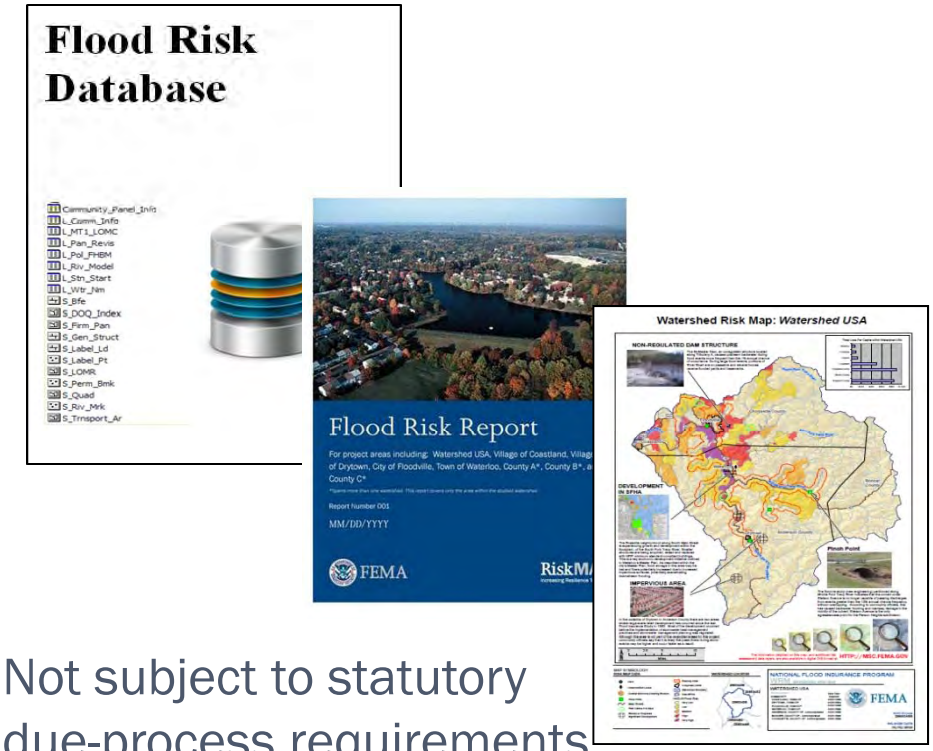
Products and Datasets: Regulatory and Non-regulatory

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

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Great Lakes Coastal Flood Study
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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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

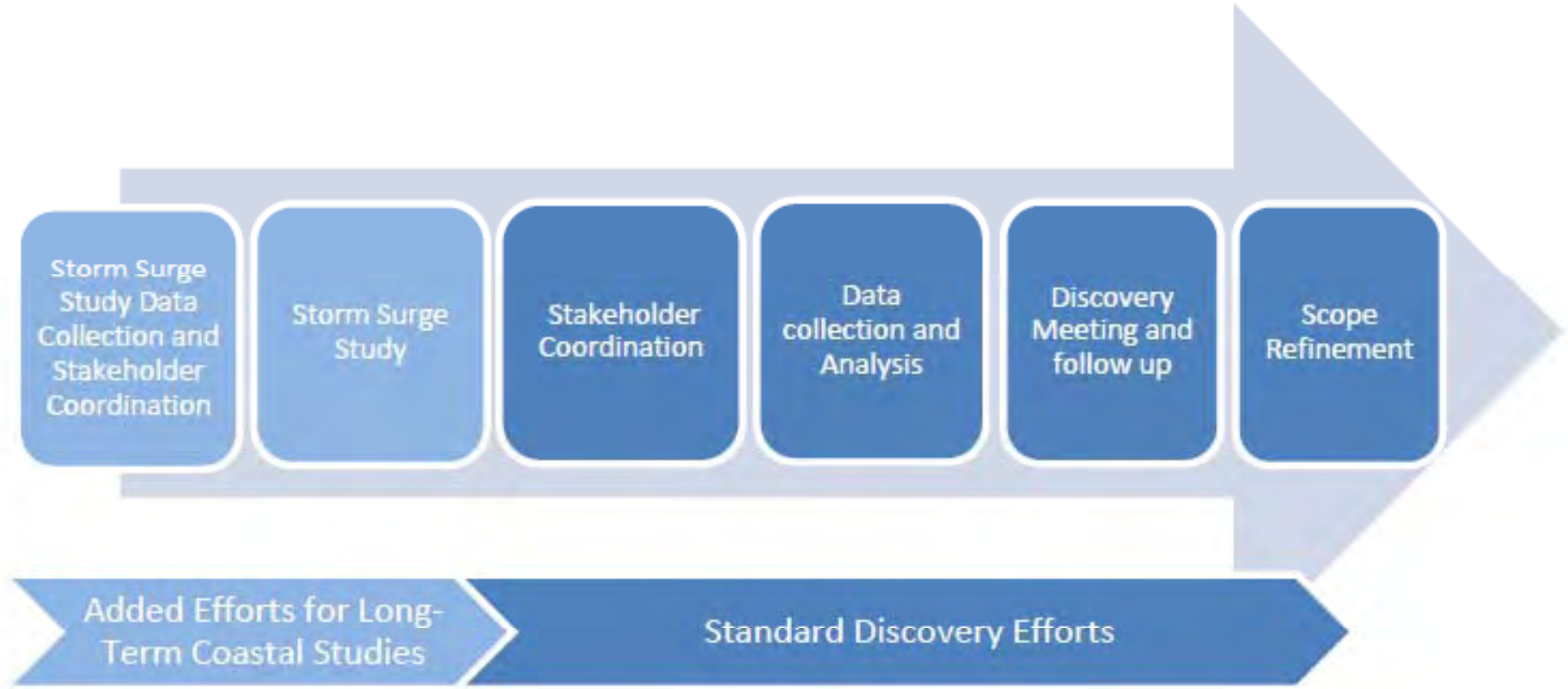
Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

- 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
greatlakescoast.org

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



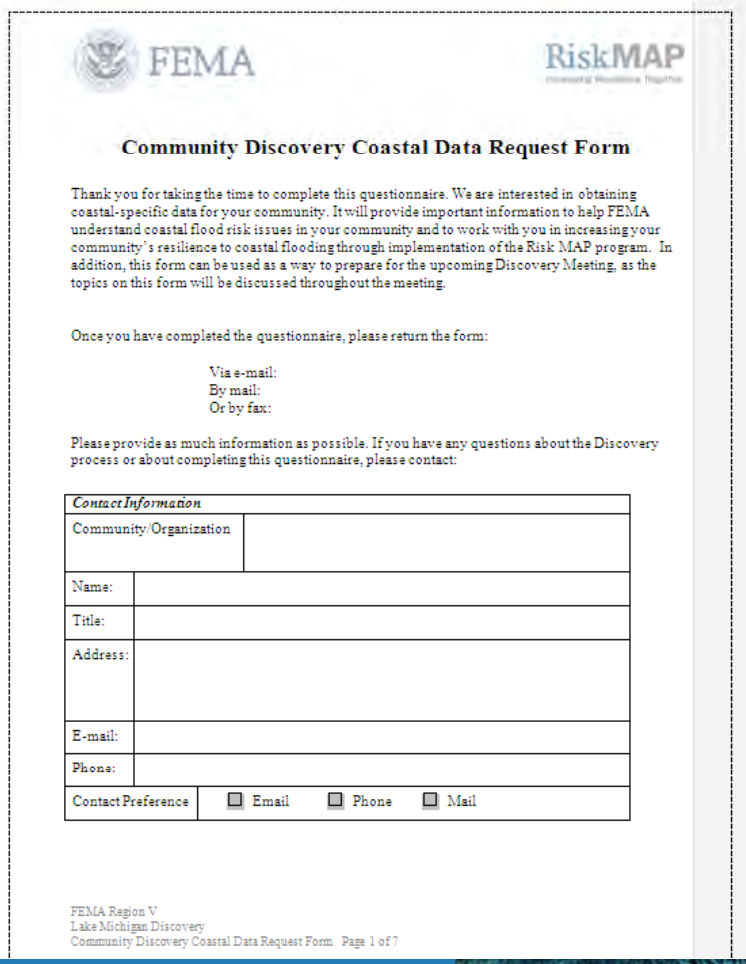
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Great Lakes Coastal

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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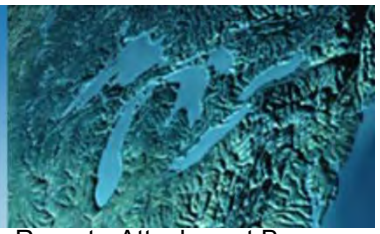
Next Steps and Opportunity to Get Involved

- 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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Great Lakes Coastal Flood Study
greatlakescoast.org



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?



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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:

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.

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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.

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

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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: 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:

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.

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Date/Time:	Monday, August 20, 2012; 2:00 - 4:00 pm ET
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Address:	21885 Dunham Road Clinton Township, Michigan 48036

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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: 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:

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.

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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: 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
Chicago, IL 60605

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:

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: Greg Nikkel, Building Inspector, City of New Baltimore
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

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:

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.

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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.

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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.

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Participant Code:	197462

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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: Brian Tingley, Community Development Director, City of Mount Clemens
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. Mark Hackel
County Executive, Macomb County
One South Main Street
8th Floor
Mount Clemens, Michigan 48043

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.

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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
Great Lakes Commission	Ecological	Cassie	Bradley		cbradley@glc.org

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
Great Lakes Commission	Ecological	Heather	Braun		hbraun@glc.org
Great Lakes Commission	Ecological	Thomas	Crane		tcrane@glc.org
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
MDA - Environmental Stewardship Division	State/Reg Agency	James	Johnson		johnsonj2@michigan.gov
MDEQ	State/Reg Agency	Judy	Andersen		andersenj1@michigan.gov
MDEQ	State/Reg Agency	Chris	Antieau		antieauc@michigan.gov
MDEQ	State/Reg Agency	Jennifer	Bolt		boltj@michigan.gov
MDEQ	State/Reg Agency	Robert	Day		dayr1@michigan.gov

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
MDEQ	State/Reg Agency	Dave	Drullinger		drullingerd@michigan.gov
MDEQ	State/Reg Agency	Kim	Fish		fishk@michigan.gov
MDEQ	State/Reg Agency	Andrew	Hartz		hartza@michigan.gov
MDEQ	State/Reg Agency	Anne	Hokanson		hokansona@michigan.gov
MDEQ	State/Reg Agency	Rhonda	Klann		klannr@michigan.gov
MDEQ	State/Reg Agency	Cindy	Masterson		mastersonc@michigan.gov
MDEQ	State/Reg Agency	Mike	Masterson		mastersonm@michigan.gov
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
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July 2012

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July 2012

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July 2012

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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

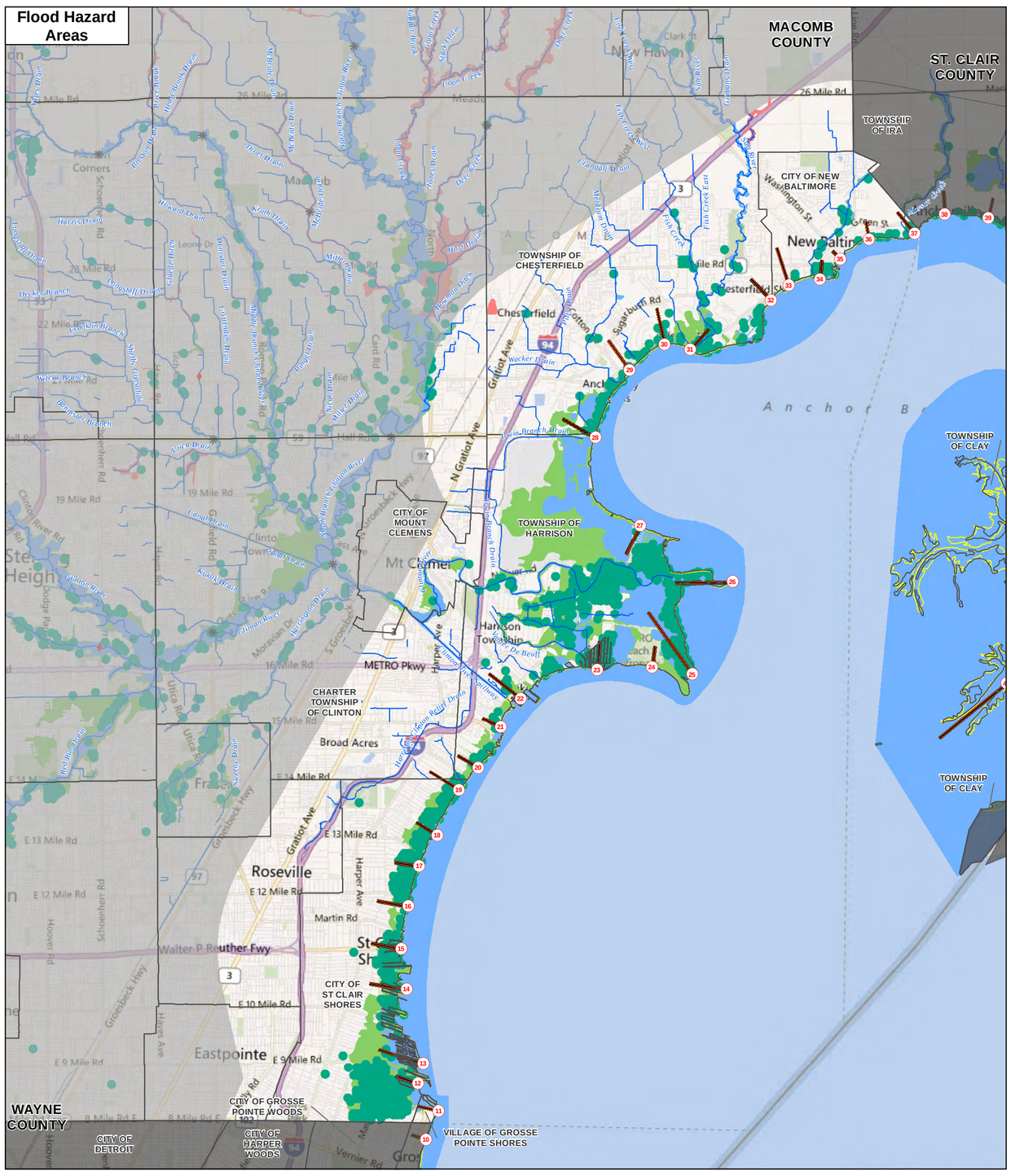
available to eligible communities. Please RSVP to FEMA's study contractor (STARR) Scott Banjavcic at (312) 780-7755 or email to GreatLakesFloodStudy@starr-team.com by **August 10, 2012.** Please reference the Discovery Meeting date and time in your RSVP.

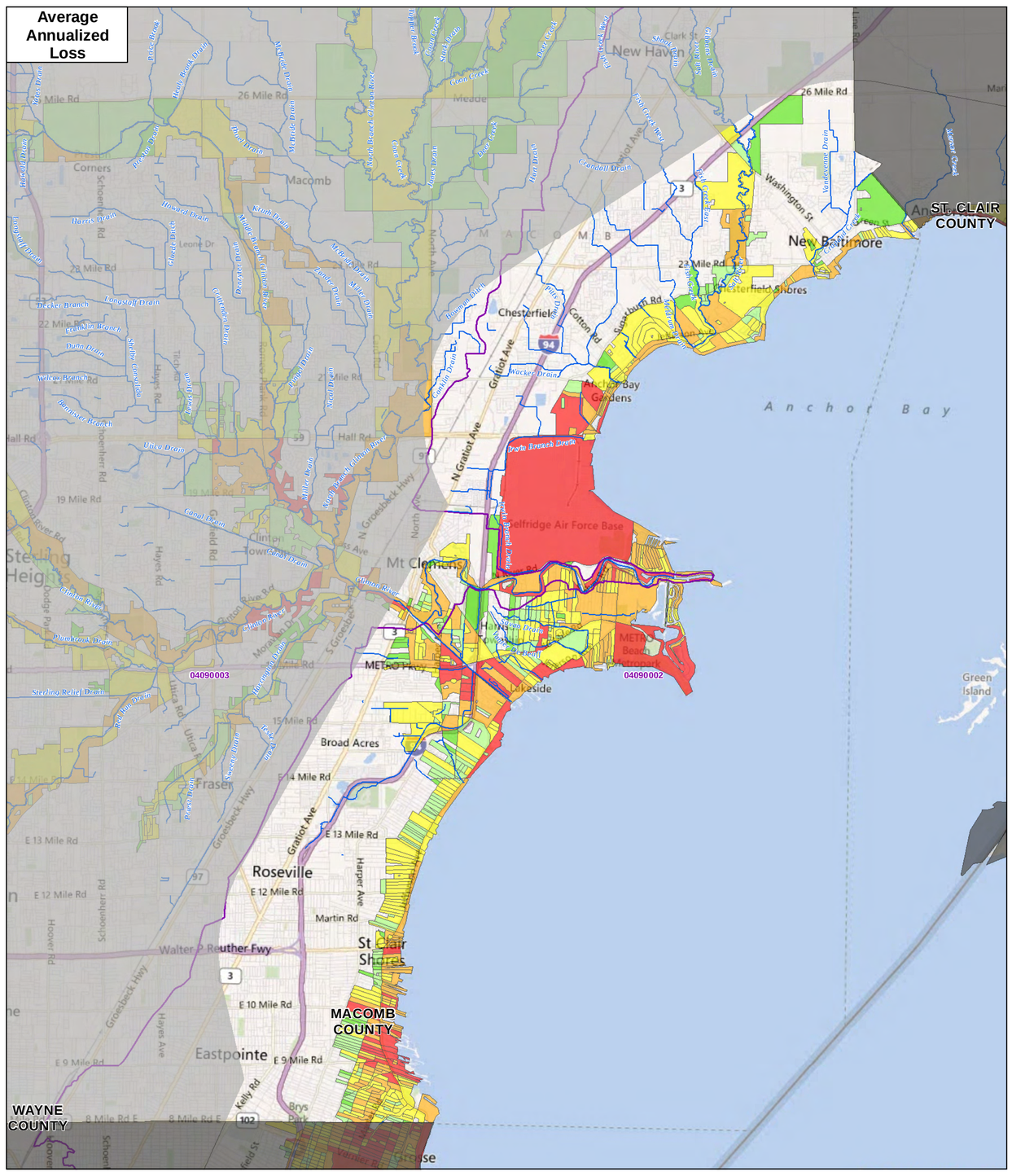
A attached Community Coastal Data Request Form was recently mailed to local community officials, along with the Discovery Meeting invitation. This form is also available online at http://www.greatlakescoast.org/pubs/forms/GLCFS_Discovery_Coastal_Data_Request_Form.pdf. If you have data or information 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.

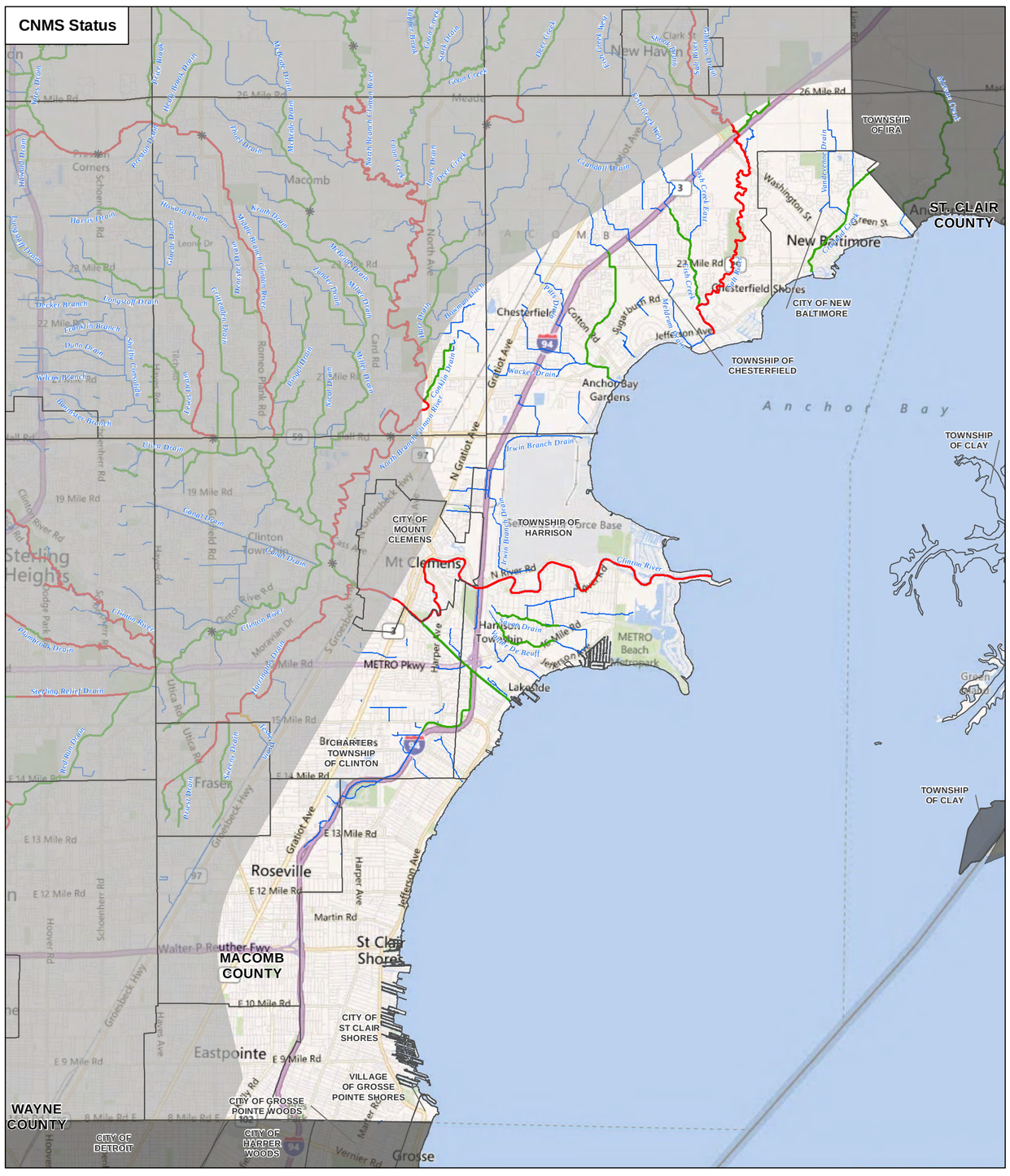
We look forward to working with you to reduce the risks associated with coastal flooding and increase resiliency for the long term. To learn more about Discovery, please visit http://www.fema.gov/library and search keywords "Discovery brochure" or contact Ken Hinterlong, FEMA Region V Senior Engineer, 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

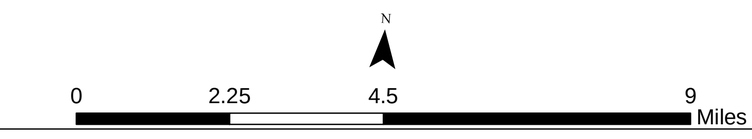
Lake	State	Declared County/Area	Declaration Date	Disaster Type	Incident Type	Description
Lake St. Clair	MI	Macomb (County)	12/1/1972	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Macomb (County)	4/12/1973	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Macomb (County)	4/26/1975	DR	Flood	SEVERE 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

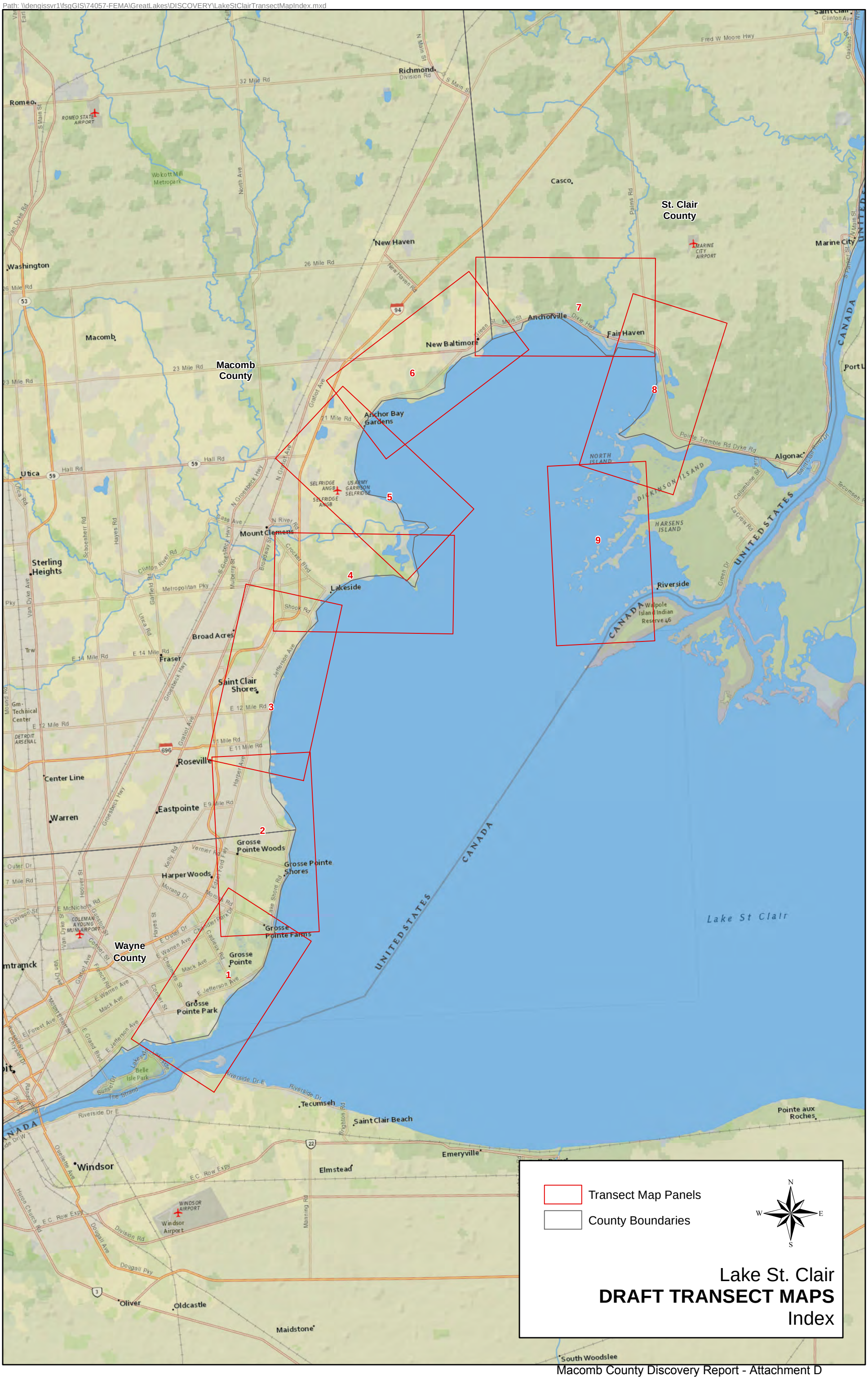
STARR

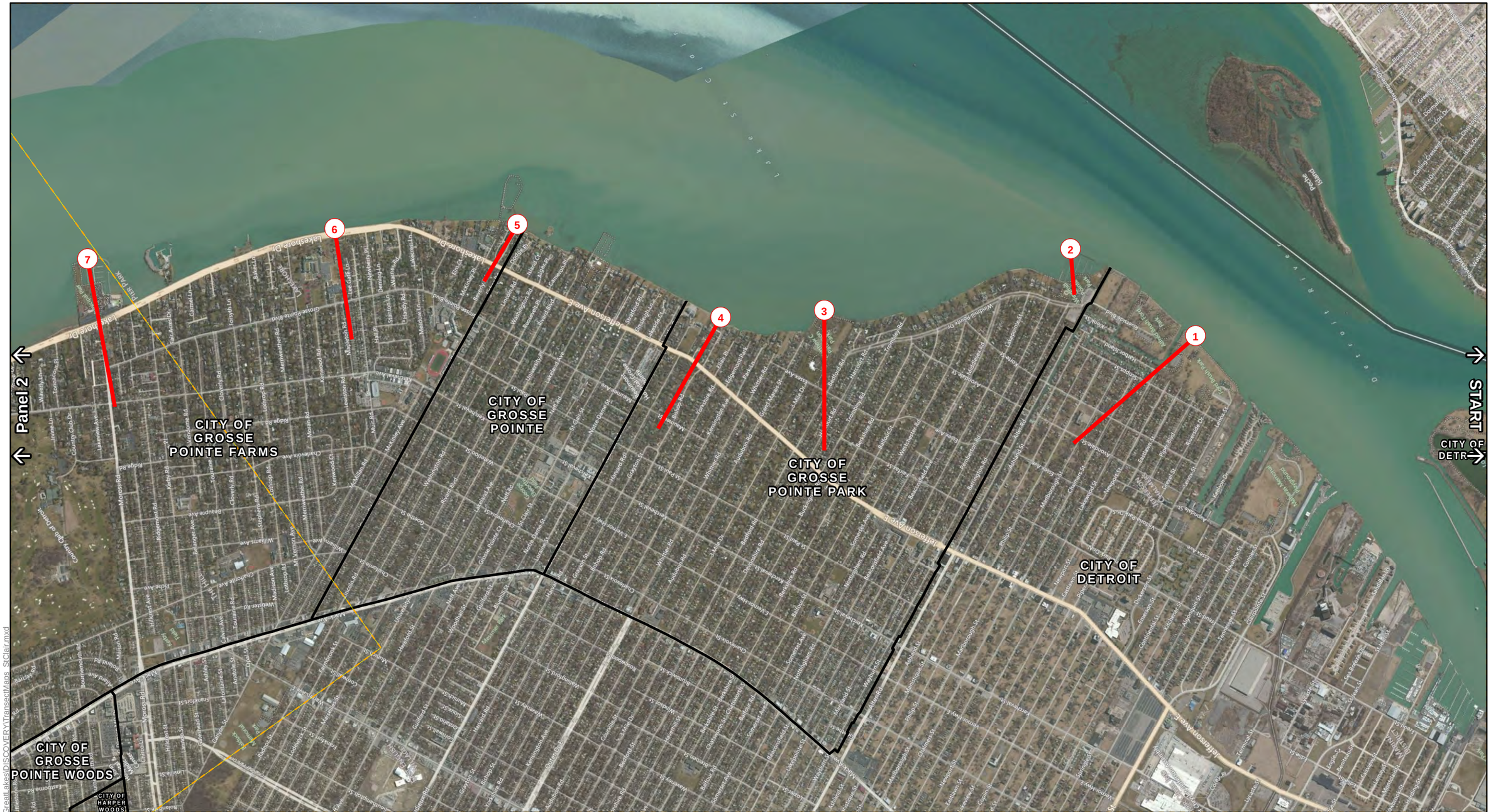
FEMA

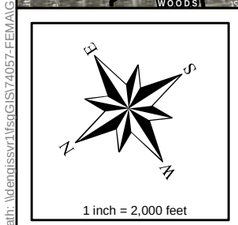
ATTACHMENT D

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

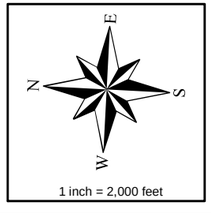
Lake St. Clair

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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21
20
19
18
17
16
15
14
TOWNSHIP OF HARRISON
CHARTER TOWNSHIP OF CLINTON
CITY OF ROSEVILLE
CITY OF ST CLAIR SHORES
Panel 4
Panel 2
Lake St Clair
Jefferson Ave
E 9 Mile Rd
Gratiot Ave
Harper Ave
Little Mack Ave
Path: \\dengisswr1\fs\GIS\74057-FEMA\Great Lakes\DISCOVERY\Transects\Maps_StClair.mxd
1 inch = 2,000 feet
Mt Clemens
Roseville 3
St Clair Shores
Eastpointe
Richmond
Pontiac
Sterling Heights
Warren
Livonia
Detroit
Westland
Windsor
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

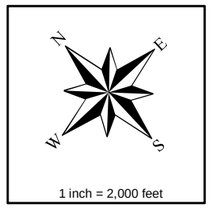
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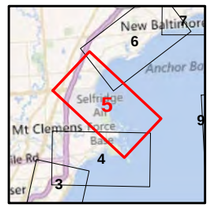
COUNTIES
MACOMB COUNTY

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

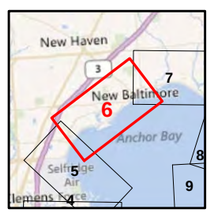
DRAFT TRANSECTS

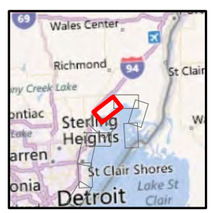
Panel 5 of 9

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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

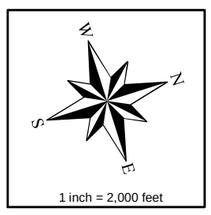
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COUNTIES
MACOMB COUNTY
ST. CLAIR COUNTY

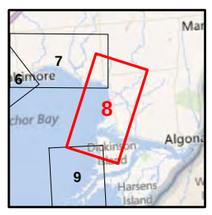
COMMUNITIES
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF IRA

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

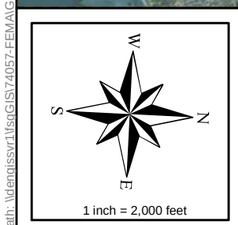
COUNTIES
ST. CLAIR COUNTY

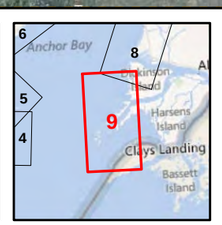
COMMUNITIES
TOWNSHIP OF CLAY
TOWNSHIP OF COTTRELLVILLE
TOWNSHIP OF IRA

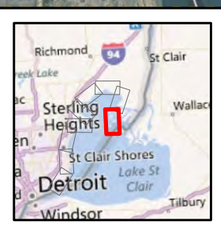
Lake St. Clair
DRAFT TRANSECTS
Panel 8 of 9

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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

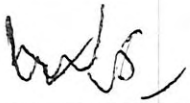
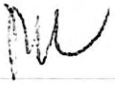
7. **Wrap Up (3:50 – 4:00 PM ET)**
   - Review of action items and next steps

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.

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Lake St. Clair Discovery

Macomb County, MI



August 20, 2012
1400 to 1700

VerKuilen Building

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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

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Status of Macomb County studies

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

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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

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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





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Great Lakes Coastal Flood Study



U.S. Army Corps of Engineers, Detroit District

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Great Lakes Coastal Flood Study
Overview

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

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Lake St. Clair Discovery

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



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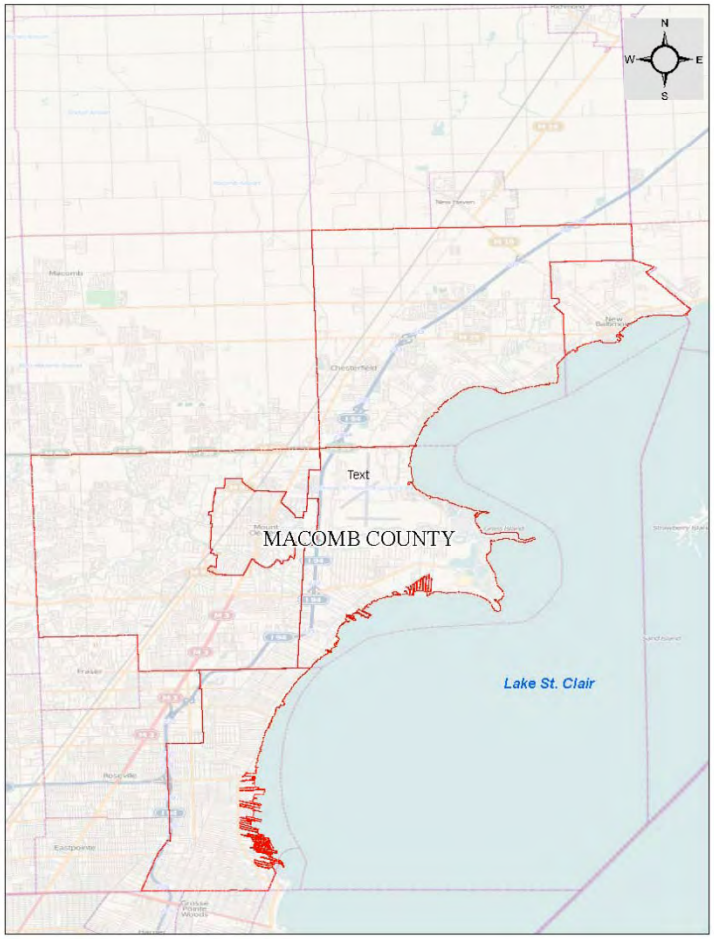
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Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Lake St. Clair Communities:

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



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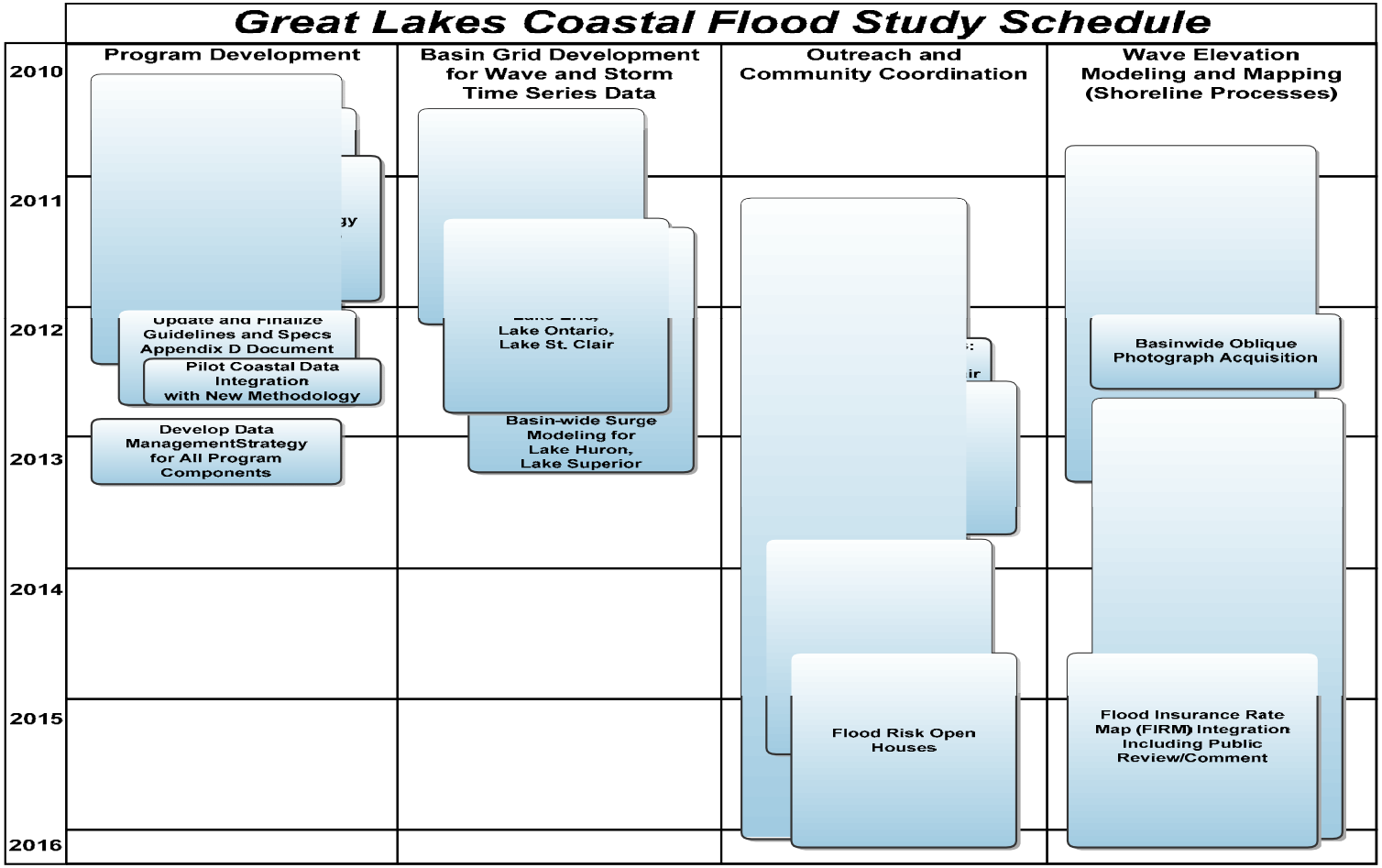
Discovery Meeting Objectives

- 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

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Stakeholder Engagement



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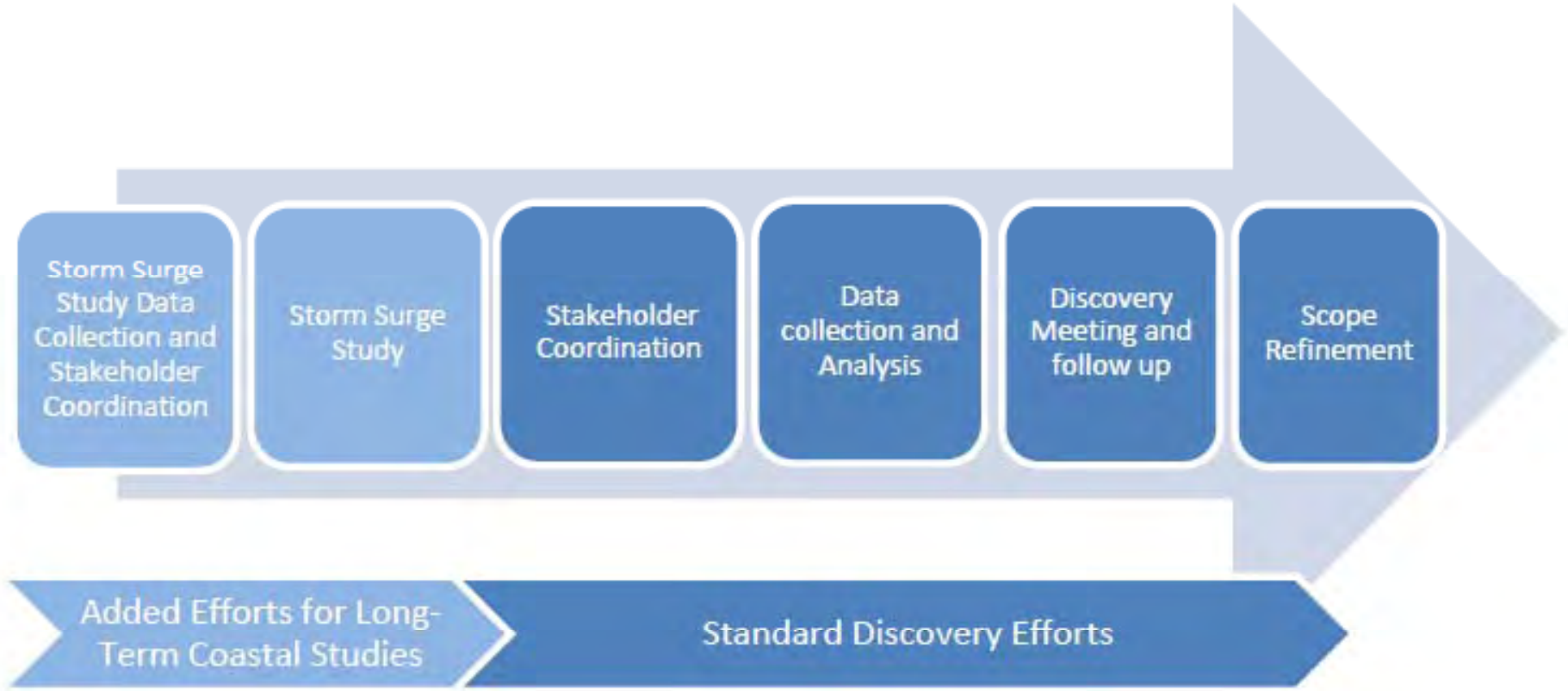
Data Inputs

- 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

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Discovery Schedule Overview



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Lake Michigan Discovery

Schedule of Activities

- Identify Draft Transect Locations – Completed
- Research available data – 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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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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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

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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

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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

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Coastal Mapping and Flood Risk Topics

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

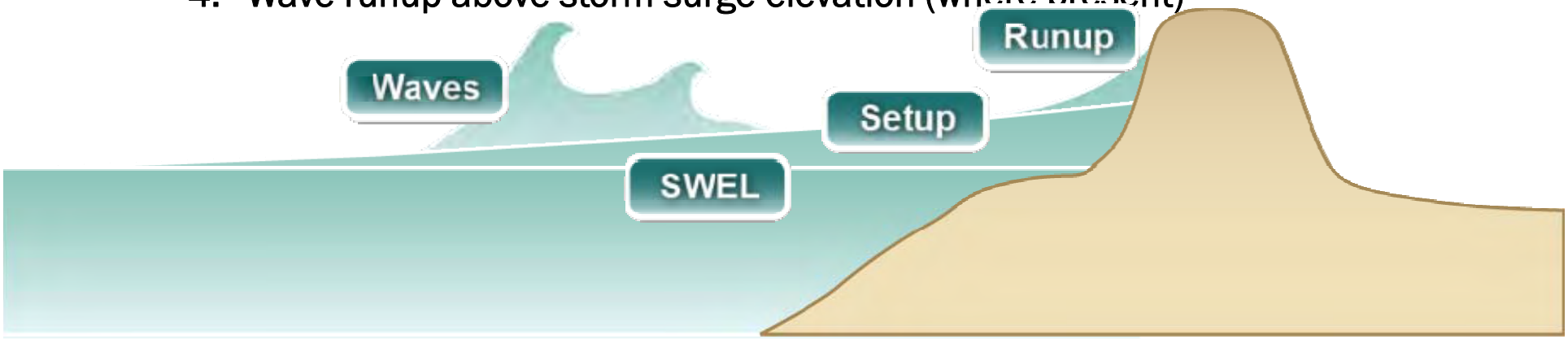
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Basic Elements of a Coastal Hazard Analysis

Base Flood Elevation on FIRM includes 4 components:

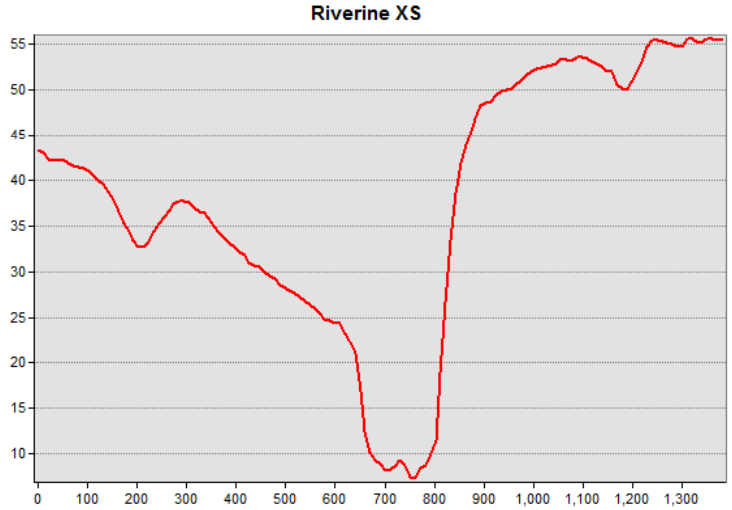
1. Storm surge stillwater elevation (SWEL) – determined from storm surge model
2. Amount of wave setup
3. Wave height above storm surge (stillwater) elevation
4. Wave runup above storm surge elevation (where present)

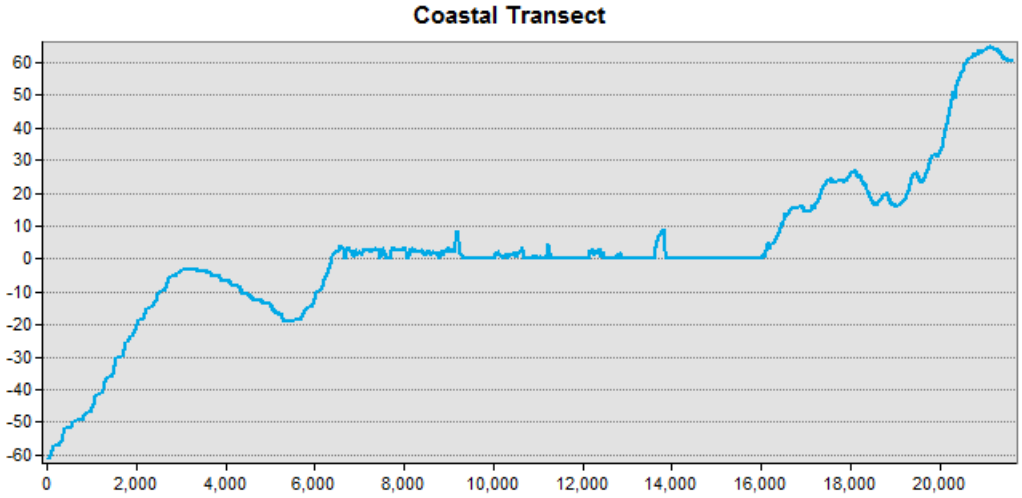


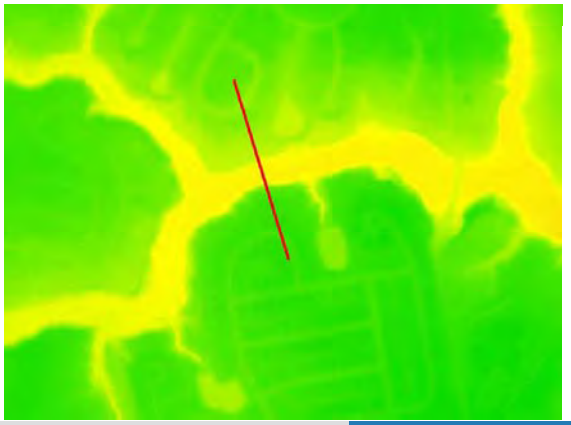
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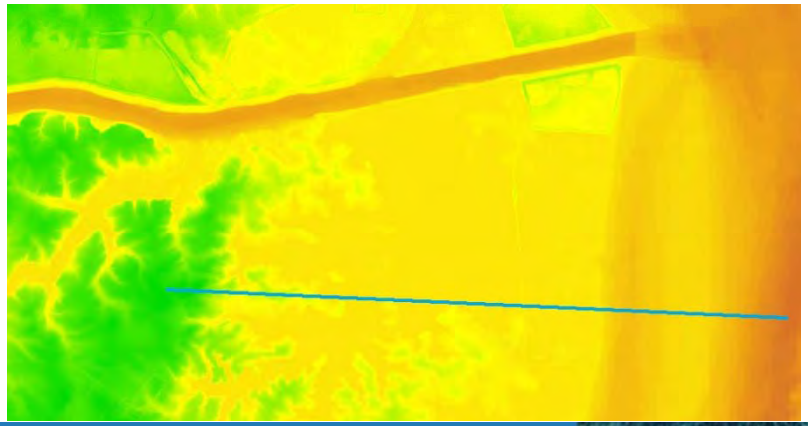
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Riverine XS vs Coastal Transect









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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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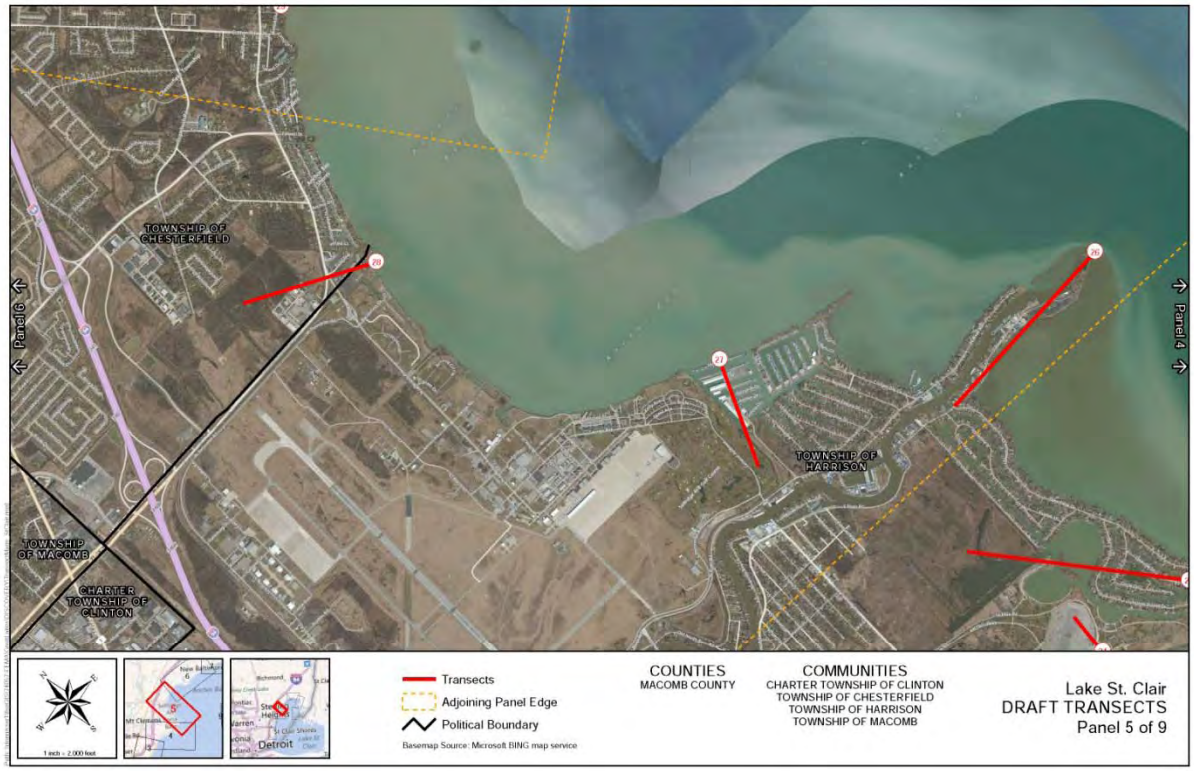


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Coastal Flood Hazard Zones

- 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

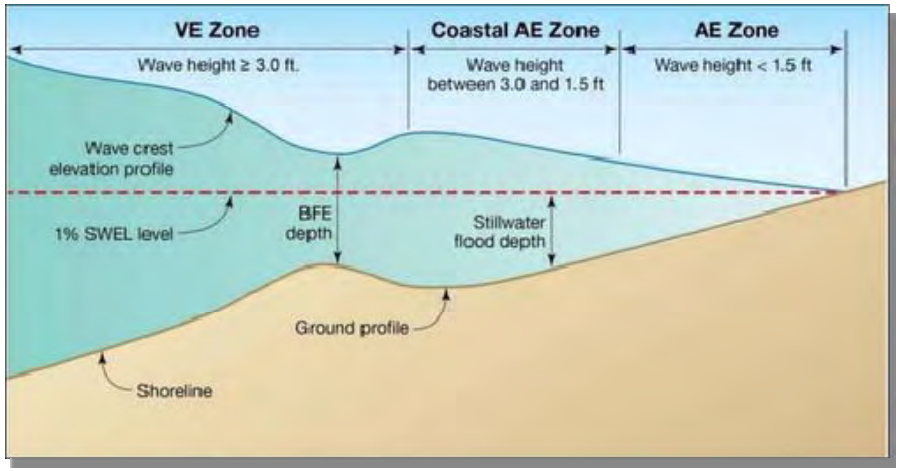
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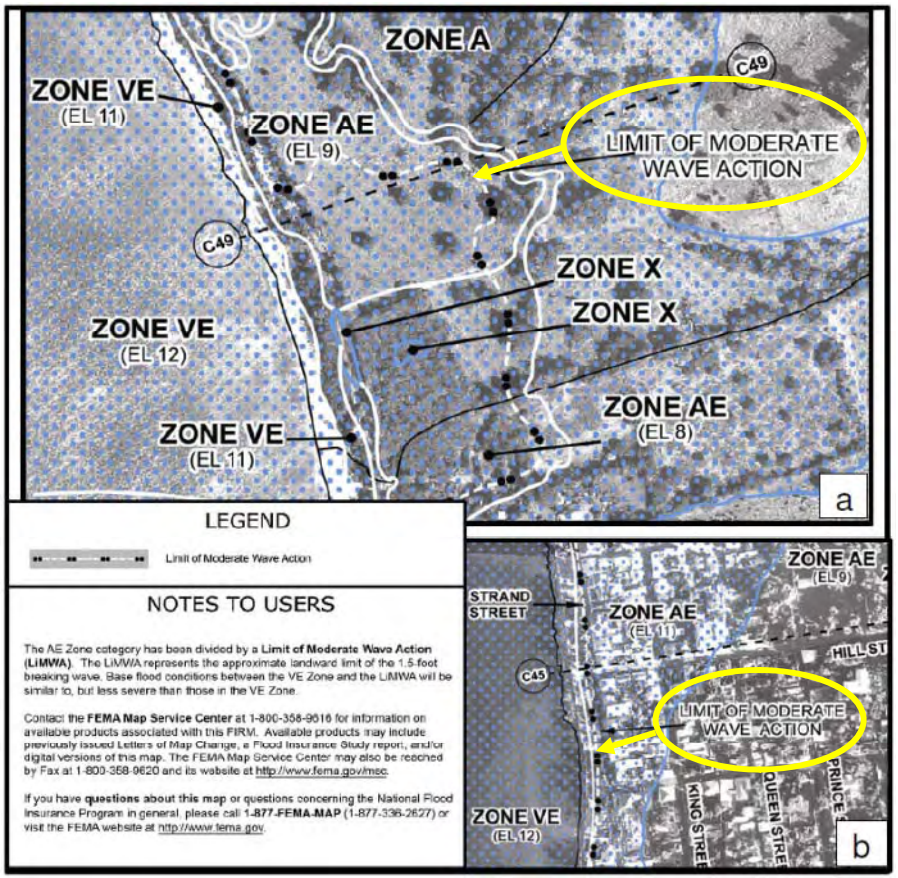
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Limit of Moderate Wave Action (LiMWA)

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)





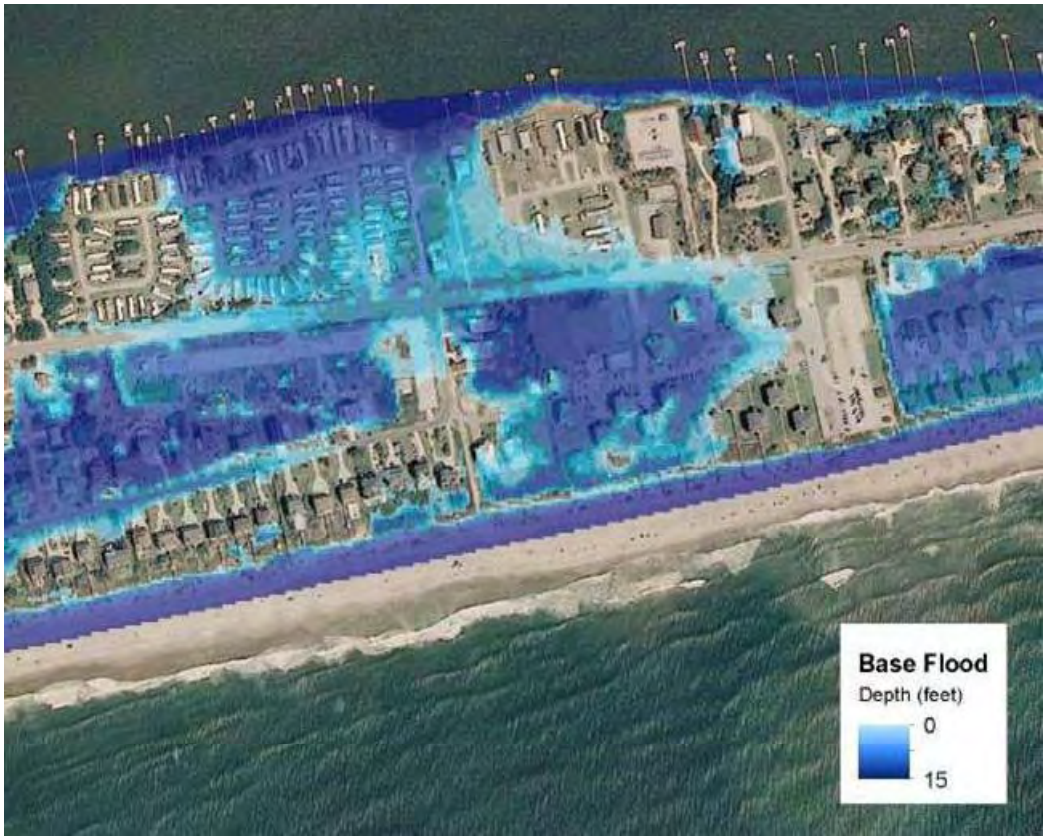
HAZUS MH
EARTHQUAKE • WIND • FLOOD

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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

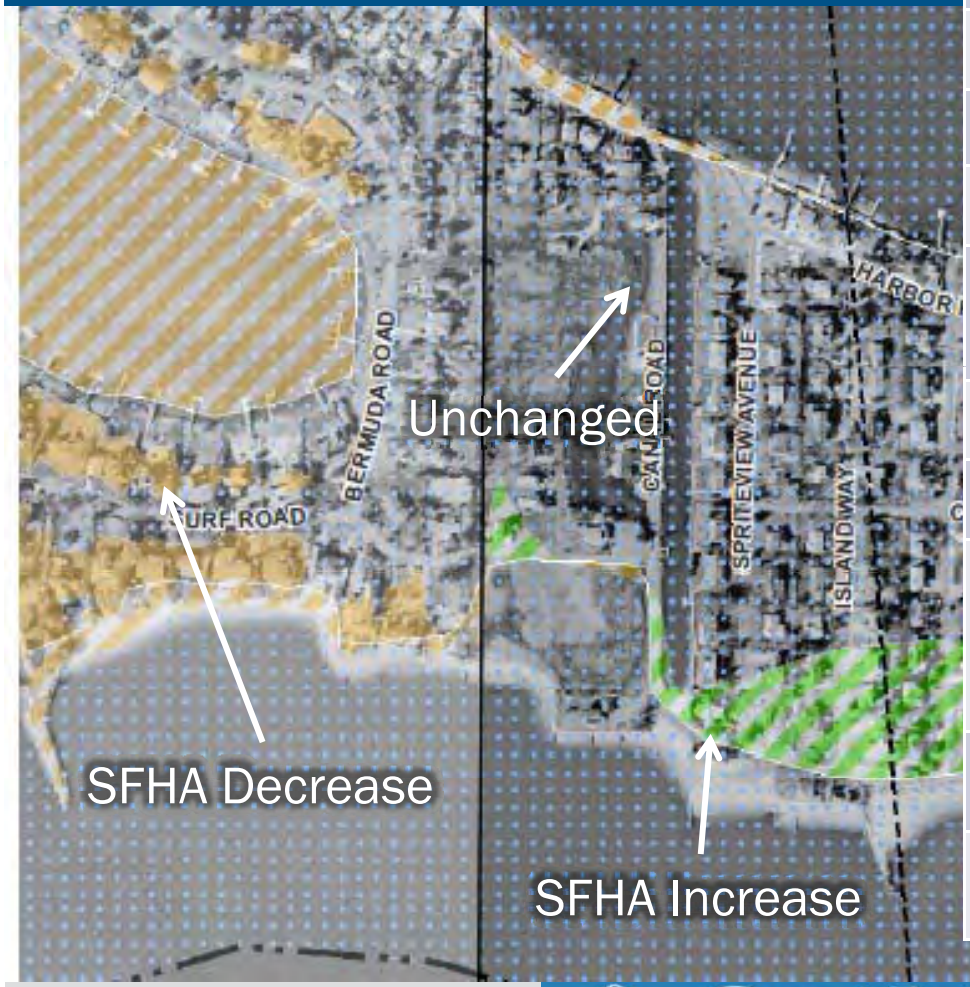
- Similar to Flood Risk Assessments for riverine, but using the coastal depth grids as input for the refined analysis
- Hazus analysis and data can support adoption of higher regulatory standards for structures in high loss areas
- Provides justification to fund mitigation actions



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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

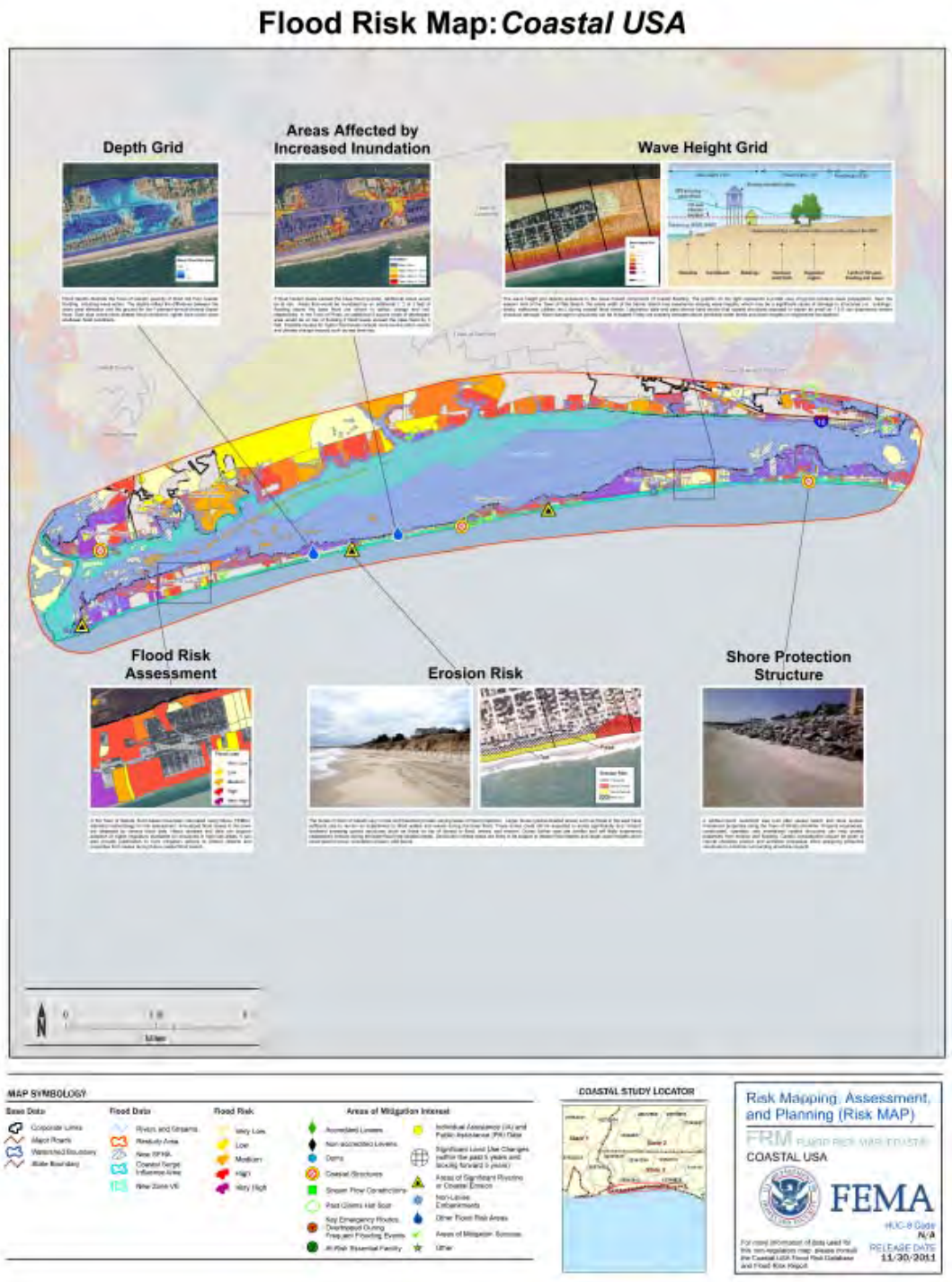
- Contains primary and secondary Land Use tables – same for coast type and vegetation
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

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Coastal FRM

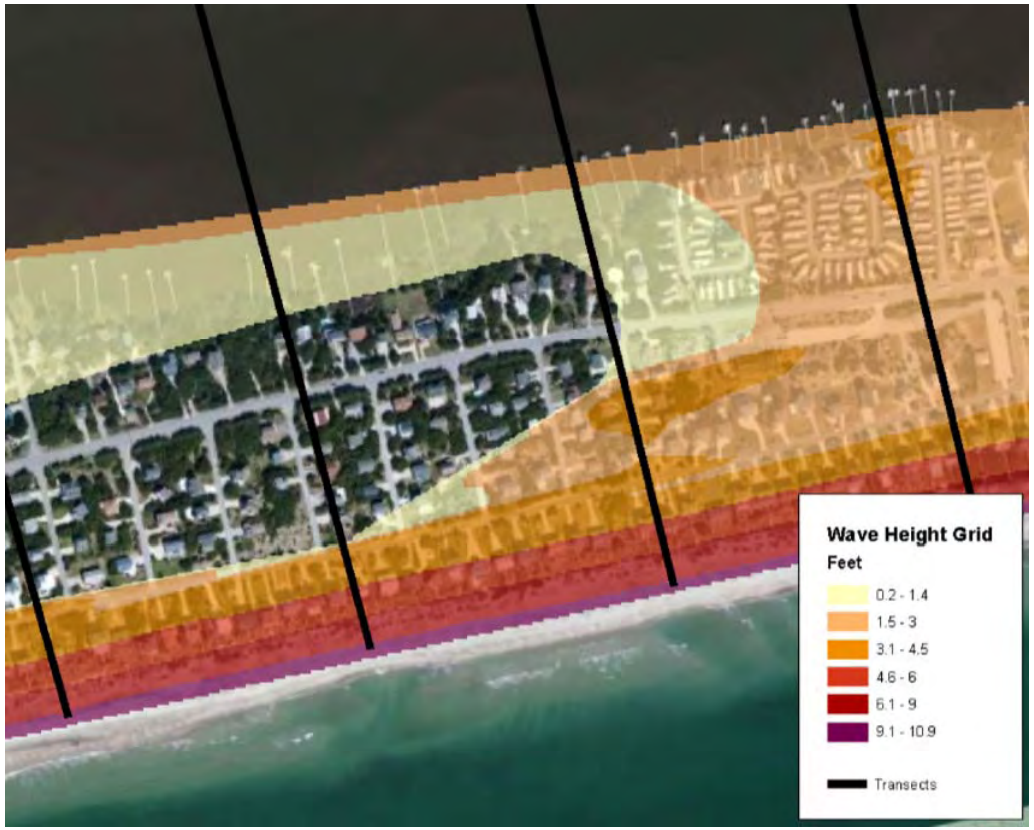
- Similar to riverine map
- Highlights area where datasets were produced
- Use of callout boxes
- Should drive the conversation towards mitigation



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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

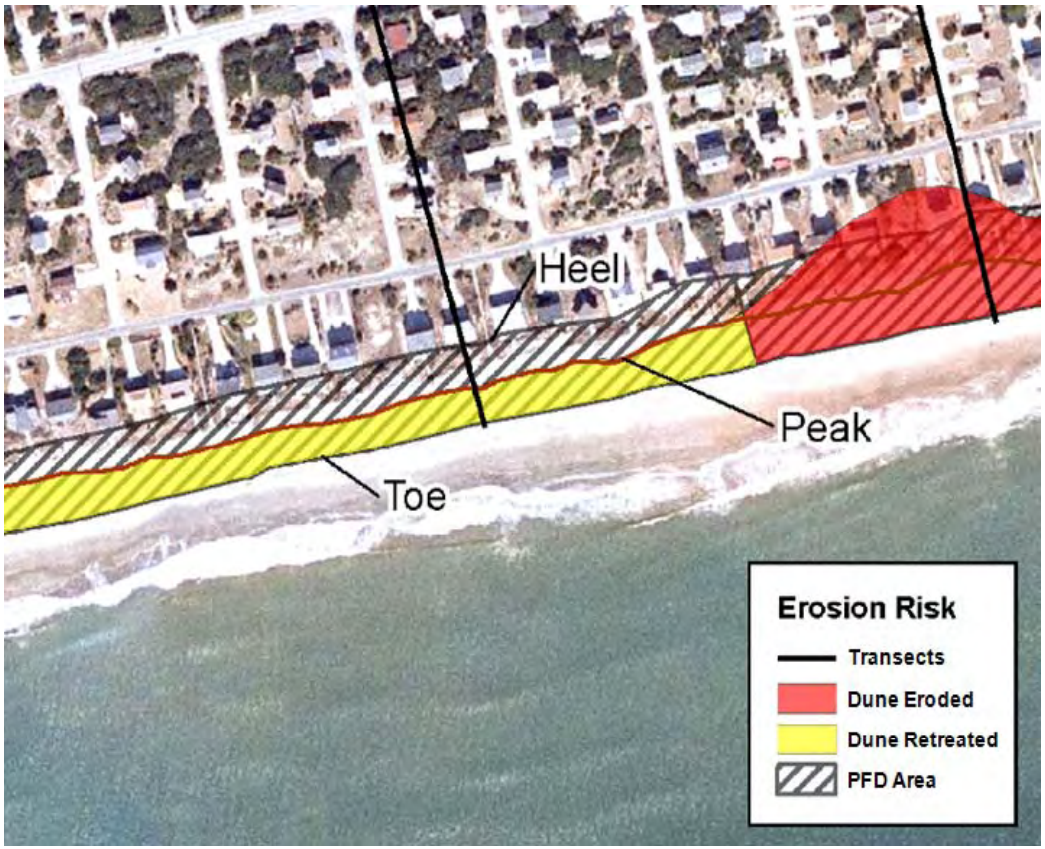


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Erosion Risk Determination

- 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*

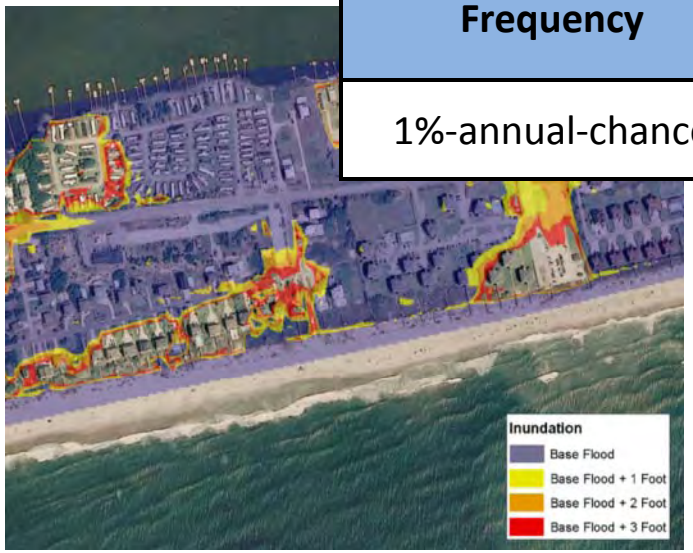
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Coastal Updates to Flood Risk Report

- 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

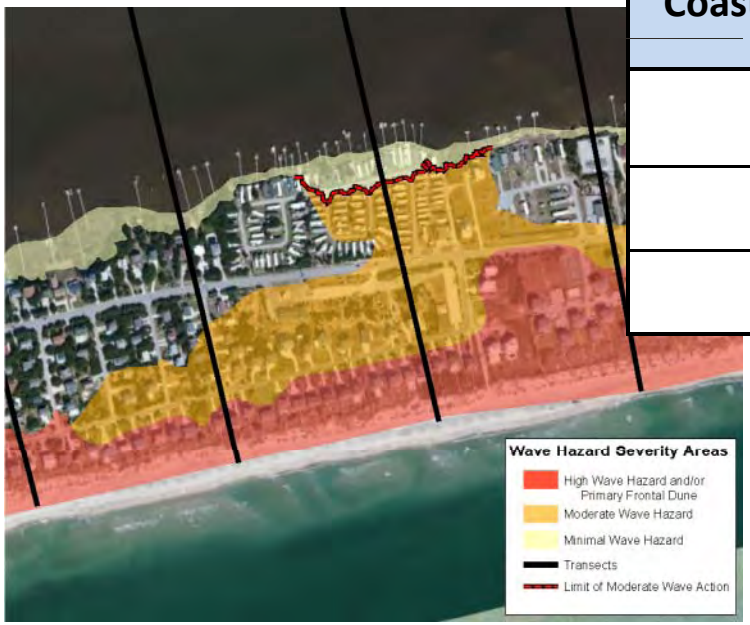


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Coastal Updates to Flood Risk Report

- 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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greatlakescoast.org

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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FEMA

How does this apply to my community?

- NFIP Compliance
- Local impacts of coastal study

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National Flood Insurance Program

FEMA

- 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?

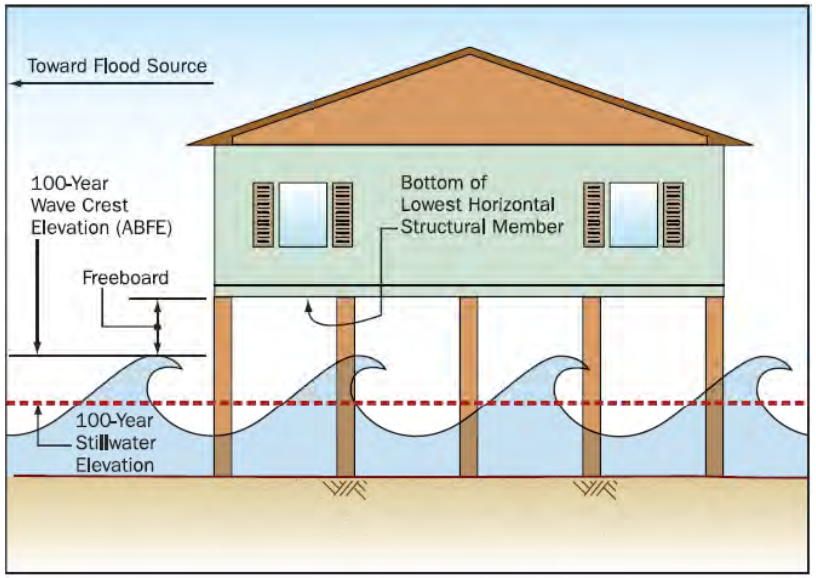
- Lake St. Clair communities currently do not have V/VE Zones. Majority of the communities have coastal A/AE zones.
- If costal AE and VE Zones are added on maps where they did not exist before, all affected communities must update regulations to include coastal requirements.
  - State will provide regulations 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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FEMA

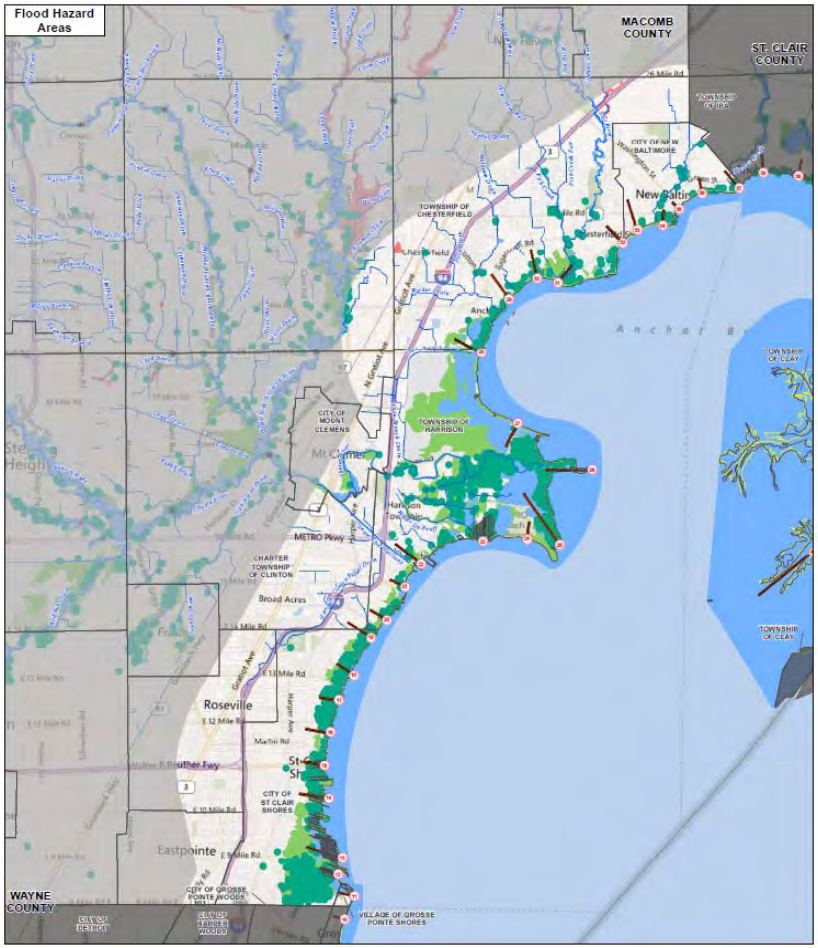
Interactive Session A

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

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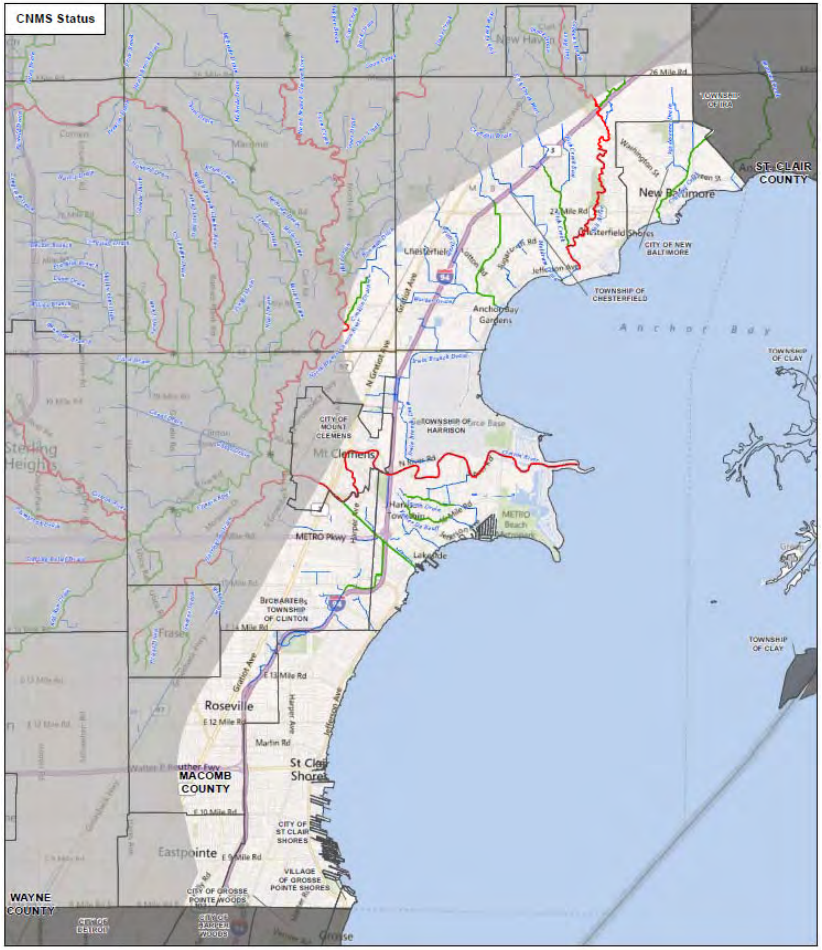
Macomb County, MI
Discovery Map – Flood Hazard Areas



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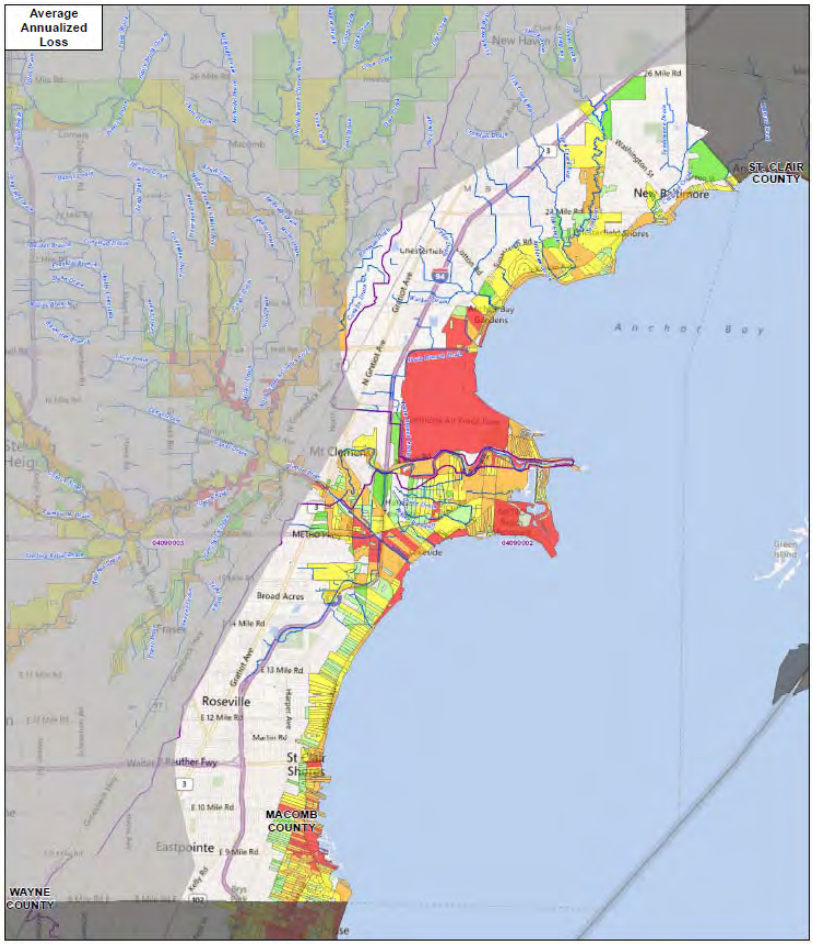
Macomb County, MI
Discovery Map – CNMS Status



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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

FEMA

Risk MAP

Risk MAP products and Datasets

Hazard Mitigation Plan

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

Other Community Plans

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

Mitigation Actions/Projects

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Mitigation Actions

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



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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

FEMA

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

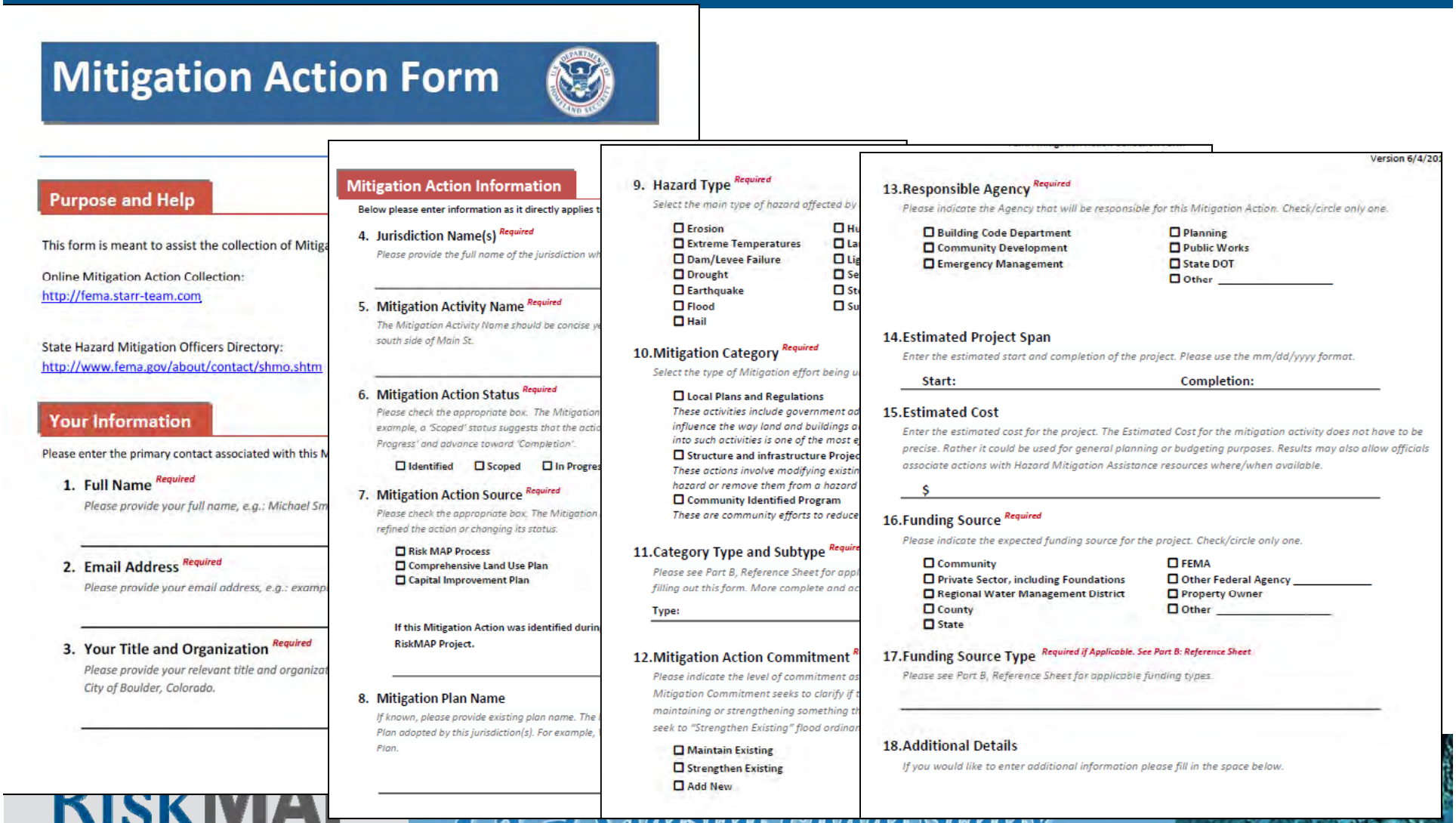
- The right action (or mix of actions) will be based on recent community experiences and level of complexity in existing infrastructure
  - *Public Works*
  - *Building Standards*
  - *Community Planning and HM Plan Update / Integration processes*
  - *Communication Processes, GIS, etc.*
- Get the right 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



RISKMAP
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FEMA

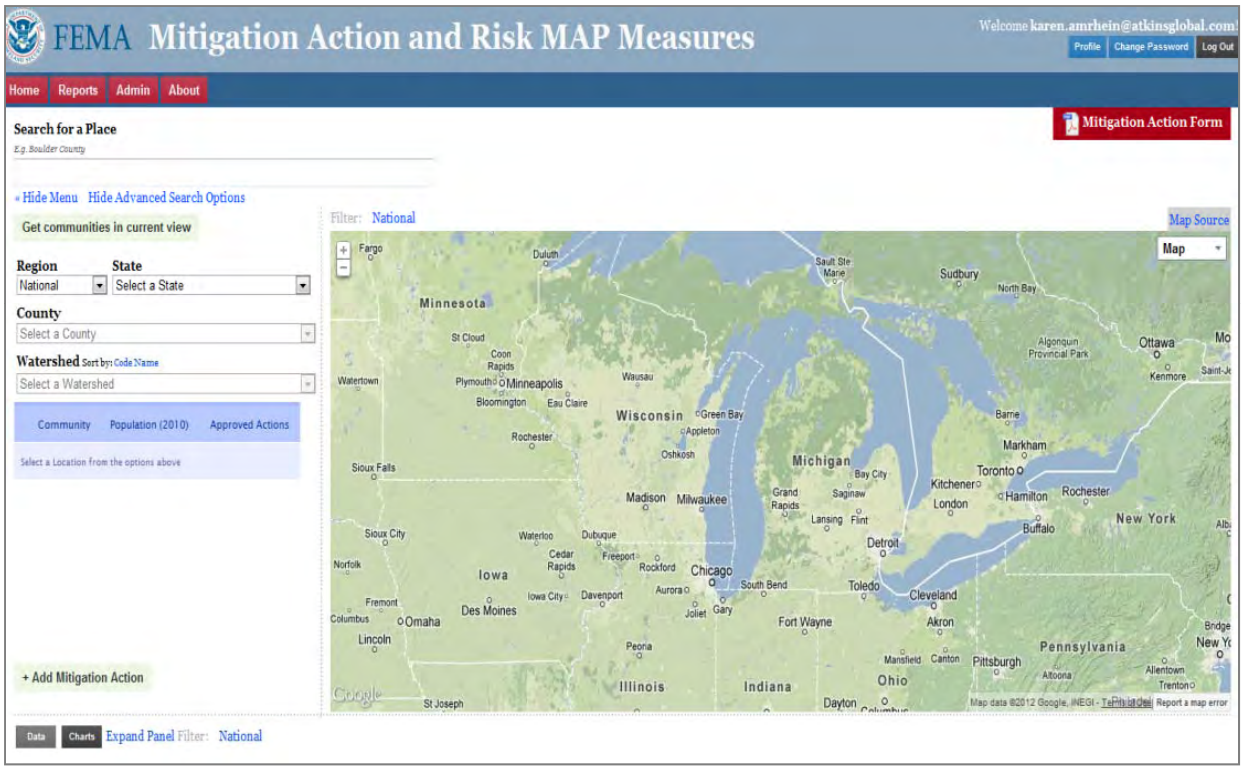
Interactive Session B

- 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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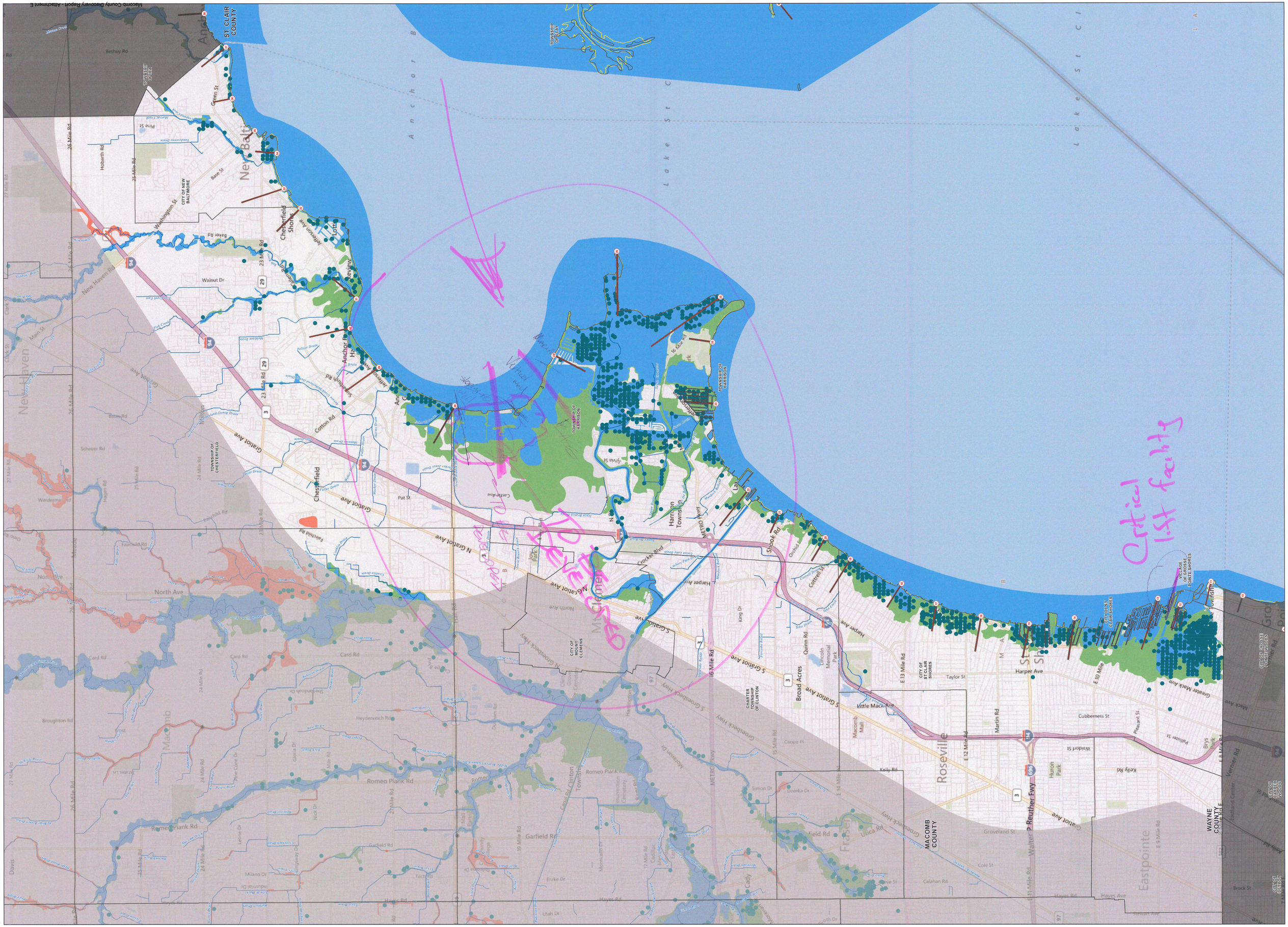


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- Michigan Partners
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- Online
  - info@greatlakescoast.org

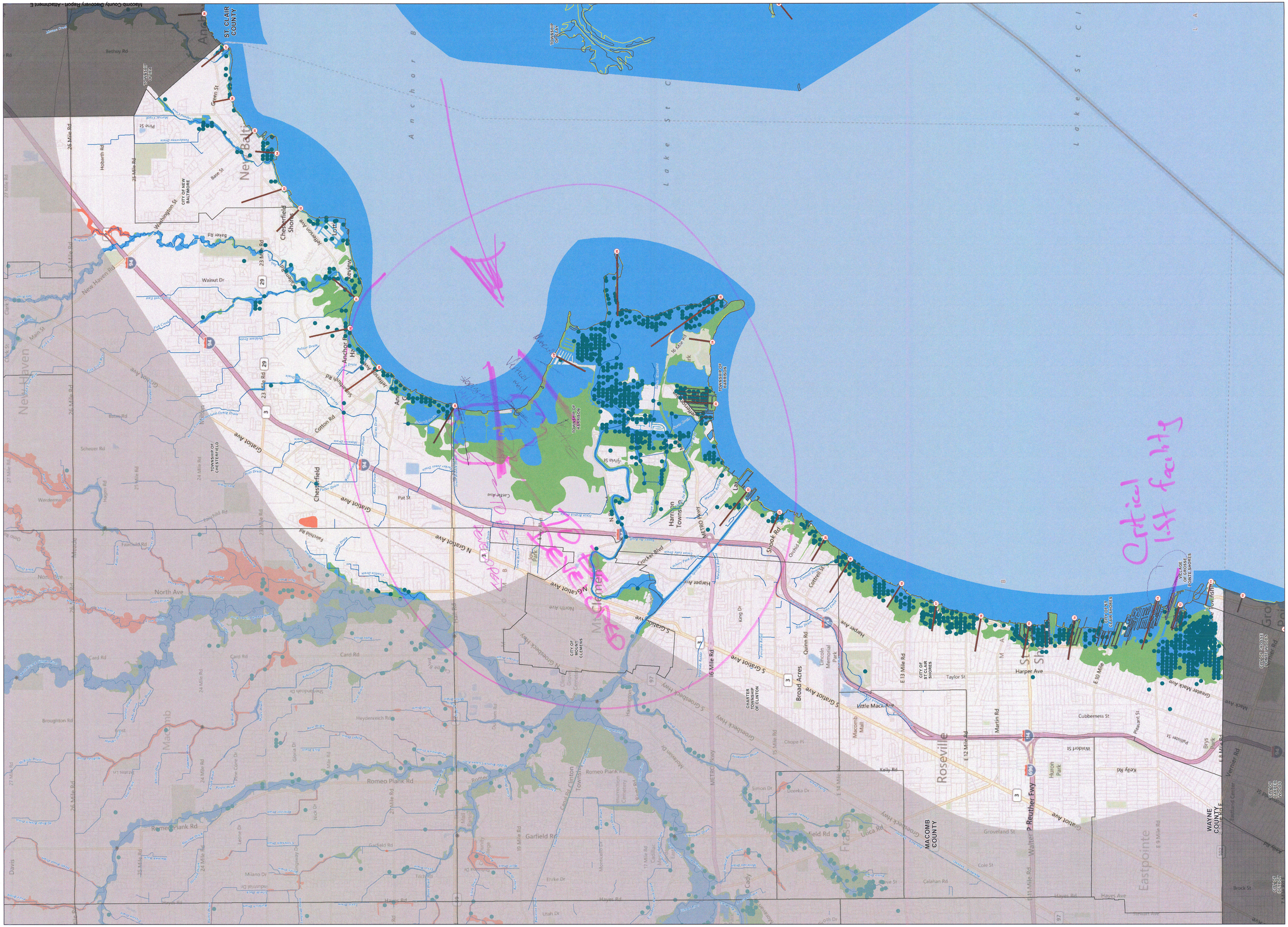
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Critical facility 1.5ft flood

Critical facility 1.5ft flood



Critical facility 1.5ft flood

Critical facility 1.5ft flood

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

APPENDIX D

St. Clair County Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake St. Clair

St. Clair County, Michigan Individual Report

Report Version 01

February 2013

FEMA

U.S. Department of Homeland Security
Federal Emergency Management Agency Region V
536 South Clark Street, 6th Floor
Chicago, Illinois 60605

SUBMITTED BY:



125 S. Wacker Drive, Suite 600
Chicago, IL 60606

Date Submitted: February 2013

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.

St. Clair
Algonac, City of
Clay, Township of
Cottrellville, Township of
East China, Township of
Ira, Township of
Marine City, City of
Marysville, City of
Port Huron, City of
St. Clair, City of
St. Clair, Township of

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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 St. Clair 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.

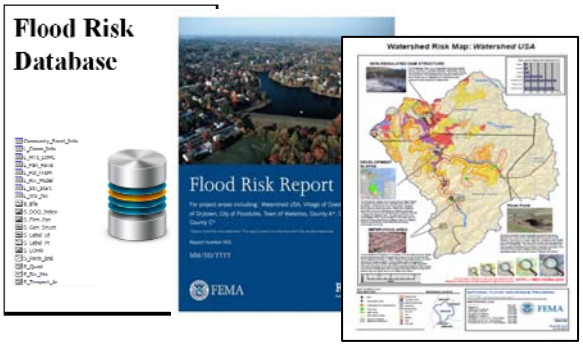
The following section describes the coastal flood risk products that a community may receive as part of a Risk MAP flood study, as well as some products that are under development for the Great Lakes study areas.

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.

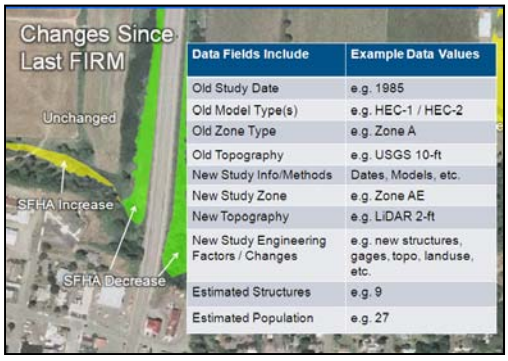
The three products are:

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

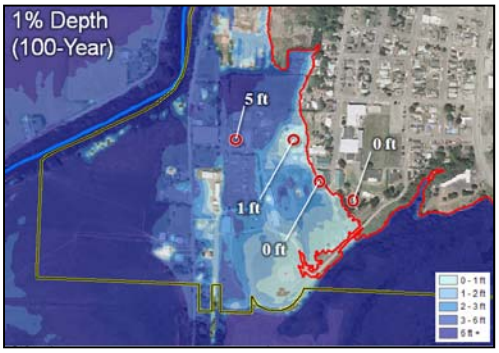


These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below.

- **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 St. Clair 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

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, St. Clair County Pre-Meeting Correspondence.

III. St. Clair County Discovery Meeting

The Discovery Meeting for St. Clair County coastal communities was held on August 20, 2012 in Goodells, Michigan. Communities affected by coastal flooding in St. Clair 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 St. Clair 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 St. Clair County Lake St. 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 St. Clair 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

[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.

Meeting for St. Clair County can be found in Attachment D. A sample map is shown below as Figure 1.

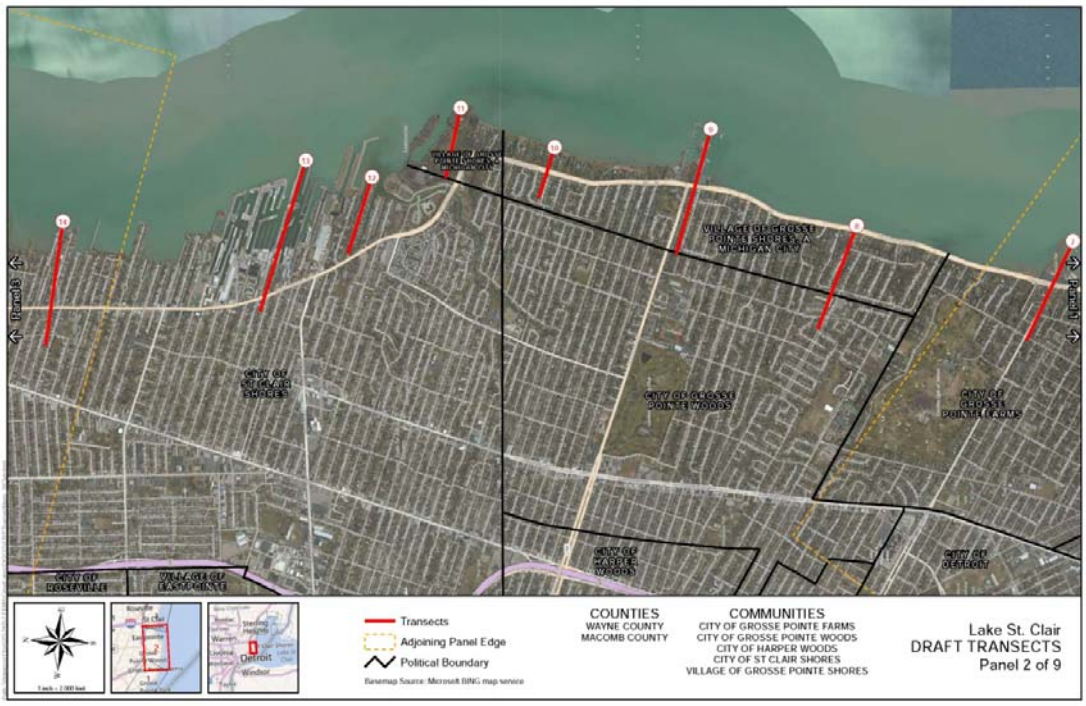


Figure 1: Sample Proposed Transect Figure

All comments that were provided during the St. Clair County Discovery Meeting have been compiled into the table below. While the draft Discovery Map and Transect Maps were not marked up with comments during the St. Clair County Discovery meeting, comments were captured in discussion throughout the Discovery Meeting. Each comment collected for St. Clair County is captured below.

Table 1. Stakeholder General Comments and Transect Comments

State	County	Location of comment	FIPS	CID	Comment
Michigan	St. Clair	St. Clair County shoreline	26147	N/A	Noted concern regarding overland flooding and how that risk will be mapped
Michigan	St. Clair	St. Clair County shoreline	26147	N/A	Concerns were expressed relative to density of near-shore vegetation, particularly phragmites, which may compromise accuracy of new LiDAR bathymetry being collected in 2012 and 2013

Table 1. Stakeholder General Comments and Transect Comments

State	County	Location of comment	FIPS	CID	Comment
Michigan	St. Clair	St. Clair County	26147	N/A	Requested the effective transects be used for Lake St Clair, where available

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, St. Clair 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 St. Clair 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 St. Clair County Lake St. Clair Project Area prior to moving forward with the coastal flood study.

Table 2. Data Collected for St. Clair 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

Table 2. Data Collected for St. Clair County

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
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 Erosion 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
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

Table 2. Data Collected for St. Clair County

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Individual/Public Assistance	Discovery Report	FEMA's "Public Assistance Subgrantee 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 below. Information can also be obtained from the report titled FEMA *Hazus AAL Usability Analysis*, dated April 13, 2011 (Federal Emergency Managment Agency, 2011). AAL data summarized at the census block level are shown on the draft Discovery Map (Attachment C).

Table 3. Hazus AAL Data for St. Clair County

County	FIPS Code	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
St. Clair	26147	597,575	265,237	312,931

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.

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.

No federal lands were found in the St. Clair County project area.

I.IV.i.4 Jurisdictional Boundaries

St. Clair County jurisdictional boundaries were obtained from the May 3, 2010 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.

Communities from the St. Clair County project area did not submit information or data via the Coastal Data Request Form at the time this report was created. However, the Southeast Michigan Council of Governments (SEMCOG) 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.

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.) were 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 St. Clair 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 St. Clair County, including St. Clair River, that is covered by this Great Lakes Coastal Flood Study totals 154.3 miles. The shoreline classification information for St. Clair County is summarized in Tables 4 through 7, including shoreline types, land uses, coverage, and vegetation types, respectively.

Table 4. Summary of Shoreline Types

County	Total Shoreline (mile)	Artificial Shoreline (mile)	Boulders, Bedrock (mile)	Cohesive Clays and Silts (mile)	Sand (mile)	Shingles, Pebbles, Cobbles (Mile)
St. Clair County (Lake St. Clair)	125.3	55.1	--	48.9	20.7	0.6
St. Clair County (St. Clair River)	29.0	27.1	0.6	--	1.3	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 5. 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)
St. Clair County (Lake St. Clair)	128.5	0.6	--	--	9.3	17.0	31.3	70.3
St. Clair County (St. Clair River)	29.0	8.2	--	--	1.3	0.6	18.3	0.6

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 6. 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)
St. Clair County (Lake St. Clair)	128.5	--	72.8	--	55.7	--	--
St. Clair County (St. Clair River)	29.0	3.2	--	--	25.8	--	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

Table 7. Summary of Shoreline Vegetation Types

County	Total Shoreline (mile)	High Density Shrubs/Trees (mile)	Low Density Shrubs/Trees (mile)	Manicured Lawn (mile)	Moderate Density Shrubs/ Trees (mile)	None (mile)	Unmaintained Non-Woody Vegetation (mile)
St. Clair County (Lake St. Clair)	128.5	--	--	57.6	--	--	70.9
St. Clair County (St. Clair River)	29.0	--	--	26.5	--	2.5	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

Stream lines and water areas for St. Clair County were acquired from the May 3, 2010 effective FIRM database. 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 (RMSE[3]) 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/.

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 St. Clair 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.

[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.

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 St. Clair County May 3, 2010 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" (http://nationalatlas.gov/atlasftp.html).

St. Clair County project area contains portions of three HUC-8 watersheds: Lake St. Clair (04090002), Birch-Willow (04080104) and St. Clair (04090001).

ii. Other Data and Information

St. Clair County is located in the southeastern portion of the lower peninsula of Michigan. It is bordered on the south by Lake St. Clair and Macomb County; on the west by Lapeer County; on the north by Sanilac County; on the northeast by Lake Huron and on the east by the St. Clair River. The major transportation arteries of St. Clair County are I-94, I-69, Gratiot Avenue, 26-Mile Road, Michigan State Highway 29, Fred W. Moore Highway, and Belle River Road. The 2010 census population of St. Clair County was reported to be 163,040 (U.S. Census Bureau, 2010).

As is the case for most of Michigan, the climate of St. Clair County is affected by the moderating influence of the Great Lakes. The heat storage capacity of the lakes tends to dampen climatic extremes and to delay seasonal changes. Lake breezes can lower daily maximum temperatures by as much as 15° F relative to the areas not under their influence. Climatology data was gathered from Michigan State Climatologist's Office, a service of

the Michigan State University Department of Geography. St. Clair County's climate is continental. On average, the warmest month is July, with an average maximum temperature of 81.9° F, as recorded at the station located in Port Huron. The lowest average daily minimum temperature occurs in January and averages 16.1° F. The average total annual precipitation is 31.5 inches, well distributed seasonally. Average annual snowfall is about 38.5 inches, with most falling in December through March. The highest monthly snow fall was 39.4 inches in December 2000 (Michigan State Climatologist's Office, Port Huron Station 6680, 2009).

St. Clair County is largely drained in the north by the Black River and its tributaries; by the Pine River in the central portion; and in the southern portion of the county by the Belle River and its tributaries. The rivers empty into the St. Clair River which borders the county to the east and flows from Lake Huron to Lake St. Clair. The soils that have developed belong to the Podzolic Group and are mostly silt loams and sand loams that are somewhat poorly drained. The northern and southern portion of the county is mostly flat to gently rolling sandy loams with most development being residential and occurring along Lake Huron and Lake St. Clair's shoreline, respectively. Ponding does occur as the soils are difficult to drain (Federal Emergency Management Agency, 2010).

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.

St. Clair County project area has no designated units of the coastal barriers along the Lake St. Clair shoreline.

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, the 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. In St. Clair County, under Operation Foresight, elevations of 580.8 (NAVD88) feet were established for lakefront dikes and 578.5 (NAVD88) feet for canal dikes (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. The Enterprise Coastal Inventory Database from the Engineer Research and Development Center (ERDC) was obtained through USACE to determine where these structures exist along Lake St. Clair. No USACE maintained coastal structures were found to exist along the St. Clair County shoreline.

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 St. Clair 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 the FEMA Community Information System (CIS) (https://portal.fema.gov/famsVuWeb/home) July 2012.

The summary of CAV visits were extracted from FEMA's Community Information System (CIS) at https://portal.fema.gov in July 2012. Table 8 shows the most recent CAV date by community in this project area.

Table 8. Summary of Community Assisted Visits

Community	CID	CAV Date
Algonac, City of	260191	5/13/1992
Clay, Township of	260194	7/21/2009
Cottrellville, Township of	260196	N/A
East China, Township of	260197	2/6/2009
Ira, Township of	260199	2/16/2012
Marine City, City of	260200	5/13/1992
Marysville, City of	260201	N/A
Port Huron, City of	260204	N/A
St. Clair, City of	260279	8/30/2000
St. Clair, Township of	260205	10/26/2009

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 St. Clair 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 St. Clair County Comprehensive Plan can be downloaded here: http://cis.stclaircounty.org/

Comprehensive plans were not collected or provided during this Discovery process for the individual communities along the Lake St. Clair shoreline in St. Clair 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 9 summarizes the draft results of the validation analysis obtained from CNMS in June 2012. CNMS only captures riverine studies at this time.

Table 9. CNMS Status for St. Clair County

County	FIPS	Stream Miles			
		Unknown	Unverified	Valid	Total
St. Clair	26147	0	46	218	265

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 St. Clair County, 8-percent of critical facilities and 6-percent of road miles (or 132 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 the Hazard Mitigation Plans (HMPs). Information on critical features can also be found in the St. Clair 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 St. Clair County through 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, no dams were identified within the St. Clair County project area.

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 10 lists the major disaster declarations that have been declared in all of St. Clair County.

Table 10. Declared Disasters in St. Clair County

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
St. Clair (County)	363	12/1/1972	Flood	Severe storms & flooding
St. Clair (County)	371	4/12/1973	Flood	Severe storms & flooding
St. Clair (County)	465	4/26/1975	Flood	Severe storms, high winds & flooding
St. Clair (County)	495	3/19/1976	Severe Storm(s)	Severe storms, tornadoes, icing & flooding
St. Clair (County)	1128	7/23/1996	Severe Storm(s)	Severe storms and flooding
St. Clair (County)	1527	6/30/2004	Severe Storm(s)	Severe storms, tornadoes, and flooding
St. Clair (County)	3057	1/27/1978	Snow	Blizzards & snowstorms
St. Clair (County)	3160	1/10/2001	Snow	Snow
St. Clair (County)	3189	9/23/2003	Other	Power outage
St. Clair (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 project, data on flood insurance policies were also gathered.

Table 11 below summarizes the numbers and premiums of insurance policies, the total coverage, and the numbers and dollar amounts of paid losses in communities of St. Clair 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 11. 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
Algonac, City of	260191	260	$ 182,700	$ 45,180,200	86	$274,798
Clay, Township of	260194	940	$ 627,207	$ 167,665,000	421	$1,086,171
Cottrellville, Township of	260196	36	$ 25,420	$ 7,955,200	13	$29,135
East China, Township of	260197	145	$ 105,344	$ 26,327,900	96	$500,538
Ira, Township of	260199	192	$ 125,020	$ 35,169,900	95	$144,958
Marine City, City of	260200	33	$ 20,033	$ 5,794,000	45	$202,334
Marysville, City of	260201	10	$ 4,460	$ 2,479,000	4	$1,834
Port Huron, City of	260204	50	$ 37,499	$ 11,608,300	26	$136,091
St. Clair, City of	260279	14	$ 8,650	$ 3,157,000	11	$6,746
St. Clair, Township of	260205	4	$ 2,688	$ 856,200	3	$3,268

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 12 shows the meteorological station identification number and location for the gages in the St. Clair County study area.

Table 12: Meteorological Stations in St. Clair County

County	Station ID	Location	Owner	Data	Years of Historical Data
St. Clair	AGCM4	Algonac, MI	National Ocean Service	Meteorological Observation	2012
St. Clair	FTGM4	Fort Gratiot, MI	National Ocean Service	Meteorological Observation	2004-Present
St. Clair	MBRM4	Mouth of Black River, MI	National Ocean Service	Meteorological Observation	2009-Present

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

Stream Gages

The USGS National Water Information System Web Interface http://waterdata.usgs.gov/nwis, provides real-time data for any given stream gage location. Table 13 shows the gage identification numbers and locations for the gages in the study areas of St. Clair County. USGS stream gage locations are shown on the Discovery Map.

Table 13. Stream Gage Stations in St. Clair 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
04160600	1962/10/01	2000/09/30	Belle River at Memphis, 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 14 lists the water level stations along Lake St. Clair

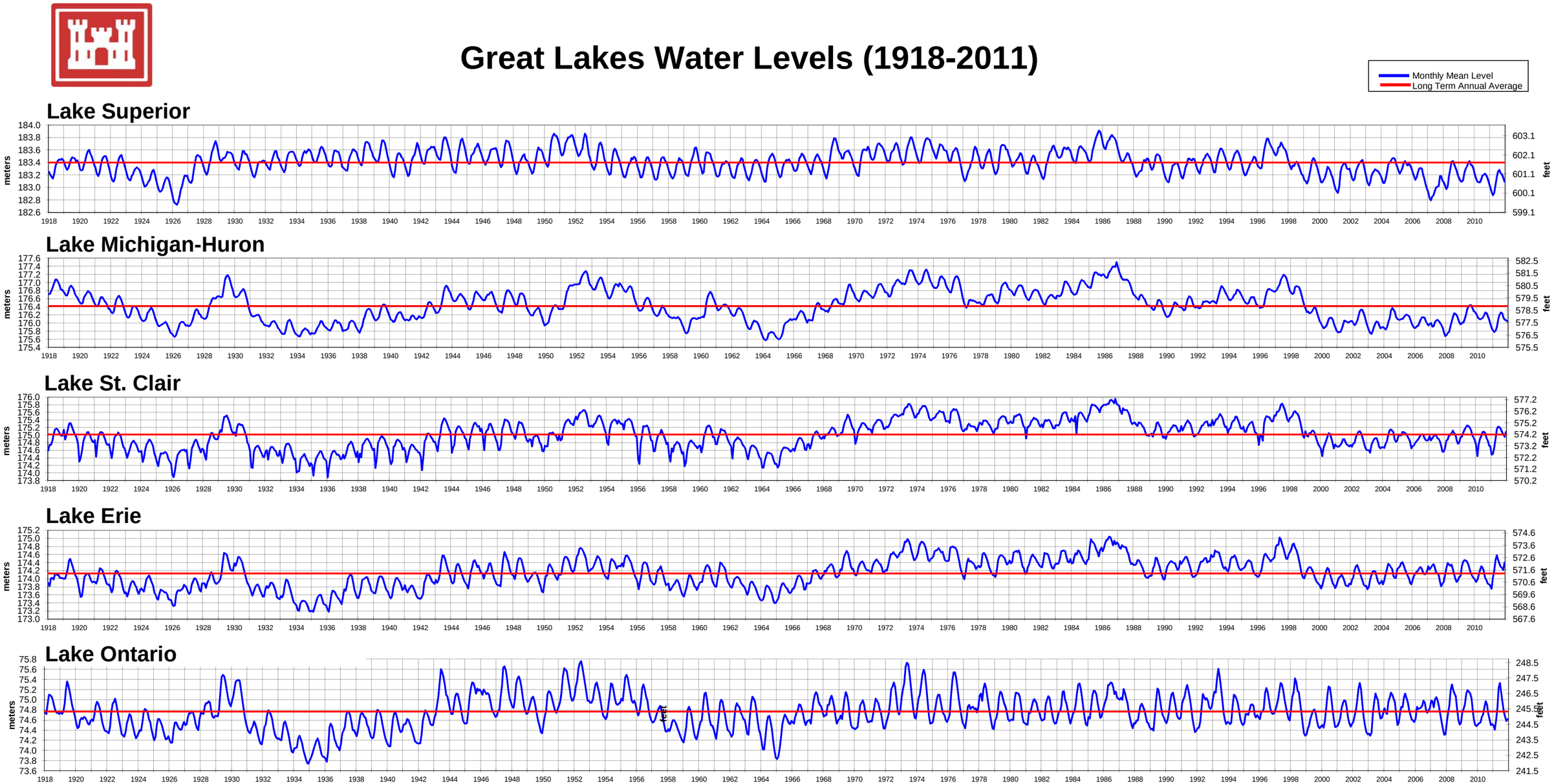
Table 14. Water Level Stations

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 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://climate.geo.msu.edu

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 15. 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 15. Hazard Mitigation Plan Status

Jurisdiction	Approval Date	Expiration Date
St. Clair County	5/9/2006	5/9/2011
City of Port Huron	6/12/2006	6/12/2012

During the Discovery process, stakeholders noted that St. Clair County had received a planning grant and the process to update the St. Clair County Hazard Mitigation plan is underway.

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 St. Clair 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 *Flood Insurance Study, St. Clair County, Michigan*, effective in 2010.

Flooding in St. Clair County is generally experienced from rainstorms in the spring or early summer. The more severe flooding occurs in late winter or early spring from rainfall and/or snowmelt in conjunction with ice jams. Water-surface elevations on the Great Lakes vary from season to season and from year to year. Seasonal variations generally reach peak values during the period from May to July, then recede to a low value in the month of February (Federal Emergency Managment Agency, 2010).

Continuous winds, blowing strongly from a southerly direction across Lake St. Clair, can create a wind setup or rise in lake level above the normal undisturbed water level along the north shore. Additionally, waves generated by these winds may induce wave run-up or a further increase in water-surface elevations above the setup level. These phenomena are of comparatively short duration and quickly subsides when the wind velocity lessens or the wind direction changes. An increase in the water-surface elevation of Lake St. Clair will be manifested by an attendant rise in the St. Clair River's stage (Federal Emergency Managment Agency, 2010).

Flooding of record in the Township of Clay occurred during the period from March 15 to 19, 1973. Undisturbed water levels in Lake St. Clair were approximately 4.0 feet above low water datum at the time. Southwest winds created an additional wind setup along the northern shore of Lake St. Clair and raised both river and lake stages above overflow levels. Ponding of water was reported in houses, garages and yards in several of the residential areas. This flood had an estimated frequency of 200 years (Federal Emergency Managment Agency, 2010).

Low lying areas along in the Township of Clay and the Township of Ira have been subject to periodic flooding caused by overflows of the St. Clair River or rises in the water levels of Lake St. Clair and the dredged waterways that are directly connected to Lake St. Clair (Federal Emergency Managment Agency, 2010).

No high water mark data was found within St. Clair County for Lake St. Clair. If local stakeholders have available high water mark data or historic photographs, they are encouraged to submit them to FEMA Region V Mitigation Division.

I.IV.ii.16 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 16 lists the number of LOMCs in the county. No Conditional LOMAs or Conditional LOMR-Fs were included. The LOMCs are shown on the Discovery Map. Clusters of LOMCs indicate a need for updated maps.

Table 16. Summary of LOMC cases in St. Clair 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
St. Clair	1151	18	16	0

I.IV.ii.17 Locally Identified Mitigation Actions

Table 17 lists the mitigation actions that were extracted from the St. Clair County Hazard Mitigation Plan, which expired on May 9, 2011.

Table 17. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Maintain updated floodplain mapping
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Implement land use planning regulations in floodplain and coastal zone areas.
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Alleviate repetitive loss properties by: wet floodproofing of structures; dry floodproofing structures; acquisition of repetitive loss properties; purchase or transfer of development rights; conservation easements.
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Implement effective stormwater management.
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Continue to enhance the capabilities of the county GIS system to function as a planning tool to aid in regulatory efforts to mitigate hazard events.

Table 17. Hazard Mitigation Actions

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Use land development techniques, such as cluster housing, to preserve natural resources and features
St. Clair County Hazard Mitigation Plan, 2005	St. Clair County	5/9/2011	Require that development and redevelopment site plans protect wood lots, wetlands, and other natural vegetation.

I.IV.ii.18 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 St. Clair County communities within the project area is shown in Table 18.

Table 18. Program Status and Ordinance Level

Community	CID	FIRM Date	Program Status	Ordinance Level
Algonac, City of	260191	5/3/2010	Participating	C
Clay, Township of	260194	5/3/2010	Participating	D
Cottrellville, Township of	260196	5/3/2010	Participating	D
East China, Township of	260197	5/3/2010	Participating	D

Table 18. Program Status and Ordinance Level

Community	CID	FIRM Date	Program Status	Ordinance Level
Ira, Township of	260199	5/3/2010	Participating	D
Marine City, City of	260200	5/3/2010	Participating	D
Marysville, City of	260201	5/3/2010	Participating	C
Port Huron, City of	260204	5/3/2010	Participating	D
St. Clair, City of	260279	5/3/2010	Participating	D
St. Clair, Township of	260205	5/3/2010	Participating	D

CID = community identification

I.IV.ii.19 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 St. Clair 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 19 is a compilation of the comments received regarding the proposed transects along Lake St. Clair in St. Clair County. Please refer to the draft Discovery Map (Attachment C) or to the proposed transect figures (Attachment D) to identify the transect location based on transect number.

Table 19. Transect Comments

Stakeholder	Transect Number (on draft Discovery Map)	Comment
Michigan Department of Environmental Quality	N/A – related to all transects	Requested the effective transects be used for St. Clair County

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 the request to utilize effective transect locations where possible. The revised

proposed draft transects can be seen on the Final Discovery Maps, located in Appendix F of the - 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.20 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.21 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.22 Regulatory Mapping

The effective mapping for coastal communities within St. Clair County is listed in Table 20 by community.

Table 20. Effective Mapping Status

Community	CID	Firm Date	Program Status
Algonac, City of	260191	5/3/2010	Participating
Clay, Township of	260194	5/3/2010	Participating
Cottrellville, Township of	260196	5/3/2010	Participating
East China, Township of	260197	5/3/2010	Participating
Ira, Township of	260199	5/3/2010	Participating
Marine City, City of	260200	5/3/2010	Participating
Marysville, City of	260201	5/3/2010	Participating

Table 20. Effective Mapping Status

Community	CID	Firm Date	Program Status
Port Huron, City of	260204	5/3/2010	Participating
St. Clair, City of	260279	5/3/2010	Participating
St. Clair, Township of	260205	5/3/2010	Participating

CID = community identification

For the May 3, 2010 effective Lake St. Clair countywide study, the results from the 1988 *Revised Report on Great Lakes Open-Coast Flood Levels* and the 2007 *Flood Level Restudy of Lake St. Clair and Anchor Bay* reports, both prepared by the USACE, were incorporated into the study. Additional information on the countywide scope of study can be found in the FIS for St. Clair County (Federal Emergency Managment Agency, 2010).

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.23 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 St. Clair County project area, as shown in Table 21.

Table 21. Repetitive Loss

Community	CID	Number of Repetitive Loss Structures	Total Repetitive Loss Payment
Algonac, City of	260191	3	$ 49,403
Clay, Township of	260194	13	$ 133,969
Cottrellville, Township of	260196	2	$ 24,610
East China, Township of	260197	10	$ 328,837
Ira, Township of	260199	6	$ 84,774
Marine City, City of	260200	7	$ 161,102
Marysville, City of	260201	0	$ 0
Port Huron, City of	260204	2	$ 43,580
St. Clair, City of	260279	0	$ 0
St. Clair, Township of	260205	0	$ 0

I.IV.ii.24 Socio-Economic Analysis

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 St. Clair County, approximately 11 percent of the population is inside a FEMA floodplain (National Oceanic & Atmospheric Administration, 2009).

In 2009, lake-related businesses provided 8.2 percent of the total jobs in St. Clair County. This accounted for approximately 3,500 jobs, $41 million in wages, and $80 million in goods & services. This represents an 8 percent decrease in lake-related jobs since 2005 (National Oceanic & Atmospheric Administration, 2009).

I.IV.ii.25 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 St. Clair 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 22 summarizes the products projected for the coastal communities.

Table 22. 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
St. Clair	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 definiencies that should be corrected.

During this discovery process, it was identified that St. Clair County had received planning grant funding and is in the process of updating their Hazard Mitigation Plans. It is recommended additional discussion occur between FEMA and the St. Clair County stakeholders as this coastal flood study moves forward to see if MPTA would be an appropriate and beneficial option.

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.

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

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

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

v. Unmet Needs

The St. Clair 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. In addition, St. Clair County representatives noted concern regarding overland flooding and how that risk will be mapped. 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.

Concerns were also expressed relative to density of near-shore vegetation, particularly phragmites, which may compromise accuracy of new LiDAR bathymetry being collected in 2012 and early 2013. St. Clair County suggested it would be helpful to photograph potential problem areas and build site-specific datasets to enhance ground-truthing techniques. There was an offer to consider local resources in obtaining survey points and photographs of the shoreline, for ground verification and independent validations.

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 St. Clair County effective transects were incorporated into the proposed 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. St. Clair County Pre-Meeting Correspondence
Attachment C. Draft Discovery Map
Attachment D. Proposed Transects
Attachment E. St. Clair County Discovery Meeting Documents
Attachment F. 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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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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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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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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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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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:

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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

ST. CLAIR 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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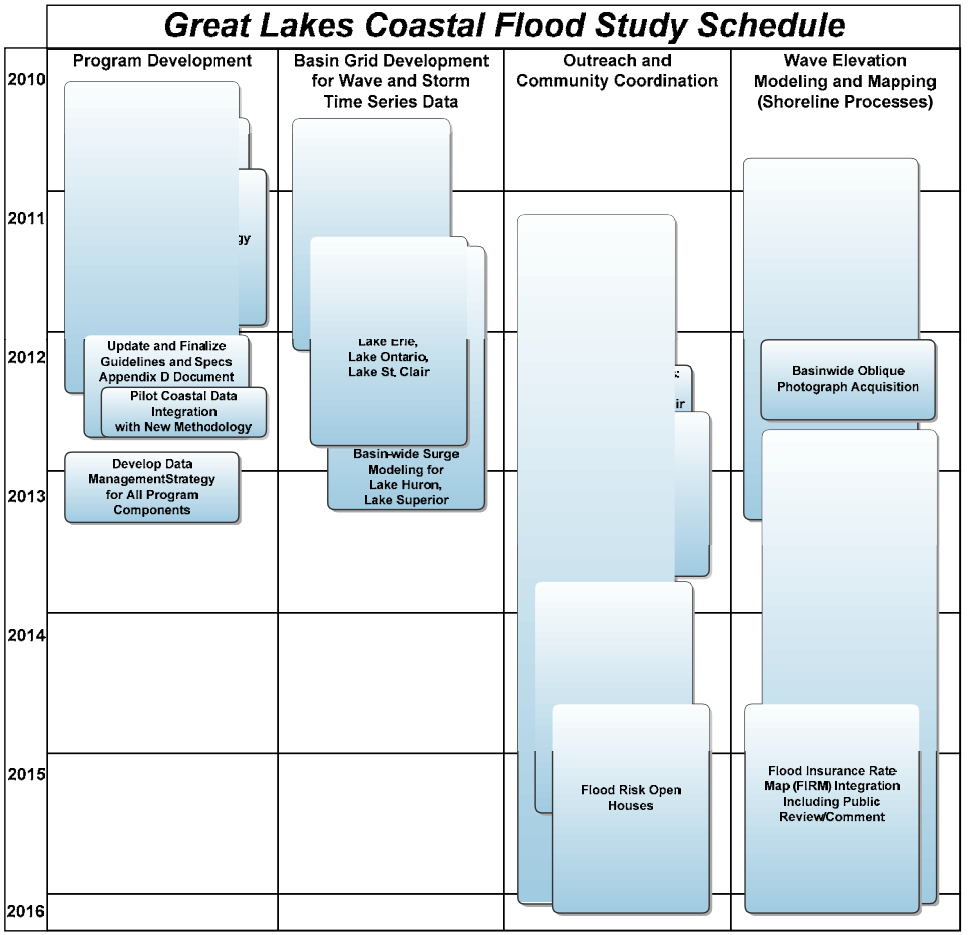
Program Overview

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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greatlakescoast.org

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)

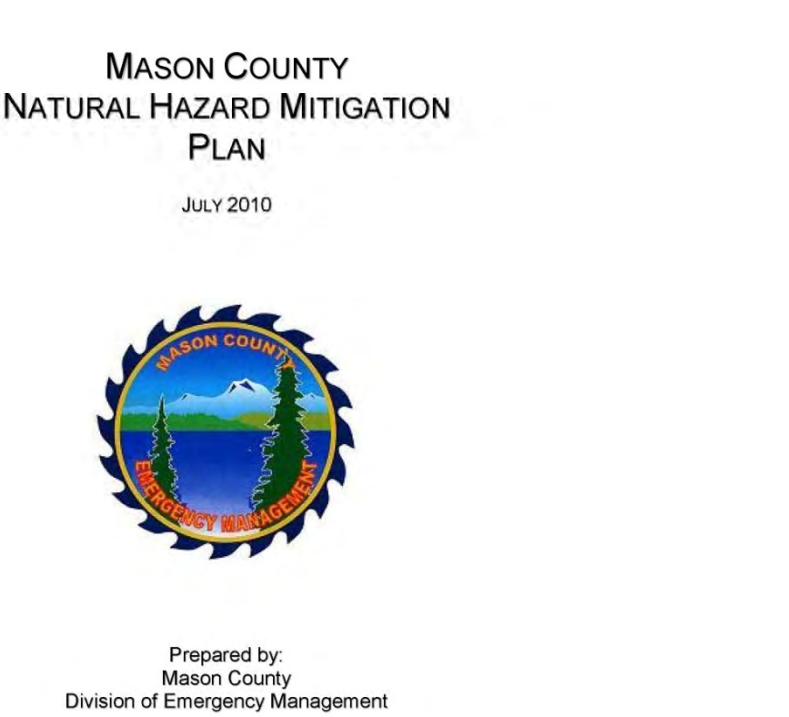
Reducing hazard risks and vulnerabilities through education, planning, physical improvements, early warning, and coordination of programs and resources.

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

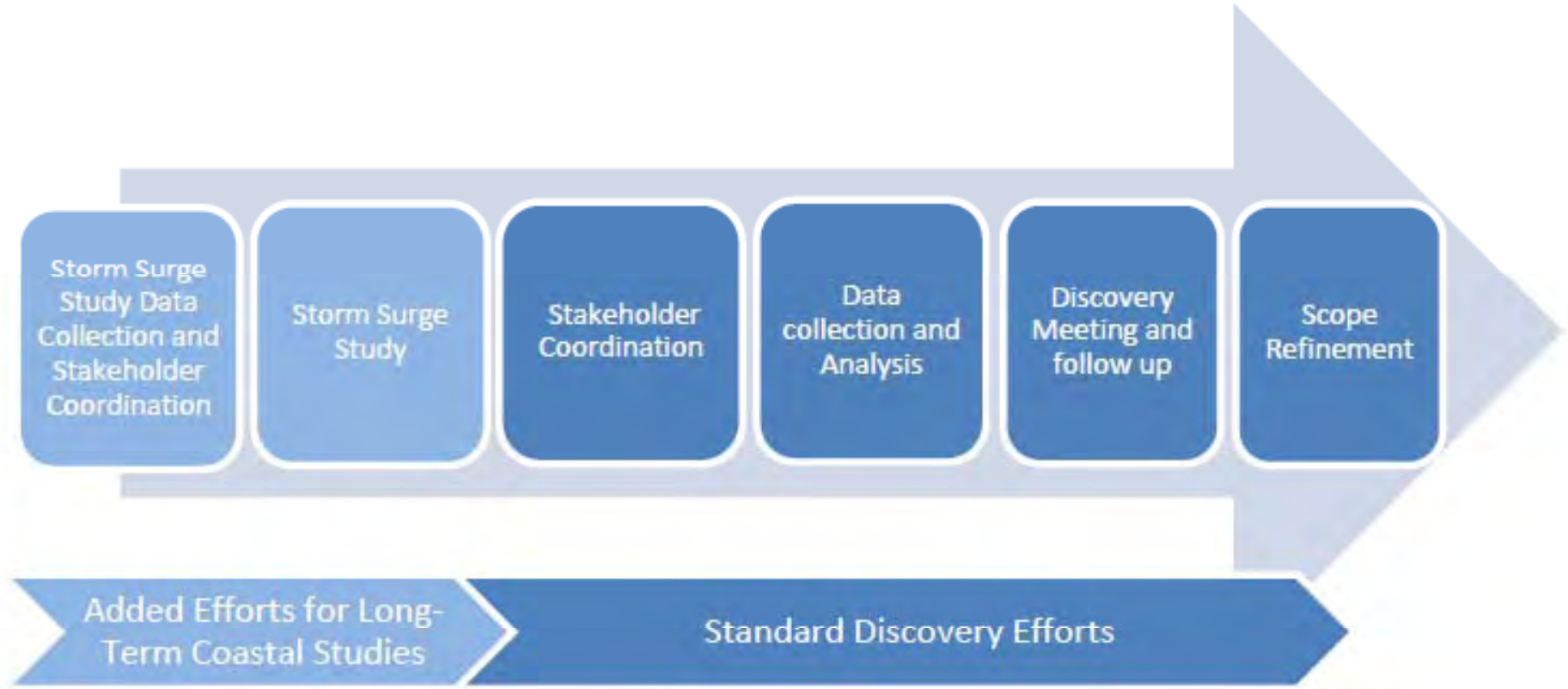
JULY 2010

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
greatlakescoast.org

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
greatlakescoast.org

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
greatlakescoast.org

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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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

Discovery Outcomes

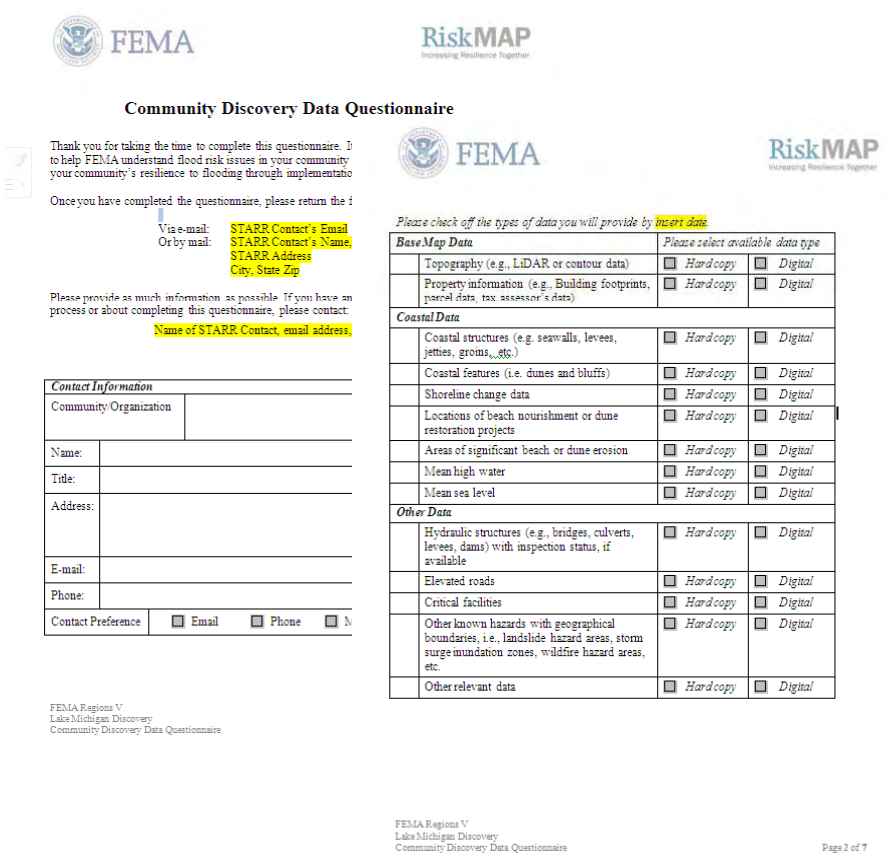
Outcome #3 - Introduce Mitigation Action Goals

- 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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Great Lakes Coastal Flood Study
greatlakescoast.org

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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Great Lakes Coastal Flood Study
greatlakescoast.org



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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greatlakescoast.org

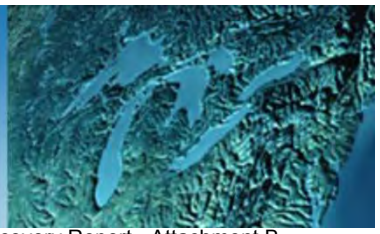
FEMA

Flood Risk Datasets

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

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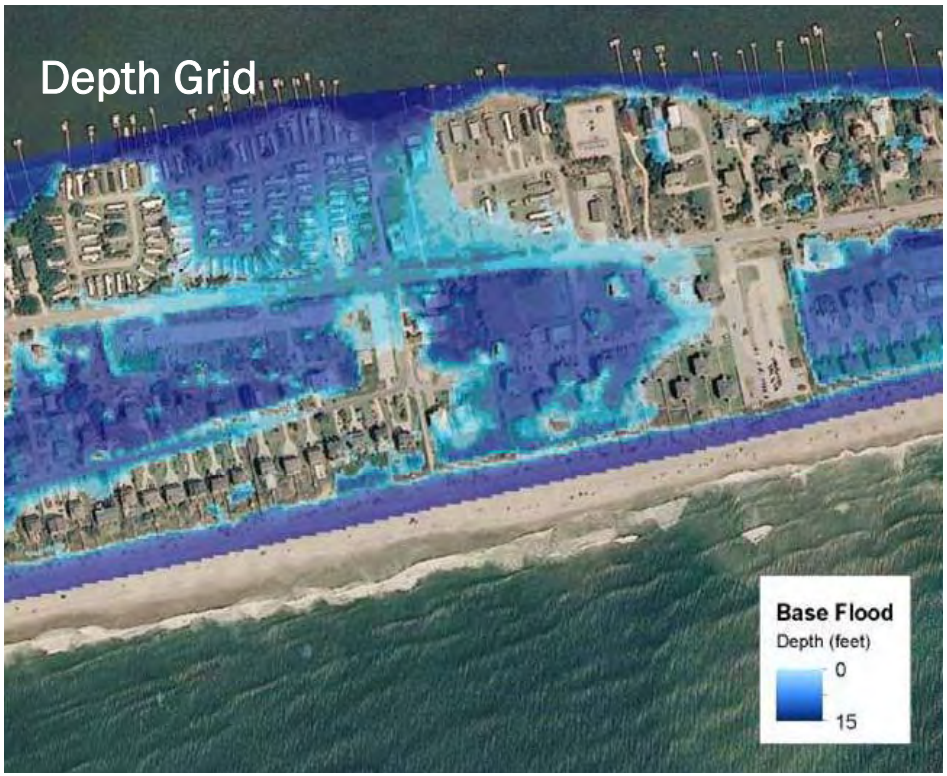
Great Lakes Coastal Flood Study
greatlakescoast.org



Standard Flood Risk Products

- Coastal Depth Grids
- Flood Risk Assessment (HAZUS)

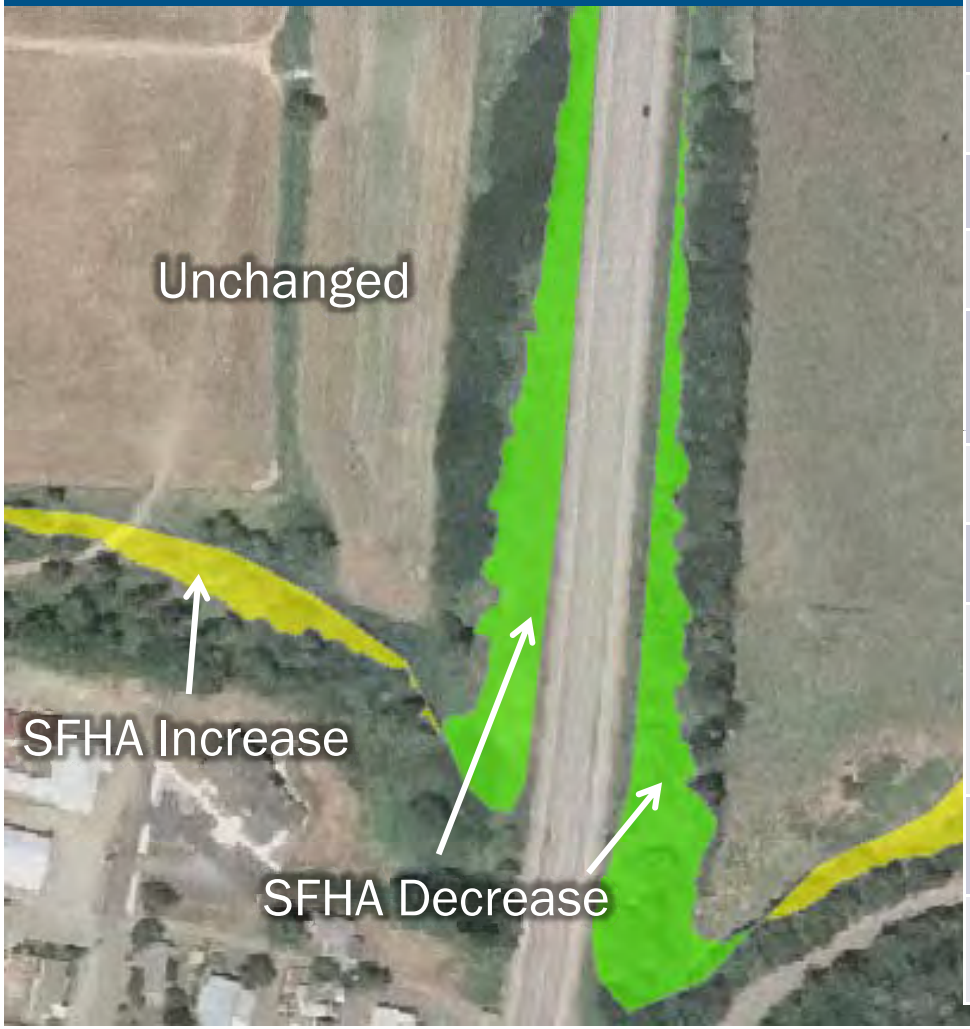
HAZUS MH
EARTHQUAKE • WIND • FLOOD



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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

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

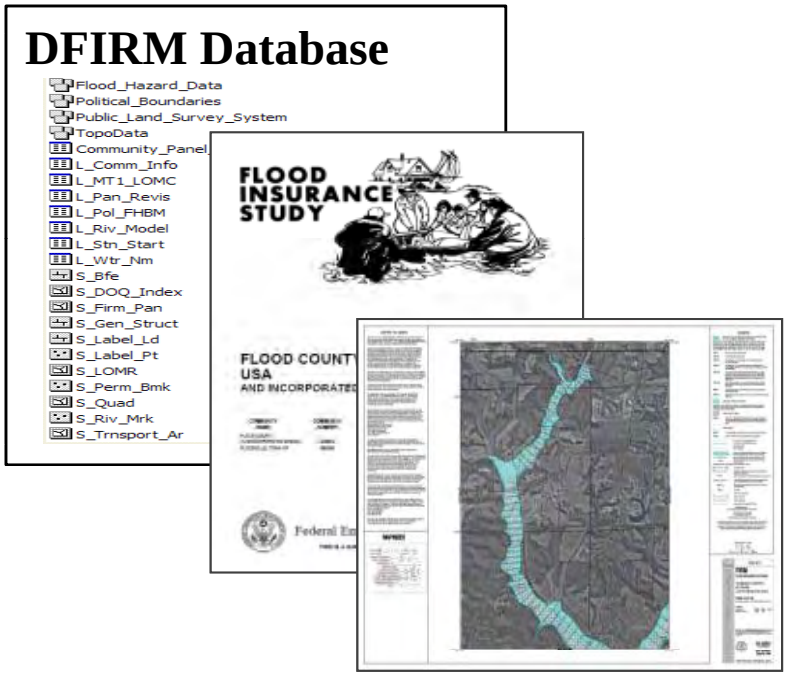
- Contains primary and secondary Land Use tables – same for coast type and vegetation.
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

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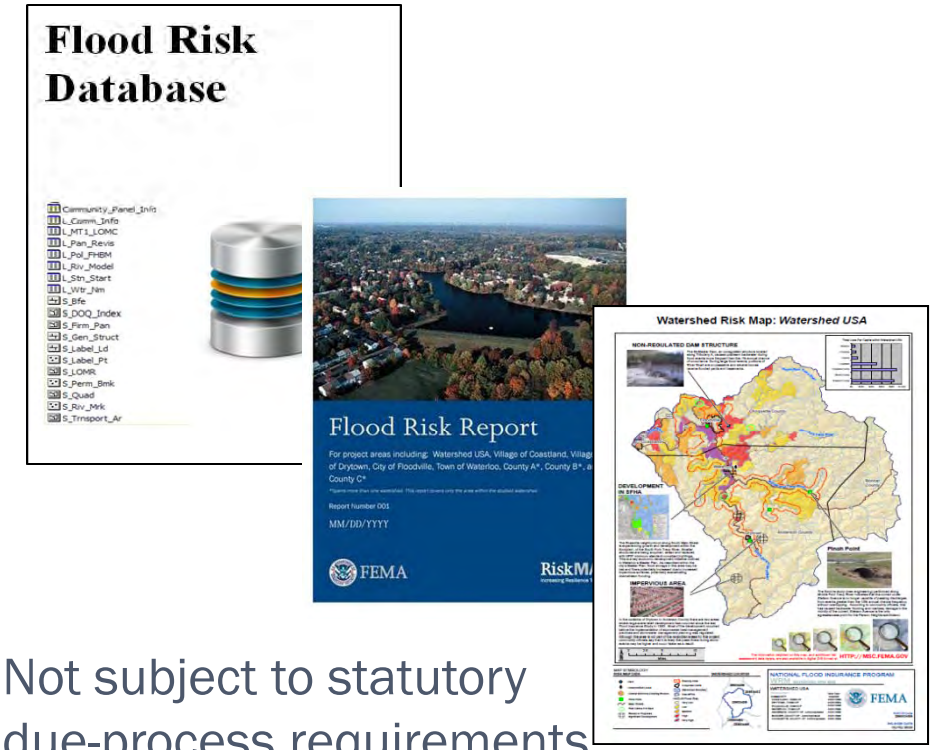
Program Product Comparisons

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

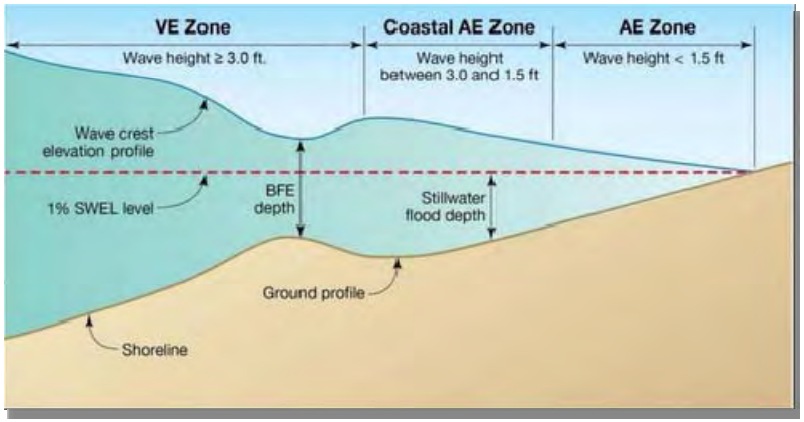
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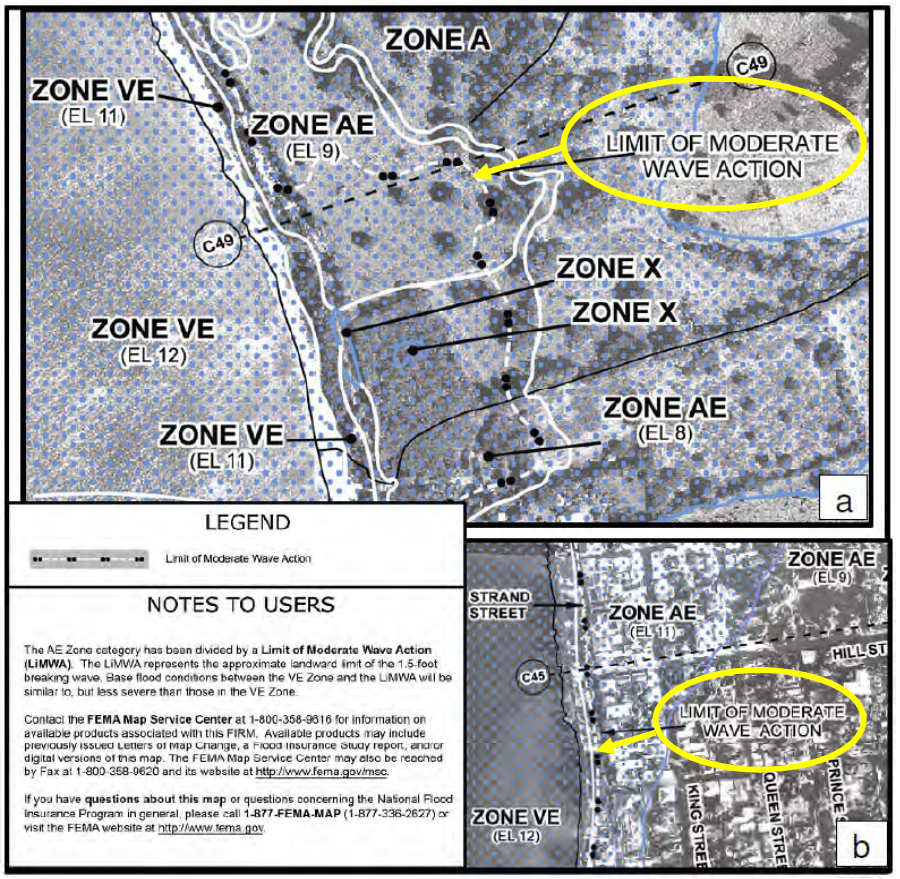
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greatlakescoast.org

Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

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



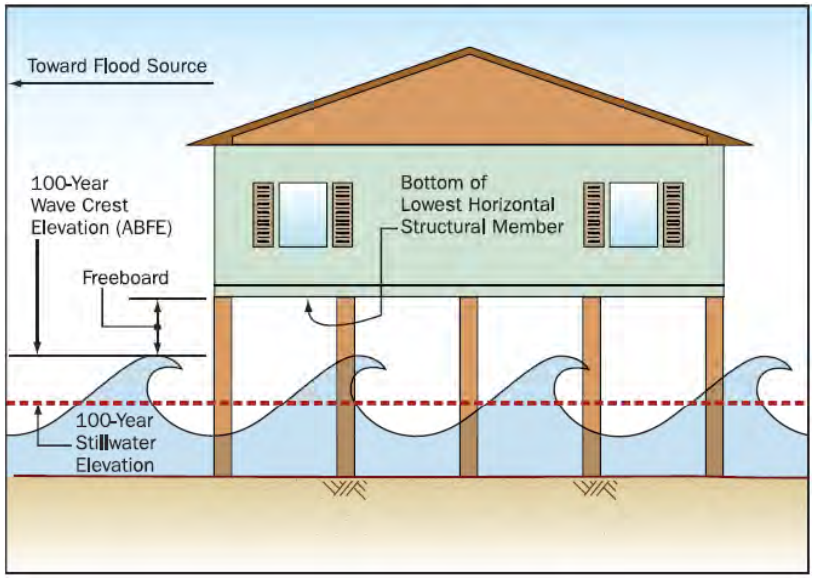


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Coastal Zones and NFIP Compliance

- 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

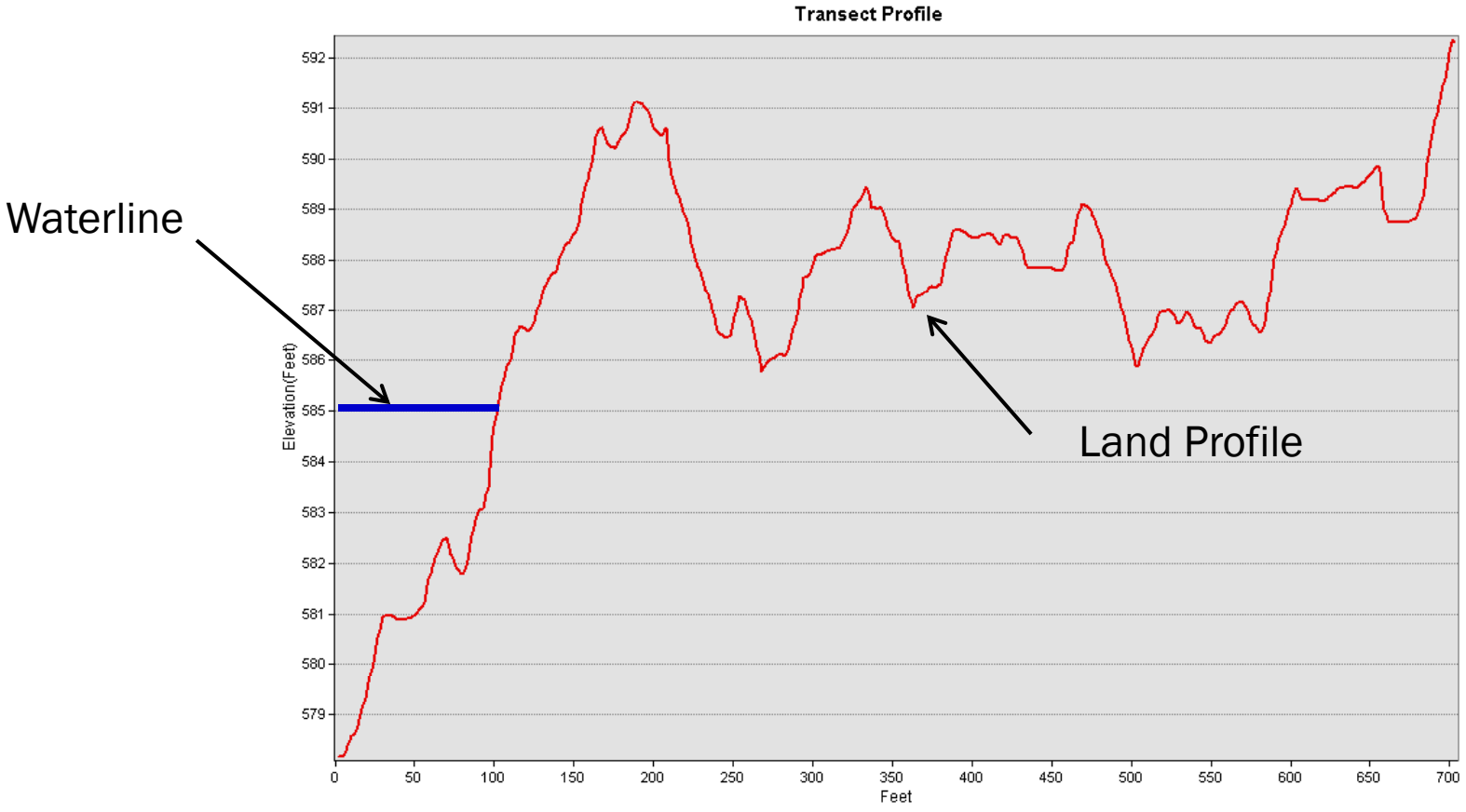
State	County	Proposed Draft Transects
Michigan	St. Clair	15
	Macomb	25
	Wayne	10
	Total	**50**



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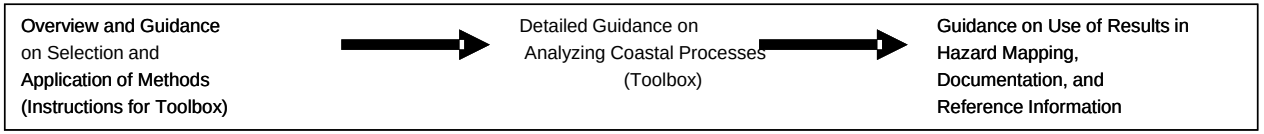
Profile from newest LiDAR

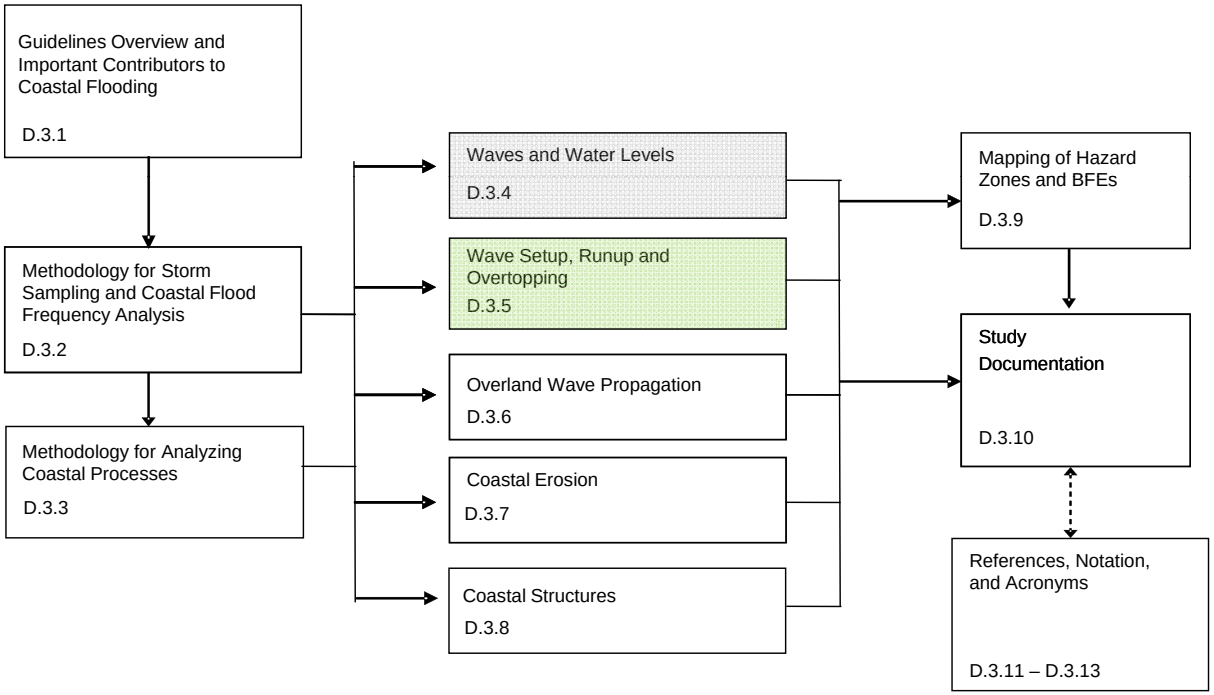


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Coastal Analysis and Updates to Guidance

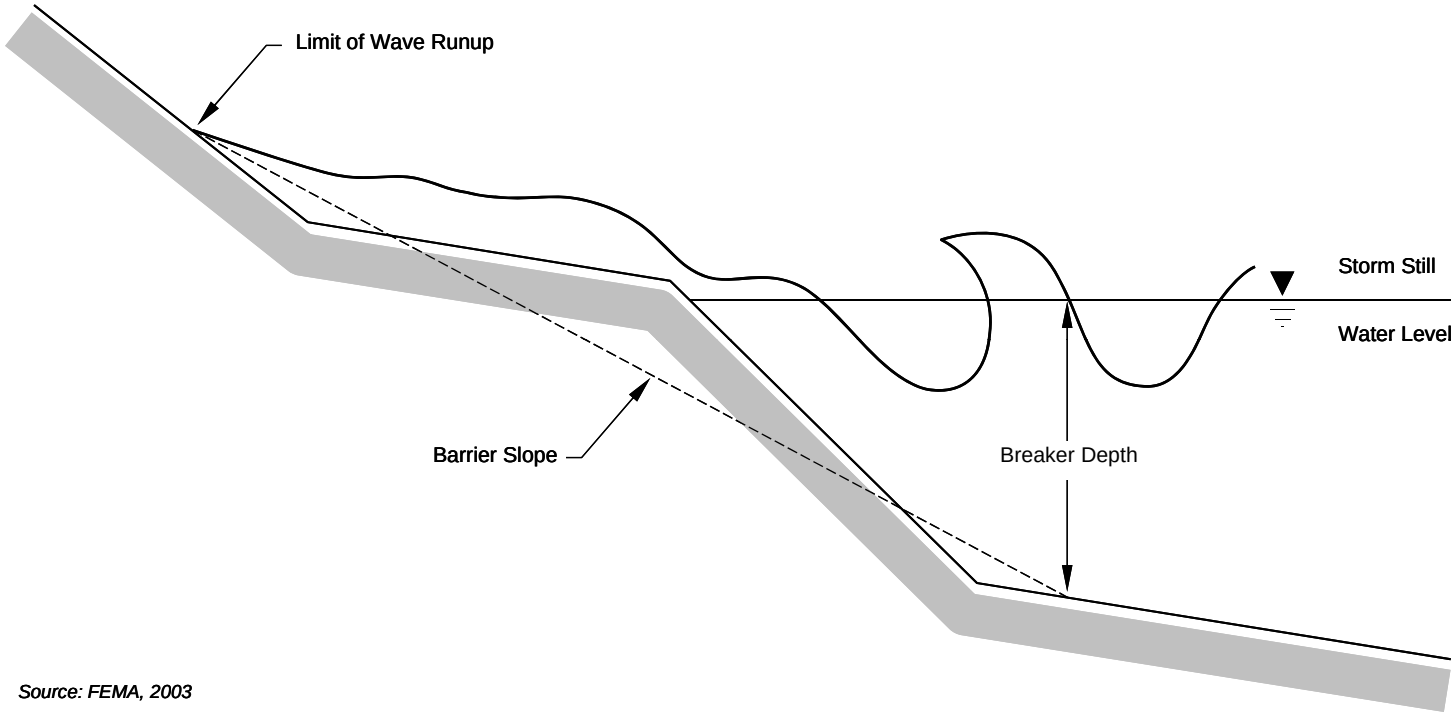




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Wave Runup

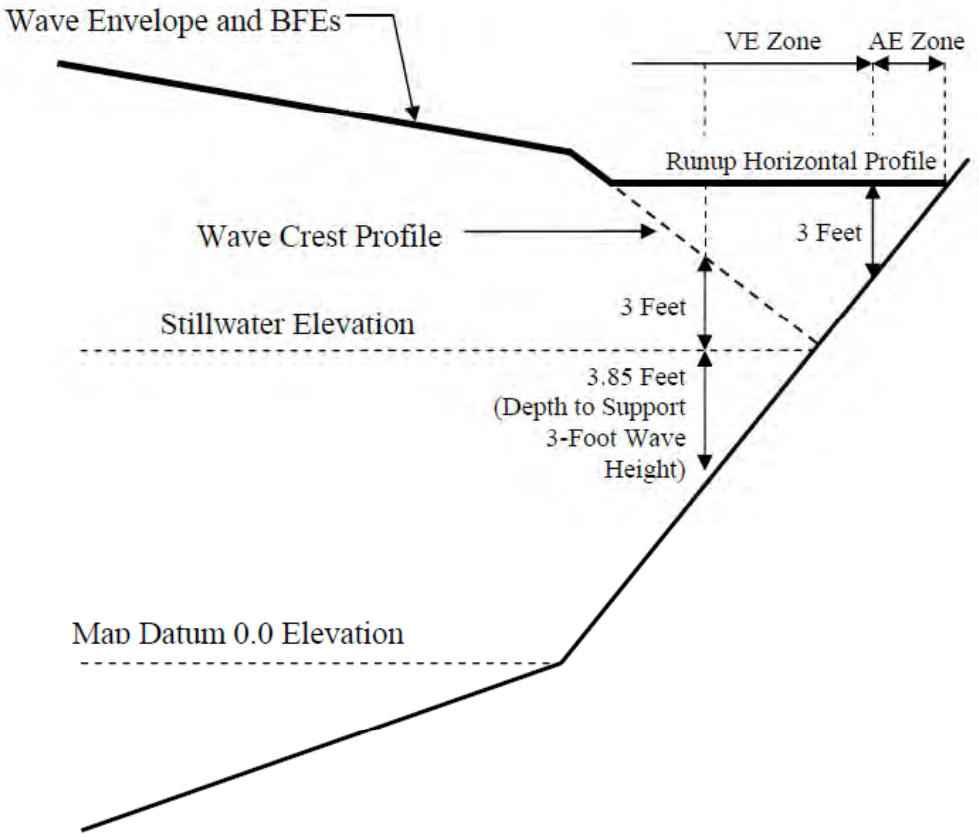


Source: FEMA, 2003

Figure D.3.5-5. Wave Runup Sketch

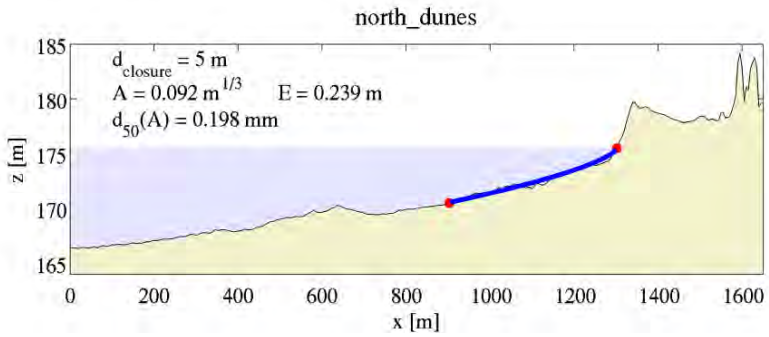
Wave Envelope

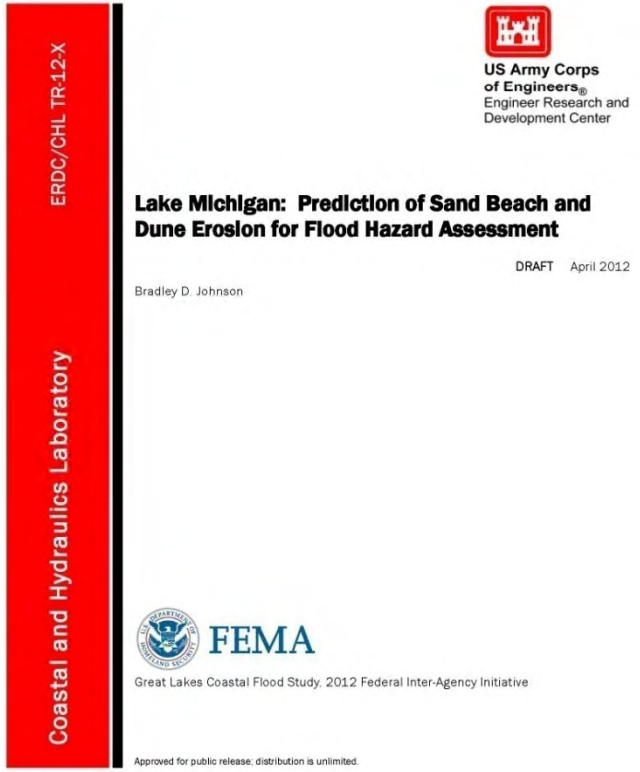
- Overland Wave Propagation
  - Wave crest is 3 feet above still water elevation
- Runup
  - Horizontal profile 3 feet above ground elevation



Erosion Assessment Methods

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



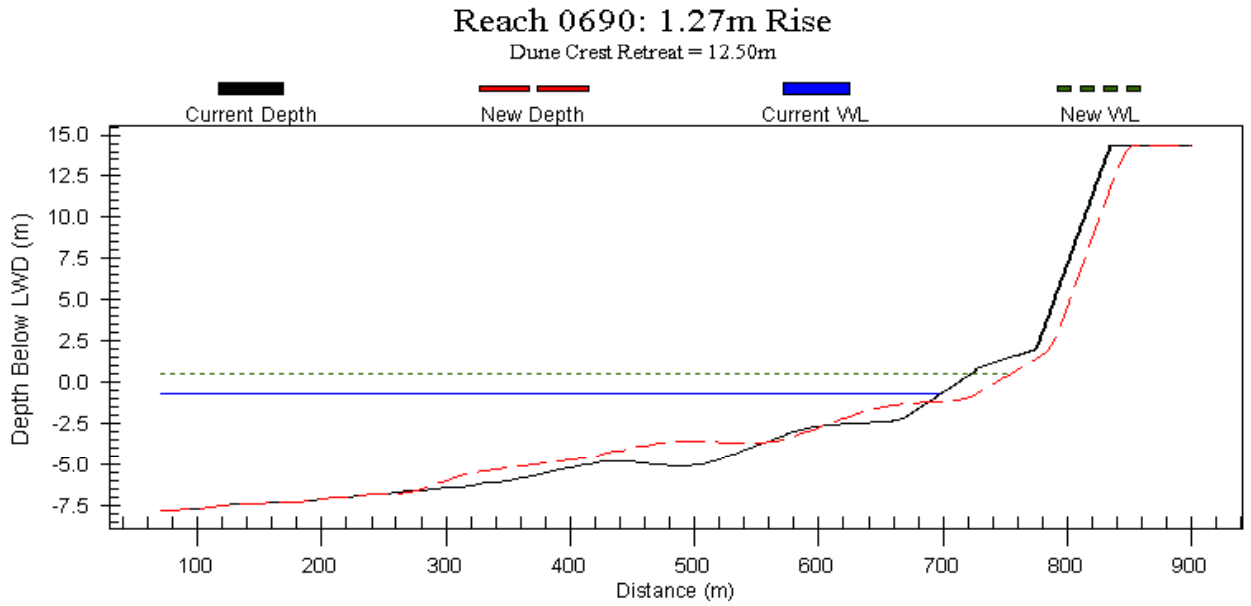


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Profile Adjustment

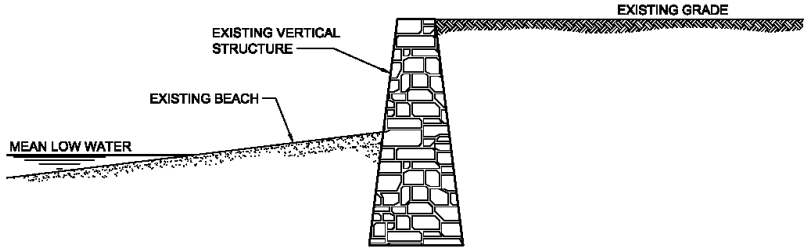
- In lieu of historical cross-shore profiles
- Necessary for response-based approach
- Utilize Bruun Rule for rising or falling lake levels



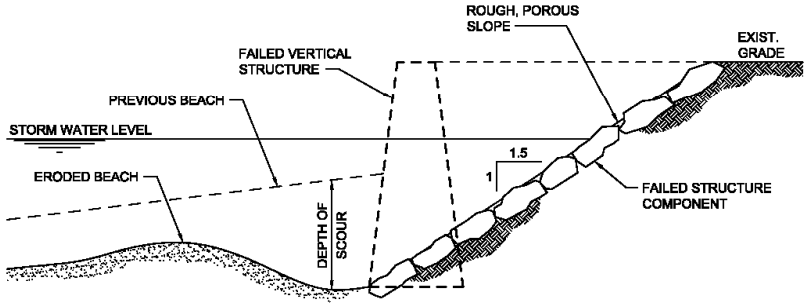
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Vertical Structures



VERTICAL STRUCTURE GEOMETRY PRIOR TO FAILURE



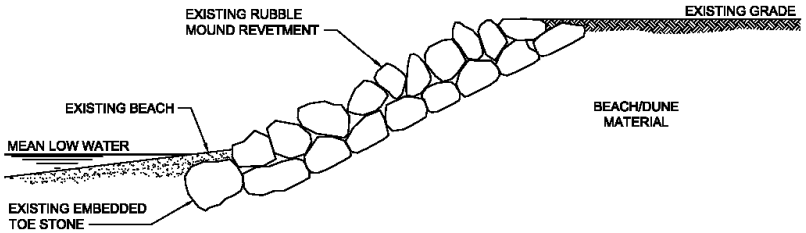
VERTICAL STRUCTURE FAILURE GEOMETRY

PARTIAL FAILURE OF VERTICAL COASTAL STRUCTURE

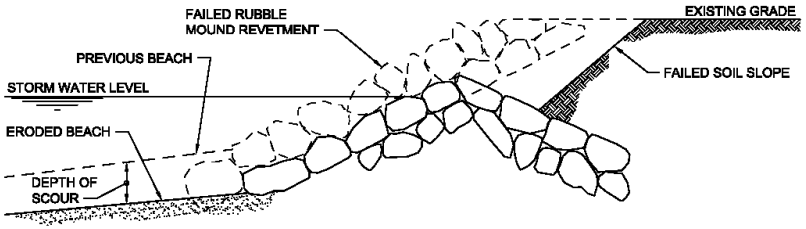
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Sloped Structures



REVETMENT GEOMETRY PRIOR TO FAILURE



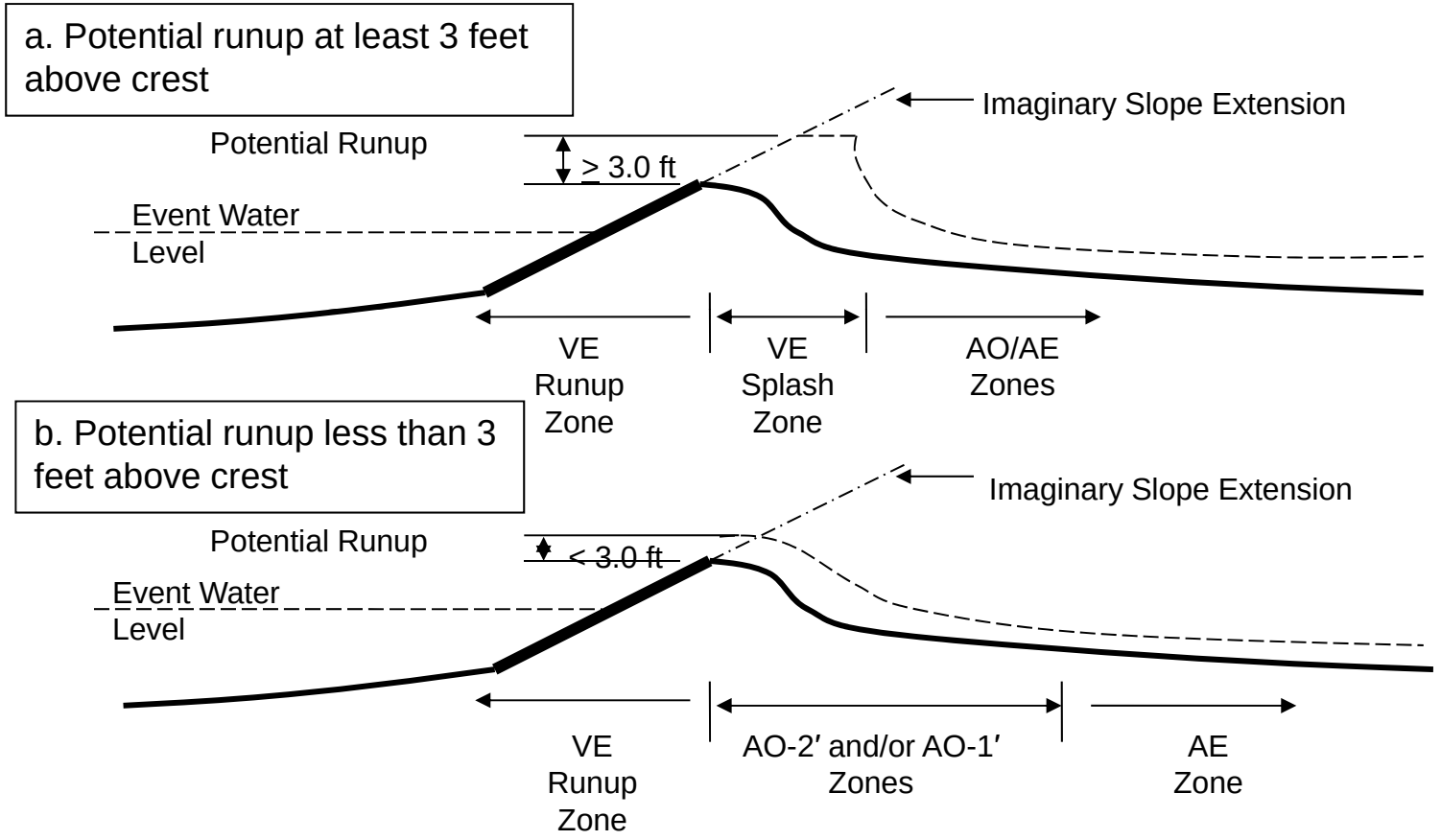
REVETMENT FAILURE GEOMETRY

PARTIAL FAILURE OF A SLOPING REVETMENT

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Interpretation of Wave Runup Results



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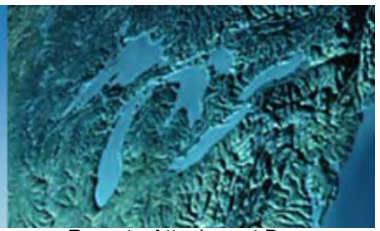
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Transect Analysis to Mapping

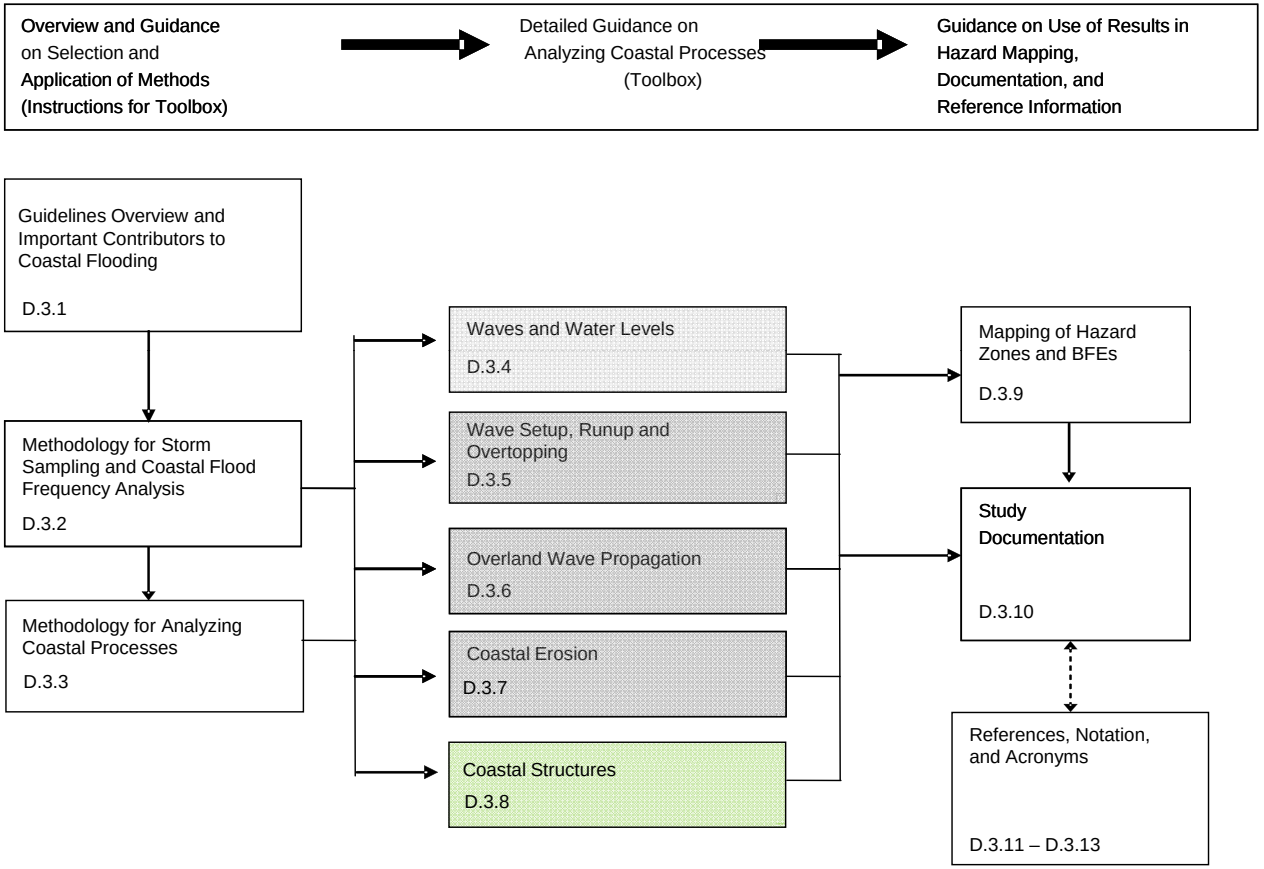
- Flood zone extents are analyzed along representative shoreline transects
- Zones are drawn between transects by interpolation based on:
  - Topography
  - Upland Cover
    - Type
    - Density
  - Upland Development
    - Residential
    - Commercial
    - Open
  - Coastal Structures
    - Presence
    - 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 3:03 PM
To: 'reppp@porthuron.org'; 'harmerk@porthuron.org'; 'supervisor@iratownship.org'; 'buildingdept@iratownship.org'; 'supervisor@claytownship.org'; 'cbrowne@marinecity-mi.org'; 'brianb@twp.stclair.mi.us'; 'gw_orr@comcast.net'; 'jhami@cityofmarysvillmi.com'; 'mbooth@cityofstclair.com'; 'dcunningham@cityofstclair.com'; 'brian@twp.stclair.mi.us'; 'rpbird@yahoo.com'; 'dmalear@algonac-mi.gov'; 'bkauffman@stclaircounty.org'; 'dstruck@stclaircounty.org'; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com); Caufield, Brian A.; Roberts, Stacey; 'cmiller79@comcast.net'; 'c.miller@hiscfa.org'; Schultz, Michael D. (Chicago); 'tfloyd@stclaircounty.org'; 'bgratopp@stclaircounty.org'
Subject: Follow-up RE: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for St. Clair 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...


StClairCounty_MI_Info Exchange...


LAKE ST CLAIR Discovery Coasta...

Thanks!
Laura

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

-----Original Appointment-----
From: Keating, Laura
Sent: Wednesday, July 25, 2012 2:43 PM
To: Keating, Laura; 'reppp@porthuron.org'; 'harmerk@porthuron.org'; 'supervisor@iratownship.org'; 'buildingdept@iratownship.org'; 'supervisor@claytownship.org'; 'cbrowne@marinecity-mi.org'; 'brianb@twp.stclair.mi.us'; 'gw_orr@comcast.net'; 'jhami@cityofmarysvillmi.com'; 'mbooth@cityofstclair.com'; 'dcunningham@cityofstclair.com'; 'brian@twp.stclair.mi.us'; 'rpbird@yahoo.com'; 'dmalear@algonac-mi.gov'; 'bkauffman@stclaircounty.org'; 'dstruck@stclaircounty.org'; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com); Caufield, Brian A.; Roberts, Stacey; 'cmiller79@comcast.net'; 'c.miller@hiscfa.org'; Schultz, Michael D. (Chicago); 'tfloyd@stclaircounty.org'; 'bgratopp@stclaircounty.org'
Subject: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for St. Clair County
When: Monday, July 30, 2012 7:00 AM-8:00 AM (GMT-08:00) Pacific Time (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 10am ET**. More information about the ***Great Lakes Coastal Flood Study*** may be found at http://www.greatlakescoast.org.

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

Date/Time:	Monday, July 30, 2012; 10:00 - 11:00 am 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 >>

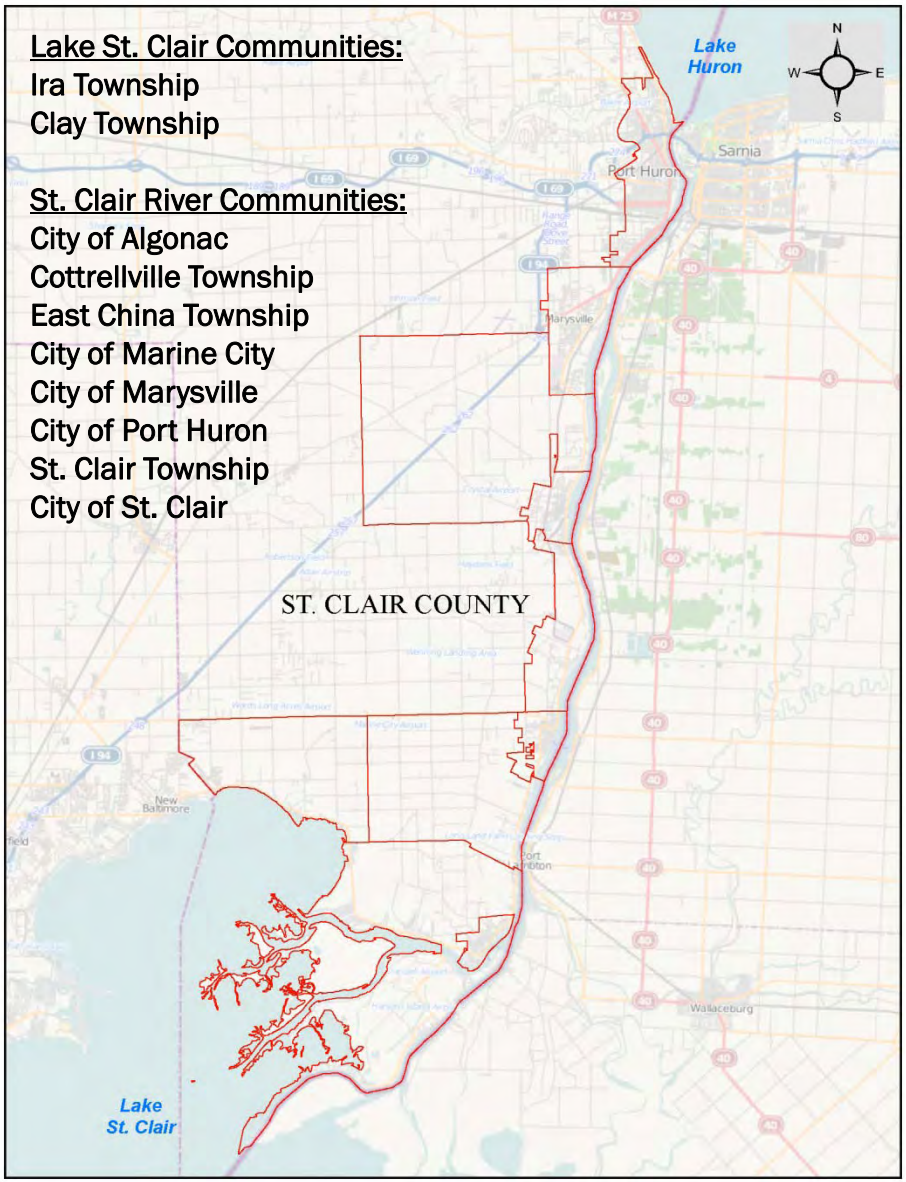
Thanks,
Laura

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

FEMA

Information Exchange Session for Lake St. Clair Discovery

St. Clair County
July 30, 2012
10am – 11am



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Purpose of Information Exchange

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



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Great Lakes Coastal Flood Study
greatlakescoast.org

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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greatlakescoast.org

Overview of Great Lakes Coastal Flood Study

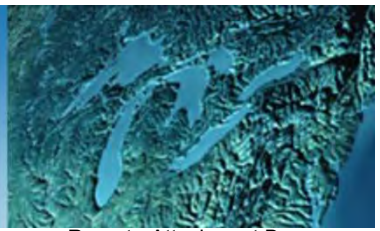
FEMA

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



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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

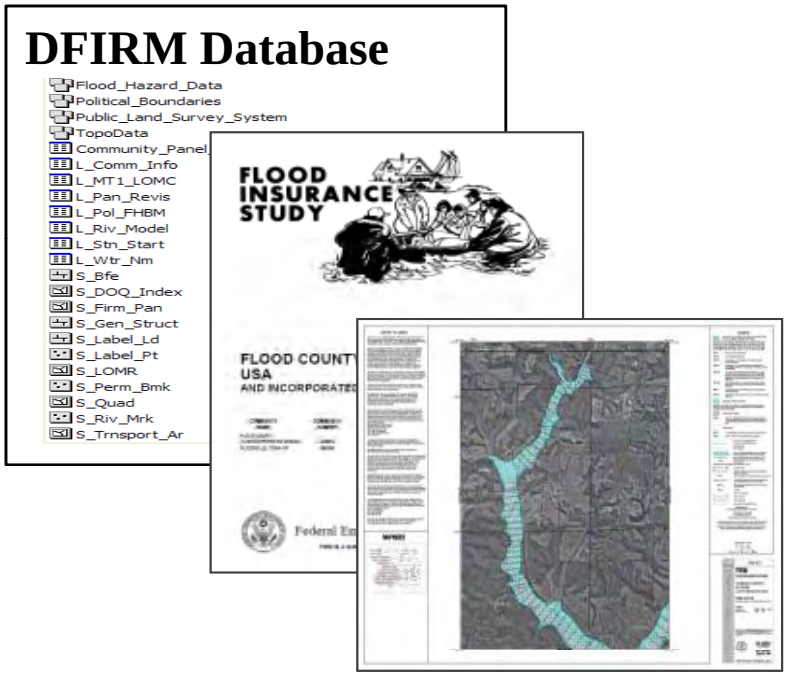
Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning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

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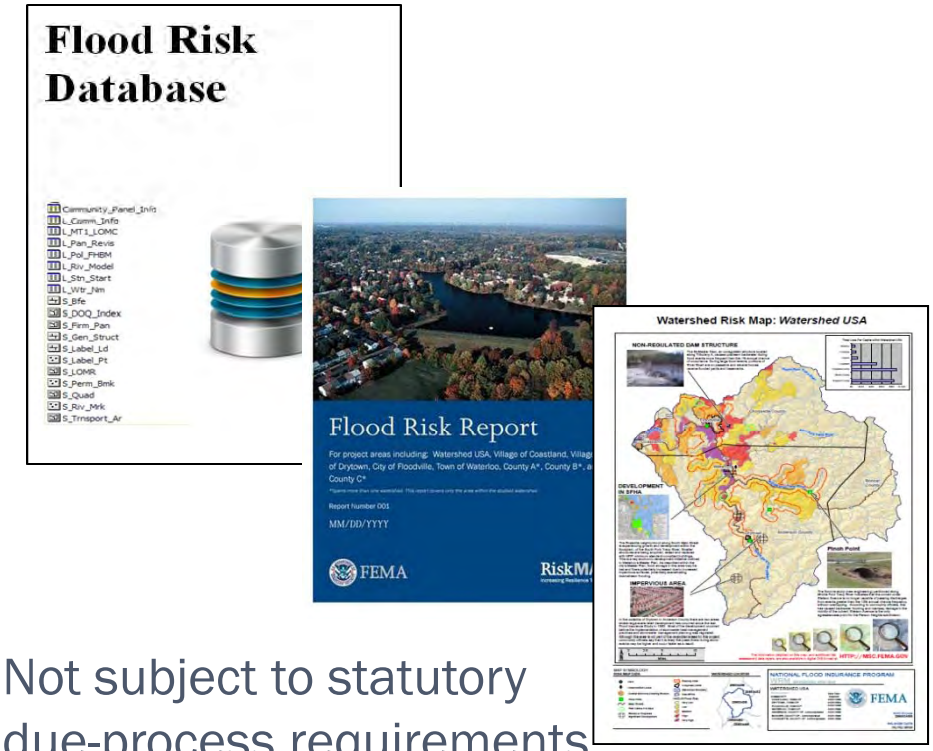
Products and Datasets: Regulatory and Non-regulatory

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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greatlakescoast.org

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

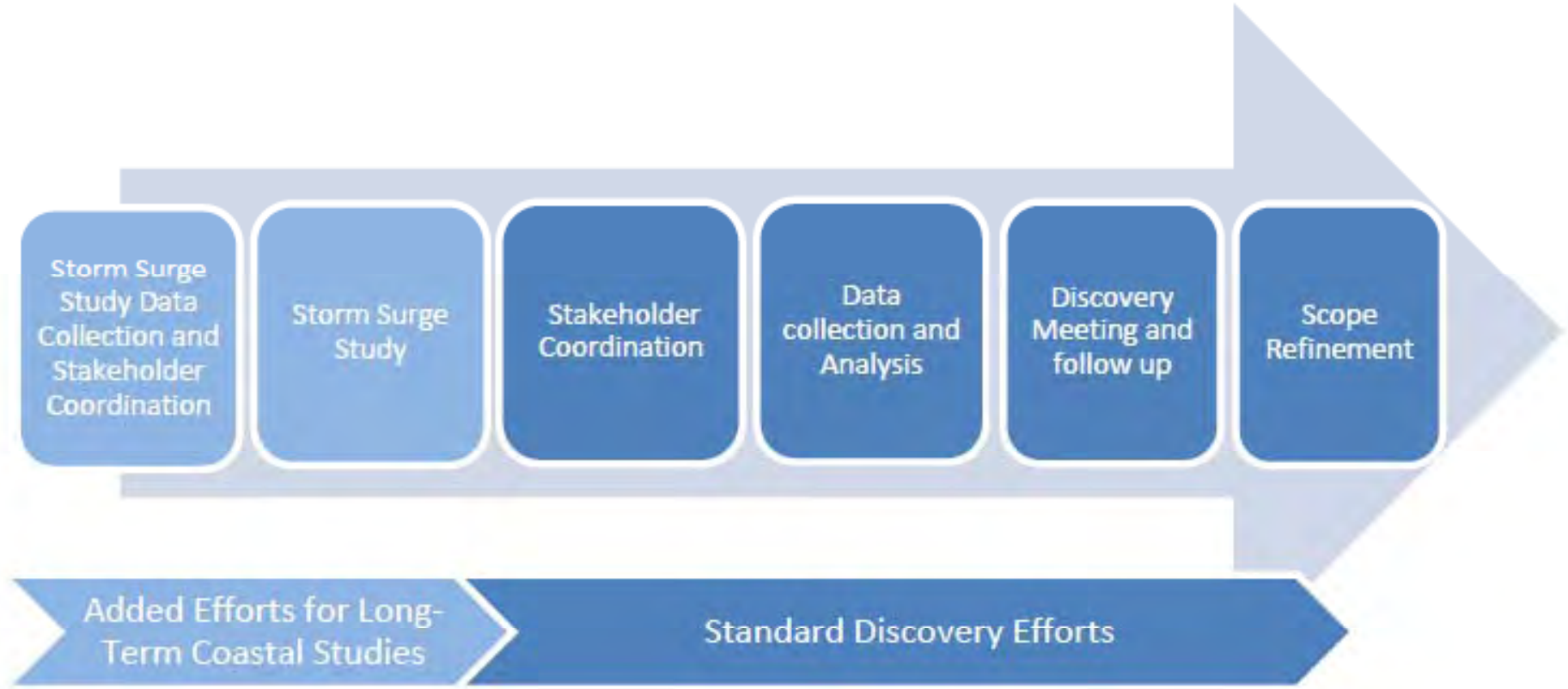
Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

- 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
greatlakescoast.org

Great Lakes Coastal Flood Study
Discovery Meeting

FEMA

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
Goodells County Park Community Center Meeting Room	8345 County Park Drive Goodells, MI 48027	Monday 8/20/2012; 8:30 am - 10:30 am

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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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Great Lakes Coastal Flood Study
greatlakescoast.org

Who Should Attend the Discovery Meeting?

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

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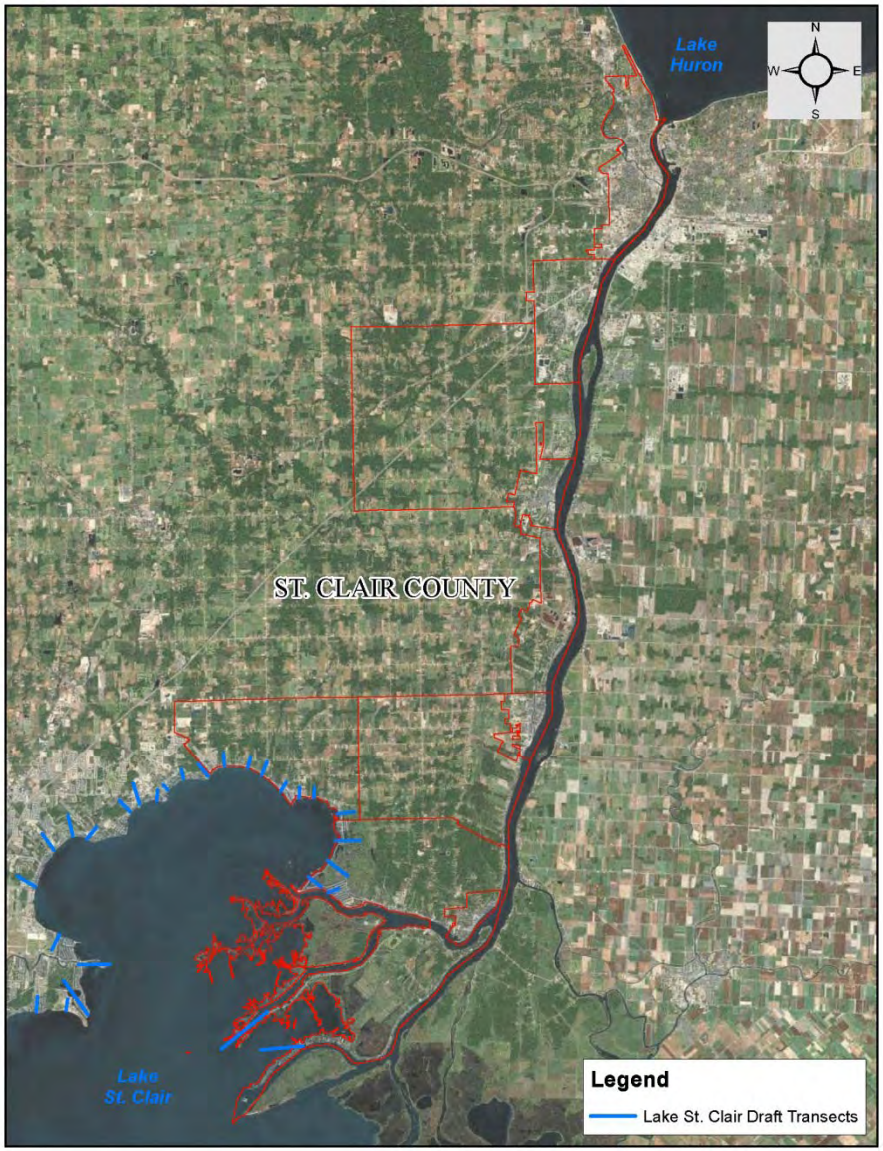
Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Communities affected by Lake St. Clair and St. Clair River:

Lake St. Clair Communities:
Ira Township
Clay Township

St. Clair River Communities:
City of Algonac
Cottrellville Township
East China Township
City of Marine City
City of Marysville
City of Port Huron
St. Clair Township
City of St. Clair

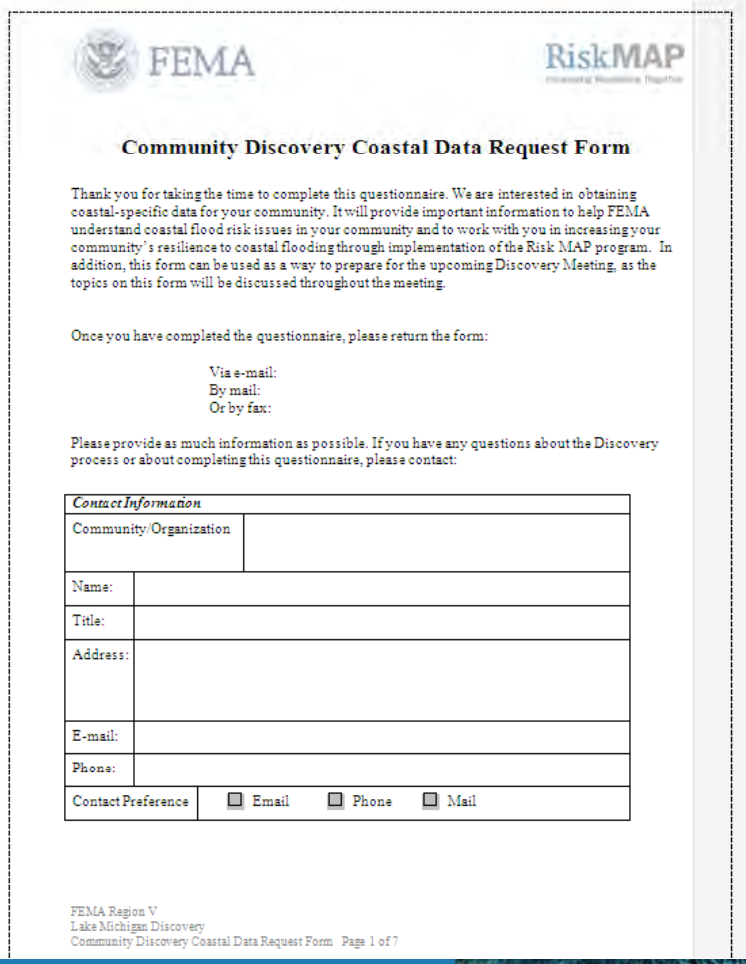


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Great Lakes Coastal

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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Great Lakes Coastal Flood Study
greatlakescoast.org

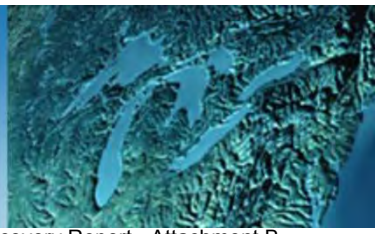
Review of Data Collected To Date

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

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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greatlakescoast.org



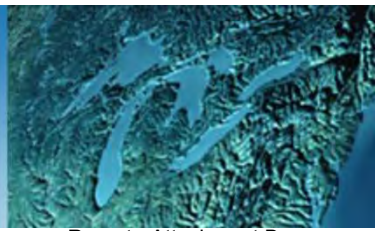
Next Steps and Opportunity to Get Involved

- 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!

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



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 - St. Clair County, MI - July 2012

County/City/Township	First/ Last Name	Title	Address	Address	ZIP
Port Huron, City	Pauline Repp	Mayor	Municipal Office Center	100 McMorran Boulevard, Port Huron, MI	48060
	Kimberly Harmer	Planning and Community Development Director (FPA)	Municipal Office Center	100 McMorran Boulevard, Port Huron, MI	48060
Ira, Township	Robert McCoy	Township Supervisor	Township Hall	7085 Meldrum Road, Fair Haven, MI	48023
	Brian Bayly	Building Inspector (FPA)	Township Hall	7085 Meldrum Road, Fair Haven, MI	48023
Clay, Township	Thomas Krueger	Supervisor		4710 Pte. Tremble Road - P.O. Box 429 , Clay Twp., Michigan	48001-0429
	Sid Browne	Building Inspector (FPA)		4710 Pte. Tremble Road - P.O. Box 429 , Clay Twp., Michigan	48001-0429
	Barbara Schutt	Assesssor		4710 Pte. Tremble Road - P.O. Box 429 , Clay Twp., Michigan	48001-0429
	Jeff Kern	Building Inspector (FPA)	Township Hall	51111 River Road, East China, MI	48054
Marine City, City	Charles Browne	Mayor	City Hall	303 South Water Street, Marine City, MI	48039
	Brian Bayly	Zoning Administrator (FPA)	City Hall	303 South Water Street, Marine City, MI	48039
Marysville, City	Gary Orr	Mayor	City Hall	1111 Delaware Avenue, Marysville, MI	48040
	Jason Hami	City Engineer (FPA)	City Hall	1111 Delaware Avenue, Marysville, MI	48040
St. Clair, City	Bill Cedar	Mayor	City Hall	547 North Carney Drive, St. Clair, MI	48079
	Mike Booth	City Manager (FPA)	City Hall	547 North Carney Drive, St. Clair, MI	48079
	Diane Cunningham	Building Clerk	City Hall	547 North Carney Drive, St. Clair, MI	48079
Cottrellville, Township	Tom Raymond	Township Supervisor	Township Hall	7008 Marsh Road, Cottrellville, MI	48039
	George Kunnath	Zoning Administrator (FPA)	Township Hall	7008 Marsh Road, Cottrellville, MI	48039
St. Clair, Township	Brian Mahaffy	Township Supervisor	Township Hall	1539 South Bartlett Road, St. Clair Township, MI	48079
	Brian Bayly	Zoning Administrator (FPA)	Township Hall	1539 South Bartlett Road, St. Clair Township, MI	48079
Algonac, City	Irene Bird	Mayor	City Hall	Post Office Box 454/805 St. Clair River Drive, Algonac, MI	48001
	William Klaassen	Building Inspector (FPA)	City Hall	Post Office Box 454/805 St. Clair River Drive, Algonac, MI	48001
St. Clair, County	William Kauffman	County Administrator		200 Grand River Avenue, Suite 203, Port Huron, MI	48060
	Dave Struck	Director of the Planning Department		200 Grand River Avenue, Suite 203, Port Huron, MI	

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

FEMA

July 19, 2012

The Honorable Pauline Repp
Mayor, City of Port Huron
Municipal Office Center
100 McMorran Boulevard
Port Huron, Michigan 48060

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

Dear Mayor Repp:

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; 8:30 am - 10:30 am ET
Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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; 10:00 - 11:00 am 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: Kimberly Harmer, Planning and Community Development Director, City of Port Huron
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 McCoy
Township Supervisor, Ira Township
Township Hall
7085 Meldrum Road
Fair Haven, Michigan 48023

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

Dear Mr. McCoy:

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.

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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.

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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

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cc: Brian Bayly, Building Inspector, Ira 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. Thomas Krueger
Supervisor, Clay Township
4710 Pte. Tremble Road
Post Office Box 429
Clay Township, Michigan 48001

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

Dear Mr. Krueger:

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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: Sid Browne, Building Inspector, Clay 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. John Randolph
Township Supervisor, East China Township
Township Hall
51111 River Road
East China, Michigan 48054

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

Dear Mr. Randolph:

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.

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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; 8:30 am - 10:30 am ET
Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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; 10:00 - 11:00 am 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

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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: Jeff Kern, Building Inspector, East China 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

The Honorable Charles Browne
Mayor, Marine City
City Hall
303 South Water Street
Marine City, Michigan 48039

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

Dear Mayor Browne:

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.

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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: Brian Bayly, Zoning Administrator, Marine City
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. Gary Orr
Mayor, City of Marysville
City Hall
1111 Delaware Avenue
Marysville, Michigan 48040

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

Dear Mr. Orr:

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.

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Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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Meeting Number:	445288484
Call in number:	1-866-398-2885
Participant Code:	197462

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

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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: Jason Hami, City Engineer, City of Marysville
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

The Honorable Bill Cedar
Mayor, City of St. Clair
City Hall
547 North Carney Drive
St. Clair, Michigan 48079

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

Dear Mayor Cedar:

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.

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Your Discovery Meeting is scheduled to occur:

Date/Time:	Monday, August 20, 2012; 8:30 am - 10:30 am ET
Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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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: Diane Cunningham, Building Clerk, City of St. Clair
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. Tom Raymond
Township Supervisor, Cottrellville Township
Township Hall
7008 Marsh Road
Cottrellville, Michigan 48039

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

Dear Mr. Raymond:

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.

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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: George Kunnath, Zoning Administrator, Cottrellville 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. Brian Mahaffy
Township Supervisor, St. Clair Township
Township Hall
1539 South Bartlett Road
St. Clair Township, Michigan 48079

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

Dear Mr. Mahaffy:

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.

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Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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Community Discovery Coastal Data Request Form

cc: Brian Bayly, Zoning Administrator, St. Clair 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

The Honorable Irene Bird
Mayor, City of Algonac
City Hall
805 St. Clair River Drive
Post Office Box 454
Algonac, Michigan 48001

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

Dear Mayor Bird:

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.

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Your Discovery Meeting is scheduled to occur:

Date/Time:	Monday, August 20, 2012; 8:30 am - 10:30 am ET
Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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; 10:00 - 11:00 am 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: William Klaassen, Building Inspector, City of Algonac
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. William Kauffman
County Administrator, St. Clair County
200 Grand River Avenue
Suite 203
Port Huron, Michigan 48060

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

Dear Mr. Kauffman:

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; 8:30 am - 10:30 am ET
Location:	Goodells County Park Community Center Meeting Room
Address:	8345 County Park Drive Goodells, Michigan 48027

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:

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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: David Struck, Director of the Planning Department, St. Clair County
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

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
Great Lakes Commission	Ecological	Cassie	Bradley		cbradley@glc.org

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
Great Lakes Commission	Ecological	Heather	Braun		hbraun@glc.org
Great Lakes Commission	Ecological	Thomas	Crane		tcrane@glc.org
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
MDA - Environmental Stewardship Division	State/Reg Agency	James	Johnson		johnsonj2@michigan.gov
MDEQ	State/Reg Agency	Judy	Andersen		andersenj1@michigan.gov
MDEQ	State/Reg Agency	Chris	Antieau		antieauc@michigan.gov
MDEQ	State/Reg Agency	Jennifer	Bolt		boltj@michigan.gov
MDEQ	State/Reg Agency	Robert	Day		dayr1@michigan.gov

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
MDEQ	State/Reg Agency	Dave	Drullinger		drullingerd@michigan.gov
MDEQ	State/Reg Agency	Kim	Fish		fishk@michigan.gov
MDEQ	State/Reg Agency	Andrew	Hartz		hartza@michigan.gov
MDEQ	State/Reg Agency	Anne	Hokanson		hokansona@michigan.gov
MDEQ	State/Reg Agency	Rhonda	Klann		klannr@michigan.gov
MDEQ	State/Reg Agency	Cindy	Masterson		mastersonc@michigan.gov
MDEQ	State/Reg Agency	Mike	Masterson		mastersonm@michigan.gov
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
MDEQ	State/Reg Agency	Joseph	Rathbun		rathbunj@michigan.gov
MDEQ	State/Reg Agency	Brian	Rudolph		rudolphb1@michigan.gov
MDEQ	State/Reg Agency	Luis	Saldivia		saldivial@michigan.gov
MDEQ	State/Reg Agency	Katherine	Tetzlaff		tetzlaffk@michigan.gov
MDEQ	State/Reg Agency	Mary	Vanderlaan		vanderlaanm@michigan.gov
MDEQ	State/Reg Agency	Robert	Zbiciak		zbiciakr@michigan.gov
MDEQ		Susan	Conradson		CONRADSONS2@michigan.gov
MDEQ		Michelle	Hohn		hohnm@michigan.gov
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
MDEQ - Water Resources Division	State/Reg Agency	William	Creal		crealw@michigan.gov
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
MDEQ - Water Resources Division	State/Reg Agency	Byron	Lane		laneb@michigan.gov
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
July 2012

Organization	Category	First Name	Last Name	Title	Email
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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
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Michigan Department of Environmental Quality - Executive Division	State/Reg Agency	Jim	Sygo		sygoj@michigan.gov
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Michigan Department of Environmental Quality - Southeast District	State/Reg Agency; Ecological; Local FPM	Maria	Zingas	Floodplain Manager/NFIP Coordinator	zingasm@michigan.gov
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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
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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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Michigan Port Collaborative	State/Reg Agency	Carol	Linteau		linteauc@aol.com
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Lake St. Clair Email Distribution List
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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
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Northeast Michigan Council of Governments	Regional	Diane	Rekowski		drekowski@nemcog.org
Northeast Michigan Council of Governments	Regional	Nico	Tucker		ntucker@nemcog.org
Northwest Michigan Council of Governments	Regional	Matt	McCauley		mccauley@nwm.cog.mi.us
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Northwestern Michigan College	University	Hans	Van Sumersen		hvansumeren@nmc.edu
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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
St. Clair Township	Local Official	Brian	Bayly	Zoning Administrator (FPA)	brianb@twp.stclair.mi.us
St. Clair Township	Local Official	Brian	Mahaffy	Township Supervisor	brian@twp.stclair.mi.us
State of Michigan	State/Reg Agency	Charles	Allen		allenc9@michigan.gov
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State of Michigan	State/Reg Agency	James	Riley		rileyj2@michigan.gov
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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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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
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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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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

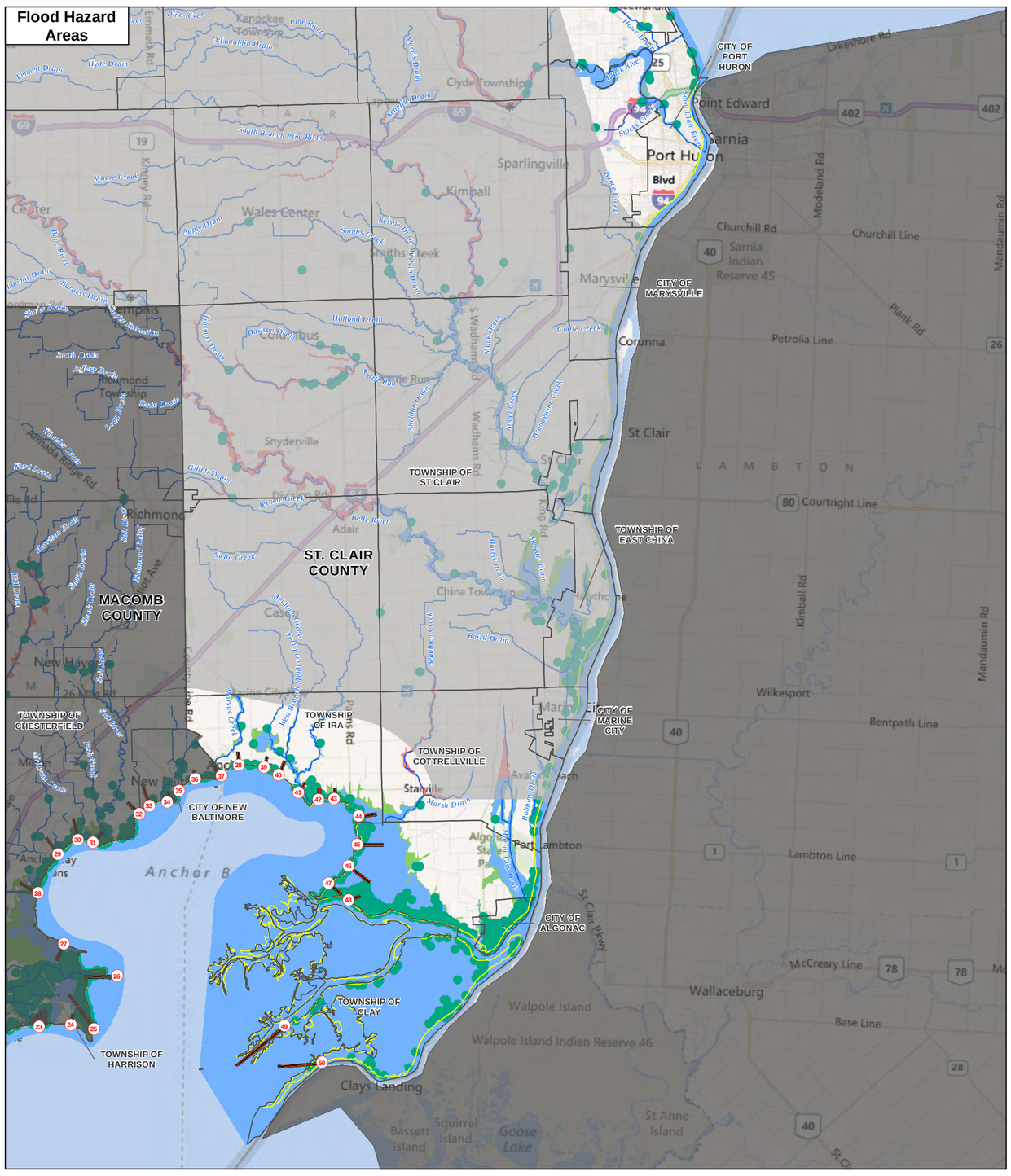
available to eligible communities. Please RSVP to FEMA's study contractor (STARR) Scott Banjavcic at (312) 780-7755 or email to GreatLakesFloodStudy@starr-team.com by **August 10, 2012.** Please reference the Discovery Meeting date and time in your RSVP.

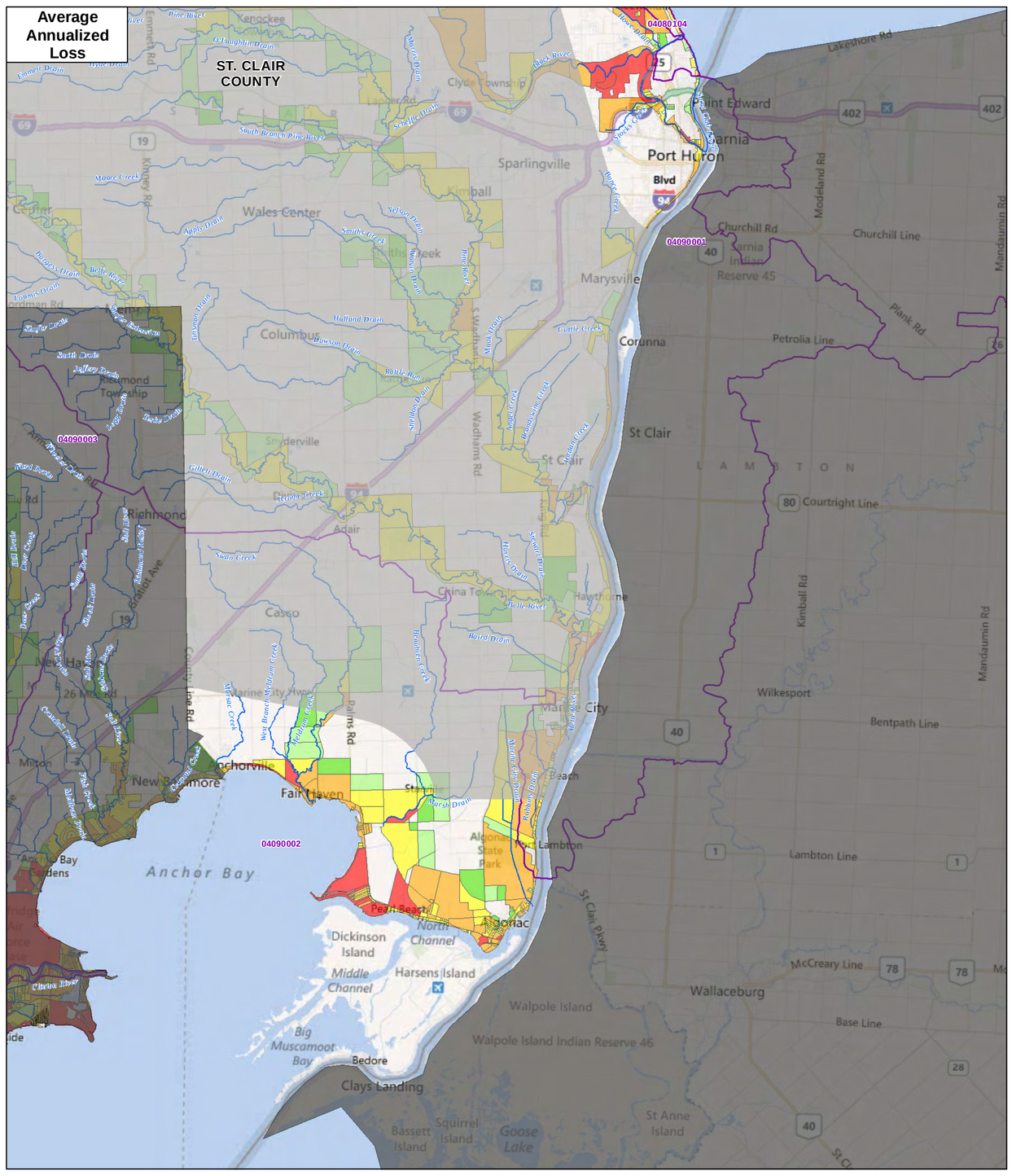
A attached Community Coastal Data Request Form was recently mailed to local community officials, along with the Discovery Meeting invitation. This form is also available online at http://www.greatlakescoast.org/pubs/forms/GLCFS_Discovery_Coastal_Data_Request_Form.pdf. If you have data or information 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.

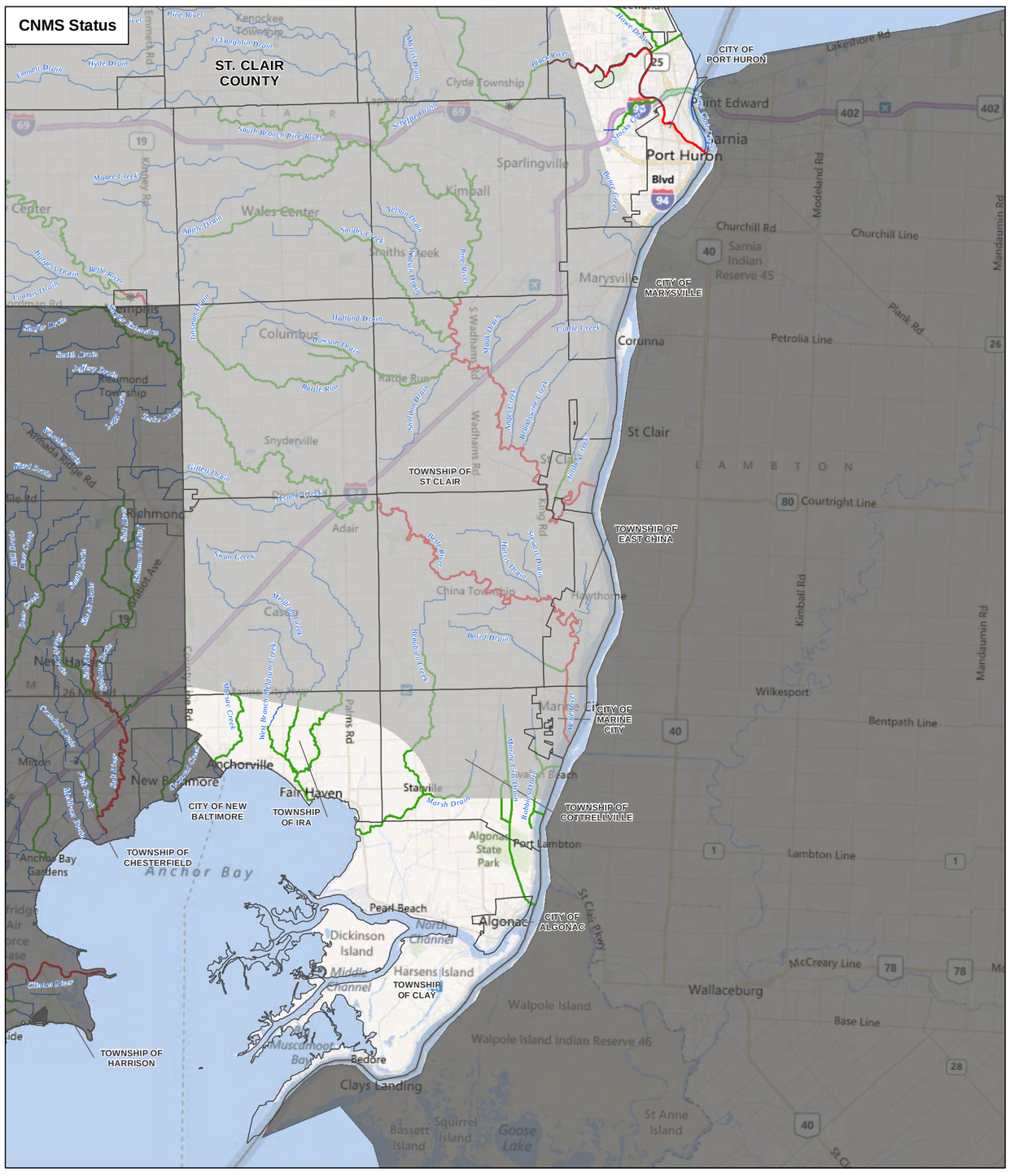
We look forward to working with you to reduce the risks associated with coastal flooding and increase resiliency for the long term. To learn more about Discovery, please visit http://www.fema.gov/library and search keywords "Discovery brochure" or contact Ken Hinterlong, FEMA Region V Senior Engineer, 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	St. Clair (County)	12/1/1972	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	St. Clair (County)	4/12/1973	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	St. Clair (County)	4/26/1975	DR	Flood	SEVERE STORMS, HIGH WINDS & FLOODING
Lake St. Clair	MI	St. Clair (County)	3/19/1976	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, ICING & FLOODING
Lake St. Clair	MI	St. Clair (County)	7/23/1996	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
Lake St. Clair	MI	St. Clair (County)	6/30/2004	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING
Lake St. Clair	MI	St. Clair (County)	1/27/1978	EM	Snow	BLIZZARDS & SNOWSTORMS
Lake St. Clair	MI	St. Clair (County)	1/10/2001	EM	Snow	SNOW
Lake St. Clair	MI	St. Clair (County)	9/23/2003	EM	Other	POWER OUTAGE
Lake St. Clair	MI	St. Clair (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)
29.0	27.1	0.6	0.0	1.3	0.0	0.0

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)
125.3	55.1	0.0	48.9	20.7	0.6	3.2

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)
29.0	3.2	0.0	0.0	25.8	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)
128.5	0.0	72.8	0.0	55.7	0.0	0.0	0.0

N

0 4 8 16 Miles

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

ST. CLAIR COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

St. Clair County
Algonac, City of
Clay, Township of
Cottrellville, Township of
East China, Township of
Ira, Township of
Marine City, City of
Marrysville, City of
Port Huron, City of
St. Clair, City of
St. Clair, Township of

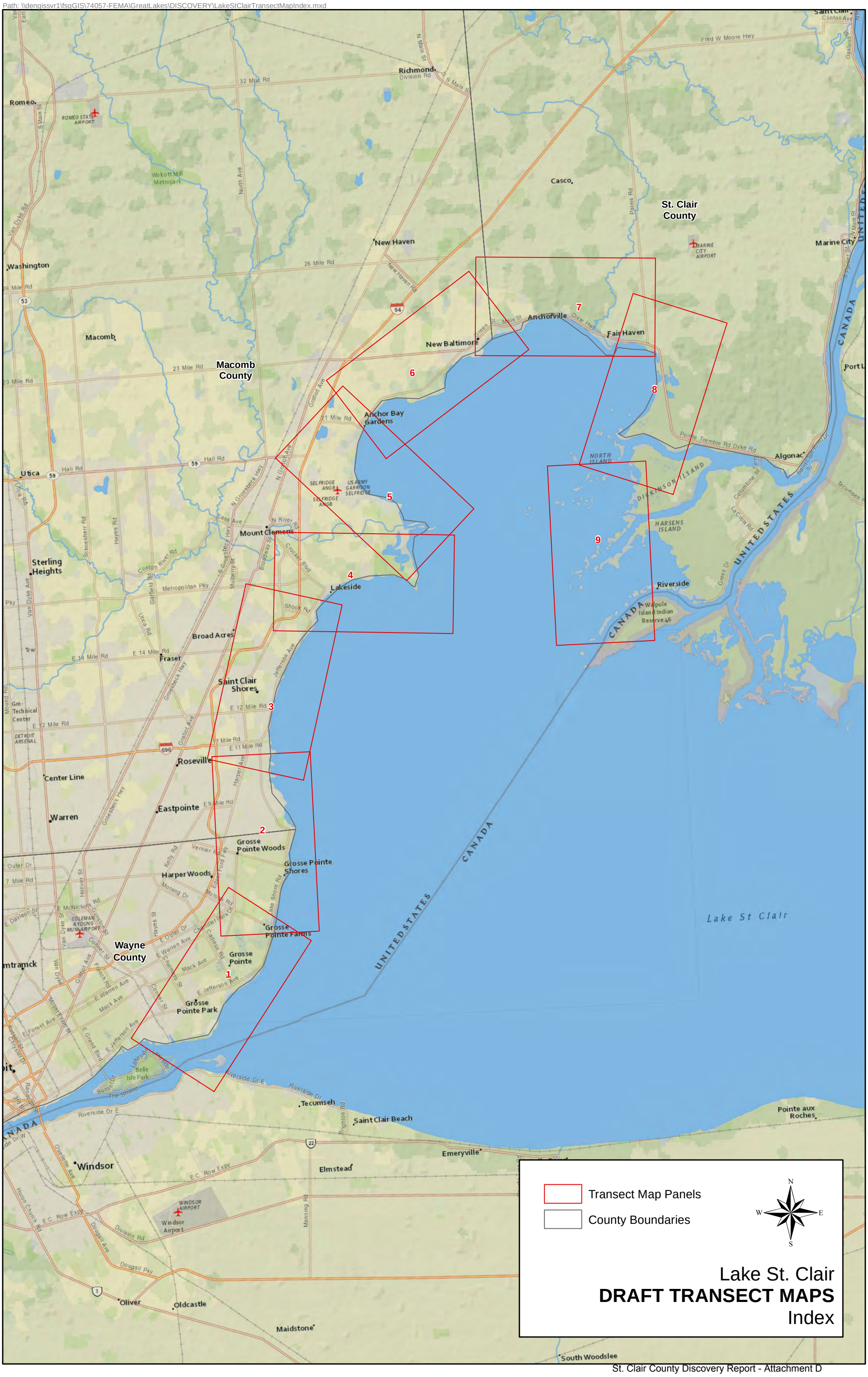
STARR

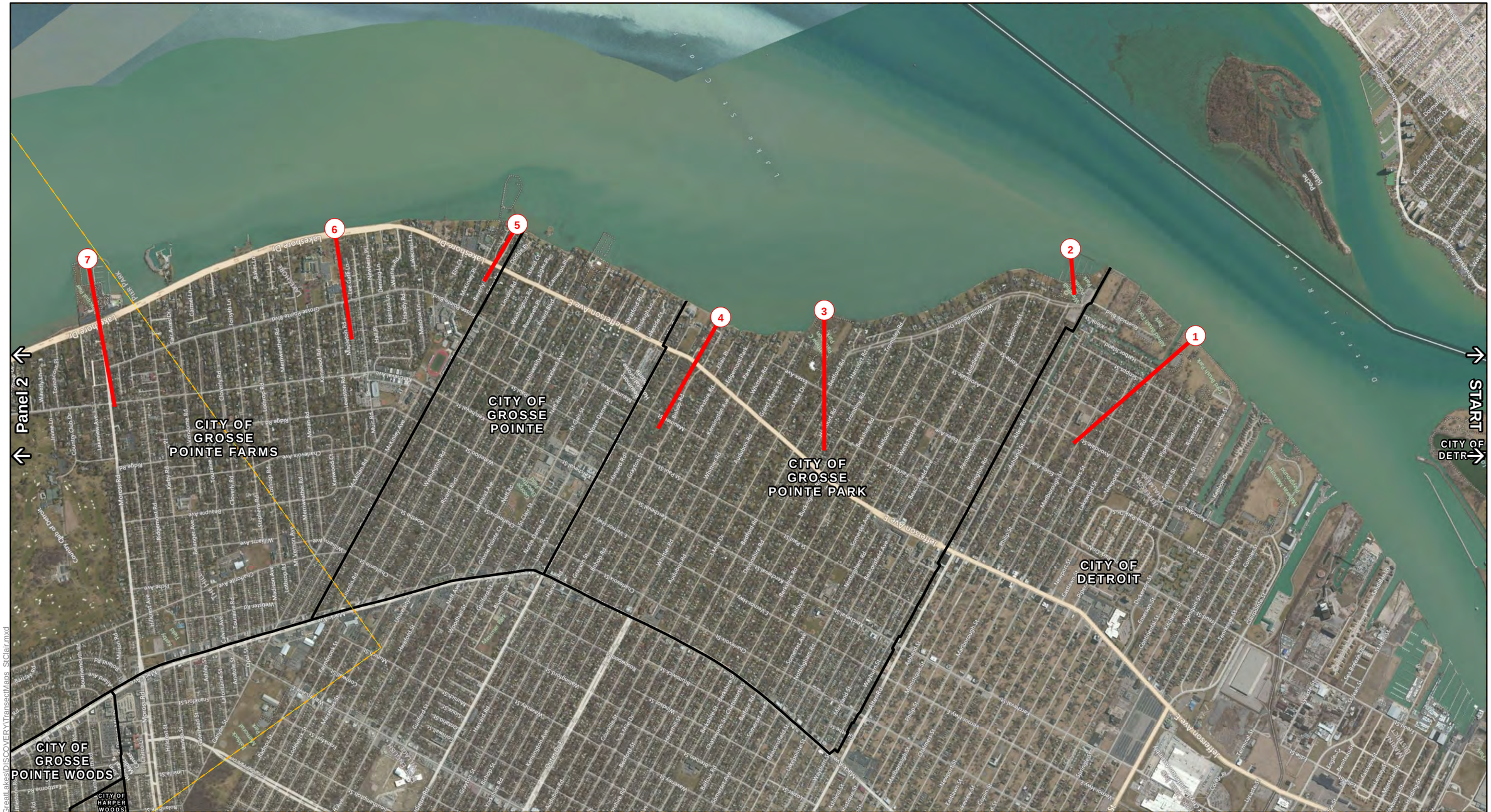
FEMA

ATTACHMENT D

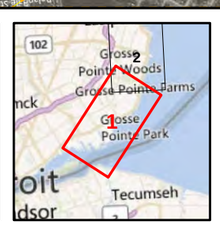
PROPOSED TRANSECTS

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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



1 inch = 2,000 feet





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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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

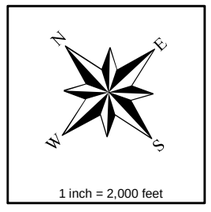
COUNTIES
MACOMB COUNTY

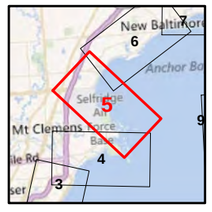
COMMUNITIES
CHARTER TOWNSHIP OF CLINTON
CITY OF MOUNT CLEMENS
TOWNSHIP OF HARRISON

Lake St. Clair
DRAFT TRANSECTS
Panel 4 of 9

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Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

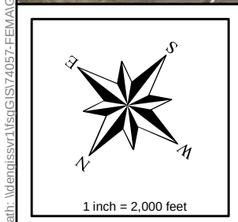
COUNTIES
MACOMB COUNTY

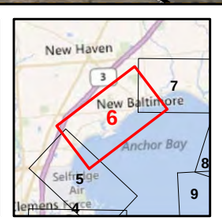
COMMUNITIES
CHARTER TOWNSHIP OF CLINTON
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF HARRISON
TOWNSHIP OF MACOMB

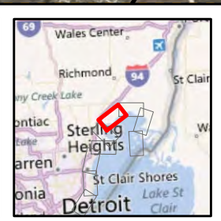
Lake St. Clair
DRAFT TRANSECTS
Panel 5 of 9

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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

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1 inch = 2,000 feet

Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

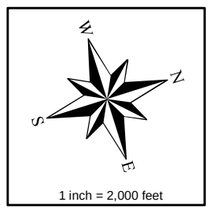
COUNTIES
MACOMB COUNTY
ST. CLAIR COUNTY

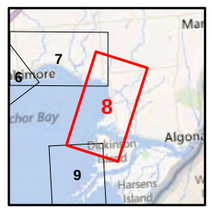
COMMUNITIES
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF IRA

Lake St. Clair
DRAFT TRANSECTS
Panel 7 of 9

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Transects

Adjoining Panel Edge

Political Boundary

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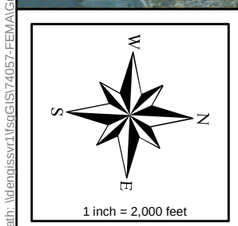
COUNTIES
ST. CLAIR COUNTY

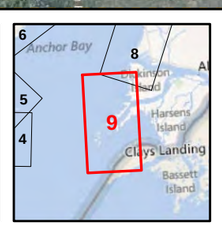
COMMUNITIES
TOWNSHIP OF CLAY
TOWNSHIP OF COTTRELLVILLE
TOWNSHIP OF IRA

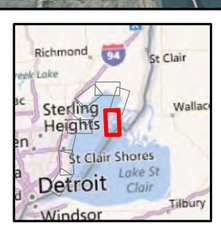
Lake St. Clair
DRAFT TRANSECTS
Panel 8 of 9

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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

ST. CLAIR COUNTY DISCOVERY MEETING DOCUMENTS

Discovery Meeting Agenda

Discovery Meeting Sign-In Sheets

Discovery Meeting Minutes

Discovery Meeting Presentation



Project Name:	FEMA Region V Discovery
Meeting:	ST. CLAIR COUNTY Great Lakes Coastal Discovery Meeting
Date and Time:	MONDAY, AUGUST 20, 2012; 8:30 – 10:30 AM ET
Place:	GOODELLS COUNTY PARK COUMMUNITY CENTER
Facilitator:	ERIN MALONEY, FEMA BRIAN CAUFIELD, MATT REMBOLD, BRETT ADDAMS, STARR

Discovery Meeting Agenda

1. **Why are we here? (8:30 – 8:45 AM ET)**
   - Great Lakes Coastal Flood Study Overview and Schedule
   - Discovery Process and Outcomes

2. **Coastal mapping and flood risk topics to be aware of (8:45 – 9:10 AM ET)**

3. **How does this apply to my community? (9:10 – 9:20 AM ET)**

4. **Interactive Session A (9:20 – 9:45 AM CT)**
   - View and Discuss Local Coastal Areas of Concern Using the Discovery Map and Community Risk MAP Questionnaire

5. **Hazard mitigation opportunities and grant funding (9:45 – 9:55 AM ET)**

6. **Interactive Session B (9:55 -10:20 AM ET)**
   - Discuss Mitigation Action Opportunities
   - Introduce the Mitigation Action Form and Mitigation Action Tracker

7. **Wrap Up (10:20 – 10:30 AM 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 ST. CLAIR 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 Algonac	Building Inspector	William	Klaassen			
2	Sem	City of Port Huron	Civil Engineer II	Sara	Montoya	100 McMorran Boulevard Port Huron, MI 48060	810.984.9730	montoyas@porthuron.org
3		St. Clair County Metro Planning Commission	Senior Planner	Geoff	Donaldson	200 Grand River Avenue, Suite 202 Port Huron, MI 48060	(810) 989-6950	gdonaldson@stclaircounty.org
4	EM	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~~
5		STARR	Engineer	Brian	Caufield	50 Hampshire Street Cambridge, MA 02139	(617) 452-6000	caufieldba@cdmsmith.com
6		STARR	Engineer	Matt	Rembold	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	remboldmd@cdmsmith.com
7		STARR	GIS Specialist	Brett	Addams	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	addamsbh@cdmsmith.com
8		CLAY TOWNSHIP	SUPERVISOR	TOM	KRENDEL	4710 PTE TREMBLE ALGONAC 48001	810 794 9303	SUPERVISOR@CLAYTOWNSHIP.ORG
9		St Clair County	Co. Commissioner	Bill	Gratopp	200 Grand River Port Huron 48060	810-989-6900	bgratopp@stclaircounty.org
10		HISCFA	Bd Member	Whitey	Simon	4722 GREEN BOX 95 H.I	810 748-3975	whiteysim@yahoo.com

August 20, 2012 ST. CLAIR 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		HRC	Project Engineer	Karyn	Stickel	555 Hulet Dr. Bloomfield Hills MI 48303	248-454-6516	kstickel@hrc-engr.com
12	FEMA	FEMA Region V	National Hazards Program Specialist	Frank	Shockey	536 S Clark St 6th floor Chicago IL 60605	312-408-5521	frank.shockey@dhs.gov
13	Don Brown Rep. Miller		Deputy District Director	Don	Brown	48701 Van Dyke Shelby Twp MI	586-977-5010	Don.Brown@mail.house.gov
14		Tetra Tech	Project Eng.	Bob	Nelson	2008 Military #17 Port Huron MI 48060	810 984 8240	Bob.Nelson@tetratech.com
15		St. Clair County Metropolitan planning commission	Senior Planner	Geoffrey	Donaldson	200 Grand River, Ste 202 Port Huron, MI 48060	810-989-6950	gdonaldson@stclaircounty.org
16								
17								
18								
19								

August 20, 2012 ST. CLAIR 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	PP	MICH SENATE	SENATOR	PHIL	PAVLOV	1577 S. ALPENA	517-373-7708	PAVLOVSENATE@GMAIL.COM
21	WCK	ALPENA	BUILDING OFFICIAL	BILL	KLAASSEN	620 N. MAIN	794 7351	
22								
23								
24								
25								
26								
27								
28								
29								

Meeting schedule: Monday, August 20, 2012 8:30 – 10:30 am (ET)
Meeting Location: Goodells County Park Community Center, Goodells, MI
Discovery Area: Coastal communities in St. Clair County
Attendees: 15 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

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:* Don Brown, Deputy District Director for U.S. Representative Candice S. Miller, asked how coarse the new LiDAR data would be. His concern was that residents are being mapped within the floodplain due to inaccurate data. *Answer:* Brian reviewed the new LiDAR specifications.
- *Discussion:* General concern about the new study. The general consensus of the community officials present was they felt that there had been no previous claims under the NFIP in St. Clair County due to flooding. They have a general concern regarding the NFIP and felt that it hurts their communities. The discussion was led by Michigan State Senator Phil Pavlov.

FEATURES NOTED ON MAPS:

- No specific comments were noted on the workmaps.

ACTIONS:

- Email sign-in sheet to Don Brown, Deputy District Director for U.S. Representative Candice S. Miller.
- Use effective transects in new study as per request by Maria Zingas, Engineer for the Michigan Department of Environmental Quality (not present at St. Clair County meeting; discussed with FEMA and STARR during the Macomb County Discovery Meeting).
- Maria Zingas may provide other comments regarding the location of the draft transects at a later date.

FEMA

Lake St. Clair Discovery

St. Clair County, MI



August 20, 2012
0830 to 1130

Goodells County Park
Community Center

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 St. Clair County studies

- Effective 05/03/2010

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

FEMA

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





RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



Great Lakes Coastal Flood Study



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
Overview

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



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

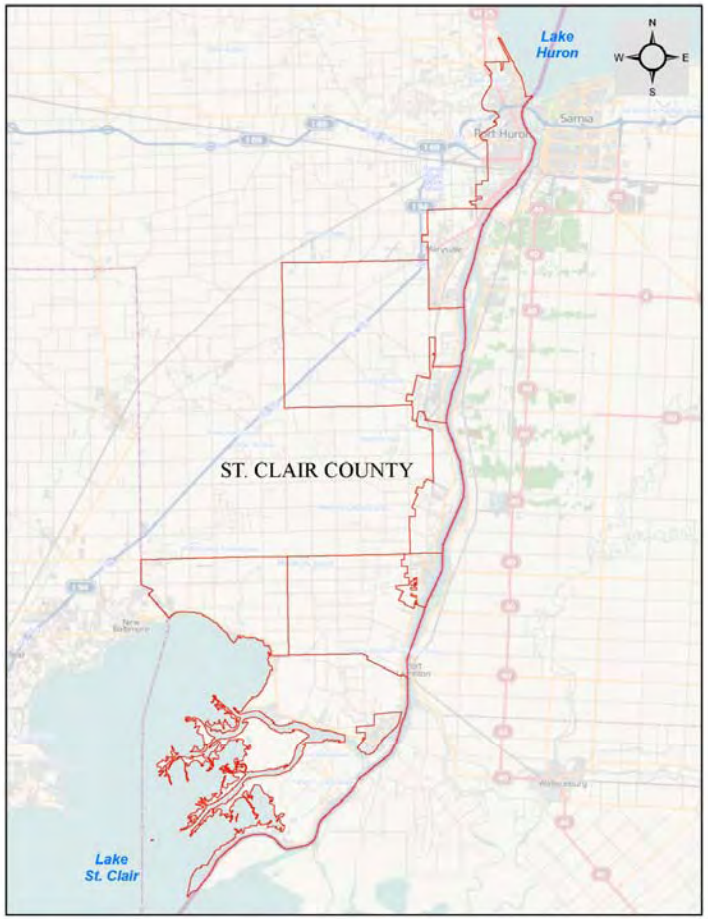
FEMA

<u>Lake St. Clair Communities:</u>

Ira Township
Clay Township
City of Algonac

<u>St. Clair River Communities:</u>

Cottrellville Township
East China Township
City of Marine City
City of Marysville
City of Port Huron
St. Clair Township
City of St. Clair



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

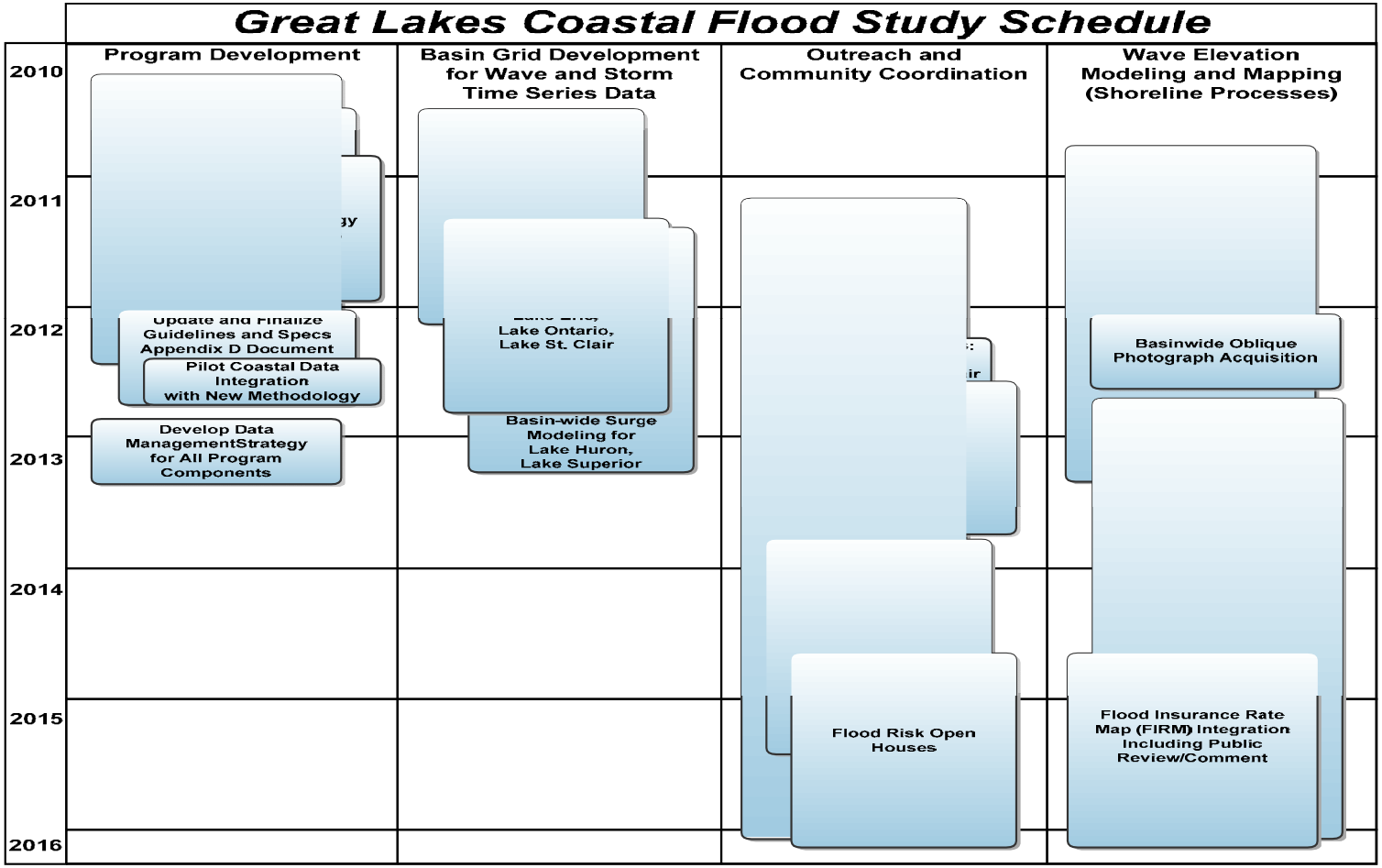
Discovery Meeting Objectives

- 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
Increasing Resilience Together



Stakeholder Engagement



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

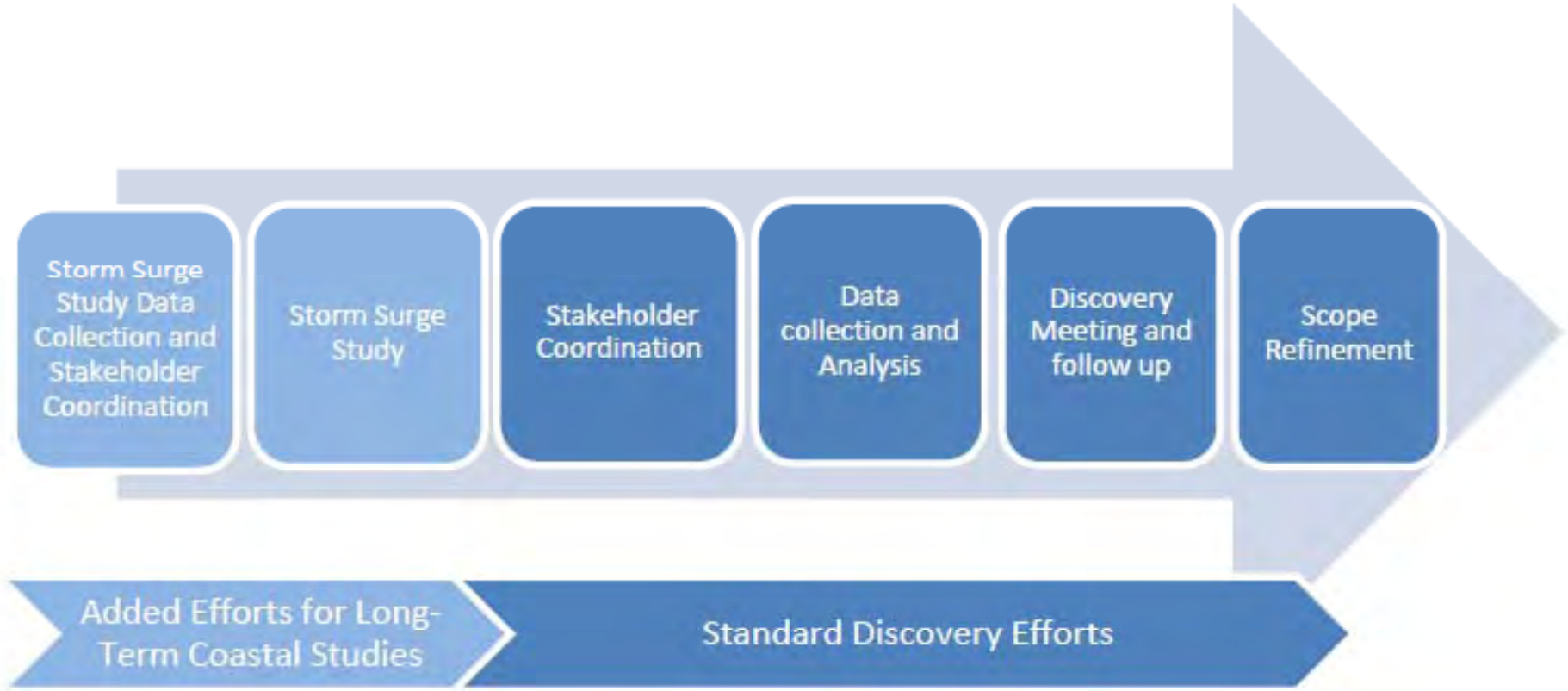
Data Inputs

- 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
Increasing Resilience Together



Discovery Schedule Overview



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Lake St. Clair 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

RiskMAP
Increasing Resilience Together



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



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
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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

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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

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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

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Coastal Mapping and Flood Risk Topics

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

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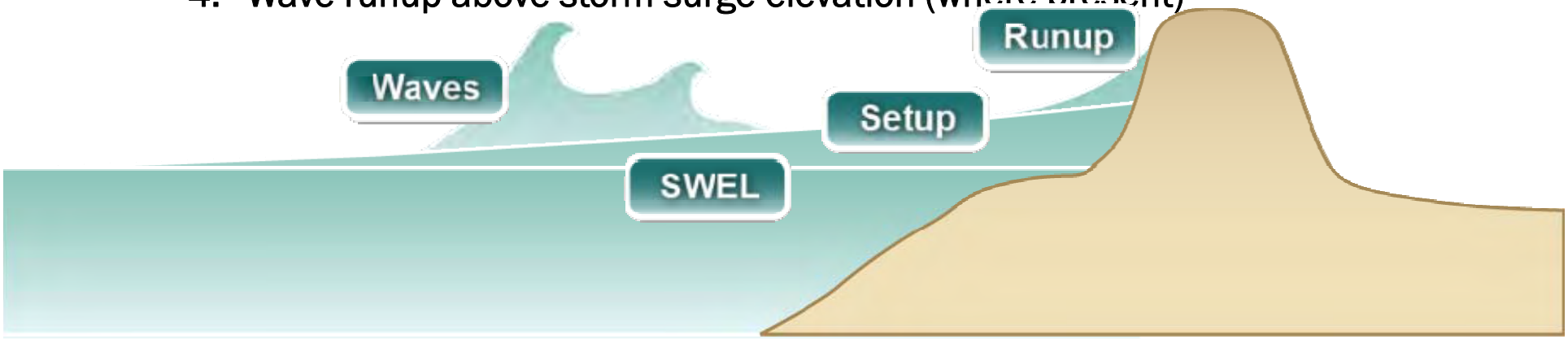
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Basic Elements of a Coastal Hazard Analysis

Base Flood Elevation on FIRM includes 4 components:

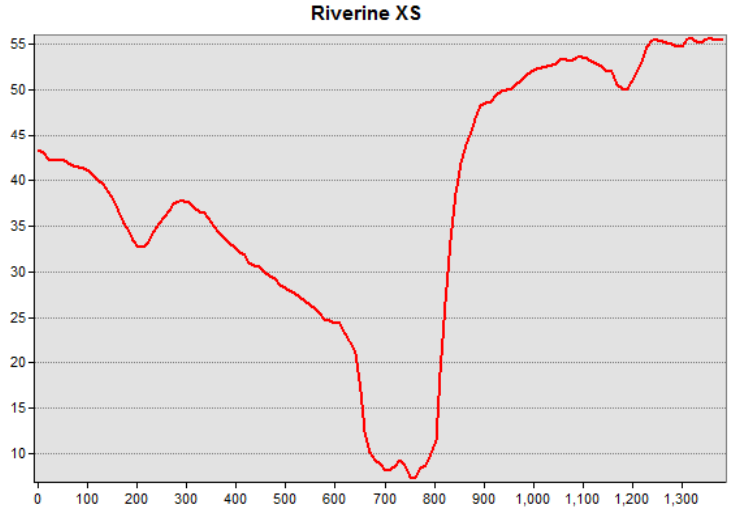
1. Storm surge stillwater elevation (SWEL) – determined from storm surge model
2. Amount of wave setup
3. Wave height above storm surge (stillwater) elevation
4. Wave runup above storm surge elevation (where present)

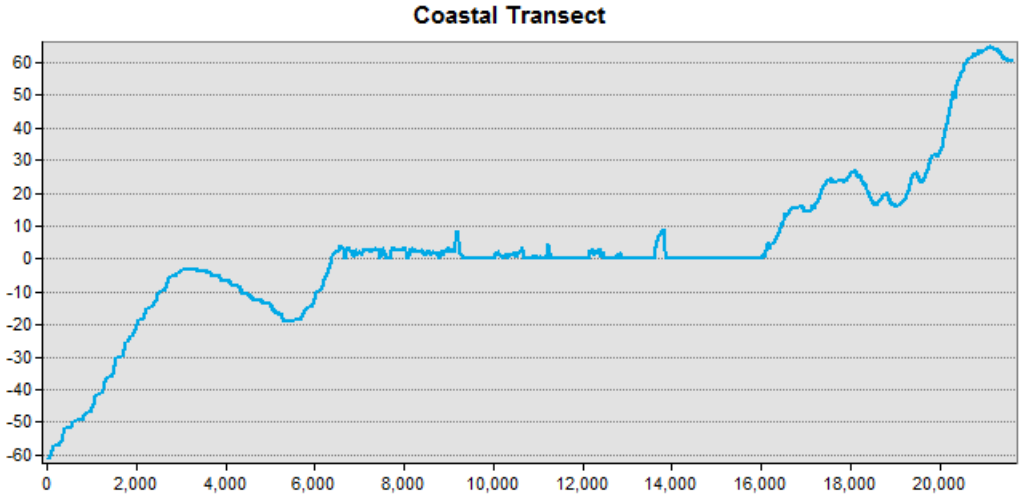


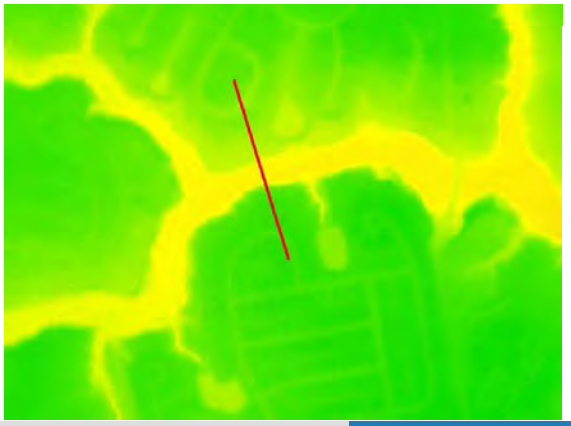
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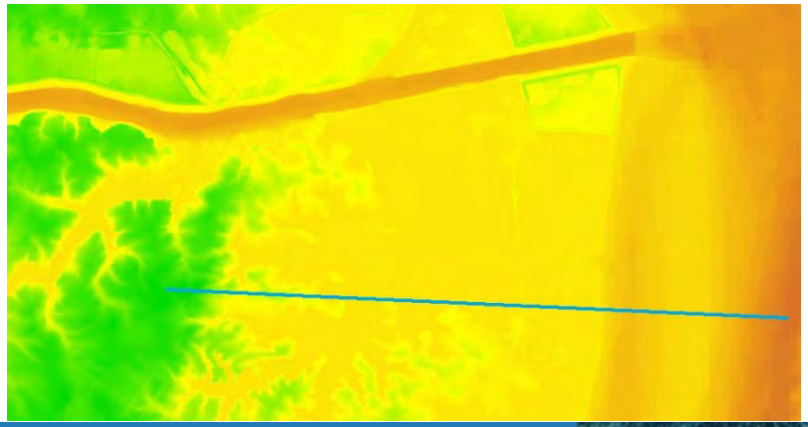
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Riverine XS vs Coastal Transect









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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
St. Clair County

- 15 transects
- 58 miles of shoreline



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Draft Transect Layout
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- 15 transects
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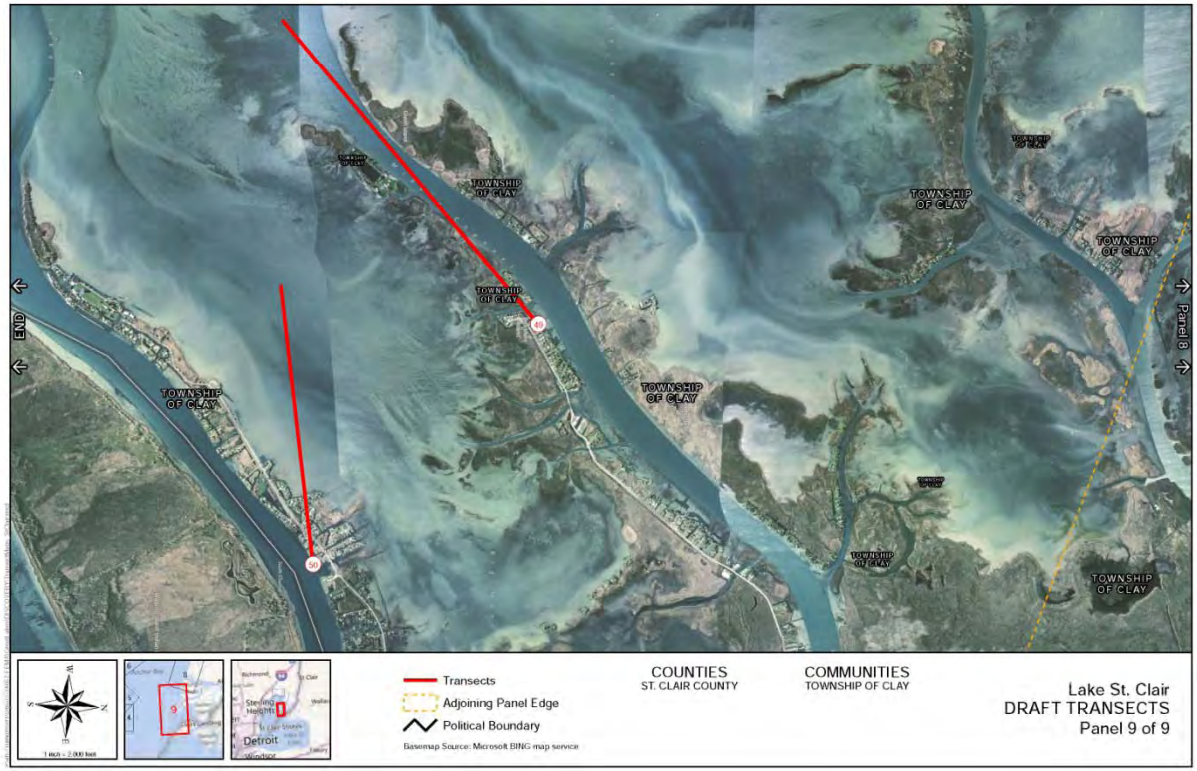


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Draft Transect Layout
St. Clair County

- 15 transects
- 58 miles of shoreline



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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

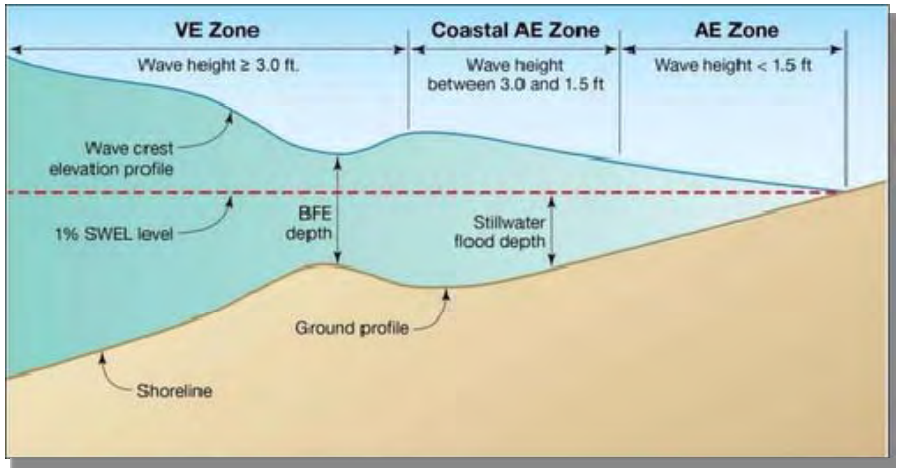
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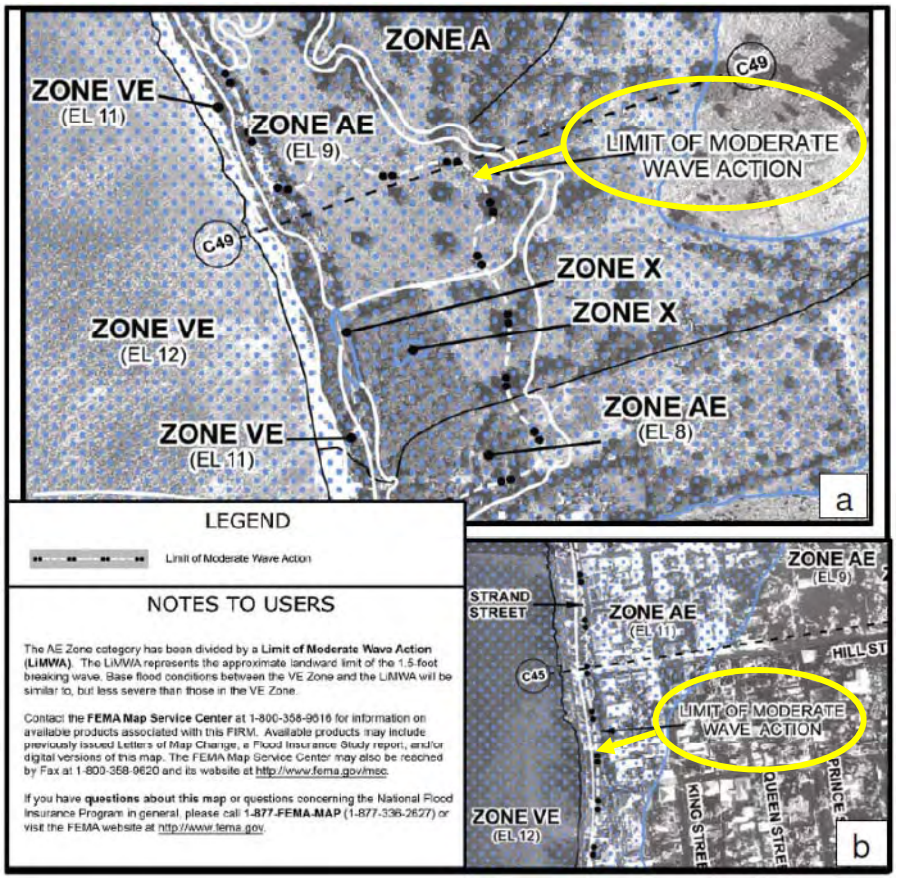
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Limit of Moderate Wave Action (LiMWA)

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)





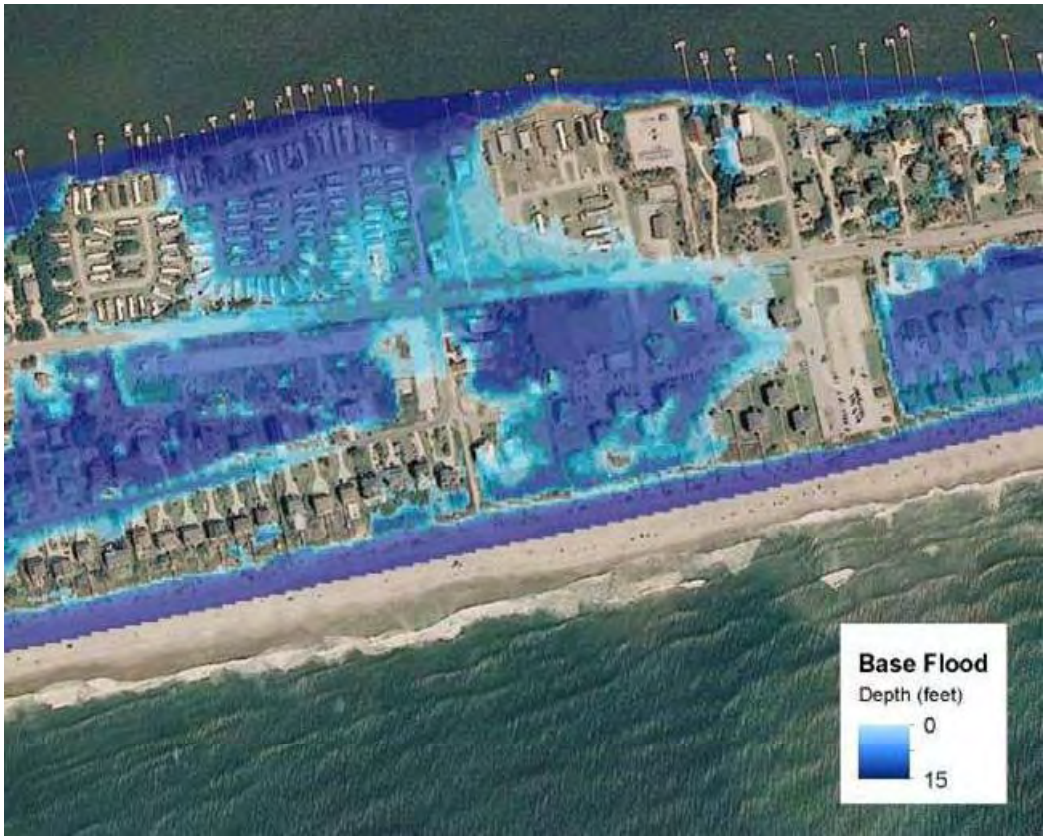
HAZUS MH
EARTHQUAKE • WIND • FLOOD

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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

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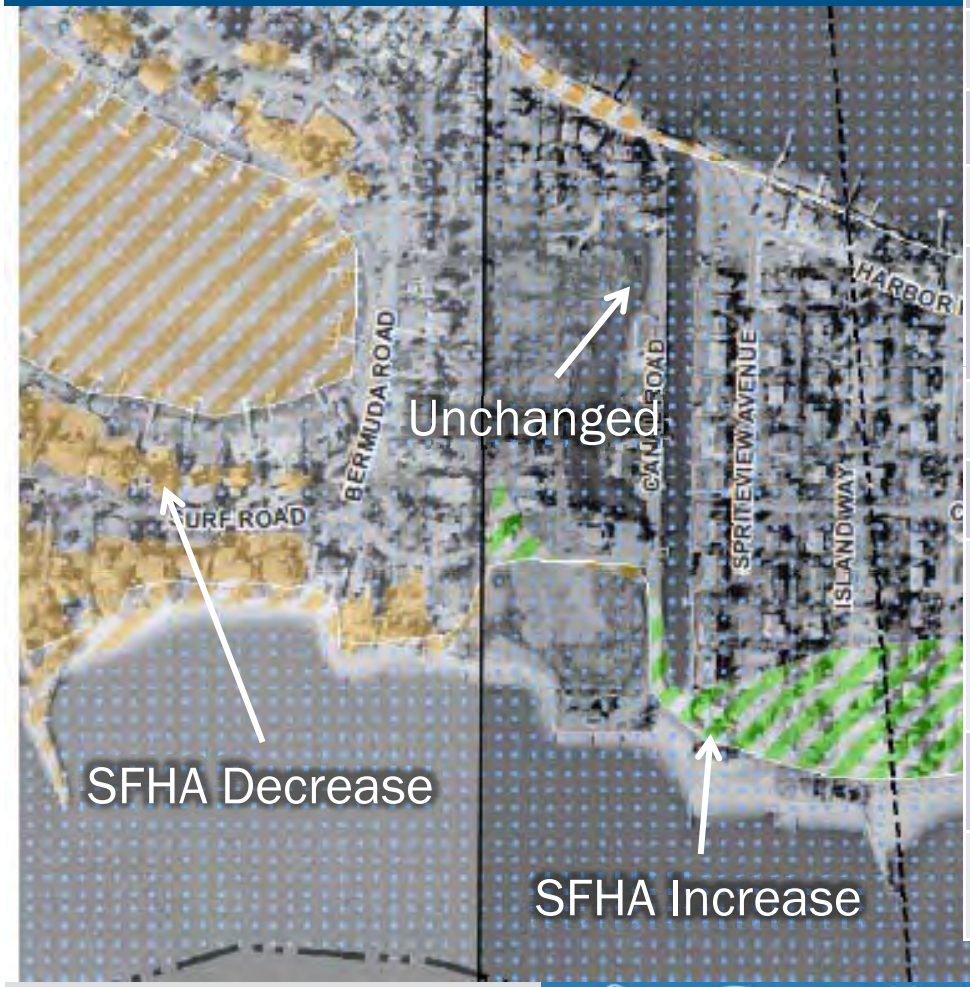
- Similar to Flood Risk Assessments for riverine, but using the coastal depth grids as input for the refined analysis
- Hazus analysis and data can support adoption of higher regulatory standards for structures in high loss areas
- Provides justification to fund mitigation actions



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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 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

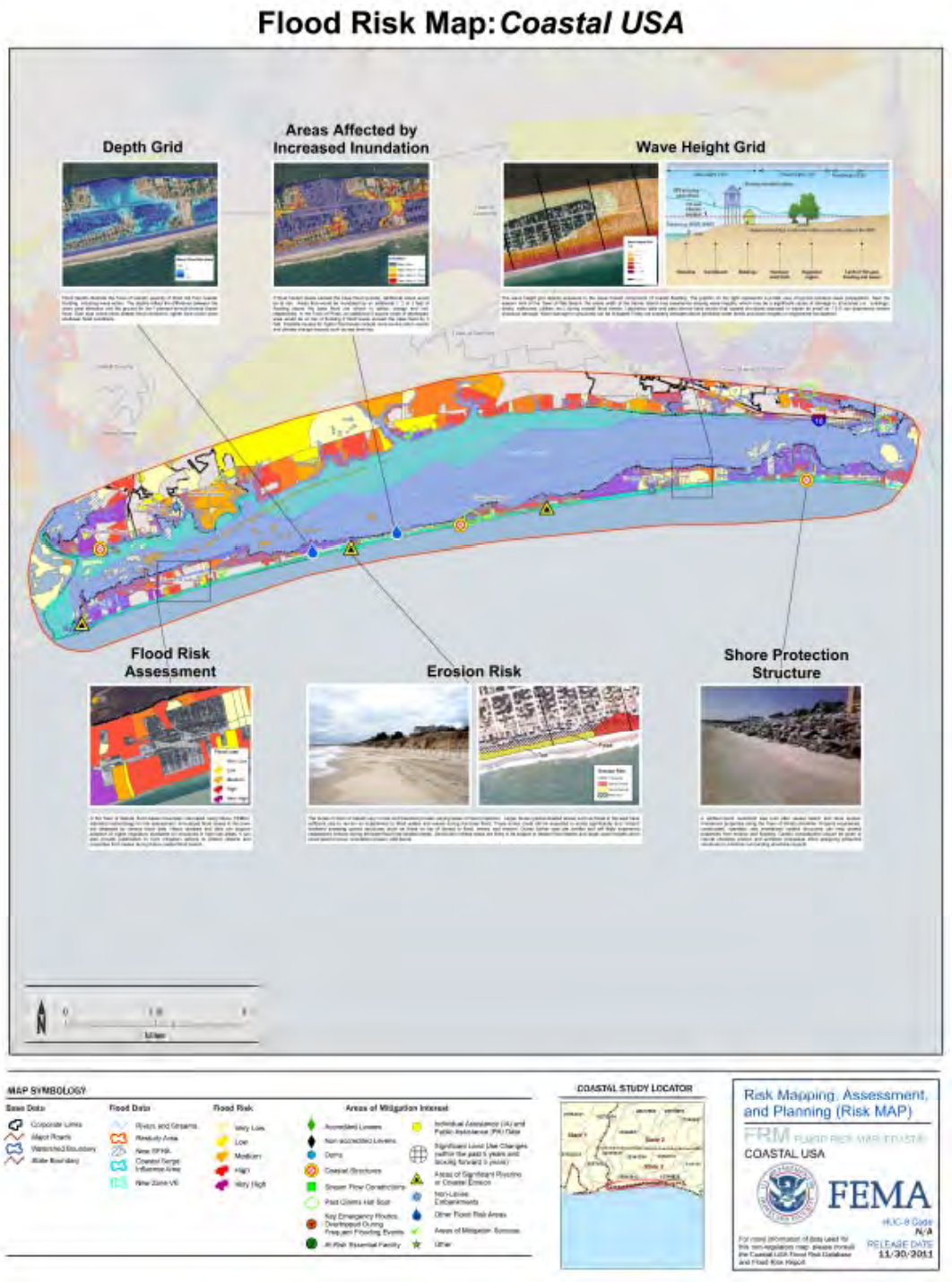
- Contains primary and secondary Land Use tables – same for coast type and vegetation
- Current project collects data at one-mile spacing, for scoping and cost
- Current project does not include field-based reconnaissance or sediment/subsurface soils collection

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Coastal FRM

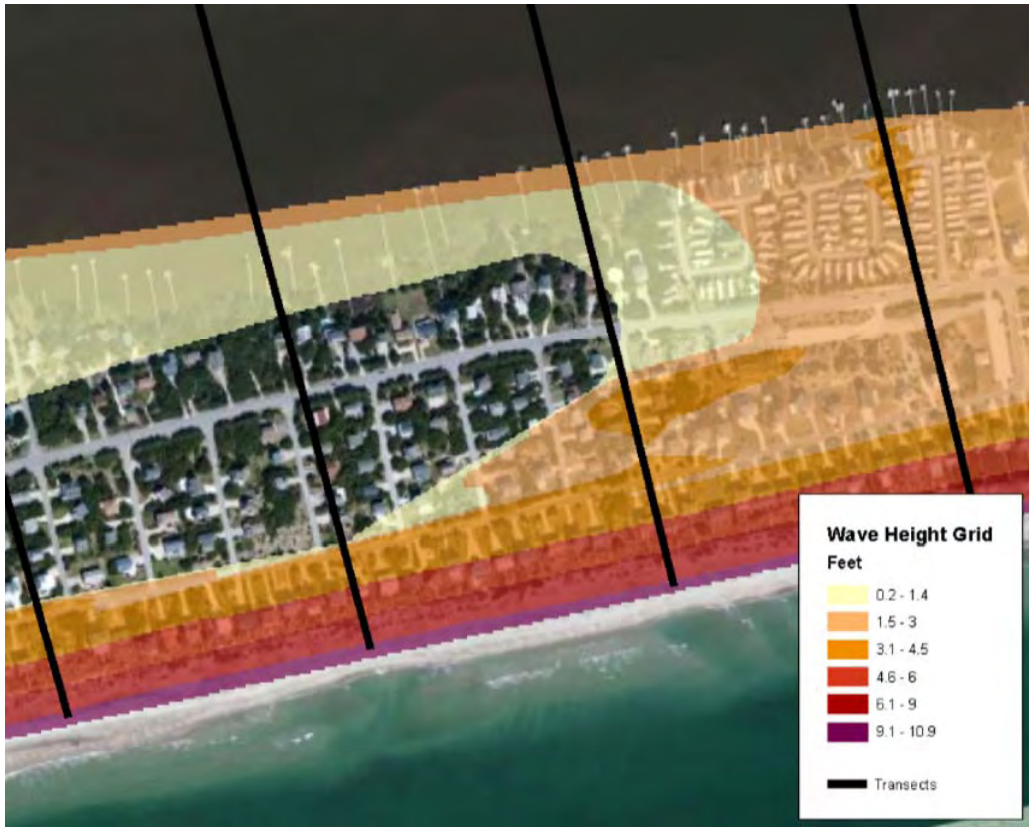
- Similar to riverine map
- Highlights area where datasets were produced
- Use of callout boxes
- Should drive the conversation towards mitigation



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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

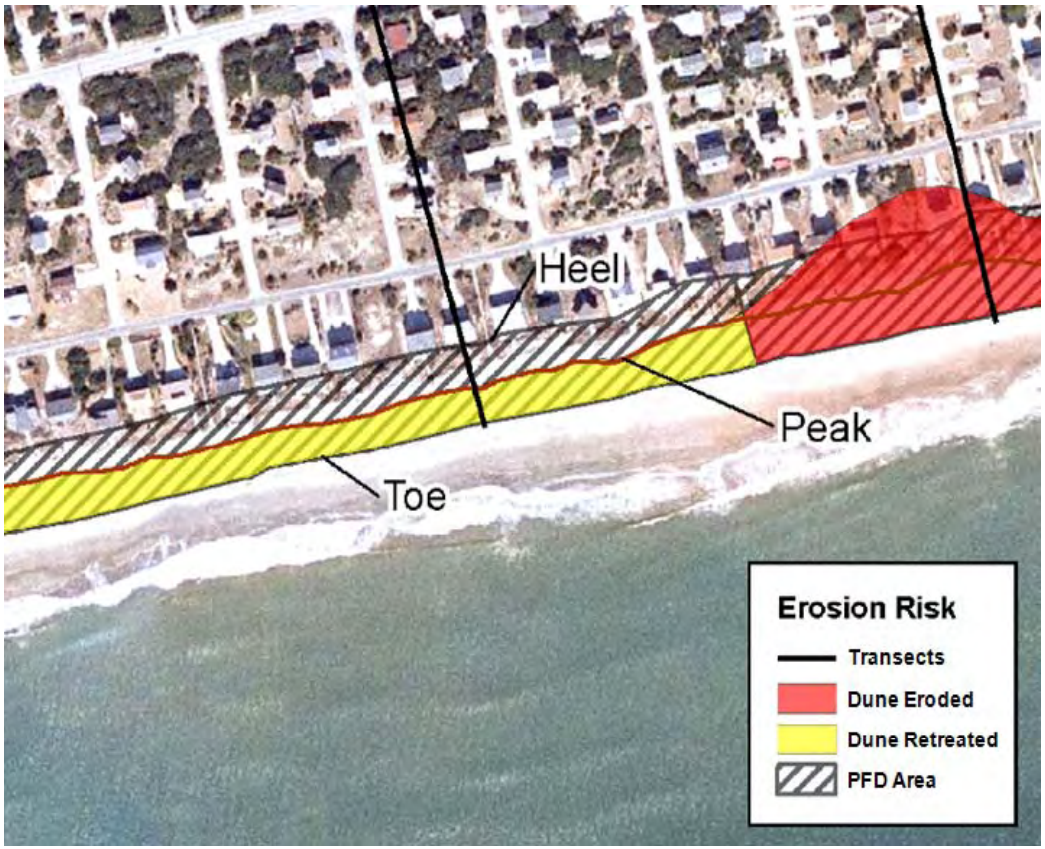


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Erosion Risk Determination

- 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

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- 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*

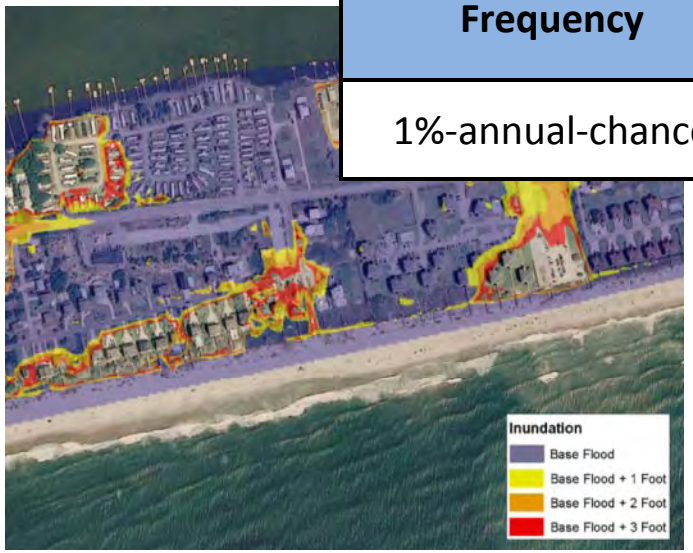
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Coastal Updates to Flood Risk Report

- 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

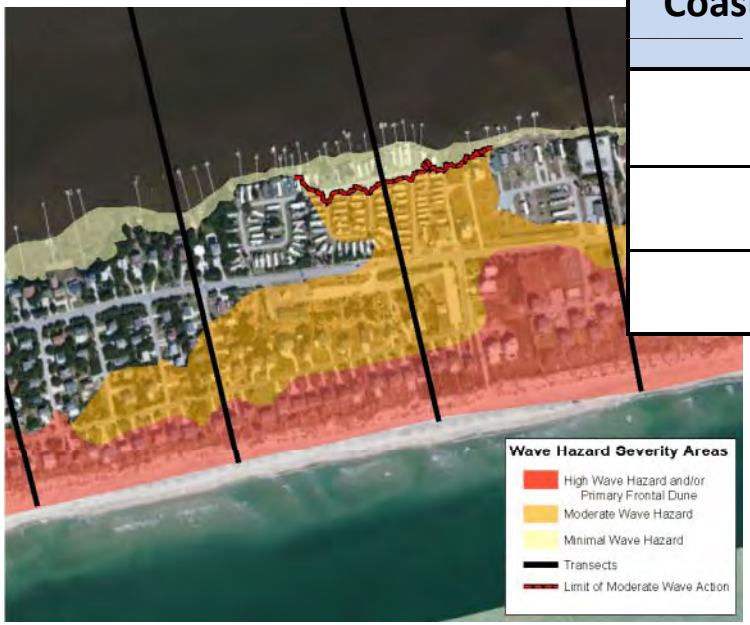


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Coastal Updates to Flood Risk Report

- 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 St. Clair?

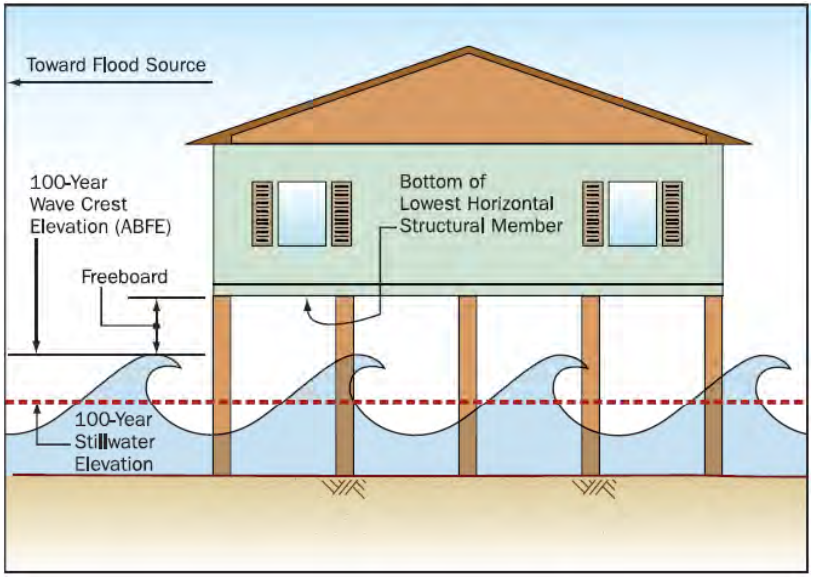
- Lake St. Clair communities currently do not have V/VE Zones. Majority of the communities have coastal A/AE zones.
- If costal AE and VE Zones are added on maps where they did not exist before, all affected communities must update regulations to include coastal requirements.
  - State will provide regulations 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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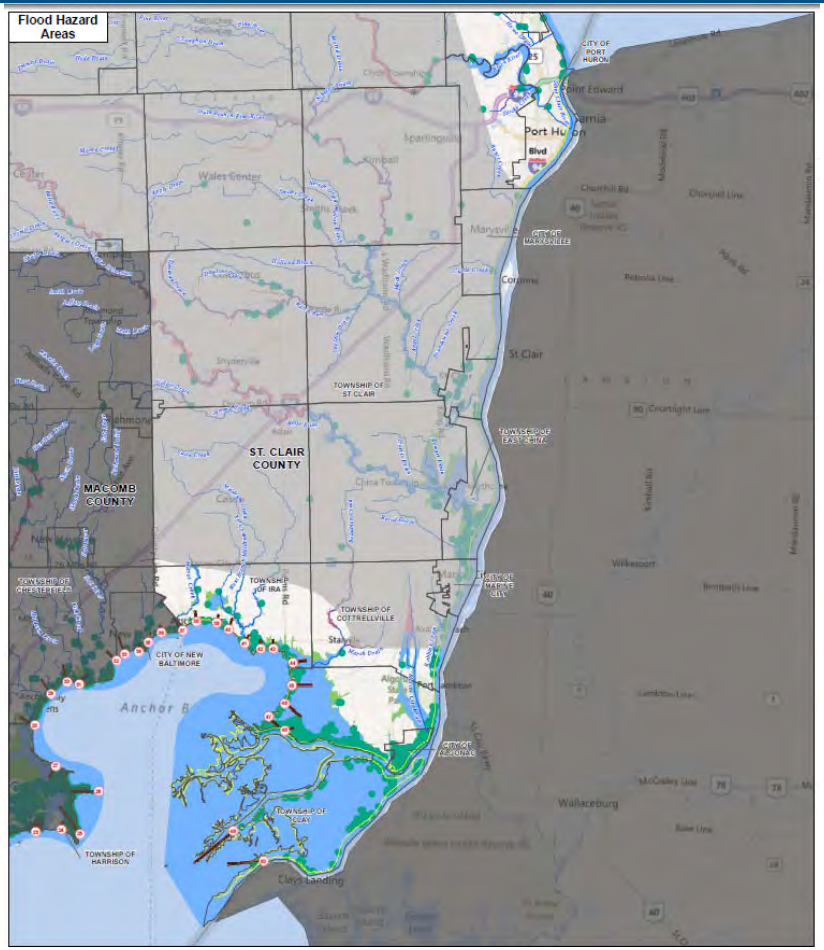
Interactive Session A

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

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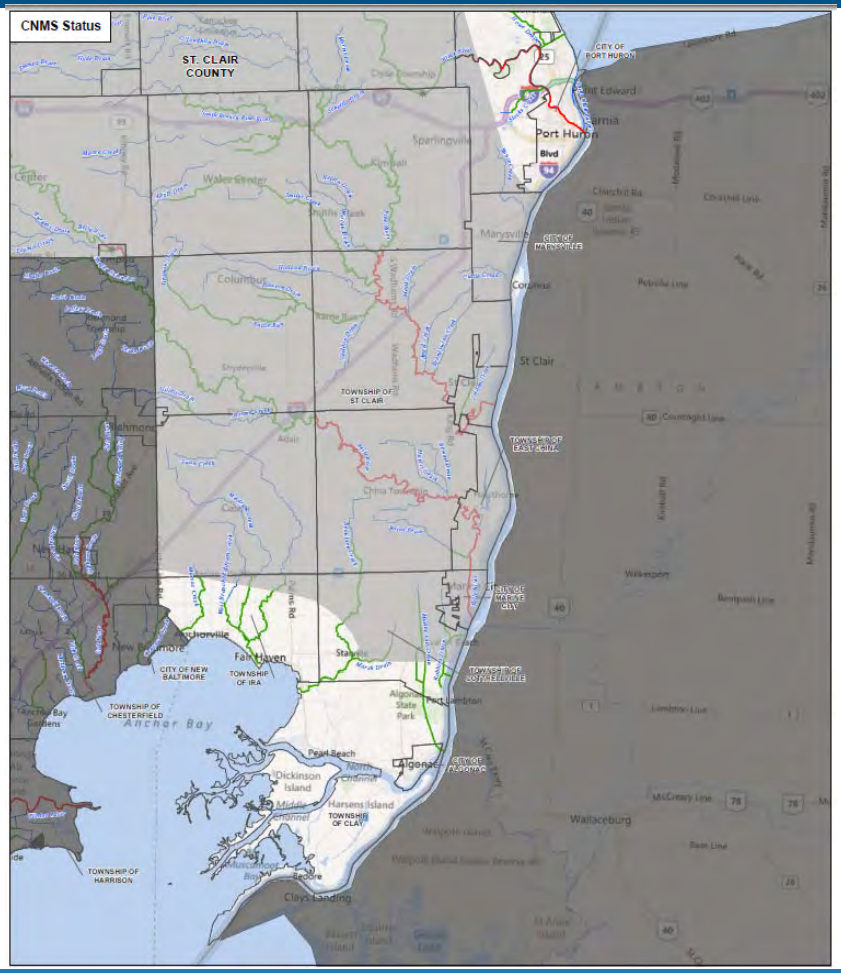
St. Clair County, MI
Discovery Map – Flood Hazard Areas



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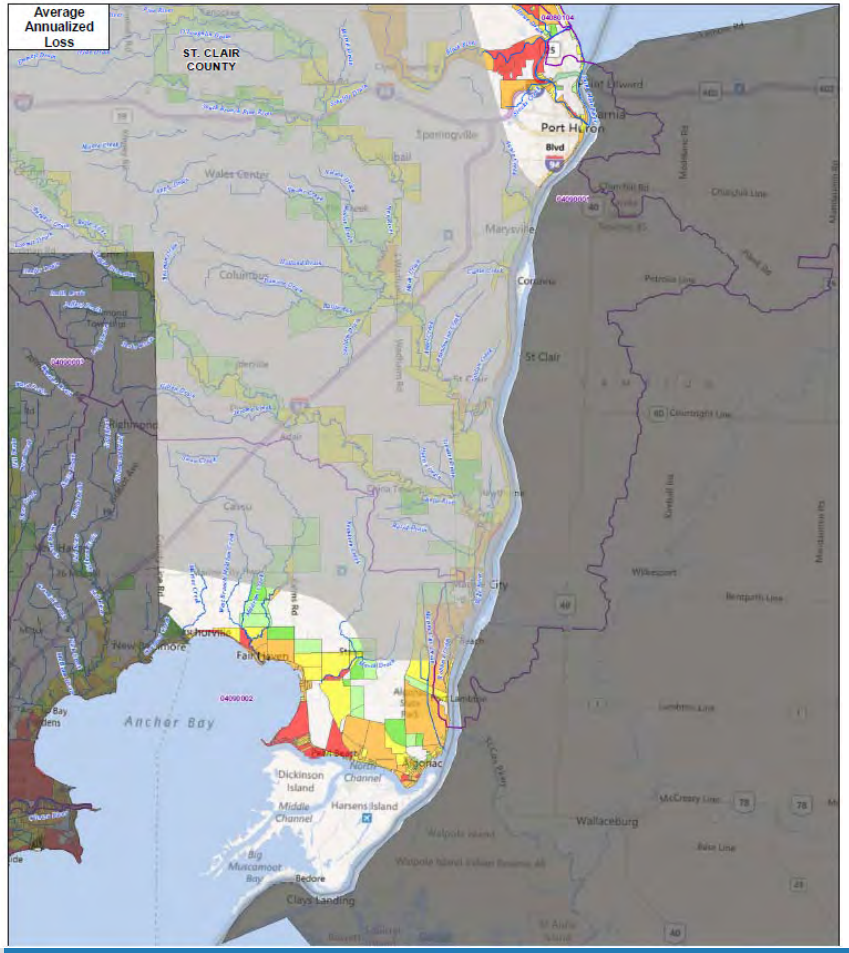
St. Clair County, MI
Discovery Map – CNMS Status



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St. Clair 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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St. Clair County Mitigation Best Practices

- City of Port Huron – Standby Power Source for Water Treatment Plant
  - HMGP funding under Federal Disaster 1346-DR-MI
  - Critical infrastructure failure mitigation project
  - Ensured continued operation of the water treatment plant during an electric power failure



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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

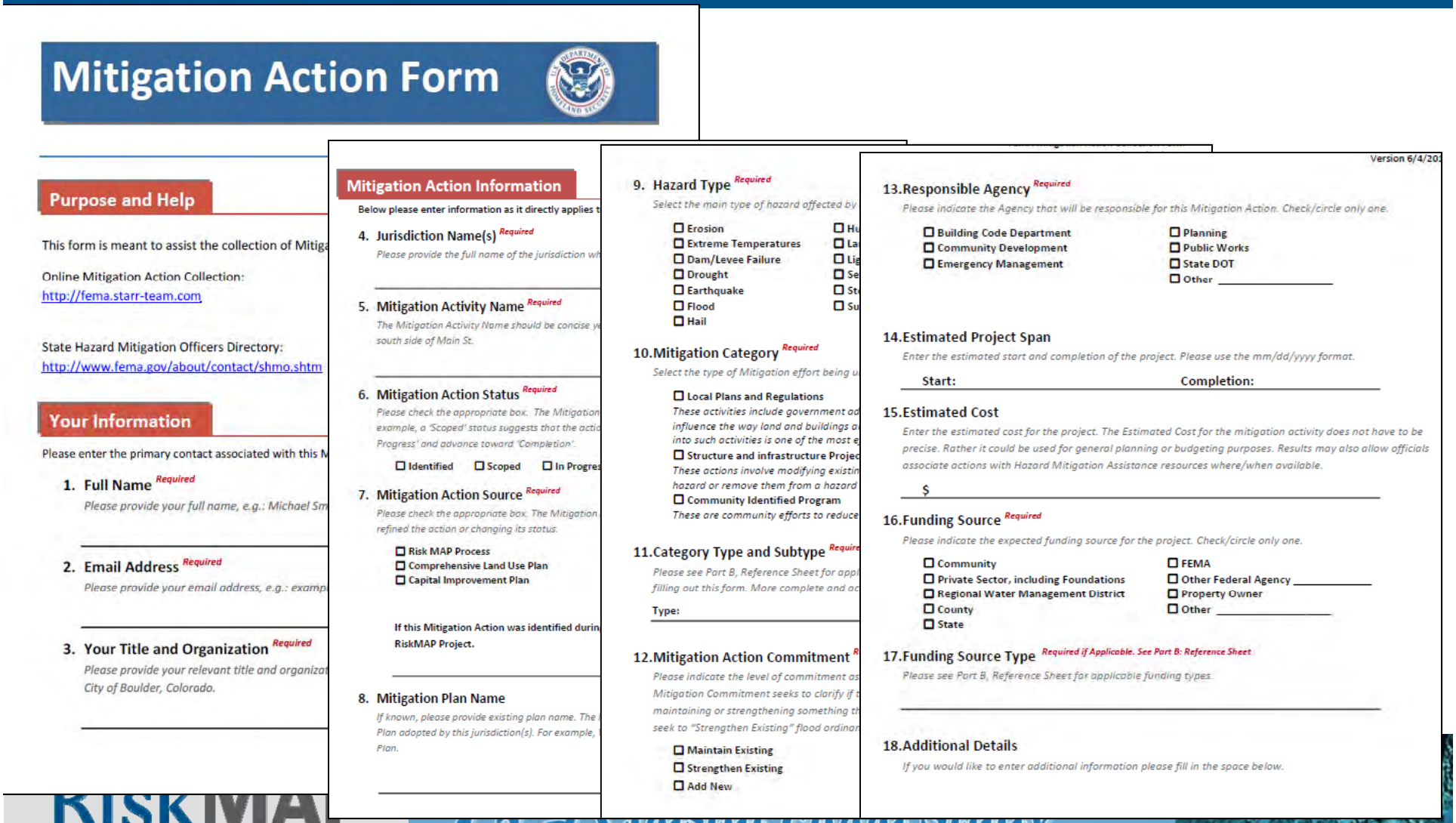
- The right action (or mix of actions) will be based on recent community experiences and level of complexity in existing infrastructure
  - *Public Works*
  - *Building Standards*
  - *Community Planning and HM Plan Update / Integration processes*
  - *Communication Processes, GIS, etc.*
- Get the right 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



Mitigation Action Form

Purpose and Help

This form is meant to assist the collection of Mitiga

Online Mitigation Action Collection:
http://fema.starr-team.com

State Hazard Mitigation Officers Directory:
http://www.fema.gov/about/contact/shmo.shtm

Your Information

Please enter the primary contact associated with this M

1. **Full Name** Required
   Please provide your full name, e.g.: Michael Sm
2. **Email Address** Required
   Please provide your email address, e.g.: exampl
3. **Your Title and Organization** Required
   Please provide your relevant title and organizat
   City of Boulder, Colorado.

Mitigation Action Information

Below please enter information as it directly applies t

4. **Jurisdiction Name(s)** Required
   Please provide the full name of the jurisdiction wh
5. **Mitigation Activity Name** Required
   The Mitigation Activity Name should be concise ye
   south side of Main St.
6. **Mitigation Action Status** Required
   Please check the appropriate box. The Mitigation
   example, a 'Scoped' status suggests that the actio
   Progress' and advance toward 'Completion'.
   ☐ Identified ☐ Scoped ☐ In Progres
7. **Mitigation Action Source** Required
   Please check the appropriate box. The Mitigation
   refined the action or changing its status.
   ☐ Risk MAP Process
   ☐ Comprehensive Land Use Plan
   ☐ Capital Improvement Plan

   If this Mitigation Action was identified durin
   RiskMAP Project.
8. **Mitigation Plan Name**
   If known, please provide existing plan name. The
   Plan adopted by this jurisdiction(s). For example,
   Plan.

9. **Hazard Type** Required
   Select the main type of hazard affected by
   ☐ Erosion
   ☐ Extreme Temperatures
   ☐ Dam/Levee Failure
   ☐ Drought
   ☐ Earthquake
   ☐ Flood
   ☐ Hail
10. **Mitigation Category** Required
    Select the type of Mitigation effort being u
    ☐ Local Plans and Regulations
    These activities include government ac
    influence the way land and buildings a
    into such activities is one of the most e
    ☐ Structure and infrastructure Projec
    These actions involve modifying existin
    hazard or remove them from a hazard
    ☐ Community Identified Program
    These are community efforts to reduce
11. **Category Type and Subtype** Require
    Please see Part B, Reference Sheet for appl
    filling out this form. More complete and ac
    Type:
12. **Mitigation Action Commitment** R
    Please indicate the level of commitment as
    Mitigation Commitment seeks to clarify if t
    maintaining or strengthening something th
    seek to "Strengthen Existing" flood ordinan
    ☐ Maintain Existing
    ☐ Strengthen Existing
    ☐ Add New

Version 6/4/20

13. **Responsible Agency** Required
    Please indicate the Agency that will be responsible for this Mitigation Action. Check/circle only one.
    ☐ Building Code Department
    ☐ Community Development
    ☐ Emergency Management
    ☐ Planning
    ☐ Public Works
    ☐ State DOT
    ☐ Other _____
14. **Estimated Project Span**
    Enter the estimated start and completion of the project. Please use the mm/dd/yyyy format.
    Start: Completion:
15. **Estimated Cost**
    Enter the estimated cost for the project. The Estimated Cost for the mitigation activity does not have to be precise. Rather it could be used for general planning or budgeting purposes. Results may also allow officials associate actions with Hazard Mitigation Assistance resources where/when available.
    $
16. **Funding Source** Required
    Please indicate the expected funding source for the project. Check/circle only one.
    ☐ Community
    ☐ Private Sector, including Foundations
    ☐ Regional Water Management District
    ☐ County
    ☐ State
    ☐ FEMA
    ☐ Other Federal Agency _____
    ☐ Property Owner
    ☐ Other _____
17. **Funding Source Type** Required if Applicable. See Part B: Reference Sheet
    Please see Part B, Reference Sheet for applicable funding types.
18. **Additional Details**
    If you would like to enter additional information please fill in the space below.

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FEMA

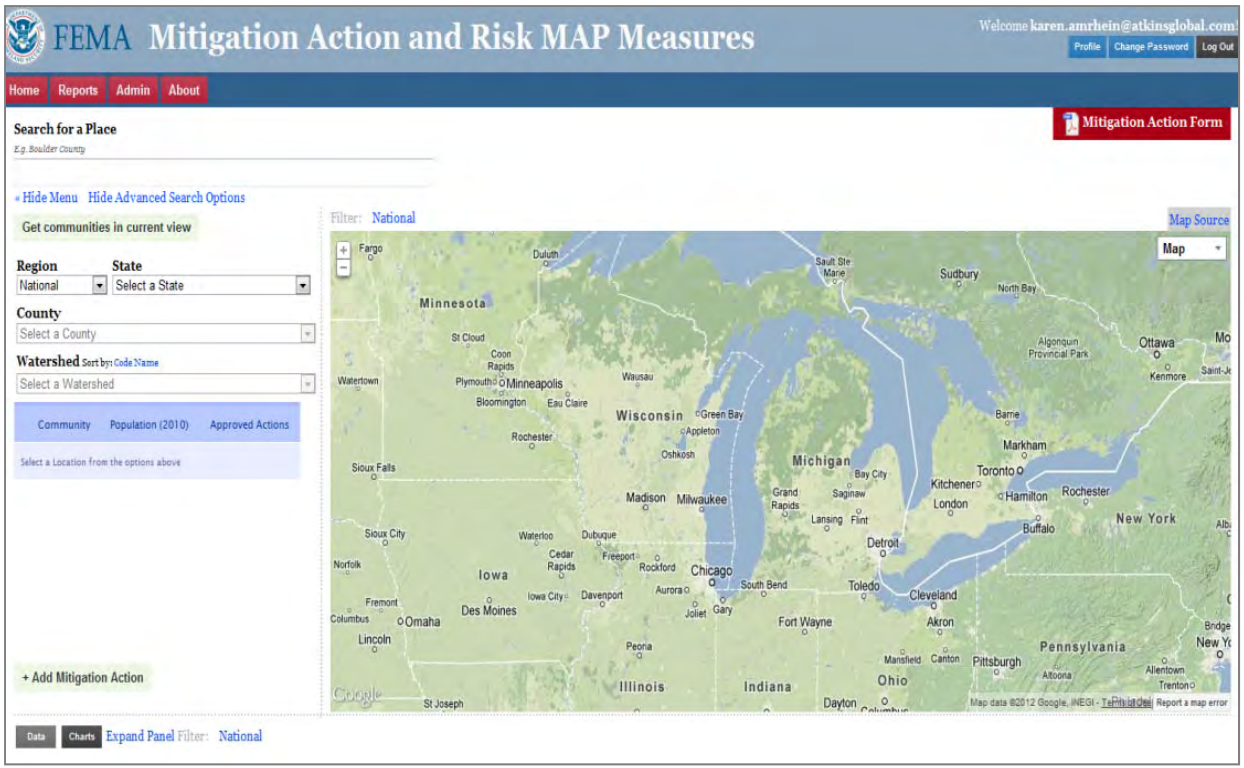
Interactive Session B

- Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form

RiskMAP
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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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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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FEMA

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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ATTACHMENT F

ST. CLAIR COUNTY HAZARD MITIGATION GRANT PROGRAM PROJECTS

HAZARD MITIGATION GRANT PROGRAM (HMGP) PROJECTS
St. Clair County, MI
As of July 2012

Disaster Number	Declaration Date	Incident Type	Disaster Title	Project Type	Project Description	Project Counties	Status
1237	08/05/1998	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS	202.1: Elevation of Private Structures - Riverine	ELEVATE 27 HOMES ABOVE 100-YR BFE ALONG LAKE ST. CLAIR.	ST. CLAIR	Closed
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	601.1: Generators		ST. CLAIR	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	602.1: Other Equipment Purchase and Installation		ST. CLAIR	Withdrawn
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	402.1: Infrastructure Protective Measures (Roads and Bridges)		ST. CLAIR	Withdrawn
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	602.1: Other Equipment Purchase and Installation	The weather station was installed at the Goodells Park, on July 20, 2004, in St. Clair County, Wales Township - approximately 633 feet south of Lapeer Road and 1434 feet east of Goodells Road in accordance with the approved scope of work. The weather station was moved from the approved location to 10730 Mary Street, north of the Eastern Michigan Grain Factory in Emmett, Michigan on December 18, 2006 due to unforeseen circumstances. No additional funds were requested for the change in location.-BBAKER-11/18/2009 15:14 GMT	ST. CLAIR	Approved
1527	06/30/2004	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING	403.1: Stormwater Management - Culverts	Project A1527.15 is for the removal of an under-capacity twin arch culvert and replacement with an appropriately sized single aluminum box culvert to mitigate roadway flooding on Mayer Road.-MSCHNEP1-11/10/2005 14:07 GMT	ST. CLAIR	Approved

APPENDIX E

Wayne County Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake St. Clair

Wayne County, Michigan Individual Report

Report Number 01

February 2013

FEMA

U.S. Department of Homeland Security
Federal Emergency Management Agency Region V
536 South Clark Street, 6th Floor
Chicago, Illinois 60605

SUBMITTED BY:



125 S. Wacker Drive, Suite 600
Chicago, IL 60606

Date Submitted: February 2013

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.

Wayne County
Detroit, City of
Grosse Pointe Farms, City of
Grosse Pointe Park, City of
Grosse Pointe Shores, Village of
Grosse Pointe Woods, City of
Grosse Pointe, City of
Harper Woods, City of

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Attachment F. Hazard Mitigation Grant Program Projects

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 Wayne 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.

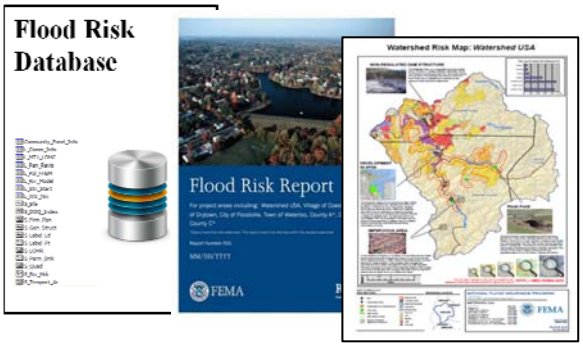
The following section describes the coastal flood risk products that a community may receive as part of a Risk MAP flood study, as well as some products that are under development for the Great Lakes study areas.

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.

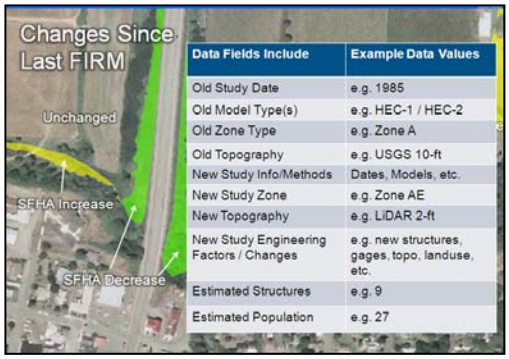
The three products are:

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

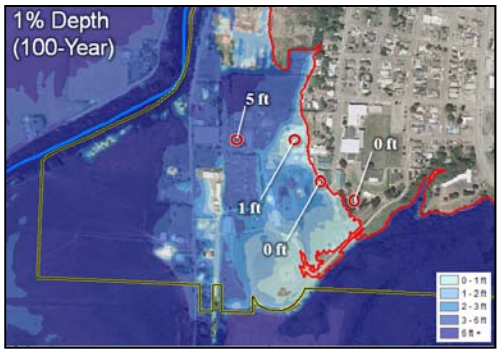


These products will summarize information captured in flood risk datasets that may be generated during a Risk MAP, or flood risk, study. The flood risk datasets could include regular and enhanced products. Standard flood risk datasets, also termed products, are listed below:

- **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 Wayne 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

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, Wayne County Pre-Meeting Correspondence.

III. Wayne County Discovery Meeting

The Discovery Meeting for Wayne County was held on August 21, 2012 in Grosse Pointe Park, Michigan. Communities affected by coastal flooding in Wayne 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 presentation 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 Wayne 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 Wayne County Lake St. 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 Wayne 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

[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.

Meeting for Wayne County can be found in Attachment D. A sample map is shown below as Figure 1.

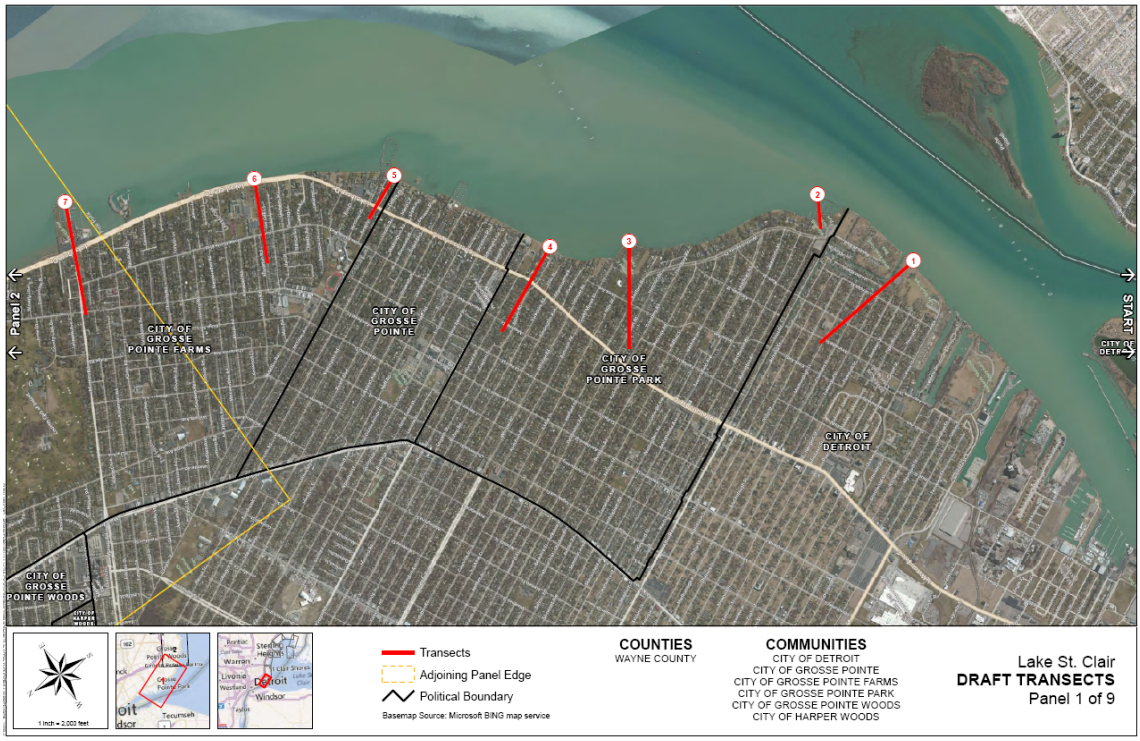


Figure 1: Sample Proposed Transect Figure

All comments that were provided during the Wayne 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 Wayne 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. WAY– 1, WAY – 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. WAY-TR-1, WAY-TR-2).

Table 1. Stakeholder General Comments and Transect Comments

ID	County	Location of Comment	FIPS	CID	Comment
WAY-4	Wayne	City of Detroit	26163	260222	Water Works Park - Critical Facility; Transect suggested at Water Works Park along Detroit River
WAY-TR-4	Wayne	Belle Isle, City of Detroit	26163	260222	Transect suggested for the eastern tip of Belle Isle
N/A	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, Wayne 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 Wayne 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 Wayne County Lake St. Clair Project Area prior to moving forward with the coastal flood study.

Table 2. Data Collected for Wayne 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

Table 2. Data Collected for Wayne County

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Contacts	Discovery Report	Local Community Websites, State/FEMA updates	June 2012	Countywide
Community Assistance Visits (CAVs)	Discovery Report	FEMA Community Information System (CIS)	July 2012	Countywide
Community Rating System (CRS)	Discovery Report	FEMA's "Community Rating System Communities and Their Classes"	July 2012	Nationwide
Comprehensive Plans	Discovery Report	Local Community Websites	July 2012	Countywide
Coastal Barrier Resources System (CBRS)	Discovery Map	U.S. Fish and Wildlife Service	July 2012	Nationwide
Coastal 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 Erosion 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
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

Table 2. Data Collected for Wayne County

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Historical Flooding	Discovery Report	Effective Flood Insurance Study (FIS), Local Mitigation Plans	July 2012	Countywide
Historical Storm Events	Discovery Report	Effective FIS, Local Mitigation Plans	July 2012	Countywide
Individual/Public Assistance	Discovery Report	FEMA's "Public Assistance Subgrantee Summary"	June 2012	Nationwide
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 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 Wayne County

FIPS Code	County	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
26163	Wayne	2,277,584	1,181,963	1,054,336

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 Wayne 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 Wayne County project area, no federal lands were identified along the Lake St. Clair Shoreline.

I.IV.i.4 Jurisdictional Boundaries

Wayne County jurisdictional boundaries were obtained from the February 2, 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, the Cities of Grosse Pointe Woods and Harper Woods provided completed data request forms back to FEMA as of the date of this report. 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 Wayne County from the Coastal Data Request Forms completed by stakeholders:

Table 4. Wayne County Local Data Collection
Base Map Data, Coastal Data, Other Data, and Historical Flood Data

			BASE MAP DATA		COASTAL DATA							OTHER DATA					HISTORICAL FLOOD DATA
Community, County or State Organization	County	State	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:
Southeast Michigan Council of Governments (SEMCOG)	Multiple	MI	LiDAR & Contour data	Building footprints													
City of Grosse Pointe Woods	Wayne	MI															No
City of Harper Woods	Wayne	MI	Available through Wayne County	Available through Wayne County													No

Table 4. Wayne County Local Data Collection
Risk Assessment and Flood Mitigation Information

			RISK ASSESSMENT		FLOOD MITIGATION INFORMATION										
Community, County or State Organization	**County**	**State**	**Does your community have HAZUS-based loss estimates from average annualized loss?**	**Does your community have other risk assessment data?**	**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?**
Southeast Michigan Council of Governments (SEMCOG)	Multiple	MI													
City of Grosse Pointe Woods	Wayne	MI	No	No	No	No	No	No	No	No	No				Low
City of Harper Woods	Wayne	MI	No		No	No	No	No	No	No	No	No	No	No	Low

Table 4. Wayne County Local Data Collection
Community Plans and Projects and Other GIS Data

			COMMUNITY PLANS AND PROJECTS							GIS DATA
Community, County or State Organization	**County**	**State**	**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**
Southeast Michigan Council of Governments (SEMCOG)	Multiple	MI							SEMCOG can also provide generalized master planning data	LiDAR, Contours, and 2010 building footprints available for counties within SEMCOG
City of Grosse Pointe Woods	Wayne	MI	Yes - Our community does have a Comprehensive Plan. No - Our community's Hazard Mitigation Plan was not coordinated with the Comprehensive Plan.	No	No	Yes - Our community has planning staff and/or planning/zoning commission and other measures, such as ordinances, administrative plans, and/or other programs contributing to effective administration of floodplain zoning, building codes, open space preservation, and coastal zone management.	No	No		
City of Harper Woods	Wayne	MI	No	No	No	No	No	No		

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.) were 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 Wayne 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 Wayne County that is covered by this Great Lakes Coastal Flood Study totals 9.4 miles. The shoreline classification information for Wayne 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)
Wayne County (Lake St. Clair)	9.4	9.3	0.1	--	--	--

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)
Wayne County (Lake St. Clair)	9.4	--	--	--	8.7	--	0.6	0.1

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)
Wayne County (Lake St. Clair)	9.4	--	--	--	9.4	--	--

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)
Wayne County (Lake St. Clair)	9.4	--	--	9.3	0.1	--	--

Source: USACE 2012, Lake St. Clair Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

Stream lines and water areas for Wayne County were acquired from the February 2, 2012 effective FIRM database for Wayne 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 Wayne 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 Wayne County February 2, 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" (http://nationalatlas.gov/atlasftp.html).

Wayne County contains portions of five HUC-8 watersheds: Lake St. Clair (04090002), Clinton (04090003), Detroit (04090004), Huron (04090005), and Ottawa-Stony (04100001).

ii. Other Data and Information

Wayne County is located in the southeastern portion of the lower peninsula of Michigan and encompasses the City of Detroit. It is bordered on the north by Oakland and Macomb Counties; on the east by Lake St. Clair, the Detroit River, and Lake Erie; on the south by Monroe County; and on the west by Washtenaw County.

The 2010 census population of Wayne County was reported to be 1,820,584, a decrease from the 2000 population of 2,061,162 (U.S. Census Bureau, 2010).

As is the case for most of Michigan, the climate of Wayne 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 (U.S. Department of Agriculture, Soil Conservation Service, November 1977).

On average, the warmest month is July, with an average maximum temperature varying only slightly: 83.4 °F at Detroit Metro, 84.5 degrees F at Detroit City, 85.7 °F at Dearborn, and 83.3 °F at Grosse Point Farms. The lowest average daily minimum temperature occurs in January and ranges from 17.8 °F at Detroit Metro and 16.1 °F at Dearborn in the west to 19.8 °F at Detroit City and 18.8 °F at Grosse Point Farms in the east. The average total annual precipitation is approximately 33 inches, with a majority of this occurring in the summer months. Average annual snowfall varies from about 28 inches in the eastern portion of the county to 43.5 inches in the western portion of the county (Midwestern Climate Center, 1961-2000).

Wayne County is drained by the tributaries of four major river systems. River Rouge drains over one-third of the county, including most of the northern half, and empties into the Detroit River. A small portion of northeastern Wayne County is drained by the Clinton River watershed. Several small tributaries in this area drain directly into Lake St. Clair and the Detroit River. A small portion of the southern half of the county is drained by the Huron River before, which empties into Lake Erie. The remaining portion of the southern half is drained by several tributaries to the Detroit River and Lake Erie. The largest of these tributaries is Ecorse Creek.

A layer of glacial drift ranging in thickness from a few feet to as much as 330 feet overlies the bedrock in Wayne County. These deposits cover all of the Detroit area except for a

small outcrop of bedrock in the southeastern part. The glacial deposits are thinnest near the mouth of the Detroit River and, in general, thicken gradually toward the west and more rapidly toward the northwest. Most of the county lays on an old, relatively flat glacial lake plain. A series of sand and gravel ridges, some as high as 25 to 30 feet, rest on the clay plain. These hills and ridges formed as beaches, terraces, and river deltas during the closing part of the glacial epoch. The northwest corner of the county is part of the down slope of the Irish Hills area, a glacial end moraine located to the west and northwest of the county which rises to a relative height of 500 to 600 feet above the level of the Detroit River and Lake Erie at the eastern boundary (U.S. Department of Agriculture, Soil Conservation Service, November 1977).

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 Wayne 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 does have 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. During 1972 and 1973, the 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. In Wayne County, these protection measures consisted of earthen dikes and sand or rock filled cribs in Charter Township of Brownstown and the Cities of Detroit, Ecorse, Gibraltar, Grosse Ile, Grosse Point, and Grosse Point Park (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).

In 1985, as part of the USACE Advance Measures initiative, additional clay dikes and sand filled cribs where constructed in the Charter Township of Brownstown (Wayne County). In response to flooding in 1985 and 1986, the City of Detroit (Wayne County) made substantial modifications to sheet piling in the vicinity of Fox Creek in the late 1980s. Numerous residential, commercial, and industrial areas along the shore have employed flood protection measures such as the filling of lower areas or the installation of sheet piling for bank stabilization and shore protection (U.S. Army Corps of Engineers, 1974).

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 Wayne 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 along Wayne 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	4263.7	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 shows a levee segment along the Lake St. Claire shoreline in Gross Pointe Park. The February 2, 2012 effective FIRM for Wayne County depict this levee as providing protection from the 1-percent-annual-chance flood event per a Provisionally Accredited Levee (PAL) agreement. As of the date of this report, the PAL agreement has expired and thus the area designated as PAL behind the levee system, and mapped as a Zone X (shaded), is currently under

review regarding the extent to which the levee provides protection from the 1-percent-annual-chance flood. Additional information on PALs can be found by visiting http://www.fema.gov/library/viewRecord.do?id=1987 . The regulatory requirements of the NFIP that apply to the evaluation and mapping of levee systems and levee-impacted areas are cited at Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations. Interested parties may access Section 65.10 of the NFIP regulations through the FEMA website at http://www.fema.gov/library/viewRecord.do?id=2741 .

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
Detroit, City of	260222	7/19/1999
Grosse Pointe Farms, City of	260229	--
Grosse Pointe Park, City of	260230	--
Grosse Pointe Shores, Village of	260250	--
Grosse Pointe Woods, City of*	260231	N/A
Grosse Pointe, City of	260228	--
Harper Woods, City of*	260214	N/A

CAV = Community Assisted Visit

*No Special Flood Hazard Areas Identified

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 Wayne 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 City of Grosse Pointe Woods noted in their coastal data request form that they have a master plan in place. This can be found at http://www.ci.grosse-pointe-woods.mi.us/Docs/Publications/Master_Plan/GPWMasterPlan.pdf . The plan discusses the community profile, background studies, future land use plans, and implementation.

No additional comprehensive plans were identified or provided during this Discovery process for the individual communities along the Lake St. Clair shoreline in Wayne 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 Wayne County

County	FIPS	Unknown (stream miles)	Unverified (stream miles)	Valid (stream miles)	Total (stream miles)
Wayne	26099	6	85	282	373

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 Wayne County, 2-percent of critical facilities and 2-percent of road miles (or 229 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 Wayne 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 Wayne 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/.

The NID shows there are 11 dams in Wayne County. There are eight (8) dams that have been identified as high and significant hazard dams in Wayne County. Seven of them have high hazard classification, which indicates loss of human life is likely if the dam fails. The Maybury Fish Pond Dam is a significant hazard classification, which indicates possible loss of human life and likely significant property or environmental destruction. Table 12 lists the high and significant hazard dams. No dams were identified near the Lake St. Clair shoreline area.

Table 12. High and Significant Hazard Dams

Name	Hazard	Height (ft)
Nankin Mill Dam	High	17
Newburgh Dam	High	29
Phoenix Dam	High	24
Wilcox Dam	High	27
Waterford Dam	High	22
Flat Rock Dam	High	16.5
French Landing Dam	High	35
Maybury Fish Pond Dam	Significant	18.5

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 13 lists the major disaster declarations that have been declared in all of Wayne County.

Table 13. Declared Disasters in Wayne County

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
Wayne (County)	363	12/1/1972	Flood	Severe storms & flooding
Wayne (County)	371	4/12/1973	Flood	Severe storms & flooding
Wayne (County)	495	3/19/1976	Severe Storm(s)	Severe storms, tornadoes, icing & flooding
Wayne (County)	631	9/8/1980	Flood	Severe storms & flooding
Wayne (County)	1181	7/11/1997	Severe Storm(s)	Severe storms, tornadoes, and flooding
Wayne (County)	1237	8/5/1998	Severe Storm(s)	Severe storms and high winds
Wayne (County)	1346	10/17/2000	Severe Storm(s)	Severe storms and flooding
Wayne (County)	1527	6/30/2004	Severe Storm(s)	Severe storms, tornadoes, and flooding
Wayne (County)	3057	1/27/1978	Snow	Blizzards & snowstorms
Wayne (County)	3137	1/27/1999	Snow	Mi - severe weather 1/2 /99
Wayne (County)	3189	9/23/2003	Other	Power outage
Wayne (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 14 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

Wayne 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 14. 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
Detroit, City of	260222	530	$ 156,111	$ 91,778,200	190	$ 328,557
Grosse Pointe Farms, City of	260229	10	$ 9,993	$ 2,485,000	1	$ 0
Grosse Pointe Park, City of	260230	11	$ 6,579	$ 3,103,200	33	$ 42,612
Grosse Pointe Shores, Village of	260250	5	$ 16,705	$ 2,300,000	4	$ 5,122
Grosse Pointe Woods, City of	260231	4	$ 1,319	$ 938,000	4	$ 1,229
Grosse Pointe, City of	260228	4	$ 3,266	$ 1,300,000	7	$ 6,303
Harper Woods, City of*	260214	N/A	N/A	N/A	N/A	N/A

*community currently not participating in the NFIP
CID = Community Identification

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/. No meteorological stations were found from NDBC for Wayne County.

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 all of Wayne County. All USGS stream gage locations are shown on the Discovery Map.

Table 15. Stream Gage Stations for Wayne County

Gage ID	Begin Date	End Date	Gage Location
04165700	1976/10/01	1977/09/30	Detroit River at Detroit, MI
04166470	1997/10/01	2000/09/30	Upper River Rouge at Detroit, MI
04166500	1930/10/01	2000/09/30	River Rouge at Detroit, MI
04167000	1930/10/01	2000/09/30	Middle River Rouge near Garden City, MI
04167150	1997/10/01	2000/09/30	Middle River Rouge at Dearborn Heights, MI
04168000	1947/06/01	2000/09/30	Lower River Rouge at Inkster, MI
04168400	1997/10/01	2000/09/30	Lower River Rouge at Dearborn, MI
04168500	1930/10/01	1933/09/30	Lower R Rouge at S Brady Rd at Dearborn, MI
04174950	1986/04/01	1997/09/30	Willow Run near Rawsonville, 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. Windmill Point is located in Wayne County.

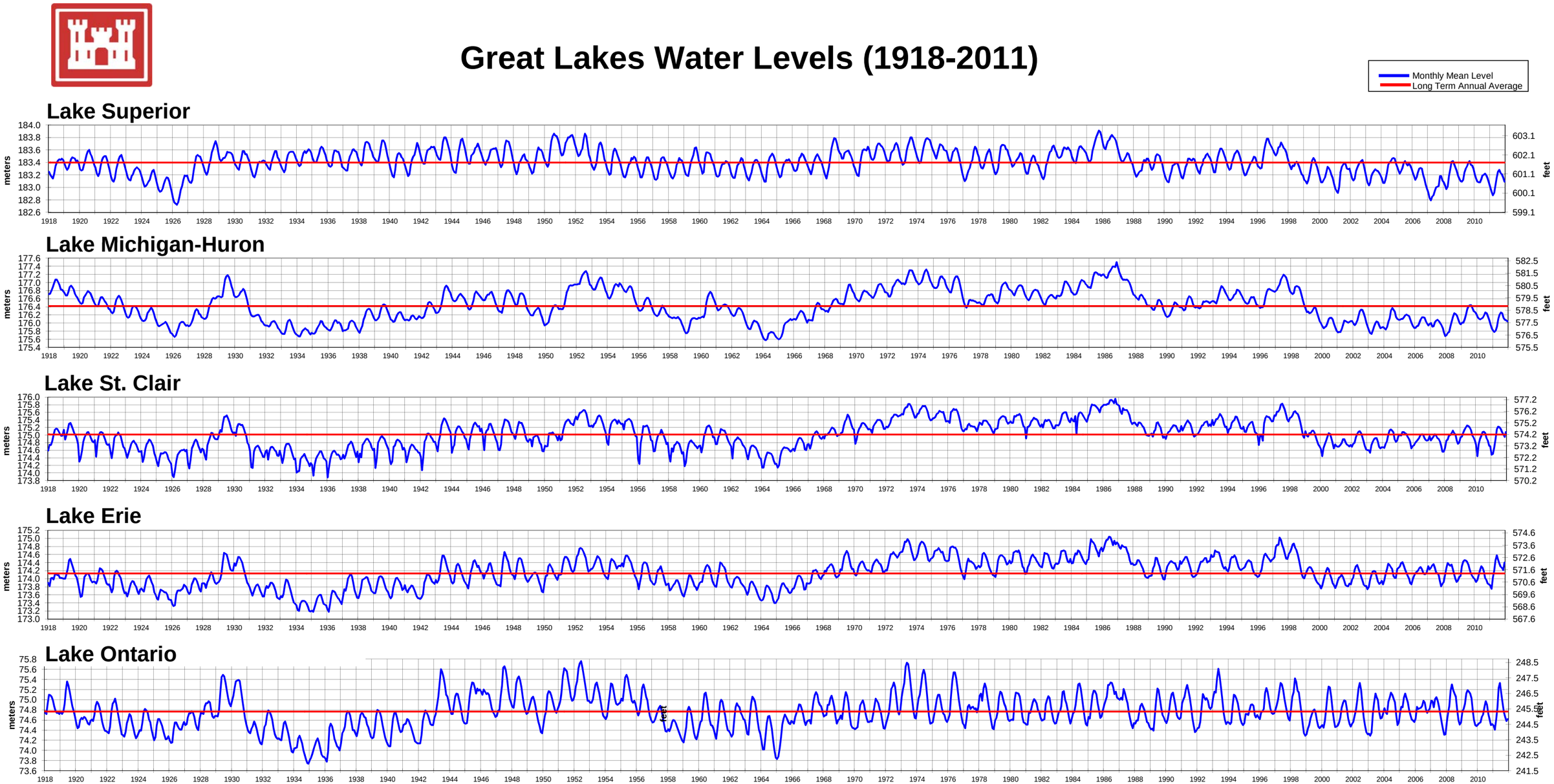
Table 16. Water Level Stations

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 (on the next page) 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: 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/ .

No stations were found within the Wayne County study area.

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
Wayne County	6/22/2007	6/22/2012
City of Detroit	3/22/2007	3/22/2012

During the Discovery process, stakeholders noted that the hazard mitigation plan for the City of Detroit had recently expired and the City had obtained planning grant funding for plan updates. The update process is currently underway. Wayne County hazard mitigation plan also recently expired and the status of updating that plan is unknown as of the date of this report.

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 Wayne 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 effective *Flood Insurance Study, Wayne County, Michigan*, dated 2012.

For the portion of Wayne County that borders the Detroit River, Lake Erie, and Lake St. Clair, a combination of high lake and river levels along with easterly winds produces conditions favorable for flooding. Historically, the most damaging floods have occurred as a result of this combination. Severe flooding occurred along this shoreline in 1954, 1973, 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, along with high easterly and northeasterly winds, drove the already high waters of Lake Erie and Lake St. Clair on shore, inundating several communities along the shoreline. This included portions of the Charter Township of Brownstown; the Cities of Ecorse, Gibraltar, Grosse Pointe, and Grosse Pointe Park; the Township of Grosse Ile; and the extreme northeastern portion of the City of Detroit (Federal Emergency Management Agency, 2012).

Some of the worst recorded flooding damage occurred in 1985 when water flowed through gaps in dikes that had been built by the USACE under Operation Foresight in 1973 and 1974. In many locations, these dikes had been lowered or removed by individual residents in the late 1970s to facilitate access to Lake Erie. The storms on March 31, 1985, and April 4 and 6, 1985, collectively caused about $2 million in damages in Wayne County, with approximately 1,300 homes reporting flood damages (U.S. Army Corps of Engineers, 1989)

No high water mark data was found within Wayne County for Lake St. Clair. If local stakeholders have 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 large parts of Wayne County are industrial and urban, much of the western half of the county is still undeveloped. The City of Detroit is one of the largest industrial centers in the Midwest and is the headquarters for the U.S. auto industry. The predominate land use in Wayne County is residential, which accounts for approximately 45 percent of the land area. Commercial/industrial land use accounts for approximately 17 percent (Southeast Michigan Council of Governments, 2011).

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 18 lists the number of LOMCs in the County. No Conditional LOMAs or Conditional LOMR-Fs were included. The LOMCs are shown on the Discovery Map. Clusters of LOMCs indicate a need for updated maps.

Table 18. Summary of LOMC cases in Wayne 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
Wayne	752	71	48	0

I.IV.ii.18 Locally Identified Mitigation Actions

Table 19 lists the flood-related mitigation action that was extracted from the Wayne County Hazard Mitigation Plan, which expired on June 22, 2012 (ASTI Environmental, 2006).

Table 19. Hazard Mitigation Action

Name of Plan	County	Plan Expiration Date	Hazard Mitigation Action
Wayne County Hazard Mitigation Plan; March 2006	Wayne County	6/22/2012	Improve flood plan management by planning acceptable uses for these areas, involving drain commissioners, hydrologic studies, etc. in analyses and decisions.

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 Wayne County communities within the project area is shown in Table 20.

Table 20. Program Status and Ordinance Level

Community	CID	FIRM Date	Program Status	Ordinance Level
Detroit, City of	260222	2/2/2012	Participating	D
Grosse Pointe Farms, City of	260229	2/2/2012	Participating	D
Grosse Pointe Park, City of	260230	2/2/2012	Participating	D
Grosse Pointe Shores, Village of	260250	2/2/2012	Participating	D
Grosse Pointe Woods, City of*	260231	2/2/2012	Participating	N/A
Grosse Pointe, City of	260228	2/2/2012	Participating	C
Harper Woods, City of*	260214	2/2/2012	Not Participating	N/A

*NSFHA – No Special Flood Hazard Areas identified

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 Wayne 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 21 is a compilation of the comments received regarding the proposed draft transects along Lake St. Clair in Wayne County. Please refer to the draft Discovery Map (Attachment C) or to the Proposed Transect figures (Attachment D) to view the transects that were proposed at the time of the Discovery Meeting. Attachment E contains the marked up draft Discovery Map with comments from stakeholders who attended the Discovery Meeting.

Table 21. Transect Comments

Transect Number (on draft Discovery Map)	Stakeholder Comment
N/A – Suggested new transect – see Attachment E	Water Works Park - Critical Facility; Transect suggested at Water Works Park along Detroit River
N/A – Suggested new transect – see Attachment E	Transect suggested for the eastern tip of Belle Isle

Based on the comments captured throughout the Discovery process and during the Discovery Meeting, proposed draft transects have been revised to incorporate placement comments. 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 Wayne County is listed in Table 22 by community.

Table 22. Effective Mapping Status

Community	CID	FIRM Date	Program Status
Detroit, City of	260222	2/2/2012	Participating
Grosse Pointe Farms, City of	260229	2/2/2012	Participating
Grosse Pointe Park, City of	260230	2/2/2012	Participating
Grosse Pointe Shores, Village of	260250	2/2/2012	Participating
Grosse Pointe Woods, City of*	260231	2/2/2012	Participating
Grosse Pointe, City of	260228	2/2/2012	Participating
Harper Woods, City of*	260214	2/2/2012	Not Participating

CID = community identification

*NSFHA – No Special Flood Hazard Areas identified

The Cities of Grosse Pointe Woods and Harper Woods do not have any Special Flood Hazard Areas (SFHAs) identified.

The February 2, 2012 effective countywide mapping included historical detailed studies performed along various riverine flooding sources, as well as restudies and new detailed studies along flooding sources. In addition, several streams were studied by approximate analysis.

Effective FIRMs and FISs, which includes additional information about the studies performed, 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 Wayne County project area, as shown in Table 23.

Table 23. Repetitive Losses

Community	CID	Number of Repetitive Loss Structures	Total Repetitive Loss Payment
Detroit, City of	260222	2	$ 15,098
Grosse Pointe Farms, City of	260229	0	$ 0
Grosse Pointe Park, City of	260230	1	$ 22,517
Grosse Pointe Shores, Village of	260250	0	$ 0
Grosse Pointe Woods, City of	260231	0	$ 0
Grosse Pointe, City of	260228	0	$ 0
Harper Woods, City of*	260214	0	$ 0

CID = community identification
*Not participating in the NFIP
Source: FEMA's CIS "Community Disaster Detail – Flood Insurance" report

I.IV.ii.25 Socio-Economic Analysis

In Wayne County, the economy is predominately service/sales oriented, accounting for approximately 65 percent of the jobs in the county, while approximately 20 percent of the jobs are in manufacturing.

In 2009, lake-related businesses provided 1.6 percent of the total jobs in Wayne County. This accounted for just under 11,000 jobs, $255 million in wages, and $448 million in goods & services. This represents a 21 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 Wayne County, approximately 4 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
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 dependant 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 Wayne 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 24 summarizes the products projected for the coastal communities.

Table 24. 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?
Wayne	MI	✓	✓	✓	✓	Not yet funded

ii. Potential 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 definiencies that should be corrected.

During this discovery process, it was noted by stakeholders that the City of Detroit received planning grant funding and are in the process of updating their hazard mitigation plan. It was also identified that Wayne County has an expired hazard mitigation plan and local officials are looking into options available to update the plans. It is recommended additional discussion occur with these stakeholders as this coastal flood study moves forward to see if MPTA would be an appropriate and beneficial option.

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 Wayne 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 draft transects were raised during the Discovery Meeting by State and county representatives. As a result, draft transects were revised to incorporate stakeholder comments. 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. Wayne County Pre-Meeting Correspondence
Attachment C. Draft Discovery Map
Attachment D. Proposed Transects
Attachment E. Wayne County Discovery Meeting Documents
Attachment F. 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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Please provide the following information about the community:

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

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

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FEMA

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

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Chicago, IL 60605
FEMA

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

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FEMA

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

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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

WAYNE 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



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**

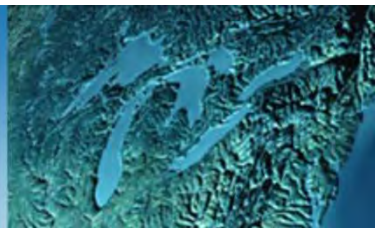
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Program Overview

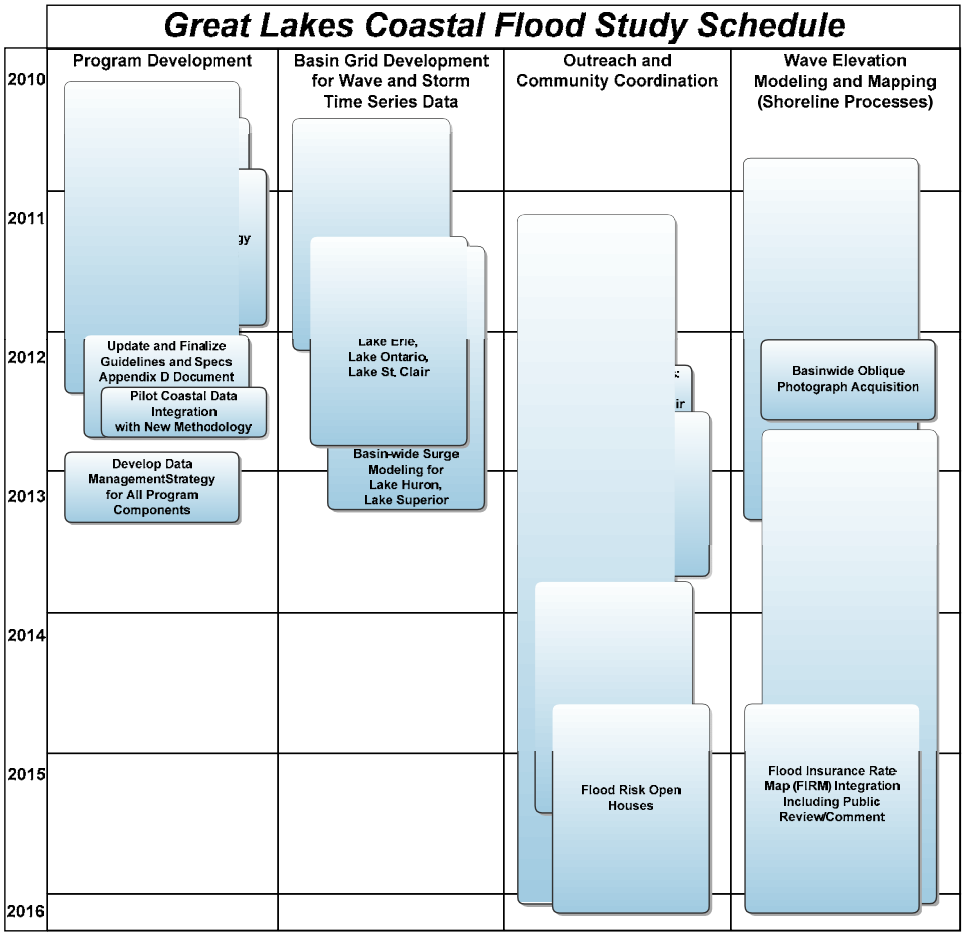
Methodology Focus points from 2009 Stakeholder Meeting:

- 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)

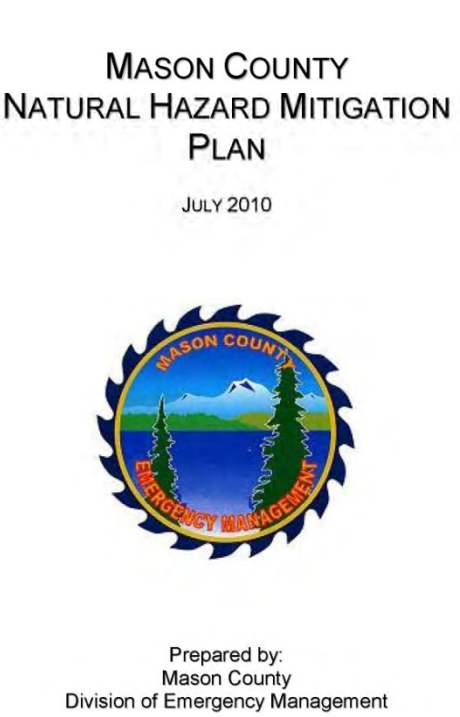
Reducing hazard risks and vulnerabilities through education, planning, physical improvements, early warning, and coordination of programs and resources.

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

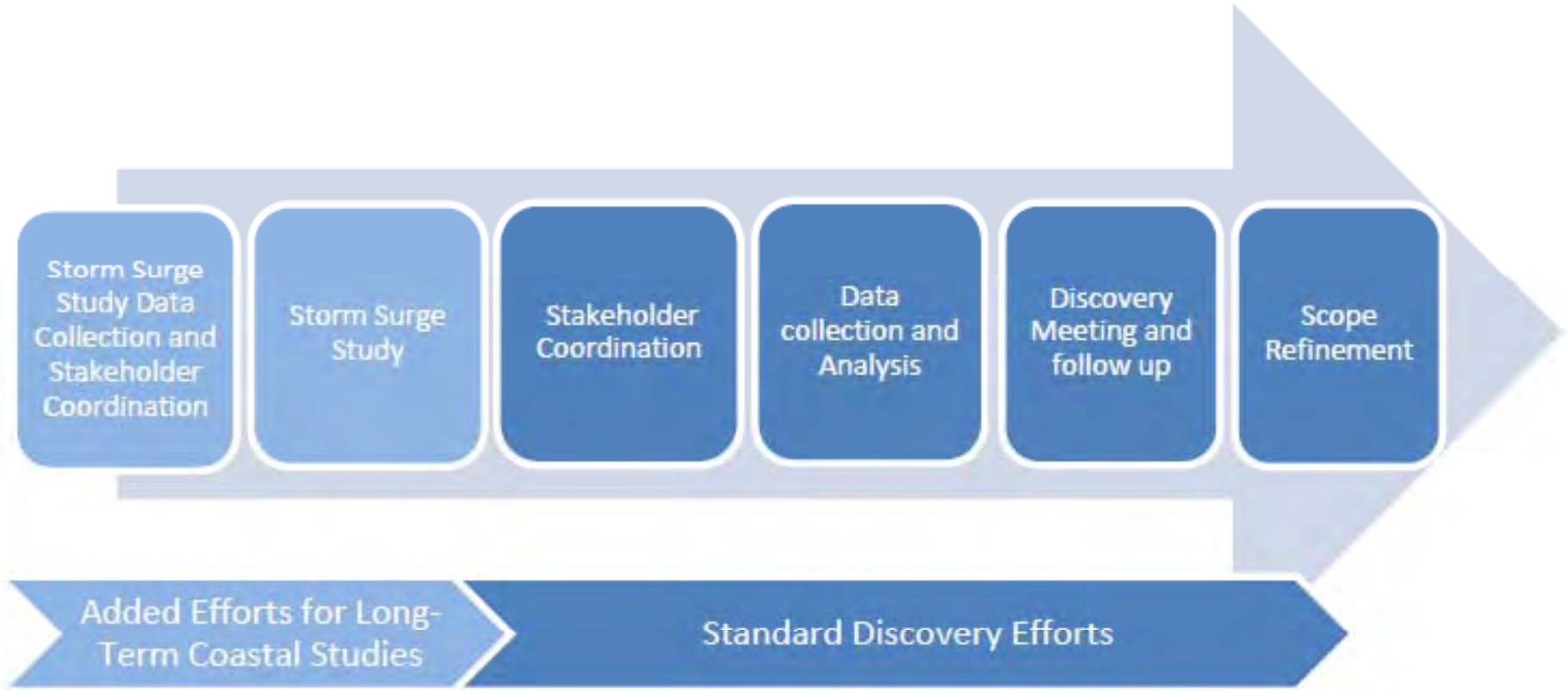
JULY 2010

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
greatlakescoast.org

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
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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
greatlakescoast.org

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…

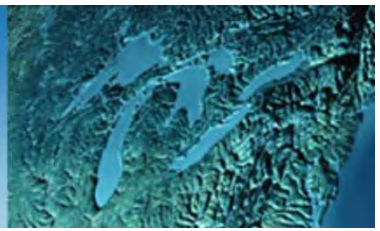
Flood Risk Discovery and Initial Coordination - 8 Meetings Planned for Lake Michigan

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
greatlakescoast.org



Great Lakes Coastal Flood Study
Lake St. Clair Discovery

FEMA

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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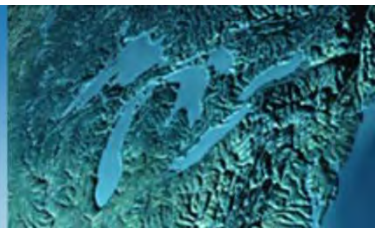


Great Lakes Coastal Flood Study

Discovery Outcomes

Outcome #1 - Encourage community participation

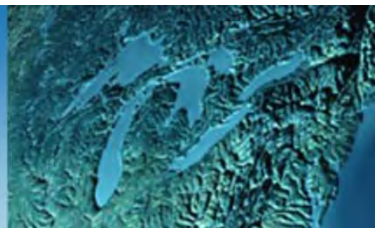
- Vet transect locations
- Identify reaches requiring special attention
- Document local data sources that will help improve study
- Identify local coastal management issues



Great Lakes Coastal Flood Study
Discovery Outcomes

Outcome #2 - Explain study process and timelines

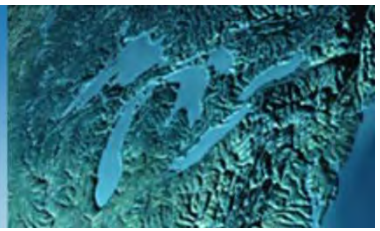
- High-level – Steps involved in study, and timeline
- Regulatory and non-regulatory products
- NFIP changes – Map revision objectives
- New concepts like LiMWA
- Where to find data and reports



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Outcome #3 - Introduce Mitigation Action Goals

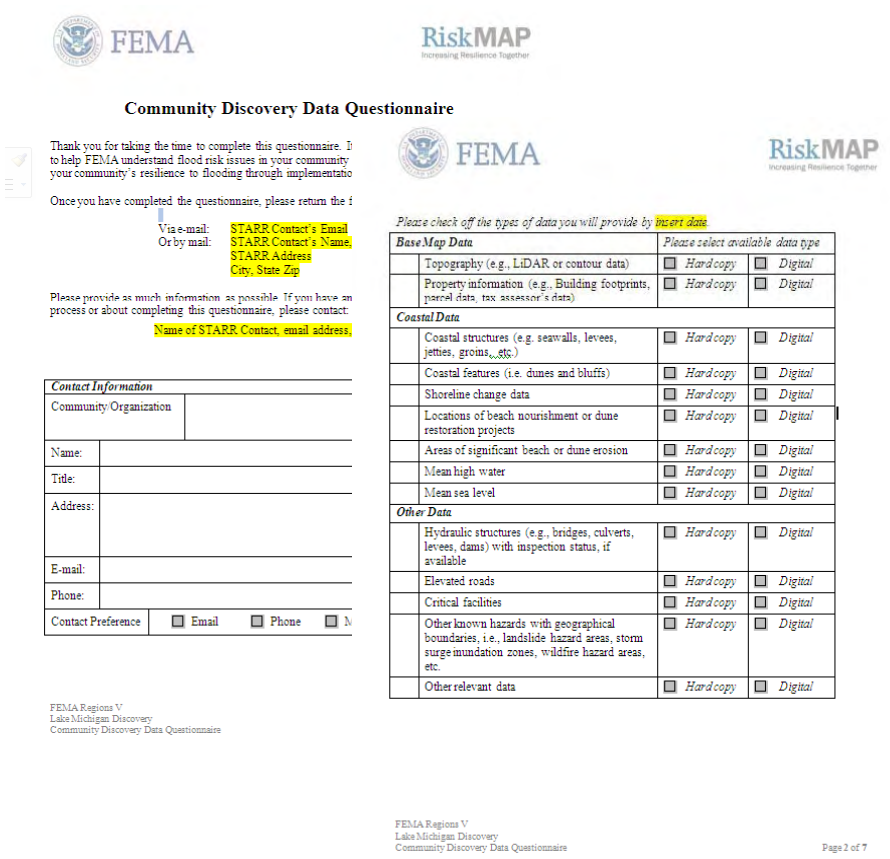
- Distribute and discuss mitigation action form
- Develop Mitigation strategies and options
    - Land Use Ordinances
    - Local Building Codes
    - Management Best Practices
    - Traditional HM Projects
    - Community Planning and Programs
- Evaluate opportunities to build storm response erosion 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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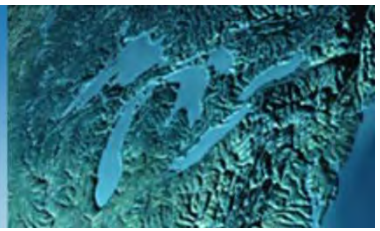
Great Lakes Coastal Flood Study
greatlakescoast.org

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

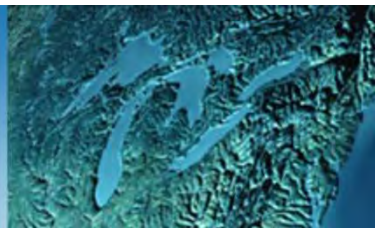
- Why are we here? (20 minutes)
  - Overview of study and explain role of discovery
- How is coastal flood risk being assessed for the Great Lakes? (30 minutes)
  - Review draft transects; coastal guidance updates; VE Zone Mapping and LiMWA; and coastal flood risk products
- How does this apply to my 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



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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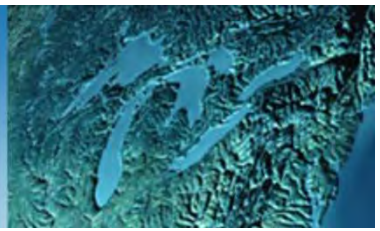
FEMA

Flood Risk Datasets

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

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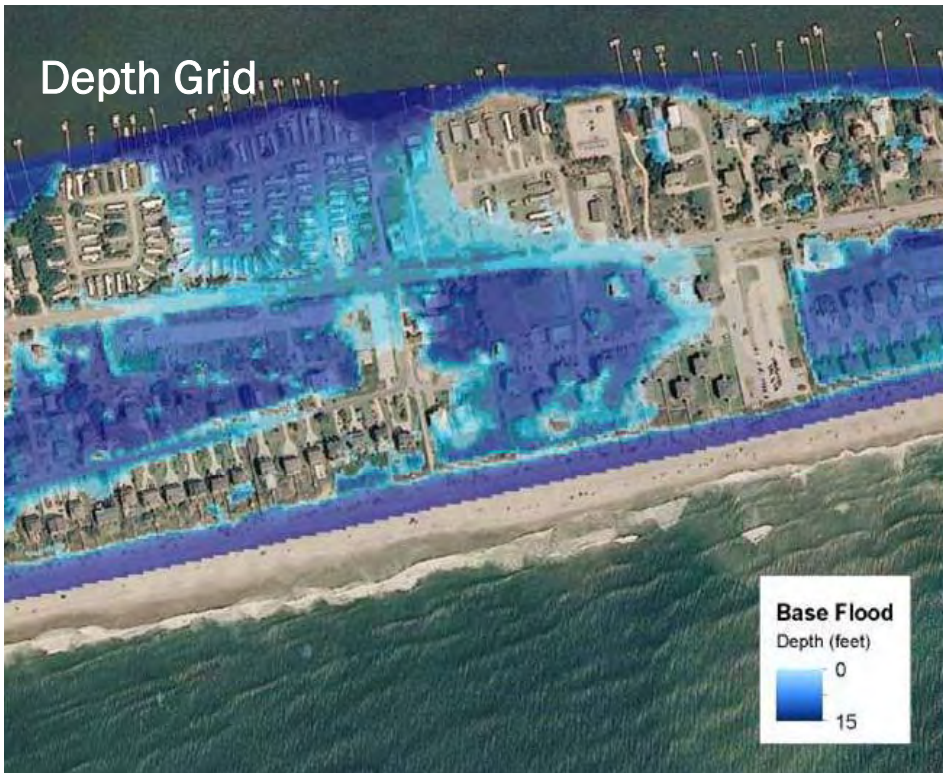
Great Lakes Coastal Flood Study
greatlakescoast.org



Standard Flood Risk Products

- Coastal Depth Grids
- Flood Risk Assessment (HAZUS)

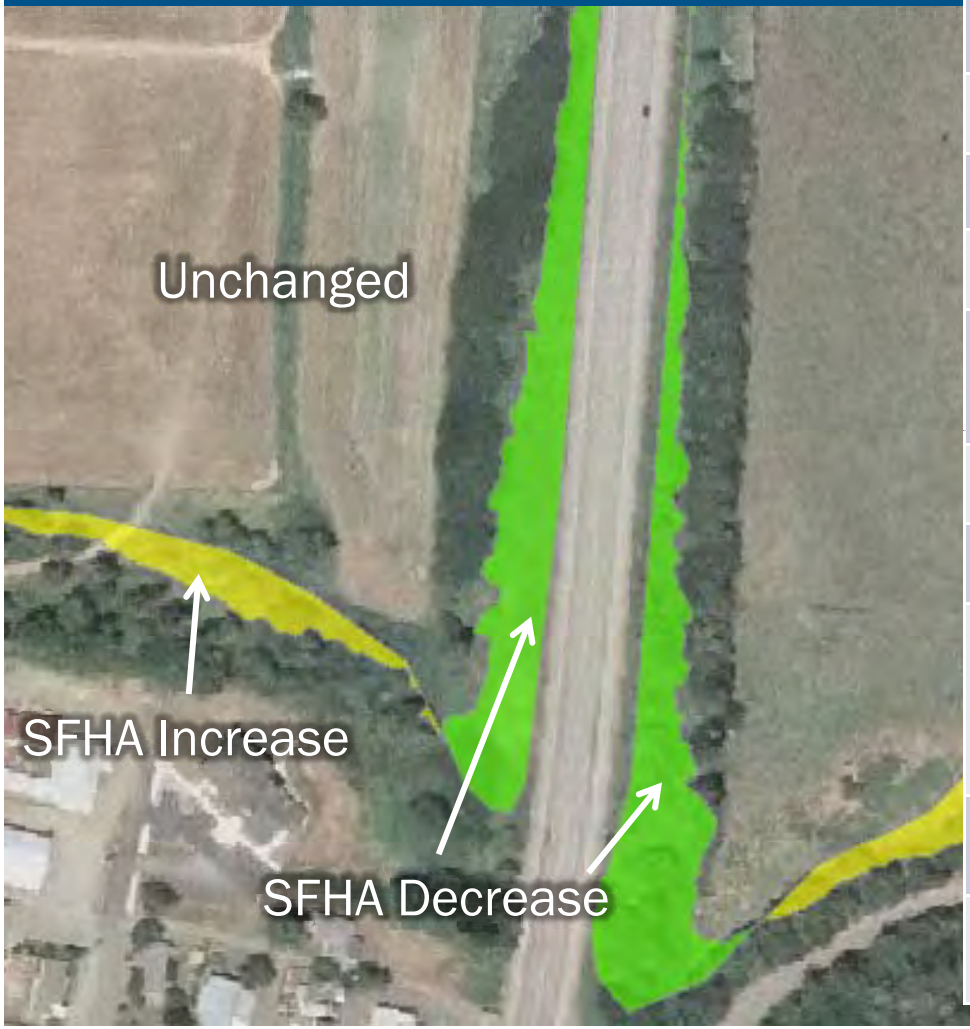
HAZUS MH
EARTHQUAKE • WIND • FLOOD



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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

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

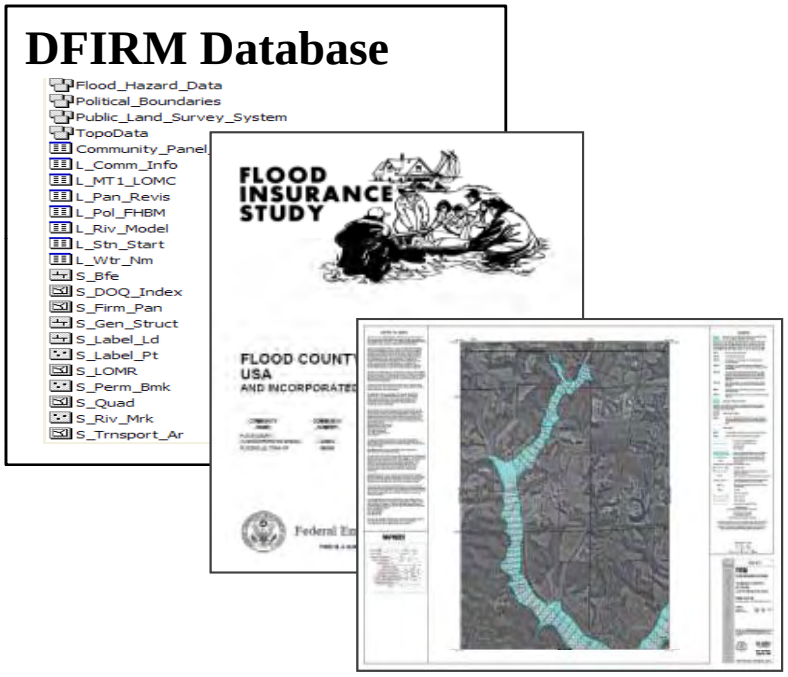
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

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

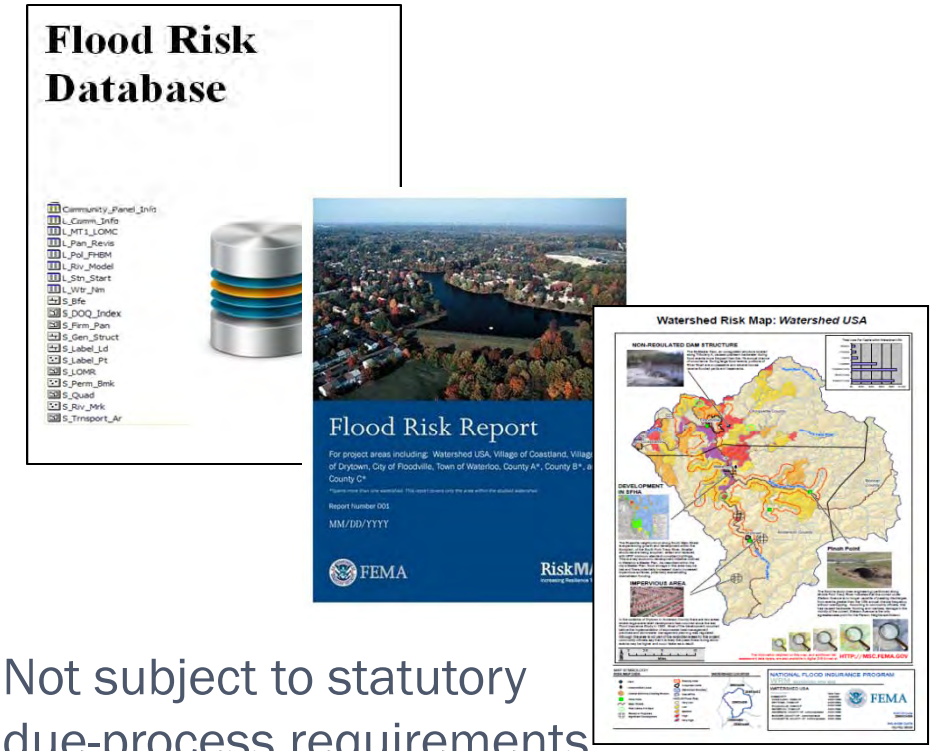
Program Product Comparisons

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

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

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

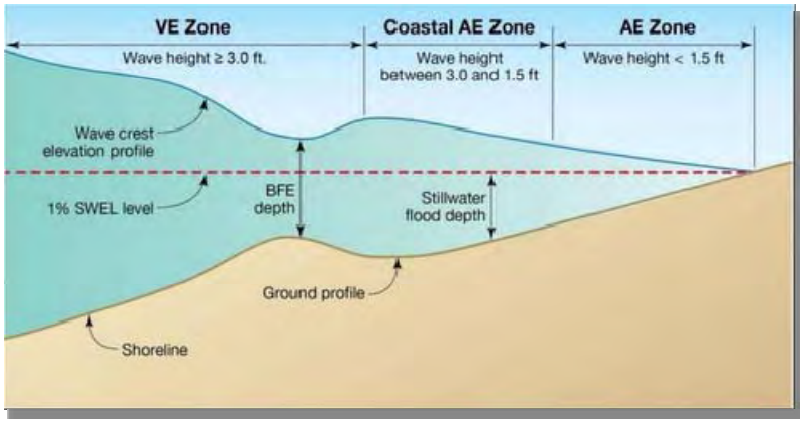


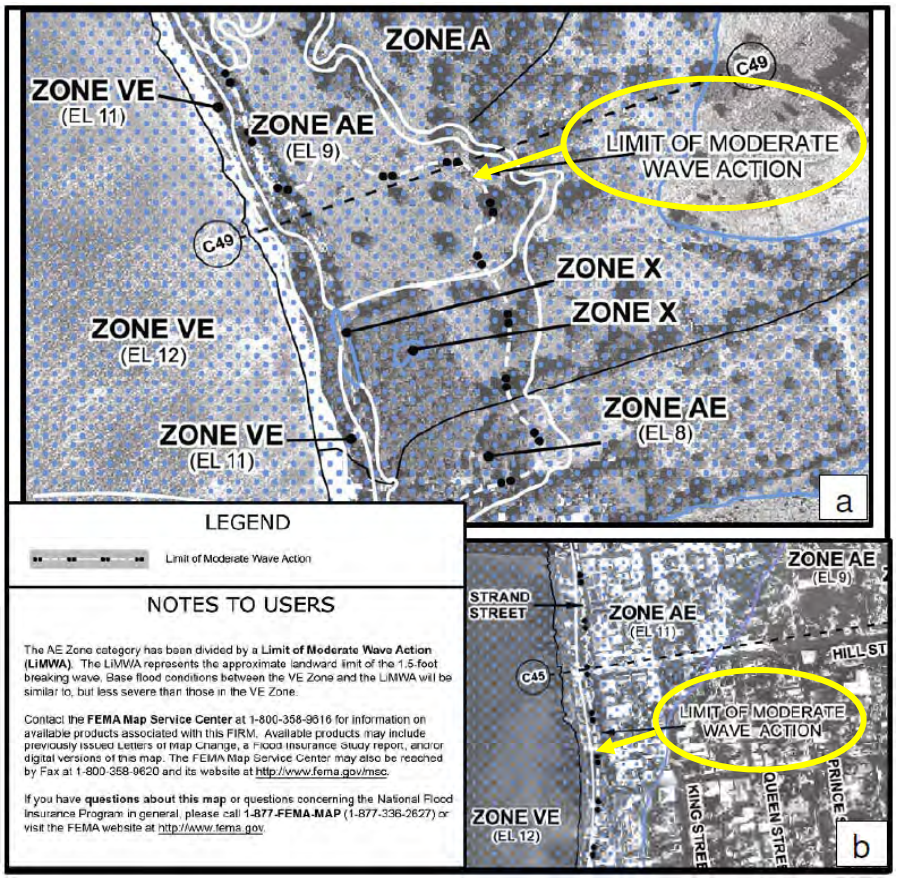
http://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf

Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

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



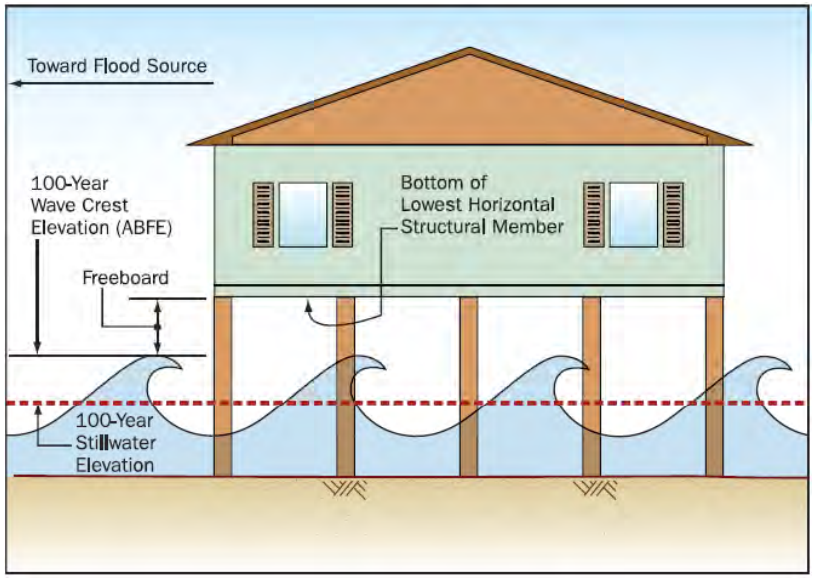


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Coastal Zones and NFIP Compliance

- 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

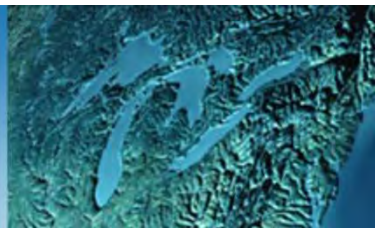


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Transect Placement

- 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



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

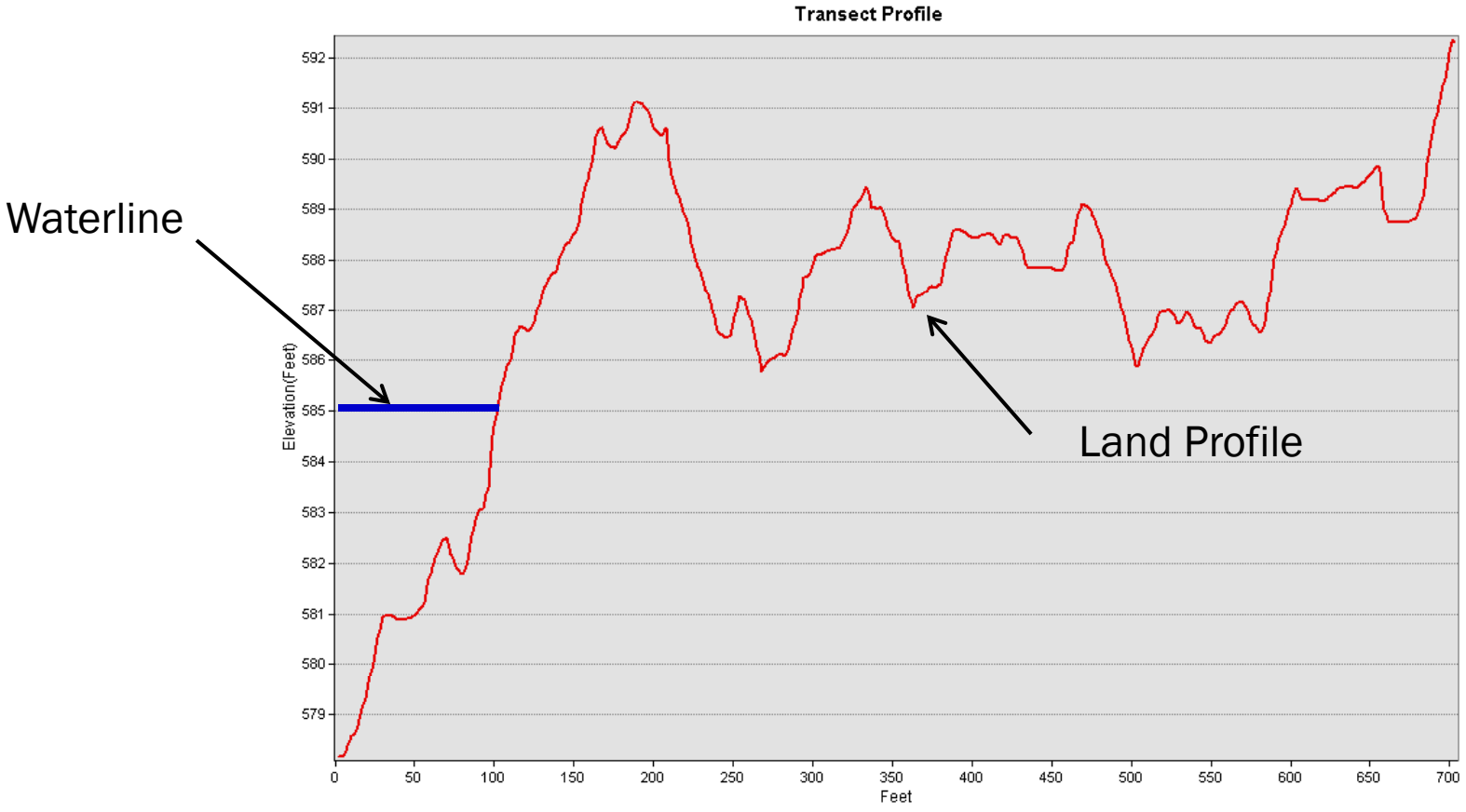
State	County	Proposed Draft Transects
Michigan	St. Clair	15
	Macomb	25
	Wayne	10
	Total	**50**



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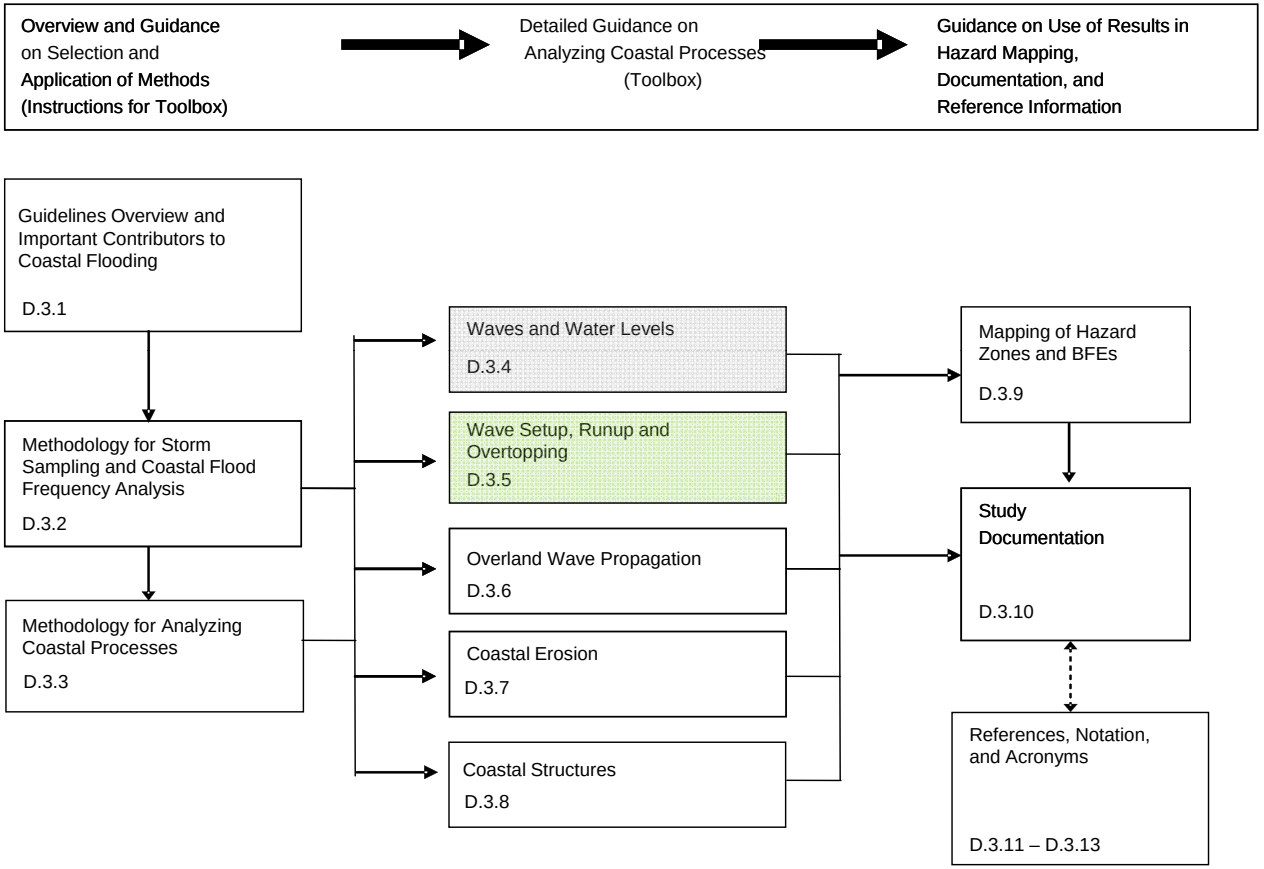
Profile from newest LiDAR



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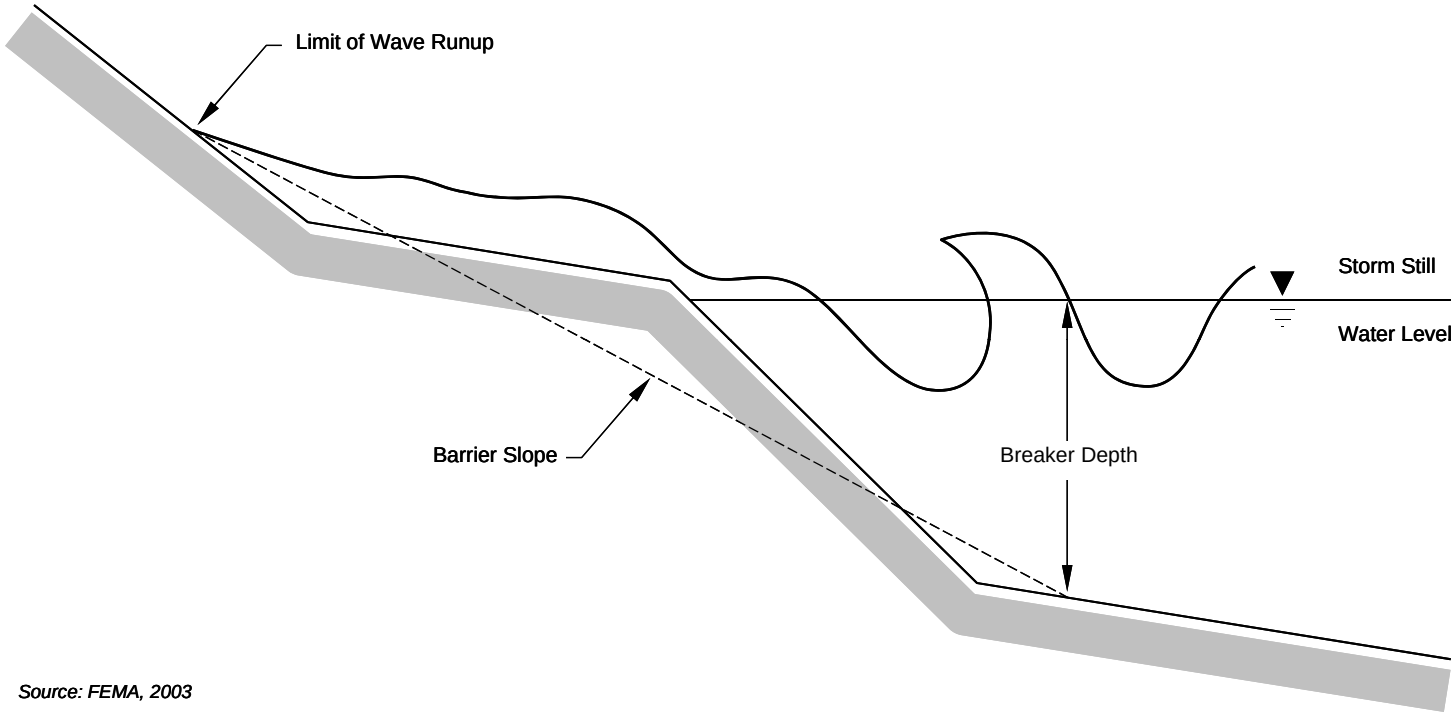
Coastal Analysis and Updates to Guidance



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Wave Runup

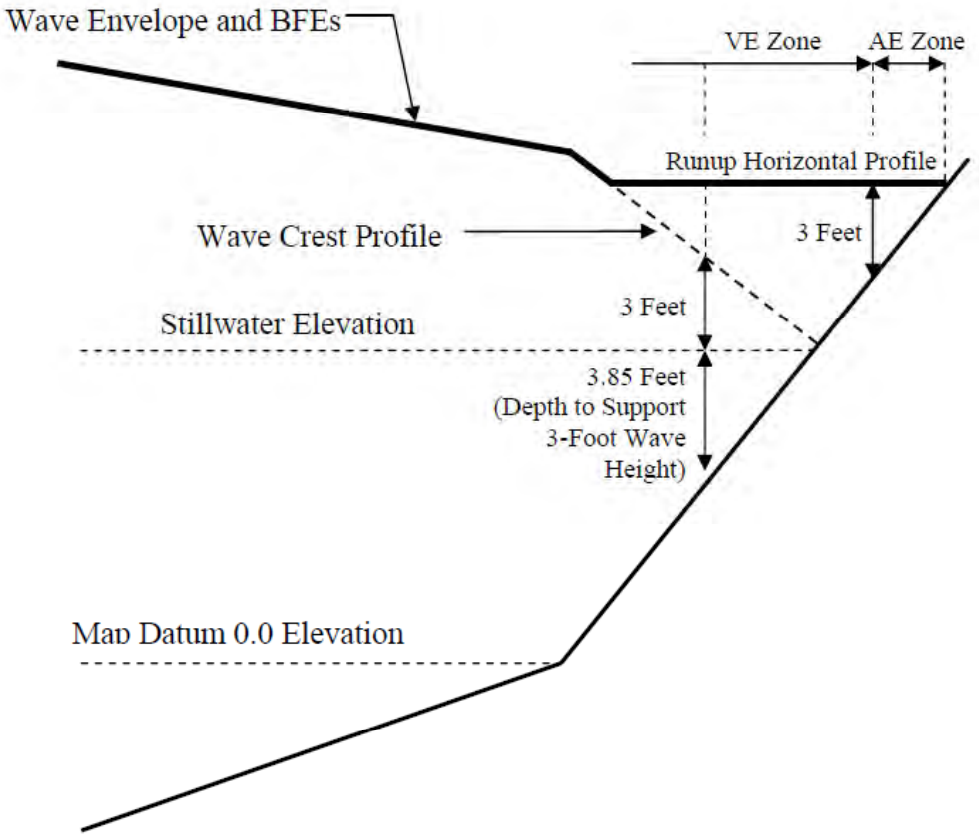


Source: FEMA, 2003

Figure D.3.5-5. Wave Runup Sketch

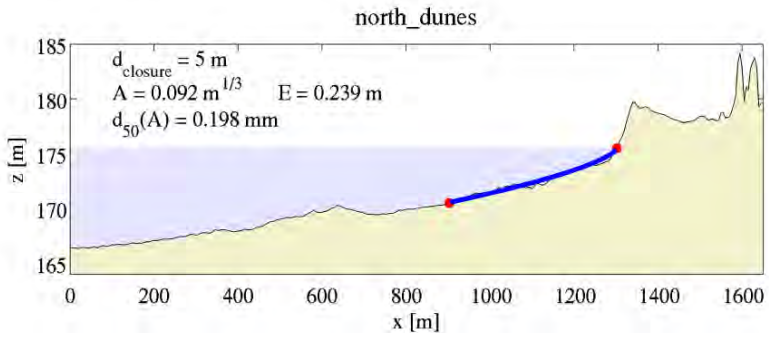
Wave Envelope

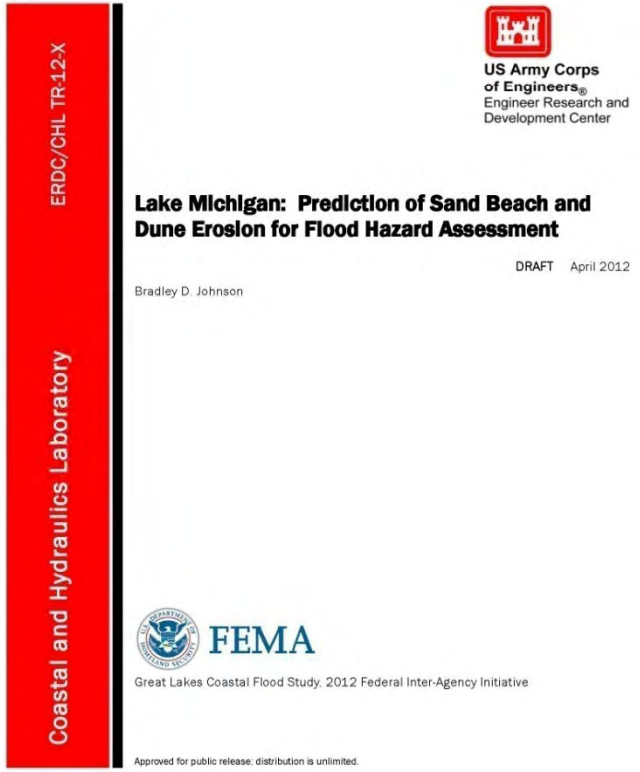
- Overland Wave Propagation
  - Wave crest is 3 feet above still water elevation
- Runup
  - Horizontal profile 3 feet above ground elevation



Erosion Assessment Methods

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




ERDC/CHL TR-12-X

Coastal and Hydraulics Laboratory

US Army Corps of Engineers®
Engineer Research and Development Center

Lake Michigan: Prediction of Sand Beach and Dune Erosion for Flood Hazard Assessment

DRAFT April 2012

Bradley D. Johnson

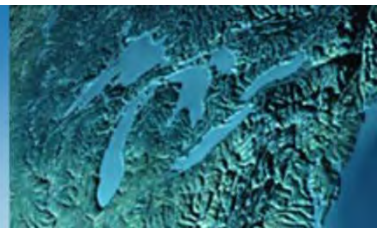
FEMA

Great Lakes Coastal Flood Study, 2012 Federal Inter-Agency Initiative

Approved for public release; distribution is unlimited.

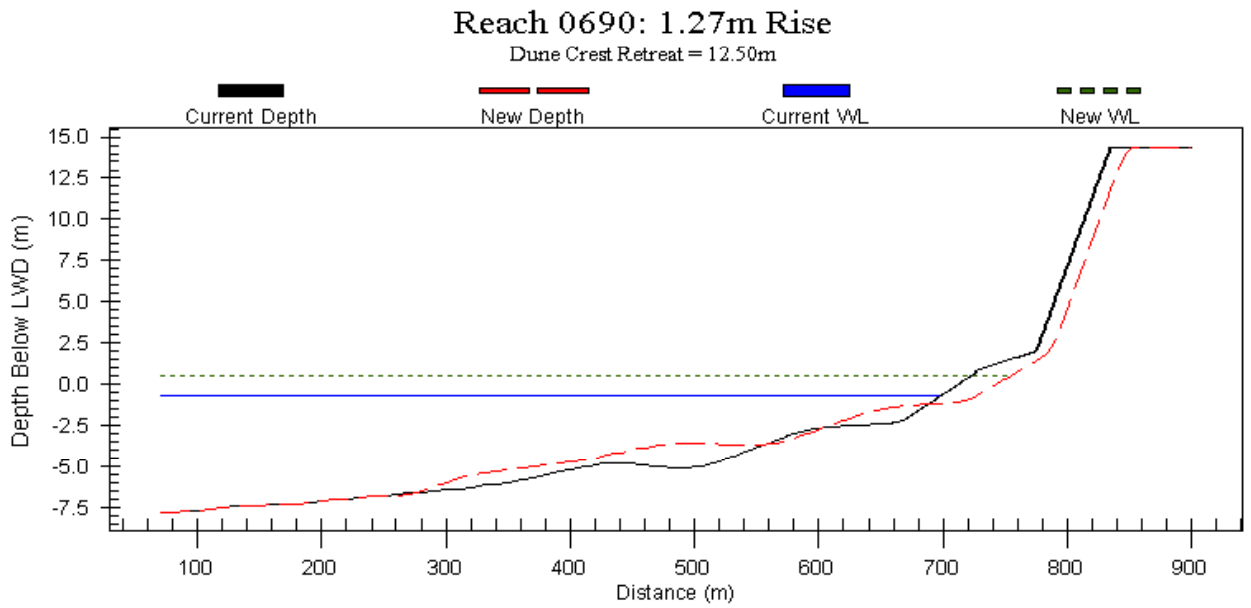
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Profile Adjustment

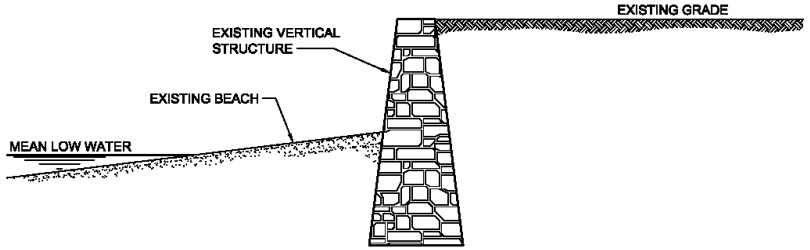
- In lieu of historical cross-shore profiles
- Necessary for response-based approach
- Utilize Bruun Rule for rising or falling lake levels



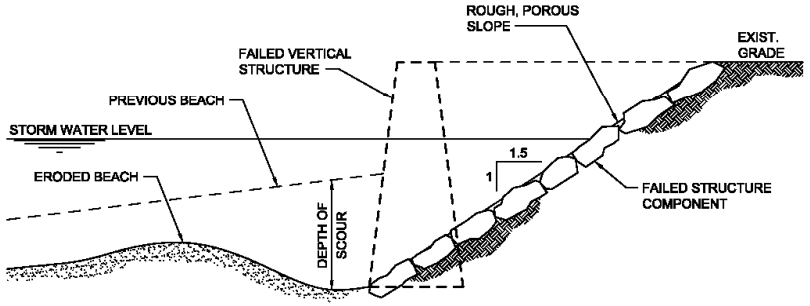
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Vertical Structures



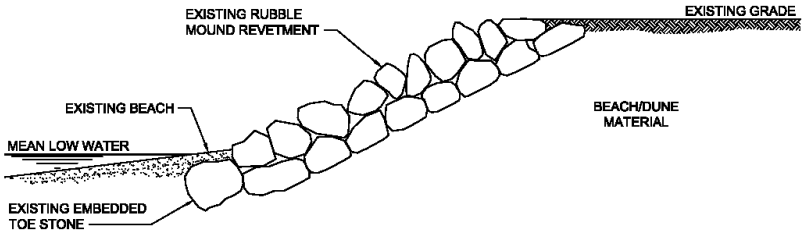
VERTICAL STRUCTURE GEOMETRY PRIOR TO FAILURE



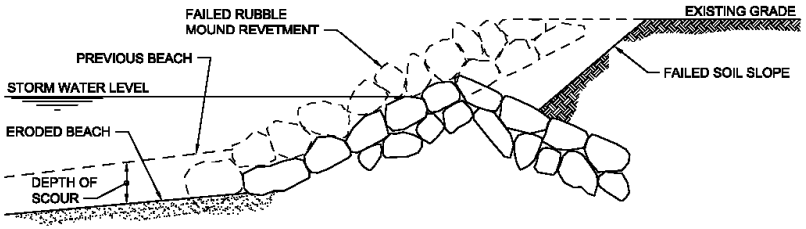
VERTICAL STRUCTURE FAILURE GEOMETRY

PARTIAL FAILURE OF VERTICAL COASTAL STRUCTURE

Sloped Structures



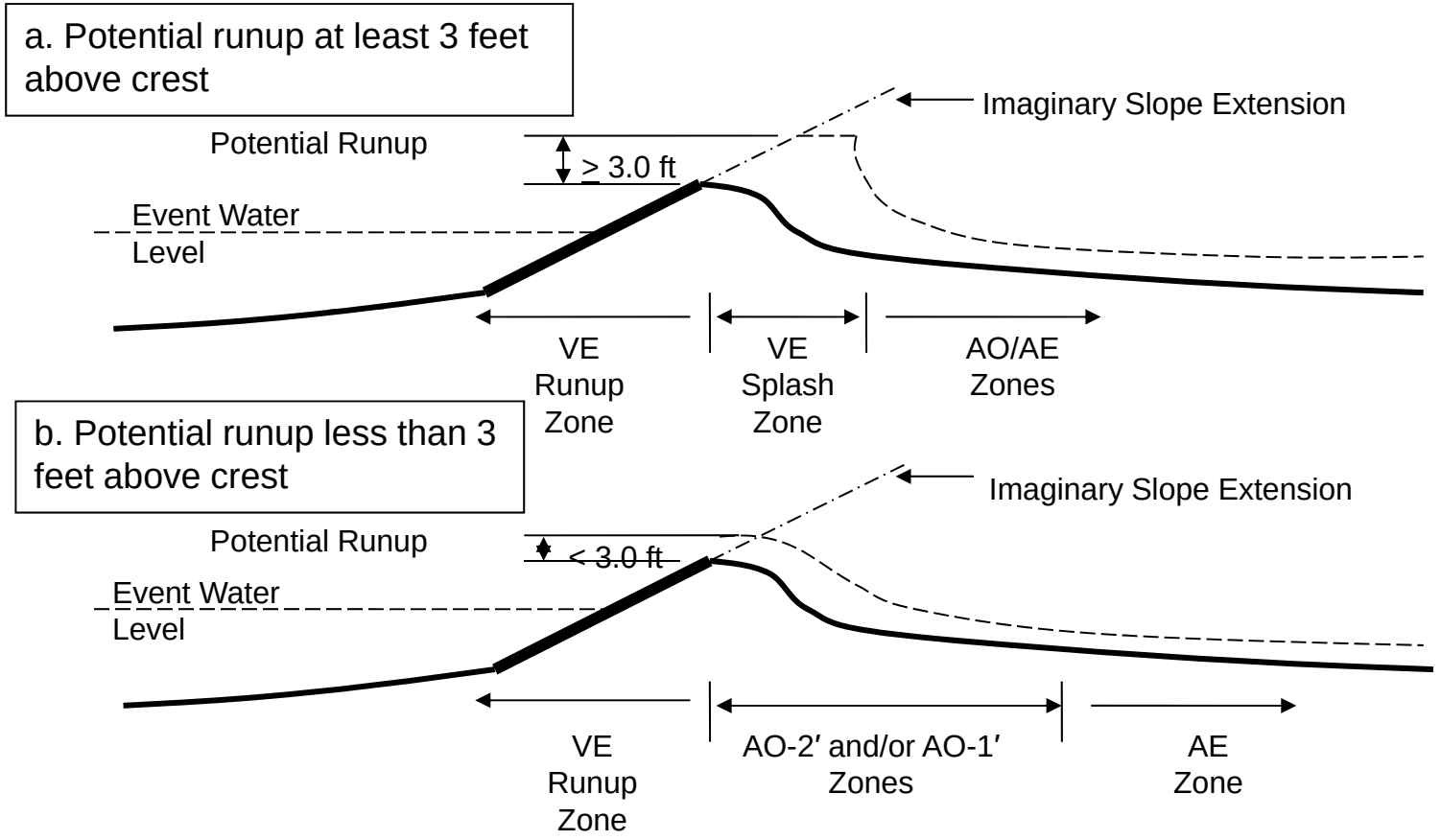
REVETMENT GEOMETRY PRIOR TO FAILURE



REVETMENT FAILURE GEOMETRY

PARTIAL FAILURE OF A SLOPING REVETMENT

Interpretation of Wave Runup Results

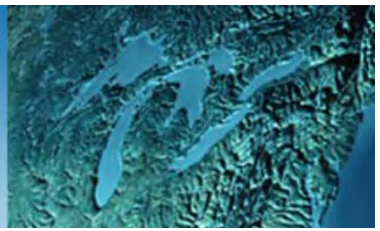


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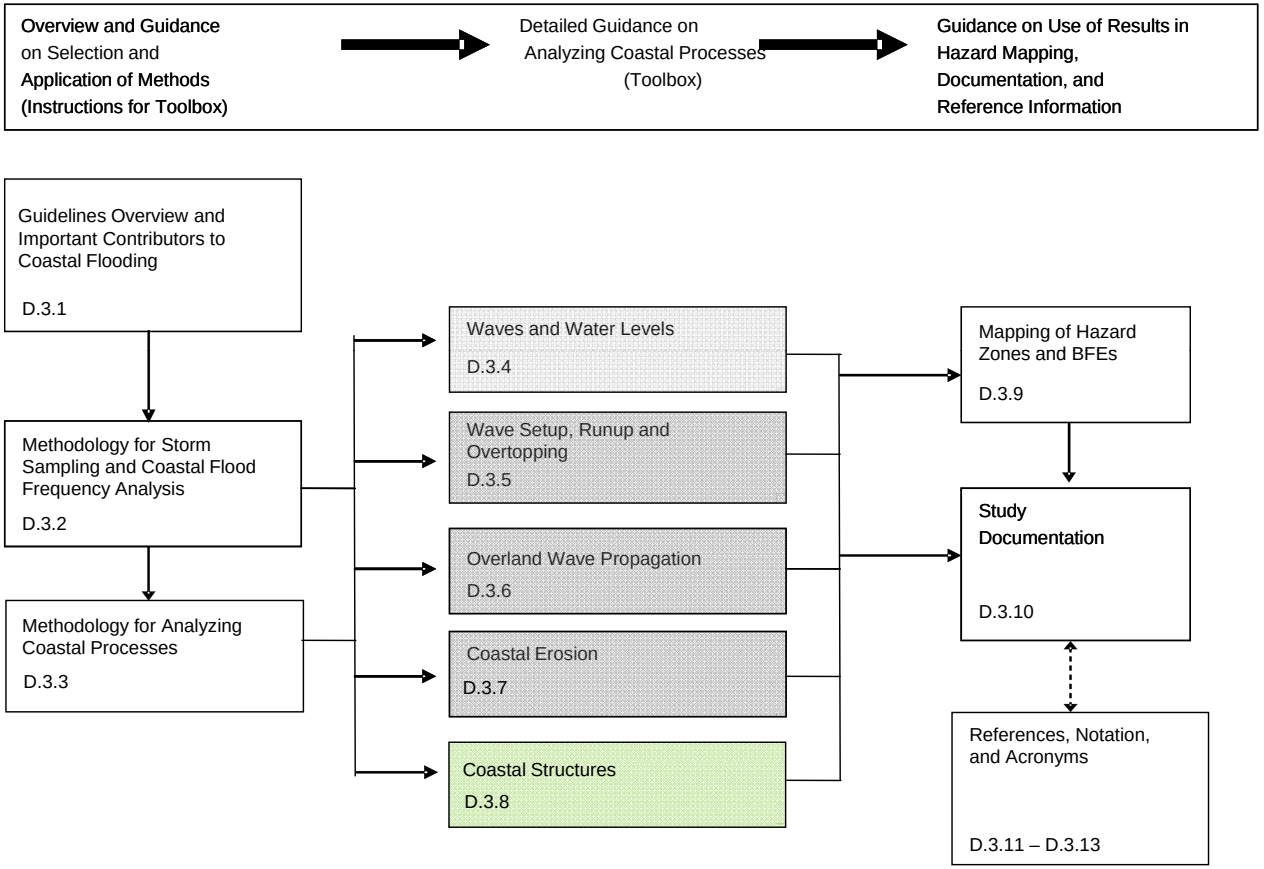
Great Lakes Coastal Flood Study
greatlakescoast.org

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



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"

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.

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

Contacts

FEMA

FEMA:

Ken Hinterlong
ken.hinterlong@fema.dhs.gov

Erin Maloney
erin.maloney@fema.dhs.gov

Tom Smith
Thomas.Smith6@fema.dhs.gov

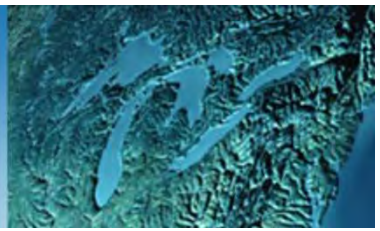
STARR:

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



Keating, Laura

From: Keating, Laura
Sent: Monday, July 30, 2012 3:12 PM
To: Keating, Laura; 'scheduling@detroitmi.gov'; 'scottr@detroitmi.gov'; 'tjkpc@aol.com'; 'Building@gpshoresmi.gov'; 'mayornovitke@comcast.net'; 'gtutag@gpwmi.us'; 'gppkd@aol.com'; 'tbrennan@grossepointefarms.org'; 'rficano@co.wayne.mi.us'; 'hsaab@co.wayne.mi.us'; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com); Roberts, Stacey
Subject: RE: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for Wayne County

Good Afternoon,

This is just a reminder of the Great Lakes Coastal Flood Study Information Exchange Session conference call scheduled for Lake St. Clair Wayne County communities tomorrow at 10am.

Date/Time: Tuesday, July 31, 2012; 10:00 - 11:00 am, 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
**please note, there is no passcode needed for the WebEx login - please leave it blank and click to continue.*

We look forward to speaking with you tomorrow!

Thanks,
Laura

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

-----Original Appointment-----
From: Keating, Laura
Sent: Wednesday, July 25, 2012 3:31 PM
To: scheduling@detroitmi.gov; scottr@detroitmi.gov; tjkpc@aol.com; Building@gpshoresmi.gov; mayornovitke@comcast.net; gtutag@gpwmi.us; gppkd@aol.com; tbrennan@grossepointefarms.org; rficano@co.wayne.mi.us; hsaab@co.wayne.mi.us; 'Hinterlong, Ken'; Randhawa, Jaspreet; Davis, Holly A (Holly.Davis@atkinsglobal.com); Roberts, Stacey
Subject: FEMA's Great Lakes Coastal Flood Study: Discovery Information Exchange Session for Wayne County
When: Tuesday, July 31, 2012 7:00 AM-8:00 AM (GMT-08:00) Pacific Time (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 ***Tuesday, July* 31st at 10am ET**. More information about the ***Great Lakes Coastal Flood Study*** may be found at http://www.greatlakescoast.org.

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

Date/Time: Tuesday, July 31, 2012; 10:00 - 11:00 am, 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 Tuesday, and appreciate your participation in this process. If you have any questions, or are not able to attend this session but would like to learn more, please do not hesitate to contact me directly. My information can be found below.

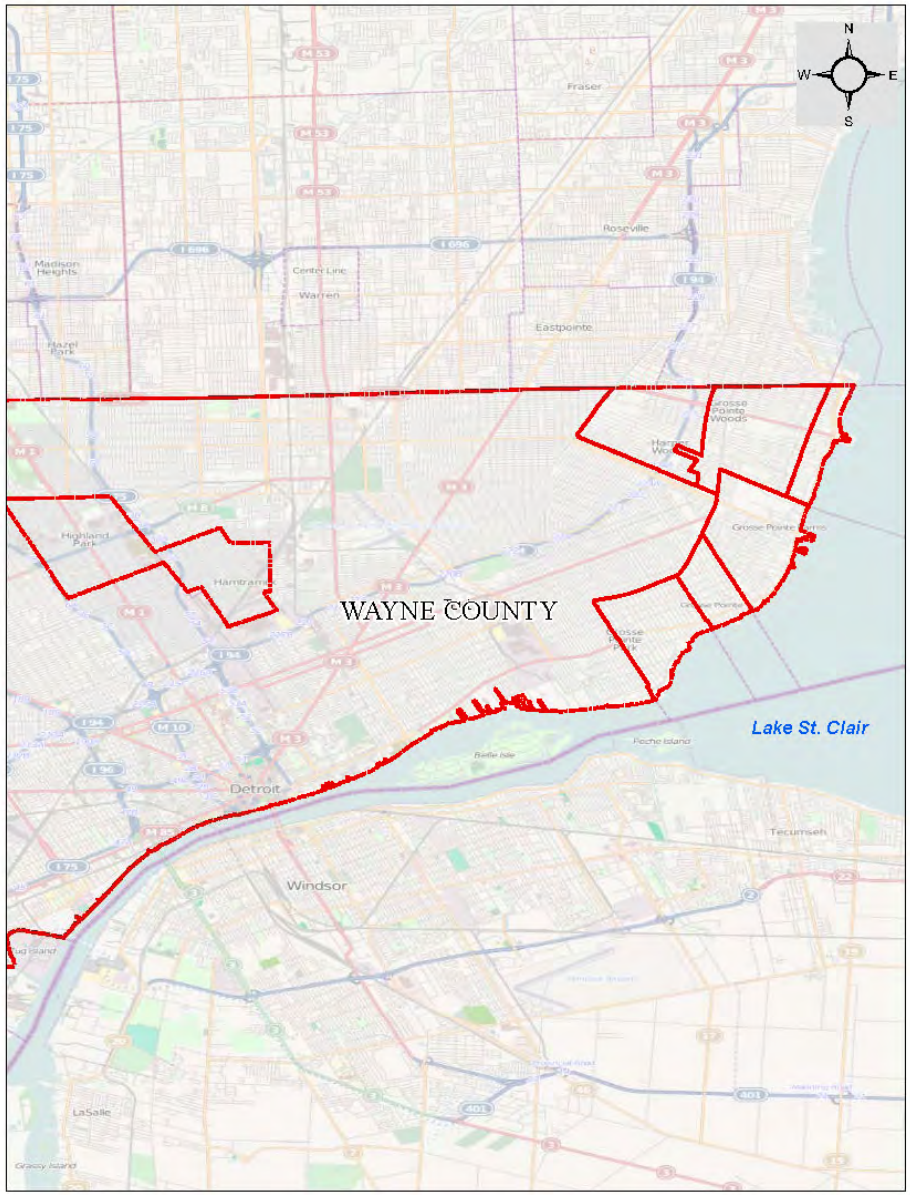
<< File: LAKE ST CLAIR Discovery Coastal Data Request Form - 07-18-2012.docx >>

Thanks,
Laura

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

FEMA

Information Exchange Session for Lake St. Clair Discovery



Wayne County
July 31, 2012
10am – 11am

RiskMAP
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Great Lakes Coastal Flood Study
greatlakescoast.org

Purpose of Information Exchange

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



Risk MAP (Mapping, Assessment, and Planning) Vision

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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greatlakescoast.org

Overview of Great Lakes Coastal Flood Study

FEMA

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



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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

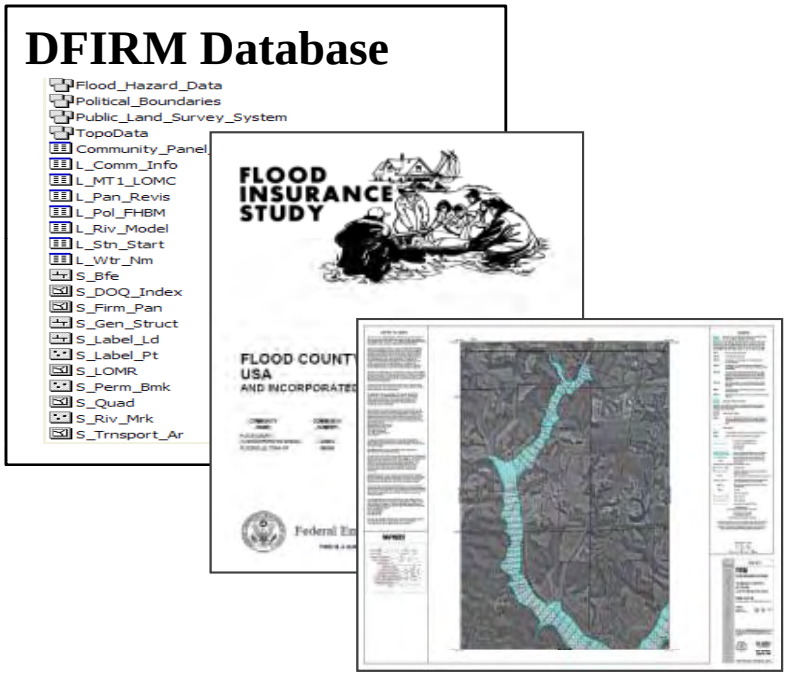
Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning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

RiskMAP
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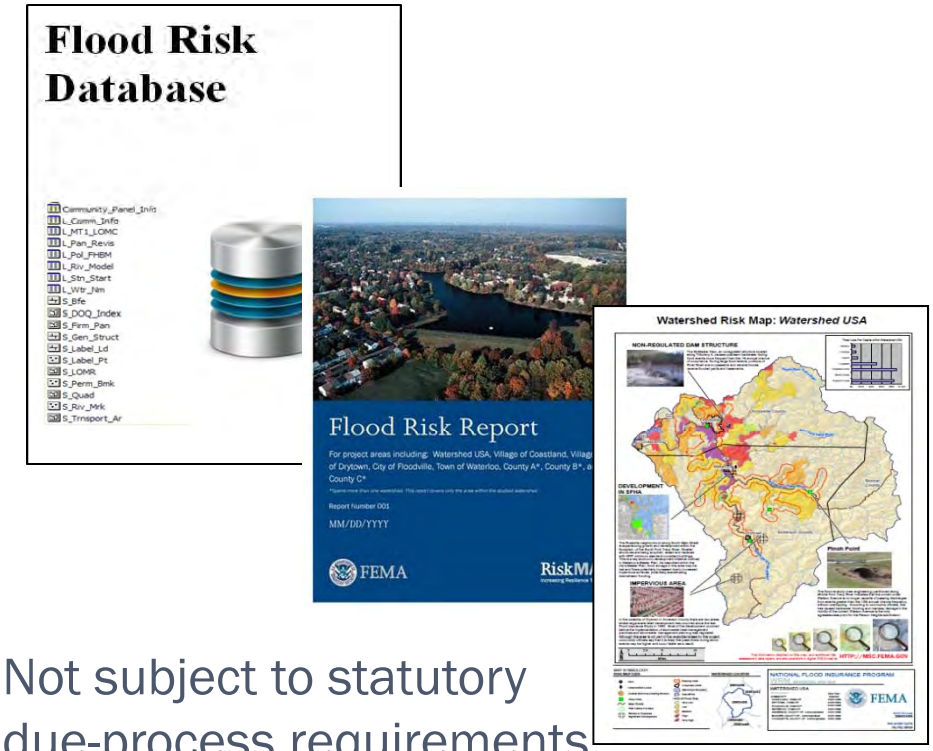
Products and Datasets: Regulatory and Non-regulatory

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

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Great Lakes Coastal Flood Study
greatlakescoast.org

Products and Datasets: Coastal Products in Development

Erosion



Red Lantern Restaurant, Lake Michigan, IN

Lake Levels



Lake Michigan Shoreline
Reference

Shoreline Feature Dataset



Upper Peninsula Shoreline
Reference

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Great Lakes Coastal Flood Study
greatlakescoast.org

Risk MAP Overview: Shoreline Features Database

Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

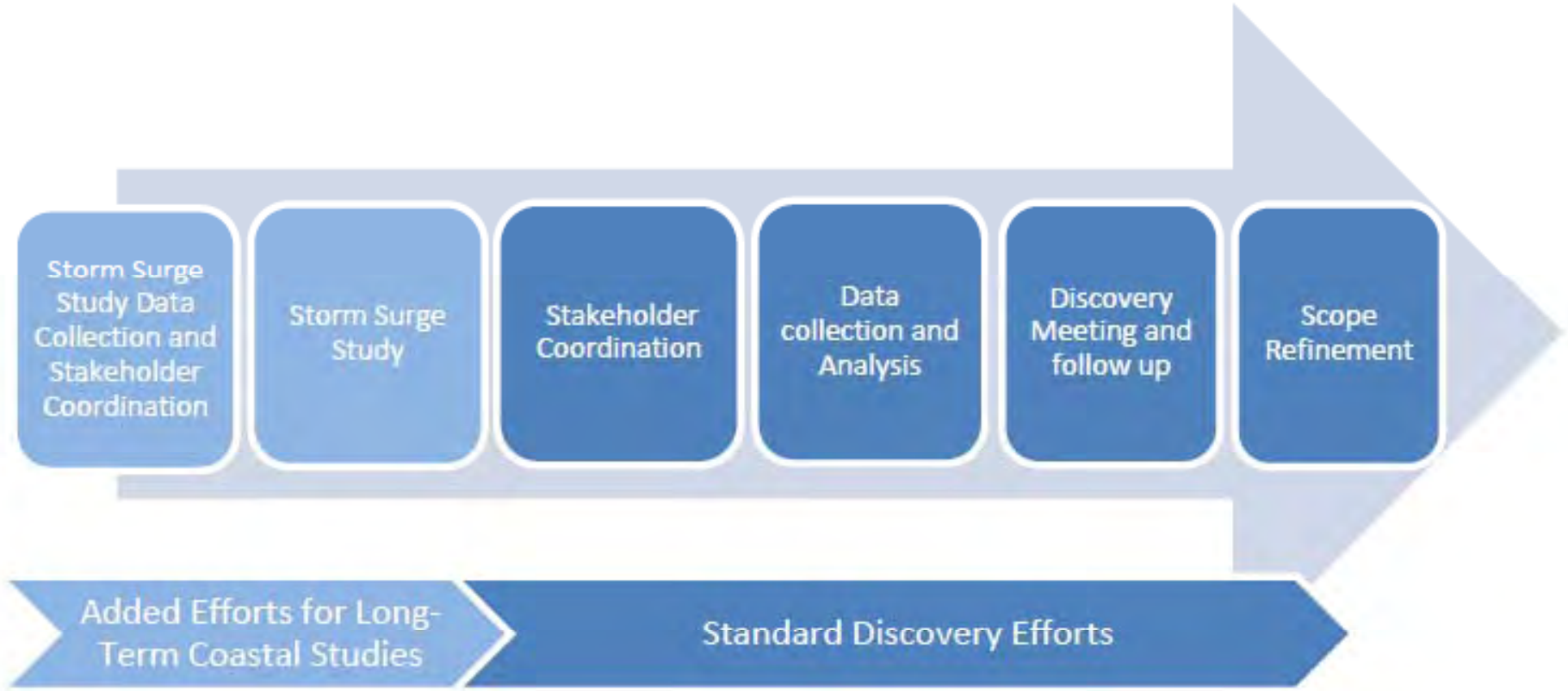
Primary Land Use
High Density Residential
Moderate Density Residential
Low Density Residential
Commercial/Industrial
Park Land
Farm Land
Forested

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

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

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

Great Lakes Coastal Flood Study
Discovery Process Overview



RiskMAP
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Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
Discovery Meeting

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
Grosse Pointe Public Library, Ewald Branch	15175 E. Jefferson Avenue, Grosse Pointe Park, MI 48230	Tuesday 8/21/2012; 2 – 4 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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Great Lakes Coastal Flood Study
greatlakescoast.org

Who Should Attend the Discovery Meeting?

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

Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

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

Wayne County
Detroit
Grosse Pointe Farms
Grosse Pointe Park
Grosse Pointe Shores
Grosse Pointe Woods
Grosse Pointe
Harper Woods

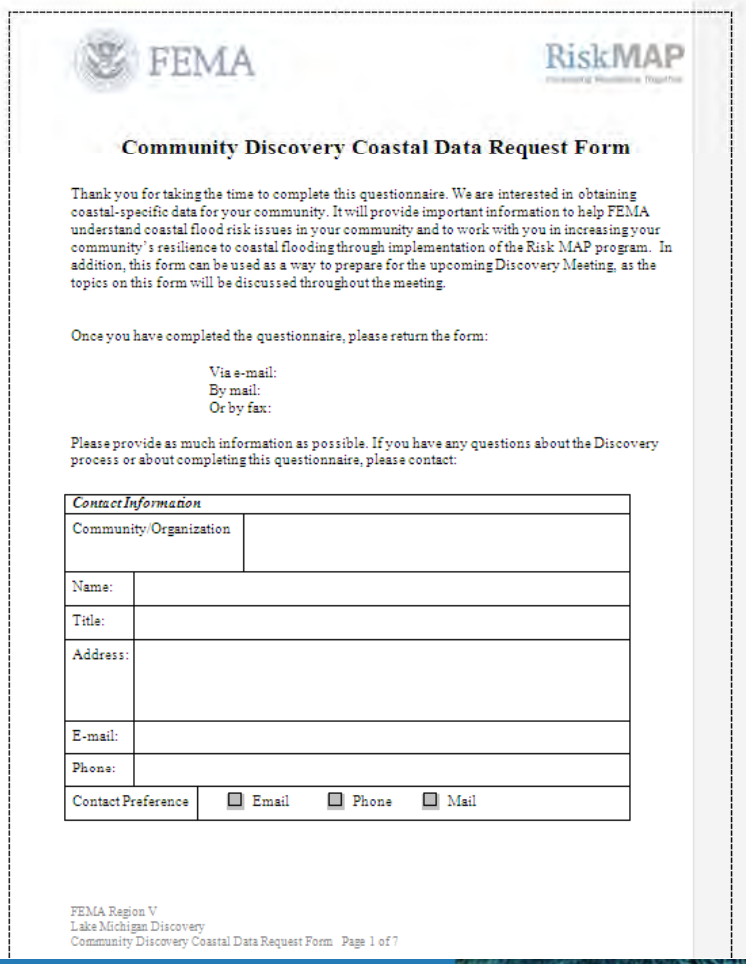


RiskMAP
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Great Lakes Coastal

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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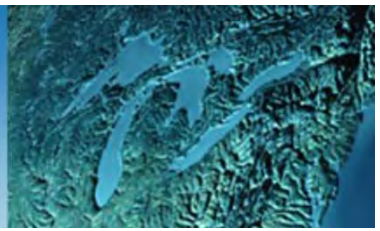
Great Lakes Coastal Flood Study
greatlakescoast.org

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



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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Increasing Resilience Together



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 - Wayne County, MI - July 2012

County/City/Township	First/ Last Name	Title	Address	Address	ZIP
Detroit, City	Dave Bing	Mayor	City Hall	2 Woodward Avenue, Suite 1126, Detroit, MI	48226
	Raymond Scott	General Manager (FPA)	City Hall	2 Woodward Avenue, Suite 1126, Detroit, MI	48226
Grosse Pointe Shores, Village	Ted J. Kedzierski	Mayor		795 Lake Shore Road, Grosse Pointe Shores, MI	48236
	Tom Krolczyk	Building Manage (FPA)		795 Lake Shore Road, Grosse Pointe Shores, MI	48236
Grosse Pointe, City	Dale N. Scrace	Mayor	City Hall	17147 Maumee Avenue, Grosse Pointe, MI	48230
	Paul Weitzel	Public Service Director	City Hall	17147 Maumee Avenue, Grosse Pointe, MI	48230
Grosse Pointe Woods, City	Robert E. Novitke	Mayor	City Hall	20025 Mack Plaza, Grosse Pointe Woods, MI	48236
	Gene Tutag	Building Official (FPA)	City Hall	20025 Mack Plaza, Grosse Pointe Woods, MI	48236
Grosse Pointe Park, City	Palmer T. Heenan	Mayor		15115 East Jefferson Avenue, Grosse Pointe Park, MI	48230
	Dale Krajniak	City Manager (FPA)		15115 East Jefferson Avenue, Grosse Pointe Park, MI	48230
Grosse Pointe Farms, City	James C. Farquhar, Jr.	Mayor		90 Kerby Road, Grosse Pointe Farms, MI	48236
	Terry Brennan	Public Service Director		90 Kerby Road, Grosse Pointe Farms, MI	48236
Harper Woods	Kenneth Poynter	Mayor		19617 Harper Avenue, Harper Woods, MI	48225
	Leslie Frank	Acting City Clerk		19617 Harper Avenue, Harper Woods, MI	48225
Wayne, County	Robert Ficano	County Executive		500 Griswold Avenue, 31st Floor, Detroit, MI	48226
	Jerry Spryfza	Director of Public Services		400 Monroe, Suite 300, Detroit, MI	48226

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

FEMA

July 19, 2012

The Honorable Dave Bing
Mayor, City of Detroit
City Hall
2 Woodward Avenue
Suite 1126
Detroit, Michigan 48226

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

Dear Mayor Bing:

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:	Tuesday, August 21, 2012; 2:00 - 4:00 pm ET
Location:	Grosse Pointe Public Library, Ewald Branch
Address:	15175 East Jefferson Avenue Grosse Pointe Park, Michigan 48230

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:	Tuesday, July 31, 2012; 10:00 - 11:00 am 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: Raymond Scott, General Manager, City of Detroit
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

The Honorable Ted J. Kedzierski
Mayor, Village of Grosse Pointe Shores
795 Lake Shore Road
Grosse Pointe Shores, Michigan 48236

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

Dear Mayor Kedzierski:

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.

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Sincerely,

Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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cc: Tom Krolczyk, Building Manager, Village of Grosse Pointe 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

The Honorable Dale Scrace
Mayor, City of Grosse Pointe
City Hall
17147 Maumee Avenue
Grosse Pointe, Michigan 48230

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

Dear Mayor Scrace:

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.

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Sincerely,

Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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Community Discovery Coastal Data Request Form

cc: Paul Weitzel, Public Service Director, City of Grosse Pointe
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

The Honorable Robert Novitke
Mayor, City of Grosse Pointe Woods
City Hall
20025 Mack Plaza
Grosse Pointe Woods, Michigan 48236

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

Dear Mayor Novitke:

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.

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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: Gene Tutag, Building Official, City of Grosse Pointe Woods
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

The Honorable Palmer Heenan
Mayor, City of Grosse Pointe Park
15115 East Jefferson Avenue
Grosse Pointe Park, Michigan 48230

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

Dear Mayor Heenan:

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:	Tuesday, August 21, 2012; 2:00 - 4:00 pm ET
Location:	Grosse Pointe Public Library, Ewald Branch
Address:	15175 East Jefferson Avenue Grosse Pointe Park, Michigan 48230

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:	Tuesday, July 31, 2012; 10:00 - 11:00 am 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: Dale Krajniak, City Manager, City of Grosse Pointe Park
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

The Honorable James Farquhar, Jr.
Mayor, City of Grosse Pointe Farms
90 Kerby Road
Grosse Pointe Farms, Michigan 48236

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

Dear Mayor Farquhar, Jr.:

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:	Tuesday, August 21, 2012; 2:00 - 4:00 pm ET
Location:	Grosse Pointe Public Library, Ewald Branch
Address:	15175 East Jefferson Avenue Grosse Pointe Park, Michigan 48230

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.

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Meeting Number:	445288484
Call in number:	1-866-398-2885
Participant Code:	197462

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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: Terry Brennan, Public Service Director, City of Grosse Pointe Farms
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

The Honorable Kenneth Poynter
Mayor, City of Harper Woods
19617 Harper Avenue
Harper Woods, Michigan 48225

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

Dear Mayor Poynter:

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:	Tuesday, August 21, 2012; 2:00 - 4:00 pm ET
Location:	Grosse Pointe Public Library, Ewald Branch
Address:	15175 East Jefferson Avenue Grosse Pointe Park, Michigan 48230

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Meeting Number:	445288484
Call in number:	1-866-398-2885
Participant Code:	197462

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

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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: Leslie Frank, Administrative Assistant, City Manager, City of Harper Woods
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 Ficano
County Executive, Wayne County
500 Griswold Avenue
31st Floor
Detroit, Michigan 48226

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

Dear Mr. Ficano:

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.

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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: Jerry Spryfza, Director of Public Services, Wayne County
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality

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
Great Lakes Commission	Ecological	Cassie	Bradley		cbradley@glc.org

Lake St. Clair Email Distribution List
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Great Lakes Commission	Ecological	Thomas	Crane		tcrane@glc.org
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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Lake St. Clair Email Distribution List
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MDEQ	State/Reg Agency	Andrew	Hartz		hartza@michigan.gov
MDEQ	State/Reg Agency	Anne	Hokanson		hokansona@michigan.gov
MDEQ	State/Reg Agency	Rhonda	Klann		klannr@michigan.gov
MDEQ	State/Reg Agency	Cindy	Masterson		mastersonc@michigan.gov
MDEQ	State/Reg Agency	Mike	Masterson		mastersonm@michigan.gov
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MDEQ	State/Reg Agency	Luis	Saldivia		saldivial@michigan.gov
MDEQ	State/Reg Agency	Katherine	Tetzlaff		tetzlaffk@michigan.gov
MDEQ	State/Reg Agency	Mary	Vanderlaan		vanderlaanm@michigan.gov
MDEQ	State/Reg Agency	Robert	Zbiciak		zbiciakr@michigan.gov
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MDEQ		Sheila	Meiers		MEIERS@michigan.gov
MDEQ		Joelle	Pepper		PepperJ@michigan.gov
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MDEQ - Remediation Division	State/Reg Agency	Susan	Erickson		ericksons@michigan.gov
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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
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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
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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
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MDNR - Wildlife Division	State/Reg Agency	Lori	Sargent		sargentl@michigan.gov
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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
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Michigan Department of Natural Resources	State/Reg Agency	Kristen	Bennett		bennettk@michigan.gov
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Michigan Department of Natural Resources	State/Reg Agency	William	Boik		boikw@michigan.gov
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Michigan Department of Natural Resources	State/Reg Agency	Elizabeth	Brockwell-Tillman		brockwell-tillmane@michigan.gov
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Michigan Department of Natural Resources	State/Reg Agency	Paul	Curtis		curtisp@michigan.gov
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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
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Michigan Department of Natural Resources	State/Reg Agency	Christine	Hanaburgh		hanaburghc@michigan.gov
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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
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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
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Michigan Department of Natural Resources	State/Reg Agency	Daniel	Mullen		mullend@michigan.gov
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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
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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
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Michigan Sea Grant Extension	State/Reg Agency	Steve	Stewart	Senior Educator	stew@anr.msu.edu
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Michigan State Housing Development Authority	State/Reg Agency	Duane	Thelen		thelend4@michigan.gov
Michigan State Police/Emergency Management	State/Reg Agency	Mitch	Graham	Hazard Mitigation Planning Specialist	GrahamM5@michigan.gov
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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
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Michigan Technological University	University	Mark	Maroste		mmaroste@mtu.edu
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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
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Northeast Michigan Council of Governments	Regional	Diane	Rekowski		drekowski@nemcog.org
Northeast Michigan Council of Governments	Regional	Nico	Tucker		ntucker@nemcog.org
Northwest Michigan Council of Governments	Regional	Matt	McCauley		mccauley@nwm.cog.mi.us
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Northwestern Michigan College	University	Hans	Van Sumersen		hvansumeren@nmc.edu
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Public Sector Consultants, Inc.	Engineer	Mark	Coscarelli		mcoscarelli@pscinc.com
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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
St. Clair Township	Local Official	Brian	Bayly	Zoning Administrator (FPA)	brianb@twp.stclair.mi.us
St. Clair Township	Local Official	Brian	Mahaffy	Township Supervisor	brian@twp.stclair.mi.us
State of Michigan	State/Reg Agency	Charles	Allen		allenc9@michigan.gov
State of Michigan	State/Reg Agency	Jordan	Kameron		jordank@michigan.gov
State of Michigan	State/Reg Agency	James	Riley		rileyj2@michigan.gov
State of Michigan	University	Lee	Yuman		leey@michigan.gov
Tetra Tech, Inc.	Engineer	Bob	Nelson		bob.nelson@tetratech.com

Lake St. Clair Email Distribution List
July 2012

Organization	Category	First Name	Last Name	Title	Email
The Central Upper Peninsula Regional Planning & Development	Regional	Lloyd	Matthes		lmatthes@cuppad.org
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
U.S. Fish & Wildlife Service	Fed Agency	Anjanette	Bowen		anjanette_bowen@fws.gov
U.S. Fish & Wildlife Service	Fed Agency	Craig	Czarnecki		craig_czarnecki@fws.gov
University of Michigan	University	Lisa	Brush		lbrush@umich.edu
University of Michigan	University	Lorelle	Meadows		lmeadows@umich.edu
University of Michigan	University	R. K.	Norton		rknorton@umich.edu
University of Michigan	University; Engineer	Guy	Meadows	Professor/Engineer	gmeadows@umich.edu
University of Michigan - Flint	University	Jonathan	Jarosz		jaroszjo@umflint.edu
University of Michigan: CILER - School of Natural Resources and the Environment (UM SNRE)	University; Ecological	Dmitry	Beletsky	Associate Research Scientist	beletsky@umich.edu
US Army Corps of Engineers	Fed Agency	Mary	Weidel	PAS Coordinator	mary.t.weidel@usace.army.mil
USACE	Fed Agency	Greg	Mausolf	Engineer	Gregory.M.Mausolf@usace.army.mil
USACE	Fed Agency	Eric	Tauriainen	Chief, HEB	eric.tauriainen@usace.army.mil
USACE	Fed Agency	Mary	Weidel	Project Manager	mary.t.weidel@usace.army.mil
USDA-NRCS	Fed Agency	Ruth	Shaffer		ruth.shaffer@mi.usda.gov
USGS	Fed Agency	Stephen	Aichele		saichele@usgs.gov
Village of Grosse Point Shores	Mayor	James M.	Cooper	City Mayor	N/A
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
Wayne County	Local Official	Robert	Ficano	County Executive	rficano@co.wayne.mi.us
Wayne County	Local Official	Jerry	Spryfza	Director of Public Services (FPA)	tspryfza@co.wayne.mi.us
Wayne County Michigan State University Extension	University	Richard	Wooten	MSU Extension, Wayne County	wooten@msu.edu
Wayne State University	University	Mark	Baskaran		baskaran@wayne.edu
Wayne State University	University	David	Pitts		pitts@wayne.edu
Wayne State University - Eng	University	Carol	Miller		cmiller@eng.wayne.edu
West Michigan Regional Planning Commission	Regional	Dave	Bee		dbee@wmrpc.org
West Michigan Shoreline Regional Development Commission	Regional	Sandeep	Dey		sdey@wmsrdc.org
West Michigan Shoreline Regional Development Commission	Regional	Nannette	Emmer		nemmer@wmsrdc.org
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
Western Michigan University	University	David	Lemberg		david.lemberg@wmich.edu
Western U.P. Planning and Development Region	Regional	Kim	Stoker		kstoker@wuppdr.org
Western U.P. Planning and Development Region 2	Regional	Lori	Hauswirth		lhauswirth@wuppdr.org
	Engineer	William	Boesch		wboeschjr@hotmail.com
	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

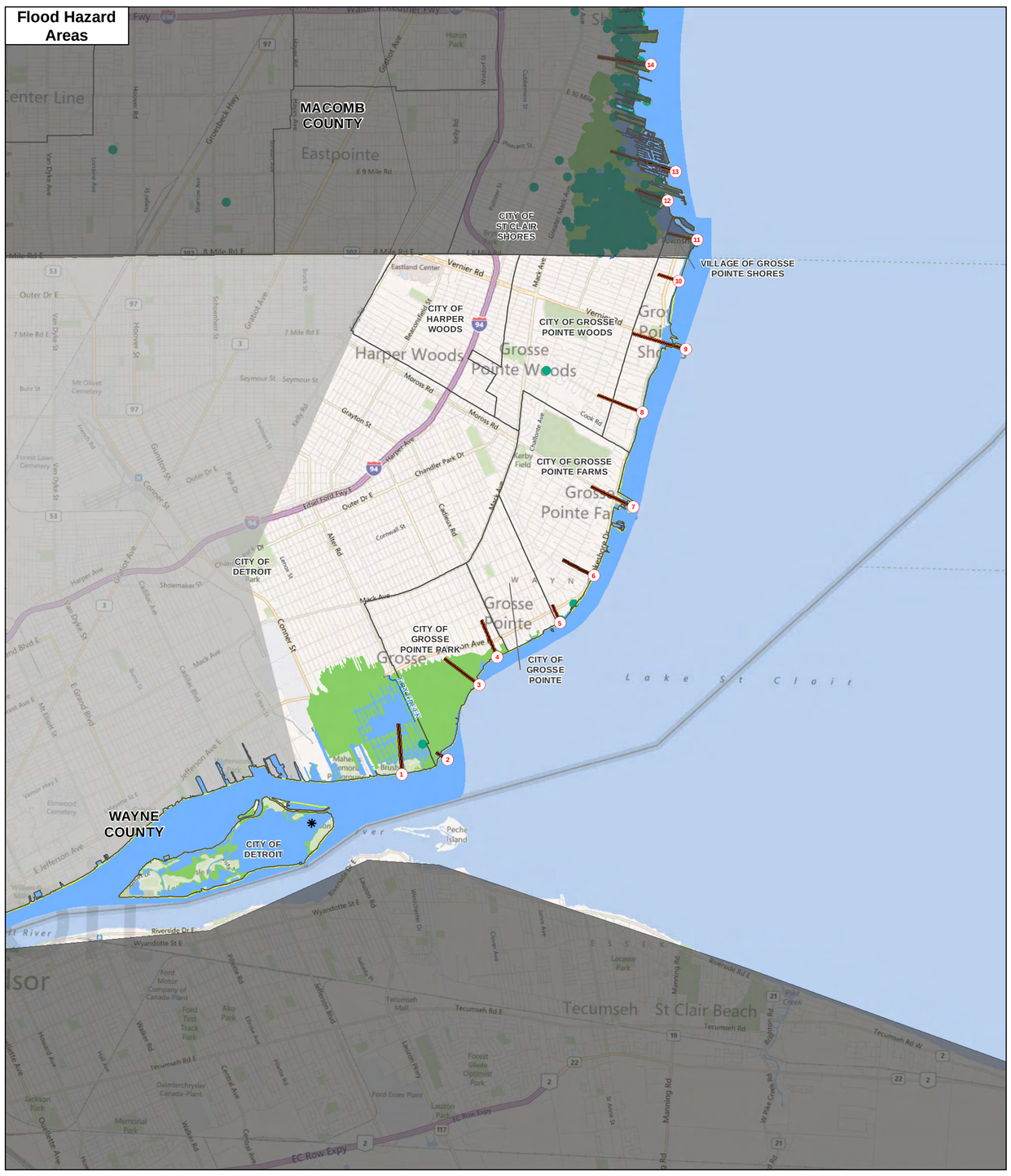
available to eligible communities. Please RSVP to FEMA's study contractor (STARR) Scott Banjavcic at (312) 780-7755 or email to GreatLakesFloodStudy@starr-team.com by **August 10, 2012.** Please reference the Discovery Meeting date and time in your RSVP.

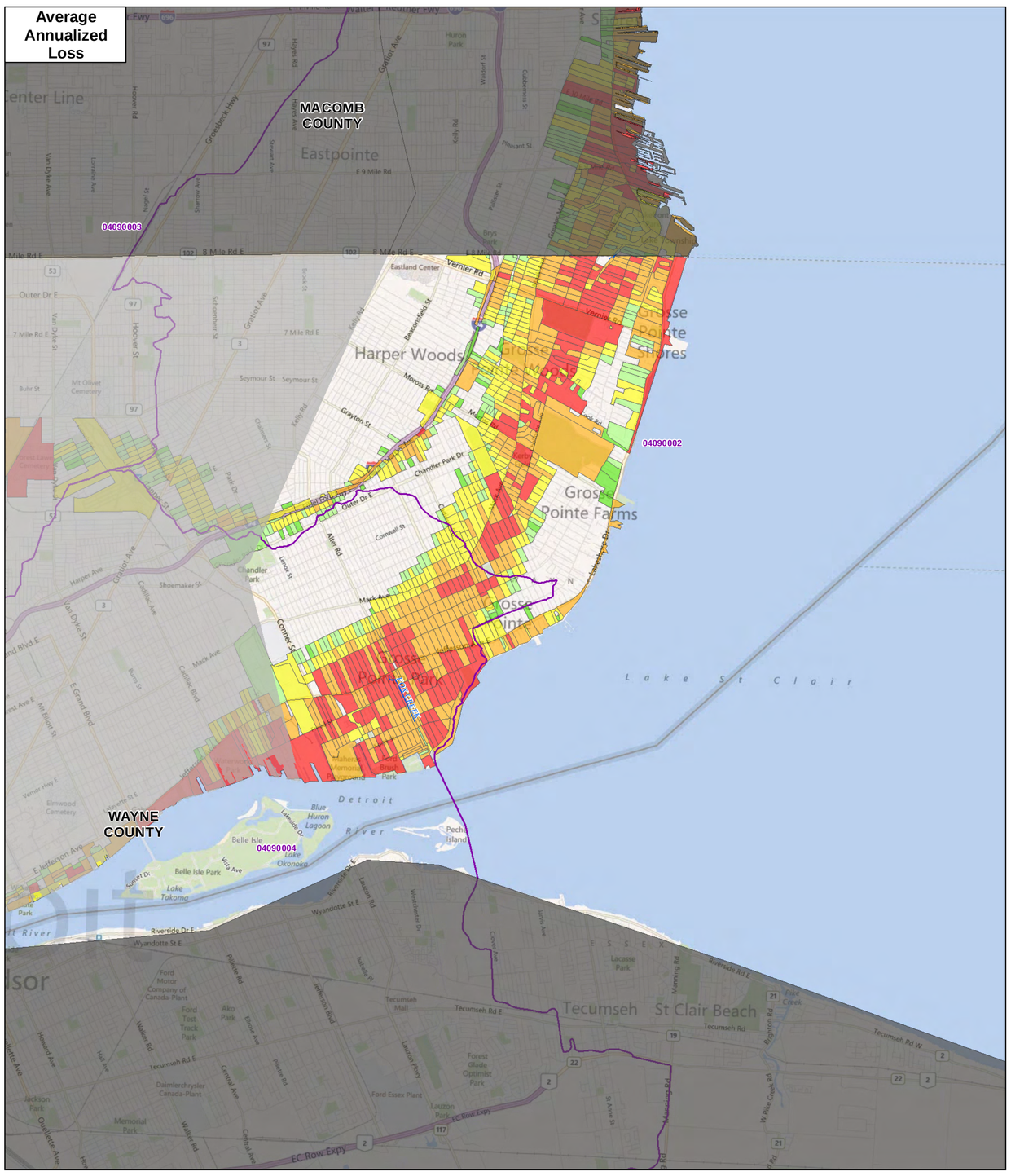
A attached Community Coastal Data Request Form was recently mailed to local community officials, along with the Discovery Meeting invitation. This form is also available online at http://www.greatlakescoast.org/pubs/forms/GLCFS_Discovery_Coastal_Data_Request_Form.pdf. If you have data or information 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.

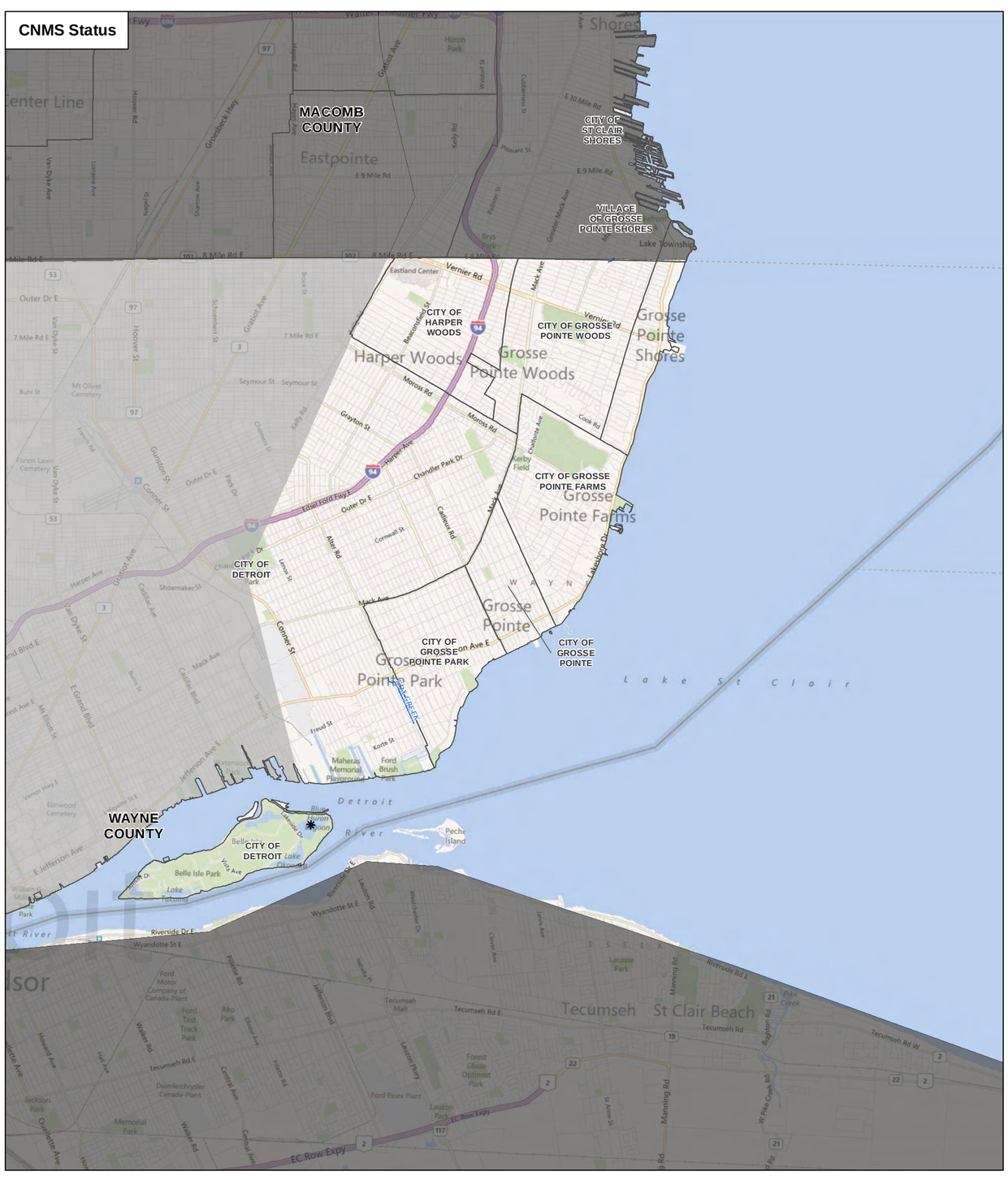
We look forward to working with you to reduce the risks associated with coastal flooding and increase resiliency for the long term. To learn more about Discovery, please visit http://www.fema.gov/library and search keywords "Discovery brochure" or contact Ken Hinterlong, FEMA Region V Senior Engineer, 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

WAYNE COUNTY DRAFT DISCOVERY MAP







Declared Disasters

Lake	State	Declared County/Area	Declaration Date	Disaster Type	Incident Type	Description
Lake St. Clair	MI	Wayne (County)	12/1/1972	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Wayne (County)	4/12/1973	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Wayne (County)	3/19/1976	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, ICING & FLOODING
Lake St. Clair	MI	Wayne (County)	9/8/1980	DR	Flood	SEVERE STORMS & FLOODING
Lake St. Clair	MI	Wayne (County)	7/11/1997	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING
Lake St. Clair	MI	Wayne (County)	8/5/1998	DR	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS
Lake St. Clair	MI	Wayne (County)	10/17/2000	DR	Severe Storm(s)	SEVERE STORMS AND FLOODING
Lake St. Clair	MI	Wayne (County)	6/30/2004	DR	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING
Lake St. Clair	MI	Wayne (County)	1/27/1978	EM	Snow	BLIZZARDS & SNOWSTORMS
Lake St. Clair	MI	Wayne (County)	1/27/1999	EM	Snow	MI - SEVERE WEATHER 1/2 /99
Lake St. Clair	MI	Wayne (County)	9/23/2003	EM	Other	POWER OUTAGE
Lake St. Clair	MI	Wayne (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)
9.4	9.3	0.1	0.0	0.0	0.0	0.0

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)
22.1	16.1	6.0	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)
9.4	0.0	0.0	0.0	9.4	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)
22.1	0.0	0.0	0.0	22.1	0.0	0.0	0.0

N

0 1.5 3 6 Miles

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

WAYNE COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Wayne County
Detroit, City of
Grosse Pointe Farms, City of
Grosse Pointe Park, City of
Grosse Pointe Shores, Village of
Grosse Pointe Woods, City of
Grosse Pointe, City of
Harper Woods, City of

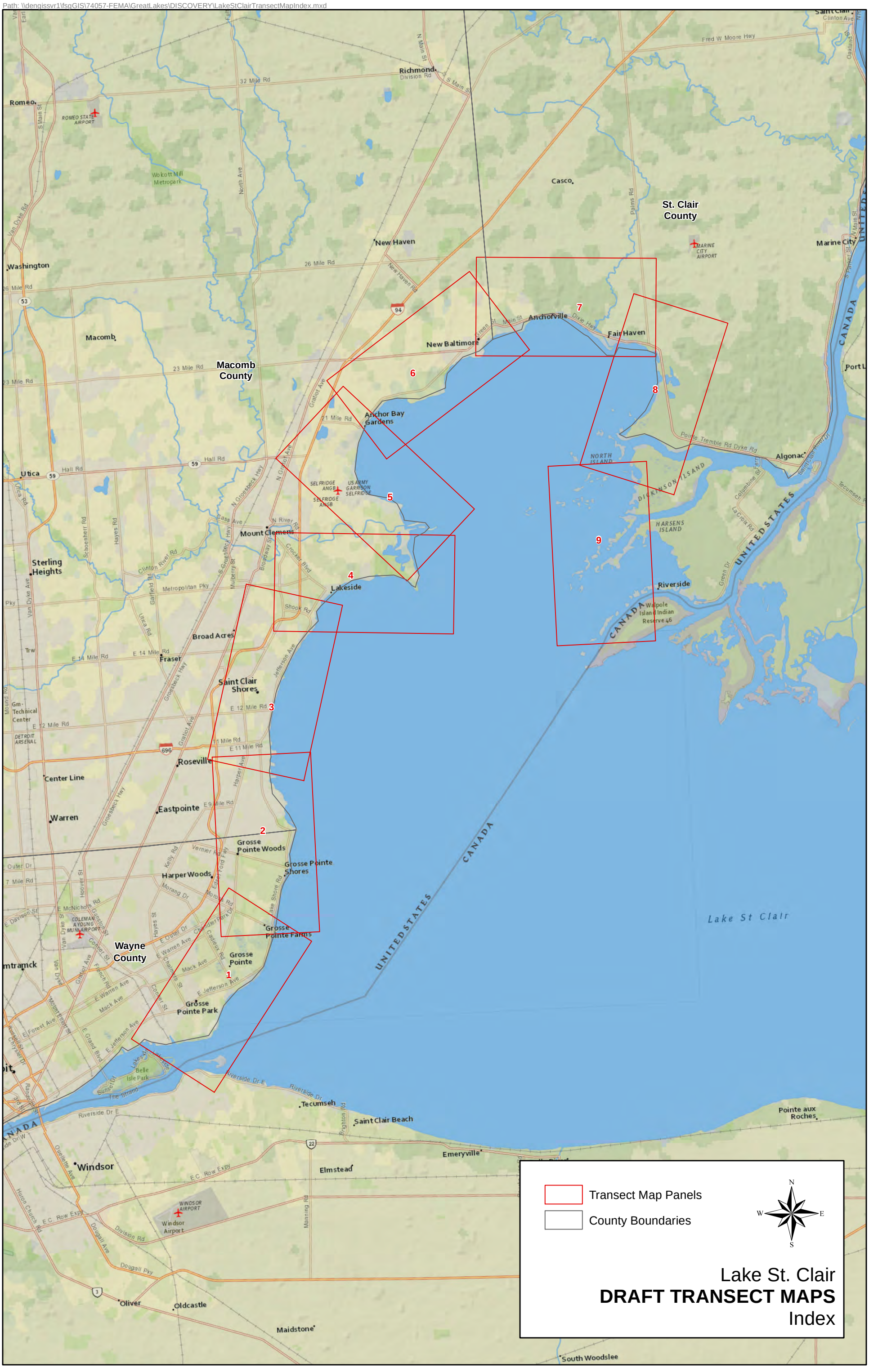
STARR

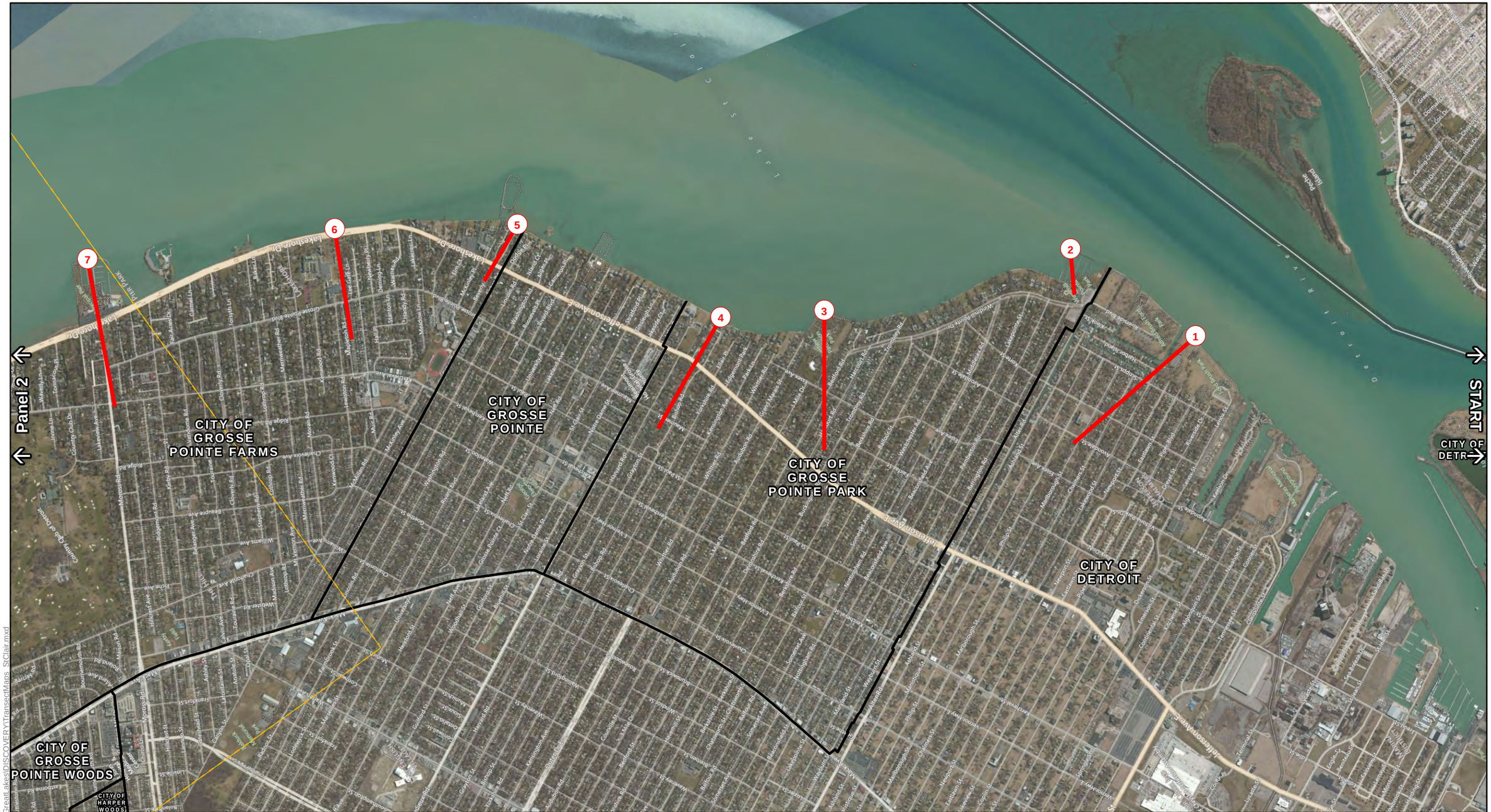
FEMA

ATTACHMENT D

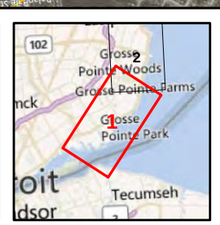
LAKE ST. CLAIR PROPOSED TRANSECTS

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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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1 inch = 2,000 feet





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



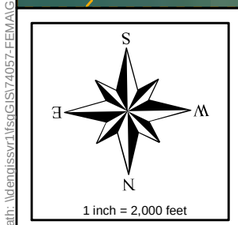
COUNTIES
MACOMB COUNTY

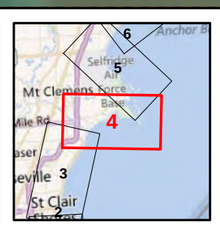
COMMUNITIES
CHARTER TOWNSHIP OF CLINTON
CITY OF ROSEVILLE
CITY OF ST CLAIR SHORES
TOWNSHIP OF HARRISON

Lake St. Clair
DRAFT TRANSECTS
Panel 3 of 9

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Transects

Adjoining Panel Edge

Political Boundary

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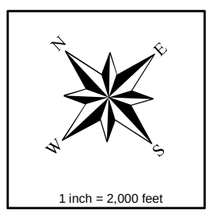
COUNTIES
MACOMB COUNTY

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

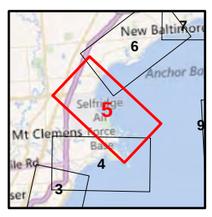
Lake St. Clair
DRAFT TRANSECTS
Panel 4 of 9

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1 inch = 2,000 feet





Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

COUNTIES
MACOMB COUNTY

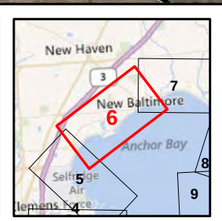
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CHARTER TOWNSHIP OF CLINTON
TOWNSHIP OF CHESTERFIELD
TOWNSHIP OF HARRISON
TOWNSHIP OF MACOMB

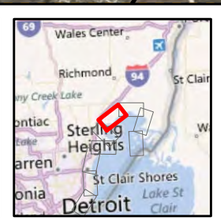
Lake St. Clair
DRAFT TRANSECTS
Panel 5 of 9

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1 inch = 2,000 feet





Transects

Adjoining Panel Edge

Political Boundary

Basemap Source: Microsoft BING map service

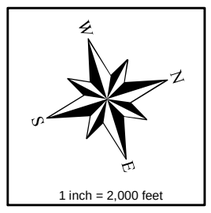
COUNTIES
MACOMB COUNTY
ST. CLAIR COUNTY

COMMUNITIES
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD

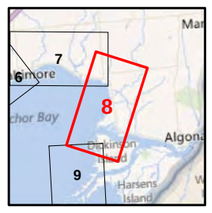
Lake St. Clair
DRAFT TRANSECTS
Panel 6 of 9


43
42
41
40
39
38
37
36
35
TOWNSHIP OF IRA
CITY OF NEW BALTIMORE
TOWNSHIP OF CHESTERFIELD
Panel 8
Panel 6
29
Dixie Hwy
Palms Rd
Broadbridge Rd
Stone Gun Rd
Arnold Rd
Meldrum Rd
Church Rd
Bethany Rd
County Line Rd
Green St
Main St
Lake St
Mill St
Maple Ave
Oak St
Creek Ln
Meadowbrook Dr
Sterling Heights
St Clair Shores
Detroit
Lake St Clair
New Baltimore
Anchor Bay
Wales Center
Richmond
St Clair
Port Huron
Casco
Algonac
Harsens Island
Marine City
Memorial Park
Township Marsh
Lions Park
Swan Creek
Salt River
Belle River
Mouth Creek
Anchor Bay Channel
Lake St Clair
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1 inch = 2,000 feet
S
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W
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7
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9
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

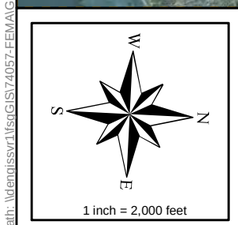
COUNTIES
ST. CLAIR COUNTY

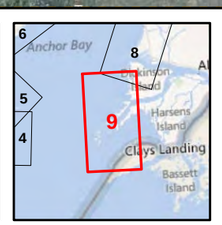
COMMUNITIES
TOWNSHIP OF CLAY
TOWNSHIP OF COTTRELLVILLE
TOWNSHIP OF IRA

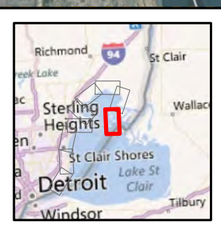
Lake St. Clair
DRAFT TRANSECTS
Panel 8 of 9

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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

WAYNE COUNTY DISCOVERY MEETING DOCUMENTS

Discovery Meeting Agenda

Discovery Meeting Sign-In Sheets

Discovery Meeting Minutes

Discovery Meeting Presentation



Project Name:	FEMA Region V Discovery
Meeting:	WAYNE COUNTY Great Lakes Coastal Discovery Meeting
Date and Time:	TUESDAY, AUGUST 21, 2012; 2:00 – 4:00 PM ET
Place:	GROSSE POINTE PUBLIC LIBRARY
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 21, 2012 WAYNE 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 Detroit	Deputy Director, Department of Buildings and Safety and Environment	Ray	Scott			
2		City of Detroit	Environmental Specialist, Department of Buildings and Safety and Environment	Min	Yang	2 Woodward Ave Rm 401 Detroit, MI 48226	313.471.5111	yangm@detroitmi.gov
3	EM	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
4	BJC	STARR	Engineer	Brian	Caufield	50 Hampshire Street Cambridge, MA 02139	(617) 452-6000	caufieldba@cdmsmith.com
5		STARR	Engineer	Matt	Rembold	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	remboldmd@cdmsmith.com
6		STARR	GIS Specialist	Brett	Addams	125 South Wacker Drive Chicago, IL 60606	(312) 346-5000	addamsbh@cdmsmith.com
7				Jon	Hartz	756 University Grosse Pointe MI 48230		jhartz@comcast.net
8		City of Detroit Homeland Sec. Mgr.	Emergency	Robert	Brown	13331 Lyndon Detroit, MI 48227	313 596-1742	Brownro@detroitmi.gov
9		City of Grosse Pointe Woods	Bldg Dept	John		20025 Mack Plaza Drive GPW 48236		
10		MI DEQ	Engineer	Marie	Zinga	27700 Donald ct Warren, MI 48092	586 753 3872	Zingasm@Michigan.gov

Great Lakes Coastal Flood Study
Wayne County Discovery Meeting--Michigan

Meeting schedule: Tuesday, August 21, 2012 2:00 – 4:00 pm (ET)
Meeting Location: Grosse Pointe Public Library, Ewald Branch, Grosse Pointe Park, MI
Discovery Area: Coastal communities in Wayne County
Attendees: 9 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

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:* Robert Brown, City of Detroit Homeland Security, Emergency Manager, asked if the increase or decrease in shipping traffic would be taken into consideration during the study. *Answer:* B. Caufield responded that only the storm surge produced from atmospheric conditions would be studied. He explained, however, that the model will calculate velocities, which could help Homeland Security plan for spills.
- *Question:* Are there examples of local mitigation actions available? *Answer:* FEMA / STARR are currently collecting local mitigation actions via the Mitigation Action Forms, as well as grant mitigation projects, and will be summarizing them in the upcoming Discovery Report. The process has just begun; therefore these local examples are not available yet. The State and County may have compiled examples of past mitigation projects.
- *Question:* Maria Zingas, Engineer for the Michigan Department of Environmental Quality, asked what the main reason was behind launching the new study as the County has recently received new maps. *Answer:* B. Caufield explained that it was a mandate from Congress to map all populated coastal shorelines. In addition, new coastal methodologies will be utilized for the study.

FEATURES NOTED ON MAPS:

- Transect suggested on the eastern tip of Belle Isle.
- Transect suggested at Water Works Park (may be too far into the Detroit River to be considered part of the coastal analysis, but potential for inclusion to be investigated further).

ACTIONS:

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

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Lake St. Clair Discovery

Wayne County, MI



August 21, 2012
1400 to 1700

Grosse Pointe Public Library

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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

Wayne County Study Status

- City of Romulus
  - Preliminary 7/20/2012
- North Branch Ecorse
  - On hold
- Grosse Pointe Park
  - On Hold

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

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





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Great Lakes Coastal Flood Study



U.S. Army Corps of Engineers, Detroit District

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Great Lakes Coastal Flood Study
Overview

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

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Lake St. Clair Discovery

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



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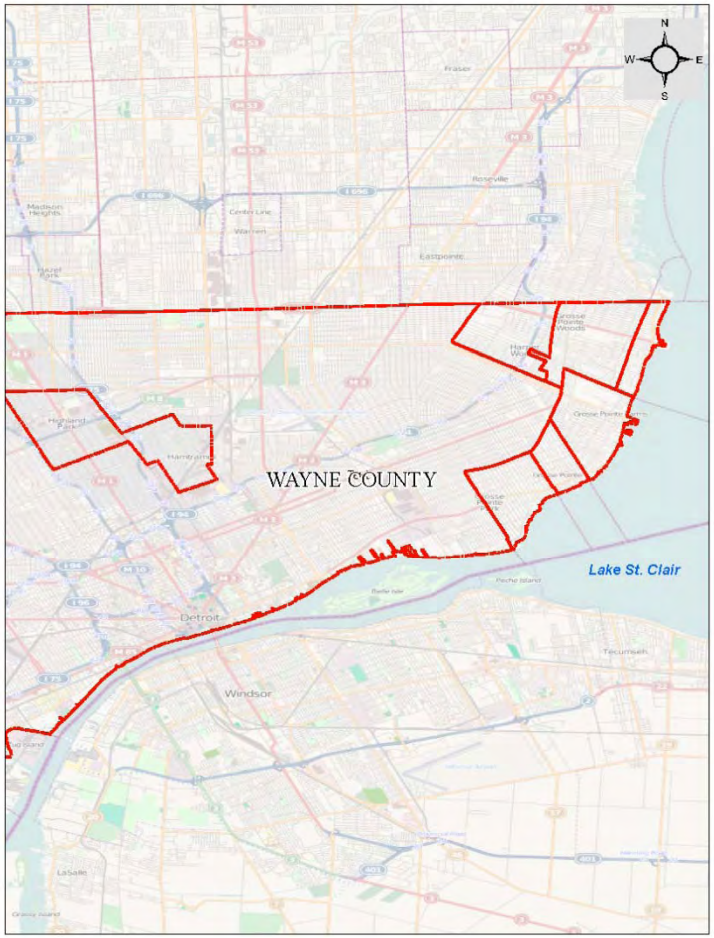
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Great Lakes Coastal Flood Study
Discovery Study Area

FEMA

Lake St. Clair Communities:

- Wayne County
- Detroit
- Grosse Pointe Farms
- Grosse Pointe Park
- Grosse Pointe Shores
- Grosse Pointe Woods
- Grosse Pointe
- Harper Woods



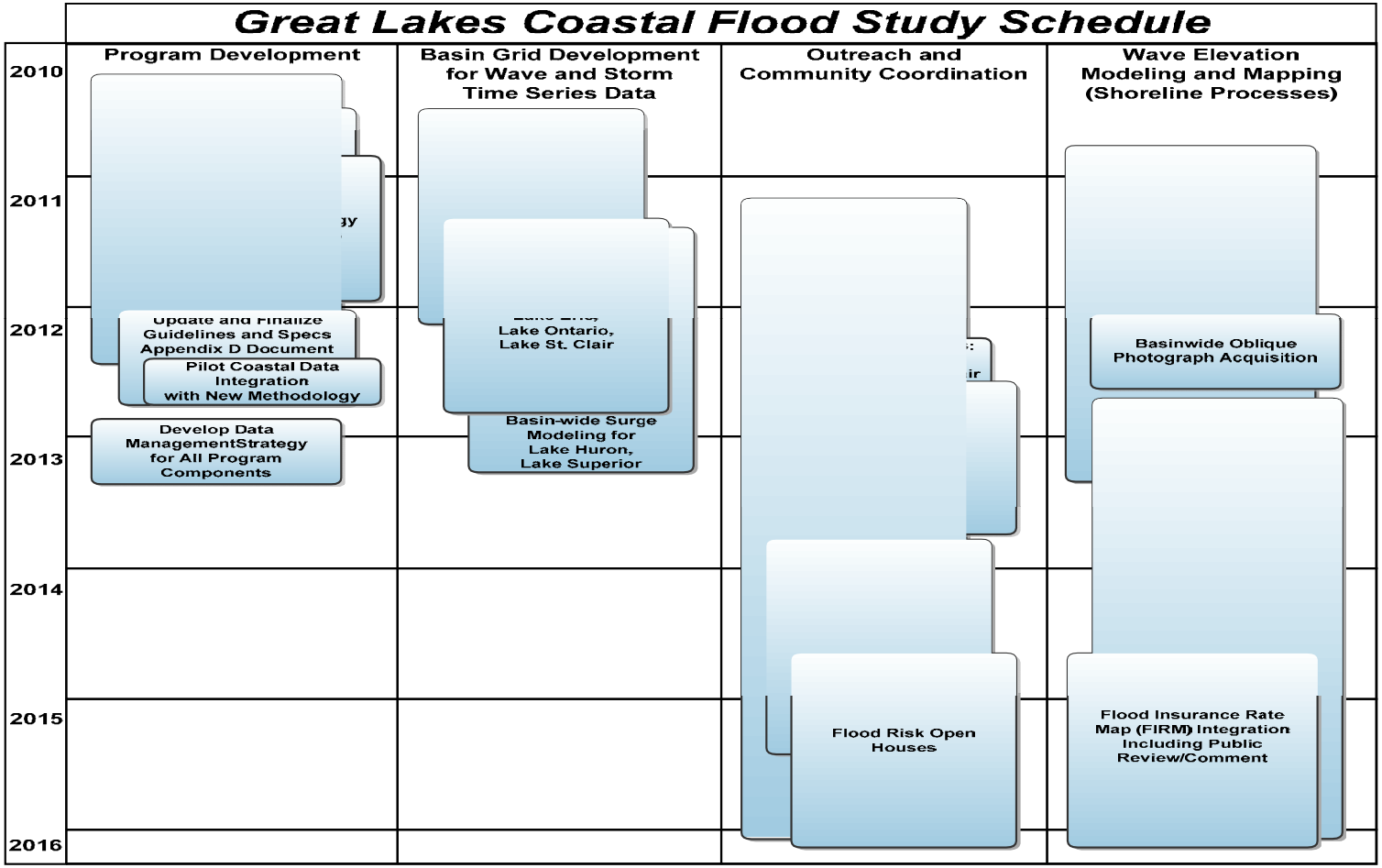
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Discovery Meeting Objectives

- 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

Stakeholder Engagement



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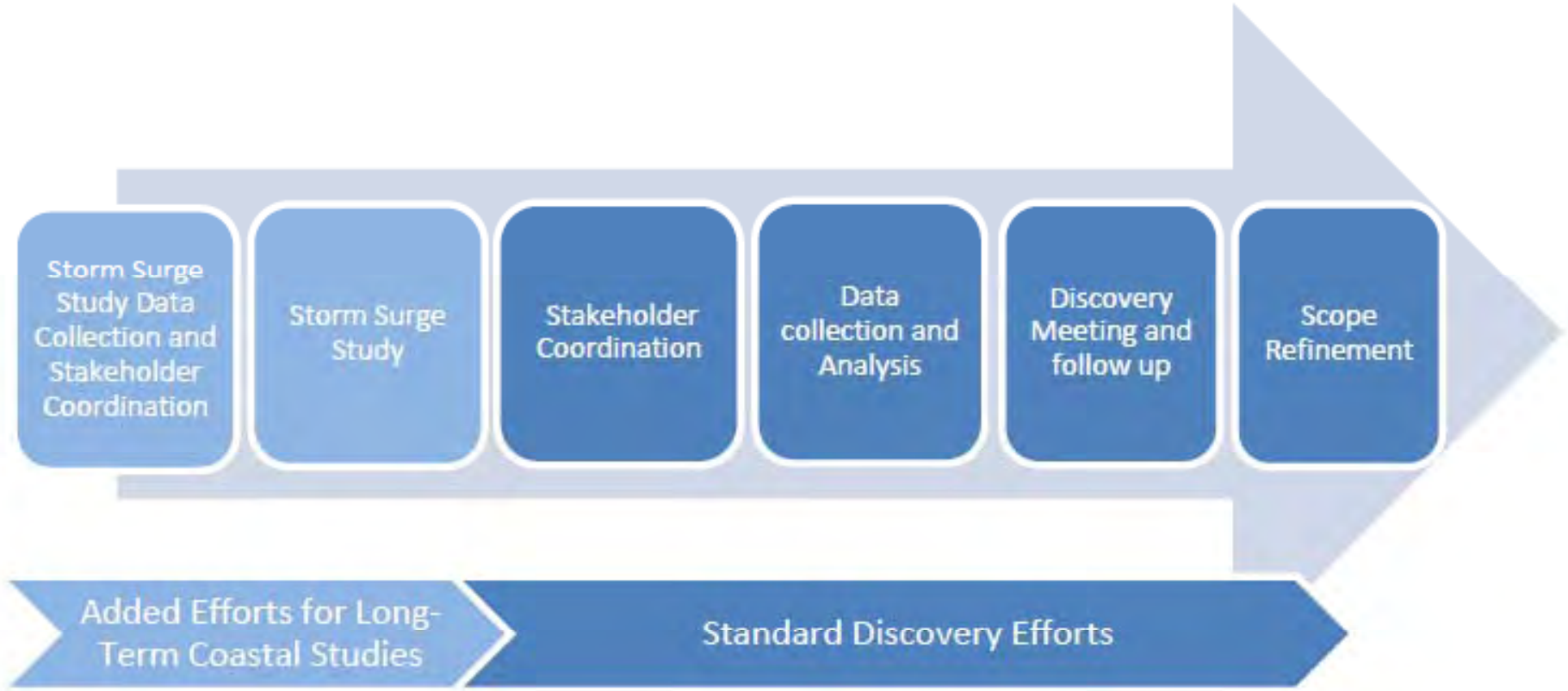
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Data Inputs

- 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



Discovery Schedule Overview



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Lake St. Clair 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



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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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



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

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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

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Coastal Mapping and Flood Risk Topics

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

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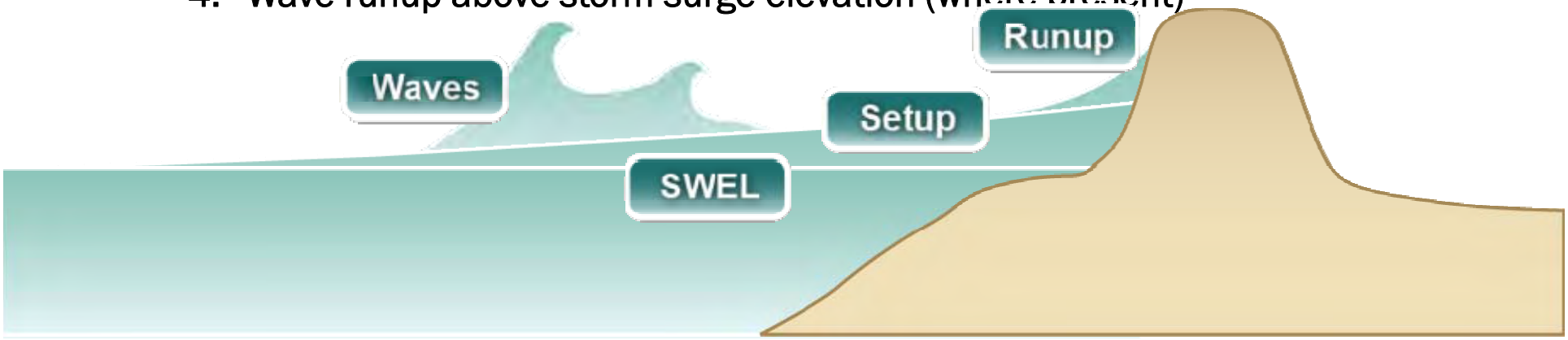
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Basic Elements of a Coastal Hazard Analysis

Base Flood Elevation on FIRM includes 4 components:

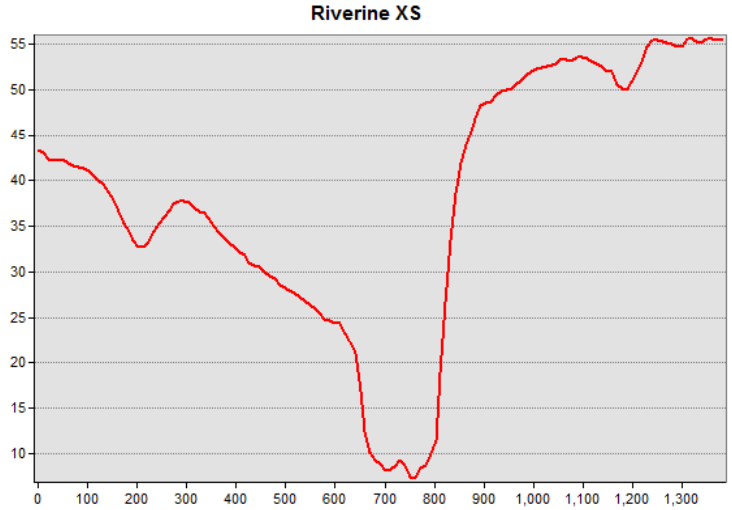
1. Storm surge stillwater elevation (SWEL) – determined from storm surge model
2. Amount of wave setup
3. Wave height above storm surge (stillwater) elevation
4. Wave runup above storm surge elevation (where present)

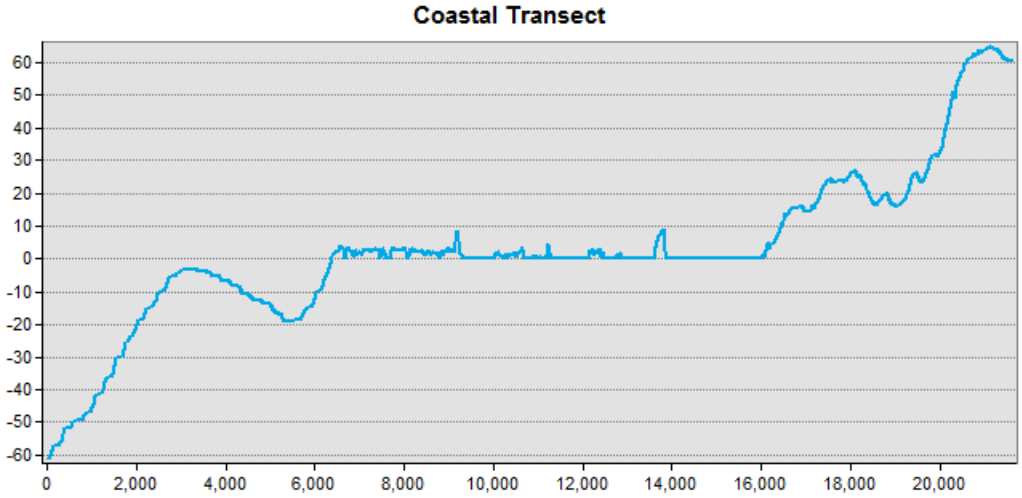


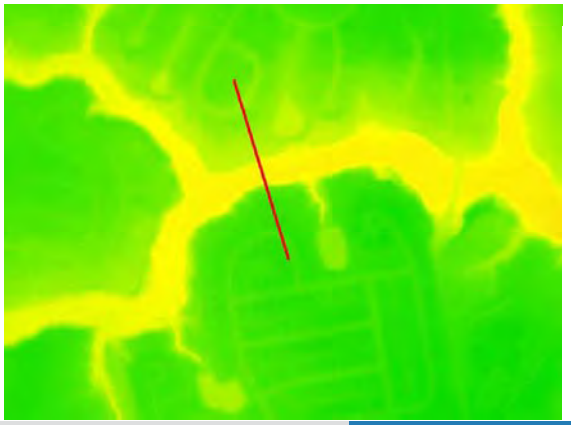
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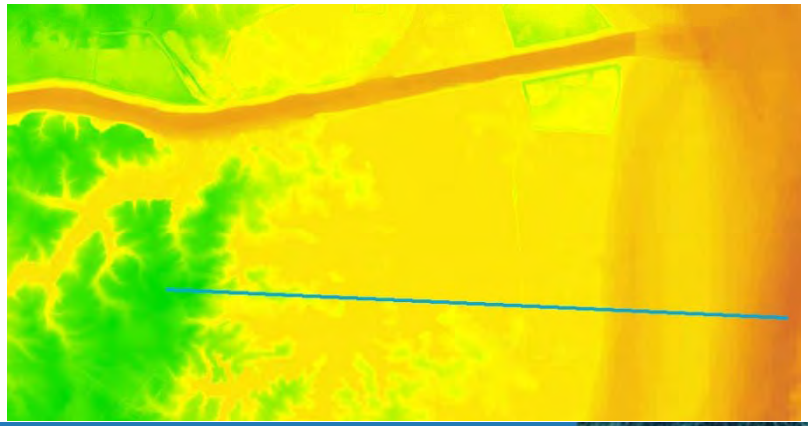
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Riverine XS vs Coastal Transect









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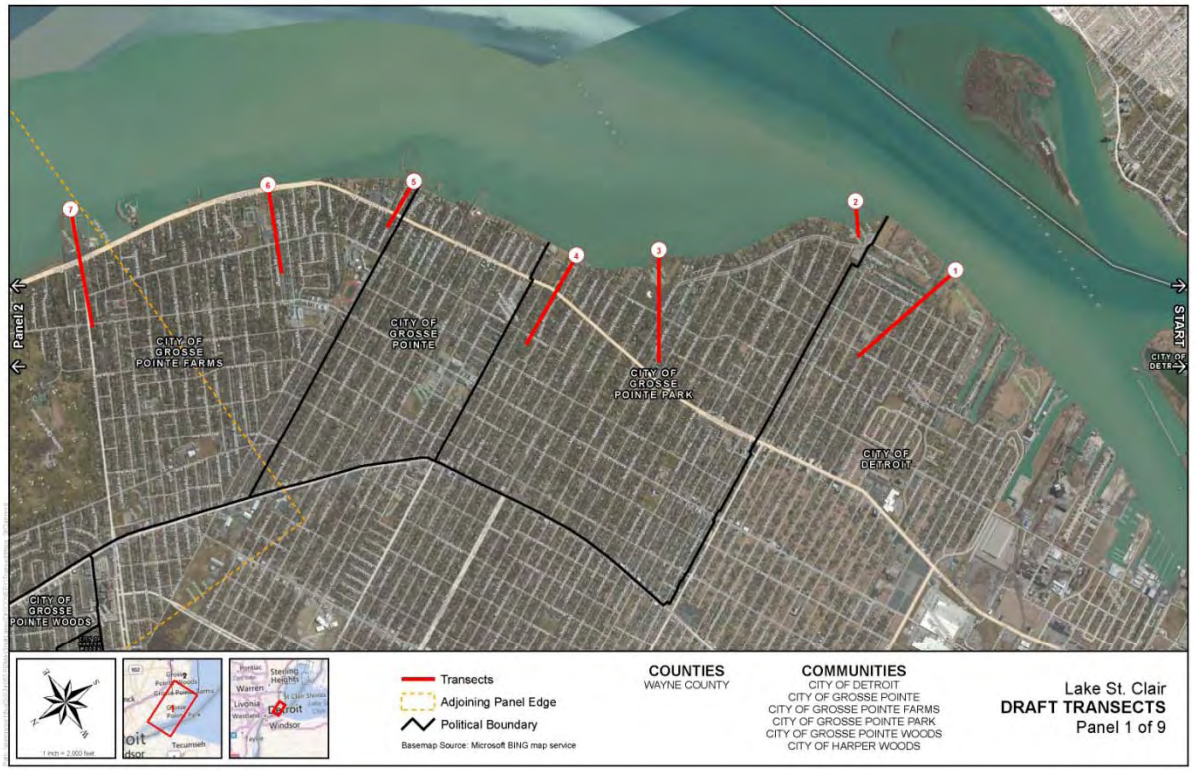
Transect Placement

- 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



Draft Transect Layout
Macomb County

- 10 transects
- 47 miles of shoreline



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Draft Transect Layout
Macomb County

- 10 transects
- 47 miles of shoreline



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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

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"



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

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

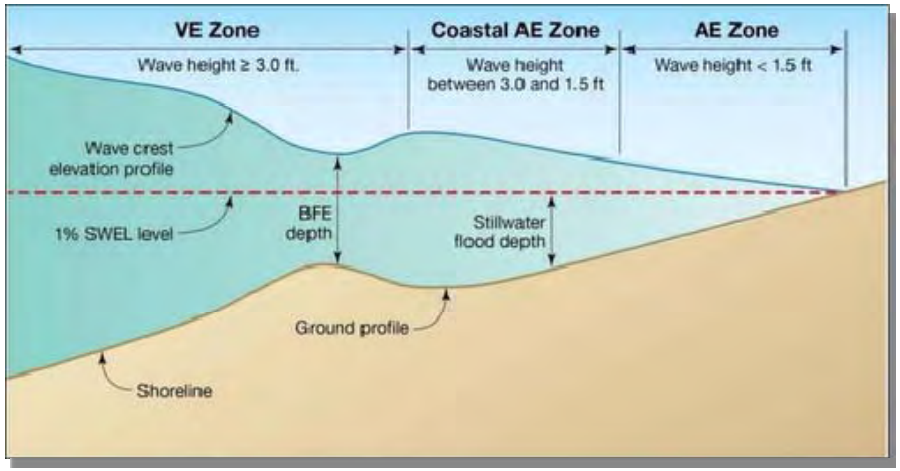


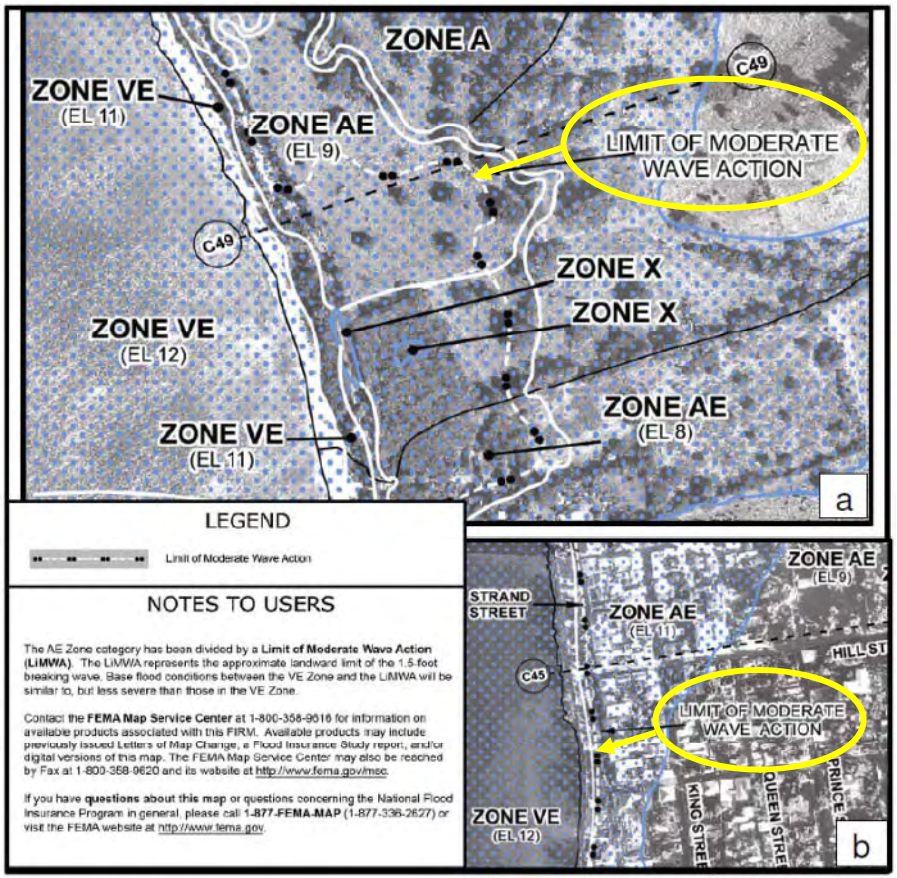
http://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf

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

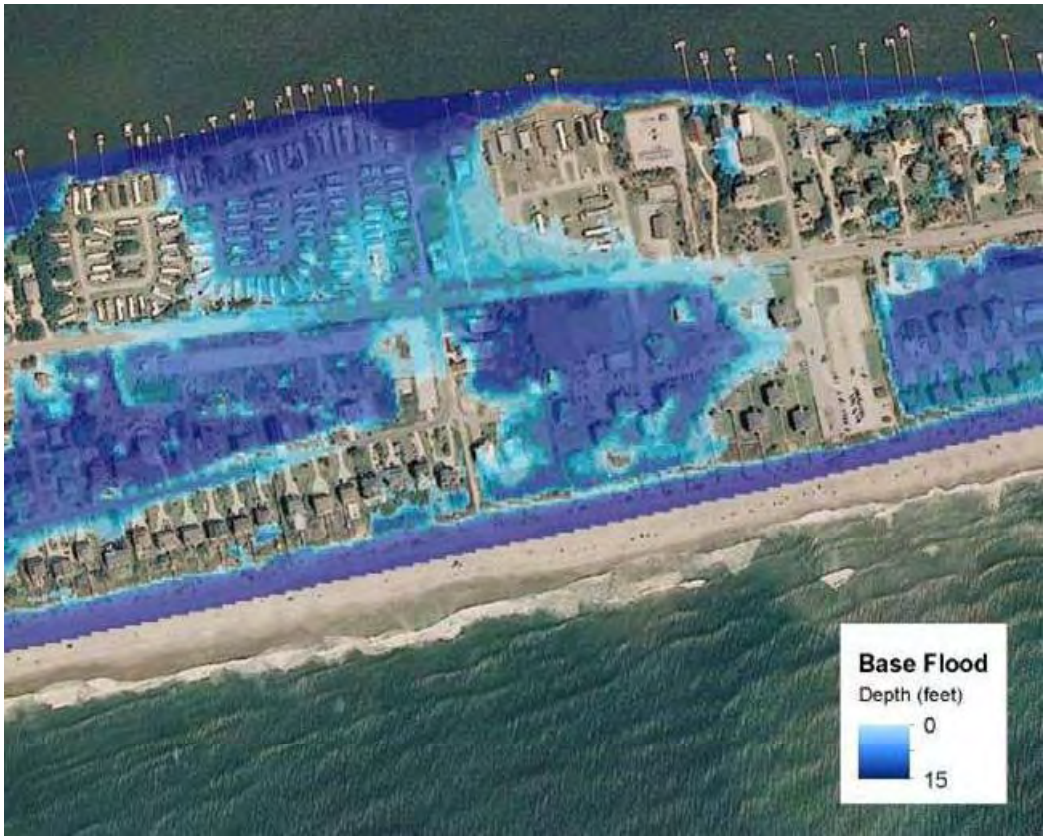
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Coastal Depth Grid

- 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



Coastal Flood Risk Assessments

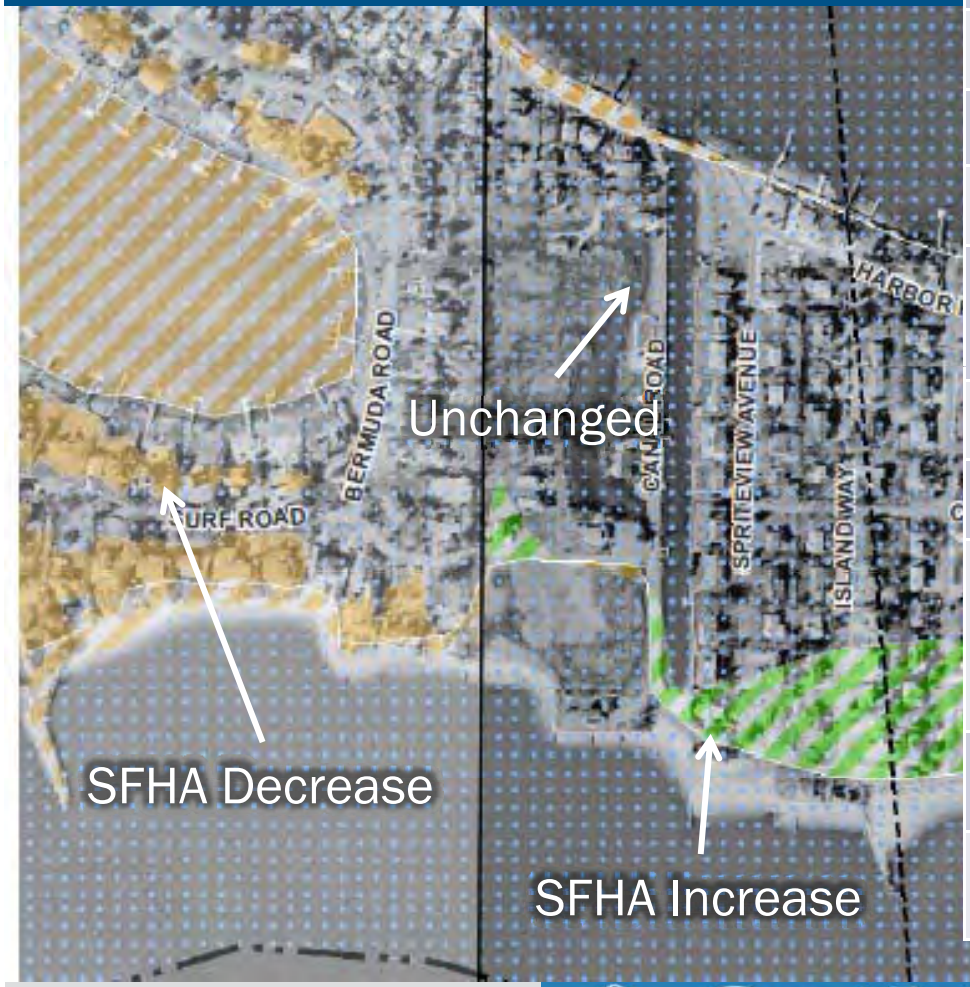
- Similar to Flood Risk Assessments for riverine, but using the coastal depth grids as input for the refined analysis
- Hazus analysis and data can support adoption of higher regulatory standards for structures in high loss areas
- Provides justification to fund mitigation actions



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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

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

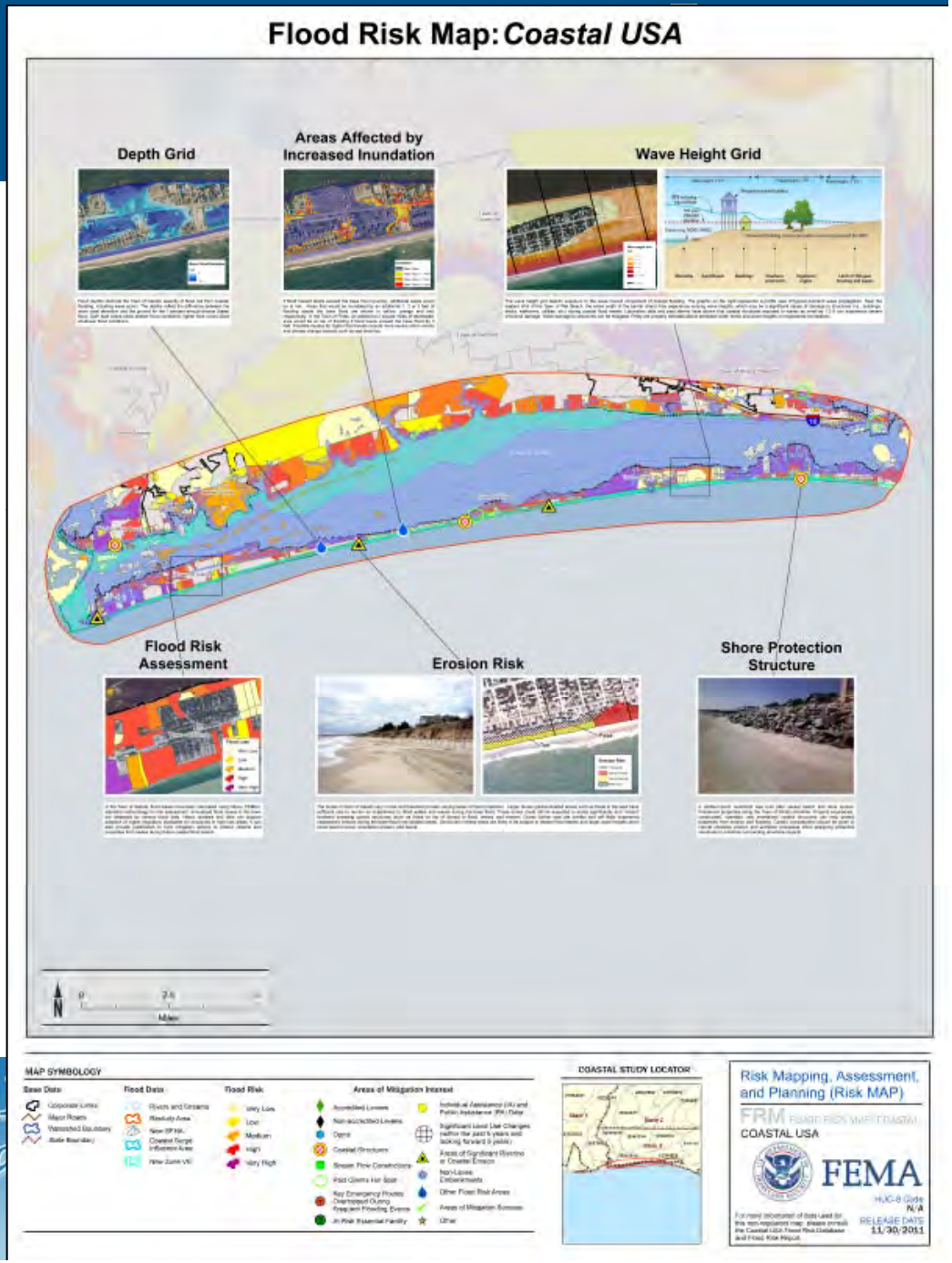
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

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

Coastal FRM

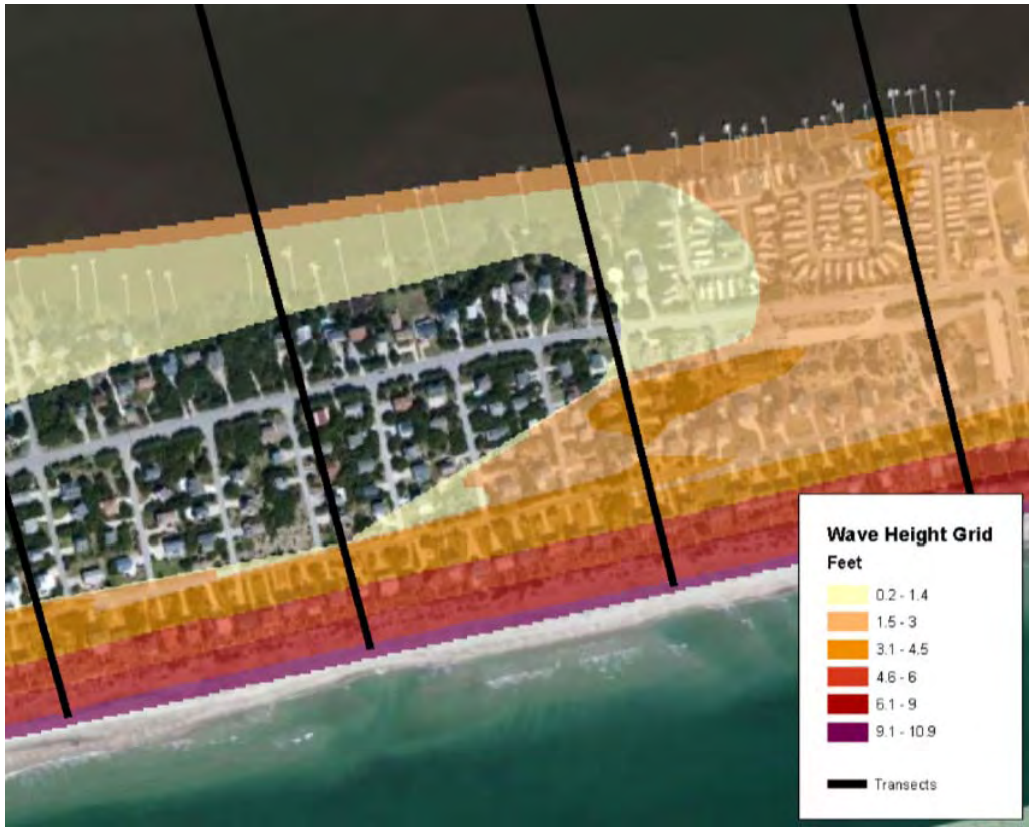
- Similar to riverine map
- Highlights area where datasets were produced
- Use of callout boxes
- Should drive the conversation towards mitigation



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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

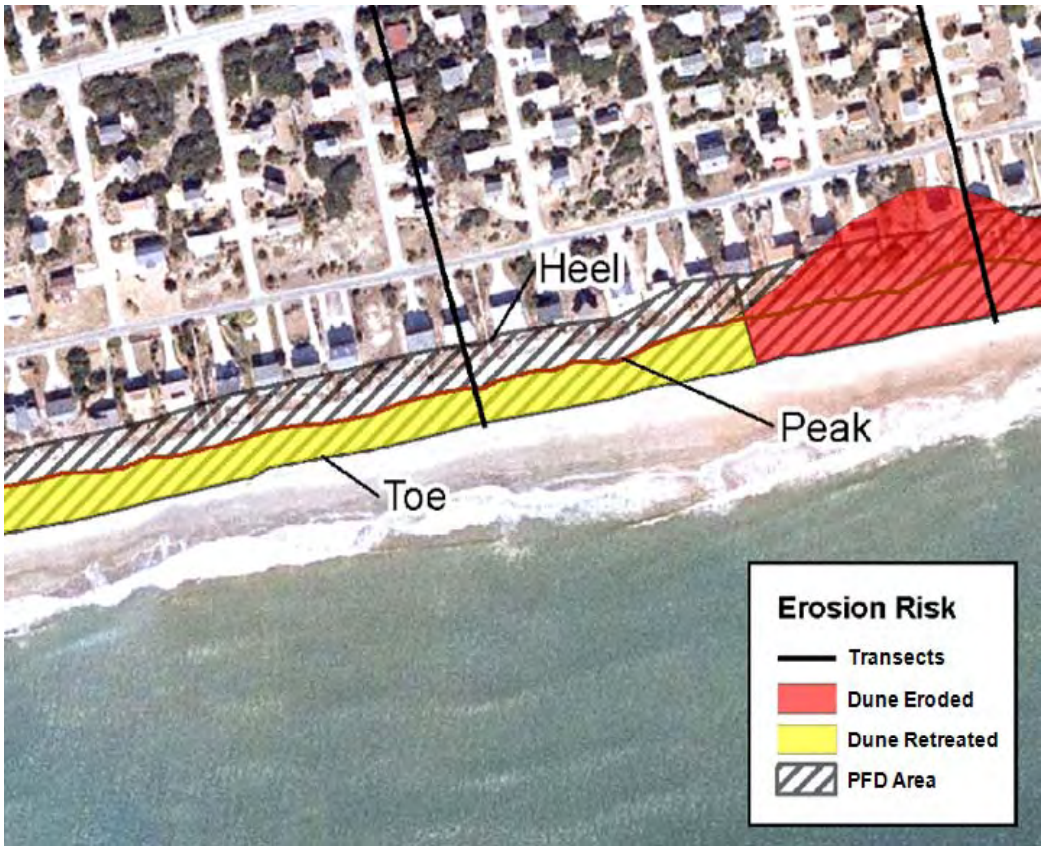


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Erosion Risk Determination

- 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



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*

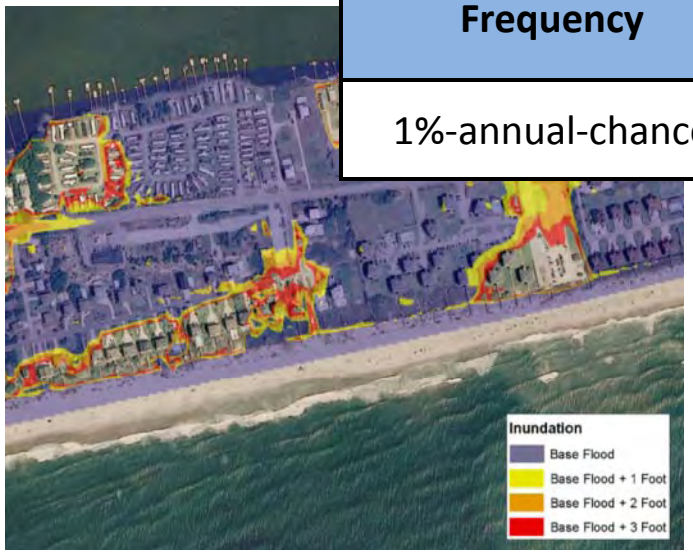
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Coastal Updates to Flood Risk Report

- 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

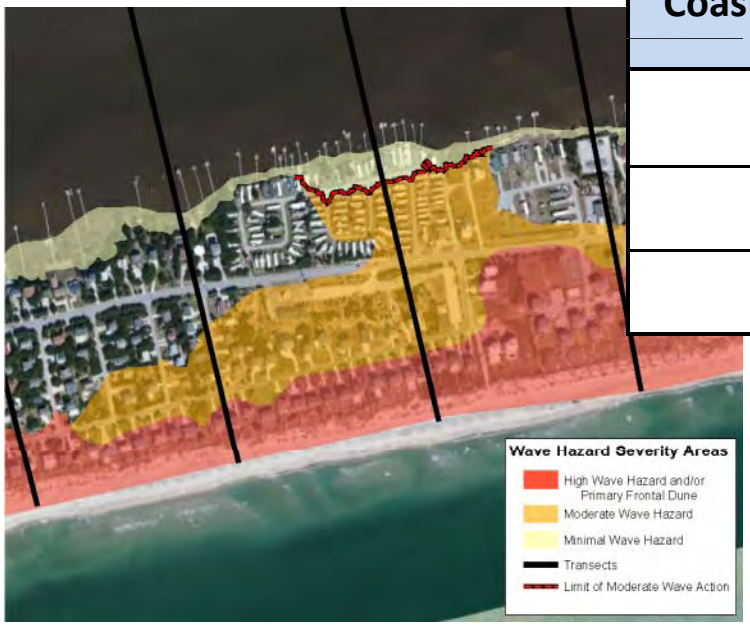


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Great Lakes Coastal Flood Study
greatlakescoast.org

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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greatlakescoast.org

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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FEMA

How does this apply to my community?

- NFIP Compliance
- Local impacts of coastal study

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National Flood Insurance Program

FEMA

- 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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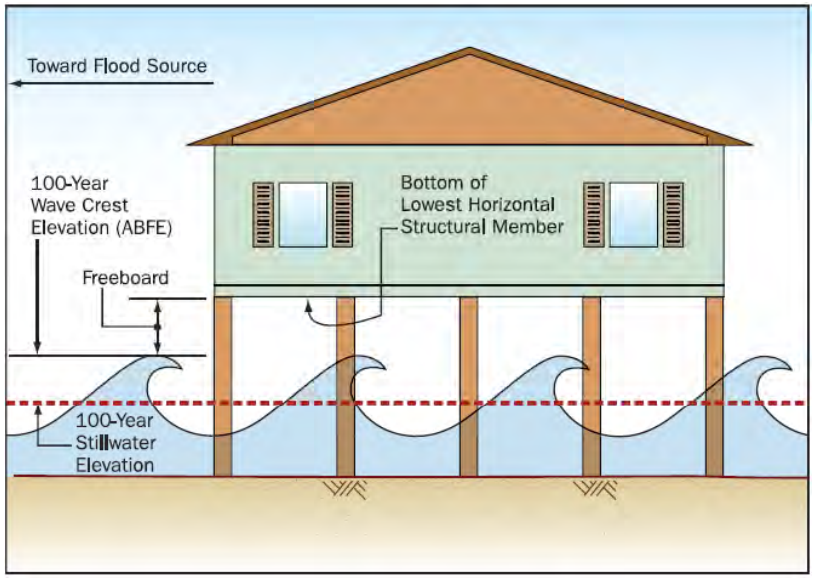
Great Lakes Coastal Flood Study
greatlakescoast.org

V Zones for Lake Michigan?

- Lake Michigan communities currently do not have V/VE Zones. Majority of the communities have coastal A/AE zones.
- If 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.

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/

FEMA

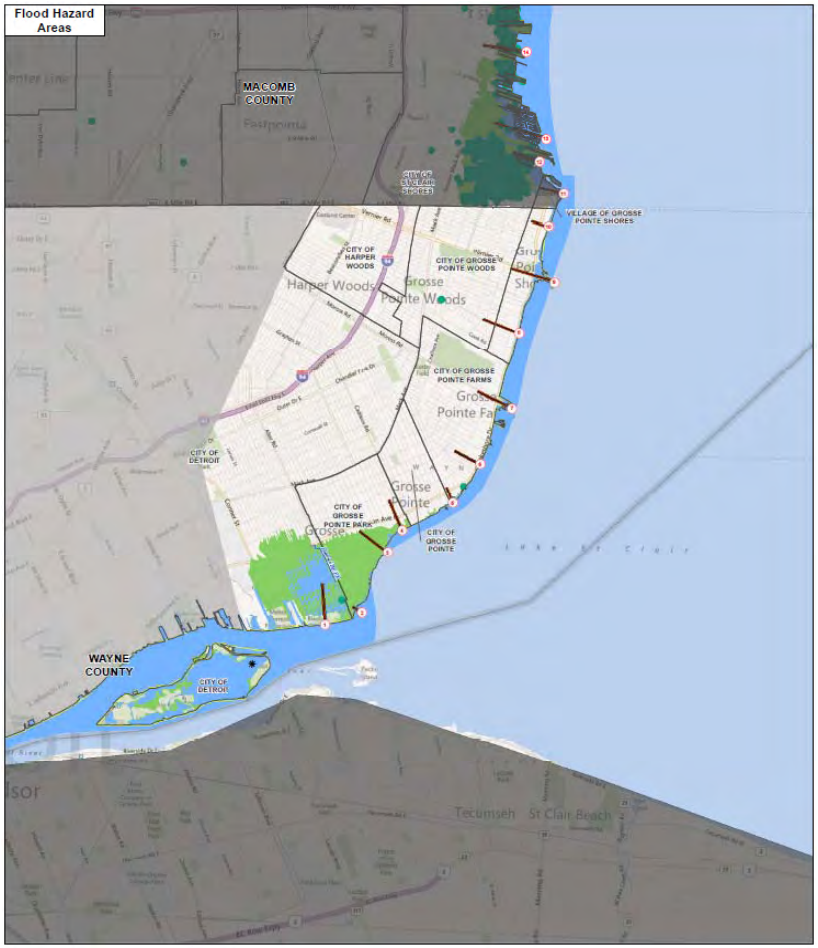
Interactive Session A

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

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Wayne County, MI
Discovery Map – Flood Hazard Areas



RiskMAP
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Great Lakes Coastal Flood Study
greatlakescoast.org

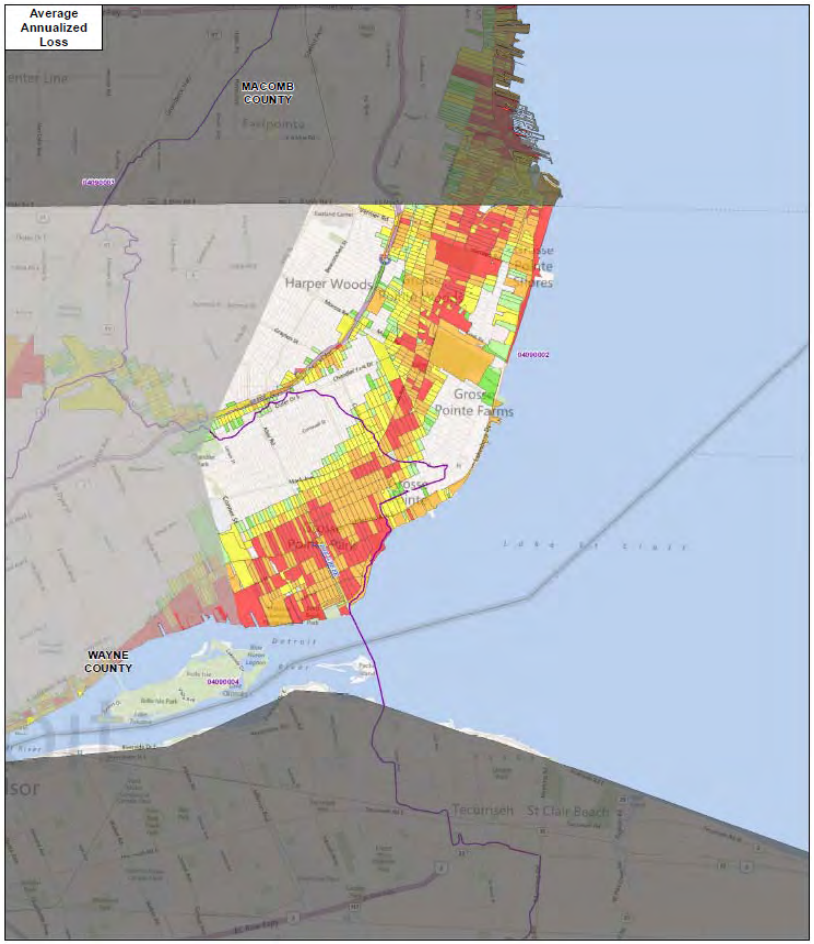
Wayne County, MI
Discovery Map – CNMS Status



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Wayne County, MI
Discovery Map – AAL and CBRS



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FEMA

Hazard Mitigation

- Opportunities
- Grant Funding

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Local Hazard Mitigation Plans

Risk MAP
Risk MAP products and Datasets

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

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

Mitigation Actions/Projects

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Mitigation Actions

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



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

FEMA

US Army Corps of Engineers

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

USDA

NOAA

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Hazard Mitigation Resources, Strategies & Actions

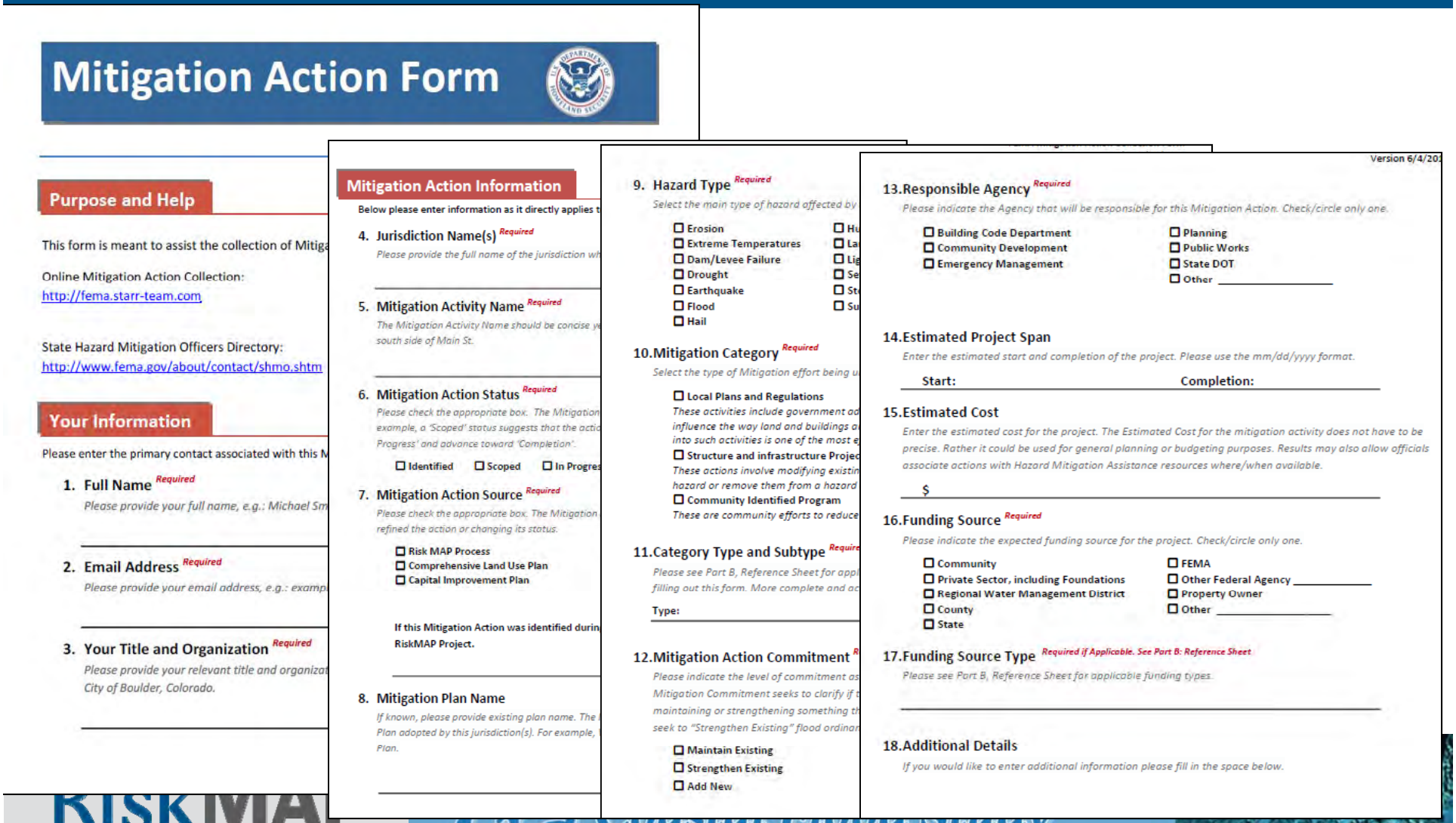
- The right action (or mix of actions) will be based on recent community experiences and level of complexity in existing infrastructure
  - *Public Works*
  - *Building Standards*
  - *Community Planning and HM Plan Update / Integration processes*
  - *Communication Processes, GIS, etc.*
- Get the right 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



Mitigation Action Form

Purpose and Help

This form is meant to assist the collection of Mitiga

Online Mitigation Action Collection:
http://fema.starr-team.com

State Hazard Mitigation Officers Directory:
http://www.fema.gov/about/contact/shmo.shtm

Your Information

Please enter the primary contact associated with this M

1. **Full Name** Required
   Please provide your full name, e.g.: Michael Sm
2. **Email Address** Required
   Please provide your email address, e.g.: exampl
3. **Your Title and Organization** Required
   Please provide your relevant title and organizat
   City of Boulder, Colorado.

Mitigation Action Information

Below please enter information as it directly applies t

4. **Jurisdiction Name(s)** Required
   Please provide the full name of the jurisdiction wh
5. **Mitigation Activity Name** Required
   The Mitigation Activity Name should be concise ye
   south side of Main St.
6. **Mitigation Action Status** Required
   Please check the appropriate box. The Mitigation
   example, a 'Scoped' status suggests that the actio
   Progress' and advance toward 'Completion'.
   ☐ Identified ☐ Scoped ☐ In Progres
7. **Mitigation Action Source** Required
   Please check the appropriate box. The Mitigation
   refined the action or changing its status.
   ☐ Risk MAP Process
   ☐ Comprehensive Land Use Plan
   ☐ Capital Improvement Plan

   If this Mitigation Action was identified durin
   RiskMAP Project.
8. **Mitigation Plan Name**
   If known, please provide existing plan name. The
   Plan adopted by this jurisdiction(s). For example,
   Plan.

9. **Hazard Type** Required
   Select the main type of hazard affected by
   ☐ Erosion
   ☐ Extreme Temperatures
   ☐ Dam/Levee Failure
   ☐ Drought
   ☐ Earthquake
   ☐ Flood
   ☐ Hail
   ☐ Hu
   ☐ La
   ☐ Lig
   ☐ Se
   ☐ St
   ☐ Su
10. **Mitigation Category** Required
    Select the type of Mitigation effort being u
    ☐ Local Plans and Regulations
    These activities include government ac
    influence the way land and buildings a
    into such activities is one of the most e
    ☐ Structure and infrastructure Projec
    These actions involve modifying existin
    hazard or remove them from a hazard
    ☐ Community Identified Program
    These are community efforts to reduce
11. **Category Type and Subtype** Require
    Please see Part B, Reference Sheet for appl
    filling out this form. More complete and ac
    Type:
12. **Mitigation Action Commitment** R
    Please indicate the level of commitment as
    Mitigation Commitment seeks to clarify if t
    maintaining or strengthening something th
    seek to "Strengthen Existing" flood ordinan
    ☐ Maintain Existing
    ☐ Strengthen Existing
    ☐ Add New

Version 6/4/20

13. **Responsible Agency** Required
    Please indicate the Agency that will be responsible for this Mitigation Action. Check/circle only one.
    ☐ Building Code Department
    ☐ Community Development
    ☐ Emergency Management
    ☐ Planning
    ☐ Public Works
    ☐ State DOT
    ☐ Other _____
14. **Estimated Project Span**
    Enter the estimated start and completion of the project. Please use the mm/dd/yyyy format.
    Start: Completion:
15. **Estimated Cost**
    Enter the estimated cost for the project. The Estimated Cost for the mitigation activity does not have to be precise. Rather it could be used for general planning or budgeting purposes. Results may also allow officials associate actions with Hazard Mitigation Assistance resources where/when available.
    $
16. **Funding Source** Required
    Please indicate the expected funding source for the project. Check/circle only one.
    ☐ Community
    ☐ Private Sector, including Foundations
    ☐ Regional Water Management District
    ☐ County
    ☐ State
    ☐ FEMA
    ☐ Other Federal Agency _____
    ☐ Property Owner
    ☐ Other _____
17. **Funding Source Type** Required if Applicable. See Part B: Reference Sheet
    Please see Part B, Reference Sheet for applicable funding types.
18. **Additional Details**
    If you would like to enter additional information please fill in the space below.

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FEMA

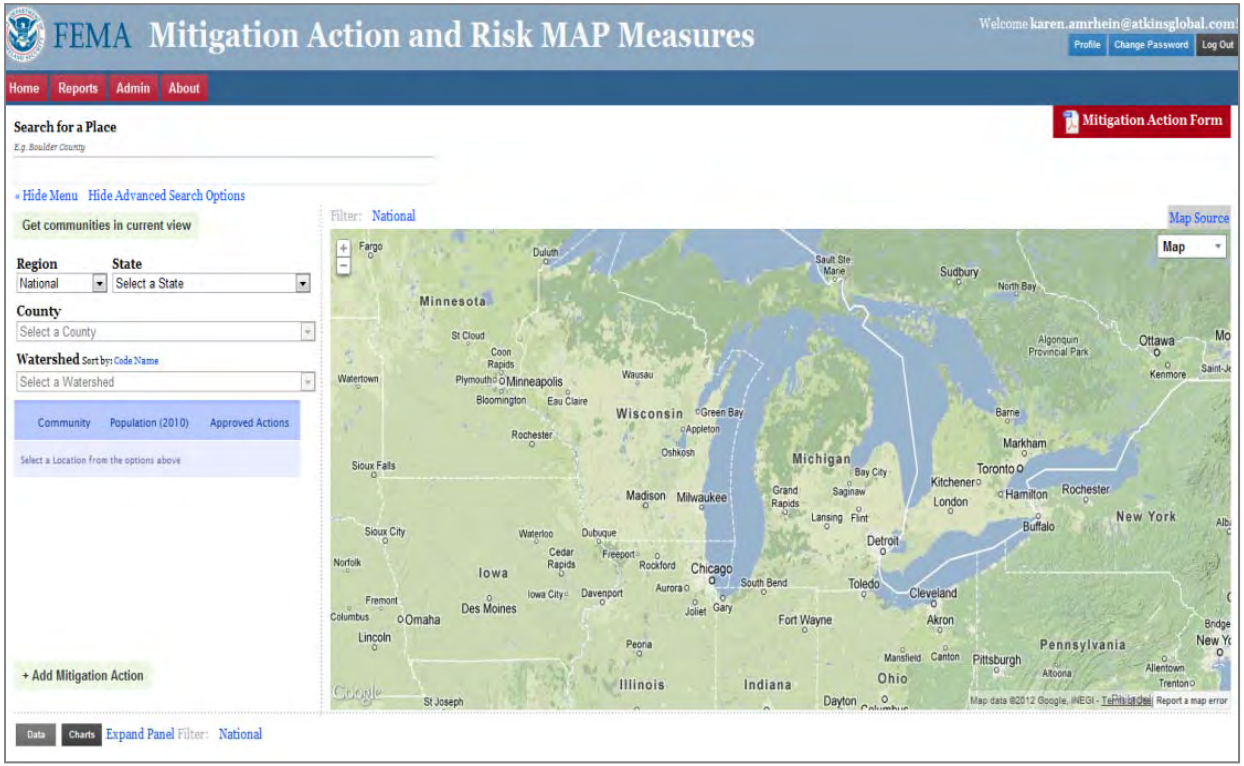
Interactive Session B

- 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

FEMA

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

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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Lake St Clair
Lake St Clair
Lake St Clair

ATTACHMENT F

WAYNE COUNTY HAZARD MITIGATION GRANT PROGRAM PROJECTS

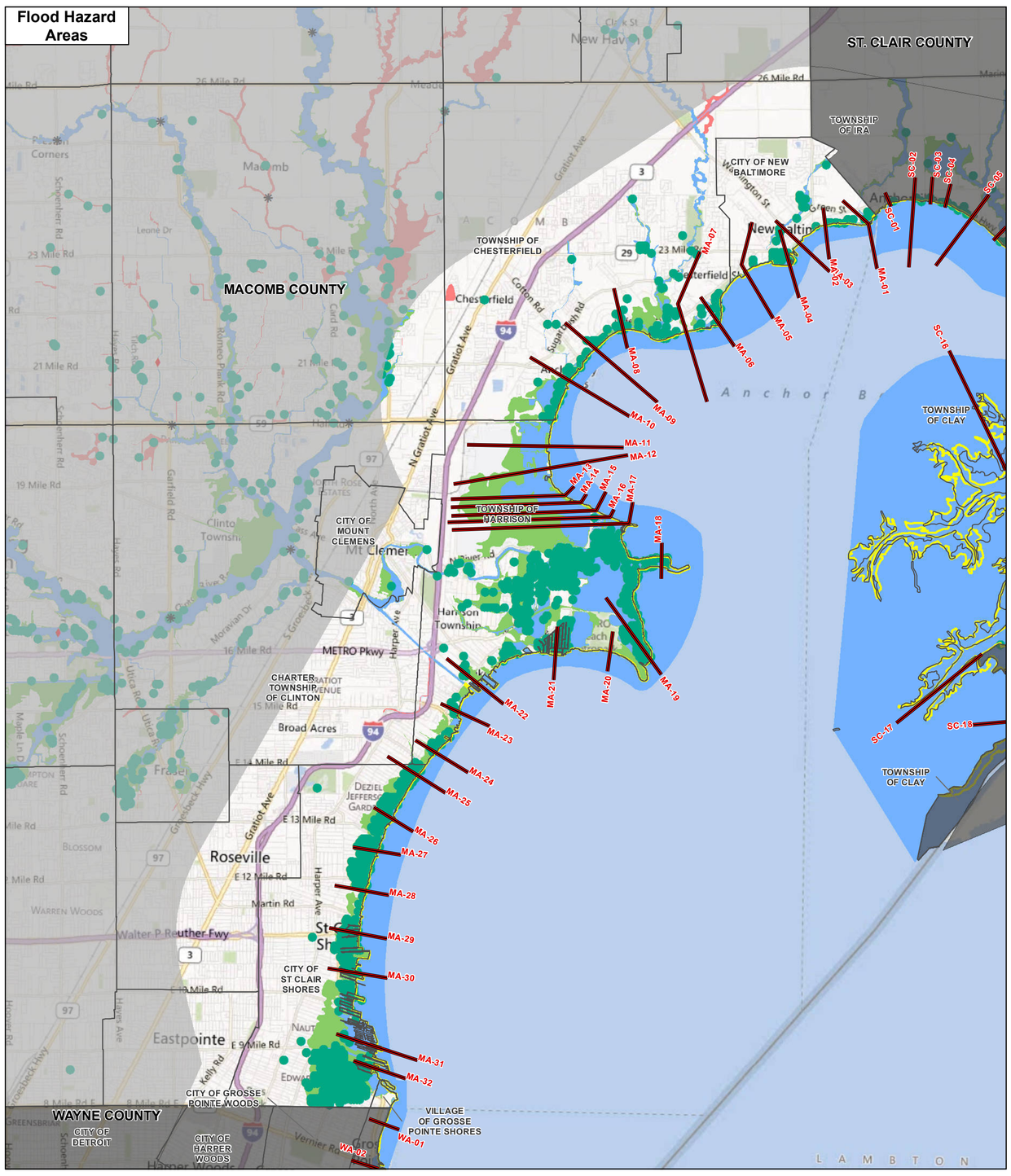
HAZARD MITIGATION GRANT PROGRAM (HMGP) PROJECTS
Wayne County, MI
As of July 2012

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; The placement of an early warning siren within area of city most affected by storm event. It will be centrally located and is a stand alone unit with battery backup. It will alert residents of impending dangerous weather conditions, such as high winds and possible tornadoes. A public info. program throughout community will instruct on the purpose of the siren and what to do when the warning is sounded in the city.	WAYNE	Closed
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)	City of River Rouge is proposing that a new outdoor early warning siren be installed at a second location in the City on the roof of a local elementary school. The Vortex is an outdoor, public warning siren, suited for community warning applications. The system provides six warning tones which are selected via a remote pair of wires or through a local control module. 5% set aside project.	WAYNE	Closed
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; A.Purchase and distribution of NOAA weather radios to every school, hospital and nursing care facility in Wayne County. B. Conducting 5 tornado shelter/spotter for employees of above and 5 spotter workshops for police,fire, and public services personnel in jurisdictions throughout the county.	WAYNE	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	100.1: Public Awareness and Education (Brochures, Workshops, Videos, etc.)	City of Detroit will hold several seminars throughout the city where a consultant will assist residents in determining the type of residential insurance they have, and inform them on the appropriate coverage they should have to better secure their property and lessen the effects of damage caused in future severe storm events.	WAYNE	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	100.1: Public Awareness and Education (Brochures, Workshops, Videos, etc.)	Duplication of hazard mitigation materials and distribution to all households via schools.5% set aside project.	WAYNE	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	602.1: Other Equipment Purchase and Installation	PURCHASE AND INSTALL PUBLIC, OUTDOOR WARNING SIREN	WAYNE	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	202.1: Elevation of Private Structures - Riverine	elevate 7 homes (7 - 12 structures)	WAYNE	Closed
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)	To provide coverage to and a alert system for a major business district for thru City of Detroit. The previous siren stopped working and is unable to be repaired because of age and deterioration. This project will allow us to replace this affected siren with a new siren.	WAYNE	Closed
1181	07/11/1997	Severe Storm(s)	SEVERE STORMS, TORNADOES,AND FLOODING	202.1: Elevation of Private Structures - Riverine	ELEVATION AND ACQUISITION OF FLOOD PRONE STRUCTURES IN THE CITY OF GIBRALTAR SUCH THAT THE FINISHED FLOORIS ABOVE THE 100-YEAR FLOODPLAIN ALSO FUNDED UNDER 1226.0040 PROP SITE INVENTORY NEEDS TO BE COMPLETED	WAYNE	Closed
1226	06/24/1998	Severe Storm(s)	SEVERE STORMS	202.1: Elevation of Private Structures - Riverine	THE CITY WILL BE USING THE OBLIGATED FUNDS TO ELEVATE 12 RESIDENTIAL STRUCTURES.	WAYNE	Closed
1237	08/05/1998	Severe Storm(s)	SEVERE STORMS AND HIGH WINDS	301.1: Shoreline Stabilization (Riprap, etc.)	THIS PROJECT IS TO STABILIZE SECTIONS OF THE LOWER ROUGE RIVER STREAMBANKS IN THE CITY OF DEARBORN, MICHIGAN. PROJECT CANCELLED DUE TO CONFLICTING PRIORITIES FOR THE CITY OF DEARBORN.	WAYNE	Void
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)	Early warning sirens in the event of a disaster.-ATUSCHER-05/30/2007 14:37 GMT	WAYNE	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)	Gauging station to provide early warning to emergency management personnel.-ATUSCHER-05/30/2007 15:55 GMT	WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	401.1: Water and Sanitary Sewer System Protective Measures		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	602.1: Other Equipment Purchase and Installation		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	601.1: Generators	This project is being fully deobligated and withdrawn.-MSAVAGE2-02/27/2008 19:42 GMT	WAYNE	Withdrawn
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	401.1: Water and Sanitary Sewer System Protective Measures		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	601.1: Generators		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	401.1: Water and Sanitary Sewer System Protective Measures		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	403.1: Stormwater Management - Culverts; 403.2: Stormwater Management - Diversions		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	405.1: Other Minor Flood Control		WAYNE	Approved
1346	10/17/2000	Severe Storm(s)	SEVERE STORMS AND FLOODING	401.1: Water and Sanitary Sewer System Protective Measures		WAYNE	Approved
1527	06/30/2004	Severe Storm(s)	SEVERE STORMS, TORNADOES, AND FLOODING	602.1: Other Equipment Purchase and Installation		WAYNE	Approved

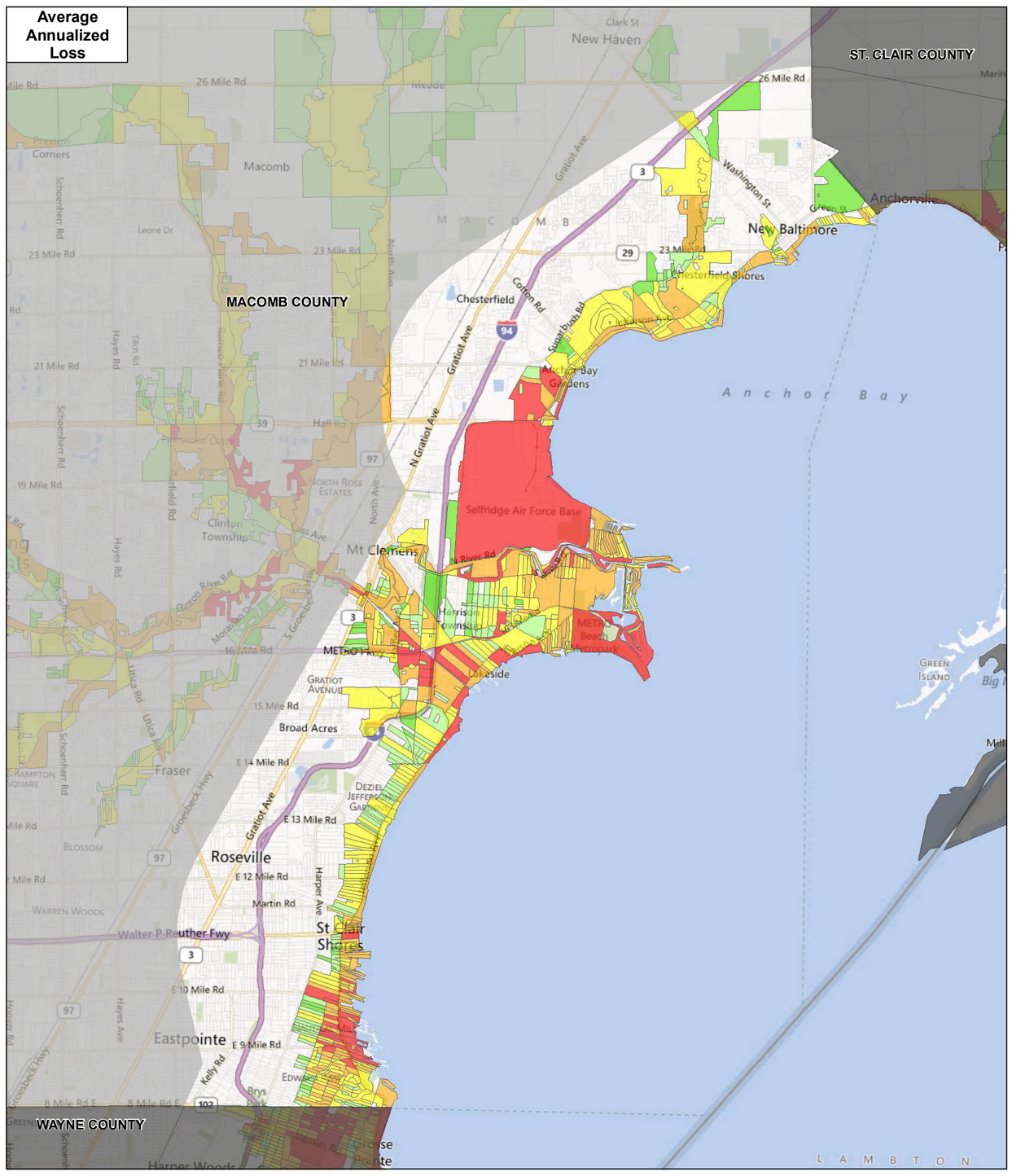
APPENDIX F

Final Discovery Maps

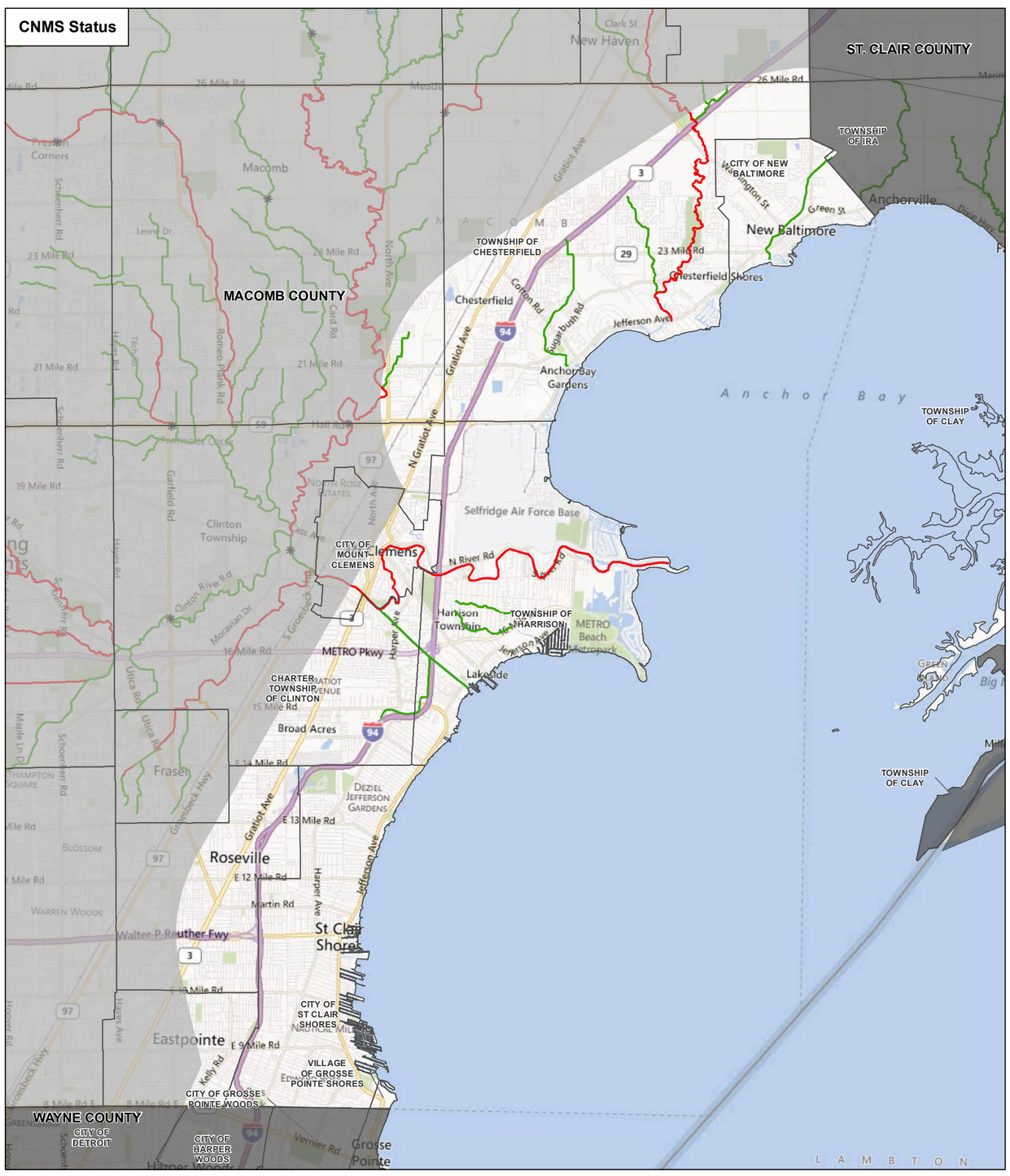
Flood Hazard Areas



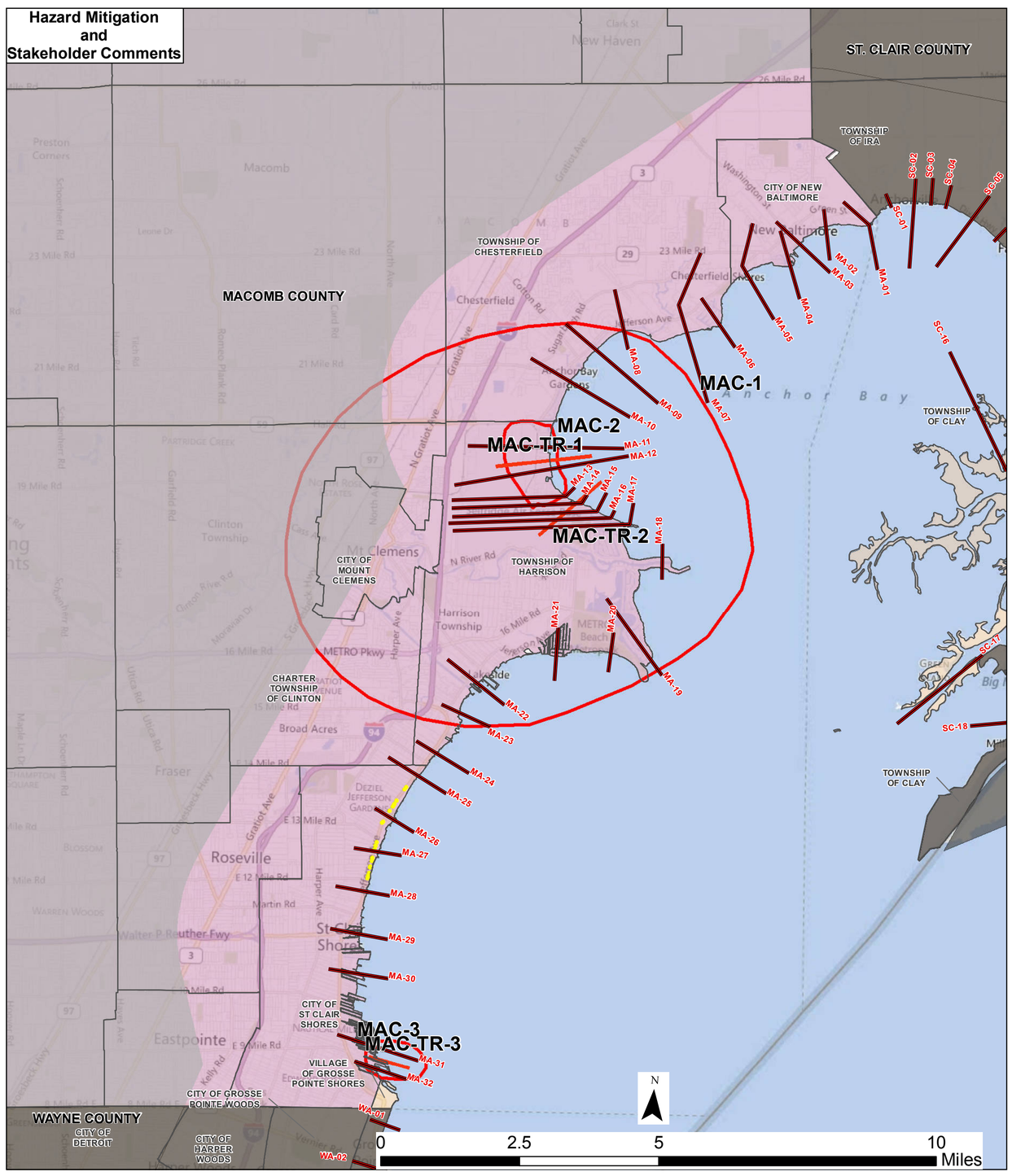
Average Annualized Loss



CNMS Status



Hazard Mitigation and Stakeholder Comments



MAP SYMBOLOGY

LEGEND

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

Effective Flood Hazards

- 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

- Unverified
- Unknown
- Valid

Comments

- Stakeholder Transect Comments
- Stakeholder General Comments

Hazard Mitigation Grant Program Projects

- Elevation Increase

Hazard Mitigation Plan Status

- Adopted
- Expired
- Not Included
- Pending Adoption

COASTAL STUDY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
Final Discovery Map

LAKE ST. CLAIR COASTAL STUDY

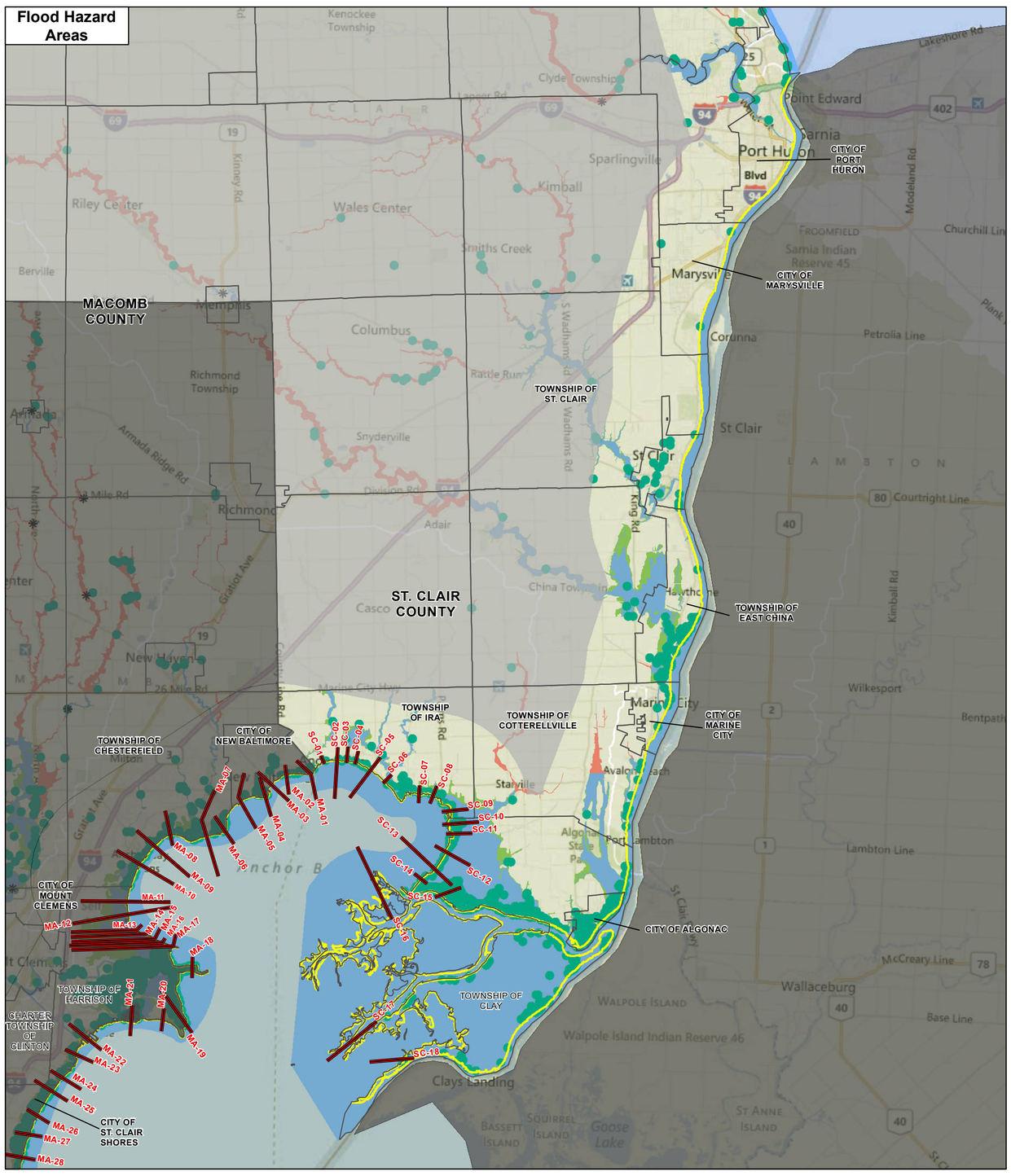
MACOMB COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

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

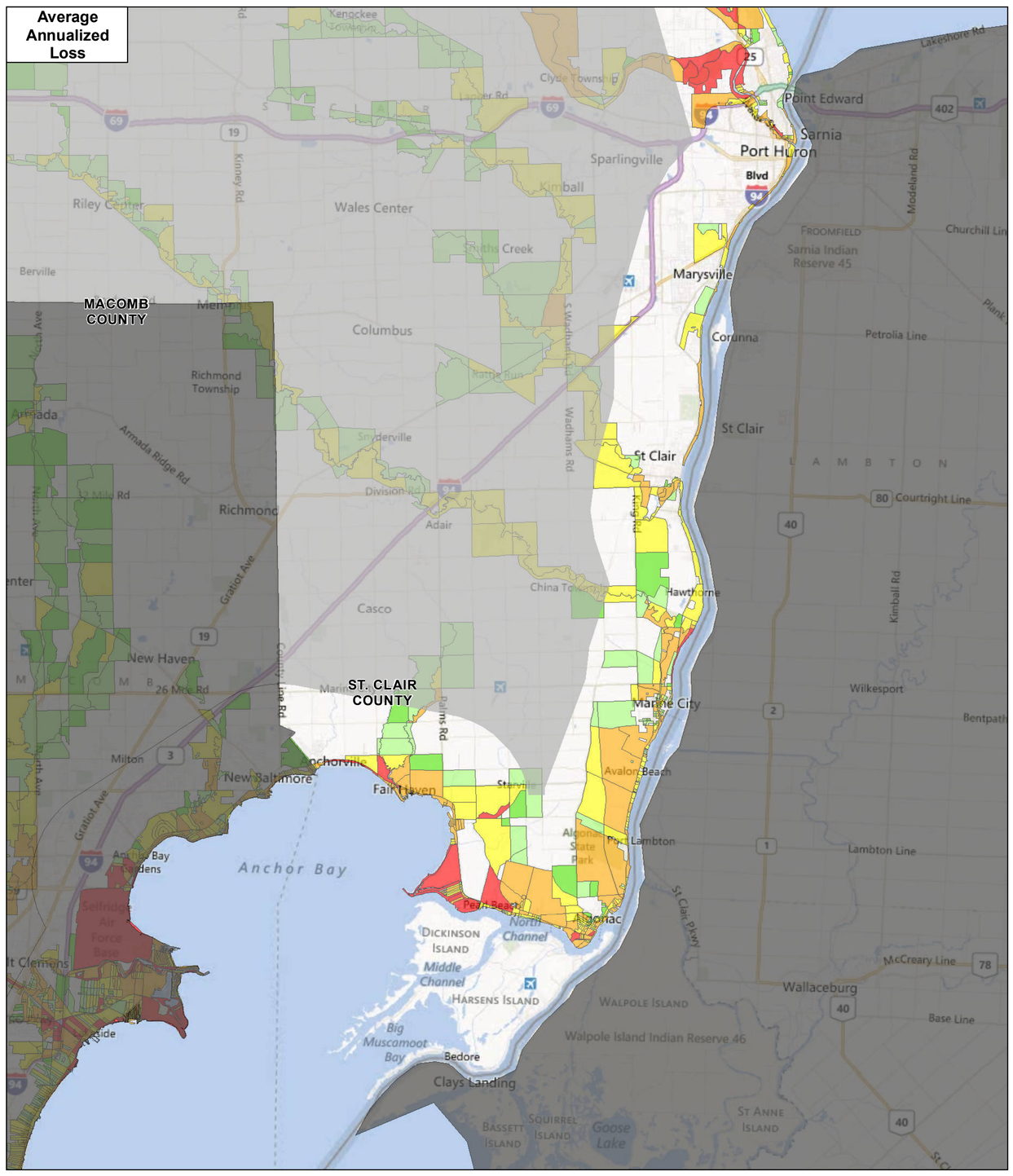
STARR

FEMA

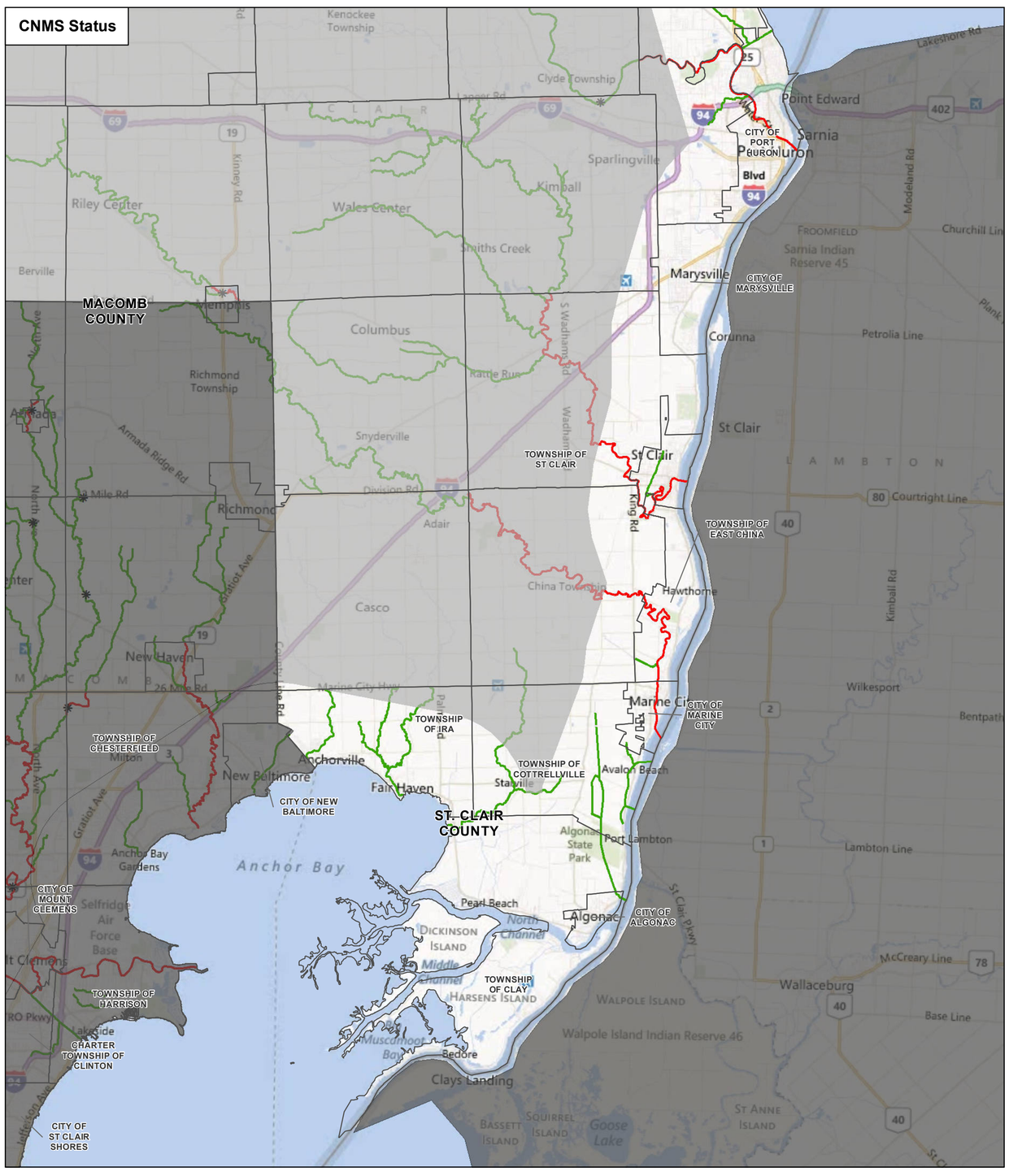
Flood Hazard Areas



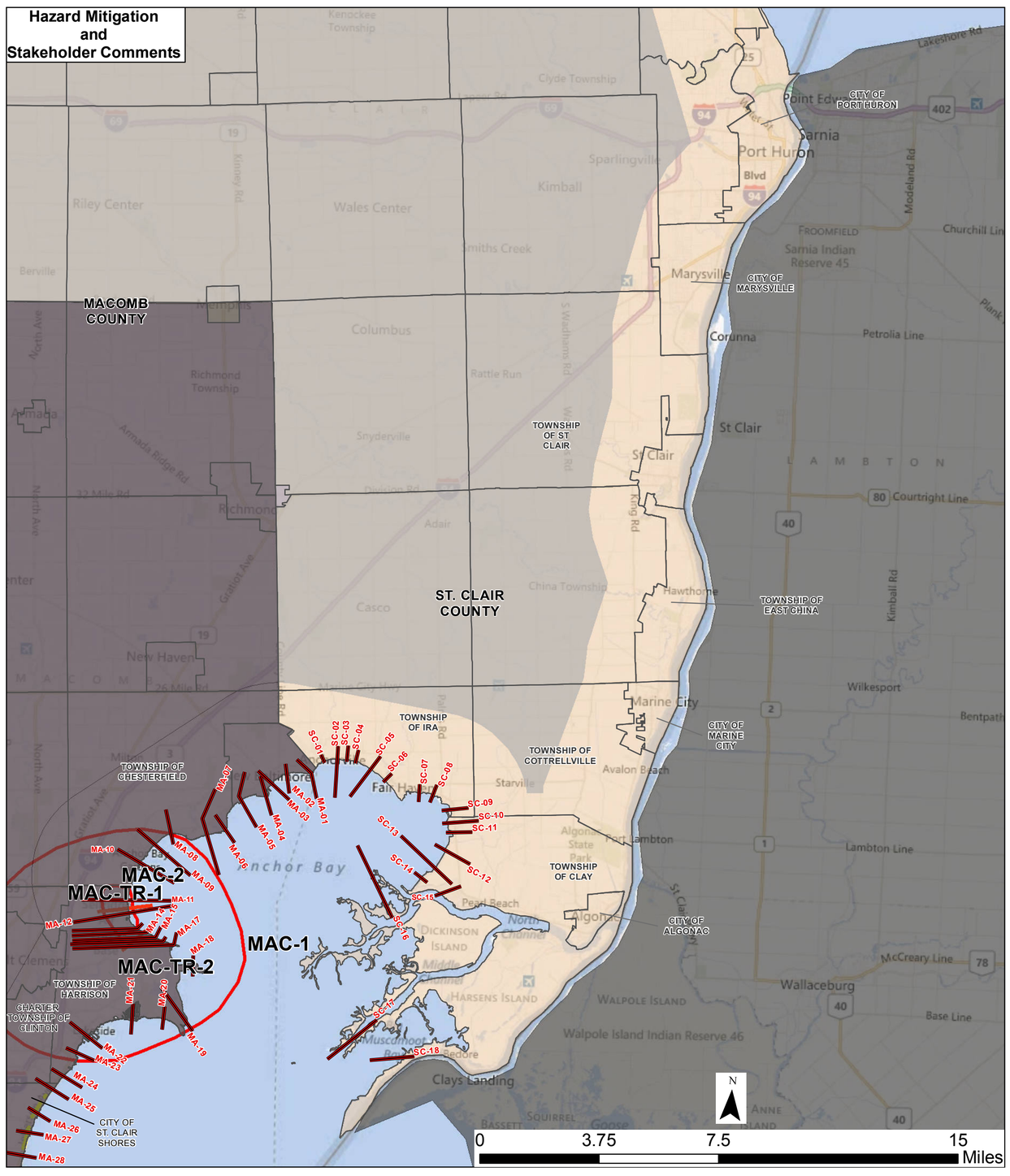
Average Annualized Loss



CNMS Status



Hazard Mitigation and Stakeholder Comments



MAP SYMBOLOGY

LEGEND

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

Effective Flood Hazards

- 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

- Unverified
- Unknown
- Valid

Comments

- Stakeholder Transect Comments
- Stakeholder General Comments

Hazard Mitigation Grant Program Projects

- Elevation Increase

Hazard Mitigation Plan Status

- Adopted
- Expired
- Not Included
- Pending Adoption

COASTAL STUDY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
Final Discovery Map

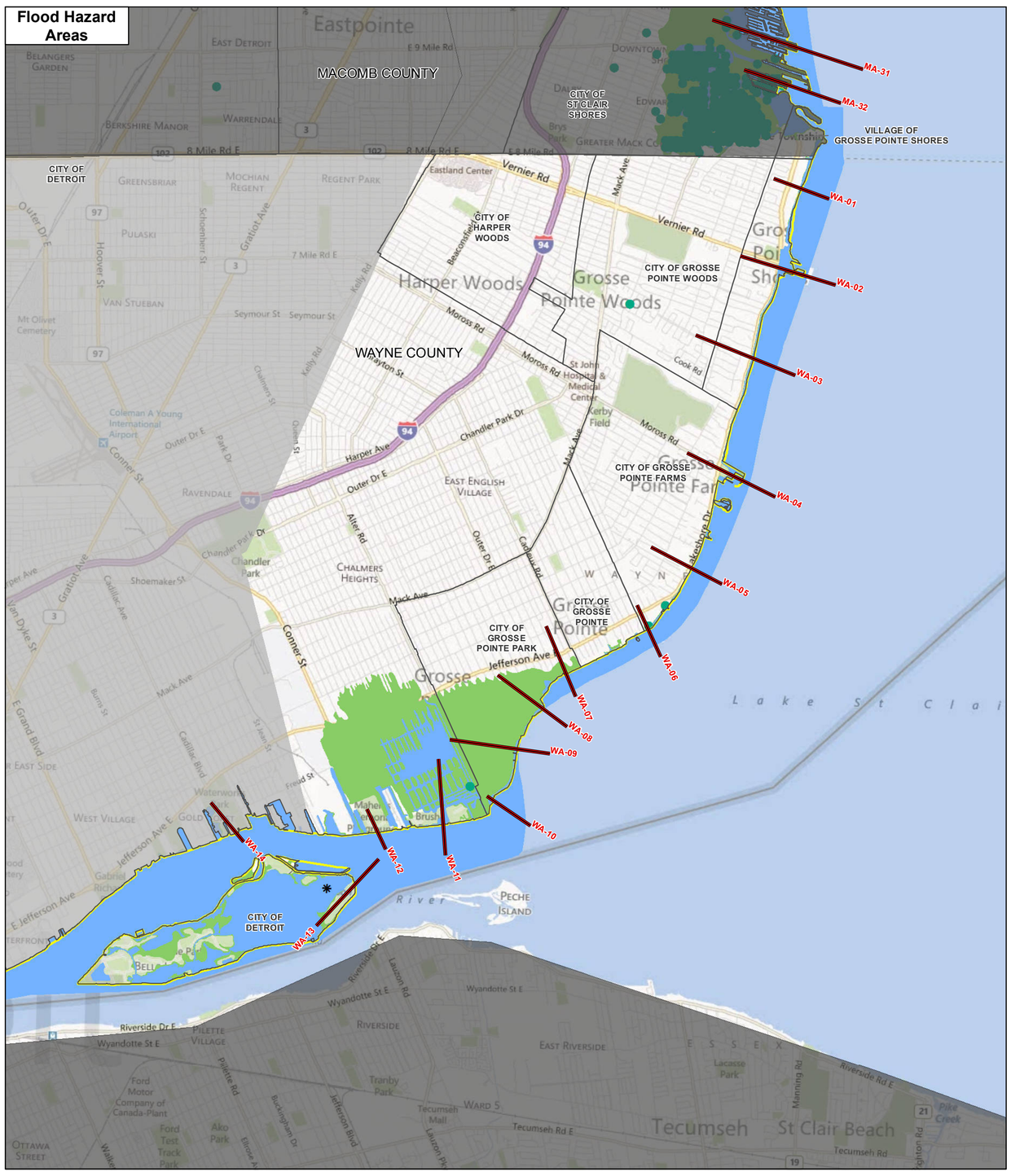
LAKE ST. CLAIR COASTAL STUDY

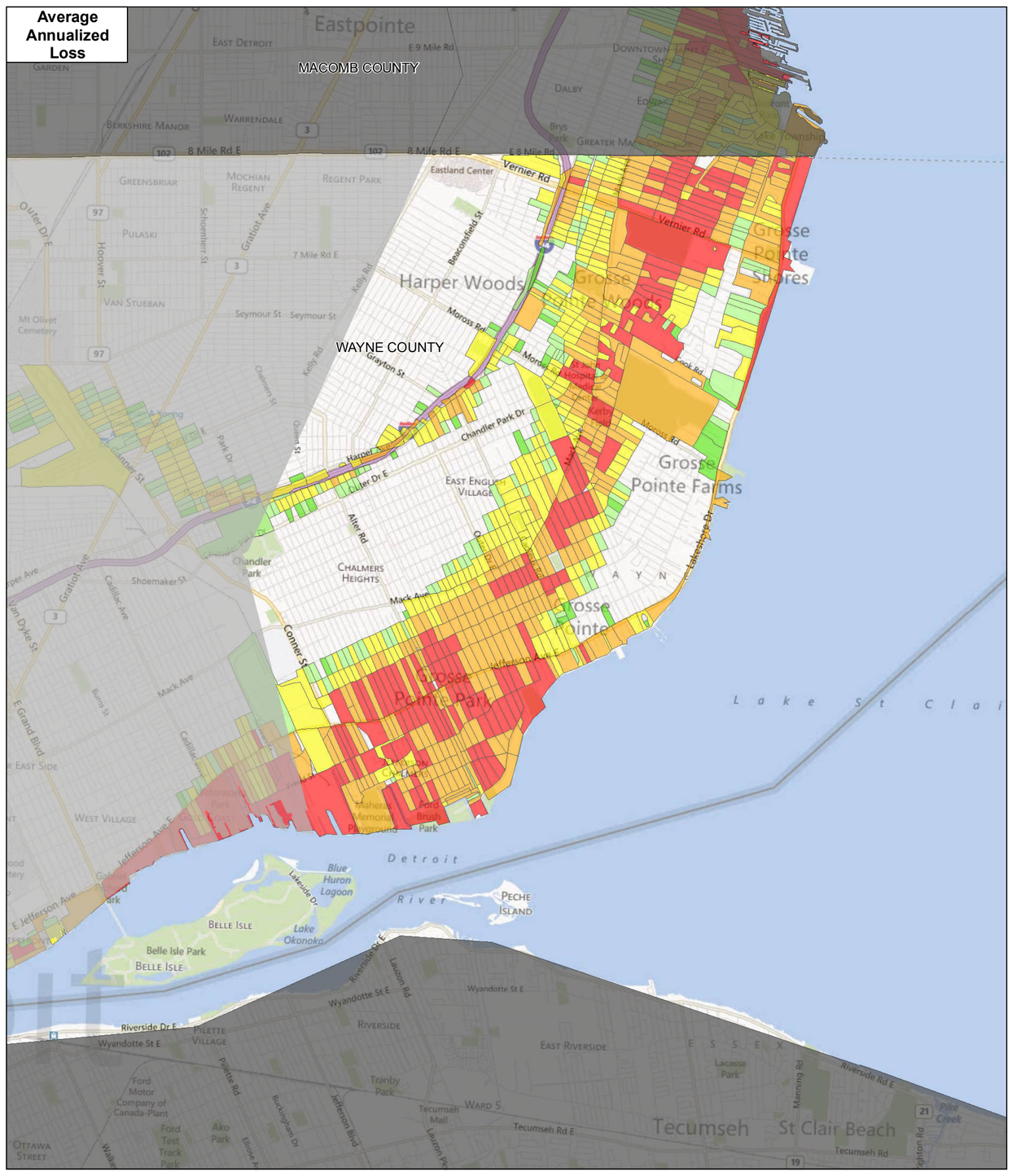
ST. CLAIR COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

St. Clair County
Algonac, City of
Clay, Township of
Cottrellville, Township of
East China, Township of
Ira, Township of
Marine City, City of
Marysville, City of
Port Huron, City of
St. Clair, City of
St. Clair, Township of

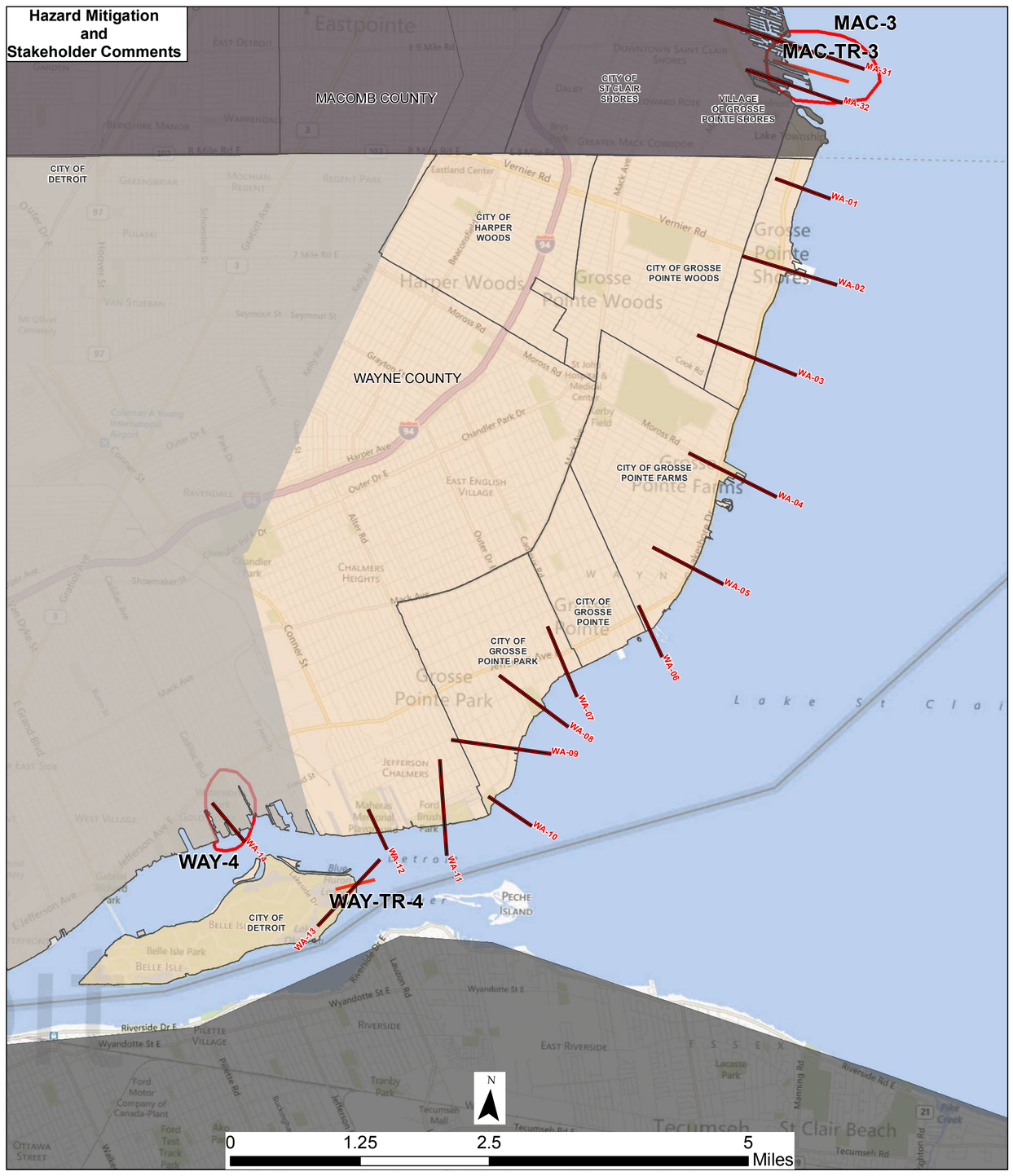
STARR

FEMA









MAP SYMBOLOGY

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

Effective Flood Hazards

- 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

- Unverified
- Unknown
- Valid

Comments

- Stakeholder Transect Comments
- Stakeholder General Comments

Hazard Mitigation Grant Program Projects

- Elevation Increase

Hazard Mitigation Plan Status

- Adopted
- Expired
- Not Included
- Pending Adoption

COASTAL STUDY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM
Final Discovery Map

LAKE ST. CLAIR COASTAL STUDY

WAYNE COUNTY, MICHIGAN COASTAL STUDY COMMUNITIES

Wayne County
Detroit, City of
Grosse Pointe Farms, City of
Grosse Pointe Park, City of
Grosse Pointe Shores, Village of
Grosse Pointe Woods, City of
Grosse Pointe, City of
Harper Woods, City of

STARR

FEMA

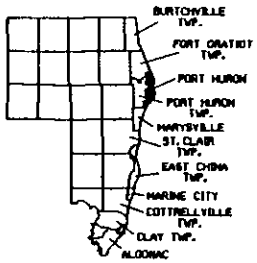
APPENDIX G

High-Risk Erosion Figures (MDEQ)

CITY OF PORT HURON

HIGH RISK EROSION AREAS

ST. CLAIR COUNTY



HIGH RISK EROSION AREAS

60'/105' THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE. THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.

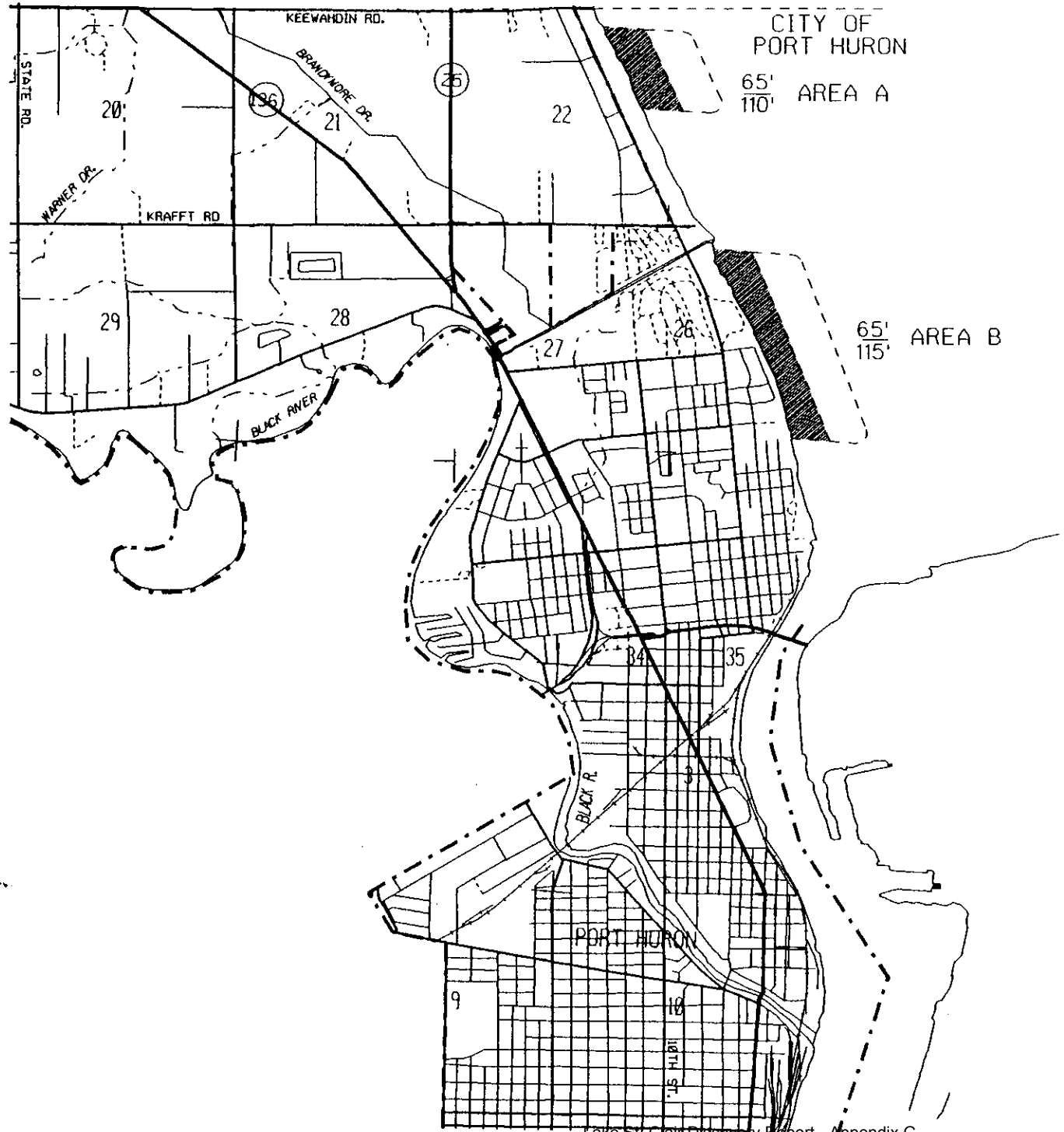
HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY PART 323, OF THE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT OF 1994, P.A. 451 AS AMENDED, AS BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO RECEDE AN AVERAGE OF ONE FOOT OR MORE A YEAR.

SOURCE

STATE OF MICHIGAN PART 323 OF ACT 451 RATE MAPS

06-26-98



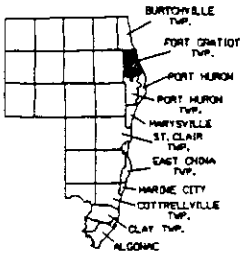
MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND AND WATER MANAGEMENT DIVISION
P.O. BOX 30458
LANSING, MI 48909-7958
(517) 373-1950

FORT GRATIOT TOWNSHIP

HIGH RISK EROSION AREAS

ST. CLAIR COUNTY



HIGH RISK EROSION AREAS

60'/185' THE NUMBER REPRESENTS, IN FEET, THE 30 YEAR PROJECTED RECESSION DISTANCE. THE NUMBER REPRESENTS, IN FEET, THE 60 YEAR PROJECTED RECESSION DISTANCE.

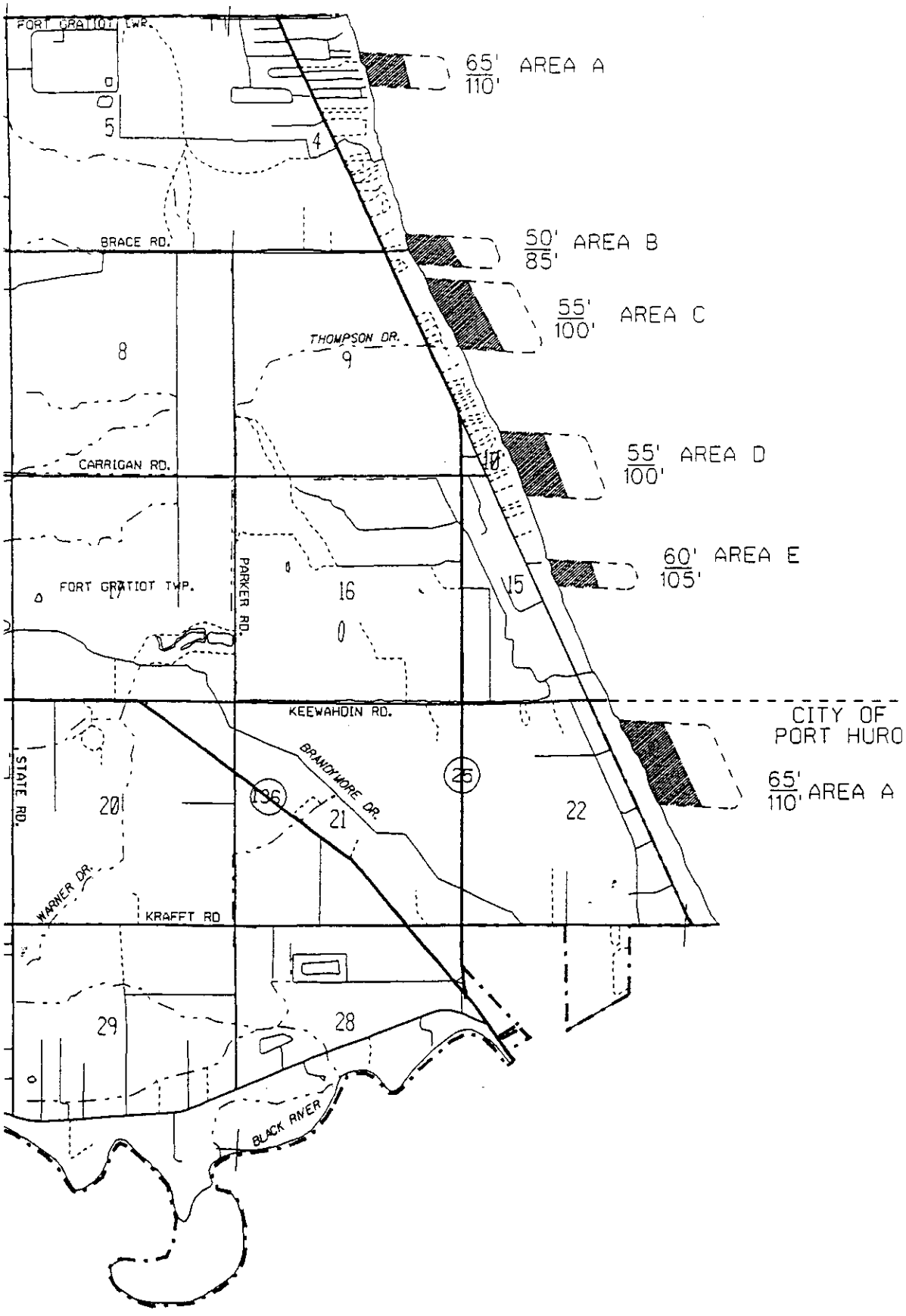
HIGH RISK EROSION AREA (shading alongshore)

THESE AREAS ARE LEGALLY DEFINED BY PART 323, OF THE NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT OF 1994, P.A. 451 AS AMENDED, AS BEING GREAT LAKES SHORELAND AREAS DOCUMENTED TO RECEDE AN AVERAGE OF ONE FOOT OR MORE A YEAR.

SOURCE

STATE OF MICHIGAN PART 323 OF ACT 451 RATE MAPS

06-26-98



N

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
LAND AND WATER MANAGEMENT DIVISION
P.O. BOX 30458
LANSING, MI 48909-7958

0 2640 5280

APPENDIX H

Mitigation Action Form

Mitigation Action Form

Contact Information

Please enter the primary contact associated with this Mitigation Action.

1. **Full Name:** _____ **Email Address :** _____

2. **Title and Organization :** _____

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

Mitigation Action Information

4. **Mitigation Activity Name** _____

5. **Describe the natural hazard and mitigation action/strategy:**

_____

_____

_____

_____

6. **Hazard Type?**

☐ *Flood* ☐ *Erosion* ☐*Storm Surge* ☐ *Earthquake* ☐ *Drought* ☐ *Hail* ☐ *Dam Levee Failure* ☐ *Hurricane*
☐ *Landslide* ☐ *Lighting* ☐ *Severe Winter Storm* ☐ *Subsidence* ☐ *Tornado* ☐ *Tsunami* ☐ *Wildfire*
☐ *Wind* ☐ *Multiple Hazards* ☐ *Other*_____

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

☐ *Local Plans and Regulations* ☐ *Structure and Infrastructure Projects* ☐ *Community Identified Programs*
*Category*_____ *Sub Type*_____

8. **How was this action/strategy identified?**

☐ *Risk Map Process* ☐ *HMA Database* *Other*_____
☐ *Comprehensive Land Use Plan* ☐ *Local Mitigation Plan*
☐ *Capital Improvement Plan* ☐ *USACE Silver Jackets*

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

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

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

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

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

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

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

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

Category Types and SubTypes

Use for answering Question 7.

Local Plans and Regulations

- ☐ Building Codes
  - o Enforcement
  - o International Building Code
  - o International Residential Code
  - o Higher Standards
  - o Post Disaster Code Enforcement
  - o Other
- ☐ Capital Improvement Plan
- ☐ Coastal Zone Management
- ☐ Comprehensive Plan
- ☐ Easements
- ☐ Floodplain Management
- ☐ Master Plan
- ☐ Open Space Preservation
- ☐ Setbacks
- ☐ Stormwater Management
- ☐ Subdivision Ordinance
- ☐ Zoning
- ☐ Other

Community Identified Program

- ☐ Funding Mechanisms for Local Risk Reduction
- ☐ Incentives for Local Risk Reduction
- ☐ Mitigation Program
  - o Fire Protection
  - o Stream Maintenance
  - o Tree Management
  - o Other

Structure and Infrastructure Projects

- ☐ Acquisition
- ☐ UHI Albedo Enhancement
- ☐ Elevation
  - o Structure
  - o Utilities
  - o Other
- ☐ Flood Control/Management
  - o Culvert
  - o Bridge Expansion
  - o Detention Basin
  - o Dams
  - o Drainage Improvements
  - o Green Roofs
  - o Jetties
  - o Levees
  - o Permeable Paving
  - o Rain Gardens
  - o Revetments
  - o Seawalls
  - o Other
- ☐ Forest or Vegetation Management
- ☐ Natural Systems
  - o Beach Nourishment
  - o Dune Rehabilitation/Protection
  - o Ground Water Recharge
  - o Sediment Trapping Vegetation
  - o Wetlands Restoration
  - o Other
- ☐ Retrofit
  - o Structural
  - o Non-Structural
  - o Other
- ☐ Safe Room Construction
- ☐ Soil Stabilization or Erosion Control
  - o Sloping/Grading
  - o Vegetation
  - o Terracing
  - o Rip Rap
  - o Geotextile Fabric
- ☐ Underground Utilities
- ☐ Other