APPENDIX K
Berrien and VanBuren County, Michigan
Discovery Report
Discovery Report
Great Lakes Coastal Flood Study
Lake Michigan
State of Michigan

Berrien County and Van Buren County
County-based Report

February 2013
SUBMITTED BY: 

STAR

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

Submitted: February 2013
### Project Area Community List

<table>
<thead>
<tr>
<th>Berrien County</th>
<th>Berrien County (cont.)</th>
<th>Van Buren County</th>
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<tr>
<td>Benton Charter, Township of</td>
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<tr>
<td>Michiana, Village of</td>
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</tbody>
</table>

This list includes all communities within the Project Area covered by this report for the Great Lakes Coastal Study under consideration for new Federal Emergency Management Agency (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) products and datasets, which may include Flood Insurance Studies (FISs) and Flood Insurance Rate Maps (FIRMs). Not all communities will receive new/updated FEMA Risk MAP products and datasets or FISs and FIRMs.
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<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<td>AAL</td>
<td>Average Annualized Loss</td>
</tr>
<tr>
<td>CAV</td>
<td>Community Assistance Visit</td>
</tr>
<tr>
<td>CBRS</td>
<td>Coastal Barrier Resources System</td>
</tr>
<tr>
<td>CID</td>
<td>Community Identification Number</td>
</tr>
<tr>
<td>CIS</td>
<td>Community Information System</td>
</tr>
<tr>
<td>CMAG</td>
<td>Coastal Management Assistance Grant</td>
</tr>
<tr>
<td>C-MAN</td>
<td>Coastal Marine Automated Network</td>
</tr>
<tr>
<td>CNMS</td>
<td>Coordinated Needs Management Strategy</td>
</tr>
<tr>
<td>CO-OPS</td>
<td>Center for Operational Oceanographic Products and Services</td>
</tr>
<tr>
<td>CRS</td>
<td>Community Rating System</td>
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<tr>
<td>DFO</td>
<td>Department of Fisheries and Oceans</td>
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<tr>
<td>FEMA</td>
<td>Federal Emergency Management Agency</td>
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<tr>
<td>FIPS</td>
<td>Federal Information Processing Standards</td>
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<tr>
<td>FIRM</td>
<td>Flood Insurance Rate Map</td>
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<tr>
<td>FIS</td>
<td>Flood Insurance Study</td>
</tr>
<tr>
<td>GLCRG</td>
<td>Great Lakes Coastal Restoration Grant</td>
</tr>
<tr>
<td>HAZUS-MH</td>
<td>Multi-Hazard Risk Assessment and Loss Estimation Software Program</td>
</tr>
<tr>
<td>HWM</td>
<td>High Water Mark</td>
</tr>
<tr>
<td>HUC8</td>
<td>Hydrologic Unit Code 8</td>
</tr>
<tr>
<td>LOMA</td>
<td>Letter of Map Amendment</td>
</tr>
<tr>
<td>LOMC</td>
<td>Letter of Map Change</td>
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<tr>
<td>LOMR</td>
<td>Letter of Map Revision</td>
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<tr>
<td>LOMR-F</td>
<td>Letter of Map Revision based on Fill</td>
</tr>
<tr>
<td>MLI</td>
<td>Midterm Levee Inventory</td>
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<tr>
<td>NDBC</td>
<td>National Data Buoy Center</td>
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<tr>
<td>NFIP</td>
<td>National Flood Insurance Program</td>
</tr>
<tr>
<td>NGDC</td>
<td>National Geophysical Data Center</td>
</tr>
<tr>
<td>NID</td>
<td>National Inventory of Dams</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NWS</td>
<td>National Weather Service</td>
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<td>Risk MAP</td>
<td>Risk Mapping, Assessment, and Planning</td>
</tr>
<tr>
<td>SFHA</td>
<td>Special Flood Hazard Area</td>
</tr>
<tr>
<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td>USGS</td>
<td>U.S. Geological Survey</td>
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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 (CLCFS) will incorporate modern analysis of historic storm and high water events and provide for updated flood risk information serving United States communities having shoreline along the Great Lakes. The storm surge study is one of the most extensive coastal storm surge analyses to date, encompassing coastal floodplains in the eight States with coastlines on the Great Lakes.
An updated coastal flood study is needed to obtain a better estimate of coastal flood hazards on
the Great Lakes. The current, effective FIRMs are outdated primarily due to the age of data and
the coastal methodologies used in producing them. Major changes in National Flood Insurance Program
(NFIP) policies and methodologies have been implemented since the effective date of many flood
insurance studies in the area, creating the need for an update that will reflect a more detailed and complete hazard
determination.

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

**ii. Purpose of Great Lakes Discovery**

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

The Discovery process also helps FEMA better identify the types of datasets or products that are useful at the local level, especially as it relates to identifying new mitigation strategies and actions and for use in local planning efforts. Products that may be available to communities as a result of this Great Lakes flood study include updated FIRMs, coastal flood risk products, calibrated models for storm surge and wave analysis on each of the lakes, and accurate depictions of water level and wave response on each lake occurring during hundreds of actual events. The type of product a community receives is dependant not only on the coastal flood study analysis results, but also on the type of data, local or nationally, that is available.
The following section describes the Coastal Flood Risk Products that a community may receive, as well as some products that are under development for the Great Lakes study areas.

iii. Coastal Flood Risk Products

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

The three products are:

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

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

Changes Since Last FIRM (CSLF)

- Identify Areas and Types of Flood Zone Change:
  - Compares current effective (previous) with proposed (new) flood hazard mapping
- Flood zone changes are categorized and quantified
• Provide Study/Reach Level Rationale for Changes Including:
  o Methodology and assumptions
  o Changes of model inputs or parameters (also known as Contributing Engineering Factors).

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

• Reflect total depth (i.e. stillwater and waves). Will be created for the 1% frequency event of the engineering studies performed and as appropriate for the data. Wave runup areas may not be applicable.

• Created using the regulatory mapping and associated zone breaks as input

**Flood Risk Assessment (HAZUS-MH)**

• Hazard-United States Multi Hazard (HAZUS-MH) combines science, engineering and mathematical modeling with GIS technology to estimate losses of life and property—and shows those losses on a map

• HAZUS-MH estimates impacts to the physical, social, and economic vitality of a community from earthquakes, hurricane, winds, and floods

• Coastal flood risk assessments will be similar to riverine, but will use coastal depth grids as input for refined analysis.

• HAZUS-MH analysis and data can support adoption of high regulatory standards for structures in high loss areas

• HAZUS-MH results can help to provide justification to find mitigation projects to protect citizens and properties from losses during future coastal flood events

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

• Storm Response Erosion Data: Dataset is expected to contain the results from erosion analysis in response to the 1-percent-annual chance flood event
• Shoreline Feature Data: Dataset was developed by the USACE and contains primary and secondary land use tables, as well as coastline type, materials, and vegetation. The current dataset contains data at one-mile spacing. The dataset does not include field-based reconnaissance or sediment/subsurface soil collection.

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

II. Stakeholder Communication and Coordination

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

i. Lake Michigan Discovery Stakeholder Coordination

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

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

Discovery Meeting invitations were sent to local community and county stakeholders within the Berrien and Van Buren Counties portions of the Lake Michigan Coastal Flood Study project. In addition, an email invitation was sent to a larger list of stakeholders, including but not limited to other federal agencies, universities, watershed groups, Great Lakes associations, technical stakeholders, and emergency management agencies.
Representatives from local governments, including cities, townships, and villages are considered fundamental stakeholders in this process because they have been elected or appointed to represent the interests of the residents of the Project Area. See Lake Michigan Basin-wide report for a complete list of the stakeholders invited to the Discovery Meeting.

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

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

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

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

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

III. Berrien and Van Buren Counties Discovery Meeting

The Discovery Meeting for Berrien and Van Buren Counties coastal communities was held on September 10, 2012 in St. Joseph, MI. Communities potentially affected by coastal flooding were invited to the Discovery Meeting. The purpose of this meeting was to facilitate discussion
about study needs, mitigation project needs, desired compliance support, and local flood risk awareness efforts.

The objectives of the Discovery Meeting included:

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

The Discovery Meeting presentations included the following information:

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

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

Geospatial Data:

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

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1 CBRS consists of the undeveloped coastal barriers and other areas located on the coasts of the United States that are identified and generally depicted on a series of maps. CBRS areas are ineligible for most new Federal expenditures and financial assistance.
- Coordinated Needs Management Strategy (CNMS)\(^2\) Data
- Proposed Coastal Transect Locations
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Shoreline
- Streams
- United States Geologic Survey (USGS) Gages
- Watershed Boundaries

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

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

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\(^2\) CNMS is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities. CNMS defines an approach and structure for the identification and management of flood hazard mapping needs that provides support to data-driven planning and the flood map update investment process in a geospatial environment. CNMS makes information related to mapping needs readily accessible and more usable. Currently, CNMS only captures riverine needs. It is expected coastal needs will be captured in this system in the future.
All comments provided during the Discovery Meeting on the draft Discovery Map and transect locations have been compiled into Table 1 below.

**Table 1: Stakeholder General and Transect Location Comments**

<table>
<thead>
<tr>
<th>State</th>
<th>County</th>
<th>Community</th>
<th>FIPS</th>
<th>CID</th>
<th>Comment</th>
<th>Type</th>
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<tbody>
<tr>
<td>Michigan</td>
<td>Berrien</td>
<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Refer to City of St. Joseph Coastal Study for areas north and south of Benton Harbor.</td>
<td>General Comment</td>
</tr>
<tr>
<td>Michigan</td>
<td>Berrien</td>
<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Shift transect to the south.</td>
<td>Transect Comment</td>
</tr>
<tr>
<td>Michigan</td>
<td>Berrien</td>
<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Suggest adding a transect between BER22 and BER23.</td>
<td>Transect Comment</td>
</tr>
</tbody>
</table>
Discovery meeting minutes, sign in sheets, PowerPoint presentation, and correspondence have been included in the Attachment F, Berrien and Van Buren Counties Discovery Meeting Documents.

IV. Summary of Data Analysis

During the Discovery phase of the Lake Michigan Coastal Flood Study project, a massive collection of tabular and spatial data was conducted for all communities from Federal and State sources. In addition, information was collected through phone conversations, information exchange session conference calls, and the Discovery Coastal Data Request forms. Section III above lists the types of data collected for the study area prior to the Discovery Meeting. The information that follows in Table 2 is divided into two sections: one section listing data that can be used for Risk MAP products and the other listing information that helped the study team form a better understanding of the Project Area, specifically as it may relate to mitigation and planning interests.

<table>
<thead>
<tr>
<th>Data Types</th>
<th>Deliverable/Product</th>
<th>Source</th>
<th>Date of Data Collection</th>
<th>Level</th>
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<tr>
<td>Average Annualized Loss Data (AAL)</td>
<td>Discovery Map</td>
<td>Federal Emergency Management Agency (FEMA)</td>
<td>June 2012</td>
<td>Nationwide</td>
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<tr>
<td>Census Blocks</td>
<td>Discovery Map</td>
<td>U.S. Census Bureau</td>
<td>June 2012</td>
<td>Countywide</td>
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<tr>
<td>Contacts</td>
<td>Discovery Report</td>
<td>Local Community Websites, State/FEMA updates</td>
<td>June 2012</td>
<td>Countywide</td>
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<tr>
<td>Community Assistance Visits (CAVs)</td>
<td>Discovery Report</td>
<td>FEMA Community Information System (CIS)</td>
<td>July 2012</td>
<td>Countywide</td>
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<tr>
<td>Community Rating System (CRS)</td>
<td>Discovery Report</td>
<td>FEMA’s “Community Rating System Communities and Their Classes”</td>
<td>July 2012</td>
<td>Nationwide</td>
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<td>Comprehensive Plans</td>
<td>Discovery Report</td>
<td>Local Community Websites</td>
<td>July 2012</td>
<td>Countywide</td>
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<td>Coastal Barrier Resources System (CBRS)</td>
<td>Discovery Map</td>
<td>U.S. Fish and Wildlife Service</td>
<td>July 2012</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Coastal Construction</td>
<td>To Be Collected</td>
<td>U.S. Army Corps of Engineers (USACE)</td>
<td>TBD</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Data Types</td>
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<td>Date of Data Collection</td>
<td>Level</td>
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<tr>
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<tr>
<td>Coordinated Needs Management Strategy (CNMS)</td>
<td>Discovery Map</td>
<td>FEMA</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Critically Erosion Beach Areas</td>
<td>To Be Collected</td>
<td>To Be Collected</td>
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</tr>
<tr>
<td>Critical Facilities</td>
<td>Discovery Report</td>
<td>Local Mitigation Plan</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Dams</td>
<td>Discovery Report</td>
<td>USACE, National Inventory of Dams, Flood Insurance Rate Map (FIRM) Database</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Declared Disasters</td>
<td>Discovery Report</td>
<td>FEMA’s “Disaster Declarations Summary”</td>
<td>June 2012</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Demographics, Industry</td>
<td>Discovery Report</td>
<td>U.S. Census Bureau, Local Mitigation Plans</td>
<td>June 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Effective Floodplains</td>
<td>Discovery Map</td>
<td>FEMA Map Service Center and Mapping Information Platform</td>
<td>June 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Hazard Mitigation Plans and Status</td>
<td>Discovery Report</td>
<td>Local Mitigation Plans</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Hazard Mitigation Assistance Program Grants Received</td>
<td>Discovery Report</td>
<td>FEMA’s “Hazard Mitigation Program Summary”, Community Input</td>
<td>June 2012</td>
<td>Nationwide</td>
</tr>
<tr>
<td>Hazard Mitigation Projects</td>
<td>Discovery Report</td>
<td>Local Mitigation Plans</td>
<td>July 2012</td>
<td>Countywide</td>
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<td>High Water Marks</td>
<td>To Be Collected</td>
<td>To Be Collected</td>
<td>TBD</td>
<td>Countywide</td>
</tr>
<tr>
<td>Historical Flooding</td>
<td>Discovery Report</td>
<td>Effective Flood Insurance Study (FIS), Local Mitigation Plans</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Historical Storm Events</td>
<td>Discovery Report</td>
<td>Effective FIS, Local Mitigation Plans</td>
<td>July 2012</td>
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</tr>
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### Data Types

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<td>Discovery Report</td>
<td>FEMA’s “Public Assistance Subgrantee Summary”</td>
<td>June 2012</td>
<td>Nationwide</td>
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<td>Insurance Policies</td>
<td>Discovery Report</td>
<td>FEMA CIS</td>
<td>July 2012</td>
<td>Nationwide</td>
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<tr>
<td>Letters of Map Change (LOMCs)</td>
<td>Discovery Map</td>
<td>FEMA’s Mapping Information Platform</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Meteorological Gages</td>
<td>Discovery Map</td>
<td>National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory</td>
<td>July 2012</td>
<td>Regionwide</td>
</tr>
<tr>
<td>Ordinance</td>
<td>Discovery Report</td>
<td>Local Community Websites</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
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<td>Repetitive Loss</td>
<td>Discovery Report</td>
<td>FEMA CIS</td>
<td>July 2012</td>
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<td>Shoreline Classification</td>
<td>Discovery Map</td>
<td>USACE</td>
<td>July 2012</td>
<td>Regionwide</td>
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<td>Stream Gages</td>
<td>Discovery Map</td>
<td>USGS</td>
<td>July 2012</td>
<td>Countywide</td>
</tr>
<tr>
<td>Water Level Gages</td>
<td>Discovery Map</td>
<td>NOAA Department of Fisheries and Oceans</td>
<td>July 2012</td>
<td>Regionwide</td>
</tr>
<tr>
<td>Wave Gages</td>
<td>Discovery Map</td>
<td>NOAA</td>
<td>July 2012</td>
<td>Regionwide</td>
</tr>
</tbody>
</table>

### Data that can be used for future Coastal Flood Risk Products

#### 1.IV.i.1 Average Annualized Loss (AAL) Data
The Average Annualized Loss (AAL) data provide a general understanding of the dollar losses associated with a certain flood frequency events and are used to get a relative comparison of flood risk. They are determined by FEMA’s Multi-Hazard Risk Assessment and Loss Estimation Program, otherwise known as HAZUS-MH.

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

HAZUS-MH includes national datasets that can be supplemented with local data. If local detailed data are available, users may utilize this data to perform more refined HAZUS analyses. Augmenting HAZUS-MH national data with local data can improve the accuracy and resolution of analysis results. Additional information about the HAZUS-MH process and tool can be found at http://www.fema.gov/protecting-our-communities/hazus.

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

Table 3: HAZUS AAL Data for Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>FIPS Code</th>
<th>County</th>
<th>Total (in thousands of $)</th>
<th>Building (in thousands of $)</th>
<th>Content (in thousands of $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26021</td>
<td>Berrien</td>
<td>762,417</td>
<td>316,939</td>
<td>415,839</td>
</tr>
<tr>
<td>26159</td>
<td>Van Buren</td>
<td>85,579</td>
<td>32,196</td>
<td>48,222</td>
</tr>
</tbody>
</table>

Source: FEMA
FIPS = Federal Information Processing Standards

I.IV.1.2 Coastal Recession

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

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

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

- Chikaming Township
- Hagar Township
- Lake Township
- Lincoln Township
- New Buffalo Township
- St. Joseph Township
- Benton Township

For Van Buren County, maps are available for:
- Covert Township
- South Haven Township

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

We are currently working to collect additional coastal erosion data along the eastern coastline of Michigan for Lake Michigan. If you have any data that you would like to submit, please contact FEMA Region V.

I.IV.i.3  Federal Land
Federal lands data were obtained from the National Atlas at http://nationalatlas.gov/mld/fedlanp.html. This map layer shows those lands owned or administered by the Federal Government, including the Bureau of Land Management, the Bureau of Reclamation, the U.S. Department of Agriculture Forest Service, the Department of Defense, the U.S. Fish and Wildlife Service, the National Park Service, and other agencies. Only areas of 640 acres or more are included. There are no federal lands in either Berrien or Van Buren Counties.

I.IV.i.4  Jurisdictional Boundaries
Jurisdictional boundaries were obtained for Berrien and Van Buren Counties and Incorporated Areas from a derived set of TIGER line files available through the U.S. Census Bureau geography division. TIGER line files were last derived from the TIGER database in 1997. To learn more about TIGER line files and other Census TIGER database derived data sets visit http://www.census.gov/geo/www/tiger.

I.IV.i.5  Local Data
As part of the Discovery process, communities were asked to complete a Coastal Data Request Form (Attachment A) and identify data available at the local level that may be of use for the flood study update and development of the coastal flood risk products discussed earlier in this report. The Coastal Data Request Form included requests for base map data, coastal data, historic flood data, risk assessment information, mitigation information, and community plans and projects.
At the time this report was created, Berrien County provided information through use of the
Coastal Data Request Form.

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

I.IV.i.6  Publicly Owned Land
There were no publicly-owned lands found along the shoreline of Berrien and Van Buren
Counties within the study area at the time this report was created (FEMA 2011b).

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

**Table 4: Summary of Shoreline Types**

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Total Shoreline (mile)</th>
<th>Artificial Shoreline (mile)</th>
<th>Boulders, Bedrock (mile)</th>
<th>Cohesive Clays and Silts (mile)</th>
<th>Sand (mile)</th>
<th>Shingles, Pebbles, Cobbles (Mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County</td>
<td>44.62</td>
<td>9.95</td>
<td>0</td>
<td>0</td>
<td>34.67</td>
<td>0</td>
</tr>
<tr>
<td>Van Buren County</td>
<td>14.4</td>
<td>4.35</td>
<td>0</td>
<td>0</td>
<td>10.05</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: USACE 2012, Lake Michigan Shoreline Classification

**Table 5: Summary of Shoreline by Land Use**

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Total Shoreline (mile)</th>
<th>Commercial /Industrial (mile)</th>
<th>Forested (mile)</th>
<th>Low Density Residential (mile)</th>
<th>Moderate Density Residential (mile)</th>
<th>Park Land (mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County</td>
<td>44.62</td>
<td>3.73</td>
<td>1.24</td>
<td>11.26</td>
<td>22.16</td>
<td>4.97</td>
</tr>
<tr>
<td>Van Buren County</td>
<td>14.4</td>
<td>1.87</td>
<td>1.24</td>
<td>8.01</td>
<td>2.04</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: USACE 2012, Lake Michigan Shoreline Classification
Table 6: Summary of Shoreline Coverage

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Total Shoreline (mile)</th>
<th>Bluff 2’-10’ (mile)</th>
<th>Coastal Wetland (mile)</th>
<th>Dune 2’-10’ (mile)</th>
<th>Flat Coast (mile)</th>
<th>High Bluff 10’+ (mile)</th>
<th>High Dune 10’+ (mile)</th>
<th>Other (mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County</td>
<td>44.62</td>
<td>0</td>
<td>0</td>
<td>4.75</td>
<td>1.87</td>
<td>8.08</td>
<td>29.91</td>
<td>0</td>
</tr>
<tr>
<td>Van Buren County</td>
<td>14.4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.49</td>
<td>0</td>
<td>11.92</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 7: Summary of Shoreline Vegetation Types

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Total Shoreline (mile)</th>
<th>High Density Shrubs/Trees (mile)</th>
<th>Low Density Shrubs/Trees (mile)</th>
<th>Manicured Lawn (mile)</th>
<th>Moderate Density Shrubs/Trees (mile)</th>
<th>None (mile)</th>
<th>Unmaintained Non-Woody Vegetation (mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County</td>
<td>44.62</td>
<td>6.91</td>
<td>6.23</td>
<td>0.62</td>
<td>30.87</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Van Buren County</td>
<td>14.4</td>
<td>9.26</td>
<td>2.49</td>
<td>0</td>
<td>2.66</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: USACE 2012, Lake Michigan Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph
Stream lines were obtained from USGS’s National Hydrography Dataset (NHD). The NHD is a digital vector dataset for use by Geographic Information Systems (GIS). It contains features such as lakes, ponds, streams, rivers, canals, dams and stream gages. The datasets are designed to be used in general mapping and analysis of surface-water systems. Data can be downloaded from [http://nhd.usgs.gov/data.html](http://nhd.usgs.gov/data.html).

I.IV.i.9 Topography, Bathymetry, and Oblique Imagery
New Data Collected for Great Lakes Coastal Flood Study
As part of the Great Lakes Coastal Flood Study, LiDAR was collected to develop topographic and bathymetric data along the Lake Michigan shoreline. Topography is the configuration of natural and man-made features of a surface area and their relative position and elevations. Bathymetry is the underwater equivalent to topography.

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

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

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

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

I.IV.i.10 Transportation
The Bing Map service has been used as a basemap layer on the Discovery Map, and includes a transportation layer. For more information on Bing Map services and how they can be used in GIS, please visit http://www.arcgis.com/home and search for “Bing Maps”.

I.IV.i.11 Watershed Boundaries
U.S. Geological Survey (USGS) Hydrologic Unit Code 8 (HUC8) watershed boundaries were obtained from the National Atlas 2011 “Raw Data Download” (http://nationalatlas.gov/atlasftp.html).

Berrien County contains portions of three HUC-8 watersheds and Van Buren County contains portions of three HUC-8 watersheds. The sub basin names and HUC-8 codes are listed below in Table 8:

<table>
<thead>
<tr>
<th>County</th>
<th>Huc_8</th>
<th>Sub Basin</th>
</tr>
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<tr>
<td>Berrien</td>
<td>4040001</td>
<td>Little Calument-Galien</td>
</tr>
<tr>
<td>Berrien</td>
<td>4050001</td>
<td>St. Joseph</td>
</tr>
<tr>
<td>Berrien</td>
<td>4050002</td>
<td>Black-Macatawa</td>
</tr>
<tr>
<td>Van Buren</td>
<td>4050002</td>
<td>Black-Macatawa</td>
</tr>
<tr>
<td>Van Buren</td>
<td>4050001</td>
<td>St. Joseph</td>
</tr>
<tr>
<td>Van Buren</td>
<td>4050003</td>
<td>Kalamazoo</td>
</tr>
</tbody>
</table>

ii. Other Data and Information
Berrien County is located in extreme southwest portion of the State of Michigan, bordered on the south by the State of Indiana, on the shore of Lake Michigan. According to the 2010 census, Berrien County has a population of 156,813, which is a decrease from 162,456 in 2000. The county has a total area of 1,581.38 square miles, of which 571.0 square miles is land and 1,010.39 square miles is water (U.S. Census Bureau, 2010). The St. Joseph River is a major geographical feature, flowing mostly north and west through the county from Niles to its mouth on Lake Michigan at St. Joseph. The southwest of the county is drained by the Galien River and
its tributaries. Paw Paw Lake is in the north of the county, along with the Paw Paw River, which flows into the St. Joseph River just before it enters Lake Michigan. A tiny portion along the Indiana state line is drained by small tributaries of the Kankakee River, which ultimately flows into the Mississippi River. This is one of the few areas of Michigan drained by the Mississippi River, the other being an area of Michigan’s Upper Peninsula near the Wisconsin boarder. Additional information on Berrien County can be found at http://www.berriencounty.org/.

Van Buren County is located the southwest portion of the State of Michigan, on the shore of Lake Michigan. According to the 2010 census, Van Buren County has a population of 76,258, which is a slight decrease from 76,263 in 2000. The county has a total area of 1,090.19 square miles, of which 610.86 square miles is land and 479.33 square miles is water (U.S. Census Bureau, 2000). Additional information on Van Buren County can be found at http://www.vbco.org.

I.IV.ii.1 Coastal Barrier Resources Systems
The Coastal Barrier Resource System (CBRS) is a nationwide system of protected coastal areas that includes ocean-front land, the Great Lakes and Other Protected Areas (OPAs). The Coastal Barrier Resources Act (CBRA) of 1982 designated undeveloped coastal barrier lands and associated aquatic habitat as part of the Coastal Barrier Resources System (CBRS). This law does not regulate how people can develop land in the CBRS, but the Federal government does not encourage development of these areas. By electing to build in CBRS areas, owners are responsible for the full cost and are ineligible for most federal expenditures and financial assistance programs.

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

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

I.IV.ii.2 Coastal Structures
The USACE maintains a large infrastructure of over 900 coastal structures in the United States. These coastal structures protect harbors and shore-based infrastructure, provide beach and shoreline stability control, provide flood protection to varying degrees, and protect coastal communities, roadways and bridges, etc. These maintained coastal structures include seawalls, bulkheads, revetments, dikes and levees, breakwaters, groins, sills/perched beaches, and jetties and piers. The Enterprise Coastal Inventory Database (ECID) from the USACE Engineer Research and Development Center (ERDC) was obtained to identify these structures along Lake
Michigan. This data is presented in tabular form in the lake-wide Lake Michigan Discovery Report.

I.IV.ii.3 Community Assisted Visits
Statewide Community Assistance Visits (CAVs) are part of the evaluation and review process used by FEMA and local officials to ensure that each community adequately enforces local floodplain management regulations to remain in compliance with NFIP requirements. Generally, a CAV consists of a tour of the floodplain, an inspection of community permit files, and meetings with local appointed and elected officials. During a CAV, observations and investigations focus on identifying issues in various areas, such as the community’s floodplain management regulations (ordinance), community administration and enforcement procedures, engineering or other issues within the FIRMs, other problems in the community’s floodplain management, and problems with the biennial report data. Any administrative problems or potential violations identified during a CAV are documented in the CAV findings report. The community is notified and given the opportunity to correct those administrative procedures and remedy the violations to the maximum extent possible within established deadlines. The summary of CAV visits were extracted from the FEMA Community Information System (CIS) (https://portal.fema.gov/famsVuWeb/home) July 2012. Table 9 below shows the summary of CAV dates by community within this study area.

Table 9: Summary of Community Assisted Visits in Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Community</th>
<th>CID</th>
<th>CAV Date</th>
<th>FIRM Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County</td>
<td>Benton Charter, Township of</td>
<td>260032</td>
<td>3/4/1993</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Benton Harbor, City of</td>
<td>260033</td>
<td>3/5/1993</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Bridgman, City of</td>
<td>260258</td>
<td>7/11/2001</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Chikaming, Township of</td>
<td>260556</td>
<td>5/18/2011</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Coloma, City of</td>
<td>260034</td>
<td>4/09/2004</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Grand Beach, Village of</td>
<td>260268</td>
<td></td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Hagar, Township of</td>
<td>260035</td>
<td>4/09/2004</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Lake Charter, Township of</td>
<td>260037</td>
<td>3/5/1993</td>
<td></td>
</tr>
<tr>
<td>Berrien County</td>
<td>Lincoln, Township of</td>
<td>260275</td>
<td>11/5/2003</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Michiana, Village of</td>
<td>260038</td>
<td></td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>New Buffalo, City of</td>
<td>260039</td>
<td>7/11/2001</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>New Buffalo, Township of</td>
<td>260280</td>
<td></td>
<td>(NSFHA)</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Shoreham, Village of</td>
<td>260044</td>
<td>1/31/1995</td>
<td>04/17/06</td>
</tr>
<tr>
<td>Berrien County</td>
<td>St. Joseph, City of</td>
<td>260045</td>
<td></td>
<td>04/17/06</td>
</tr>
<tr>
<td>County</td>
<td>Community</td>
<td>CID</td>
<td>CAV Date</td>
<td>FIRM Date</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Berrien County</td>
<td>Stevensville, Village of</td>
<td>260557</td>
<td>04/17/06</td>
<td></td>
</tr>
<tr>
<td>Berrien County</td>
<td>Three Oaks, Township of</td>
<td>261111</td>
<td>04/17/06</td>
<td></td>
</tr>
<tr>
<td>Van Buren County</td>
<td>Covert, Township of</td>
<td>260259</td>
<td>12/03/09</td>
<td></td>
</tr>
<tr>
<td>Van Buren County</td>
<td>South Haven Charter, Township of</td>
<td>260212</td>
<td>12/03/09</td>
<td></td>
</tr>
</tbody>
</table>

CAV = Community Assisted Visit

I.IV.ii.4 Community Rating System
The Community Rating System (CRS) is a voluntary incentive program to provide flood Insurance premium discounts to NFIP-participating communities that take extra measures to manage floodplains above the minimum requirements. A point system is used to determine a CRS rating. The more measures a community takes to minimize or eliminate exposure to floods, the more CRS points are awarded and the higher the discount on flood insurance premiums. The list of CRS communities is available on FEMA’s Website site at http://www.fema.gov/library/viewRecord.do?id=3629. No communities in Berrien and Van Buren Counties participate in the CRS program.

I.IV.ii.5 Comprehensive Plans
A comprehensive plan is a land use document providing framework and policy direction for land use decisions. Comprehensive plans usually include chapters detailing policy direction affecting land use, transportation, housing capital facilities, utilities, coastal and rural areas. Comprehensive plans identify where and how growth needs will be met.

The Berrien County Master Plan is intended to guide land use decisions and provide direction to current and future Planning Commissions and Boards which will implement it. With this plan, the Planning Commission also seeks the cooperation of the professional and citizen planners in each of Berrien County’s cities, villages and townships. While the Berrien County Master Plan provides overall guidance in managing the growth and development of the County, much of the responsibility for implementation will fall to the local governments. A copy of the Berrien County Master Plan can be found at their website at http://www.berriencounty.org/econdev/pdfs/Master%20Plan%20Draft.pdf?PHPSESSID=64e73e67c9a1441736e05f8e39b586d1.

The Van Buren County Planning Commission has developed the 2005 Comprehensive Plan to establish goals that, if strived for, will shape and direct the future of Van Buren County, providing a consistent and sustainable land-use pattern in the county. The Plan will focus on the existing
conditions and trends within the county and is to be used as a resource for those making land use decisions in Van Buren County. The intent is to provide a process for making decisions and the information necessary to complete that process. The desired outcome is a sustainable development pattern in Van Buren County. A copy of the Van Buren County Comprehensive Plan can be found at their website at http://www.vbco.org/downloads/final_vbc_comp_plan_july_2006.pdf.

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

During FEMA’s Flood Map Modernization program from 2003 to 2008, FEMA adhered to Procedure Memorandum No. 56 which states that, “Section 575 of the National Flood Insurance Program Reform Act of 1994 mandates that at least once every five years FEMA assess the need to review and update all floodplain areas and flood risk zones identified, delineated, or established under Section 1360 of the National Flood Insurance Act, as amended.” This requirement was fulfilled through the Mapping Needs Assessment process. Other mechanisms such as the Mapping Needs Update Support System (MNUSS) and scoping reports were used to capture information describing conditions on the FIRMs and the potential for a map update. FEMA’s Coordinated Needs Management Strategy (CNMS) was initiated through FEMA’s Risk MAP program in 2009.

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

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

### Table 10: CNMS Status for Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>FIPS</th>
<th>Unknown (stream miles)</th>
<th>Unverified (stream miles)</th>
<th>Valid (stream miles)</th>
<th>Total (stream miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County, MI</td>
<td>26021</td>
<td>0.80</td>
<td>47.83</td>
<td>231.84</td>
<td>280.47</td>
</tr>
<tr>
<td>Van Buren County, MI</td>
<td>26159</td>
<td>1.55</td>
<td>1.67</td>
<td>72.20</td>
<td>75.42</td>
</tr>
</tbody>
</table>

### 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 Berrien County, 2% of critical facilities and 2% of road miles (54 miles) are within the floodplain. (National Oceanic & Atmospheric Administration, 2009). Information regarding Van Buren County was not available at the time of this report.

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

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

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

A Coastal Engineering Study for the City of St. Joseph, Michigan was prepared in August 2012. The purpose of the report was to evaluate the coast of Lake Michigan with St. Joseph city limits and to provide recommendations for shoreline management to protect natural resources, preserving the Lake Michigan shoreline, advancing the economic and environmental well-being, health, safety, and general welfare of the City; and preserve/enhance property values by preserving the natural character of the shoreline. A copy of the report is available in Attachment H.
Dams

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

Table 11 below is a summary of documented dams by county in Berrien and Van Buren counties. The NID is available at the USACE Website [https://nid.usace.army.mil/](https://nid.usace.army.mil/).

<table>
<thead>
<tr>
<th>County</th>
<th>Name</th>
<th>Primary Purpose</th>
<th>Dam Type</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>Chikaming Springs Farm Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Tributary to Galien River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Trickett Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Painter Creek</td>
</tr>
<tr>
<td>Berrien</td>
<td>Dayton Lake Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Galien River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Denardo Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Tributary to Lake Michigan</td>
</tr>
<tr>
<td>Berrien</td>
<td>French Paper Company Dam</td>
<td>Hydroelectric</td>
<td>-</td>
<td>Saint Joseph River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Niles</td>
<td>Hydroelectric</td>
<td>-</td>
<td>St Joseph River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien Springs Dam</td>
<td>Hydroelectric</td>
<td>-</td>
<td>Saint Joseph River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Buchanan</td>
<td>Hydroelectric</td>
<td>-</td>
<td>St Joseph River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Forkers Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Tributary to Galein River</td>
</tr>
<tr>
<td>Berrien</td>
<td>Welch Dam</td>
<td>-</td>
<td>Earth</td>
<td>Tributary to Paw Paw</td>
</tr>
<tr>
<td>Berrien</td>
<td>Jelinek Dam</td>
<td>Recreation</td>
<td>Earth</td>
<td>Tributary to Galein River</td>
</tr>
<tr>
<td>Van Buren</td>
<td>Wolf Lake Fish Hatchery Dams</td>
<td>Other</td>
<td>Earth</td>
<td>Trib to Campbell Creek</td>
</tr>
<tr>
<td>Van Buren</td>
<td>Maple Lake Dam</td>
<td>Other</td>
<td>-</td>
<td>S Br Paw Paw River</td>
</tr>
<tr>
<td>Van Buren</td>
<td>Briggs Dam</td>
<td>Hydroelectric</td>
<td>-</td>
<td>South Branch Paw Paw River</td>
</tr>
</tbody>
</table>

Levees

The table below presents levee information from the National Levee Database (NLD), developed by the U.S. Army Corps of Engineers (USACE). The NLD does not contain all levees located in the United States. The database contains information to facilitate and link activities, such as flood risk communication, levee system evaluation for the NFIP, levee system inspections, floodplain management, and risk assessments. The NLD continues to be a dynamic database.
with ongoing efforts to add levee data from federal agencies, states, and tribes. There are 0.2477 miles of levees in Berrien County, Michigan. No levees were identified in Van Buren County at the time of this report.

Table 12: Summary of Levees in Berrien County, MI

<table>
<thead>
<tr>
<th>County</th>
<th>System Name</th>
<th>Length (Miles)</th>
<th>Inspection Rating</th>
<th>Inspection Date</th>
<th>Risk Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>Paw Paw River</td>
<td>0.2477</td>
<td>Not provided.</td>
<td>-</td>
<td>No</td>
</tr>
</tbody>
</table>

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

I.IV.i.11 Declared Disasters
The FEMA Disaster Declarations Summary is a dataset describing all federally declared disasters. This information begins with the first disaster declaration in 1953 and features all three disaster declaration types: major disaster, emergency, and fire management assistance. The dataset includes declared recovery programs and geographic areas (County data not available before 1964; fire management records are considered partial because of the historical nature of the dataset).

The list of FEMA’s disaster declarations is available on the FEMA Website at http://www.fema.gov/data-feeds. Table 13 below lists the major disaster declarations declared in Berrien and Van Buren Counties.

Table 13: Declared Disasters in Berrien and Van Buren, MI

<table>
<thead>
<tr>
<th>Declared County/Area</th>
<th>Disaster Number</th>
<th>Declaration Date</th>
<th>Incident Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>363</td>
<td>12/1/1972</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
<tr>
<td>Berrien</td>
<td>371</td>
<td>4/12/1973</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
<tr>
<td>Van Buren</td>
<td>371</td>
<td>4/12/1973</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
<tr>
<td>Berrien</td>
<td>465</td>
<td>4/26/1975</td>
<td>Flood</td>
<td>Severe Storms, High Winds, and Flooding</td>
</tr>
<tr>
<td>Van Buren</td>
<td>465</td>
<td>4/26/1975</td>
<td>Flood</td>
<td>Severe Storms, High Winds, and Flooding</td>
</tr>
<tr>
<td>Berrien</td>
<td>631</td>
<td>9/8/1980</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
<tr>
<td>Van Buren</td>
<td>631</td>
<td>9/8/1980</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
<tr>
<td>Declared County/Area</td>
<td>Disaster Number</td>
<td>Declaration Date</td>
<td>Incident Type</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>Berrien</td>
<td>654</td>
<td>3/29/1982</td>
<td>Flood</td>
<td>Flooding</td>
</tr>
<tr>
<td>Van Buren</td>
<td>774</td>
<td>9/18/1986</td>
<td>Flood</td>
<td>Severe Storms and Flooding</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>County</th>
<th>CID</th>
<th>No. Policies</th>
<th>Total Premium</th>
<th>Total Coverage</th>
<th>Number of claims since 1978</th>
<th>Dollar ($) paid for claims since 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>26021</td>
<td>412</td>
<td>$262,444</td>
<td>$85,066,200</td>
<td>264</td>
<td>$2,653,726</td>
</tr>
<tr>
<td>Van Buren</td>
<td>26159</td>
<td>90</td>
<td>$72,752</td>
<td>$16,623,300</td>
<td>23</td>
<td>$93,605</td>
</tr>
</tbody>
</table>

I.IV.ii.12 Flood Insurance Policies
A community’s agreement to adopt and enforce floodplain management ordinances, particularly with respect to new construction, is an important element in making flood insurance available to home and business owners. For this Discovery project, data on flood insurance policies were also gathered.

Table 14 below summarizes the numbers and premiums of insurance policies, the total coverage, and the numbers and dollar amounts of paid losses in communities of Berrien and Van Buren Counties. The data were based on Community Summary Reports extracted from FEMA’s CIS website (https://portal.fema.gov/famsVuWeb/home) in July 2012.

Table 14: Summary of Flood Insurance Policies and Claims for Berrien and Van Buren Counties

I.IV.ii.13 Gage Data
The NOAA Coastal Services Center, Digital Coast, hosts a variety of digital coastal data, including gage data, and is located at http://www.csc.noaa.gov/digitalcoast.

Meteorological Stations
The National Data Buoy Center (NDBC) is a part of the NOAA National Weather Service (NWS). NDBC designs, develops, operates, and maintains a network of data collecting buoys and coastal stations. NDBC provides hourly observations from a network of about 90 buoys and 60 Coastal Marine Automated Network (C-MAN) stations. All stations measure wind speed, direction, and gust; atmospheric pressure; and air temperature. Water level is measured at selected stations. The historical and current data are available at the NDBC Website http://www.ndbc.noaa.gov.
Table 15 below shows the meteorological station identification number and location for the gages in the Lake Michigan Berrien and Van Buren Counties Coastal Flood Study area. Meteorological stations are also shown on the Discovery map.

Table 15: Meteorological Stations in Lake Michigan, Berrien and Van Buren, MI by NOAA

<table>
<thead>
<tr>
<th>County</th>
<th>Station ID</th>
<th>Location</th>
<th>Owner</th>
<th>Data</th>
<th>Years of Historical Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>45026</td>
<td>St. Joseph</td>
<td>Limno Tech</td>
<td>Wind, wave height, air temperature, water temperature, dew point</td>
<td>2011 - present</td>
</tr>
<tr>
<td>Berrien</td>
<td>SJOM4</td>
<td>St. Joseph</td>
<td>National Weather Service Central Region</td>
<td>Wind, atmospheric pressure, air temperature</td>
<td>2007 - present</td>
</tr>
<tr>
<td>Van Buren</td>
<td>SVNM4</td>
<td>South Haven</td>
<td>Great Lakes Environmental Research Laboratory</td>
<td>Wind, air temperature</td>
<td>2005 - present</td>
</tr>
</tbody>
</table>

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](http://www.glerl.noaa.gov).

**Stream Gages**

The USGS National Water Information System Web Interface ([http://waterdata.usgs.gov/nwis](http://waterdata.usgs.gov/nwis)), provides real-time data for any given stream gage location. Table 16 below shows the gage identification numbers and locations for the gages in Berrien and Van Buren Counties. USGS stream gage locations are also shown on the Discovery Map.

Table 16: Stream Gage Stations in Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Gage ID</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Gage Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>4101500</td>
<td>10/1/1930</td>
<td>9/30/2011</td>
<td>St. Joseph River at Niles, MI</td>
</tr>
<tr>
<td>Berrien</td>
<td>4102500</td>
<td>10/1/1951</td>
<td>9/30/2011</td>
<td>Paw Paw River at Riverside, MI</td>
</tr>
<tr>
<td>Van Buren</td>
<td>4102700</td>
<td>10/1/1965</td>
<td>9/30/2011</td>
<td>South Branch Black River near Bangor, MI</td>
</tr>
</tbody>
</table>

**Water Level Station**

Great Lakes water levels constitute one of the longest, high quality hydrometeorological data sets in North America with reference gage records beginning around 1860 with sporadic records back to the early 1800's. NOAA’s Center for Operational Oceanographic Products and Services (CO-OPS) maintains several water level stations along Lake Michigan. CO-OPS’ primary motivation is the collection and dissemination of high quality and accurate measurements of lake level for


**Wave Gage/Buoy Stations**

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

**I.IV.ii.14 Hazard Mitigation Plans**

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

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

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

Local mitigation plans are required to be updated every 5 years to maintain eligibility for FEMA Hazard Mitigation Assistance (HMA) grant programs. The status of current hazard mitigation plans is available at [http://www.ndbc.noaa.gov/](http://www.ndbc.noaa.gov/).
plans for Berrien and Van Buren counties is shown in the Table 17 below. The data was obtained from FEMA’s Plan Approval Status Report based on Regional reports for the end of June 2012.

### Table 17: Hazard Mitigation Plan Status for Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Approval Date</th>
<th>Expiration Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>12/22/2005</td>
<td>12/22/2010</td>
</tr>
</tbody>
</table>


**I.IV.ii.15 Hazard Mitigation Grant Program**

Hazard mitigation initiatives are intended to actively reduce a community’s vulnerability to hazards and are developed to accurately reflect a community’s need. A variety of hazard mitigation projects have been submitted to FEMA’s Hazard Mitigation Grant Program (HMGP).

A summary of HMGP projects can also be downloaded from [https://explore.data.gov/catalog/raw](https://explore.data.gov/catalog/raw)

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

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

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

The following information on flood concerns were noted for Berrien County:

Berrien County municipalities reported the following concerns related to flooding:

- In Baroda and Baroda Township, Hickory Creek occasionally floods.
- Galien has had erosion on the shoreline of Lake Michigan, which caused the loss of some homes and property.
- In Lincoln Charter Township, James Drive neighborhood is considered to be in a floodplain.
- In New Buffalo, there was flooding at the Lake Michigan shoreline due to a surge and New Buffalo frequently experiences severe lakefront and river basin erosion due to wind and water from Lake Michigan.
- Niles Township has flooding and erosion issues from the St. Joseph River off Old US-31 at the Harbor Towne Apartments and in the ThorneAcre, Washington Court, and Echo Valley areas. Niles Township is also concerned about Brandywine Creek flooding around the Bond and Beeson Road areas and on 3rd Street, north of Beeson.
- Shoreham has had flooding on South Lakeshore Drive after heavy rain and has a problem with shoreline erosion on Lake Michigan.
- In St. Joseph Charter Township, Eagle Pointe Marina and adjacent properties are in a floodplain. St. Joseph Charter Township has properties at risk for flooding near the St. Joseph River and Hickory Creek.
- In Watervliet, Mill Creek is a potential flood concern.

Overall, Berrien County considers riverine and urban flooding to be a moderate hazard for mitigation purposes. However, as mentioned above some of the impacts individual communities due to flooding are considerable and will require mitigation planning for implementing effective solutions.

No High Water Mark (HWM) data was found within Berrien and Van Buren Counties for Lake Michigan. If local stakeholders have available HWM data or historic photographs, they are encouraged to submit them to FEMA Region V, Mitigation Division.

I.IV.ii.17 Letters of Map Change
A Letter of Map Change (LOMC) is a letter that reflects an official revision to an effective NFIP map. LOMCs are issued in place of the physical revision and republication of the effective FIRM. LOMCs include completed cases of Letters of Map Amendment (LOMAs) and Letters of Map Revision (LOMRs), including LOMRs based on fill (LOMR-Fs), and conditional LOMRs.

Table 18 below lists the number of LOMCs in Berrien and Van Buren counties. No Conditional LOMAs or Conditional LOMR-Fs were included. The LOMCs are shown on the Discovery Maps. Clusters of LOMCs indicate a need for updated maps. The list of LOMC cases were obtained from the FEMA Mapping Information Platform Website (https://hazards.fema.gov/femaportal/wps/portal).
Table 18: Summary of LOMC cases in Berrien and Van Buren Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Letters of Map Amendments</th>
<th>Number of Letters of Map Revisions – Based on Fill</th>
<th>Number of Letters of Map Revisions – Floodway Removal</th>
<th>Number of Letters of Map Revisions</th>
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<tr>
<td>Berrien County</td>
<td>138</td>
<td>11</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Van Buren County</td>
<td>159</td>
<td>4</td>
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</table>

I.IV.ii.18  Locally Identified Mitigation Projects
The table in Attachment G lists the potential mitigation actions and strategies as pulled from each of the County level Hazard Mitigation Plans (Berrien and Van Buren Counties).

I.IV.ii.19  Ordinances
For States that have demonstrated a commitment to, and experience in, the application of NFIP minimum floodplain management criteria, 44 CFR §60.25(d) allows FEMA to consider State approval or certification of community floodplain management ordinances as meeting NFIP requirements. This provision provides Regional Offices with the latitude to approve floodplain management regulations based on their review and approval by the State. However, the Regional Office must still formally approve the regulations in the Community Information System (CIS).

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

County regulations regarding development within known flood hazard areas can range from ordinances with minimum NFIP requirements to strong, pro-active ordinances. Stronger ordinances not only regulate and protect new and improved development in existing Special Flood Hazard Areas (SFHAs), but also seek to mitigate the growth of SFHAs. Increase of SFHA can be caused by increased runoff from developed areas and the degradation of natural flood control areas, such as wetlands and forests. Ordinance information for Berrien and Van Buren counties is shown in Table 19 below.

Table 19: NFIP Program Status and Ordinance Level for Berrien and Van Buren, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Community</th>
<th>CID</th>
<th>Program Status</th>
<th>Level of Adopted Regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>Benton Charter, Township of</td>
<td>260031</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Benton Harbor, City of</td>
<td>260032</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Bridgman, City of</td>
<td>260033</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>County</td>
<td>Community</td>
<td>CID</td>
<td>Program Status</td>
<td>Level of Adopted Regulation</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------</td>
<td>--------</td>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Berrien</td>
<td>Chikaming, Township of</td>
<td>260258</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma, City of</td>
<td>260556</td>
<td>Not Participating</td>
<td></td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma, Township of</td>
<td>260034</td>
<td>Participating</td>
<td>C</td>
</tr>
<tr>
<td>Berrien</td>
<td>Grand Beach, Village of</td>
<td>260268</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Hagar, Township of</td>
<td>260035</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Lake Charter, Township of</td>
<td></td>
<td>Not Participating</td>
<td></td>
</tr>
<tr>
<td>Berrien</td>
<td>Lincoln, Township of</td>
<td>260037</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Michiana, Village of</td>
<td>260275</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>New Buffalo, City of</td>
<td>260038</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>New Buffalo, Township of</td>
<td>260039</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Shoreham, Village of</td>
<td>260280</td>
<td>Participating</td>
<td>C</td>
</tr>
<tr>
<td>Berrien</td>
<td>St. Joseph, City of</td>
<td>260044</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>St. Joseph Charter, Township of</td>
<td>260045</td>
<td>Participating</td>
<td></td>
</tr>
<tr>
<td>Berrien</td>
<td>Stevensville, Village of</td>
<td>260557</td>
<td>Participating</td>
<td>D</td>
</tr>
<tr>
<td>Berrien</td>
<td>Three Oaks, Township of</td>
<td>261111</td>
<td>Not Participating</td>
<td></td>
</tr>
<tr>
<td>Berrien</td>
<td>Three Oaks, Village of</td>
<td></td>
<td>Participating</td>
<td></td>
</tr>
<tr>
<td>Van Buren</td>
<td>Covert, Township of</td>
<td>260259</td>
<td>Participating</td>
<td>C</td>
</tr>
<tr>
<td>Van Buren</td>
<td>South Haven Charter, Township of</td>
<td>260212</td>
<td>Participating</td>
<td>D</td>
</tr>
</tbody>
</table>

I.IV.i.20 **Proposed Transects**

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

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

Stakeholders were provided with the proposed transect shapefiles (GIS digital data) upon request, and the proposed transects were also reviewed during Discovery Meetings. Input from local officials was requested regarding the placement and the number of transects. Comments regarding placement of transects in Berrien and Van Buren Counties, Michigan are shown in Table 20.
Table 20: Stakeholder Comments Regarding Transect Placement

<table>
<thead>
<tr>
<th>State</th>
<th>County</th>
<th>Community</th>
<th>FIPS</th>
<th>CID</th>
<th>Comment</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>Berrien</td>
<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Shift transect to the south.</td>
<td>Transect Comment</td>
</tr>
<tr>
<td>Michigan</td>
<td>Berrien</td>
<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Suggest adding a transect between BER22 and BER23.</td>
<td>Transect Comment</td>
</tr>
</tbody>
</table>

I.IV.i.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](http://www.fema.gov/pre-disaster-mitigation-grant-program/pre-disaster-mitigation-archives)

I.IV.i.22 Great Lakes Coastal Restoration Grants
The Great Lakes received $475 million for restoration efforts in 2010, as part of the Great Lakes Restoration Initiative, or GLRI. Michigan Sea Grant was awarded more than $1.5 million to help restore particular areas in the region and is leading two projects while assisting on five others. The projects focus on endangered fish, invasive species, beach contamination, water pollution and sound boating and marina operations.

Additional information can be found at Michigan Sea Grant website [http://www.miseagrant.umich.edu/explore/restoration/](http://www.miseagrant.umich.edu/explore/restoration/).

I.IV.i.23 Public Assistance Projects
The mission of FEMA’s Public Assistance (PA) Grant Program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from declared disasters or emergencies.

Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.
Table 21 below presents a summary of PA projects in Berrien and Van Buren counties. Detailed project descriptions for completed PA projects can be downloaded from [https://explore.data.gov/catalog/raw](https://explore.data.gov/catalog/raw).

### Table 21: Public Assistance Projects for Van Buren and Berrien Counties, MI

<table>
<thead>
<tr>
<th>County</th>
<th>Applicant</th>
<th>Education Applicant</th>
<th>Number of Projects</th>
<th>Federal Share Obligated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>Benton Harbor Area Schools</td>
<td>Yes</td>
<td>1</td>
<td>$4,907.20</td>
</tr>
<tr>
<td>Berrien</td>
<td>Benton Harbor, City Of</td>
<td>No</td>
<td>1</td>
<td>$7,865.36</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien County Intermediate School District</td>
<td>Yes</td>
<td>1</td>
<td>$4,004.89</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien, County Of</td>
<td>No</td>
<td>1</td>
<td>$1,544.93</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien County Road Commission</td>
<td>No</td>
<td>1</td>
<td>$79,788.69</td>
</tr>
<tr>
<td>Berrien</td>
<td>Brandywine Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,585.22</td>
</tr>
<tr>
<td>Berrien</td>
<td>Bridgman, City Of</td>
<td>No</td>
<td>1</td>
<td>$4,310.77</td>
</tr>
<tr>
<td>Berrien</td>
<td>Bridgman Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,680.31</td>
</tr>
<tr>
<td>Berrien</td>
<td>Buchanan, City Of</td>
<td>No</td>
<td>1</td>
<td>$8,049.15</td>
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<tr>
<td>Berrien</td>
<td>Buchanan Community School District</td>
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<td>1</td>
<td>$3,710.54</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma, City Of</td>
<td>No</td>
<td>1</td>
<td>$3,668.44</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma Community Schools</td>
<td>Yes</td>
<td>1</td>
<td>$3,235.94</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma Emergency Ambulance Service</td>
<td>No</td>
<td>1</td>
<td>$4,010.48</td>
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<tr>
<td>Berrien</td>
<td>Community Emergency Services Inc. Medic 1 Amb</td>
<td>No</td>
<td>1</td>
<td>$0.00</td>
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<tr>
<td>Berrien</td>
<td>Eau Claire Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,362.22</td>
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<tr>
<td>Berrien</td>
<td>Eau Claire, Village Of</td>
<td>No</td>
<td>1</td>
<td>$1,913.21</td>
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<tr>
<td>Berrien</td>
<td>Gateway Rehab Center</td>
<td>No</td>
<td>1</td>
<td>$1,290.87</td>
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<tr>
<td>Berrien</td>
<td>Lake Michigan Catholic Schools</td>
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<td>1</td>
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<tr>
<td>Berrien</td>
<td>Lake Michigan College</td>
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<td>Berrien</td>
<td>Michigan Lutheran High School</td>
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<td>Berrien</td>
<td>New Buffalo Area Schools</td>
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<tr>
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<td>1</td>
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<td>Niles Township Fire Department</td>
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<td>Berrien</td>
<td>River Valley School District</td>
<td>Yes</td>
<td>1</td>
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<td>Berrien</td>
<td>Shoreham, Village Of</td>
<td>No</td>
<td>1</td>
<td>$958.07</td>
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<td>St Joseph Catholic Church &amp; School</td>
<td>Yes</td>
<td>1</td>
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</tr>
<tr>
<td>County</td>
<td>Applicant</td>
<td>Education Applicant</td>
<td>Number of Projects</td>
<td>Federal Share Obligated</td>
</tr>
<tr>
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<td>---------------------</td>
<td>--------------------</td>
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</tr>
<tr>
<td>Berrien</td>
<td>St. Joseph, City Of</td>
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<td>1</td>
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<td>St Joseph Public Schools</td>
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<td>1</td>
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<td>Berrien</td>
<td>St Mary Of The Lake Church</td>
<td>No</td>
<td>1</td>
<td>$0.00</td>
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<td>Three Oaks, Village Of</td>
<td>No</td>
<td>1</td>
<td>$4,641.28</td>
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<td>Berrien</td>
<td>Trinity Lutheran Church &amp; School</td>
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<td>1</td>
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<td>Watervliet, City Of</td>
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<td>Berrien</td>
<td>Watervliet Public Schools</td>
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<td>Van Buren</td>
<td>Bangor, City Of</td>
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<td>Bloomingdale, Village Of</td>
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<td>Van Buren</td>
<td>Decatur Public Schools</td>
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<td>1</td>
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<td>Decatur, Village Of</td>
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<td>Gobles Public Schools</td>
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<td>Hartford, City Of</td>
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<td>Hartford Public Schools</td>
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<td>1</td>
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<td>Lawrence Public Schools</td>
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<td>1</td>
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<td>Lawrence, Village Of</td>
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<td>$4,642.57</td>
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<td>Van Buren</td>
<td>Lawton, Village Of</td>
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<td>Van Buren</td>
<td>Mattawan Consolidated School</td>
<td>Yes</td>
<td>1</td>
<td>$2,568.84</td>
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<tr>
<td>Van Buren</td>
<td>Mattawan, Village Of</td>
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<td>Van Buren</td>
<td>Paw Paw Public Schools</td>
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<tr>
<td>Van Buren</td>
<td>Paw Paw, Village Of</td>
<td>No</td>
<td>1</td>
<td>$6,146.97</td>
</tr>
<tr>
<td>Van Buren</td>
<td>South Haven Area Emergency Services</td>
<td>No</td>
<td>1</td>
<td>$2,653.34</td>
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<tr>
<td>Van Buren</td>
<td>South Haven, City Of</td>
<td>No</td>
<td>1</td>
<td>$7,666.78</td>
</tr>
<tr>
<td>Van Buren</td>
<td>South Haven Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$5,390.40</td>
</tr>
<tr>
<td>Van Buren</td>
<td>Van Buren County Road Commission</td>
<td>No</td>
<td>1</td>
<td>$37,759.37</td>
</tr>
<tr>
<td>Berrien</td>
<td>Andrews (Andrews University)</td>
<td>Yes</td>
<td>1</td>
<td>$0.00</td>
</tr>
<tr>
<td>Berrien</td>
<td>Benton Charter Township</td>
<td>No</td>
<td>1</td>
<td>$0.00</td>
</tr>
<tr>
<td>Berrien</td>
<td>Benton Harbor Area Schools</td>
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<td>1</td>
<td>$11,438.85</td>
</tr>
<tr>
<td>Berrien</td>
<td>Benton Harbor, City Of</td>
<td>No</td>
<td>1</td>
<td>$1,054.14</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien County Intermediate School District</td>
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<td>1</td>
<td>$4,862.30</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien, County Of</td>
<td>No</td>
<td>1</td>
<td>$2,380.14</td>
</tr>
<tr>
<td>Berrien</td>
<td>Berrien County Road Commission</td>
<td>No</td>
<td>1</td>
<td>$70,368.66</td>
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<tr>
<td>Berrien</td>
<td>Berrien Springs, Village Of</td>
<td>No</td>
<td>1</td>
<td>$2,138.48</td>
</tr>
<tr>
<td>Berrien</td>
<td>Brandywine Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,430.65</td>
</tr>
<tr>
<td>County</td>
<td>Applicant</td>
<td>Education Applicant</td>
<td>Number of Projects</td>
<td>Federal Share Obligated</td>
</tr>
<tr>
<td>--------</td>
<td>-----------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Berrien</td>
<td>Bridgman, City Of</td>
<td>No</td>
<td>1</td>
<td>$4,379.65</td>
</tr>
<tr>
<td>Berrien</td>
<td>Bridgman Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$899.67</td>
</tr>
<tr>
<td>Berrien</td>
<td>Buchanan, City Of</td>
<td>No</td>
<td>1</td>
<td>$5,100.21</td>
</tr>
<tr>
<td>Berrien</td>
<td>Buchanan Community Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,964.77</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma, City Of</td>
<td>No</td>
<td>1</td>
<td>$3,817.68</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma Community Schools</td>
<td>Yes</td>
<td>1</td>
<td>$4,254.12</td>
</tr>
<tr>
<td>Berrien</td>
<td>Eau Claire Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$1,563.09</td>
</tr>
<tr>
<td>Berrien</td>
<td>Eau Claire, Village Of</td>
<td>No</td>
<td>1</td>
<td>$1,789.10</td>
</tr>
<tr>
<td>Berrien</td>
<td>Galien Township Schools</td>
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<td>Lakeland Regional Health</td>
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<td>1</td>
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<td>Lake Michigan College</td>
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<td>1</td>
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<td>Berrien</td>
<td>Lakeshore Public Schools</td>
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<td>1</td>
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</tr>
<tr>
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<td>New Buffalo Area Schools</td>
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<td>1</td>
<td>$0.00</td>
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<td>Niles Community Schools</td>
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<td>Niles Township Of</td>
<td>No</td>
<td>1</td>
<td>$0.00</td>
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<td>Berrien</td>
<td>River Valley School District</td>
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<td>1</td>
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<td>1</td>
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<td>St Joseph Public Schools</td>
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<td>1</td>
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<td>Education Applicant</td>
<td>Number of Projects</td>
<td>Federal Share Obligated</td>
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<td>$0.00</td>
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<td>1</td>
<td>$934.33</td>
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<td>1</td>
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<td>Paw Paw, Village Of</td>
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<td>1</td>
<td>$3,411.54</td>
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<td>South Haven Area Regional Airport Authority</td>
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<td>1</td>
<td>$2,305.65</td>
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<td>1</td>
<td>$7,693.45</td>
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<tr>
<td>Van Buren</td>
<td>South Haven Public Schools</td>
<td>Yes</td>
<td>1</td>
<td>$2,744.69</td>
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<td>Van Buren</td>
<td>Van Buren County</td>
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<td>1</td>
<td>$1,444.01</td>
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<td>Van Buren</td>
<td>Van Buren County Road Commission</td>
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<td>1</td>
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<td>Van Buren</td>
<td>Van Buren Intermediate School District</td>
<td>Yes</td>
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<td>$2,775.42</td>
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I.IV.ii.24 Regulatory Mapping
A FIRM is a regulatory map created by the NFIP for floodplain management and insurance purposes. The FIRM shows a community’s base-flood elevations (BFE), flood zones and floodplain boundaries. FIRM maps with effective dates and NFIP Program participation status for Berrien and Van Buren Counties are listed in Table 22 by community. Berrien County has been modernized to digital mapping, but Van Buren County is still in process. Effective FIRMs and Flood Insurance Studies (FIS) can be downloaded from FEMA’s Map Service Center (MSC) at [https://msc.fema.gov](https://msc.fema.gov).

Table 22: Effective Status of Berrien and Van Buren Counties, MI
<table>
<thead>
<tr>
<th>County</th>
<th>Community</th>
<th>CID</th>
<th>Status</th>
<th>Effective Date</th>
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</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>All Jurisdictions</td>
<td>26021</td>
<td>Published</td>
<td>4/17/2006</td>
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<tr>
<td>Van Buren</td>
<td>County</td>
<td>26159</td>
<td>Published</td>
<td>3/12/2009</td>
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I.IV.ii.25 Repetitive Loss/Severe Repetitive Loss
The following communities located in Berrien and Van Buren Counties (not limited to the study area) have incurred repetitive losses.

Table 23: Repetitive Loss/Severe Repetitive Loss for Berrien and Van Buren Counties, MI
<table>
<thead>
<tr>
<th>County</th>
<th>Community</th>
<th>CID</th>
<th>No. of Repetitive Losses</th>
<th>Total Area Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>Chikaming, Township of</td>
<td>260258</td>
<td>2</td>
<td>3,692</td>
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<tr>
<td>Berrien</td>
<td>Coloma, City of</td>
<td>260556</td>
<td>2</td>
<td>1,600</td>
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<tr>
<td>County</td>
<td>Community</td>
<td>CID</td>
<td>No. of Repetitive Losses</td>
<td>Total Area Population</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------</td>
<td>------</td>
<td>--------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Berrien</td>
<td>Coloma, Township of</td>
<td>26034</td>
<td>10</td>
<td>5,123</td>
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<tr>
<td>Berrien</td>
<td>Hagar, Township of</td>
<td>26035</td>
<td>2</td>
<td>3,964</td>
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<tr>
<td>Berrien</td>
<td>Royalton, Township of</td>
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<td>11</td>
<td>4,520</td>
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<tr>
<td>Berrien</td>
<td>St. Joseph, Township of</td>
<td>26044</td>
<td>2</td>
<td>8,789</td>
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<tr>
<td>Berrien</td>
<td>Watervliet, City of</td>
<td></td>
<td>2</td>
<td>1,867</td>
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<td>Van Buren</td>
<td>Covert, Township of</td>
<td>26025</td>
<td>4</td>
<td>3,141</td>
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<td>Van Buren</td>
<td>South Haven, City of</td>
<td>26021</td>
<td>2</td>
<td>5,021</td>
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</table>

**I.IV.ii.26 Socio-Economic Analysis**

The 2010 American Community Survey 1-year estimate indicates the median income for a household in Berrien County was $40,329 and the median income for a family was $51,305. Males had a median income of $26,745 versus $16,289 for females. The per capita income for the county was $22,337. About 12.1% of families and 16.8% of the population were below the poverty line, including 28.5% of those under the age 18 and 8.3% of those age 65 or over.

In Van Buren County, the median income for a household in the county was $44,242 and the median income for a family was $53,642. Males had a median income of $28,079 versus $18,124 for females. The per capita income for the county was $21,495. About 10.0% of families and 14.8% of the population were below the poverty line, including 21.1% of those under the age 18 and 11.8% of those age 65 or over.

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

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

**USGS Studies**

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

The Michigan Coastal Management Program website, located at [www.mi.gov/coastalmanagement](http://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

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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](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](http://www.michigan.gov/deq/0,4561,7-135-3313_3677_3696-171451--,00.html)

V. Risk MAP Projects and Needs

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

i. Future Coastal Study

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

A summary of the GLCFS project can be found at [http://www.greatlakescoast.org/](http://www.greatlakescoast.org/) under Great Lakes Coastal Analysis & Mapping.

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

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

**Engineering & Mapping:**

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

**National Flood Insurance Program Integration:**

Regulatory Digital Flood Insurance Rate Map (DFIRM) files will be updated through FEMA’s Physical Map Revision (PMR) process, using the results from the work performed in the Engineering and Mapping task described above.
Coastal flood maps (or workmaps) will be produced for the study area and reviewed with local community officials. The workmap will include the 1%- and 0.2%-annual chance Special Flood Hazard Area (SFHA), Coastal High Hazard Zone (VE Zone) and Coastal A Zone (AE Zone), Base Flood Elevations (BFEs) and Limit of Moderate Wave Action (LiMWA).

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

**Coastal Flood Risk Assessment Products:**
Coastal flood risk products were introduced in section 1 iii of this report. Depending on available data, results of coastal analysis, fiscal year funding, and community partnerships with FEMA, coastal flood risk products may be generated for identified coastal communities in Berrien and Van Buren Counties as summarized in Table 24.

<table>
<thead>
<tr>
<th>County</th>
<th>State</th>
<th>Flood Risk Map and Flood Risk Report</th>
<th>Changes Since Last FIRM</th>
<th>Flood Depth and Analysis Grids</th>
<th>Optional Flood Risk Assessment Products</th>
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</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>MI</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Van Buren</td>
<td>MI</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>TBD</td>
</tr>
</tbody>
</table>

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

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

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

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

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

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

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

### iii. Compliance

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

The CAV is a visit to a community by a FEMA staff member or staff of a state agency on behalf of FEMA that serves the dual purpose of providing technical assistance to the community and assuring that the community is adequately enforcing its floodplain management regulations. Potential violations may be identified during the CAV visit as a result of touring the floodplain, inspecting community permit files, and meeting with local appointed and elected officials. Open CAVs can be indicative of unresolved violations.
Violations can also be discovered when LOMR-F applications depict a non-compliant structure based on elevation data; or can be found through Submit-for-Rate requests, which occur when a structure applies for flood insurance but has been identified as being two or more feet below Base Flood Elevation (BFE). Elevation comparisons identified through LOMR-F applications and Submit-for-Rates imply structures were not built compliantly.

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

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

iv. Communication

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

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

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

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

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

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

VI. Close

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

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

VII. References


VIII. Attachments

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

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

A. Coastal Data Request Form  
B. Berrien and Van Buren Counties Pre-Meeting Correspondence  
C. Berrien County Draft Discovery Map  
D. Van Buren County Draft Discovery Map  
E. Berrien and Van Buren Counties Proposed Transects  
F. Berrien and Van Buren Counties Discovery Meeting Documents  
G. Locally Identified Mitigation Projects  
H. City of St. Joseph Coastal Engineering Study (August 17, 2012)
Attachment A.

Coastal Data Request Form
Community Discovery Coastal Data Request Form

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

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

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

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

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

<table>
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<th>Contact Information</th>
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</tr>
<tr>
<td>Title:</td>
</tr>
<tr>
<td>Address:</td>
</tr>
<tr>
<td>E-mail:</td>
</tr>
<tr>
<td>Phone:</td>
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<tr>
<td>Contact Preference</td>
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FEMA Region V
Great Lakes Discovery
Community Discovery Coastal Data Request Form   Page 1 of 8
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<td>Property information (e.g., Building footprints, parcel data, tax assessor’s data)</td>
<td>Hard copy</td>
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<tr>
<td>Coastal features (i.e., dunes and bluffs)</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Shoreline change data</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Locations of beach nourishment or dune restoration projects</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Areas of significant beach or dune erosion</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Mean high water</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Mean lake level</td>
<td>Hard copy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Other Data</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic structures (e.g., bridges, culverts, levees, dams) with inspection status, if available</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Elevated roads</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Critical facilities</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Other known hazards with geographical boundaries, i.e., landslide hazard areas, storm surge inundation zones, wildfire hazard areas, etc.</td>
<td>Hard copy</td>
</tr>
<tr>
<td>Other relevant data</td>
<td>Hard copy</td>
</tr>
</tbody>
</table>
Please provide the following information about the community:

<table>
<thead>
<tr>
<th>Historical Flood Data</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you aware of any coastal flooding issues not represented on effective FIRMs?</td>
<td>□ yes □ no</td>
<td>If yes, please explain and provide inundation areas of historic flooding events if available.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk Assessment</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your community have HAZUS-based loss estimates from average annualized loss?</td>
<td>□ yes □ no</td>
<td>If yes, please describe:</td>
</tr>
<tr>
<td>Does your community have other risk assessment data?</td>
<td>□ yes □ no</td>
<td>If yes, please describe:</td>
</tr>
<tr>
<td><strong>Flood Mitigation Information</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does your community have a hazard mitigation plan?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, what is the status of the hazard mitigation plan?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ being reviewed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ it has been adopted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ it is currently being updated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ it is planned for updates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the plan reflect any coastal flood hazards?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, please explain:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the hazard mitigation plan indicate any data deficiencies for flood hazards that could be addressed through a flood study, especially near coastal zones?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, please explain:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does your community have ongoing mitigation projects, such as acquisition, elevation, flood control, soil stabilization, natural systems restoration, floodproofing, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, please describe the projects and their locations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Any specific coastal mitigation projects?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does your community have experience with coastal flood disasters and flood disaster recovery?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does your community coordinate floodplain management programs with programs for the management and planning of open space? If possible, any coastal specific?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>Have you had any prior proactive mitigation actions and planning efforts that resulted in reduced losses? If possible, any coastal specific?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has your community applied and granted Individual Assistance/Public Assistance grants for declared disasters?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>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?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 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

<table>
<thead>
<tr>
<th>Question</th>
<th>Response Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your community have a comprehensive plan?</td>
<td>[ ] yes  [ ] no</td>
</tr>
<tr>
<td>If you answered yes and you have a hazard mitigation plan, was your hazard mitigation plan coordinated with the comprehensive plan?</td>
<td>[ ] yes  [ ] no</td>
</tr>
<tr>
<td>Does your community’s comprehensive plan have a special consideration for coastal areas?</td>
<td>[ ] yes  [ ] no</td>
</tr>
<tr>
<td>If yes, please explain elements/regulations that affect coastal area development.</td>
<td></td>
</tr>
<tr>
<td>Does your community have a coastal zone management plan?</td>
<td>[ ] yes  [ ] no</td>
</tr>
<tr>
<td>If yes, please provide a digital or hard copy of the plan.</td>
<td></td>
</tr>
<tr>
<td>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?</td>
<td>[ ] yes  [ ] no</td>
</tr>
<tr>
<td>If yes, please explain this group’s role in floodplain management and provide examples of the types of programs in place:</td>
<td></td>
</tr>
</tbody>
</table>
| 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.

Berrien and Van Buren Counties Pre-Meeting Correspondence
Good Morning,

You are receiving this meeting invitation because you have been identified as a Lake Michigan local community stakeholder. You should have recently received an invitation in the mail from the Federal Emergency Management Agency (FEMA), regarding the Great Lakes Coastal Flood Study effort, inviting you to attend a Discovery Meeting in September, as well as this information exchange session, scheduled for Monday, August 6, 2012 at 1pm 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: Monday, August 6, 2012
Time: 1:00pm – 2:00pm ET
Link to WebEx: https://www.webex.com/login/attend-a-meeting
Meeting No: 658 935 489
Call in number: 877-537-6647
Participant Code: 31578

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

We look forward to speaking with you on 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.

Thanks,
Holly

Holly A. Davis
STARR Team
Tel: (904) 363-8451 | Fax: (904) 363 8811 | Cell: (904) 476 9840
Great Lakes Coastal Flood Study  
Information Exchange WebEx Meeting  
Berrien and Van Buren County, Michigan  
August 6, 2012  1:00pm ET

Attendance:
Cecil Derringer, City Manager, City of St. Joseph  
John Hodgson, Community Development Director, City of St. Joseph  
Tim Zebell, City Engineer, City of St. Joseph  
Derek Perry, Deputy City Manager, City of St. Joseph  
Erin Maloney, FEMA Region V  
Stacey Roberts, STARR  
Holly Davis, STARR  
Laura Keating, STARR

Discussion/Q&A:

- North side of the St. Joseph River inlet has been filled for development; has acquired appropriate permits.
- East side of the Paw Paw River – residential development area surrounded by a golf course.
- NW corner of St. Joseph and Paw Paw River – Marina in planning phase. Is partially filled above BFE; has acquired appropriate permits.
- City of St. Joseph has been conducting a coastal study (consultants) of their own:
  - North of River - St. Joseph Pier trapped sand resulting in accretion. The public believe that this is permanent and therefore want to build, some have built closer than City believes is safe. Concerned for when the water levels trend back higher
  - City of St. Joseph is working towards an ordinance (in the fall) that will require setbacks.
  - Concerned with how and where seawalls and other coastal structures are constructed. T North of the St. Joseph River they may prohibit coastal structures all together, while south of the St. Joseph River they may just regulate structures. Concern is to maintain public access along the shoreline.
- There is concern regarding transect location – There appears to only be one transect in the area of the City of St. Joseph, and it appears there would be a better location. The City of St. Joseph would like to adjust the one representative transect or include additional transects in specific locations.
- City of St. Joseph will share their study with the STARR team when it is final. They should have a final report this week.
- Suggested that STARR reach out to Lex Winans, at Berrien County, for the most current County-wide topographic and aerial photography data (1998-1999).
- A resident located north of the St. Joseph River, has also had topographic data (lidar and aerials?) flown; the City of St. Joseph will inquire to see if they can provide that data.
- City of St. Joseph FIRM maps are from 2006. Will these maps, which have been amended via LOMR’s, become the new base map for our coastal analysis? The City would like to see the changes to the map panels amended by letter represented visually on the base maps.

- Corps of Engineers harbor dredging with placement of dredged material on beaches – Section 111 project – also buried seawall in the vicinity of the nourishment

- Check with Berrien County for their hazard mitigation plan update

Wrap-up and Adjourn

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

Action Items

- Great Lakes website has Corps reports on lake level modeling, but does not seem to include resulting data? At save points? Continue to track down availability of data. Requested Bill Dally forward email in which he was provided data location for our pilot study.

- Request from Corps further information/data on beach nourishment project conducted under Section 111 beneficial use project dredging the harbor. Looked on District site and did not find information on project.
Information Exchange Session for Lake Michigan Discovery

Van Buren and Berrien Counties, Michigan
August 6, 2012
1pm – 2pm ET
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
Overview of Great Lakes Coastal Flood Study

- 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
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
Zoning, Setbacks, Floodplain Management, etc.

Local Building Codes
IBC, IRC, Local Regulations, etc.

Mitigation Projects
Acquisition, Elevation, Floodproofing, etc.

Community Identified Mitigation Programs

Management Best Practices
Integration of natural hazards into other planning mechanisms
Products and Datasets: Regulatory and Non-regulatory

Traditional Regulatory Products

DFIRM Database

Subject to statutory due-process requirements

Non-Regulatory Products

Flood Risk Database

Not subject to statutory due-process requirements
Products and Datasets:
Coastal Products in Development

Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline Reference

Shoreline Feature

Upper Peninsula Shoreline Reference
### Shoreline Features Database

<table>
<thead>
<tr>
<th>Shoreline Material</th>
<th>Primary Land Use</th>
<th>Primary Coast Type</th>
<th>Primary Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>High Density Residential</td>
<td>High Dune, 10'+</td>
<td>None</td>
</tr>
<tr>
<td>Cohesive</td>
<td>Moderate Density Residential</td>
<td>Dune, 2' - 10'</td>
<td>High Density Shrubs/Trees</td>
</tr>
<tr>
<td>Cobble</td>
<td>Low Density Residential</td>
<td>High Bluff, 10'+</td>
<td>Moderate Density Shrubs/Trees</td>
</tr>
<tr>
<td>Diamicton*</td>
<td>Commercial/Industrial</td>
<td>Bluff, 2' - 10'</td>
<td>Low Density Shrubs/Trees</td>
</tr>
<tr>
<td>Shingle</td>
<td>Park Land</td>
<td>Coastal Wetland</td>
<td>Manicured Lawn</td>
</tr>
<tr>
<td>Bedrock</td>
<td>Farm Land</td>
<td>Flat Coast</td>
<td>Native Vegetation</td>
</tr>
<tr>
<td>Artificial</td>
<td>Forested</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 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

1. Storm Surge Study Data Collection and Stakeholder Coordination
2. Storm Surge Study
3. Stakeholder Coordination
4. Data collection and Analysis
5. Discovery Meeting and follow up
6. Scope Refinement

Added Efforts for Long-Term Coastal Studies
Standard Discovery Efforts
<table>
<thead>
<tr>
<th>Discovery Meeting Venue</th>
<th>Discovery Meeting Address</th>
<th>Discovery Meeting Date, Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County Administrative Building</td>
<td>701 Main Street</td>
<td>Monday 09/10/2012; 2:00 - 4:00 PM ET</td>
</tr>
<tr>
<td></td>
<td>St. Joseph, Michigan 49085</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Draft Discovery Meeting Agenda

- Why are we here?

- Coastal mapping and flood risk topics to be aware of

- How does this apply to my community?
  - NFIP compliance, hazard mitigation opportunities, and grant funding

- Interactive Session
  - Utilization of Coastal Flood Risk Products for Planning and Mitigation, Identification of Existing Local Coastal Data, View and Discuss Local Coastal Areas of Concern Using the Discovery Map, Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form

- Wrap Up

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

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

Discovery Products

▪ Final Discovery Report
  • Single, comprehensive report for all of Lake Michigan, with appendices for each coastal community by county
  • Includes pre-discovery data, meeting agenda, sign-in sheets, discussion topics, decisions made, etc.

▪ Final Discovery Maps
  • Including feedback from participants
  • Visual representation of meeting outcomes
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**
Lake Michigan coastal communities in Van Buren and Berrien Counties, Michigan

Berrien County
City of Benton Harbor
City of Bridgman
Chikaming Township
City of Coloma
Coloma Township
Village of Grand Beach
Hagar Township
Lake Charter Township
Lincoln Charter Township
Michiana Village
City of New Buffalo
New Buffalo Township
Shoreham Village
Benton Charter Township
St. Joseph Charter Township

Van Buren County
Covert Township
South Haven Charter Township
Geneva Township
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

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

<table>
<thead>
<tr>
<th>Community/Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Title</td>
</tr>
<tr>
<td>Address</td>
</tr>
<tr>
<td>E-mail</td>
</tr>
<tr>
<td>Phone</td>
</tr>
</tbody>
</table>

Contact Preference: Email, Phone, Mail
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

<table>
<thead>
<tr>
<th>Incident Type</th>
<th>Incident Begin Date</th>
<th>Incident End Date</th>
<th>Area Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>12/1/1972</td>
<td>12/1/1972</td>
<td>Berrien (County)</td>
</tr>
<tr>
<td>Flood</td>
<td>4/12/1973</td>
<td>4/12/1973</td>
<td>Berrien (County)</td>
</tr>
<tr>
<td>Flood</td>
<td>4/12/1973</td>
<td>4/12/1973</td>
<td>Van Buren (County)</td>
</tr>
<tr>
<td>Flood</td>
<td>4/26/1975</td>
<td>4/26/1975</td>
<td>Berrien (County)</td>
</tr>
<tr>
<td>Flood</td>
<td>4/26/1975</td>
<td>4/26/1975</td>
<td>Van Buren (County)</td>
</tr>
<tr>
<td>Flood</td>
<td>9/10/1986</td>
<td>10/10/1986</td>
<td>Van Buren (County)</td>
</tr>
<tr>
<td>Severe Storm(s)</td>
<td>5/20/2004</td>
<td>6/8/2004</td>
<td>Berrien (County)</td>
</tr>
<tr>
<td>Severe Storm(s)</td>
<td>5/20/2004</td>
<td>6/8/2004</td>
<td>Van Buren (County)</td>
</tr>
</tbody>
</table>
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 interested in participating in Discovery Meeting facilitation?

THANK YOU FOR YOUR PARTICIPATION!
Who to Contact

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

Berrien County Draft Discovery Map
Attachment D.

Van Buren County Draft Discovery Map
Attachment E.

Berrien and Van Buren Counties Proposed Transects
Panel 3 of 17

Basemap Source: Microsoft BING map service

1 inch = 1,001 feet

BER04
BER05
BER06
BER07

STUDY COMMUNITIES

Township of Benton Harbor
City of Benton Harbor
City of Bridgman
Township of Chikaming
City of Coloma
Township of Coloma
Village of Grand Beach

Township of Hagar
Township of Lake Charter
Township of Lincoln
Village of Michiana
City of New Buffalo
Township of New Buffalo
Village of Shoreham

Township of St. Joseph Charter
Village of Stevensville
City of St. Joseph
Township of Weesaw
Township of Three Oaks
Village of Three Oaks
STUDY COMMUNITIES
Township of Covert
Township of Charter South Haven
Township of Geneva

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

Van Buren County, Michigan
DRAFT TRANSECTS
Panel 1 of 6
STUDY COMMUNITIES
Township of Covert
Township of Charter South Haven
Township of Geneva

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\VanBurenMIDraftTransects.mxd
Van Buren County, Michigan
DRAFT TRANSECTS
Panel 4 of 6

Basemap Source: Microsoft BING map service
STUDY COMMUNITIES
Township of Covert
Township of Charter South Haven
Township of Geneva

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

Van Buren County, Michigan
DRAFT TRANSECTS
Panel 5 of 6

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service
Attachment F.

Berrien and Van Buren Counties Discovery Meeting Documents
July 13, 2012

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

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

Dear «Salutation» «Last_Name»:

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

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

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

Your Discovery Meeting is scheduled to occur:

- Date: Monday, September 10, 2012
- Time: 2:00pm – 4:00pm
- Location: Berrien County Administrative Building
- Address: 701 Main Street, St. Joseph, Michigan 49085

Please save this date on your calendar. At the meeting, we will review the coastal flood risk data we have gathered to date and discuss your community’s coastal floodplains, mitigation plan and projects, coastal flood risk concerns, and coastal floodplain management activities. This discussion will allow us to better identify your community’s coastal flood hazard needs and subsequent Risk MAP regulatory and non-regulatory products and datasets that can be delivered during the Risk MAP project. We will also discuss how the coastal flood risks and needs are related to mapping, risk assessment, Hazard Mitigation planning, and grant programs available to eligible communities. To best facilitate this discussion, we would like to request your help in inviting community leaders, emergency managers, GIS specialists, engineers, outreach specialists, and local planners to the meeting. Please RSVP to FEMA’s study contractor (STARR) Holly Davis at (904) 363-8451 or email to GreatLakesFloodStudy@starr-team.com no later than August 17, 2012. Please reference the Discovery Meeting date and time in your RSVP.
So that we can better prepare for the upcoming Discovery Meeting, we are asking local communities to participate in an Information Exchange conference call and WebEx. This call will provide an overview of FEMA’s Risk MAP program and the Discovery process, and will allow us to review with you our request for the exchange of coastal flood risk and hazard mitigation data, and to learn more about your community’s coastal flood hazard risks and needs, in advance of the Discovery Meeting. The partnership and exchange of data between FEMA, the State, and your community is vital to the success of identifying flood risks and needs that may impact your citizens.

The Information Exchange conference call is scheduled to occur:

Date: Monday, August 6, 2012
Time: 1:00pm – 2:00pm EST
Link to WebEx: https://www.webex.com/login/attend-a-meeting
Meeting No: 658 935 489
Call in number: 877-537-6647
Participant Code: 31578

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

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

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

Sincerely,

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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

cc: Community FPA
Linda Burke, Michigan Department of Environmental Quality
Les Thomas, Michigan Department of Environmental Quality
Byron Lane, Michigan Department of Environmental Quality
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<thead>
<tr>
<th>No.</th>
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<tr>
<td>1</td>
<td></td>
<td>Berrien County</td>
<td>GIS Director</td>
<td>Lex</td>
<td>Winans</td>
<td>701 Main Street St. Joseph, MI 49085</td>
<td>(269) 983-7111</td>
<td><a href="mailto:lwinans@berriencounty.org">lwinans@berriencounty.org</a></td>
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<tr>
<td>1</td>
<td></td>
<td>City of St. Joseph</td>
<td>Community Development Director</td>
<td>John</td>
<td>Hodgson</td>
<td>700 Broad Street St. Joseph, MI 49085</td>
<td>(269) 983-1212</td>
<td><a href="mailto:jhodgson@sjcity.com">jhodgson@sjcity.com</a></td>
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<td>2</td>
<td></td>
<td>City of St. Joseph</td>
<td>City Engineer</td>
<td>Tim</td>
<td>Zebell</td>
<td>700 Broad Street St. Joseph, MI 49085</td>
<td>(269) 983-1212</td>
<td><a href="mailto:tzebell@sjcity.com">tzebell@sjcity.com</a></td>
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<td>3</td>
<td></td>
<td>City of St. Joseph</td>
<td>Chief Building Official</td>
<td>Cecil</td>
<td>Derringer</td>
<td>700 Broad Street St. Joseph, MI 49085</td>
<td>(269) 983-1212</td>
<td><a href="mailto:cderringer@sjcity.com">cderringer@sjcity.com</a></td>
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<td>4</td>
<td></td>
<td>St. Joseph Charter Township</td>
<td>Building Official</td>
<td>Jerry</td>
<td>Jones</td>
<td>3000 Washington Ave., P.O. Box 147 St. Joseph MI 49085</td>
<td>(269) 429-7703</td>
<td>ji Jones @ sjct.org</td>
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<td>5</td>
<td></td>
<td>St. Joseph Charter Township</td>
<td>Township Manager</td>
<td>Tim</td>
<td>Fenderbosch</td>
<td>3000 Washington Ave., P.O. Box 147 St. Joseph MI 49085</td>
<td>(269) 429-7703</td>
<td><a href="mailto:tfenderbosch@sjct.org">tfenderbosch@sjct.org</a></td>
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<td></td>
<td>Southwest Michigan Planning Commission</td>
<td>Senior Planner</td>
<td>Marcy</td>
<td>Colclough</td>
<td>185 East Main Street, Suite 701 Benton Harbor, MI 49022</td>
<td>(269) 925-1137</td>
<td><a href="mailto:colcloughm@swmpc.org">colcloughm@swmpc.org</a></td>
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<td></td>
<td>FEMA</td>
<td>FEMA Region V</td>
<td>Ken</td>
<td>Hinterlong</td>
<td>536 S. Clark Street, 6th Floor Chicago, IL 60605</td>
<td>(312) 408-5529</td>
<td><a href="mailto:Ken.Hinterlong@fema.dhs.gov">Ken.Hinterlong@fema.dhs.gov</a></td>
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<td></td>
<td>FEMA</td>
<td>FEMA Region V Risk Analysis</td>
<td>Erin</td>
<td>Maloney</td>
<td>536 S. Clark Street, 6th Floor Chicago, IL 60605</td>
<td>(312) 408-5435</td>
<td><a href="mailto:erin.maloney@fema.dhs.gov">erin.maloney@fema.dhs.gov</a></td>
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<td>9</td>
<td></td>
<td>STARR</td>
<td>Project Manager/Coastal Engineer</td>
<td>Stacey</td>
<td>Roberts</td>
<td></td>
<td>(850) 580-7896</td>
<td><a href="mailto:stacey.roberts@starr-team.com">stacey.roberts@starr-team.com</a></td>
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<td>10</td>
<td>AJ</td>
<td>STARR</td>
<td>Outreach Coordinator</td>
<td>Holly</td>
<td>Davis</td>
<td>2100 E. Empire</td>
<td>(904) 363-8451</td>
<td><a href="mailto:holly.davis@atarr-team.com">holly.davis@atarr-team.com</a></td>
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<td>11</td>
<td>JL</td>
<td>STARR</td>
<td>Sr. Technical Coordinator</td>
<td>Janet</td>
<td>Luce</td>
<td></td>
<td>(321) 242-4942</td>
<td><a href="mailto:janet.luce@atkinsglobal.com">janet.luce@atkinsglobal.com</a></td>
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<td>12</td>
<td>CB</td>
<td>Berrien County</td>
<td>Berrien County</td>
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<td>Burks</td>
<td>2100 E. Empire</td>
<td>269-983-7111 x.4916</td>
<td><a href="mailto:cburks@berriencounty.org">cburks@berriencounty.org</a></td>
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<td>JL</td>
<td>Berrien County</td>
<td>Berrien County</td>
<td>Jeanette</td>
<td>Leakey</td>
<td>B Co County Admin</td>
<td>269-369-2255</td>
<td><a href="mailto:jeanetteleakey@hotmail.com">jeanetteleakey@hotmail.com</a></td>
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<td>14</td>
<td>MM</td>
<td>Edgewater Resources</td>
<td>Engineer</td>
<td>Mike</td>
<td>Morphey</td>
<td>518 East Street, Suite 200</td>
<td>269-408-6389</td>
<td><a href="mailto:mmorphney@edgewater-resources.com">mmorphney@edgewater-resources.com</a></td>
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<td>15</td>
<td>ES</td>
<td>MDEA</td>
<td>Engineer</td>
<td>Ernie</td>
<td>Sarkipan</td>
<td>7953 Aboose Rd</td>
<td>269-567-3564</td>
<td><a href="mailto:sarkipan@mi.gov">sarkipan@mi.gov</a></td>
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<td>16</td>
<td>JB</td>
<td>Southwest GIS</td>
<td>Specialist</td>
<td>Jeff</td>
<td>Flexner</td>
<td>185 E Main Street</td>
<td>269-925-1137 x 22</td>
<td><a href="mailto:flexner@swhl.org">flexner@swhl.org</a></td>
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<td>17</td>
<td>AH</td>
<td>Berrien County</td>
<td>Berrien County</td>
<td>Anne</td>
<td>Hendrix</td>
<td>701 Main St</td>
<td>269-483-7111 x 6560</td>
<td><a href="mailto:ahendrix@berriencounty.org">ahendrix@berriencounty.org</a></td>
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<td>JT</td>
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<td>Seanine</td>
<td>Toreke</td>
<td>510 Main St</td>
<td>269-983-7111 x 8255</td>
<td><a href="mailto:jtor2ke@berriencounty.org">jtor2ke@berriencounty.org</a></td>
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<td>19</td>
<td>KY</td>
<td>Saint Joseph Townsh</td>
<td>Building Official</td>
<td>Jerry</td>
<td>Jones</td>
<td>3000 Washington Ave</td>
<td>269-429-7703</td>
<td><a href="mailto:jones@sj.tkwk">jones@sj.tkwk</a></td>
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Great Lakes Flood Study
Berrien and VanBuren Counties Discovery Meeting--Michigan

Meeting Schedule: Monday, September 10, 2012   2:00 – 4:00 pm (ET)
Meeting Location: Berrien County Administrative Building, St. Joseph, MI

PARTICIPANTS

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

Michigan DEQ
Ernie Sarkipato

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

Discovery Meeting Agenda

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

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

3. How does this apply to my community?

4. Hazard mitigation opportunities and grant funding

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

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

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

A. Questions asked during the presentations (summary of answers provided in italics)
   1. Is the USACE doing a separate analysis of lake levels for the new coastal study? Ken Hinterlong said yes, FEMA has funded the USACE to do a new analysis based on 50 years of record. 150 storms are being modeled. The data generated from this analysis is being stored on CSTORM at a large number of save points; this creates many “virtual gauges”. This data will be available to the public. FEMA has spent about $11 million on the Great Lakes program so far; much of the results of this work can be found at www.greatlakescoast.org.
   2. When will the Coastal Flood Risk Report and Maps be complete? The Coastal Flood Study Maps will be completed in the next 18-24 months.

B. Questions/comments raised during the discussion and break out session
   1. Potential person to contact for additional information:
      a. Marcy Colchough (suggested by Jill Plesher who attended the 9/10 Discovery meeting). Mary has been involved with local planning and environmental work for the past 15 years. Among other interests, she wants to promote a Lake Michigan kayak and canoe trail. Mary’s contact information is:
         Southwest Michigan Regional Planning Commission
         185 East Main Street
         Benton Harbor, MI 49022
         Telephone: 269-925-1137
   2. Transect VA B05 is in an interesting area with a very unusual transient dune system that moves several feet each year and has buried numerous homes. Keep this transect as placed.
   3. Open house to review preliminary maps is scheduled for 2014. Work maps will be released prior to open house.
   4. The USACE Oblique Photo Viewer is currently being used for regulatory purposes.
   5. The 2006 Michigan Building Code currently includes VE zones.
   6. Berrien County Commissioner, Jeanette Leahey, and Emergency Manager, Corey Burks - Very supportive of efforts. Recommends contact with the local Police and Fire Chiefs to seek out historical information on past flood events and high water marks.
   7. St. Joseph Township – No new development in this area in past four years.
   8. Harbor Shores - Located on St. Joseph River relatively near the coast. Only engineered basements permitted by code. They are about to be taken out of the floodplain because an area to be developed will be filled as part of development of a nearby marina.

C. General notes
   a. A separate meeting was held with the City of St. Joseph at the conclusion of this Discovery meeting. (Notes from this meeting have been compiled and inserted at the conclusion of this meeting summary.)
   b. No other general notes for this meeting.

FEATURES NOTED ON MAPS:

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<th>Community</th>
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<td>Michigan</td>
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<td>City of Benton Harbor</td>
<td>26021</td>
<td>260032</td>
<td>Refer to City of St. Joseph Coastal Study for areas north and south of Benton Harbor.</td>
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### Actions:

- STARR will send out the discovery presentation as well as contact information to attendees.
City of St. Joseph Meeting Summary:
Meeting schedule: Monday, September 10, 2012   4:00 – 5:00 pm (ET)
Meeting Location: Berrien County Administrative Building, St. Joseph, MI

PARTICIPANTS

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

City of St. Joseph
John Hodgson, Community Development Director
Cecil Derringer, Building Official

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

A. Discussion and action items
1. The City recently completed a study of management options for its shoreline – “City of St. Joseph Coastal Engineering Study”, dated August 17, 2012. A copy of this study was provided to FEMA and STARR. In this study, the shoreline was divided into several areas and management recommendations were provided for each area.

2. The City is very interested in new floodplain maps and tools, especially for Areas 1 and 2. Not much can be done in Area 3 due to bluffs and existing coastal structures.

3. Transect locations should be adjusted as requested by John and Cecil (see marked up maps – shift transect from the north slightly to the south to cover this area better). Make sure to cover the area to the north of the jetty/pier where big homes are being built. Some of these homeowners have removed the dunes along the lakeside.

4. Communicate with St. Joseph as the pilot study results and final transect locations are generated. These results will then be used in discussions to help decide which (if any) non-regulatory products can help the City best manage the coastal floodplain. Erosion maps may be very helpful.

5. The City has a variety of recent aerial photography and topo (1’ and 2’ contours) and will provide this to STARR (Holly Davis).

6. John expressed concern with damages from ice events. Ken indicated that, since these are pretty limited in scope and are very rare events, they will not be included in the new study by FEMA.

7. Sand is moving from north to south along the shoreline of the community. The beach north of the jetty has been building since the pier/jetty was tightened in 1980, while the area to the south is being starved of sand and is eroding. The USACE dredges the basin each year and puts this material on the south/eroding beach. This is roughly maintaining the shoreline position. The dredged material is very fine and erodes quickly.

8. The City has built a substantial rock revetment to protect its water treatment plant which is located on the lake. The basic configuration of this revetment will be required for any new structures built in Area 2. The City is dealing with how to write this ordinance and whether they should require that each new project cover several properties to help address problems with structures being flanked.
Lake Michigan Discovery
Berrien County, MI
Van Buren County, MI

September 10, 2012
2pm to 4pm ET
Berrien County Administrative Building
St. Joseph, Michigan
Introductions

Who’s here?

- State Representatives
  - MDEQ

- Risk MAP Project Team
  - FEMA
  - STARR

- Local Stakeholders
  - CEOs
  - Floodplain Administrators
  - Planners
  - Engineers
  - Emergency Managers
  - Community Leaders
  - Regional Planning Agencies
  - Coastal Organizations
  - Property Owner Associations
  and Other Key Stakeholders
Discovery Meeting Agenda

- **Why are we here?**
  - Risk MAP Program, Great Lakes Study, and Discovery Overview

- **Coastal mapping (regulatory products)**

- **Flood risk products (non-regulatory products)**

- **How does this apply to my community?**
  - NFIP compliance, local impacts of coastal study, hazard mitigation, and grant funding

- **Interactive Sessions**
  - View and Discuss Local Coastal Areas of Concern Using the Discovery Map and Community Risk MAP Questionnaire
  - Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form

- **Wrap Up**

- **Optional Interactive Stations**
Risk Mapping, Assessment and Planning

Risk MAP

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.
Great Lakes Coastal Flood Study
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
Welcome to the Great Lakes Coastal Flood Study website at greatlakescoast.org. This is the official public website for FEMA’s comprehensive storm and wind study of the Great Lakes basin for the purpose of updating the coastal flood hazard information and Flood Insurance Rate Maps (FIRM) for Great Lakes coastal communities. This is the main page of the website and contains the most recent content posted to the site. Use the menu at the left to visit pages with additional content pertaining to the Great Lakes Coastal Flood Study.

Home

Technical Resources Page Added to GreatLakesCoast.org
May 7, 2012 — Great Lakes Coast

A new page has been added to the Great Lakes Coastal Flood Study website in the menu on the left called Technical Resources. The Technical Resources page contains links to data and reports of interest to engineers and other technical stakeholders interested in the Great Lakes Coastal Flood Study.

As of this posting, there is a link to high-resolution bathymetric and topographic LIDAR data on NOAA’s Coastal Services Center Digital Coast website. In June 2012, additional data links will go live, including the C-STORM wave and storm surge database (containing all the wind, wave, pressure, ice and water level data for the Great Lakes basin) and the Great Lakes Oblique Photo Viewer (containing all the coastal oblique photographs of the Great Lakes shoreline).

The Technical Resources page also currently houses links to U.S. Army Corps of Engineers reports relevant to the Great Lakes Coastal Flood Study, as well as a link to the FEMA Great Lakes Coastal Guidelines, Appendix D.3 Update at fema.gov, which includes information on the 60-day public comment process that starts today.

All stakeholders are invited to review and comment on this draft guidance. See FEMA’s webpage for e-mail address for submission of comments.

Posted in Data, Reports.
Tags: Guidelines, Public Comment, Technical Resources.
Great Lakes Coastal Flood Study Schedule

Program Development
- Data Storage System Development
- Evaluation of Storm Sampling and Statistical Approach
- Conduct Methodology Sensitivity Studies
- Update and Finalize Guidelines and Specs Appendix D Document
- Pilot Coastal Data Integration with New Methodology
- Develop Data Management Strategy for All Program Components

Basin Grid Development for Wave and Storm Time Series Data
- Basin-wide Surge Modeling for Lake Michigan (Data Analysis, Model Setup, Wave & Water Level Production Modeling)
- Basin-wide Surge Modeling for Lake Erie, Lake Ontario, Lake St. Clair
- Basin-wide Surge Modeling for Lake Huron, Lake Superior

Outreach and Community Coordination
- Outreach greatlakescoast.org, Fact Sheets, Presentations, Speakers Bureau, Newsletters, Social Media
- Technical Workshops: Lake Erie, Lake Michigan, Lake St. Clair
- Flood Study Discovery and Initial Coordination Meetings
- Flood Risk Data and Mitigation Workshops
- Flood Risk Open Houses

Wave Elevation Modeling and Mapping (Shoreline Processes)
- Topographic / Bathymetric Data Collection (LiDAR)
- Basinwide Oblique Photograph Acquisition
- Wave Runup and Overland Wave Modeling, Draft Map Production
- Flood Insurance Rate Map (FIRM) Integration Including Public Review/Comment
Lake Michigan Discovery

- 34 counties in total
  - 4 counties in UP Michigan
  - 11 counties in Wisconsin
  - 2 counties in Illinois
  - 3 counties in Indiana
  - 14 counties in lower Michigan
- 226 coastal communities
## Lake Michigan coastal communities in Berrien and Van Buren Counties:

<table>
<thead>
<tr>
<th>Berrien County</th>
<th>Berrien County (cont.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benton Charter, Township of</td>
<td>New Buffalo, Township of</td>
</tr>
<tr>
<td>Benton Harbor, City of</td>
<td>Shoreham, Village of</td>
</tr>
<tr>
<td>Bridgman, City of</td>
<td>St. Joseph Charter, Township of</td>
</tr>
<tr>
<td>Chikaming, Township of</td>
<td>St. Joseph, City of</td>
</tr>
<tr>
<td>Coloma, City of</td>
<td>Stevensville, Village of</td>
</tr>
<tr>
<td>Coloma, Township of</td>
<td>Three Oaks, Township of</td>
</tr>
<tr>
<td>Grand Beach, Village of</td>
<td>Three Oaks, Village of</td>
</tr>
<tr>
<td>Hagar, Township of</td>
<td></td>
</tr>
<tr>
<td>Lake Charter, Township of</td>
<td>Van Buren County</td>
</tr>
<tr>
<td>Lincoln, Township of</td>
<td>Covert, Township of</td>
</tr>
<tr>
<td>Michiana, Village of</td>
<td>South Haven Charter, Township of</td>
</tr>
<tr>
<td>New Buffalo, City of</td>
<td></td>
</tr>
</tbody>
</table>

### Diagram:

- Berrien County
- Van Buren County

---

**RiskMAP**

*Increasing Resilience Together*

**Great Lakes Coastal Flood Study**

greatlakescoast.org
Discovery Schedule Overview

- Storm Surge Study Data Collection and Stakeholder Coordination
- Storm Surge Study
- Stakeholder Coordination
- Data collection and Analysis
- Discovery Meeting and follow up
- Scope Refinement

Added Efforts for Long-Term Coastal Studies

Standard Discovery Efforts

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Lake Michigan Discovery

Schedule of Activities

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

- **Explain the Project**
  - Regulatory and non-regulatory products/datasets
  - Analysis, concepts, timelines

- **Encourage Community Participation**
  - Transect Locations
  - Areas of concern and need
  - Data to improve upon products and datasets

- **Introduce Mitigation Action**
  - Mitigation Action Form
  - Action Tracker
  - Mitigation strategies for coastal flood and erosion
**Great Lakes Coastal Flood Study Discovery Products**

- **Final Discovery Report**
  - Single, comprehensive report for all of Lake Michigan, with appendices for each Discovery meeting
  - Includes pre-discovery data, meeting agenda, sign-in sheets, discussion topics, decisions made, etc.

- **Final Discovery Maps**
  - Including feedback from participants
  - Visual representation of meeting outcomes
  - Delivered in digital format
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
Coastal Mapping

- Draft Transects
- VE Zone Mapping
- Limit of Moderate Wave Action (LiMWA)
### Draft Transect Layout
Berrien and Van Buren Counties

<table>
<thead>
<tr>
<th>County</th>
<th># Shoreline Miles</th>
<th># Transects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien</td>
<td>39</td>
<td>30</td>
</tr>
<tr>
<td>Van Buren</td>
<td>13</td>
<td>9</td>
</tr>
</tbody>
</table>
Transect Placement

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

Transect Profile

Waterline

Land Profile

Great Lakes Coastal Flood Study
greatlakescoast.org
Basic Elements of a Coastal Hazard Analysis

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

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

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

- **Gutters**
  - Internal zone breaks where BFE changes
  - VE/AE Gutter - Location where risk of damage due to wave action diminishes
How is Limit of Moderate Wave Acton (LiMWA) Defined?

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

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Great Lakes Coastal Flood Study

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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
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

V Zones for Lake Michigan?

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

- If coastal AE and VE Zones are added on maps where they did not exist before, all affected communities must update regulations to include coastal requirements.
  - State will provide regulations assistance and technical support if/when coastal flood zones are added.
Coastal Flood Risk Products

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

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

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

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

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

**Data Fields Include**

<table>
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</table>
Coastal Non-Regulatory Products in Development

Erosion

Lake Levels

Lake Michigan Shoreline Reference

Shoreline Feature Dataset

Upper Peninsula Shoreline Reference

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## Shoreline Features Database

<table>
<thead>
<tr>
<th>Shoreline Material</th>
<th>Primary Land Use</th>
<th>Primary Coast Type</th>
<th>Primary Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>High Density Residential</td>
<td>High Dune, 10'+'</td>
<td>None</td>
</tr>
<tr>
<td>Cohesive</td>
<td>Moderate Density Residential</td>
<td>Dune, 2' - 10'</td>
<td>High Density Shrubs/Trees</td>
</tr>
<tr>
<td>Cobble</td>
<td>Low Density Residential</td>
<td>High Bluff, 10'+</td>
<td>Moderate Density Shrubs/Trees</td>
</tr>
<tr>
<td>Diamicton*</td>
<td>Commercial/Industrial</td>
<td>Bluff, 2' - 10'</td>
<td>Low Density Shrubs/Trees</td>
</tr>
<tr>
<td>Shingle</td>
<td>Park Land</td>
<td>Coastal Wetland</td>
<td>Manicured Lawn</td>
</tr>
<tr>
<td>Bedrock</td>
<td>Farm Land</td>
<td>Flat Coast</td>
<td>Native Vegetation</td>
</tr>
<tr>
<td>Artificial</td>
<td>Forested</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

http://greatlakes.usace.army.mil/
Coastal Flood Risk Map and Report

- Highlights area where datasets were produced
- Use of callout boxes
- Should drive the conversation towards mitigation
How Can You Use These (Non-Regulatory) Products?

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

- Mitigation Action Form
How does this apply to my community?

- NFIP Compliance
- Local impacts of coastal study
National Flood Insurance Program (NFIP)

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

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

- Flood insurance premium rates discounted to reward community actions that reduce flood losses, facilitate accurate insurance ratings, and promote the awareness of flood insurance
- Class rating system from 1 to 10
- Each Class improvement (500 point increments) results in additional 5% discount, up to 45% in SFHAs for Class 1 communities
- Uniform minimum credits give you points for activities on the state level (state laws) and make achieving a Class 9 relatively easy
- 18 creditable activities organized under four categories:
  - Public Information
  - Mapping and Regulations
  - Flood Damage Reduction
  - Flood Preparation
- [http://training.fema.gov/EMIWeb/CRS/]
Hazard Mitigation

- Opportunities
- Grant Funding
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
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
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

Mitigation Actions/Projects

Other Community Plans
- Comprehensive plans
- Land Use Plans
- Capital Improvement
- Stormwater
- Management Plans
- Emergency Operations
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)
Hazard Mitigation Assistance includes both post-disaster and pre-disaster grants.

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

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

HMGP is a post-disaster grant program.

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Mitigation Grants/Programs: Other Federal Agencies (OFA)

- 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
Meet the Action Form

Mitigation Action Form

6. Hazard Type?
   - Flood
   - Erosion
   - Storm S
   - Landslide
   - Lighting
   - Sev
   - Wind
   - Multiple Hazards

9. Who is the Responsible Agency?
   - Building Code Department
   - Planning
   - Other
   - Community Development
   - Public Works
   - State DOT
   - Emergency Management

7. What is the Mitigation Category?
   - Local Plans and Regulations

8. How was this action/strategy identified?
   - Risk Map Process
   - Comprehensive Land Use Plan
   - Capital Improvement Plan
   - County
   - State

10. What is the expected/potential funding source?
    - Community
    - Private Sector, including Foundations
    - Regional Water Management District

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
Action Tracker

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

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

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

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

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

• Discuss Mitigation Action Opportunities and Introduce the Mitigation Action Form
Berrien County, MI
Discovery Map

RiskMAP
Increasing Resilience Together

Great Lakes
Coastal Flood Study
greatlakescoast.org
Data Gaps

Do you know of any:

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

- FEMA Region V
  - Ken Hinterlong @ ken.hinterlong@fema.dhs.gov
  - Erin Maloney @ Erin.Maloney@fema.dhs.gov
- Michigan Partners
  - Linda Burke (MDEQ) @ BURKEL4@michigan.gov
- STARR
  - Stacey Roberts (technical) @ stacey.roberts@starr-team.com
  - Holly Davis (outreach) @ holly.davis@starr-team.com
- Online
  - info@greatlakescoast.org
Optional Interactive Stations

- **Draft Transect Map Station**
  - View draft transect locations and oblique imagery in data viewer [http://greatlakes.usace.army.mil/](http://greatlakes.usace.army.mil/)
  - Discuss draft transect locations with technical staff

- **Mitigation Resources, Strategies, and Actions Station**
  - Talk with FEMA and State representatives about areas of concern and potential mitigation actions to help reduce risk
  - Fill out Mitigation Action Form
Attachment G.

Hazard Mitigation Actions for Berrien and Van Buren Counties, MI
<table>
<thead>
<tr>
<th>Name of Plan</th>
<th>County</th>
<th>Hazard Mitigation Actions and Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Improve warning systems to adequately warn the public in high-risk areas.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Improve communication systems to better respond to disasters.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Better serve elderly, disabled and LEP (Limited English Proficiency) populations.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Maintain and protect essential public services, critical facilities and public infrastructure.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Require new development to pay the full cost of protection measures.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Protect floodplains, wetlands and other important natural areas. Limit building in high-risk areas.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Improve building construction.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Develop public/private partnerships to implement mitigation activities.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Leverage grant dollars by using county/municipal funds to implement mitigation activities.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Encourage people to assume some responsibility for their own protection.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Develop public outreach campaigns about priority hazards to make people aware of hazards and mitigation activities.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Involve local municipalities and general public in hazard mitigation planning.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Keep current siren systems functioning and in good repair.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Evaluate the need for expanded warning siren coverage.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Continue to improve weather forecasting abilities.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Explore the feasibility of utilizing the EAS (Emergency Alert System) to warn and provide instructions for residents during hazard events.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Purchase and install warning sirens on public beaches.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Continue to produce and distribute family preparedness information. Also, place information on county website.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Translate family preparedness information into Spanish and include on website.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Distribute Red Cross brochure on the need for homeowners and renters to purchase adequate insurance coverage.</td>
</tr>
<tr>
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<td>Berrien</td>
<td>Distribute Red Cross information regarding the need for home disaster plans.</td>
</tr>
<tr>
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<td>Berrien</td>
<td>Work with partners to develop methods for disseminating multi-lingual hazard warnings for non-English speaking residents of the County.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Help partner agencies to publicize existing services for special populations</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Assist local businesses in planning for and responding to natural hazard events when they do occur.</td>
</tr>
<tr>
<td>Berrien County Hazard Mitigation Plan 2012</td>
<td>Berrien</td>
<td>Develop partnerships with business associations to develop a mechanism for assessing damages, estimating indirect losses and reporting information about local businesses after a disaster.</td>
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<td>Name of Plan</td>
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<td>Install and test EAS (Emergency Alert System) to warn and provide instructions for residents during hazard events.</td>
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<td>Continue to produce and distribute family preparedness information. Also, place information on county website.</td>
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<td>Translate family preparedness information into Spanish and include on website.</td>
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<td>Work with partners to develop methods for disseminating multi-lingual hazard warnings for non-English speaking residents of the County.</td>
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<td>Assist local businesses in planning for and responding to natural hazard events when they do occur.</td>
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Attachment H.

City of St. Joseph Coastal Engineering Study (August 17, 2012)
City of St. Joseph Coastal Engineering Study

August 17, 2012
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PURPOSE

This report is intended to evaluate the Lake Michigan coast within the St. Joseph City Limits and to provide recommendations for shoreline management to best preserve the public trust property along the shoreline and protect private interests and property, taking into consideration the unique characteristics and circumstances of the shoreline in different areas of the city that will govern the shoreline management approach. The recommended shoreline management approach is intended to help city policy makers as they evaluate options to further public purposes such as protecting natural resources; preserving the Lake Michigan shoreline, advancing the economic and environmental well-being, health, safety, and general welfare of the City; and preserving/enhancing property values by preserving the natural character of the shoreline.

EXECUTIVE SUMMARY

AREA 1

Area 1 is bookended by public parks at either end that are connected by uninterrupted public trust property and to private property. To preserve this public trust property, reduce the risks of coastal hazards to private property, and maintain the natural shoreline, we recommend the implementation of a fixed setback line, based on coastal engineering principles. The setback line would prevent the construction of structures within a fixed area adjacent to Lake Michigan and prevent the need for shoreline protection structures that cause unnatural erosion and irreversible damage to the shoreline and adjacent property.

AREA 2

Area 2 contains public parks at both ends and publicly-owned shoreline along its entire length. The area is fully developed and shallow lots prevent structures from being built significantly further from the lake than existing structures. This area is already impacted by existing shore protection activity. To protect existing structures during periods of high water, more substantial shoreline protection structures may be required. We recommend the implementation of design guidelines to preserve public access, while allowing property owners to construct, if necessary, properly designed shoreline protection structures which could ultimately become one unified structure.

AREA 3

The entire shoreline of Area 3 contains existing shoreline protection structures, including stone revetments, sheet piling, groins, and timber structures. Steep bluffs containing cohesive soils line the shoreline and the structures are necessary for the protection of the bluffs against erosion. The steep bluffs and shoreline structures restrict public access. We do not recommend additional regulation of shoreline protection structures in Area 3.
STUDY AREAS

AREA 1

Area 1 includes the St. Joseph shoreline from the south limit of Jean Klock Park to the north line of the St. Joseph River. The public trust property in this area varies in width and extends from the water line to the Natural Ordinary High Water Mark (NOHWM). Structures in this area are generally located at least 300 feet inland from the Ordinary High Water Mark (OHWM), with a few exceptions that are as close as 70 feet from the OHWM.

Figure 1: Area 1 Aerial

Area 1 is bordered on both ends by public parks, with Jean Klock Park to the north and Tiscornia Beach to the south. Between the parks, private properties exist and many of the lots extend several hundred feet southeast to the street known as Ridgeway. Currently, no shore protection structures exist within Area 1, apart from the federal navigation structure at the southerly limit of the area. The entire shoreline here is sandy beach and the southern half of Area 1 is typically an accretion zone, but subject to erosion at times.

AREA 2

Area 2 includes the St. Joseph shoreline from the south pier of the St. Joseph River to the north limit of the St. Joseph Water Plant. This area includes two public parks, with Silver Beach located at the north end and Lions Park Beach located at the south end.

The entire shoreline here is publicly-owned with some existing federally-constructed shore protection structures and some private shore protection structures on adjacent private property. In some circumstances, the Lake Michigan water line can reach private property at the southern extents of the residential neighborhood.
Area 2 consists of sandy beach, with some coarse fill from past beach nourishment. This area receives beach nourishment from federal dredging operations on a regular basis, typically annually, because it is subject to erosion. Public access along the public trust property can vary, depending on lake conditions, erosion, and beach nourishment. Private properties that border Area 2 between Silver Beach and Lions Park Beach are fully developed and parcels are typically very shallow in comparison to those in Area 1, none exceeding 132 feet in depth.

AREA 3

Area 3 includes the St. Joseph shoreline from the north limit of the St. Joseph Water Plant to the south City Limit, just south of Orleans Circle.

Little to no meaningful public trust property exists here due to limited access, high bluffs, stone revetments, and other existing shoreline protection structures. The shores within Area 3, in contrast to Areas 1 and 2 are composed of cohesive material and the entire shoreline here contains shore protection of varying types and states of repair.
DEFINITIONS & COASTAL CONSIDERATIONS

VERTICAL DATUM

All elevations within this study are in reference to the International Great Lakes Datum, 1985 (IGLD 85), unless otherwise noted. Some elevations within the study are converted from other datums which were referenced in original documents. A table summary of the key elevations and conversions is located in Appendix 1.

WAVES

A wave is defined as the difference in elevation between the wave’s crest to its neighboring trough. In order to standardize wave heights for statistical analysis, wave heights are generally referred to as significant wave heights. A significant wave height was originally defined as the average wave height of the largest third of the waves; it is now commonly defined as four times the standard deviation of the surface elevation of the water.

According to the U.S. Army Corps of Engineers Wave Information Studies (WIS) for St. Joseph, the 50-year event peak wave height is 7 meters, or 23 feet, and the 100-year event peak wave height is 7.5 meters, or 24.6 feet. A 50-year event has a 2% chance of being equaled or exceeded in any single year and a 100-year event has a 1% chance of being equaled or exceeded in any single year.

Figure 4: U.S. Army Corps of Engineers WIS Data
Also according to the Wave Information Studies, wind occurs most frequently from the south-southwest direction, and high frequencies of wind also occur from the southwest and north-northwest directions (Figure 6). The greatest frequency of wave occurrence, however, is from the north-northwest, due to the long wave fetch in the north-northwest direction (Figure 7). Wave fetch is the distance over which wave-generating winds travel. In St. Joseph, although winds come from the south-southwest most frequently, the fetch in that direction is only 25 miles, so waves have a relatively short distance to form. When winds come from the north-northwest, the fetch distance is 150 miles and extreme waves can be generated. Figure 5 illustrates the St. Joseph fetch distances for each of the two most predominant wind directions.

Figure 5: Fetch Distances for St. Joseph
Figure 6: U.S. Army Corps of Engineers WIS Wind Rose
Figure 7: U.S. Army Corps of Engineers WIS Wave Rose
As a strong, sustained wind with a large fetch blows across open water, some of its energy is transferred to the water. This energy transfer causes water to be dragged with the wind, causing a storm surge, or set-up, to occur on the leeward (downwind) side of the water body. This set-up inversely causes a set-down on the windward (upwind) side of the water body. This relationship is shown in Figure 8. Set-ups and set-downs can also be caused by sudden changes in atmospheric pressure on the lake. Since it is located on the side of Lake Michigan that is typically leeward, St. Joseph is highly susceptible to wave set-ups ranging from two to three feet. These set-ups, combined with large wave heights during a storm event, can create extreme shoreline conditions.

![Figure 8: U.S. Army Corps of Engineers/University of Wisconsin. Living on the Coast. USA: U.S. Army Corps of Engineers/University of Wisconsin, 2003. Print.](image)

**WAVE RUNUP**

Wave runup is defined as the landward extent of wave uprush measured vertically from the still water level (Figure 9). Runup is largely dependent on deep water wave height, wave period, slope of lake bottom, and slope of shoreline. The calculated 2% wave runup of a 50-year deep water wave that propagates to shore for Area 1 is 7.0 feet and the average calculated 2% wave runup for Area 2 is 6.0 feet, both relative to still water elevation. The primary difference in runup is attributed to slope/bathymetry differences between the areas.

![Figure 9: FEMA Wave Runup Graphic](image)
LAKE MICHIGAN WATER LEVEL

Water levels are typically expressed in reference to a static elevation referred to as low water datum (LWD). The low water datum of Lake Michigan is elevation 577.5’ IGLD 85. As of the August 2012 U.S. Army Corps of Engineers (USACE) Lakes Michigan-Huron Water Level Bulletin (see Appendix), the current water level is +0.2’ LWD. The long-term average level for August is +1.8’ LWD, meaning that Lake Michigan is currently in a low lake level condition.

The USACE has monitored and recorded Great Lakes water levels since 1918 (Figure 10). Over this period, the long term lake water level fluctuates between -1.3’ LWD and +4.9’ LWD, a range of 6.4 feet. The all-time high occurred in 1986 and the all-time low occurred in 1964. On the date of survey, the Lake Michigan water level was +0.4’ LWD. Figure 10 illustrates the horizontal movement of the water line in Area 1 resulting from long term water level fluctuations and accretion.

Although the records only extend back to 1918, they are still commonly referred to as “all-time high”/“all-time low” and these terms will be used for the purposes of this study. However, prior to 1918, there are few records of Lake Michigan’s long term water level fluctuations. Record data from Milwaukee, Wisconsin suggests that in 1838 Lake Michigan may have reached an even higher level than the 1986 “all-time high”. The data indicates that a level of +6.6’ LWD was reached in 1838, which is 1.7 feet higher than the 1986 level. Due to information such as the record from Milwaukee, a factor of safety is recommended as the basis of design is based on 90 years of water level data. Ideally, we would have additional/older historic data, but unfortunately this is not available. Therefore, it is important to
note that this report and its assumptions are based on the best information currently available (including existing studies, historic data, local, state and federal documentation) however there is no guarantee that unusual coastal conditions will not occur that could create conditions worse than projected herein.

Since 1918, data for Lake Michigan shows there have been three 10-year periods of low lake level, in which water levels are at least one foot below the long-term annual average (Figure 11). These periods occurred from approximately 1931 to 1942, from 1957 to 1967, and from 1999 to the present. Each of the two previously recorded low-level periods was followed by high water levels. Based on the long term fluctuations of the Lake Michigan water level, high water can be expected to occur again in the future.

![Great Lakes Water Levels (1918-2011)](image)

**Figure 11: U.S. Army Corps of Engineers long term water level chart**

In addition to long term fluctuations, Lake Michigan fluctuates on an annual cycle. Typically, water levels will fluctuate one to two feet per year, with lowest water levels in the winter and highest water levels in the summer. Figure 12 below depicts the annual cycle of the Lake Michigan water level and shows the relationship between the long term average water level, current water level, OHWM, all-time high water level, and all-time low water level.
According to the Federal Emergency Management Agency (FEMA), areas that will be inundated by the base flood, or 100-year flood, are identified as a Special Flood Hazard Area (SFHA). The base flood is the flood event that has “a 1-percent chance of being equaled or exceeded in any given year”. The base flood is defined by FEMA as a base flood elevation using historical flood events and floodplain studies. The elevations are published by FEMA Flood Insurance Studies (FIS) and on Federal Insurance Rate Maps (FIRMs). These maps also show areas that are outside of the SFHA, but still susceptible to other flood risks.

FEMA recommends and the State of Michigan requires that structures built in the SFHA are constructed at least one foot of freeboard (height) above the base flood elevation to lower the risk of flooding. FEMA’s freeboard recommendations increase when building near the coast to compensate for changing shoreline conditions, water levels and storm events. However, currently there are no FEMA requirements to account for these hazards on the Great Lakes beyond the base flood elevation, which is a still water level and does not account for waves, setup, or other coastal conditions.

Per the Berrien County Flood Insurance Study No. 26021CV000A, effective April 17, 2006, the 1% annual chance flood elevation is 584.0’ south of the St. Joseph River and 583.8’ north of the St. Joseph River (both elevations are IGLD 85, converted from NGVD 29). This document is the authoritative document for flood levels. FEMA Flood Insurance Rate Map Number 26021C0101C, revised March 1, 2007, indicates a Base Flood Elevation of 584.0’ IGLD 1985 (converted from 585.0’ NGVD 1929) along the shoreline, within the study limits. This map is shown as Figure 13.
FEMA is currently collaborating with the USACE, the Association of State Floodplain Managers (ASFPM), and state partners to conduct a Great Lakes Coastal Flood Study. The study began in 2010 and will provide updated flood risk information serving the U.S. communities with Great Lakes shorelines. Currently, data collection and the application of modern analysis of historic storm and high water events are ongoing. The study will result in updated Flood Rate Insurance Rate Maps along the shorelines of the Great Lakes, with anticipated release during the period of 2014 to 2016. Berrien County is one of seven counties selected as pilot counties, so updated information for St. Joseph may be available for review sooner. The FEMA study is intended to address high water along the Great Lakes Coast due to flooding and wave and wind effects. Currently, the FEMA Base Flood Elevation is 1.6 feet above the all-time high Lake Michigan Water level however neither elevation accounts for wind and waves. The FEMA study may have results that could impact the recommendations in this analysis. Therefore this analysis should be updated once the FEMA findings are known.

Figure 13: Part of FEMA Flood Insurance Rate Map Number 26021C0101C, Revised March 1, 2007

ORDINARY HIGH WATER MARK

The Michigan Department of Environmental Quality (MDEQ) provides a guidance document for clarifying the authority of the MDEQ under Part 325 of the Natural Resources and Environmental Protection Act, also referred to as the Great Lakes Submerged Lands Act (GLSLA), as it relates to the
Ordinary High Water Mark (OHWM). The document refers to Section 324.32502 of the Michigan legislature, which says:

“For the purposes of this part, the ordinary high-water mark shall be at the following elevations above sea level, international Great Lakes Datum of 1955; …Lakes Michigan and Huron 579.8 feet…”

Although Section 324.32502 does not provide a conversion between IGLD 1955 and IGLD 1985, the MDEQ Guidance Document Number 325-06-02 does. It specifically names an elevation of 580.5’ IGLD 1985 as the OHWM of Lakes Michigan and Huron. This elevation will be used as OHWM for the purposes of this study and it is this elevation that constitutes the limit of the MDEQ’s jurisdiction under the GLSLA. The OHWM is +3 LWD, which is 1.9 feet below the all-time Lake Michigan high water level. The USACE defines the OHWM and limit of USACE jurisdiction of Lake Michigan as elevation 581.5’ IGLD 1985, which is one foot higher than the MDEQ OHWM elevation.

Additional definitions are provided within the MDEQ guidance document to explain what is commonly referred to as the Natural Ordinary High Water Mark (NOHWM). The NOHWM is the upland boundary of the public trust property. According to the guidance document, “prior to 1968 amendments to the Part 325, the rules contained the following definition:

‘Ordinary high water mark means the line between upland and bottomland which persists through successive changes in water levels, and below which the presence and action of the water is so common or recurrent as to mark upon the soil a character, distinct from that which occurs on the upland, as to the soil itself; the configuration of the surface of the soil and the vegetation. When the soil, configuration of the surface, or vegetation has been altered by man’s activity, the ordinary high water mark shall be located where it would have been if this alteration had not occurred.’

It is important to note that the horizontal locations of both OHWM and NOHWM change over time, depending on water level, waves, and coastal processes. For instance, after a period of erosion, although the determining elevation remains unchanged, the OWHM will intersect the shoreline at a more landward point than pre-erosion. After a period of accretion, the OWHM, likewise, will intersect the shoreline at a more lakeward point than pre-accretion. Figure 14 illustrates this concept.

Figure 14: Illustration of OHWM movement
LITTORAL DRIFT

One of the key processes that affect the coastline of St. Joseph is littoral drift or longshore transport. Littoral drift is the transportation of sediment in the littoral zone of a water body. Littoral drift is a function of wind and wave direction, wind and wave amplitude, shoreline material, sediment supply, water circulation patterns, water level, and shoreline structures.

The creation of groins and piers create barriers that alter the sediment transportation process. This process has a major effect on a shoreline by adding material through accretion in some locations and by interrupting the supply of sediment in others, thereby resulting in an erosion-like process.

Generally, sandy shores are identified by what seems to be an unlimited supply of cohesionless beach material. Oppositely, cohesive shores are classified by having a cohesive sub layer (typically beneath a cohesionless surface) consisting of such materials as glacial till, soft rock and other various deposits. This cohesive sub layer determines the long-term shoreline condition. On cohesive shores, the thin surface layer of cohesionless (such as sand and gravel) material is eroded by coastal forces and replenished by littoral drift. When replenishment is interrupted, the cohesive sub layer can become exposed and susceptible to increased erosion.

Near the City of St. Joseph, the lake bed is comprised of cohesive material with a cohesionless surface layer with varying thickness of 0-4 meters (0-13 feet). Large deposits of sand accumulate near the mouth of the harbor and are dredged on a regular basis. Since the 1970s, this material has been deposited as beach nourishment on the designated feeder beach south of the St. Joseph River, typically south of Park Street, as shown in Figure 15. This material helps to protect the existing cohesive sub layer; however, since it is primarily fine to very fine grain, it is easily eroded by coastal forces. The quantity of dredging that is completed per year ranges from 20,000 to 150,000, cubic yards, although not all of the material is used for beach nourishment. It is important to consider that USACE funding is often an issue and that beach nourishment may not always be available. A summary of dredging quantities by year is included in Appendix 3.

Figure 15: 2012 photo of beach nourishment south of Park Street showing the dredge in background
Immediately north of the St. Joseph River, sand accumulates via littoral drift, creating an accretion zone. The piers act as a barrier, interrupting sediment as it is moved along the coast in a southerly direction. This accretion zone has grown during the recent 13-year period of low lake levels. This area, as well as Area 2, experiences short term erosion during significant storm events and is expected to experience erosion during the transition period from low to high water conditions (Figures 16-19).

Figure 16: January 24, 2012 - Area 1 short term beach erosion

Figure 17: January 29, 2012 - Area 1 short term beach erosion
Figure 18: October, 2004 - Area 2 short term erosion

Figure 19: December, 2004, Area 2 short term erosion
Based on the 1997 USACE study, “Effectiveness of Beach Nourishment on Cohesive Shores, St. Joseph, Lake Michigan”, Figure 20 illustrates the modeled longshore transport of sediment in Area 1 and Area 2 during the early 1990s. Net transport quantities are depicted, along with northerly and southerly components.

Figure 20: Graphic representation of longshore sediment transport

HIGH RISK EROSION AREA

The MDEQ identifies and designates High Risk Erosion Areas (HREAs) and defines them as:

*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, over a minimum period of 15 years.*

Within the study area, only one designated HREA exists, located at the southern extent of Area 3. The HREA has a projected 30-year recession of 65 feet and a projected 60-year recession of 115 feet (Figure 21). Based on aerial imagery, shoreline protection has been constructed in this area within the past five years, so recession projections will likely be revised as the HREA studies are revisited and updated.
According to the U.S. Army Corps of Engineers (Vol. 162 2006), a seiche is a periodic oscillation of lake levels caused by either a rapid change in air pressure or a rapid shift in wind direction as weather systems pass over the lakes. This process is often compared to water sloshing from side to side in a bathtub. A seiche can last anywhere from seconds to minutes, occurring at intervals of tens of minutes to multiple hours until stored energy is dissipated from the lake. In St. Joseph, seiches typically range from one to three feet in height.

Although data regarding seiche events is scarce, the following is a sample of events that have occurred in southern Lake Michigan since 1900:

- On August 24, 1900, a huge seiche like wave was reported hitting the shores of St. Joseph, washing away small boats and various other items along the shoreline. (1900 NY Times)

- In 1929, a seiche occurred in Grand Haven during a 4th of July Celebration with 20’ waves sweeping people off of the piers. 10 people were killed by the event. (MSU Report)

- On August 3, 1960 a seiche temporarily raised the water levels in Chicago 2.5’-4’ and St. Joseph residents were warned against 4’-6’ waves. (1960 Lawrence Journal)

- On July 11, 2011, a seiche of unrecorded height hit near Holland causing significant damage. (2011 Holland Sentinel)
BERRIEN COUNTY COASTAL DAMAGE, 1957-1977

For the ten year period 1957 to 1967, Lake Michigan experienced low to average water levels, similar to the conditions experienced today. The ten year period that followed until 1977 saw water levels rise to high levels, reaching 581.8’ (+4.3) in 1974, which is only 0.6’ below the Lake Michigan all-time high water level. This water level fluctuation is part of the normal cycle of Lake Michigan as observed from 1918 to 2012 and discussed above.

High water conditions and severe storms culminated in 1973, when President Nixon declared Berrien County a disaster area, according to articles from the Herald Palladium. Damage that occurred during the early 1970s included the loss of beach, bluff erosion, damage to structures, and the loss of structures. Figures 23-26 illustrate some of the damage that occurred.

Figure 23: 1973 Herald Palladium photo of Jean Klock Park
Figure 24: 1973 Herald Palladium photo of Jean Klock Park sidewalk

Figure 25: 1970s Herald Palladium photo of bluff erosion south of St. Joseph, MI
The period of 1957-1977 is an important example of what can happen as the conditions of Lake Michigan change. During times of low water, building structures closer to the lake is a dangerous temptation for many property owners and leaves structures exposed to the risk of erosion, wave action, and damage when water levels rise again. Based on 94 years of Lake Michigan water level records and the cycles that have occurred in the past, water levels will rise again and coastal communities must plan and prepare for these ever-changing conditions.
OTHER GREAT LAKES STATES

Other Great Lakes states have developed standard setbacks and/or guidelines for various reasons. These states provide valuable examples of setbacks and coastal guidelines. This study will focus on the setbacks and guidelines that have been implemented in Wisconsin and in Ohio.

WISCONSIN

The State of Wisconsin implemented setbacks to “…conform to health, safety and welfare requirements, preserve natural beauty, reduce flood hazards and avoid water pollution”. Chapter NR 115 of the Wisconsin Administrative Code requires all buildings and structures to be setback a minimum of 75 feet from the OHWM of navigable lakes, rivers, and streams. This requirement applies to Wisconsin’s coastline on both Lake Michigan and on Lake Superior. In addition to the statewide setback, some counties have increased minimum setbacks. For instance, the setback in Sheboygan County is 225 feet from OHWM. Michigan does not currently have a similar setback.

Additional methods are provided within NR 115 for the reduction of setbacks for lots with minimal depth or for vacant lots between lots that were developed before setbacks. Some counties require new structures to be setback as far as lots allow. Others average the setbacks of adjacent developed substandard lots to provide a requirement to an undeveloped lot. The third and most flexible method for reducing setbacks is what is called “the formula approach”. This method allows limited reduction of a roadway setback first; then allows reduction of the shoreline setback until a 30 foot deep building envelope is created. Typically, when any setback reduction is allowed, mitigation measures are required to compensate for the reduction of buffers.

OHIO

In 2011, the Ohio Department of Natural Resources, Office of Coastal Management published the Ohio Coastal Design Manual to “promote better projects along the Ohio shore of Lake Erie”. It provides guidance in the design of commonly constructed structures for engineers, surveyors, and landowners, while attempting to balance erosion control needs with lake access and protection of natural resources.

The manual does not provide specific setback requirements but does include guidance for the design of shoreline structures, including considerations such as erosion, existing structures, geology, habitat, near shore bathymetry, wave climate, submerged lands, water levels, littoral drift, revetment flanking, and revetment materials.

Based on conversations with the Ohio Office of Coastal Management, setbacks have not been implemented. However, where a proposed structure is within a designated Coastal Erosion Area, plans must be submitted to the Office of Coastal Management for review and approval before construction can commence. In Ohio, the Coastal Erosion Areas are updated every ten years and are based upon recession rates observed from aerial photos, similar to Michigan’s High Risk Erosion Areas.
GREAT LAKES SHORELINE PROTECTION

According to the USACE Coastal Engineering Manual (Section III-5-13):

(1) The two most important issues in the planning and management of cohesive shores relate to implementing setbacks for development and to managing human influences on the sediment supply.

(2) Many Jurisdictions along U.S. shorelines impose a setback for new development consisting of some multiple of the average annual recession rate (e.g., 30 to 100 times the average recession rate). The purpose of the setback is to avoid the need for shore protection within the life of the new development, recognizing the irreversible and inevitable erosion that occurs along cohesive shores (and some sandy shores as well).

[emphasis added]

Shoreline protection structures reflect and accelerate wave energy, causing unnatural erosion and resulting in irreversible changes to the shoreline. Where possible, it is recommended to avoid the need for shore protection and in Area 1 this opportunity still exists. Most structures are set back from Lake Michigan and the public trust property is uninterrupted between two public parks.

However, in Area 2, structures are located closer to Lake Michigan, potentially requiring the construction of shoreline protection structures during periods of high water in addition to the existing shoreline protection structures.

In Area 3, cohesive bluffs would be exposed to erosion, were it not for the existing shoreline protection structures that line the shore. These structures are necessary to prevent erosion and protect property.

DESIGN CONSIDERATIONS

Shoreline protection must be designed with an awareness of the following considerations:

- **Height:** The top of the structure must be built to an elevation that will prevent wave overtopping.

- **Surface:** Irregular shapes and permeable materials absorb wave energy, whereas flat, planar surfaces reflect and accelerate wave energy.
- **Toe Protection**: Sufficient toe protection must be incorporated to prevent scour of the toe of the structure which can result in slip failure of the structure.

![Figure 27: Graphic from USACE Coastal Engineering Manual](image)

- **Length**: Sufficient structure length and/or return walls are required to prevent flanking of the structure and produce potential adverse effects on neighboring properties. As depicted in Figures 28-30, flanking is the erosion that occurs on either side of a shoreline structure caused by the reflection and acceleration of wave energy.

![Figure showing natural condition and flanked shoreline without protection](image)
FAILURE EXAMPLES

Berrien County coastal structures are subjected to severe coastal conditions on a regular basis. Any weakness will be exposed by these conditions. The USACE Coastal Engineering Manual includes examples of the effects Lake Michigan can have on these structures in order to help guide the design process of future protection.

Figure 31: Example of flanking in southern Berrien County. Note how this failure has resulted in the loss of the public trust property lakeward of the NOHWM and public passage is only possible in the lake itself.
Figure 32: USACE CEM Photo, “A toppled concrete seawall along the Lake Michigan coast of Berrien County. Failure probably resulted from undermining of the underlying glacial till foundation, April 1991.”

Figure 33: USACE CEM Photo, “A steel sheet-pile wall and groin field has been ineffective at protecting this section of cohesive shore along the Berrien County shore of Lake Michigan, south of the town of St. Joseph, April 1994.”
SUCCESSFUL EXAMPLES

Within the study area, two successful examples of shore protection have been identified. The first is the shoreline that borders the St. Joseph Water Plant, located at the north end of Area 3. The structure consists of armor stone, laid on a slope of 1 vertical on 2 horizontal to a top elevation of 591.20 feet. The toe of the revetment extends several feet below the lake bottom to prevent scour.

Figure 34: St. Joseph Water Plant Revetment Oblique Photo

Figure 35: St. Joseph Water Plant Revetment, spring 2012
The stone revetment along South Lakeshore Drive provides another example of a successful shoreline protection structure. It is also comprised of armor stone set at a slope of approximately 1 vertical on 2 horizontal and protects the high bluffs on which South Lakeshore Drive is constructed.

Figure 36: Stone Revetment along South Lakeshore Drive Oblique Photo

However, although both of these stone revetments have been successful in protecting the water plant and South Lakeshore Drive bluff, respectively, from erosion, they have had a dramatic effect on the public trust property along the shoreline.
AREA 1 FINDINGS

CURRENT CONDITIONS

Area 1 is bordered by Jean Klock Park to the north and Tiscornia Beach to the south. Between the parks, private properties exist and many of the lots extend several hundred feet from the street known as Ridgeway to Lake Michigan. Currently, no shore protection structures exist within Area 1. The entire shoreline is sandy beach. The southern half of Area 1 is typically an accretion zone, but subject to erosion as well. The public trust property in this area varies in width and extends from the water line to the NOHWM, connecting the public parks.

Figure 36: Area 1 typical shoreline

SHORELINE MANAGEMENT RECOMMENDATION

We recommend that the City of St. Joseph prohibit the construction, erection, or expansion of Structures, as defined by the Zoning Ordinance of the City of St. Joseph, within Area 1 by a fixed setback line as shown on the attached exhibit, “Area 1 Proposed Setback Line”. The definition of a Structure per the Zoning Ordinance of the City of St. Joseph is as follows:

“Anything fabricated, constructed or erected, the Use of which requires fixation or placement in, on or attachment to something having location on the ground including but not limited to all Buildings, independently supported Decks, satellite dishes and free-standing Signs; excepting anything lawfully in a public Right-Of-Way including but not limited to utility poles, sewage pumping stations, utility manholes, fire hydrants, electric transformers, telephone boxes, and related public facilities and utilities defined as essential public services. A paved, uncovered parking lot is not considered a structure.”
We recommend that the following Structure types be exempt from the setback ordinance:

- Walkways that are not attached to primary structures
- Staircases of wood construction only that are not attached to primary structures
- Free-standing signs

The location of the propose setback line is based upon the long-term cycles of Lake Michigan and therefore is a fixed line, not a line defined by elevation that may move during short term changes.

The setback would help preserve the public trust property along the shoreline, maintain the natural shoreline, and reduce the risk of coastal hazards to private structures. The location of the proposed setback is based upon the following factors:

- Lake Michigan all-time high water level  +  5.0 LWD  
  *(Rounded from +4.9 LWD)*
- Storm surge of two feet  +  2.0’
- 2% wave runup, 50-year deep water wave  +  7.0’
  + 14.0’ LWD = Elevation 591.5’

- Factor of Safety
  - Factor of Safety of 1.3 applied to average offset of the calculated runup elevation from current still water level. (50’) Engineering design utilizes a factor of safety ranging from 1.2 to over 4.0, depending on what is being designed, data quality/accuracy and consequences of failure. Most designs use a factor between 1.2 and 1.8.
  - Reduces the likelihood that structures will adversely affect the public trust property and the natural shoreline
  - Provides space to account for the constantly-changing shoreline

The location of the setback line should be reviewed, at minimum, every ten years or with a change in the Lake Michigan water level of four feet or more from the current water level of +0.2’ LWD to ensure it is performing its intended function based on continuing experience and then current conditions.

This recommendation is based on 94 years of Lake Michigan water level data and less than fifty years of wave data. Recognizing that we do not have data extending beyond these time periods, an even more conservative approach could be considered to account for future unpredictable events such as a 500-year event, which would consider layered design waves and higher lake levels, if that data were available.
AREA 2 FINDINGS

CURRENT CONDITIONS

Area 2 is fully-developed by homes along the shoreline, with the exception of the two public parks at its ends. Under most lake levels, the entire shoreline is publicly-owned and consists of a sandy beach. Area 2 is an erosion zone, but typically receives beach nourishment from the USACE on an annual basis. Existing structures are built on shallow lots that do not allow structures to move significantly closer or further from Lake Michigan. In order to protect structures, in reasonably foreseeable coastal conditions, shore protection may be required because limited lot sizes restrict private property owners’ options.

Figure 37: Area 2 typical shoreline

SHORELINE MANAGEMENT RECOMMENDATION

To provide the best protection to private property while maintaining meaningful public access along the shoreline, we recommend that future shoreline protection structures within the area bounded on the north by the St. Joseph River, on the east by Lions Park Drive, and on the south by the St. Joseph Water Plant be subject to the following requirements:

- Design must be prepared by a licensed professional engineer experienced in coastal engineering to account for coastal engineering factors including, but not limited to wave overtopping, scour protection, and flanking prevention.
- Approval must be granted by the City of St. Joseph City Engineer prior to construction
- Vertical walls are prohibited
- Perpetual public access landward of the structure must be provided to ensure continued public access along the coast regardless of lake levels.
- Structures must not adversely affect other/neighboring properties and must connect to adjacent shoreline protection structures, if present, to eventually create one unified structure.
Furthermore, we recommend that any shoreline protection structures be of the same type that has been successfully constructed, such as the stone revetments at the St. Joseph Water Plant. The attached exhibit, “Typical Proposed Shoreline Protection Section” contains a typical cross section of this type of shoreline protection. This type of protection would require that private property owners be permitted to construct all or part of the structure within public property.

We recognize that there are likely a number of issues that the City must or may wish to consider before implementing this recommendation, including but not limited to issues regarding ownership, maintenance, liability, cost of the structures, as well as the appropriate mechanism or procedure for permitting the construction on public property. Such issues are beyond the scope of this study.
AREA 3 FINDINGS

CURRENT CONDITIONS

The entire shoreline of Area 3 contains existing shoreline protection structures, including stone revetments, sheet piling, groins, and timber structures. Steep bluffs containing cohesive soils line the shoreline and the structures are necessary for the protection of the bluffs against erosion.

Figure 38: Area 3 typical shoreline

SHORELINE MANAGEMENT RECOMMENDATIONS

We do not recommend additional regulation of shoreline protection within Area 3, beyond the regulation already administered by both the USACE and the MDEQ. Because Area 3 contains little to no public shoreline access and existing shoreline protection structures extend across its full shoreline, additional regulation is unnecessary.
REFERENCE LIST


Appendices
# APPENDIX 1

## St. Joseph Coastal Study Datum Conversion Chart

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**Notes:**

1. Bold elevations indicate original/published elevation/datum.
2. All elevations shown in feet.
APPENDIX 2
CHART DATUM  577.5 FEET (176.0 METERS)

** Average, Maximum and Minimum for period 1918-2011
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OPEN WATER (15,260) BEACH OVER S PIER (54,026) 1.5 MI SOUTH AT 20'CNTR (352)
BEACH (SILVER BEACH) (67,801) AND 500' SOUTH AT 18'CNTR (6,375)
OPEN WATER (19,101) BEACH (SILVER BEACH) (160,236) .5 MI SOUTH AT 18'CNTR (1,760)
BEACH (SILVER BEACH) (84,565) 7 MI SOUTH AT 18'CNTR (4,928) WHIRLPOOL CDF (38,735)
BEACH (SILVER BEACH) (108,233) WHIRLPOOL CDF (39,279)
BEACH (SILVER BEACH) (91,905) WHIRLPOOL CDF (24,359)
OPEN WATER (3,975) BEACH 150-1200' SOUTH (65,767) WHIRLPOOL CDF (21,094)
OPEN WATER (18,136) BEACH 1000-3000' S OF S PIER (116,895) WHIRLPOOL CDF (17,900)
BEACH 1000-3000' S OF S PIER
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**ST JOSEPH HARBOR, MI**
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**TOTAL** 3,365,753 $13,129,432
THE CITY OF ST. JOSEPH
BERRIEn COUNTY, MICHIGAN
ORDINANCE NO. 39-1-2
SPECIAL ORDINANCE

THE CITY OF ST. JOSEPH ORDAINS:

Chapter 39 of the Code of Ordinances of the City of St. Joseph, Michigan is hereby amended by
amending Special Ordinance No. 39-1-2 to read as follows:

AN ORDINANCE TO IMPOSE A TEMPORARY MORATORIUM ON ANY SHORE PROTECTION
STRUCTURES, SEAWALLS OR SIMILAR IMPROVEMENTS FOR CERTAIN PARCELS ABUTTING LAKE
MICHIGAN.

Sec. 1. Intent and Purpose.
Consistent with its adopted Comprehensive Master Plan, the City desires to preserve and encourage open
space along Lake Michigan and to maintain the integrity and character of the Lake Michigan shoreline. The
City recognizes that the beach areas adjacent to the Ridgeway neighborhood and the south end of Lions Park
Drive have distinctive characteristics and locations within the City, each with a large, open beach area along
Lake Michigan and each located between and connects two public parks upon which the public has a right to
unimpeded pedestrian use of as part of the public trust. The south end of the Lions Park Drive area also
contains some public land located between the shore of Lake Michigan and private properties.

The City intends to conduct a review of various City regulations to further the maintenance and
encouragement of open space, preservation of private property, and preservation of public trust areas along
Lake Michigan in the above described neighborhoods. That review will include an analysis of the placement of,
shore protection structures, seawalls, or other like improvements in this area and may include a request that
the City Planning Commission also review this issue and make recommendations regarding possible zoning or
other regulations.

The City Commission finds that there is a need to enact a temporary moratorium and that it is necessary for
the preservation of the public safety and private property. Failure to enact this Ordinance while the City
Commission and/or the Planning Commission actively reviews this matter will likely result in irreparable harm
to the welfare of City residents and their properties given the domino-like impact that will occur if improvements
adversely change erosion, etc. on the beach, the likely adverse impacts upon neighboring properties and the
rights of the public to use the public portions of the beach due to the placement of, shore protection structures,
seawalls, or similar fixed improvements along this area, and the fact that once such improvements are made
and the public beach areas are impacted, such effects cannot be undone.

Sec. 2. Moratorium.
1. A moratorium is hereby adopted until July 30, 2012, prohibiting the construction, erection or expansion
of all shore protection structures, seawalls, and similar fixed improvements on parcels of property
located within the following boundaries: (1) all properties located on the west side of the street known
as Ridgeway within the area bounded on the south by the St. Joseph River and on the north by the
northerly boundary of the City of St. Joseph and (2) those properties that are located on the west side
of Lions Park Drive within the area bounded on the north by Silver Beach County Park, on the north
by Park Street, and on the south by Lions Park. This moratorium includes, without limitation, all shore
protection structures, seawalls, retaining walls, break walls, groins and jetties along or parallel to the
shore of Lake Michigan within the above-described area.

2. In addition, a moratorium is hereby adopted until July 30, 2012, prohibiting the construction, erection
or expansion of any Structure as defined by the Zoning Ordinance of the City of St. Joseph, within two
hundred feet landward of the Ordinary High Water Mark for all parcels of property located on the west
side of the street known as Ridgeway within the area bounded on the south by the St. Joseph River
and on the north by the northerly boundary of the City of St. Joseph. Pursuant to the Natural
Resources and Environmental Protection Act, Public Act 451 of 1994, Part 325, as amended, the Ordinary High Water Mark for Lake Michigan is 580.5 feet above sea level, International Great Lakes Datum of 1985.

3. These moratoria may be extended by resolution of the City Commission for a period up to six (6) additional months if the City Commission determines it necessary to protect and promote the public health, safety and welfare.

Sec. 3. Effective Date.
This Ordinance shall be effective 10 days from the date of its final passage.

CERTIFICATION

The Mayor and Clerk of the City of St. Joseph, Berrien County, certify that this ordinance was passed by the St. Joseph City Commission on March 26, 2012, and that notice of its adoption or a copy of the ordinance was published in The Herald-Palladium newspaper on April 1, 2012.

[Signature]
ROBERT L. JUDD, Mayor

[Signature]
DEBORAH S. KOROCH, Clerk
APPENDIX 5
CITY OF ST. JOSEPH
BERRIEN COUNTY, MICHIGAN
AN ORDINANCE TO AMEND THE ZONING ORDINANCE OF
THE CITY OF ST. JOSEPH, MICHIGAN

THE CITY OF ST. JOSEPH ORDAINS:
The Zoning Ordinance of the City of St. Joseph, Michigan, is hereby amended by adding the following
Section 9.7 to Article IX of the Ordinance:

"SECTION 9.7  "EB-OD" EDGEBEACH OVERLAY DISTRICT"

9.7.1 Intent. The Edgewater Beach Overlay District (EB-OD) is an overlay District intended to
preserve the character of the public trust land along the shore of Lake Michigan, which is found to
be a valuable public resource of the community, to prevent damage to the public trust land and to
prevent damage to private property.

Based on the record presented the City finds that during periods of low Lake Michigan water
levels, sand accretion in this District tends to significantly enlarge the beach and to enlarge
affected parcels in this District. This additional land area can be seen by property owners as
permanent and attractive for development. The character of the public trust land along the Lake
Michigan shoreline, as well as viewsheds along the shoreline from public parks included in and
adjacent to this District, is compromised by development in immediate proximity to the public trust
land.

Based on the record presented the City further finds that the beach and property area near the
shoreline is subject to submergence and erosion during periods of higher Lake Michigan water
levels and resulting from weather conditions. It has been demonstrated that current state and
federal development standards for the Lake Michigan shoreline, such as the Ordinary High Water
Mark (OHWM) and the Base Flood Elevation, do not ensure that property shoreward of those
locations is protected from erosion, inundation, or damage during such periods of time and/or
weather events. The OHWM is not intended to reflect these periods of peril, and the Base Flood
Elevation is a still water elevation that does not take into account the effect of wave action. The
City further understands that revised federal floodplain regulations are being developed to take
into account additional environmental factors such as waves and to provide an improved standard
of floodplain development protection, but implementation of these regulations will not likely occur
for several years.

When erosion threatens a Structure legally built near the shoreline, a natural reaction for the
owner is to attempt to construct a seawall or other shore protection structure. Shore protection
structures in this District would diminish significantly the character of the public trust land and pose
an increased threat of erosion and damage to the public trust land as well as to adjacent private
property.

The City has long experience with the detrimental effects of seawalls and shore protection
structures constructed over a period of many years in response to erosion south of the St. Joseph
River. These shore protection structures were and are necessary to protect previously developed
areas of the City which are otherwise subject to regular and ongoing erosion. However, given the
physical, environmental, and developmental characteristics of the EB-OD, including generally large
lots which need not be developed near to the water’s edge to be economically viable and that the
area is generally benefitting from accretion rather than persistent erosion, the City believes that
shore protection structures should not be necessary in this area and that would be detrimental to
the public health, safety and welfare for reasons further identified and set forth in the City of St.
Joseph, Michigan Coastal Engineering Study, dated August 17, 2012, a copy of which is on file
with the City.
The City believes the most appropriate, effective and reasonable method to further the public interests of protecting natural resources; preserving the economic and environmental well-being of the community; to protect the health, safety and general welfare of the community; and the general preservation or enhancement of property values is to restrict the construction of structures so near to the water’s edge as to be detrimental to the character of the public trust property and/or the vistas from neighboring public parks; and/or to be susceptible to damage resulting from inundation or erosion or to create an apparent future need for seawalls or other shore protection structures in order to protect these structures from damage resulting from inundation or erosion; and/or to be potentially built in a location that will render the structure nonconforming under the future federal floodplain protection regulations currently under development.

These regulations are intended to preserve the character of the public trust property along the shoreline, protect the vistas from neighboring public parks, and prevent the construction of structures and shore protection structures which would have deleterious effects on the public trust property as well as neighboring private property.

These regulations are also supported by the Comprehensive Plan, as the Future Land Use Map indicates lakefront property in this area should be used as open space and the supporting text indicates that open space areas should be maintained and encouraged along the shoreline.

**9.7.2 Description of District.** The EB-OD includes all lands in any zoning District located north of the St. Joseph River and situated lakeward of a line sequentially connecting the following points described by Michigan State Plane Grid Coordinates, South Zone, Grid, NAD 83, U.S. Survey Feet and as illustrated in Map 9-3, Area of Edgewater Beach Overlay District:

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<th>Easting</th>
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<td>C</td>
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<td>D</td>
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<tr>
<td>H</td>
<td>234820.85’</td>
<td>12550921.86’</td>
</tr>
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</table>
9.7.2.1 Area of Edgewater Beach Overlay District

Map 9-3  Area of Edgewater Beach Overlay District
9.7.3 **Structure Development.** For the reasons set forth in Subsection 9.7.1 and elsewhere in this Ordinance, the installation, construction and operation of Structures, which for the purpose of this section includes seawalls and shore protection structures, within the EB-OD shall be subject to the following:

A. No Structure shall be installed or constructed in the EB-OD. The following are not considered a Structure for purposes of this section only:
   1. Public recreational equipment in public parks;
   2. Open, unroofed walkways, including those constructed of pavers or similar objects;
   3. Stairs and similar open, unroofed structures that are set on the surface of the ground and which are not attached to a Structure; and
   4. Freestanding signs.

B. In the event the provisions of the EB-OD prevents the development or use of a Lot existing on the effective date of this amendment for the purposes permitted in the Zoning District, or creates practical difficulties or unnecessary hardship for the use of such a Lot, the property owner may seek a Hardship Planned Unit Development or Variance under the terms of this Ordinance.

C. If any Lot within or partially within the EB-OD is divided or the subject of a boundary adjustment after the effective date of this amendment such that any resulting parcel is nonbuildable due to the regulations of this section, except for a boundary adjustment that has the effect of lessening a Nonconformity with respect to this section, it will be deemed a voluntary action of the property owner and will disqualify the resulting nonbuildable parcel from receiving a Variance or Hardship Planned Unit Development.

D. In the event the provisions of the EB-OD render Nonconforming any Structure which is existing or which is the subject of a valid building permit and under construction on the effective date of this amendment, this shall not be deemed a voluntary action of the property owner and will not disqualify the parcel from receiving a Variance or Hardship Planned Unit Development under the procedures described in this Ordinance.

E. To the extent of any conflict between the regulatory provisions contained in this section and other provisions of the Zoning Ordinance, the restrictions contained in this section shall control.

This ordinance shall take effect 10 days after its final passage.

The Mayor and Clerk of the City of St. Joseph, Berrien County, certify that this ordinance was passed by the St. Joseph City Commission on ____________, 2012, and that notice of its adoption or a copy of the ordinance was published in *The Herald-Palladium* newspaper on ______________, 2012.

ROBERT L. JUDD, Mayor

DEBORAH S. KOROCH, Clerk
APPENDIX 6
August 19, 2012

Robert L. Judd, Mayor  
City Commission  
City of St. Joseph  
City Hall  
700 Broad Street  
St. Joseph, MI 49085

Re: Coastal Study Review and Implementation

Dear Mayor Judd and Members of the City Commission:

The City of St. Joseph ("City") has asked for our opinion concerning the legality of adopting and enforcing potential new ordinances regulating designated areas of the Lake Michigan shoreline, specifically with regard to setbacks and the construction of shoreline protection structures.

In preparing this opinion, we have reviewed the report and recommendations for shoreline management prepared by the City’s consultants. It is our understanding after reviewing the "St. Joseph Coastal Study" ("Report") that the City’s consultants are recommending separating the Lake Michigan shorefront into three distinct areas based on identifying characteristics: Area 1 (Jean Klock Park to North Pier), Area 2 (South Pier to the St. Joseph Water Plant), and Area 3 (St. Joseph Water Plant South to City Limits). The consultants have recommended the following:

- **Area 1**: An ordinance (proposed by the City to be a zoning ordinance amendment) prohibiting all structures, including shoreline protection structures (i.e., seawalls or similar structures), within a fixed setback of 130' to 180' (depending on location) landward of the statutory ordinary high water mark.
- **Area 2**: An ordinance establishing the location where shoreline protection structures may be constructed, and setting forth certain design standards (e.g., stone revetment) for such structures.
- **Area 3**: No ordinances are proposed for this area because no further regulation is recommended.

In the course of its review of these recommendations, an assertion was made to the City that such regulations would constitute a “taking” of private property by, presumably, unduly restricting the ability of a property owner to develop or protect his or her property. The remainder of this letter addresses this and similar issues.
Initially, it must be noted that as of the date of this letter, the only proposed ordinance language that we have reviewed is a draft ordinance amending the City's Zoning Ordinance to add Section 9.7, entitled "EB-OD" Edgewater Beach Overlay District. We previously provided our comments and revisions regarding the proposed ordinance language to the City, and our opinion, as expressed in this letter, is based in part on the proposed language. Our opinion is subject to change depending upon the language that is actually proposed or adopted by the City (whether it be a zoning ordinance, regulatory ordinance or both), or if the facts conveyed to us are later discovered to be incomplete or incorrect.

I. PRELIMINARY ISSUES

A. General Authority to Adopt Local Ordinances

As a home rule city, the City has broad powers under the Michigan Constitution to enact ordinances for the benefit of municipal concerns. Const. 1963, art. 7, §§ 22. The Home Rule City Act ("HRCA"), MCL 117.1 et seq., further defines the authority of cities to enact and enforce local ordinances. Laws (such as the HRCA) that concern local governments "shall be liberally construed in their favor." Const. 1963, art. 7, §§ 34.

"Among the powers that may properly be exercised by a home rule city is the police power." Belle Isle Grill Corp v Detroit, 256 Mich App 463, 481; 666 NW2d 271 (2003); see also MCL 117.3(j) (requiring city charters to include provisions for the "public peace and health and for the safety of persons and property"). It is clear that the City has the authority to enact ordinances for the public health, safety, and welfare of its citizens.

Zoning regulations constitute a valid exercise of governmental authority when they have a rational relation to the public health, safety, welfare and prosperity of the community. Comer v City of Dearborn, 342 Mich 471, 477; 70 NW2d 813 (1955); see also MCL 125.3201 (authorizing a local unit of government to adopt zoning ordinances regulating the use of land and structures "to promote public health, safety, and welfare"). The Michigan Zoning Enabling Act, being MCL 125.3201 et seq., ("MZEA") specifically allows a local unit of government to regulate land development "to achieve specific land management objectives and avert or solve specific land use problems, including the regulation of land development and the establishment of districts in areas subject to damage from flooding or beach erosion." MCL 125.3201(3) (emphasis added).

Michigan courts further recognize that local governments are generally permitted to regulate water or riparian rights (such as the right to erect docks and moor boats) as part of their zoning power. Twp of Yankee Springs v Fox, 264 Mich App 604, 606; 692 NW2d 728 (2005). In fact, the Michigan Supreme Court has recognized that in order to accomplish the goals of zoning, riparian rights cannot be excluded:

In a state such as Michigan, with its abundant bodies of water, there would be no way to ensure that land uses are compatible with surrounding properties unless water activities are evaluated. Similarly, the conservation of natural resources, which clearly includes water, cannot be undertaken if there is no means for
regulating riparian rights. [Hess v W Bloomfield Twp, 439 Mich 550, 563; 486 NW2d 628 (1992).]

The Court has recognized that by granting the authority to municipalities to promote the public health, safety, and general welfare through enactment of zoning ordinances, the Legislature was complying with a “constitutional mandate to protect the environment, including bodies of water, from impairment or destruction.” Id. at 564 (emphasis added).  

Thus, in our opinion, the City has the authority to adopt local ordinances—both police power and zoning ordinances—that promote public health, safety, and welfare, even if the ordinances impact riparian rights or other property rights of lakeshore owners.

As indicated, we have reviewed a proposed Zoning Ordinance amendment that would be applicable to Area 1. We understand that the City may be considering a stand-alone police power ordinance that would be applicable to Area 2; however, we cannot express an opinion at this time regarding whether the proposed regulations for Area 2 are more properly considered zoning or police power ordinances, as we have not reviewed any proposed language. (“The question whether or not a particular ordinance is a zoning ordinance may be determined by a consideration of the substance of its provisions and terms, and its relation to the general plan of zoning in the city.” Square Lake Hills Condo Ass’n v Bloomfield Twp, 437 Mich 310, 233; 471 NW2d 321 [1991].)

B. Ordinary High Water Mark

Because the Report’s recommendations implicate the statutory ordinary high water mark (“OHWM”), a brief discussion of the OHWM is relevant.

The OHWM constitutes the limit of the Department of Environmental Quality’s (“DEQ’s”) jurisdiction under Part 325 of the Natural Resources Environmental Protection Act (“NREPA”), MCL 324.32501 et seq. 3 Thus, the DEQ has jurisdiction to require permits under Part 325 concerning lands “lying below and lakeward of the natural ordinary high-water mark...” MCL 324.32502.

In the recent case of Burleson v Dep’t of Environmental Quality, 292 Mich App 544, 549; 808 NW2d 792 (2011), the Michigan Court of Appeals affirmed that the scope of the DEQ’s regulatory authority under Part 325 is set by the statutorily-defined elevations. For example, the

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1 Article 4, §52 of the Michigan Constitution states:

The conservation and development of the natural resources of the state are hereby declared to be of paramount public concern in the interest of the health, safety and general welfare of the people. The legislature shall provide for the protection of the air, water and other natural resources of the state from pollution, impairment and destruction.

2 Zoning ordinances are generally recognized as such if they regulate the use of land and buildings according to districts, areas, or locations. In contrast, an ordinance that regulates an “activity” is generally considered a police power ordinance. Square Lake Hills Condo Ass’n v Bloomfield Twp, 437 Mich 310, 232-25; 471 NW2d 321 (1991).

3 Part 325 of NREPA is sometimes referred to as the Great Lakes Submerged Lands Act, or GLSLA. It regulates the use of land below or lakeward of the statutorily-defined ordinary high water mark.
OHWM for Lake Michigan is statutorily set at 579.8 feet of elevation above sea level. MCL 324.32502. Thus, for example, when the water recedes below the OHWM, the riparian owner may not generally place any permanent structures or do any dredging or filling on that land without a permit from the DEQ. Part 325; OAG, 1977-1978, No. 5327.

The OHWM should not be confused with the common law natural ordinary high water mark (“NOHWM”) discussed in Glass v Goeckel, 473 Mich 667, 683; 703 NW2d 58, 67 (2005). In Glass, the Court held that the boundaries of the public trust are not limited by the statutory elevations in MCL 324.32502. Instead, the public trust (which permits, for example, pedestrians to walk along the Great Lakes) extends to the common law NOHWM, which the Court defined as where “the presence and action of the water is so continuous as to leave a distinct mark either by erosion, destruction of terrestrial vegetation, or other easily recognized characteristic.” Id. at 674.4 The NOHWM would generally need to be determined on a property-by-property basis.

Because the statutorily-defined OHWM differs from the common law NOHWM, the City should use caution in incorporating one or both terms into its ordinances so that the City’s intent is clear from the chosen language. In addition, the OHWM used in the Coastal Engineering Study (“Study”) is 580.5 feet, which is different from the statutory OHWM of 579.8 feet in MCL 324.32502.5 Thus, for clarity’s sake, we recommend that any references to an OHWM in the ordinance(s) be clearly defined. Further, to the extent the City chooses to reference a NOHWM in one or more of the ordinances, the City must be aware that the NOHWM varies and that the location of the NOHWM on a particular property may be subject to debate.6

C. Preemption

Because the OHWM delineates the primary landward limit of the DEQ’s permit jurisdiction, it raises a question as to whether a local ordinance intended to regulate land between the OHWM and the water’s edge would be preempted (i.e., precluded) by state law. (This issue does not arise with regard to an ordinance that applies only to property landward of the OHWM.)

In Michigan, a municipality may not enact an ordinance if (a) the ordinance directly conflicts with the state statutory scheme, or (b) the state statutory scheme preempts the ordinance by occupying the field of regulation, even where there is no direct conflict between the two schemes of regulation. Frericks v Highland Twp, 228 Mich App 575, 585-86; 579 NW2d 441, 447 (1998). In that regard, preemption may be established “(1) where state law is expressly preemptive; (2) by examination of the legislative history; (3) by the pervasiveness of the state regulatory scheme, although this factor alone is not generally sufficient to infer preemption; or

4 The State of Michigan holds in trust the navigable waters of the state in behalf of its citizens, and riparian owners hold “the right to use and enjoy” their riparian property “subject to the public right of navigation...” Hall v Alford, 114 Mich 165, 167; 72 NW 137 (1897). “As trustee, the state must preserve and protect specific public rights below the ordinary high water mark and may permit only those private uses that do not interfere with these traditional notions of the public trust.” Glass v Goeckel, 473 Mich 667, 694; 703 NW2d 58 (2005).

5 The Study uses 580.5 feet as the OHWM based upon DEQ Guidance Document No. 325-06-02, which provides a conversion between IGLD 1955 (utilized in MCL 324.32502) and IGLD 1985 (utilized in the study).

6 “[T]he precise location of the ordinary high water mark at any given site on the shores of our Great Lakes remains a question of fact.” United States v Marion L Kincaid Trust, 463 F Supp 2d 680, 694 (ED Mich, 2006), quoting Glass, supra at 694.
(4) where the nature of the subject matter regulated demands exclusive state regulation to achieve the uniformity necessary to serve the state’s purpose or interest.” Id. at 585-586.

We have not located any appellate court decisions addressing whether local units of government have concurrent jurisdiction involving the Great Lakes with the DEQ lakeward of the OHWM or whether local ordinances pertaining to such land are preempted. However, in our opinion, a court would likely find that such a local ordinance is not preempted as a matter of law.

Part 325 is not expressly preemptive in that nothing in the statutory scheme expressly prohibits a local unit of government from adopting or enforcing local ordinances regulating land, uses or activities that fall within the scope of the state’s regulatory jurisdiction. In fact, the state administrative rules promulgated under NREPA state that the DEQ “may require such permit conditions as it deems reasonable and necessary to protect the public trust and private riparian interests, including any of the following conditions:...(e) That the project be in compliance with local zoning ordinances.” R 322.1011(1)(e). In addition, the rules explicitly state that the issuance of a permit under Part 325 (i.e., for a seawall, bulkhead, or other permanent revetment structures) “does not obviate the necessity of receiving approval from the United States army corps of engineers and, where applicable, other federal, state, or local units of government.” R 322.1011(4).

Furthermore, the types of regulations recommended in the Report would not be preempted as a matter of law by federal law. Under federal law, the Great Lakes are considered navigable waters. 33 CFR § 328.3(a)(3). The federal government’s jurisdiction over the Great Lakes (in the absence of adjacent wetlands) “extends to the ordinary high water mark”, 33 CFR § 328.4; United States v Rands, 389 US 121, 123 (1967). The federal regulations define the “ordinary high water mark” as:

that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas. [33 CFR § 328.3(e).]

While we believe local regulations that interfere with the federal navigational servitude may be preempted, it does not appear on the face of the Report that the regulations recommended in the Report would interfere with the construction or maintenance of federal navigational structures such as piers. Further, in our opinion, because the federal and state laws represent a coordinated effort between the state and federal government, and because the state law allows for more restrictive regulations on the local level, federal law does not per se preempt local regulation of the Lake Michigan shoreline.

In fact, the Coastal Engineering Manual published by the Army Corps of Engineers (“ACOE”) recognizes several alternatives for shore protection, including but not limited to armoring (i.e., seawalls, protective revetments) and the “do nothing” approach. The ACOE manual states that “[n]ational plans for beach management and shore protection do not exist” and that each project must consider several factors, including but not limited to public health, safety and social well-being, community cohesion, and state, regional and local plans for coastal zones.
The ACOE manual recognizes that "[s]everal states have established construction setback lines to reduce damage in areas subject to coastal erosion and shoreline retreat." Further, as stated in the manual:

Some states (North Carolina, Maine) have passed laws banning the use of armored structures (seawalls, bulkheads, revetments) and shore protection on their ocean coasts. South Carolina only bans armored structures and other coastal states are considering similar laws. Florida and California have adopted sand mitigation policies and procedures to permit seawall construction but require the annual placement of sand to compensate for that trapped behind the structure.

The ACOE manual does not suggest in any way that these types of state regulations are preempted by federal law, nor does it suggest that similar local regulations would be preempted by federal law.

Based on the above, it our opinion that a local ordinance regulating land, use or activities between the OHWM and the water’s edge would not be preempted as a matter of law. Whether a specific ordinance would be preempted for the reason that it creates a direct conflict with state or federal law would need to be determined after a review of the proposed ordinance language.

II. CONSTITUTIONAL ISSUES

As discussed above, one issue already raised is whether the recommended regulations could withstand constitutional scrutiny. Below is our analysis of the proposed regulations under the three primary types of constitutional challenges to land-use ordinances.

At the outset, it is important to note that all ordinances are presumed to be constitutional and are construed so unless their unconstitutionality is clearly apparent. *Kenefick v City of Battle Creek*, 284 Mich App 653, 654-655; 774 NW2d 925 (2009). “The foundation for this presumption is our recognition that elected officials generally act in a constitutional manner when regulating within their particular sphere of government.” *Truckor v Erie Twp*, 283 Mich App 154, 162; 771 NW2d 1 (2009). Thus, the party challenging the ordinance has the burden of rebutting the presumption that the ordinance is constitutional. *Id*. The Michigan Court of Appeals has recognized that zoning ordinances come clothed “with every presumption of validity.” *Adams Outdoor Advertising, Inc v City of Holland*, 234 Mich App 681, 692; 600 NW2d 339 (1999).7

A. Substantive Due Process

Both the United States and Michigan Constitutions guarantee that no state shall deprive any person of “life, liberty or property, without due process of law.” *People v Sierb*, 456 Mich 519, 522; 581 NW2d 219 (1998). The due process provisions encompass procedural fairness, but also have a substantive component that protects individual liberty and property interests.

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7 See also *Rental Prop Owners Ass'n of Kent Co v Grand Rapids*, 455 Mich 246, 253; 566 NW2d 514 (1997) (“enforcement of ordinances related to municipal concerns is a valid exercise of municipal police powers as long as the ordinance does not conflict with the constitution or general laws”).
against certain government actions. "The underlying purpose of substantive due process is to secure the individual from the arbitrary exercise of governmental power." Id. at 523.

A party arguing that an ordinance violates his or her substantive due process rights has the burden of showing that the ordinance is arbitrary and unreasonable. Conlin v Scio Twp, 262 Mich App 379, 390; 686 NW2d 16 (2004). This is a high burden, as the challenger must negate "every conceivable basis which might support the legislation." TIG Ins Co v Dep’t of Treasury, 464 Mich 548, 558; 629 NW2d 402 (2001). Under a substantive due process analysis, an ordinance will be upheld if it is "rationally related to a legitimate government interest." Conlin, supra, 262 Mich App at 389.8

The government interests advanced by the City to justify the proposed ordinances include, among others, the protection of natural resources, preservation of the public way, and protection of property. Presumably, the City would further contend that the economic and environmental well-being, health, safety and general welfare of the City is dependent upon and related to the preservation of the Lake Michigan shoreline within the City’s boundaries; that property values will generally be enhanced by the preservation of the natural features of the shoreline; and that it is obligated to prevent or help minimize the impairment or destruction of the shoreline and the adjacent bottomlands.

In our opinion, these interests are legitimate government interests and should be sufficient to justify the constitutionality of the proposed regulations, as long as the regulations are rationally related to one or more of these interests.

By way of example, in the recent case of Gruetz v City of New Baltimore, Michigan Court of Appeals Docket No. 302860; 2012 WL 2402011 (June 26, 2012), a property owner challenged a city ordinance that prohibited fences within 30 feet of water, after the city stopped her from erecting a fence on the lake side of her waterfront property. The Court found that the ordinance was constitutional, even though it impacted the owner’s property rights.

In the Gruetz case, the Court of Appeals reaffirmed that aesthetics and public safety are legitimate governmental interests that are sufficient to justify the constitutionality of a zoning ordinance. Id., slip op at 3, citing Adams Outdoor Advertising, supra at 693. The Court held that "protecting and promoting public health, safety, and general welfare are legitimate governmental interests...and protecting aesthetic value is included in the concept of the general welfare." Norman Corp v City of East Tawas, 263 Mich App 194, 200-201; 687 NW2d 861 (2004).

In our opinion, the interests advanced by the City in this matter are significantly stronger than a government’s interest in protecting only aesthetic value. Thus, in our opinion, it is unlikely that a court would strike down the proposed regulations on substantive due process grounds unless there was no rational basis between the City’s stated interests and the adopted

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8 Property owners sometimes argue that they have a fundamental right to develop their property. However, the United States Supreme Court has consistently applied the reasonable and legitimate state interest test to land-use decisions and has not treated land-use issues as involving fundamental rights. Dolan v City of Tigard, 512 US 374; 114 S Ct 2309 (1994); Euclid v Ambler Realty Co, 272 US 365, 395; 47 S Ct 114 (1926) (stating that before a zoning ordinance can be declared unconstitutional, the provision must be clearly arbitrary and unreasonable, having no substantial relation to the public health, safety, morals, or general welfare).
ordinances. See e.g., Young v American Mini Theatres, Inc, 427 US 50, 71; 96 S Ct 2440; 49 L Ed 2d 310 (1976) (stating that a municipality’s interest in attempting to preserve quality of life is accorded high respect). See also Bevan v Brandon Twp, 438 Mich 385, 399-400; 475 NW2d 37 (1991) (upholding an ordinance restricting lakefront property, finding that it was rationally related to the legitimate government purpose of ensuring access for emergency personnel); Cummins v Robinson Twp, 283 Mich App 677, 702; 770 NW2d 421 (2009) (the township’s enforcement of flood-resistant building code requirements advanced legitimate state interests in protecting the health, safety, and welfare of the public and protected property located in flood-prone areas).

This conclusion is consistent with cases in other jurisdictions as well. For example, in the case of Samson v City of Bainbridge Island, 202 P3d 334, 349 (2009), the Court of Appeals for the State of Washington upheld an amendment to city’s shoreline master program that prohibited the construction of single-family private docks in a harbor. The court noted that the amendment was adopted “to protect the aesthetic, navigational, and recreational values that would be diminished by multiple docks in the harbor” and that the amendment did not violate due process rights because “[i]t defies logic to suggest an ordinance is unduly oppressive when it regulates only the activity which is directly responsible for the harm.”

Nevertheless, it is not the municipality that is obligated to justify an ordinance by affirmatively showing that it has a reasonable governmental interest in the ordinance—which we believe the City would have in this case—rather, “it is plaintiff who is required to affirmatively prove that defendant does not have a reasonable governmental interest.” Gruce, supra at 4. Moreover, courts are not to sit as a “superzoning commission,” Brae Burn, Inc v Bloomfield Hills, 350 Mich 425, 430; 86 NW2d 166 (1957), and will not adjudicate the wisdom of zoning ordinances beyond evaluating them for a rational basis. Thus, the Due Process Clause cannot be invoked by a disgruntled property owner simply because he or she disagrees with the regulation. “The Due Process Clause is not a guarantee against incorrect or ill-advised [governmental] decisions.” Cummins v Robinson Twp, 283 Mich App 677, 702; 770 NW2d 421 (2009) (citations omitted).

Further, the fact that the local ordinance(s) may impose restrictions that exceed federal or state regulations would not necessarily render the ordinance(s) unconstitutional. In Frericks v Highland Twp, 228 Mich App 575, 599; 579 NW2d 441 (1998), the Court of Appeals upheld a township zoning ordinance requiring septic tanks and tile fields to be constructed at least 125 feet from the high water mark of any subaqueous area. The plaintiffs argued that the setback regulation was unreasonable and unnecessary because county and state regulations were adequate. The Court noted there was testimony in the case that the township generally had extremely porous soil, which justified adopting a setback requirement greater than county or state standards as an additional “safety” measure to protect water resources. The Court said, “[g]iven this evidence, while there may be a difference of opinion concerning the need for a ‘safety’ factor, we are not persuaded that the trial court erred in finding that the setback regulation…was reasonable.”

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9 To the extent the City seeks to adopt regulations that are more stringent or restrictive than the state (or federal) requirements, it would be beneficial for the City to be able to present (prior to enactment of the regulations)
Based on the information presented to date, it is our opinion that the proposed ordinances would likely withstand a constitutional challenge under a substantive due process argument because they appear to directly advance legitimate government interests—as long as the ordinances that the City adopts are rationally related to those interests.

B. Equal Protection

Property owners sometimes challenge ordinances arguing that the ordinance violates his or her right to equal protection. In determining whether application of an ordinance violates equal protection, courts apply the following principles set forth in *Shepherd Montessori Center Milan v Ann Arbor Charter Twp*, 486 Mich 311, 318-319; 783 NW2d 695 (2010):

When reviewing the validity of state legislation or other official action that is challenged as denying equal protection, the threshold inquiry is whether plaintiff was treated differently from a similarly situated entity. The general rule is that legislation that treats similarly situated groups disparately is presumed valid and will be sustained if it passes the rational basis standard of review: that is, the classification drawn by the legislation is rationally related to a legitimate state interest. Under this deferential standard, “the burden of showing a statute to be unconstitutional is on the challenging party, *not* on the party defending the statute.” [Citations omitted; emphasis in original.]

Based upon our understanding of the proposed regulations, it does not appear that there would be any disparate treatment among similarly situated property owners. The ordinances would be generally applicable, would not single out any waterfront property owners for special treatment, and would treat all persons of the same class alike. In other words, no immunities or privileges would be extended to an arbitrary or unreasonable class while denied to others of like kind.

If a challenger is unable to meet his or her burden of proving different treatment, and as long as there is no evidence of discriminatory intent in the enforcement of the ordinance, then a court would not even apply the rational basis test to determine whether the ordinance is rationally related to a legitimate state interest. *Shephard, supra* at 323 (“because plaintiff has

evidence or testimony, if necessary, that there are factors or characteristics unique to the area that justify the additional “safety measures.”

10 The Equal Protection Clause requires that all persons similarly situated be treated alike under the law.

11 When legislation treats similarly situated groups differently on the basis of a suspect classification (e.g., race, alienage, or national origin), or infringes on a fundamental right protected by the Constitution (e.g., the free exercise of religion), “the legislation must pass the rigorous strict scrutiny standard of review: that is, the government bears the burden of establishing that the classification drawn is narrowly tailored to serve a compelling governmental interest.” *Shephard, supra* at 319. If legislation treats similarly situated groups differently on the basis of a quasi-suspect classification (e.g., gender), then the intermediate scrutiny test is applied and “the burden is on the government to show that “the classification serves important governmental objectives and that the means employed are substantially related to the achievement of those objectives.” *Id.* Where, as here, an ordinance is facially neutral, the burden is on the challenging party—not the government—to show that the challenging party “was actually treated differently from others similarly situated and that no rational basis exists for the dissimilar treatment.” *Id.* at 319-320.
failed to demonstrate that it was treated differently from similarly situated entities, we need not apply the rational basis test”).

Even assuming for argument’s sake that there was evidence of dissimilar treatment, courts will uphold legislation as long as it is “rationally related to a legitimate government purpose.” A reviewing court need only determine if there is “any reasonably conceivable state of facts that could provide a rational basis for the classification.” *Kenefick v City of Battle Creek*, 284 Mich App 653, 658; 774 NW2d 925 (2009). The finding may be based on “rational speculation unsupported by evidence or empirical data.” *Id*.

The person challenging the ordinance has an extremely high burden—“the challenger must ‘negative [sic] every conceivable basis which might support’ the legislation.” *Id.* (citation omitted). See also *Risko v Grand Haven Charter Twp Zoning Bd of Appeals*, 284 Mich App 453, 465; 773 NW2d 730 (2009) (“[T]he party raising the equal protection challenge has the burden of proving that the challenged law is arbitrary and thus irrational”); *Houdek v Centerville Twp*, 276 Mich App 568, 585; 741 NW2d 587 (2007) (“When an ordinance is challenged on the basis of equal protection guarantees, the ordinance is presumed constitutional, and the challenging party has the burden to show that the established classification is not rationally related to a legitimate state interest”).

Lakefront property owners are not a protected class. Thus, based on the information presented to date, it is our opinion that the proposed ordinances would likely withstand a constitutional challenge under an equal protection argument, so long as the ordinances are rationally related (or bear a reasonable relationship) to a legitimate governmental interest, they treat similarly situated individuals alike, and they do not single out any property owner for special treatment. We believe that if the ordinances meet these requirements, it is unlikely that a court would conclude that the ordinances are arbitrary and irrational, or that a challenger could overcome the substantial burden to negate every conceivable basis which might support the ordinances.

### C. Regulatory Taking

Finally, it is not unusual for property owners to challenge an ordinance claiming that the ordinance restricts the use of their property in an unreasonable manner, and, as a result, constitutes an impermissible “taking” of private property for public purposes without compensation.

The United States and Michigan Constitutions provide that private property shall not be taken for public use without just compensation. The government may effectively “take” a person’s property by overburdening that property with regulations. However, a “land-use regulation does not effect a taking if it substantially advances legitimate state interests and does not deny an owner economically viable use of his land.” *Nollan v California Coastal Comm*, 483 US 825, 834 (1987).

Courts have found that land use regulations effectuate a taking where the regulation denies an owner economically viable use of his land. *K & K Const. Inc v Dep’t of Nat Res*, 456 Mich 570, 576-77; 575 NW2d 531(1998). This type of taking encompasses two types of
situations: (1) a “categorical” taking, where the owner is deprived of “all economically beneficial or productive use of land,” *Lucas v South Carolina Coastal Council*, 505 US 1003, 1015 (1992); and (2) a taking recognized on the basis of the application of the traditional “balancing test” established in *Penn Central Transp Co v New York City*, 438 US 104 (1978).

Based upon our understanding of the proposed ordinances, it is highly unlikely that the ordinances would force a property owner to sacrifice *all economically beneficial uses* of his or her land, except perhaps if the proposed setback requirement rendered a currently buildable vacant lot *unbuildable* or would cause an existing building to be destroyed by coastal conditions without the ability to rebuild. Thus, before adopting any setback requirements, the City should investigate what effect the proposed setbacks would have on existing vacant lots (if any), as well as on any lots on which existing structures may be destroyed in the future by fire or natural disaster. Depending upon the results of the investigation, the City may determine that it is highly unlikely that a “categorical” taking would result.

With regard to the second type of “taking,” courts analyze such a claim using three factors: (1) the character of the government’s action, (2) the economic effect of the regulation on the property, and (3) the extent by which the regulation has interfered with distinct, investment-backed expectations. *Penn Central*, *supra* at 124.

The first factor evaluates whether a property owner is being singled out or whether an ordinance applies broadly and equally. *Chelsea Inv Group LLC v Chelsea*, 288 Mich App 239, 261; 792 NW2d 781 (2010). As discussed above, it appears based upon the information presented to date that the City has the authority to adopt the proposed ordinances, that the ordinances could be rationally related to legitimate governmental interests, and that the ordinances would apply broadly and equally. Assuming that to be true, this factor would weigh in favor of the City.

To the extent a challenger claims that the economic effect of the ordinances amounts to a taking under the second factor, it is well established that mere diminution in value is not enough to establish a taking. “The Taking Clause does not guarantee property owners an economic profit from the use of their land.” *Frrick v Highland Twp*, 228 Mich App 575, 616; 579 NW2d 441, 460 (1998). Further, in applying a “taking” analysis, the full bundle of property rights associated with land is generally viewed in its entirety. *Bevan v Brandon Twp*, 438 Mich. 385, 395-397, 475 N.W.2d 37 (1991). As a result, restrictions on the use of only limited portions of a parcel, such as setback ordinances, are not generally considered regulatory takings. *Tahoe-Sierra Pres Council, Inc v Tahoe Regl Planning Agency*, 535 US 302, 327 (2002) (“where an owner possesses a full ‘bundle’ of property rights, the destruction of one ‘strand’ of the bundle is not a taking”); *Goriseck v Fox*, 274 US 603 (1927).12

Finally, under the third factor, courts consider whether the challenger has made any investments in the property that were subsequently lost because of the ordinance. To the extent a challenger contends that the ordinances interfere with distinct, investment-backed expectations

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12 Indeed, it is our understanding that one of the purposes for the proposed ordinances is to protect private property and to, in fact, enhance the value of that property. Enhancing property values serves legitimate governmental interests including but not limited to increasing the tax base and, therefore, property tax revenues.
concerning riparian rights, the expectations must be viewed in light of the public trust doctrine discussed above. Our Supreme Court has articulated the following standard with regard to the taking of riparian rights: "Riparian rights are property, for the taking or destruction of which by the State compensation must be made, unless the use has a real and substantial relation to a paramount trust purpose." Peterman v Dep't of Nat Resources, 446 Mich 177, 213-214; 521 NW2d 499 (1994), citing Hilt v Weber, 252 Mich 198, 225; 233 NW 159 (1930).

In the Peterman case, landowners brought an action against the Department of Natural Resources ("DNR"), alleging that the DNR’s construction of a boat launch and jetties—which resulted in the destruction of the plaintiffs’ beachfront property as a result of erosion and filtration of sand—was an unconstitutional taking. The court found that

defendant’s [the DNR’s] actions were the proximate cause of the destruction of plaintiffs’ beachfront property. Assuming that defendant did not directly invade plaintiffs’ land, it undoubtedly set into motion the destructive forces that caused the erosion and eventual destruction of the property. Defendant was forewarned that the construction of the jetties could very well result in the washing away of plaintiffs’ property, and the evidence reveals that the destruction of plaintiffs’ property was the natural and direct result of the defendant’s construction of the boat launch. The effect of defendant’s actions were no less destructive than bulldozing the property into the bay. [Peterman, supra, at 191.]

The court noted that as a result of erosion from the DNR’s construction of the boat launch and jetties, the plaintiffs had lost a significant amount of “fast land.” Fast land is property that is “above the high water mark.” Id. at 181. The court then concluded—citing to several earlier court decisions—that fast land cannot be taken without just compensation. See also United States v Rand, 389 US 121, 123 (1967), in which the United States Supreme Court stated that “when fast lands are taken by the Government, just compensation must be paid.”

In our opinion, regulations of the type proposed are distinguishable from government-caused erosion or flooding due to government improvements or construction. In the Peterson case, the government (there, the DNR) actually undertook activity that caused the property damage. In contrast, the City in this case is simply seeking to regulate and/or prevent the development of shoreline property by the property owner. And, in our opinion, prohibiting a property owner from constructing a seawall, in and of itself, does not amount to an unconstitutional taking.

However, we cannot conclude that the City would be insulated from an action by one or more property owners alleging that the City ordinances prohibiting the construction of certain shoreline protection structures caused increased erosion or the loss of fast land for which compensation must be paid. If such an action were to be filed against the City, expert testimony would, quite obviously, be critical with respect to the effects of building/prohibiting shoreline protection structures.

The case of Shell Island Homeowners Association, Inc v Tomlinson, 517 SE2d 406 (1999) is instructive on this issue. In that case, the Court of Appeals of North Carolina upheld a state regulation that prohibited permanent erosion control structures, including seawalls. The
court rejected the property owners’ argument that the regulation amounted to a “taking,” finding that the property owners failed to show that they had any legally cognizable property interest that had been taken by the state. The court explained:

The invasion of property and reduction in value which plaintiffs allege clearly stems from the natural migration of Mason’s Inlet, and plaintiffs have based their takings claim on their need for “a permanent solution to the erosion that threatens its property,” and the premise that “[t]he protection of property from erosion is an essential right of property owners....” The allegations in plaintiffs’ complaint have no support in the law, and plaintiffs have failed to cite to this Court any persuasive authority for the proposition that a littoral or riparian landowner has a right to erect hardened structures in statutorily designated areas of environmental concern to protect their property from erosion and migration. [Id. at 228.]

The court in the Shell Island case stressed that there was no actual interference with the plaintiffs’ property rights. Rather, the alleged injuries were merely consequential or incidental and “allegations of mere incidental or consequential interferences with property rights are insufficient to maintain and action for inverse condemnation.” Id. at 229. The court found that the alleged damages to the plaintiffs’ property were not caused by the government’s regulatory action, but by “naturally occurring phenomena” of the migration of the inlet and the resulting erosion of the property. Id. at 229-230.

Similarly here, the City’s enforcement of the proposed regulations (i.e., a ban on shoreline protection structures in Area 1) would be incidental to naturally occurring events. Thus, as long as the regulations would not cause a property owner to lose all economically beneficial or productive use of their property (as opposed to suffering a mere reduction in value), we believe that the regulations could withstand constitutional scrutiny under a takings analysis, even if as a result of the regulations a property owner suffered incidental damage from naturally occurring phenomena.

In sum, it is our opinion that City has the legal authority under state law and federal law to enact and enforce the types of ordinances it is considering. Further, it is our opinion that such ordinances can withstand constitutional scrutiny if they apply broadly and equally, do not single out any property owners, and do not deprive a property owner of all economically viable uses of his or her property.\textsuperscript{13}

\textsuperscript{13} We note that depending on how the City decides to proceed with regard to the Area 2 recommendations, there may be additional areas requiring additional research. For example, what are the ramifications, if any, of requiring property owners to construct shoreline protection structures on public property (realizing that with regard to most parcels in Area 2, there may be no alternative)? This raises questions regarding ownership and maintenance of the structures, as well as governmental liability and the appropriate mechanism/procedure for granting property owners permission to construct the structures, while at the same time minimizing the City’s exposure to liability.
Thank you for allowing us the opportunity to work with the City. If there are additional questions regarding these matters, or if we can be of further assistance, please do not hesitate to contact us.

Very truly yours,

Jeffrey V.H. Sluggett
Exhibits
EXHIBIT I
Area 1 Proposed Setback Line
EXHIBIT 2

Area 2 Shoreline Protection Concept Section
EXHIBIT 3
Working Overall Maps, Areas 1-3