APPENDIX J
Lake, Porter, and LaPorte, Indiana
Discovery Report

Discovery Report

Great Lakes Coastal Flood Study

Lake Michigan
State of Indiana

Lake County, Porter County, and LaPorte County
County-based Report

February 2013

FEMA

SUBMITTED BY:

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

Submitted February 2013

Project Area Community List

Lake County	Porter County	LaPorte County
East Chicago, City of	Beverly Shores, Town of	Long Beach, Town of
Gary, City of	Chesterton, Town of	Michigan City, City of
Hammond, City of	Dune Acres, Town of	
Lake Station, City of	Ogden Dunes, Town of	
Whiting, City of	Portage, City of	
	Porter, Town of	
	Pines, Town of	
	Burns Harbor, Town of	

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

Table of Contents

List of Tables

List of Figures

List of Attachments

Acronyms and Abbreviations

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

I. Discovery Overview

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

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

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

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

i. Great Lakes Coastal Flood Study

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

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

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

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

ii. Purpose of Great Lakes Discovery

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

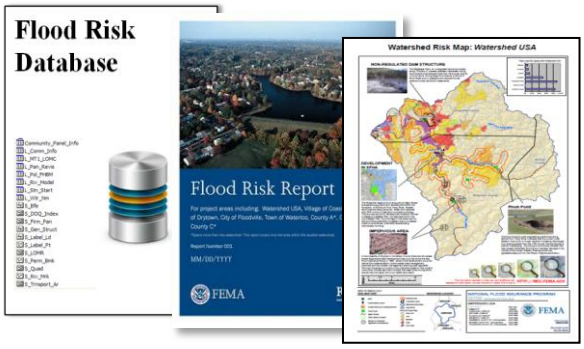
The Discovery process also helps FEMA better identify the types of datasets or products that are useful at the local level, especially as it relates to identifying new mitigation strategies and actions and for use in local planning efforts. Products that may be available to communities as a

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

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

iii. Coastal Flood Risk Products

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



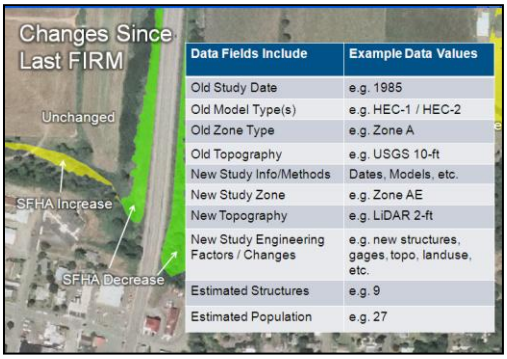
The three products are:

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

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

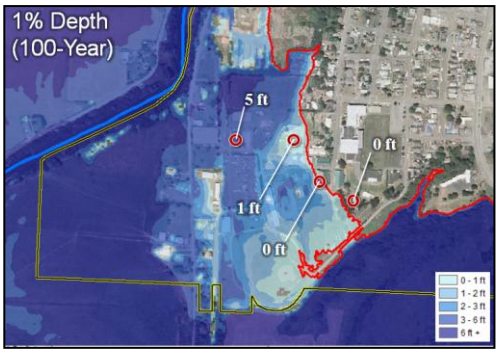
Changes Since Last FIRM (CSLF)

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



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

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



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

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

Flood Risk Assessment (HAZUS-MH)

HAZUS-MH
EARTHQUAKE • WIND • FLOOD

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

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

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

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

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

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

II. Stakeholder Communication and Coordination

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

i. Lake Michigan Discovery Stakeholder Coordination

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

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

Discovery Meeting invitations were sent to local community and county stakeholders within the Lake, Porter, and LaPorte 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.

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, Lake, Porter, and LaPorte Counties Pre-Meeting Correspondence.

III. Lake, Porter, and LaPorte Counties Discovery Meeting

The Discovery Meeting for Lake, Porter, and LaPorte Counties coastal communities was held on September 10, 2012 in Valparaiso, IN. 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 Lake, Porter, and LaPorte Counties (Attachments C-E) were displayed and utilized during the meeting to stimulate discussion regarding areas of coastal flood risk concern and areas of hazard mitigation interest. The draft Discovery Map shown at the meeting included geospatial and tabular data that had been collected prior to the meeting:

Geospatial Data:

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

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

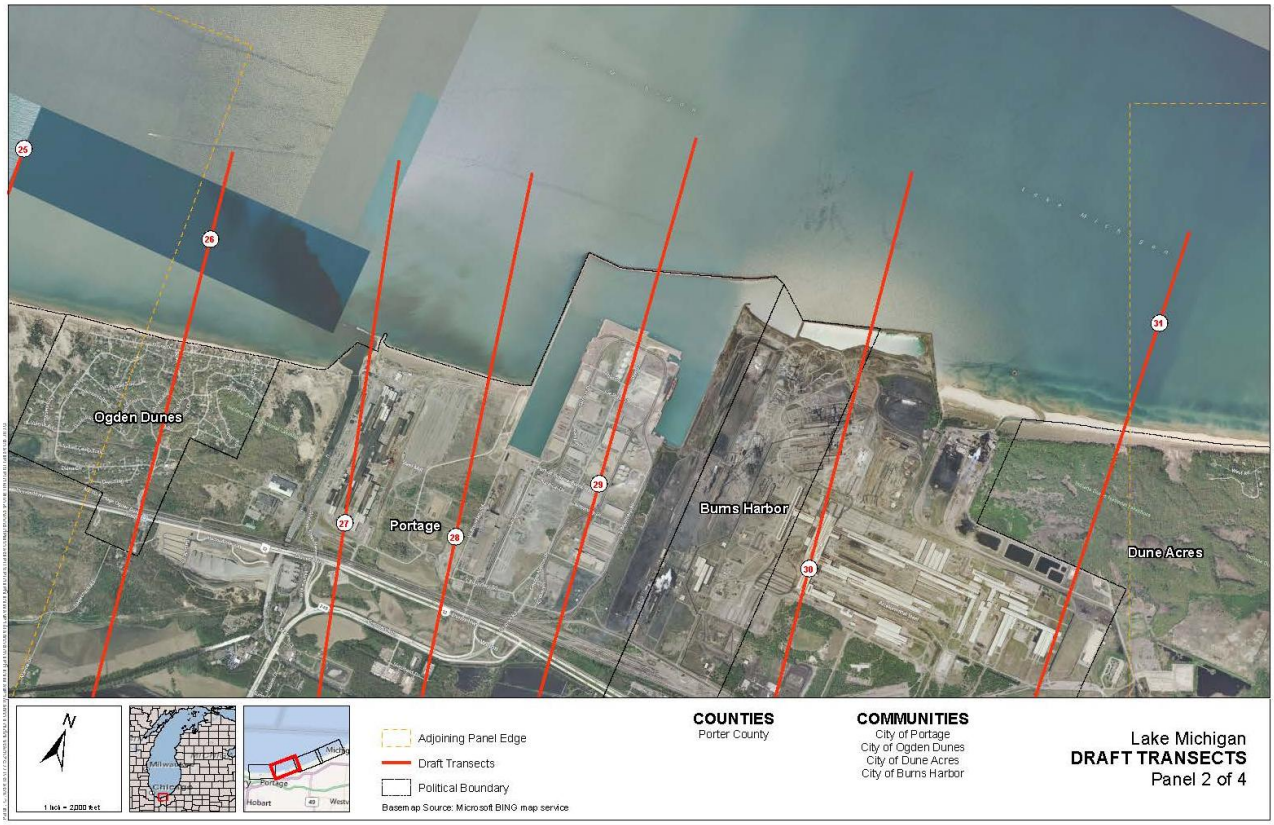
- Coordinated Needs Management Strategy (CNMS)[2] Data
- Proposed Coastal Transect Locations
- Effective Special Flood Hazard Areas (SFHAs)
- Jurisdictional Boundaries
- Letters of Map Change (LOMCs)
- Levees
- Shoreline
- Streams
- United States Geologic Survey (USGS) Gages
- Watershed Boundaries

Attendees were asked to cooperatively identify Areas of Concern and Areas of Mitigation Interest (AoMIs) within Lake, Porter, and LaPorte 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 Lake, Porter, and LaPorte Counties were available for review and comment immediately following the meetings. Stakeholders were encouraged to review proposed transects and provide comments related to their location. Maps of proposed transect locations presented at the Discovery Meeting can be found in Attachment F. A sample map is shown below as Figure 1:

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

Figure 1: Sample Proposed Transect Figure



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

Table 1: Stakeholder General and Transect Location Comments

State	County	Community	FIPS	CID	Comment	Type
Indiana	Porter	Dune Acres	18127	180205	Residential communities up against lake. Private community with public roads.	General Comment
Indiana	Porter		18127		High Erosion Hazard Area information is available from Steve Davis, Division of Water, or Sergio Mendoza - (219) 926-9757. He also developed a draft Coastal Hazard Model Ordinance.	General Comment

State	County	Community	FIPS	CID	Comment	Type
Indiana	Porter		18127		Add Town of Pines and Burns Harbor to the list of communities.	General Comment
Indiana	Porter		18127		Contact Info Notes: Portage – A.J. Monroe Chesterton – Mark O'Dell Beverly Shores – Geoff Benson D.O.I. Indiana Dunes National Lake Shore – DEIS not released yet	General Comment

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

IV. Summary of Data Analysis

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

Table 2: Data Collected for Lake, Porter, and LaPorte Counties, IN

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Average Annualized Loss Data (AAL)	Discovery Map	Federal Emergency Management Agency (FEMA)	June 2012	Nationwide
Census Blocks	Discovery Map	U.S. Census Bureau	June 2012	Countywide

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Contacts	Discovery Report	Local Community Websites, State/FEMA updates	June 2012	Countywide
Community Assistance Visits (CAVs)	Discovery Report	FEMA Community Information System (CIS)	July 2012	Countywide
Community Rating System (CRS)	Discovery Report	FEMA's "Community Rating System Communities and Their Classes"	July 2012	Nationwide
Comprehensive Plans	Discovery Report	Local Community Websites	July 2012	Countywide
Coastal Barrier Resources System (CBRS)	Discovery Map	U.S. Fish and Wildlife Service	July 2012	Nationwide
Coastal Construction	To Be Collected	U.S. Army Corps of Engineers (USACE)	TBD	Nationwide
Coordinated Needs Management Strategy (CNMS)	Discovery Map	FEMA	July 2012	Countywide
Critically Erosion Beach Areas	To Be Collected	To Be Collected	TBD	Statewide
Critical Facilities	Discovery Report	Local Mitigation Plan	July 2012	Countywide
Dams	Discovery Report	USACE, National Inventory of Dams, Flood Insurance Rate Map (FIRM) Database	July 2012	Countywide
Declared Disasters	Discovery Report	FEMA's "Disaster Declarations Summary"	June 2012	Nationwide
Demographics, Industry	Discovery Report	U.S. Census Bureau, Local Mitigation Plans	June 2012	Countywide
Effective Floodplains	Discovery Map	FEMA Map Service Center and Mapping Information Platform	June 2012	Countywide

Data Types	Deliverable/Product	Source	Date of Data Collection	Level
Hazard Mitigation Plans and Status	Discovery Report	Local Mitigation Plans	July 2012	Countywide
Hazard Mitigation Assistance Program Grants Received	Discovery Report	FEMA's "Hazard Mitigation Program Summary" Community Input	June 2012	Nationwide
Hazard Mitigation Projects	Discovery Report	Local Mitigation Plans	July 2012	Countywide
High Water Marks	To Be Collected	To Be Collected	TBD	Countywide
Historical Flooding	Discovery Report	Effective Flood Insurance Study (FIS), Local Mitigation Plans	July 2012	Countywide
Historical Storm Events	Discovery Report	Effective FIS, Local Mitigation Plans	July 2012	Countywide
Individual/Public Assistance	Discovery Report	FEMA's "Public Assistance Subgrantee Summary"	June 2012	Nationwide
Insurance Policies	Discovery Report	FEMA CIS	July 2012	Nationwide
Letters of Map Change (LOMCs)	Discovery Map	FEMA's Mapping Information Platform	July 2012	Countywide
Meteorological Gages	Discovery Map	National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Laboratory	July 2012	Regionwide
Ordinance	Discovery Report	Local Community Websites	July 2012	Countywide
Repetitive Loss	Discovery Report	FEMA CIS	July 2012	Countywide

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

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

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

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

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

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

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

Table 3: HAZUS AAL Data for Lake, Porter, and LaPorte Counties, MI

FIPS Code	County	Total (in thousands of $)	Building (in thousands of $)	Content (in thousands of $)
18089	Lake, IN	30,135	11,153	17,826
18127	Porter, IN	1,695	604	1,025
18091	LaPorte, IN	6,553	2,122	4,055

Source: FEMA
FIPS = Federal Information Processing Standards

I.IV.i.2 Coastal Recession

A High Erosion Hazard Area (HEHA) is a segment of shoreline with a long term erosion rate greater than one foot per year as determined by the State. The Indiana lakeshore of Lake Michigan includes several HEHAs; however, many of the areas are currently protected from erosion by man-made structures or are included in the national or state park where the natural shoreline is preserved. (Indiana Natural Resources Commission).

HEHA's identified in LaPorte County include areas located in Michiana Shores and Long Beach east of Michigan City. However, this segment of shoreline is armored with a rock revetment in order to protect Lake Shore Drive and seawalls constructed by private homeowners. West of Michigan City portions of the shoreline are owned by the National Lakeshore. Areas such as Crescent Dune and Mount Baldy are preserved as natural shoreline. Here, nonstructural methods of mitigating erosion (beach nourishment) have been used in 1974, 1981, 1996, 1997, and 1998.

In Porter County, HEHA's along Indiana Dunes State Park is also maintained as natural shoreline. To the west, a short segment of property fronting the Town of Porter is designated as HEHA. Continuing west, the entire shoreline within the Town of Dune Acres is designated as HEHA, but only a small portion of shore is left unprotected by hard structures. West of the Burns Small Boat Harbor, less than one mile of shoreline is designated HEHA, however most of this area is either protected by the Harbor breakwater, is preserved by the National Lakeshore, or is protected by hard structures built by private property owners in Ogden Dunes. In 1997, the easternmost homes of Ogden Dunes were further protected by a new seawall built by the State of Indiana.

In Lake County, very little shoreline is designated as HEHA. This is largely attributable to extensive shore protection structures that protect industrial areas fronting the shore. The easternmost segment of Lake County shoreline near Wells Street Beach is designated HEHA.

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

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.

In Lake, Porter, and LaPorte Counties, the Indiana Dunes National Lakeshore hugs 15 miles of the southern shore of Lake Michigan. The park is part of the National Park Service. In 1916, the region was booming with industry in the form of steel mills and power plants, and there was a struggle to preserve the largest sand dune on Indiana's lakeshore. The legislation that authorized the Indiana Dunes National Lakeshore in 1966 resulted from a movement that began in 1899.

I.IV.i.4 Jurisdictional Boundaries

Jurisdictional boundaries were obtained for Lake, Porter, and LaPorte 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, no Coastal Data Request Forms had been received from communities in Lake, Porter, and LaPorte Counties.

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 Lake, Porter, and LaPorte 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 length of Lake Michigan shoreline along Lake, Porter, and LaPorte Counties is approximately 69 miles. Tables 4 through 7 below summarize the shoreline features from the USACE dataset for the Indiana lakeshore.

Table 4: Summary of Shoreline Types

COUNTY	Total Shoreline (mile)	Artificial Shoreline (mile)	Boulders, Bedrock (mile)	Cohesive Clays and Silts (mile)	Sand (mile)	Shingles, Pebbles, Cobbles (Mile)
Lake County	36.92	31.07	0	0.62	5.23	0
Porter County	22.57	7.46	0	0	15.11	0
LaPorte County	9.09	3.73	0	0	5.36	0

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 5: Summary of Shoreline by Land Use

COUNTY	Total Shoreline (mile)	Commercial /Industrial (mile)	Forested (mile)	High Density Residential (mile)	Moderate Density Residential (mile)	Park Land (mile)
Lake County	36.92	29.2	0.62	3.11	2.49	1.5
Porter County	22.57	8.7	4.18	0	1.86	7.82
LaPorte County	9.09	3.11	0.79	0.62	4.57	0

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 6: Summary of Shoreline Coverage

COUNTY	Total Shoreline (mile)	Bluff 2'-10' (mile)	Coastal Wetland (mile)	Dune 2'-10' (mile)	Flat Coast (mile)	High Bluff 10'+ (mile)	High Dune 10'+ (mile)	Other (mile)
Lake County	36.92	6.84	0	0.62	28.58	0.62	0.26	0
Porter County	22.57	0	0	0	12.43	0	10.14	0
LaPorte County	9.09	0	0	3.95	3.11	0	2.03	0

Source: USACE 2012, Lake Michigan Shoreline Classification

Table 7: Summary of Shoreline Vegetation Types

COUNTY	Total Shoreline (mile)	High Density Shrubs/ Trees (mile)	Low Density Shrubs/ Trees (mile)	Manicured Lawn (mile)	Moderate Density Shrubs/ Trees (mile)	None (mile)	Unmaintained Non-Woody Vegetation (mile)
Lake County	36.92	3.36	16.78	2.49	9.31	4.97	0
Porter County	22.57	11.36	8.08	0	3.11	0	0
LaPorte County	9.09	0.79	3.11	0	5.19	0	0

Source: USACE 2012, Lake Michigan Shoreline Classification

I.IV.i.8 Stream Lines/Hydrograph

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

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

New Data Collected for Great Lakes Coastal Flood Study

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

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

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

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

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

I.IV.i.10 Transportation

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

I.IV.i.11 Watershed Boundaries

U.S. Geological Survey (USGS) Hydrologic Unit Code 8 (HUC8) watershed boundaries were obtained from the National Atlas 2011 "Raw Data Download" (http://nationalatlas.gov/atlasftp.html). Lake, Porter and LaPorte Counties each contain portions of the same two HUC-8 watersheds. The sub basin names and HUC-8 codes are listed below in Table 8:

Table 8: HUC-8 Watersheds in Lake, Porter, and LaPorte Counties

County	Huc_8	Sub basin
Lake County Porter County LaPorte County	4040001	Little Calumet-Galien
	7120001	Kankakee

ii. Other Data and Information

Lake County is located in the northwestern corner of the State of Indiana on the shore of Lake Michigan. According to the 2010 census, Lake County has a population of 496,005, which is an increase from 484,564 in 2000, and makes it Indiana's second-most populous county. The county has a total area of 626.56 square miles, of which 498.96 square miles is land and 127.60 square miles is water (U.S. Census Bureau, 2010). The northern portion of the county is mainly flat, except for a few sand ridges. Additional information on Lake County can be found at http://www.lakecountyin.org/.

Porter County is located in the northern portion of the State of Indiana on the shore of Lake Michigan. According to the 2010 census, Porter County has a population of 164,343, which is an increase from 146,798 in 2000. The county has a total area of 521.78 square miles, of which 418.15 square miles is land and 103.63 square miles is water, much of it in Lake Michigan (U.S. Census Bureau, 2010). Additional information on Porter County can be found at http://www2.porterco.org/.

LaPorte County is located in the northeastern corner of the State of Indiana on the shore of Lake Michigan. According to the 2010 census, it has a population of 111,467, which is an increase from 110,106 in 2000. The county has a total area of 613.26 square miles, of which 598.30 square miles is land and 14.96 square miles is water (U.S. Census Bureau, 2010). It is the third largest county in Indiana by area. Additional information on LaPorte County can be found at http://www.laportecounty.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 Lake, Porter or LaPorte Counties.

I.IV.ii.2 Coastal Flood Protection Measures

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 Lake, Porter, and LaPorte Counties, IN

County	Community	CID	CAV Date	FIRM Date
Lake	East Chicago, City of	180130	03/30/04	01/18/2012
Lake	Gary, City of	180132	04/24/12	01/18/2012
Lake	Hammond, City of	180134	01/03/05	01/18/2012
Lake	Lake Station, City of	180131	08/20/09	01/18/2012
Lake	Whiting, City of	180313	01/04/05	01/18/2012
Porter	Beverly Shores, Town of	185173	--	10/17/1975
Porter	Chesterton, Town of	180201	06/02/00	03/15/1984
Porter	Dune Acres, Town of	180205	--	04/24/1981
Porter	Ogden Dunes, Town of	180206	06/04/96	08/5/1986
Porter	Portage, City of	180202	06/02/00	06/01/1982
Porter	Porter, Town of	180208	03/15/04	06/04/1980
Porter	Burns Harbor, Town of	180207	--	06/01/1981
LaPorte	Long Beach, Town of	185177	06/22/10	11/21/1975
LaPorte	Michigan City, City of	180147	05/09/12	08/17/1981

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 Lake, Porter or LaPorte 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 Northwestern Indiana Regional Planning Commission (NIRPC) is an agency that serves the citizens of Lake, Porter, and LaPorte Counties. Although the agency was created in 1965, in 2003, the Indiana General Assembly amended NIRPC's enabling legislation granting the designation of a regional Council of Governments, with representation from each of the 41 cities and towns and the three counties of Northwest Indiana, as well as an appointment from the Governor. Additionally, this legislation charged NIRPC to plan for transportation, economic development and the environment within a comprehensive planning framework that is more responsive to the overall needs of citizens, stakeholders and local governments alike.

The NIRPC led the development of Northwest Indiana's first Comprehensive Regional Plan (CRP). The CRP is based on extensive public involvement and input obtained through numerous public workshops and meetings with local agencies and officials. Integrating land use and transportation planning with economic development, environmental and social equity considerations, the CRP provides a framework for how the region will grow through the year 2040. The 2040 comprehensive regional plan was adopted on June 23, 2011 and can be found at http://www.nirpc.org/2040CRP/Final/FinalPlan.html.

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

Table 10: CNMS Status for Lake, Porter, and LaPorte, IN

County	FIPS	Unknown (stream miles)	Unverified (stream miles)	Valid (stream miles)	Total (stream miles)
Lake County, IN	18089	73.09	173.22	84.84	331.15
Porter County, IN	18127	71.43	0.00	36.26	107.69
LaPorte County, IN	18091	67.30	0.00	122.93	190.23

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 Lake County, 6% of critical facilities and 11% of road miles (341 miles) and in LaPorte County, 2% of critical facilities and 6% of road miles (119 miles) are within the floodplain. (National Oceanic & Atmospheric Administration, 2009). Information regarding Porter County was not available at the time of this report.

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

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

Critically eroded beaches and beach nourishment/dune replacement projects were not identified in Lake, Porter, and LaPorte Counties through this Discovery process.

I.IV.ii.9 Dams

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

The NID is available at the USACE Website https://nid.usace.army.mil/.
Table 11 below is a summary of documented dams by county in Lake, Porter and LaPorte counties. The NID is available at the USACE Website https://nid.usace.army.mil/.

Table 11: Documented Dams for Lake, Porter, and LaPorte, IN

County	Name	Primary Purpose	Dam Type	River
Lake	Lakewood Estates Dam	Recreation	Earth	Unnamed Tributary Cedar Creek
Lake	Hooseline & Molchan Lake Dam	Recreation	Earth	Unnamed Tributary Deer Creek
Lake	Lake Dalecarlia Dam (East)	Recreation	Earth	Cedar Creek
Lake	Lake George Dam	Other	Earth	Deep River
Lake	Doubletree Lake Estates Dam (North)	Recreation	Earth	Unnamed Tributary Deep River

County	Name	Primary Purpose	Dam Type	River
Lake	Doubletree Lake Estates Dam (West)	Recreation	Earth	Unnamed Tributary Deep River
Lake	Lake Hills Country Club Golf Course Dam	Recreation	Earth	Golf Lake
Lake	Cedar Lake Control Structure	Recreation	Earth	Cedar Creek
Lake	Lake of the Four Seasons (Lower) C	Recreation	Earth	Unnamed Tributary Stony Run
LaPorte	Dingler Lake Dam	Recreation	Earth	Unnamed Tributary East Branch Trail Creek
LaPorte	Union Mills Dam	Recreation	Earth	Mill Creek
LaPorte	Camp Red Mill Lake Dam	Recreation	Earth	Little Calumet River
LaPorte	Walton Lake Dam	Recreation	Earth	Unnamed Tributary Little Calumet River
LaPorte	Wallace Lake Dam	Recreation	Earth	Unnamed Tributary Galena River
LaPorte	Lower Fish Lake Control Structure	Recreation	--	Mill Creek
LaPorte	La Lumiere	--	Earth	Unnamed Tributary Galena River
LaPorte	Saugany Lake Control Structure	Recreation	Earth	Unnamed Tributary Hudson Lake
LaPorte	Seven Springs Lake Dam	Recreation	Earth	Unnamed Tributary Galena River
Porter	Lake of Four Seasons (Dam A)	Recreation	Earth	Unnamed East Branch Stony Run Creek #2
Porter	Lake Louise Dame	Recreation	Earth	Unnamed Tributary Salt Creek
Porter	Norman Olson Lake Dame	Recreation	Earth	Unnamed Tributary Deep River
Porter	Old Longs Mill Dam	Recreation	Earth	Coffee Creek
Porter	Loomis Lake Dam	Water Supply	Earth	Unnamed Tributary Flint Lake
Porter	Lake of the Woods Dam	Recreation	Earth	Unnamed Tributary Salt Creek
Porter	Lake of the Woods Dam (Sagers Lake)	Recreation	Earth	Unnamed Tributary Salt Creek
Porter	Dog Lake Control Structure	Recreation	Earth	Unnamed Tributary Cobb Creek
Porter	Cyrus Moayad Lake Dam	--	--	Beauty Creek
Porter	Rice Lake Dam	Recreation	Earth	Unnamed Tributary Little Calumet River

County	Name	Primary Purpose	Dam Type	River
Porter	Lake of Four Seasons (Dam B)	Recreation	Earth	--
Porter	Lake Eliza Control Structure	--	--	Unnamed Tributary Wolf Creek

I.IV.ii.10 Levees

The table below presents levee information from the National Levee Database (NLD), developed by the U.S. Army Corps of Engineers (USACE). The NLD does not contain all levees located in the United States. The database contains information to facilitate and link activities, such as flood risk communication, levee system evaluation for the NFIP, levee system inspections, floodplain management, and risk assessments. The NLD continues to be a dynamic database with ongoing efforts to add levee data from federal agencies, states, and tribes. There are 22.7 miles of levees in Lake County, Indiana, as shown in Table 12. No levees were identified in La Porte or Porter Counties at the time of this report.

Table 12: Summary of Levees in Lake County, IN

County	System Name	Length (Miles)	Inspection Rating	Inspection Date	Risk Assignment
Lake	Marshaltown	0.9028	Minimally Acceptable	9/14/2009	No
Lake	Highland	4.0753	Minimally Acceptable	4/27/2010	No
Lake	Gary-Hammond	15.9275	Unacceptable	5/4/2010	No
Lake	Burr Street	1.8333	Unacceptable	4/28/2010	No

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

I.IV.ii.11 Declared Disasters

The FEMA Disaster Declarations Summary is a dataset describing all federally declared disasters. This information begins with the first disaster declaration in 1953 and features all three disaster declaration types: major disaster, emergency, and fire management assistance. The dataset includes declared recovery programs and geographic areas (County data not available

before 1964; fire management records are considered partial because of the historical nature of the dataset).

The list of FEMA's disaster declarations is available on the FEMA Website at http://www.fema.gov/data-feeds. Table 13 below lists the major disaster declarations declared in Lake, Porter, and LaPorte Counties.

Table 13: Declared Disasters in Lake, Porter, and LaPorte, IN

Declared County/Area	Disaster Number	Declaration Date	Incident Type	Description
LaPorte (County)	652	03/20/1982	Flood	Severe Storms & Flooding
Lake (County)	885	12/06/1990	Flood	Severe Storms & Flooding
Lake (County)	891	01/05/1991	Flood	Severe Storms & Flooding
LaPorte (County)	891	01/05/1991	Flood	Severe Storms & Flooding
Porter (County)	891	01/05/1991	Flood	Severe Storms & Flooding
LaPorte (County)	962	09/18/1992	Severe Storm(s)	Severe Storms, Tornadoes & Flooding
Porter (County)	962	09/18/1992	Severe Storm(s)	Severe Storms, Tornadoes & Flooding
Lake (County)	1476	07/11/2003	Severe Storm(s)	Severe Storms, Tornadoes & Flooding
Porter (County)	1476	07/11/2003	Severe Storm(s)	Severe Storms, Tornadoes & Flooding
Lake (County)	1520	06/03/2004	Severe Storm(s)	Severe Storms, Tornadoes & Flooding
Lake (County)	1573	01/21/2005	Severe Storm(s)	Severe Winter Storms, Tornadoes & Flooding
LaPorte (County)	1573	01/21/2005	Severe Storm(s)	Severe Winter Storms, Tornadoes & Flooding
Porter (County)	1573	01/21/2005	Severe Storm(s)	Severe Winter Storms And Flooding
Lake (County)	1662	10/06/2006	Severe Storm(s)	Severe Storms And Flooding
Lake (County)	1732	11/30/2007	Severe Storm(s)	Severe Storms And Flooding
Lake (County)	1740	01/30/2008	Severe Storm(s)	Severe Storms And Flooding
LaPorte (County)	1740	01/30/2008	Severe Storm(s)	Severe Storms And Flooding
Lake (County)	1795	09/23/2008	Severe Storm(s)	Severe Storms And Flooding
LaPorte (County)	1795	09/23/2008	Severe Storm(s)	Severe Storms And Flooding
Porter (County)	1795	09/23/2008	Severe Storm(s)	Severe Storms And Flooding
Lake (County)	1832	04/22/2009	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding
LaPorte (County)	1832	04/22/2009	Severe Storm(s)	Severe Storms, Tornadoes, And Flooding

I.IV.ii.12 Flood Insurance Policies

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

Table 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 Lake, Porter, and LaPorte 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 Lake, Porter, and LaPorte Counties

County	CID	No. Policies	Total Premium	Total Coverage	Number of claims since 1978	Dollar ($) paid for claims since 1978
Lake	18089	4,746	$4,517,844	$754,994,100	2,820	$47,650,877
Porter	18091	210	$182,779	$38,616,300	123	$650,832
LaPorte	18127	222	$146,462	$49,991,200	157	$1,784,521

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 Lake, Porter, and LaPorte Counties Coastal Flood Study area. Meteorological stations are also shown on the Discovery map.

Table 15: Meteorological Stations in Lake Michigan, Lake, Porter, and LaPorte, IN

County	Station ID	Location	Owner	Data	Years of Historical Data
Lake	45015 – Calumet Beach	Chicago Park District	Chicago Park District	Wave height, water temperature	2
Porter	BHR13 - Burns Harbor, IN	NWS Central Region	National Weather Service Central Region	Wind, Atmospheric pressure, air temperature	6
LaPorte	MCY13 - Michigan City	Michigan City, IN	Great Lakes Environmental Research Laboratory	Wind, air temperature	7

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

Stream Gages

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

Table 16: Stream Gage Stations in Lake, Porter, and LaPorte Counties, IN

County	Gage ID	Begin Date	End Date	Gage Location
Lake	4092677	10/1/1994	9/30/2011	Grand Calumet River at Industrial Hwy at Gary, IN
Lake	4092750	10/1/1993	9/30/2011	Indian Harbor Canal at East Chicago, IN
Lake	4093000	10/1/1947	9/30/2011	Deep River at Lake George Outlet at Hobart, IN
Lake	4093100			Deep River near Liverpool, IN
Lake	4093250			Little Calumet River Near Lake Station, IN
Lake	5536160			Little Calumet River near Hammond, IN
Lake	5536165			Little Calumet River at Highland, IN
Lake	5536179			Hart Ditch at Dyer, IN
Lake	5536190			Hart Ditch at Munster, IN

County	Gage ID	Begin Date	End Date	Gage Location
Lake	5536195			Little Calumet River at Munster, IN
Lake	5536357			Grand Calumet Riverat Hohman Av at Hammond, IN
Lake	413028087303601			Hart Ditch at Dyer, IN (LCRDAN)
Lake	413339087223001			Little Calumet River at Burr Street at Gary, IN
Lake	413340087285001			Hart Ditch at Munster, IN (LCRDAN)
LaPorte	4095300	10/1/1969	9/30/2011	Trail Creek Michigan City, IN
LaPorte	4095380	10/1/1994	9/30/2011	Trail Creek at Michigan City Harbor, IN
Porter	4094000	10/1/1945	9/30/2011	Little Calumet River at Porter, IN
Porter	4094400			Salt Creek at Valparaiso, IN
Porter	4095090	10/1/1994	9/30/2011	Burns Ditch at Portage, IN
Porter	4095100			Derby Ditch at Beverly Shores, IN
Porter	4095154			Brown Ditch at Beverly Shores, IN
Porter	4095158			Kintzele Ditch at Beverly Shores, IN
Porter	5517500	10/1/1948	9/30/2011	Kankakee River at Dunns Bridge, IN

Water Level Station

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

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

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

Wave Gage/Buoy Stations

As mentioned above, the NDBC provides hourly observations from a network of about 90 buoys and 60 C-MAN stations. In addition to standard meteorological observation, all buoy stations and some C MAN stations measure sea surface temperature, wave height and period.

Conductivity and water current are measured at selected stations. The historical and current data are available at NDBC Website http://www.ndbc.noaa.gov/.

I.IV.ii.14 Hazard Mitigation Plans

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

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

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

Local mitigation plans are required to be updated every 5 years to maintain eligibility for FEMA Hazard Mitigation Assistance (HMA) grant programs. The status of current hazard mitigation plans for Lake, Porter and LaPorte counties is shown in Table 17 below. The data was obtained from FEMA's Plan Approval Status Report based on Regional reports for the end of June 2012. LaPorte County Hazard Mitigation Plan was not available at the time of this report.

Table 17: Hazard Mitigation Plan Status for Lake, Porter, and LaPorte Counties, IN

County	Approval Date	Expiration Date
Lake	09/29/2010	09/29/2015
Porter	05/25/2011	05/25/2016
LaPorte	Unknown	Unknown

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

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.

No High Water Mark (HWM) data was found for Lake, Porter, and LaPorte Counties associated with historical flooding of Lake Michigan. If local stakeholders have available HWM data or historic photographs, they are encouraged to submit them to FEMA Region V, Mitigation Division.

I.IV.ii.17 Letters of Map Change

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

Table 18 below lists the number of LOMCs in Lake, Porter and LaPorte counties. No Conditional LOMAs or Conditional LOMR-Fs were included. 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 Lake, Porter, and LaPorte Counties, IN

County	Number of Letters of Map Amendments	Number of Letters of Map Revisions – Based on Fill	Number of Letters of Map Revisions – Floodway Removal	Number of Letters of Map Revisions
Lake County	289	41	5	18
Porter County	47	5	0	1
LaPorte County	68	4	1	3

I.IV.ii.18 Locally Identified Mitigation Projects

The potential mitigation actions and strategies, as pulled from the Lake County Hazard Mitigation Plan and the Porter County Hazard Mitigation Plan, are available in Attachment H. The Hazard Mitigation Plan for LaPorte County was not available as of the date of this report.

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 Lake, Porter and LaPorte counties is shown in Table 19 below.

Table 19: NFIP Program Status and Ordinance Level for Lake, Porter and LaPorte, IN

County	Community	CID	Program Status	Level of Adopted Regulation
Lake	East Chicago, City of	180130	Participating	D
Lake	Gary, City of	180132	Participating	D
Lake	Hammond, City of	180134	Participating	D
Lake	Lake Station, City of	180131	Not Participating	--
Lake	Whiting, City of	180313	Participating	D
Porter	Beverly Shores, Town of	185173	Not Participating	--
Porter	Chesterton, Town of	180201	Not Participating	--
Porter	Dune Acres, Town of	180205	Not Participating	--
Porter	Ogden Dunes, Town of	180206	Not Participating	--
Porter	Portage, City of	180202	Not Participating	--
Porter	Porter, Town of	180208	Not Participating	--

County	Community	CID	Program Status	Level of Adopted Regulation
Porter	Burns Harbor, Town of	180207	Not Participating	--
LaPorte	Long Beach, Town of	185177	Not Participating	--
LaPorte	Michigan City, City of	180147	Not Participating	--

I.IV.ii.20 Proposed Transects

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

The proposed transect layout is shown on the draft Discovery Map for Lake, Porter, and LaPorte Counties (Attachment C-E) 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. There were no comments regarding placement of transects in Lake, Porter, and LaPorte Counties, Indiana.

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

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

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

I.IV.ii.22 Public Assistance 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 20 below presents a summary of PA projects in Lake, Porter and LaPorte counties. Detailed project descriptions for completed PA projects can be downloaded from https://explore.data.gov/catalog/raw .

Table 20: Public Assistance Projects for Lake, Porter, and LaPorte Counties, IN

County	Applicant	Education Applicant	Number of Projects	Federal Share Obligated
Lake	Cedar Lake	No	3	$25,368.79
Lake	Crown Point Public Works	No	3	$26,890.28
Lake	Dyer	No	1	$9,524.03
Lake	Dyer Police Department	No	2	$11,609.83
Lake	Dyer Public Works	No	2	$61,427.42
Lake	East Chicago Fire Dept	No	1	$1,342.76
Lake	East Chicago Park Dept	No	2	$6,018.53
Lake	East Chicago Police Dept	No	1	$2,113.52
Lake	East Chicago Solid Waste Division	No	2	$155,709.43
Lake	East Chicago Street Department	No	1	$73,381.37
Lake	Gary	No	19	$406,990.74
Lake	Griffith	No	4	$148,896.24
Lake	Hammond	No	4	$396,076.03
Lake	Hammond Sanitary District	No	2	$238,851.34
Lake	Hammond Water Works Department	No	2	$127,705.35
Lake	Highland (Highlands)	No	5	$107,682.45
Lake	Hobart	No	35	$583,553.16
Lake	Lake Central School Corporation	Yes	3	$8,755.04
Lake	Lake County Convention & Visitors Bureau	No	2	$339,029.49
Lake	Lake County Highway Department	No	15	$794,456.95
Lake	Lake County Parks	No	4	$14,965.65
Lake	Lake County Public Library	No	3	$132,879.00

County	Applicant	Education Applicant	Number of Projects	Federal Share Obligated
Lake	Lake County Public Works Department	No	3	$29,381.28
Lake	Lake County Solid Waste Management District	No	1	$394,785.12
Lake	Lake County Surveyor	No	6	$125,326.03
Lake	Lake Station	No	13	$876,373.15
Lake	Lowell	No	3	$21,308.89
Lake	Merrillville	No	3	$78,163.09
Lake	Munster	No	9	$1,267,500.33
Lake	Munster School District	Yes	4	$21,679.82
Lake	Schererville	No	5	$62,929.31
Lake	School City Of Hobart	Yes	9	$73,264.00
Lake	St. John	No	3	$18,105.73
Lake	Whiting	No	1	$9,356.21
Lake	Winfield	No	3	$18,525.68
LaPorte	Beechwood Golf Course	No	1	$3,261.75
LaPorte	Kankakee Township Fire Dept	No	2	$11,976.75
LaPorte	La Crosse	No	1	$3,931.42
LaPorte	Lacrosse Fire Dept	No	2	$6,318.27
LaPorte	LaPorte County Drainage Board	No	1	$14,850.00
LaPorte	LaPorte County Highway Department	No	4	$41,314.98
LaPorte	LaPorte County Parks Dept	No	1	$5,492.78
LaPorte	Laporte Street Department	No	1	$1,290.01
LaPorte	LaPorte Wastewater Treatment Plant	No	1	$10,363.88
LaPorte	Michigan City Dept Of Parks & Recreation	No	1	$2,786.39
LaPorte	Michigan City Refuse Dept	No	1	$19,154.61
LaPorte	Michigan City Sanitary District	No	2	$74,433.45
LaPorte	Wanatah	No	1	$2,732.41
LaPorte	Westville	No	1	$2,519.67
LaPorte	Westville City Fire Dept	No	1	$807.54
Porter	Chesterton	No	5	$490,202.20
Porter	Chesterton Street Department	No	2	$18,688.58
Porter	Christian Community Action	No	1	$21,414.80

County	Applicant	Education Applicant	Number of Projects	Federal Share Obligated
Porter	Housing Opportunities, Inc.	No	2	$5,667.93
Porter	Little Calumet River Basin Dev	No	2	$38,483.98
Porter	Ogden Dunes (Wickliffe)	No	3	$17,717.67
Porter	Portage	No	18	$524,662.09
Porter	Portage Port Authority	No	2	$35,469.75
Porter	Porter	No	8	$53,783.19
Porter	Porter County Drainage Board	No	8	$89,460.49
Porter	Porter County Highway Department	No	6	$59,163.50
Porter	Porter County Recycling & Waste Reduction District	No	1	$10,180.14
Porter	Town Of Burns Harbor	No	2	$25,658.03
Porter	Twin Creeks Conservancy District	No	1	$33,127.58
Porter	Valparaiso Lakes Area Conservancy District	No	2	$15,859.65
Porter	Valparaiso Public Works	No	14	$106,911.69

I.IV.ii.23 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 Lake, Porter, and LaPorte Counties are listed below by community. Porter and LaPorte Counties have not yet been modernized to digital maps. Effective FIRMs and Flood Insurance Studies (FIS) can be downloaded from FEMA's Map Service Center (MSC) at https://msc.fema.gov .

Table 21: Effective Status of Lake, Porter, and LaPorte Counties, IN

County	Community	CID	FIRM Date	Program Status
Lake	East Chicago, City of	180130	1/18/2012	Participating
Lake	Gary, City of	180132	1/18/2012	Participating
Lake	Hammond, City of	180134	1/18/2012	Participating
Lake	Lake Station, City of	180131	1/18/2012	Participating
Lake	Whiting, City of	180313	1/18/2012	Participating
Porter	Beverly Shores, Town of	185173	10/17/75	Participating
Porter	Chesterton, Town of	180201	03/15/84	Participating
Porter	Dune Acres, Town of	180205	04/24/81(M)	Participating

County	Community	CID	FIRM Date	Program Status
Porter	Ogden Dunes, Town of	180206	08/05/86(M)	Participating
Porter	Portage, City of	180202	06/01/82	Participating
Porter	Porter, Town of	180208	06/04/80	Participating
Porter	Burns Harbor, Town of	180207	06/01/81	Participating
LaPorte	Long Beach, Town of	185177	11/21/75	Participating
LaPorte	Michigan City, City of	180147	08/17/81	Participating

I.IV.ii.24 Repetitive Loss/Severe Repetitive Loss

No repetitive loss or severe repetitive loss data was collected at the time this report was created for the communities in Lake, Porter, and LaPorte Counties.

I.IV.ii.25 Socio-Economic Analysis

The 2010 American Community Survey 1-year estimate indicates the median income for a household in Lake County was $45,153 and the median income for a family was $55,696. Males had a median income of $48,703 versus $32,536 for females. The per capita income for the county was $21,722. About 12.0% of families and 17.2% of the population were below the poverty line, including 25.6% of those under the age 18 and 7.5% of those age 65 or over.

In Porter County, the median income for a household in the county was $55,186 and the median income for a family was $66,700. Males had a median income of $55,544 versus $36,809 for females. The per capita income for the county was $25,012. About 7.6% of families and 11.7% of the population were below the poverty line, including 15.5% of those under the age of 18 and 5.1% of those ages 65 or over.
In La Porte County, the median income for a household in the county was $43,765 and the median income for a family was $55,977. Males had a median income of $46,563 versus $30,170 for females. The per capita income for the county was $20,982. About 13.0% of families and 16.5% of the population were below the poverty line, including 25.3% of those under the age 18 and 7.8% of those ages 65 or over.

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

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

USGS Studies

As previously mentioned, the USGS, under the Coastal and Marine Geology Program, initiated a 5-year study to document the timing and magnitude of prehistoric lake-level fluctuations, and to

assess some of the important geologic processes responsible for severe erosion of the Illinois-Indiana shoreline. More information can be found on this study at http://pubs.usgs.gov/fs/lake-michigan/index.html , accessed July 2012.

Indiana Lake Michigan Coastal Program

The purpose of the Lake Michigan Coastal Program (LMCP) is to support coordination and partnerships among local, state, and federal agencies and local organizations for the protection and sustainable use of natural and cultural resources in the Lake Michigan region. Through the LMCP, the state of Indiana participates in the Coastal Zone Management Program with 33 other coastal states and territories to protect, restore, and responsibly develop Indiana's coastal area.

The Indiana LMCP website (http://www.in.gov/dnr/lakemich) provides program information including that related to permitting, coastal planning and technical assistance programs. The purpose of the Indiana Lake Michigan Coastal Program is to enhance the State's role in planning for and managing natural and cultural resources along the coast and to support partnerships between federal, state and local agencies and organizations.

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 Lake, Porter, and LaPorte Counties Discovery effort and provided in this report will be utilized in the upcoming GLCFS for Lake Michigan.

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

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

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

Engineering & Mapping:

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

National Flood Insurance Program Integration:

Regulatory Digital Flood Insurance Rate Map (DFIRM) files will be updated through 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 Lake, Porter, and LaPorte Counties as summarized in Table 22.

Table 22: Potential Flood Risk Products

County	State	Flood Risk Map and Flood Risk Report	Changes Since Last FIRM	Flood Depth and Analysis Grids	Optional Flood Risk Assessment Products
Lake	IN	X	X	X	TBD
Porter	IN	X	X	X	TBD
LaPorte	IN	X	X	X	TBD

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

ii. Potential Mitigation Projects

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

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

Technical assistance is available through Risk MAP to assist communitites in identifiying, selecting, and implementing activities to support mitigation planning and risk reduction. Technical assistance activities should be based on the needs of the community and assist with already established capabilities. Such activities could include (but are not limited to):

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

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

iii. Compliance

FEMA uses a number of key tools to determine a community's compliance with the minimum regulations of the NFIP. Among them are Community Assistance Visits (CAVs), the Letter of

Map Change (LOMC) process, and Submit-for-Rates. These tools help assess a community's implementation of their flood damage reduction regulations and identify any floodplain management deficiencies and violations.

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

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

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

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

iv. Communication

Throughout this Discovery process, community representatives and local stakeholders indicated the need to be kept informed about the results of Discovery, the upcoming coastal flood study, and opportunities for public input throughout the study process. Ongoing communication and coordination will be an essential part of this Lake Michigan Coastal Flood Study for Lake, Porter, and LaPorte Counties. Throughout this study process, Federal, State, and local stakeholders for Lake, Porter, and LaPorte 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.

No comments related to the proposed transects were raised during the Discovery Meeting by Indiana's State or County representatives (only one comment identifying residential properties close to the shore of Lake Michigan). Any comments received are 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 Lake, Porter, and LaPorte Counties will provide invaluable information as the Lake Michigan Coastal Flood Study proceeds.

VII. References

Indiana Department of Natural Resources, 2011, *State of Indiana Coastal Management Program*, http://www.in.gov/dnr/lakemich/6039.htm accessed July 2012

Federal Emergency Management Agency. 2011a. *HAZUS Flood Average Annualized Loss*

Usability Analysis. April 13, 2011.

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

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

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

Federal Emergency Management Agency, 2012d, Community ID Search Report, Indiana, (available at FEMA Community Information System (https://portal.fema.gov/famsVuWeb/home, accessed July 2012)

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

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

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

VIII. Attachments

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

LakeMichigan\Discovery\Project_Discovery_Initiation\Discovery_Report\

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

A. Coastal Data Request Form
B. Lake, Porter, and LaPorte Counties Pre-Meeting Correspondence
C. Lake County Draft Discovery Map
D. Porter County Draft Discovery Map
E. LaPorte County Draft Discovery Map
F. Lake, Porter, and LaPorte Counties Proposed Transects
G. Lake, Porter, and LaPorte Counties Discovery Meeting Documents
H. Locally Identified Mitigation Projects

Attachment A.

Coastal Data Request Form

Attachment B.

Lake, Porter, and LaPorte Counties Pre-Meeting Correspondence

Great Lakes Coastal Flood Study
Information Exchange WebEx Meeting
Lake, Porter and LaPorte County, Indiana
August 6, 2012 10:00am CT

Attendance:
Darrin Miller, Indiana DNR
Siavash Beik, Director – Christopher B. Burke Engineering, LLC, representing the City of Whiting and the City of Hammond
Michael Barry, Town of Porter
Erin Maloney, FEMA Region V
Stacey Roberts, STARR
Holly Davis, STARR

Discussion/Q&A:

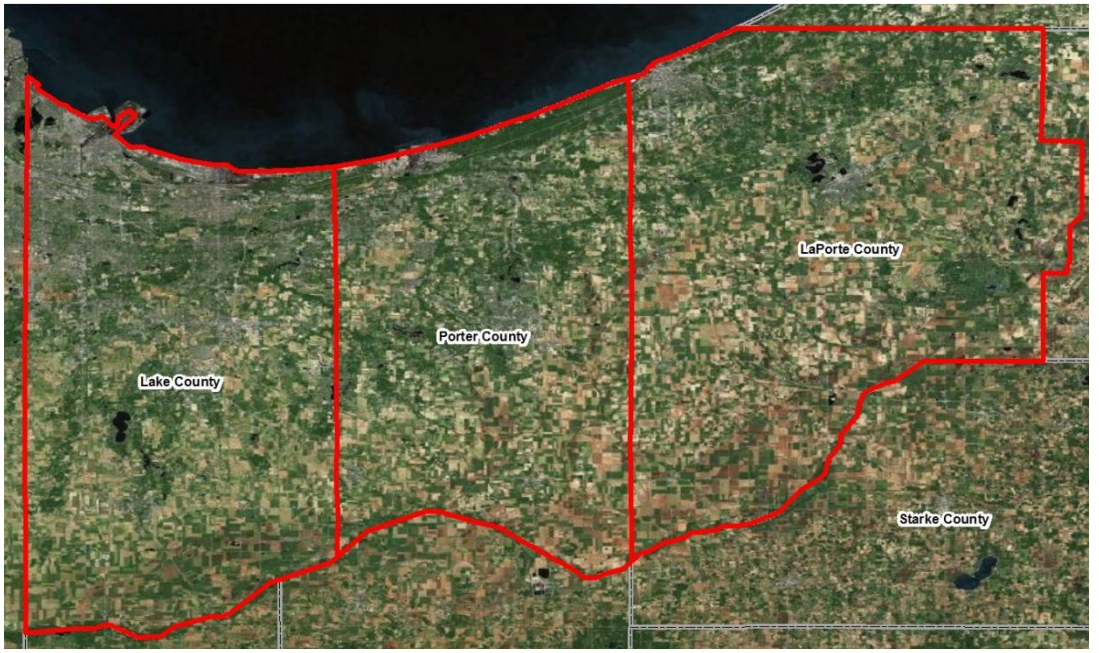
- **The US Army Corps of Engineers completed a study in 1988 that was supposed to be updated about every 20 years. Is the Lake Michigan Storm Surge modeling effort an update to the 1988 study?** Yes
- **When will the results from the US Army Corps of Engineers, Modeling of Lake Michigan Storm Waves and Water Levels be available to communities?** The report is currently in draft form and available under technical resources on www.greatlakescoast.org.

Wrap-up and Adjourn

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

FEMA

Information Exchange Session for Lake Michigan Discovery



Lake, Porter and LaPorte Counties, Indiana
August 6, 2012
10am – 11am CT

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Purpose of Information Exchange

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

Risk MAP (Mapping, Assessment, and Planning) Vision

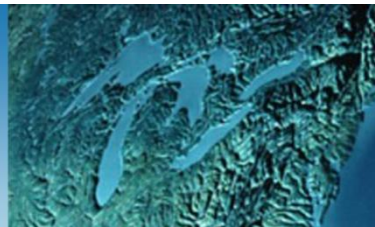
FEMA

Goals

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



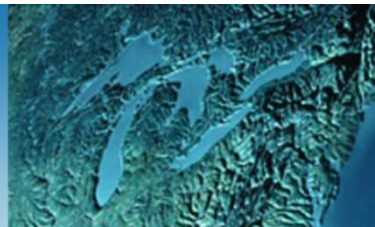
Overview of Great Lakes Coastal Flood Study

FEMA

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org



Hazard Mitigation Resources, Strategies & Actions

FEMA

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

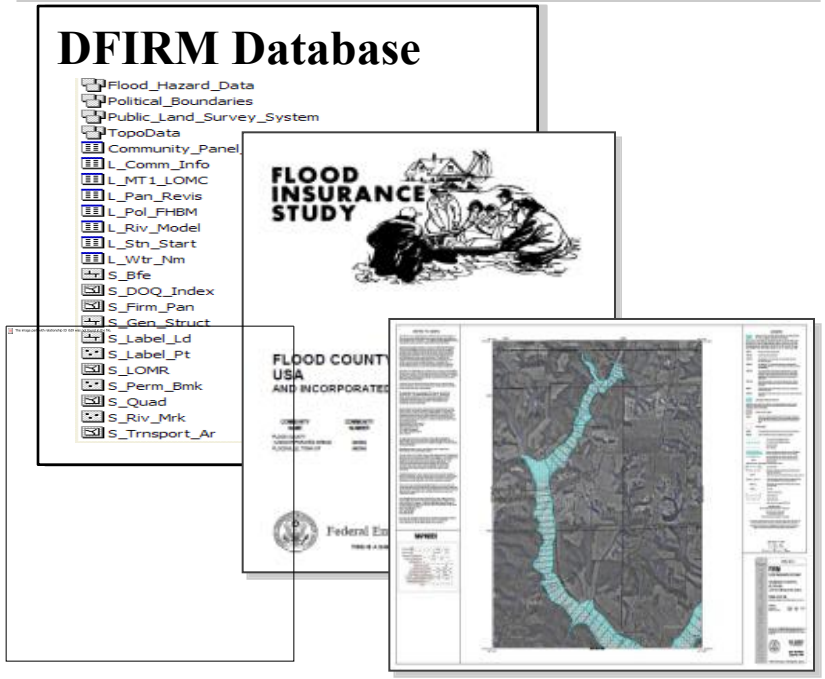
Land Use Ordinances	Local Building Codes	Mitigation Projects	Community Identified Mitigation Programs	Management Best Practices
Zoning, Setbacks, Floodplain Management, etc.	IBC, IRC, Local Regulations, etc.	Acquisition, Elevation, Floodproofing, etc.		Integration of natural hazards into other planning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

RiskMAP
Increasing Resilience Together

Products and Datasets: Regulatory and Non-regulatory

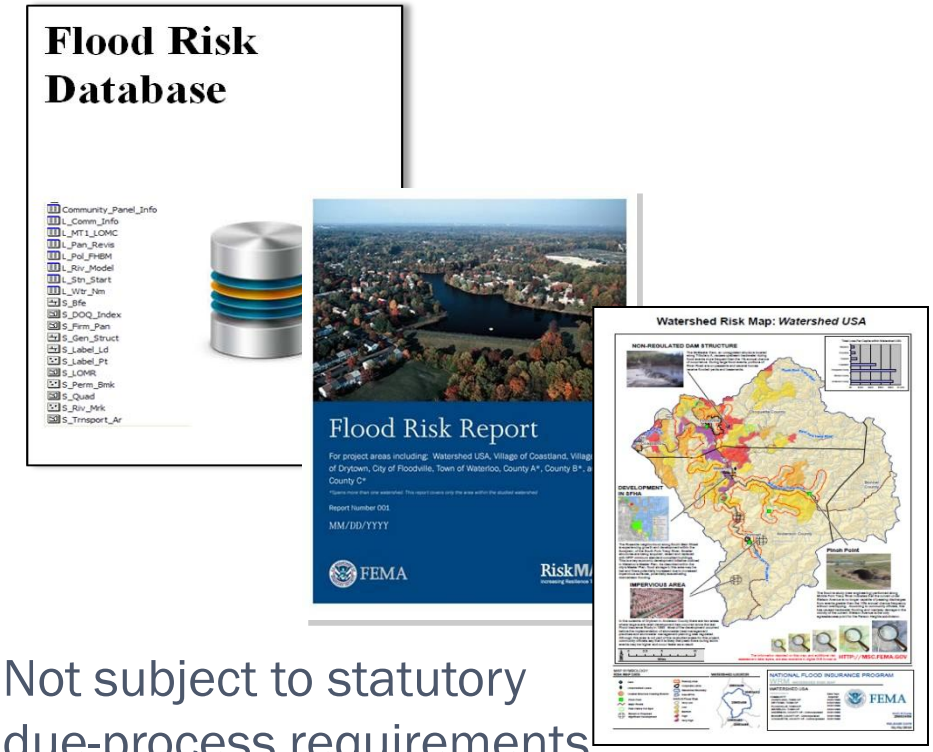
FEMA

Traditional Regulatory Products



Subject to statutory due-process requirements

Non-Regulatory Products



Not subject to statutory due-process requirements

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Products and Datasets: Coastal Products in Development

FEMA

Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline
Reference

Shoreline Feature

Upper Peninsula Shoreline
Reference

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Risk MAP Overview: Shoreline Features Database

FEMA

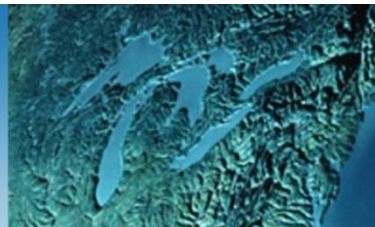
Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

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

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

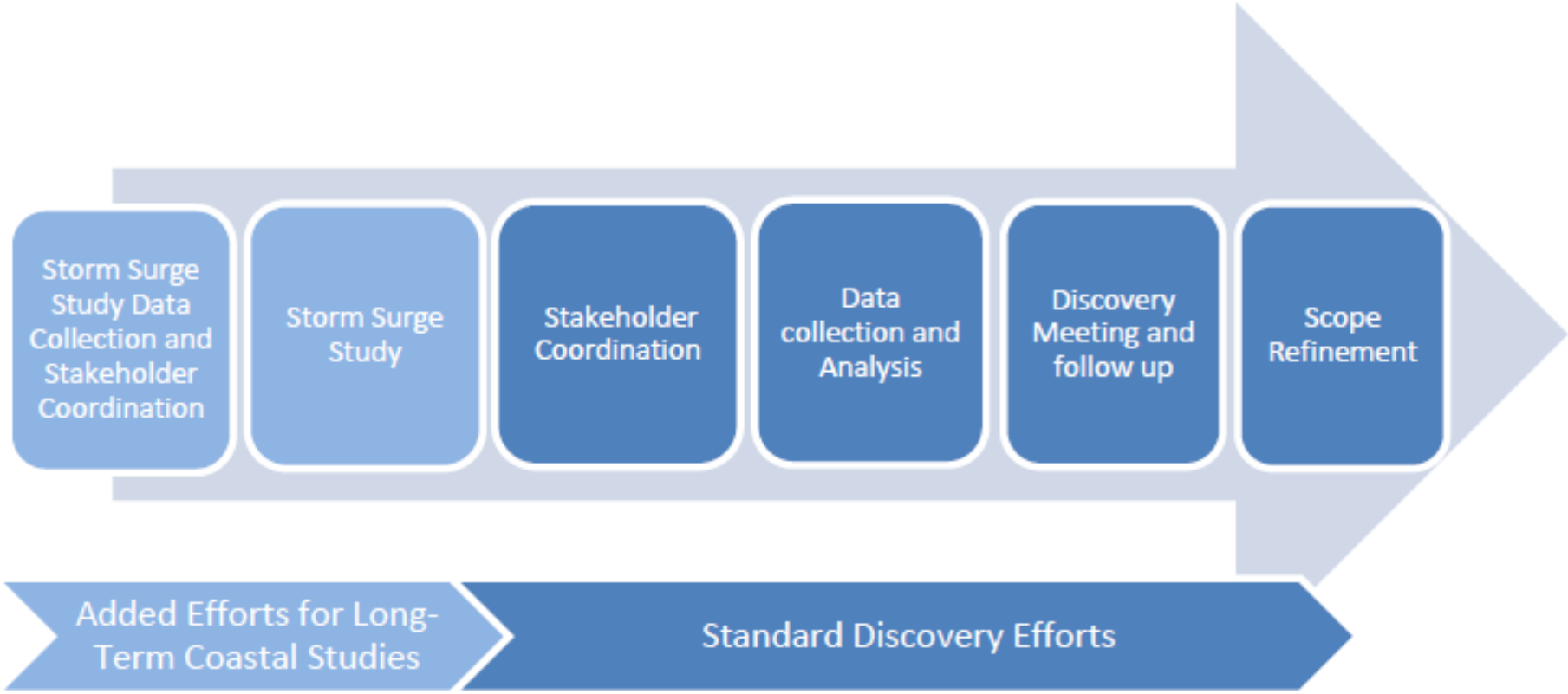
Primary Vegetation
None
High Density Shrubs/Trees
Moderate Density Shrubs/Trees
Low Density Shrubs/Trees
Manicured Lawn
Native Vegetation

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



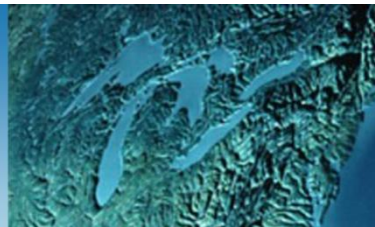
Great Lakes Coastal Flood Study
Discovery Process Overview

FEMA



RiskMAP
Increasing Resilience Together

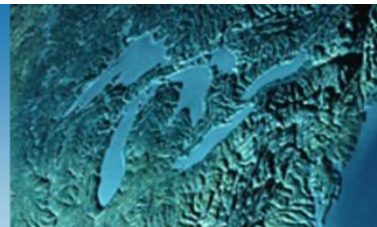
Great Lakes Coastal Flood Study
greatlakescoast.org



Great Lakes Coastal Flood Study
Discovery Meeting

FEMA

Discovery Meeting Venue	Discovery Meeting Address	Discovery Meeting Date, Time
City Hall - Council Chamber	166 Lincolnway Valparaiso, Indiana 46383	Monday 09/10/2012; 9:00 - 11:00 AM CT



Draft Discovery Meeting Agenda

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

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

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

Great Lakes Coastal Flood Study
Discovery Products

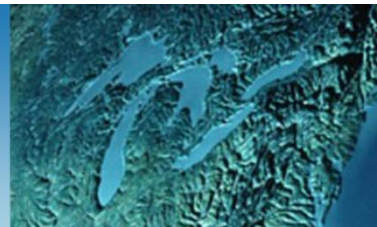
- **Final Discovery Report**
  - Single, comprehensive report for all of Lake Michigan, with appendices for each coastal community by county
  - Includes pre-discovery data, meeting agenda, sign-in sheets, discussion topics, decisions made, etc.
- **Final Discovery Maps**
  - Including feedback from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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Who Should Attend the Discovery Meeting?

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



Great Lakes Coastal Flood Study
Discovery Study Area

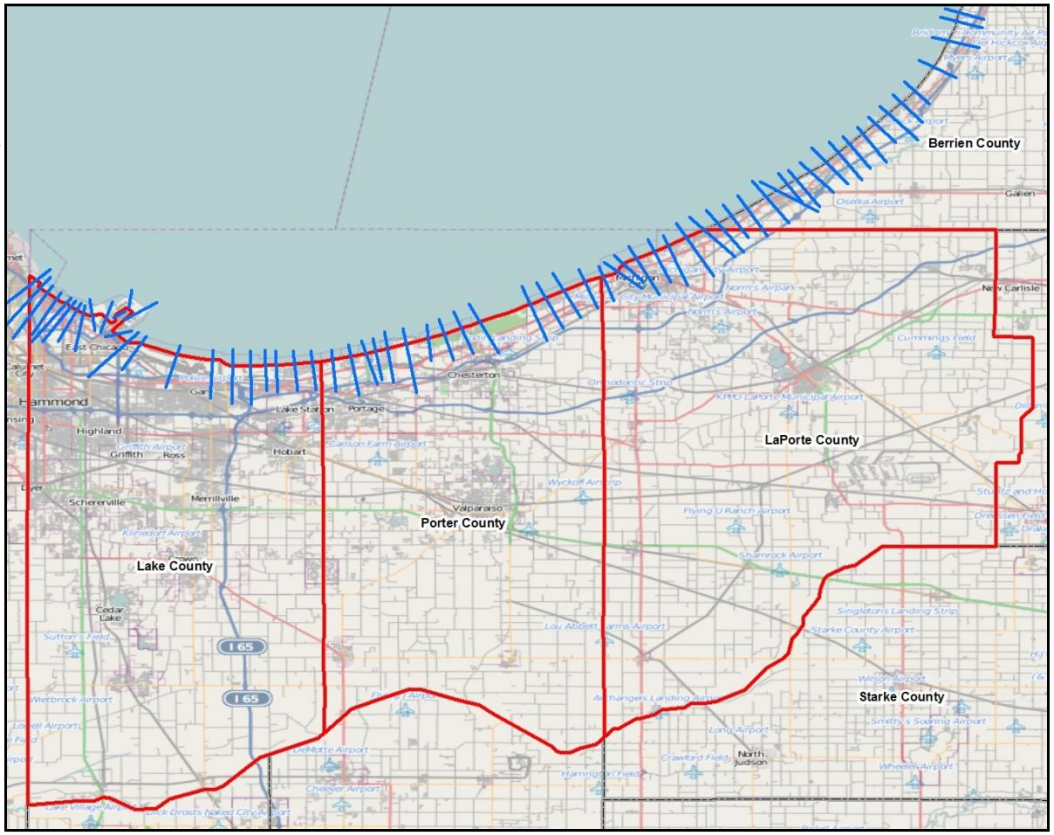
FEMA

Lake Michigan coastal communities in Lake, Porter and LaPorte Counties, Indiana

Lake County
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

LaPorte County
Town of Long Beach
City of Michigan City

Porter County
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
City of Portage
Town Porter

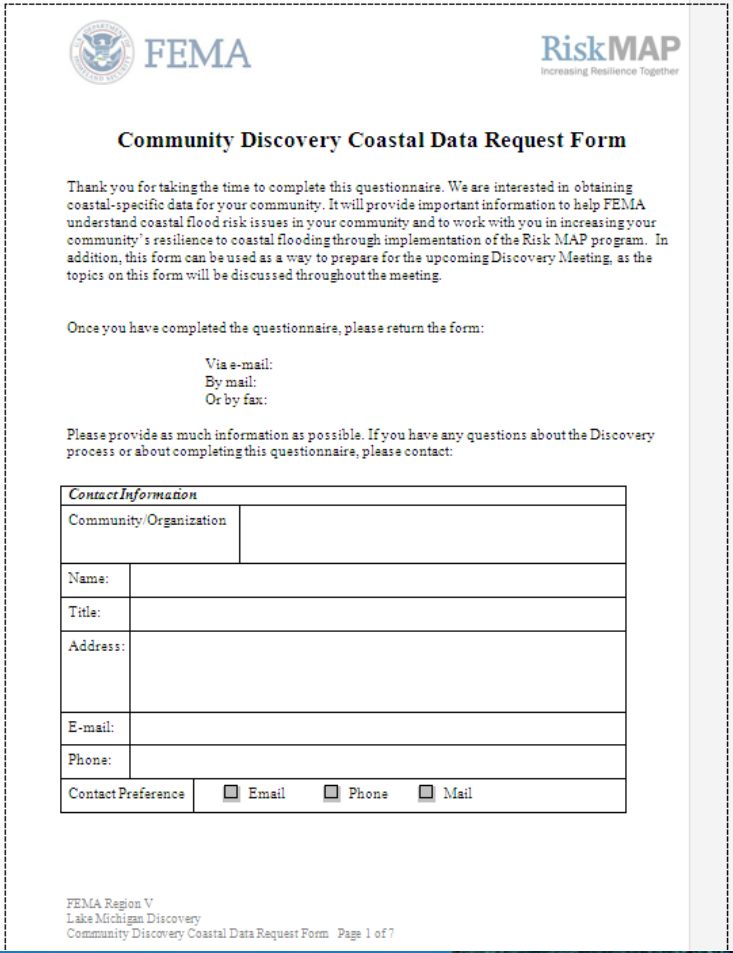


RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Data Request Form Overview

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



FEMA

RiskMAP
Increasing Resilience Together

Community Discovery Coastal Data Request Form

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

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

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

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

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

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

RiskMAP
Increasing Resilience Together

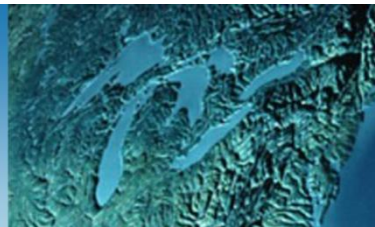
Great Lakes Coastal Flood Study
greatlakescoast.org

Review of Data Collected To Date

FEMA

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

Incident Type	Incident Begin Date	Incident End Date	Area Name
Flood	3/20/1982	3/20/1982	LaPorte (County)
Flood	11/27/1990	12/14/1990	Lake (County)
Flood	12/28/1990	1/22/1991	Lake (County)
Flood	12/28/1990	1/22/1991	LaPorte (County)
Flood	12/28/1990	1/22/1991	Porter (County)
Severe Storm(s)	6/16/1992	7/23/1992	LaPorte (County)
Severe Storm(s)	6/16/1992	7/23/1992	Porter (County)
Severe Storm(s)	7/4/2003	8/6/2003	Lake (County)
Severe Storm(s)	7/4/2003	8/6/2003	Porter (County)
Severe Storm(s)	5/25/2004	6/25/2004	Lake (County)
Severe Storm(s)	1/1/2005	2/11/2005	Lake (County)
Severe Storm(s)	1/1/2005	2/11/2005	LaPorte (County)
Severe Storm(s)	1/1/2005	2/11/2005	Porter (County)
Severe Storm(s)	9/12/2006	9/14/2006	Lake (County)
Severe Storm(s)	8/15/2007	8/27/2007	Lake (County)
Severe Storm(s)	1/7/2008	3/14/2008	Lake (County)
Severe Storm(s)	1/7/2008	3/14/2008	LaPorte (County)
Severe Storm(s)	9/12/2008	10/6/2008	Lake (County)
Severe Storm(s)	9/12/2008	10/6/2008	LaPorte (County)
Severe Storm(s)	9/12/2008	10/6/2008	Porter (County)
Severe Storm(s)	3/8/2009	3/14/2009	Lake (County)
Severe Storm(s)	3/8/2009	3/14/2009	LaPorte (County)



Next Steps and Opportunity to Get Involved

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

THANK YOU FOR YOUR PARTICIPATION!

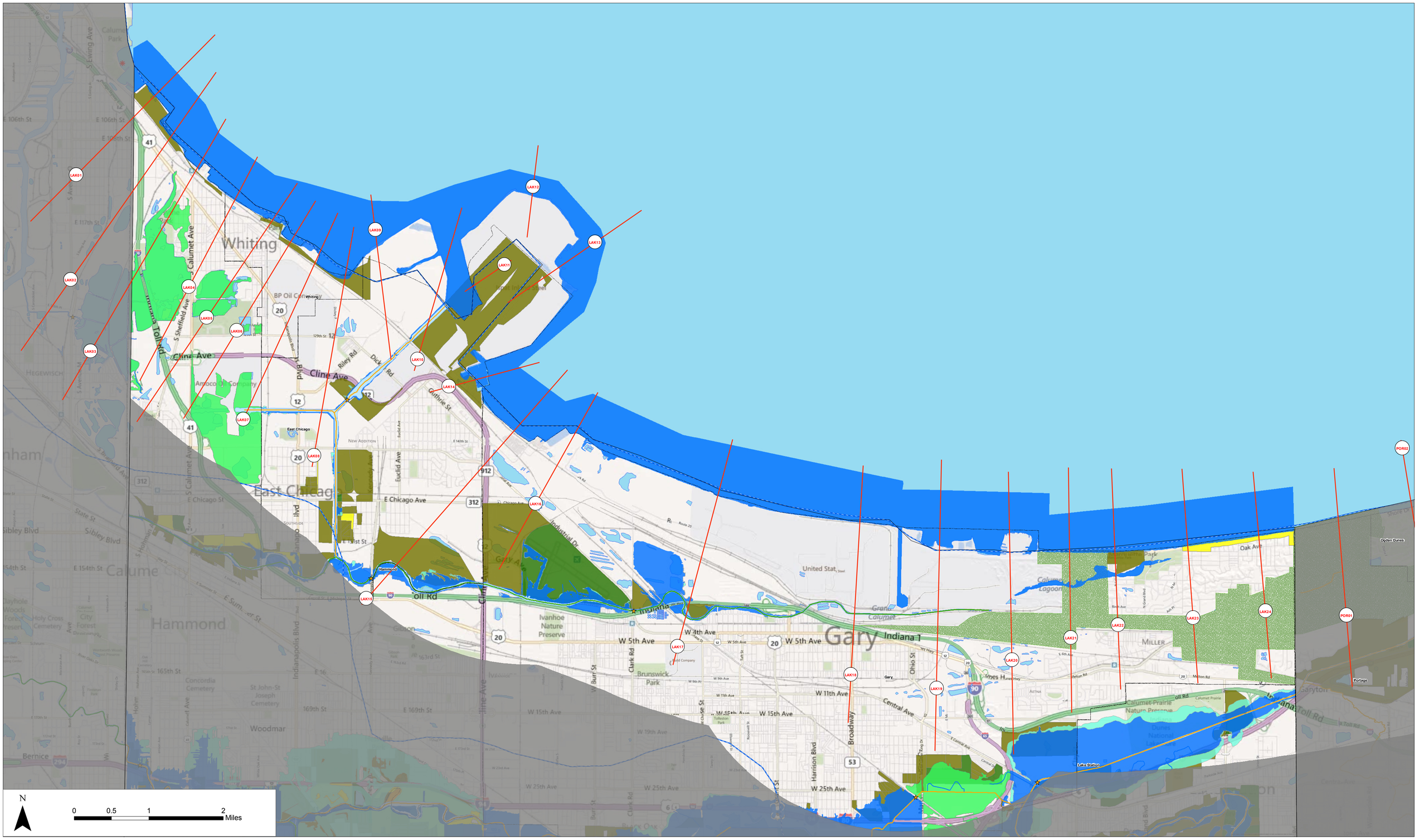
Who to Contact

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

Questions?

Attachment C.

Lake County Draft Discovery Map



MAP SYMBOLOGY

LEGEND

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

AAL DATA/ Total Average Annualized Losses per Census Block

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

Effective SFHA

- AE
- A
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map

LAKE MICHIGAN COASTAL STUDY

LAKE COUNTY, INDIANA COASTAL STUDY COMMUNITIES

City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

STARR

FEMA

Attachment D.

Porter County Draft Discovery Map

MAP SYMBOLOGY

LEGEND

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

AAL DATA/ Total Average Annualized Losses per Census Block

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

DFIRM Floodplains (IN DNR)

- AE
- A

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM
Discovery Map

LAKE MICHIGAN COASTAL STUDY

PORTER COUNTY, INDIANA COASTAL STUDY COMMUNITIES

Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
City of Portage
Town of Porter

STARR

FEMA

Attachment E.

LaPorte County Draft Discovery Map

MAP SYMBOLOGY

LEGEND

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

AAL DATA/ Total Average Annualized Losses per Census Block

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

DFIRM Floodplains (IN DNR)

- AE
- A

Coordinated Needs Management Strategy (CNMS) - Status

- UNVERIFIED
- UNKNOWN
- VALID

COASTAL STUDY LOCATOR

NATIONAL FLOOD INSURANCE PROGRAM

Discovery Map

LAKE MICHIGAN COASTAL STUDY

LaPorte COUNTY, INDIANA COASTAL STUDY COMMUNITIES

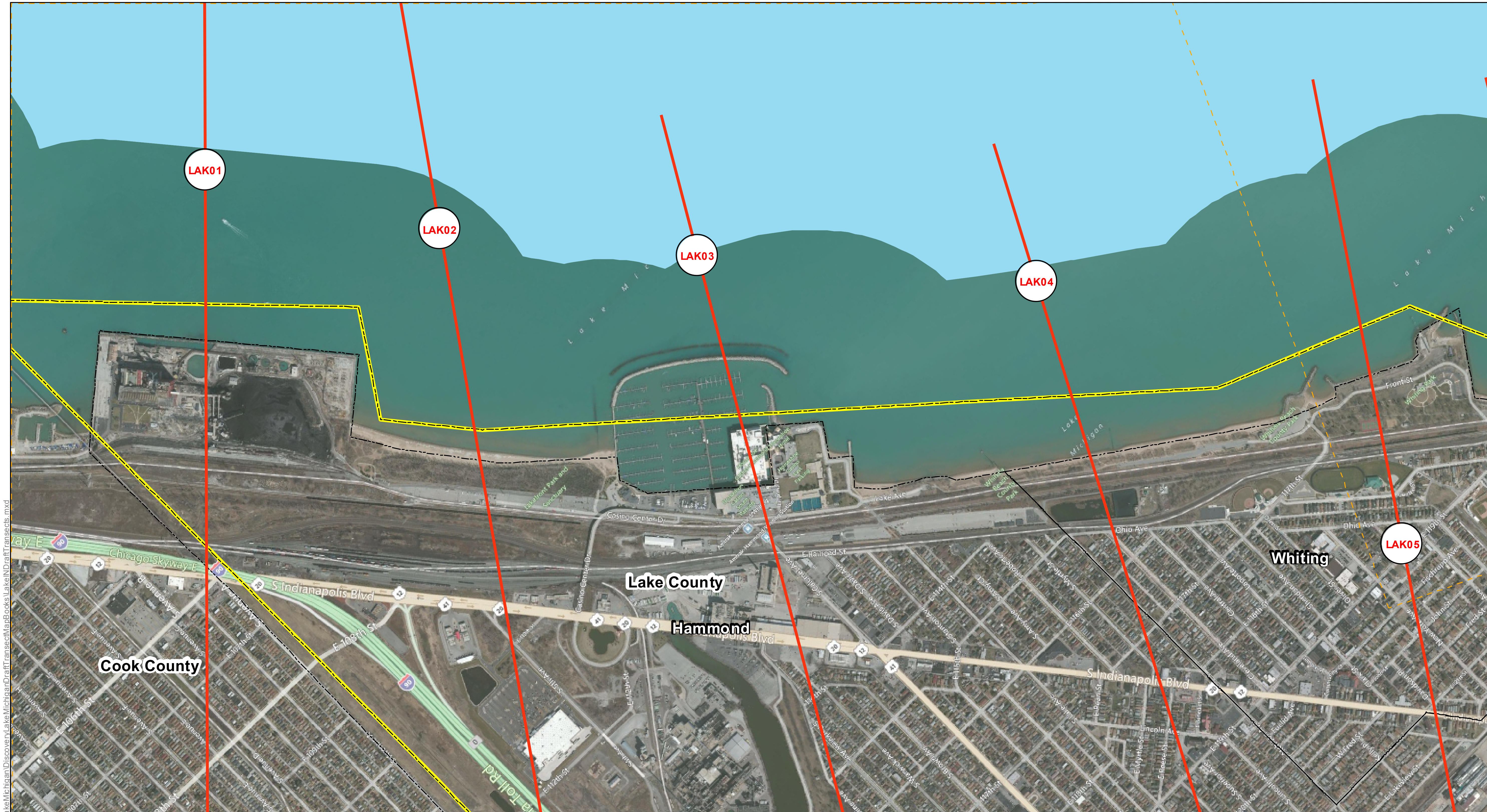
Town of Long Beach
City of Michigan City
City of Trail Creek

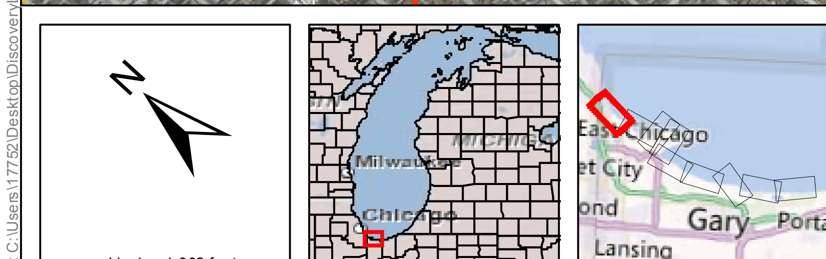
STARR

FEMA

Attachment F.

Lake, Porter, and LaPorte Counties Proposed Transects





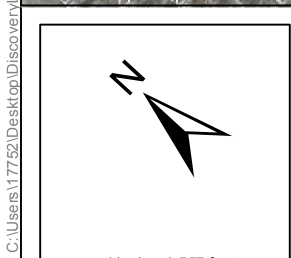
Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

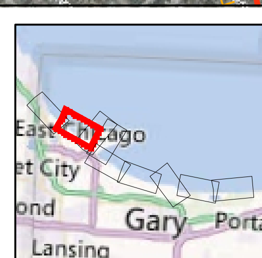
Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 1 of 9

Path: C:\Users\177752\Desktop\Discovery\LakeMichigan\DiscoveryLakeMichigan\DraftTransectMapBooks\LakeIN\DraftTransects.mxd



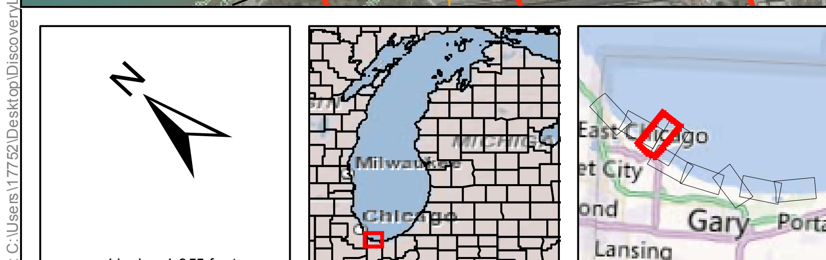


Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 2 of 9



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

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 3 of 9

Path: C:\Users\177752\Desktop\Discovery\LakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\LakeINDraftTransects.mxd

LAK12
LAK11
LAK13
LAK10
LAK09
LAK14
LAK15
LAK07
LAK08
LAK16
East Chicago
Lake County
Whiting
Gary
Indiana Harbor
Indiana Harbor Ship Canal
Cline Ave
Riley Rd
N Clark Rd

1 inch = 2,018 feet

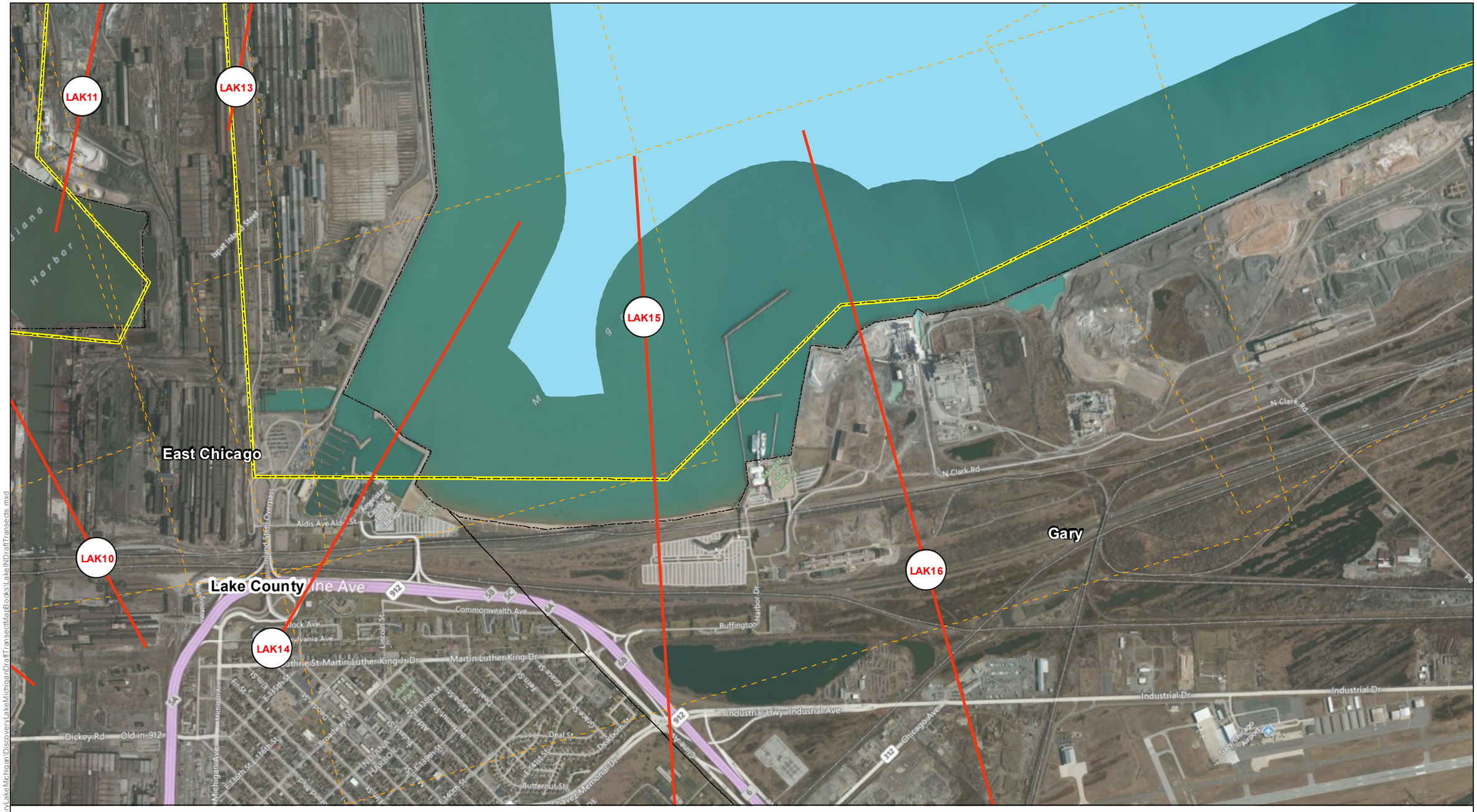
Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 4 of 9

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichigan\DraftTransectMapBooks\LakeINDraftTransects.mxd



1 inch = 1,480 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 5 of 9

Path: C:\Users\17752\Desktop\Discovery\Lake Michigan\Discovery\Lake Michigan\Draft Transect\MapBooks\LakeINDraftTransects.mxd

1 inch = 1,751 feet

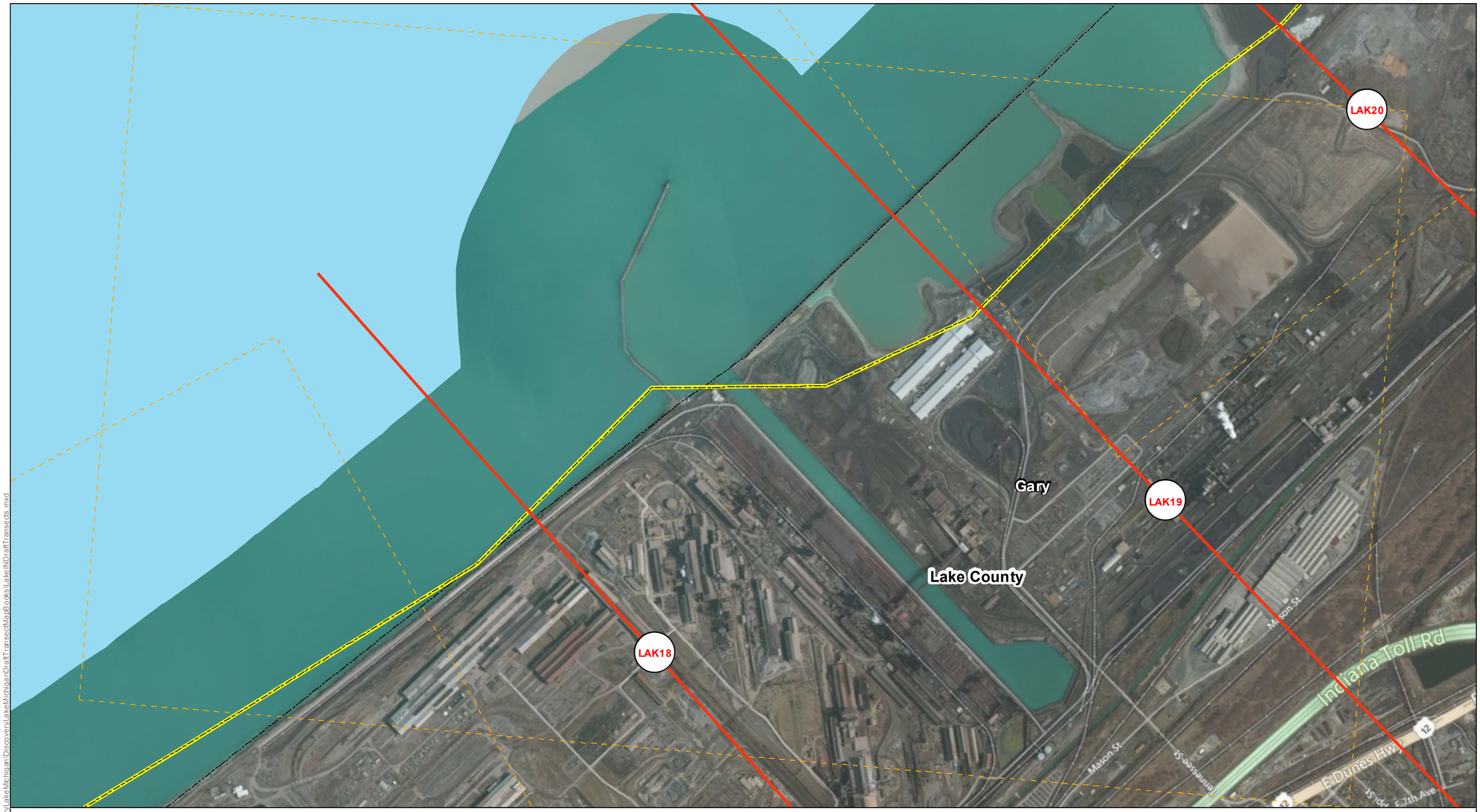
Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 6 of 9

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichigan\DraftTransectMapBooks\LakeINDraftTransects.mxd



1 inch = 1,151 feet

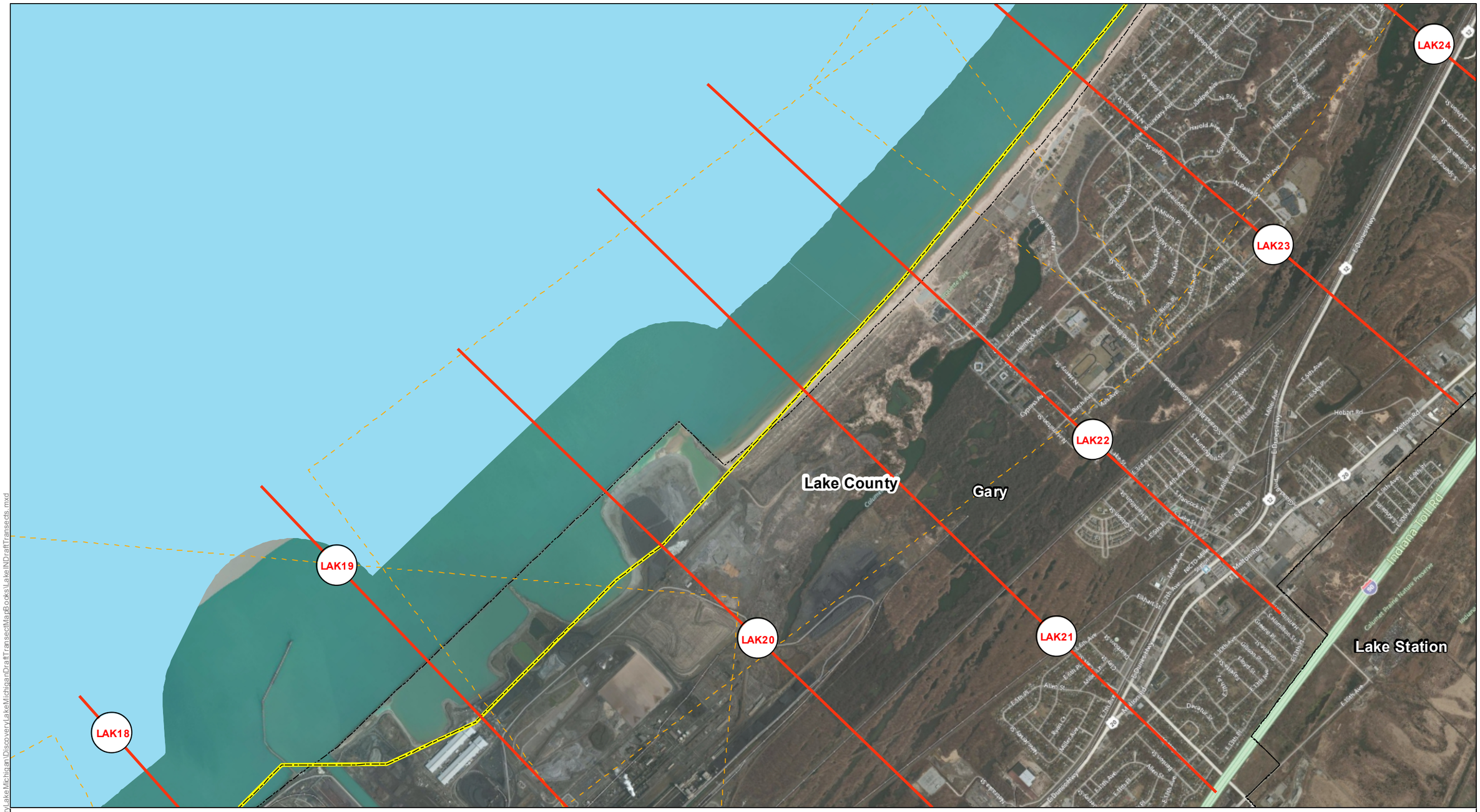
Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 7 of 9

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichiganDraftTransectMapBooks\LakeINDraftTransects.mxd



1 inch = 1,900 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana
DRAFT TRANSECTS
Panel 8 of 9

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichiganDraftTransectMapBooks\LakeINDraftTransects.mxd

Ogden Dunes

Porter County

Portage

Gary

Lake County

Lake Station

POR02

POR01

LAK24

LAK23

LAK22

LAK21

1 inch = 2,059 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of East Chicago
City of Gary
City of Hammond
City of Lake Station
City of Whiting

Lake County, Indiana

DRAFT TRANSECTS

Panel 9 of 9

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichiganDraftTransectMapBooks\LakeINDraftTransects.mxd

POR01

POR02

POR03

POR04

Porter County

Ogden Dunes

Portage

Lake Michigan

Indiana Dunes National Lakeshore

Dunes Hwy

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

N

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

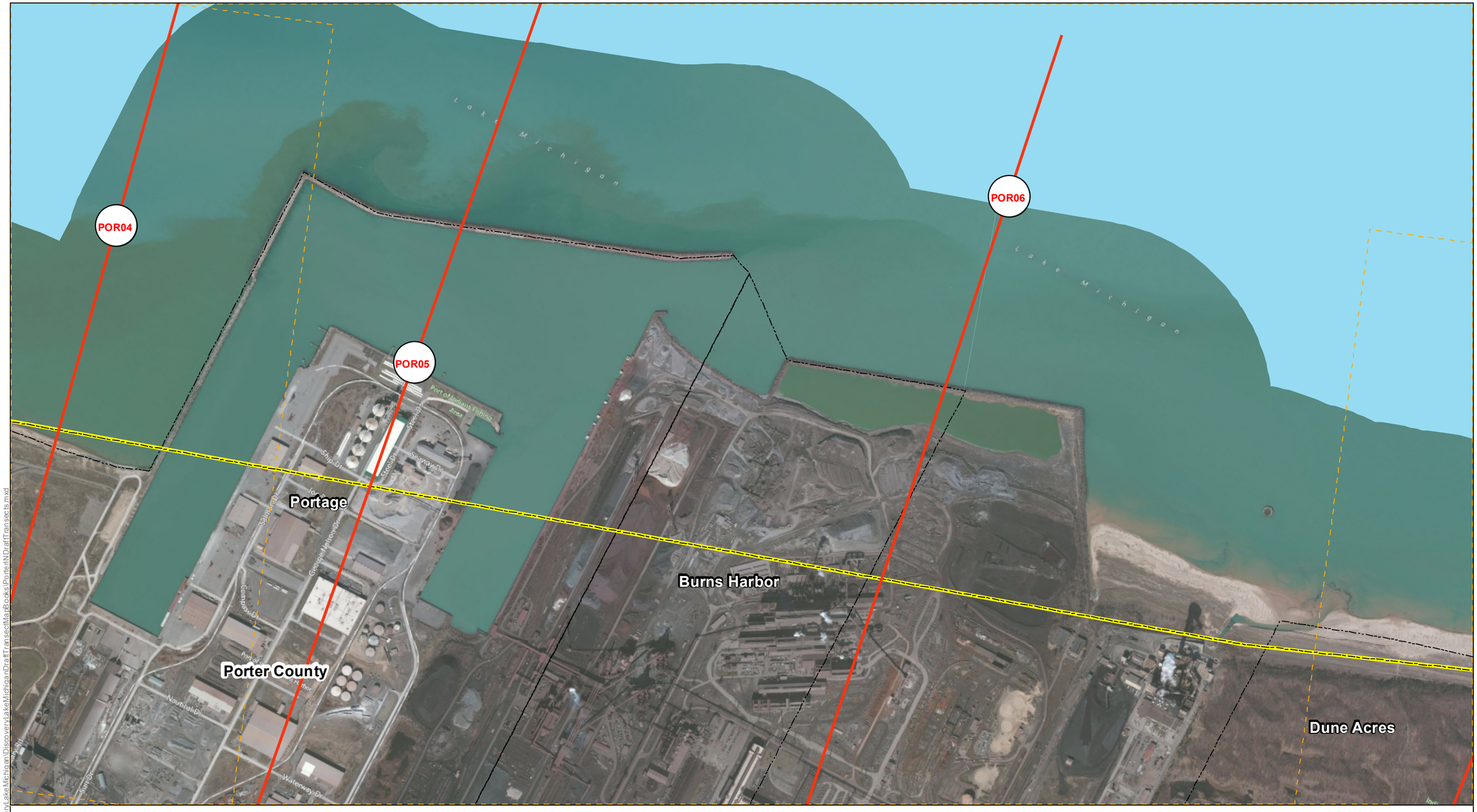
STUDY COMMUNITIES

City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana

DRAFT TRANSECTS

Panel 1 of 6



1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

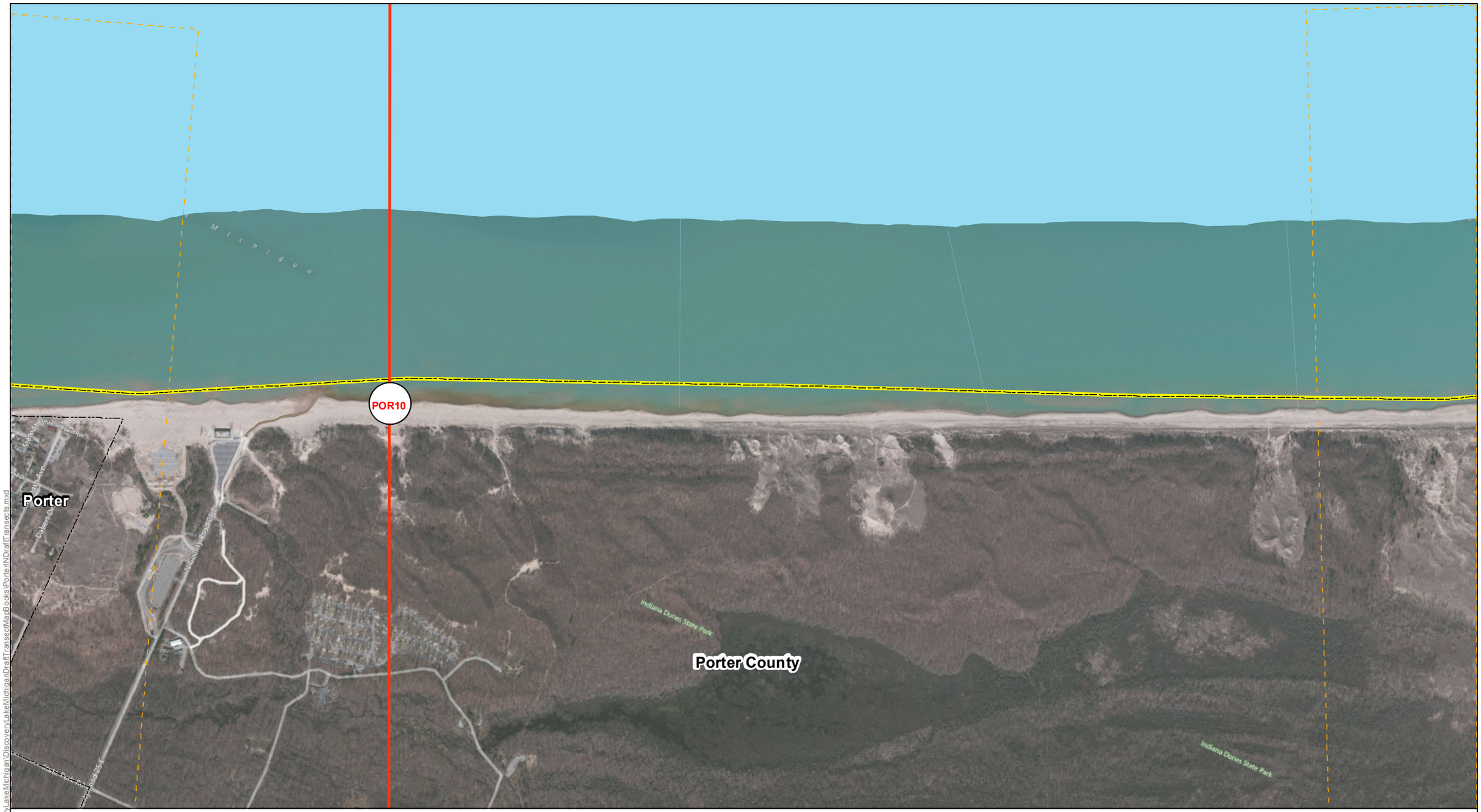
City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana
DRAFT TRANSECTS
Panel 2 of 6

STUDY COMMUNITIES

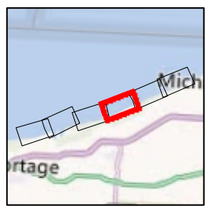
City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana
DRAFT TRANSECTS
Panel 3 of 6



N

1 inch = 1,001 feet



Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana
DRAFT TRANSECTS
Panel 4 of 6

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge
Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana
DRAFT TRANSECTS
Panel 5 of 6

Path: C:\Users\177752\Desktop\Discovery\LakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\PorterINDraftTransects.mxd

POR13

POR14

LAP01

Lake Michigan

Beverly Shores

Porter County

Town of Pines

LaPorte County

Michigan City

E Lake Front Dr

Beverly Dr

Indiana Dunes National Lakeshore

1 inch = 1,002 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

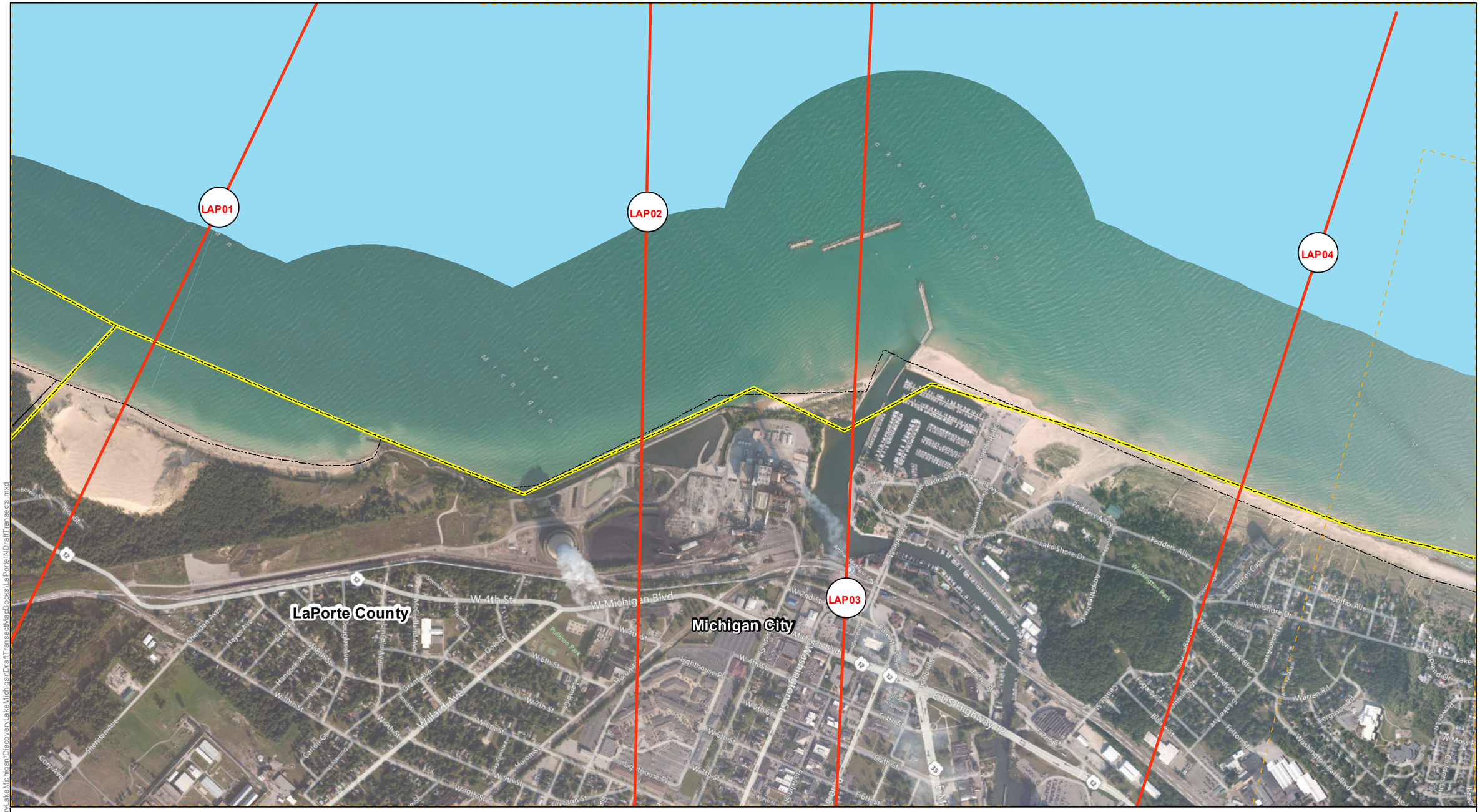
City of Portage
Town of Burns Harbor
Town of Beverly Shores
Town of Chesterton
Town of Dune Acres
Town of Ogden Dunes
Town of Porter

Porter County, Indiana

DRAFT TRANSECTS

Panel 6 of 6

Path: C:\Users\17752\Desktop\DiscoveryLakeMichigan\DiscoveryLakeMichiganDraftTransectMapBooks\Porter\NDraftTransects.mxd



1 inch = 1,002 feet

Draft Transects
County Boundary
Municipal Boundary
Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of Michigan City
Town of Long Beach

LaPorte County, Indiana
DRAFT TRANSECTS
Panel 1 of 3

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichiganDraftTransectMapBooks\LaPorteINDraftTransects.mxd

LAP05

LAP06

LAP07

LaPorte County

Michigan City

Long Beach

E US Highway 12

1 inch = 1,002 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES
City of Michigan City
Town of Long Beach

LaPorte County, Indiana
DRAFT TRANSECTS
Panel 2 of 3

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

LAP07

LAP08

BER01

Long Beach

LaPorte County

Michigan City

Michiana Shores

Village of Michiana

Berrien County

New Buffalo Township

Lake Michigan

US Highway 12

1 inch = 1,001 feet

Draft Transects

County Boundary

Municipal Boundary

Adjoining Panel Edge

Basemap Source: Microsoft BING map service

STUDY COMMUNITIES

City of Michigan City

Town of Long Beach

LaPorte County, Indiana

DRAFT TRANSECTS

Panel 3 of 3

Path: C:\Users\17752\Desktop\Discovery\LakeMichigan\Discovery\LakeMichiganDraftTransectMapBooks\LaPorteINDraftTransects.mxd

Attachment G.

Lake, Porter, and LaPorte Counties Discovery Meeting Documents

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

July 13, 2012

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

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

Dear «Salutation» «Last_Name»:

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

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

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

Your Discovery Meeting is scheduled to occur:

Date:	Monday, September 10, 2012
Time:	9:00am – 11:00am Central
Location:	City Hall Commission Chambers
Address:	166 Lincolnway, Valparaiso, Indiana 46383

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:	10:00am – 11:00am CST
Link to WebEx:	https://www.webex.com/login/attend-a-meeting
Meeting No:	659 962 301
Call in number:	877-537-6647
Participant Code:	31578

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

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

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

Sincerely,

Christine Stack

Christine Stack
Division Director
Mitigation Division, FEMA Region V

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

cc: FPA
Greg Main, Indiana NFIP Coordinator
Dave Knipe, Indiana Department of Natural Resources

Monday, September 10, 2012
9:00am - 11:00am CT
City Hall Commission Chambers
166 Lincolnway, Valparaiso, Indiana

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
1		Christopher Burke Engineering, LLC (on behalf of the City of Whiting)	Director, Water Resources	Siavash	Beik	115 West Washington Street Suite 1368 South Indianapolis, IN 46204	(317) 266-8000	sbeik@cbbel-in.com
2		INDNR	Coastal Communities Resource Planner	Sergio	Mendoza	1600 North 25 East Chesterton, IN 46304	(219) 926-9757	smendonza@dnr.in.gov
3	DM	INDNR	Hydraulic Eng.	Darrin	Miller	402 West Washington St. Room W264 Indianapolis, IN 46204	(317) 234-1053	dmiller@dnr.in.gov
4		INDNR	Floodplain Management	Laura	Kannapel	402 West Washington St. Room W264 Indianapolis, IN 46204	(317) 234-1059	lkannapel@dnr.IN.gov
5		IDHS	State Hazard Mitigation Officer	Jan	Crider	402 West Washington St. Indianapolis, IN 46204	(317) 232-3833	jcrider@dhs.in.gov
6		FEMA	FEMA Region V	Ken	Hinterlong	536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5529	Ken.Hinterlong@fema.dhs.gov
7		FEMA	FEMA Region V Risk Analysis	Erin	Maloney	536 S. Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5435	erin.maloney@fema.dhs.gov
8		STARR	Project Manager/Coastal Engineer	Stacey	Roberts		(850) 580-7896	stacey.roberts@starr-team.com
9		STARR	Outreach Coordinator	Holly	Davis		(904) 363-8451	holly.davis@atarr-team.com
10		STARR	Sr. Technical Coordinator	Janet	Luce		(321) 242-4942	janet.luce@atkinsglobal.com

Monday, September 10, 2012
9:00am - 11:00am CT
City Hall Commission Chambers
166 Lincolnway, Valparaiso, Indiana

No.	Sign Intials	Affiliation	Title	Name First	Name Last	Street Address	Phone	Email Address
11		DNR-LMCP	Program Manager	Mike	Molnar		317-233-0132	mmolnar@dnr.in.gov
12		STARR	PROJECT MANAGER	WAYNE	LASH	7406 FULLERTON ST., SUITE 350 JACKSONVILLE, FL 32256	904-363-8449	WAYNE.LASH@ATKINSGLOBAL.COM
13		Porter County	Executive Director Plan Comm	Bob	Thompson	155 Indiana Ave. Suite 311 Valparaiso, IN 46383	219-465-3540	rthompson@porterco.org
14		CBBEL whiting-Hammond	Consultant	Samuel	Beik	115 W. Washington St. S1368S Indpls, IN 46204	317-266-8000	sbeik@cbbel-in.com
15		HERBIE CRUZ	EMA DIRECTOR	HERBIE	CRUZ	2301 E. COLUMBUS DR. EAST CHGO, IN 46312	219 391-8310	hcruz@eastchicago.com
16								
17								
18								
19								
20								

Monday, September 10, 2012
9:00am - 11:00am CT
City Hall Commission Chambers
166 Lincolnway, Valparaiso, Indiana

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

Meeting Schedule: Monday, September 10, 2012 9:00 – 11:00 am (CT)
Meeting Location: City Hall Commission Chambers, Valparaiso, Indiana

PARTICIPANTS

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

Indiana DNR
Darrin Miller, INDNR
Laura Kannapel, INDNR
Mike Molnar, INDR, Coastal Program
Sergio Mendoza, INDNR, Coastal Program

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. Does the shoreline classification data set from the USACE include information on shoreline structures? *No, it does not. This data set only has qualitative information.*
2. What is the highest Community System Rating (CRS) you can get in Indiana? *An "8" is the highest due to the state's building code.*

B. Questions/comments raised during the discussion and break out session
1. Why do the transect lines extend so far inland? *The lengths shown on the maps only indicate the location of the line along the shoreline, not how far it extends offshore or inland (i.e., the lengths shown do not have any real meaning).*
2. What's new about the Stillwater analysis? *The latest analysis was done by ERDC. It covers the whole lake and is much more detailed and comprehensive than the prior study. It employs a detailed grid and up to date computer models.*
3. What specifically does FEMA need from each city (this was asked by Herbie Cruz, EMA Director, City of East Chicago)? *We would like them to:*
    a. *Review the proposed transect locations and suggest any shifts that they think may be needed to cover specific areas and/or needs (e.g. areas where new development is expected or areas with unique conditions).*
    b. *Identify areas with new aerials, topo, or other studies that should be included in the new coastal mapping/analyses.*
    c. *Identify any special needs they have for non-regulatory products (i.e., products that would help them better manage flood risks.*

FEATURES NOTED ON MAPS:

State	County	Community	FIPS	CID	Comment	Type
Indiana	Porter	Dune Acres	18127	180205	Residential communities up against lake. Private community with public roads.	General Comment
Indiana	Porter		18127		High Erosion Hazard Area information is available from Steve Davis, Division of Water, or Sergio Mendoza (219) 926-9757. He also developed a draft Coastal Hazard Model Ordinance.	General Comment
Indiana	Porter		18127		Add **Town of Pines** and **Burns Harbor** to the list of communities.	General Comment
Indiana	Porter		18127		Contact Info Notes: - Portage – A.J. Monroe - Chesterton – Mark O'Dell - Beverly Shores – Geof Benson - D.O.I. Indiana Dunes National Lake Shore – DEIS not released yet	General Comment

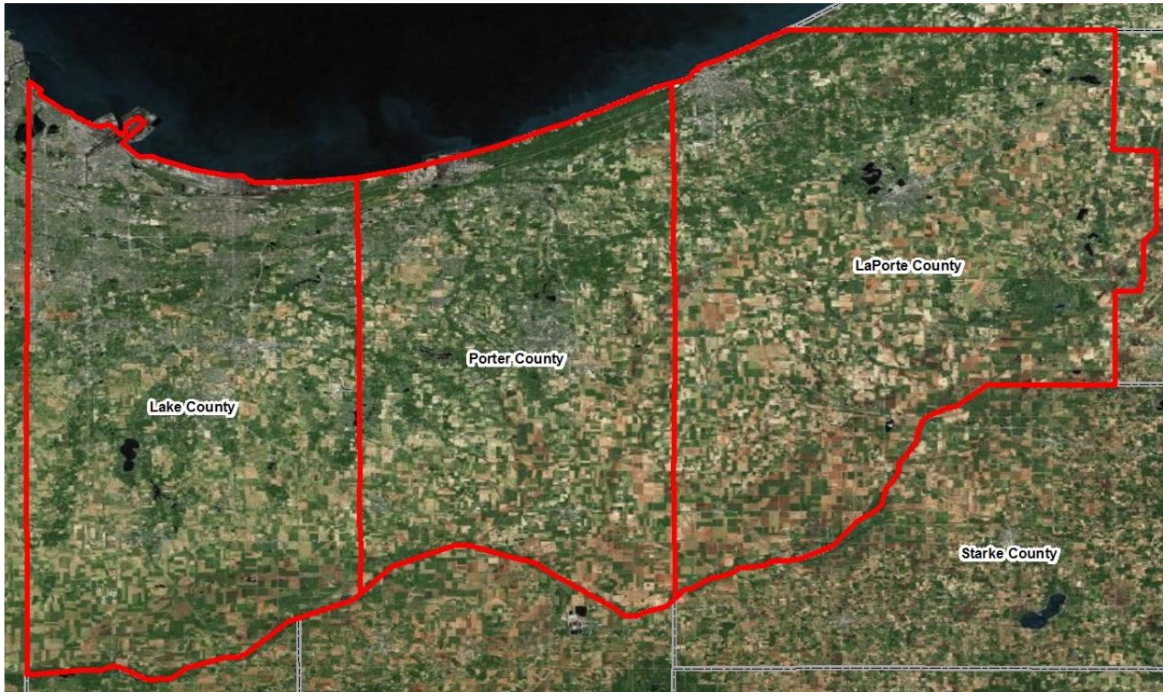
ACTIONS:

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

FEMA

Lake Michigan Discovery

Lake County, IN
Porter County, IN
LaPorte County, IN



September 10, 2012
9 am to 11 am CT
City Hall Commission Chambers,
Valparaiso, Indiana

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Introductions

Who's here?

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

Discovery Meeting Agenda

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

Risk Mapping, Assessment and Planning
Risk MAP

FEMA

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study

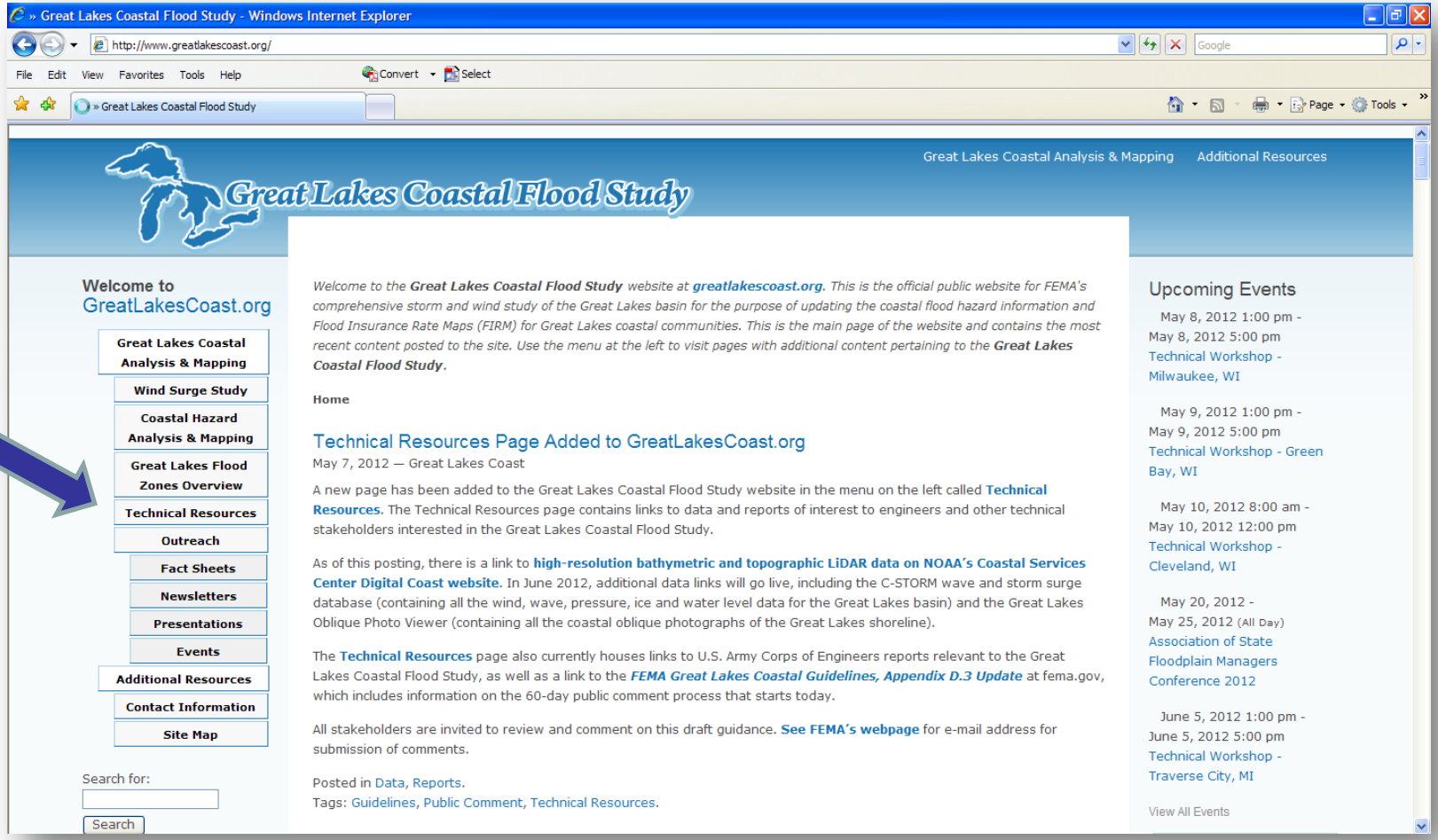
RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study Overview

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

Technical Resources

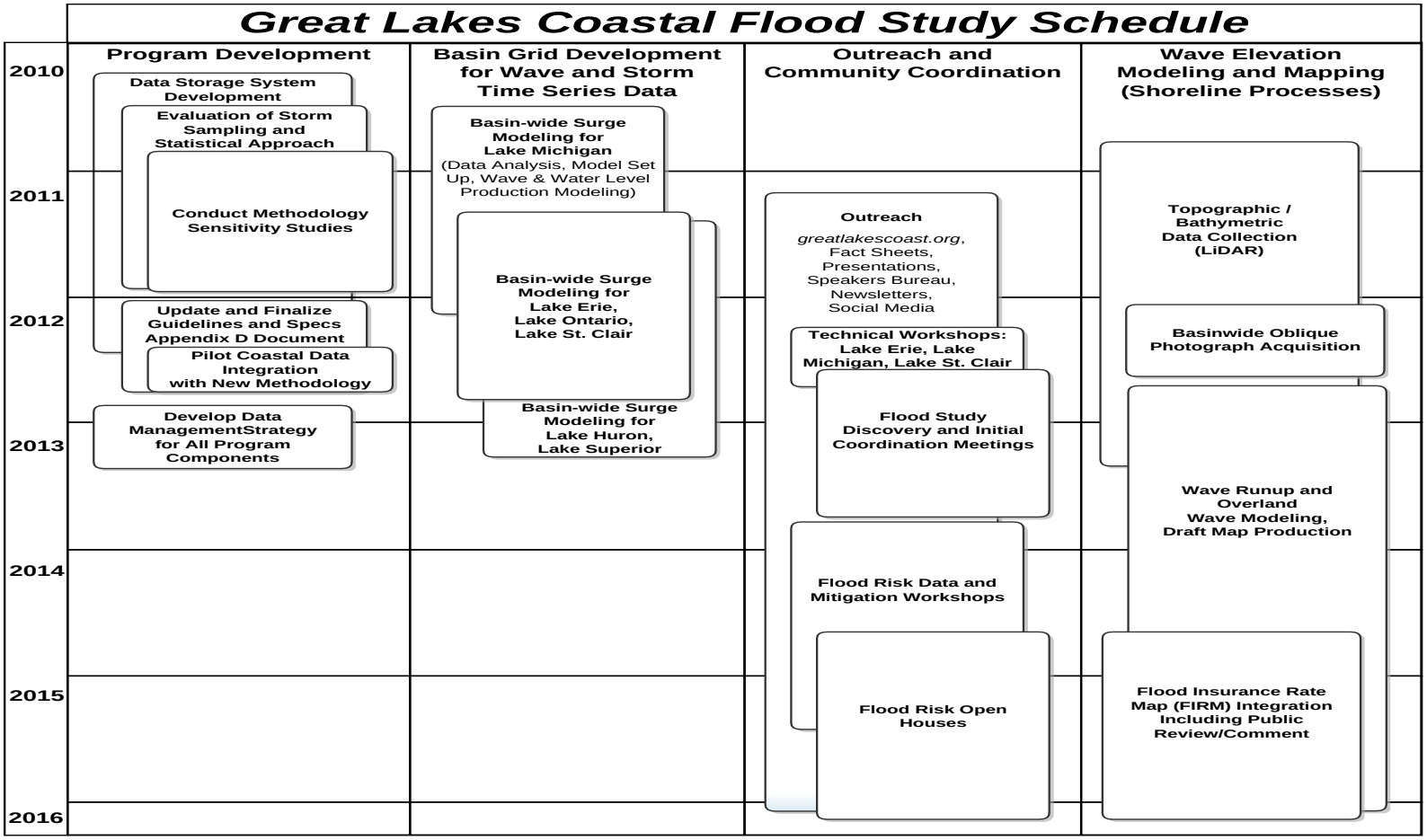


RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study Schedule

FEMA



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study Discovery Study Area

FEMA

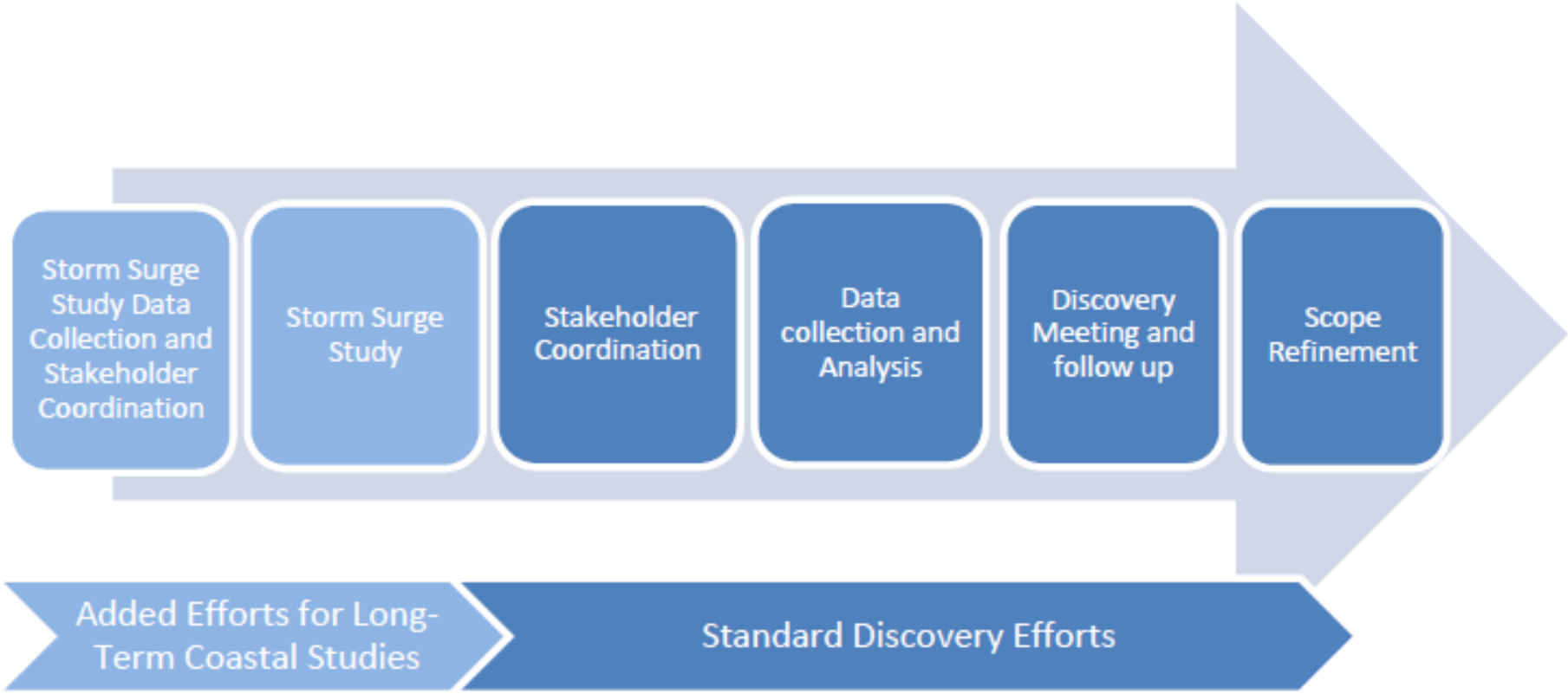
Lake Michigan coastal communities in Lake, Porter and LaPorte Counties:

Lake County	Porter County
East Chicago, City of	Beverly Shores, Town of
Gary, City of	Chesterton, Town of
Hammond, City of	Dune Acres, Town of
Lake Station, City of	Ogden Dunes, Town of
Whiting, City of	Portage, City of
	Porter, Town of
LaPorte County	Burns Harbor, Town of
Long Beach, Town of	Pines, Town of
Michigan City, City of	

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Discovery Schedule Overview



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Data Collection in Progress

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

FEMA

Coastal Mapping

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

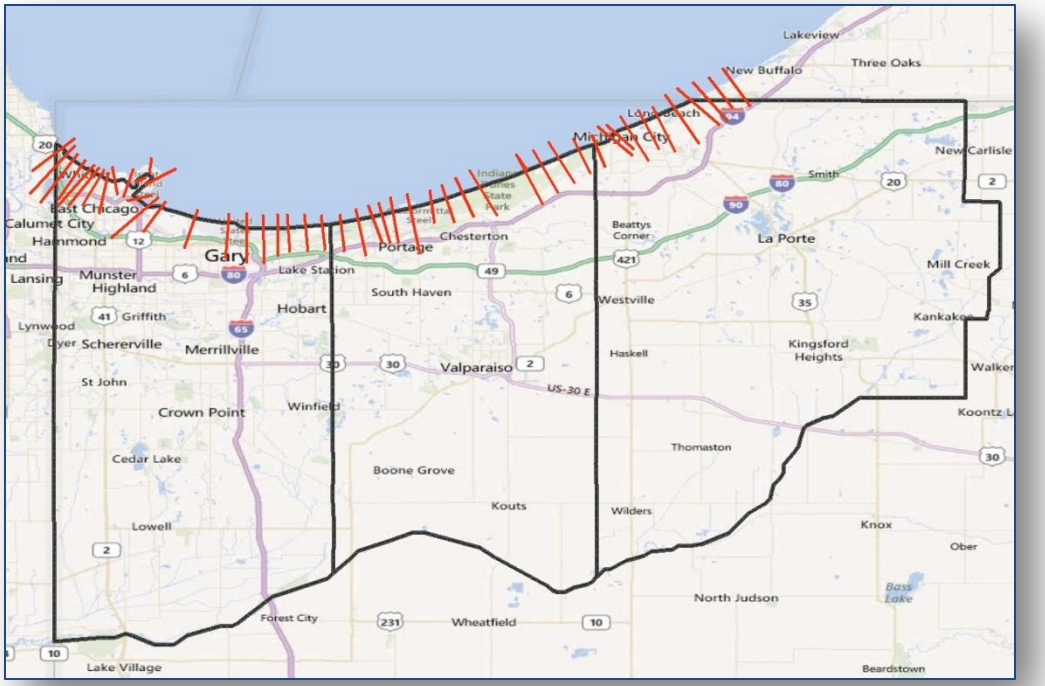
RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Draft Transect Layout
Lake, Porter and LaPorte Counties

FEMA

County	# Shoreline Miles	# Transects
Lake	21	19
Porter	19	11
LaPorte	8	6

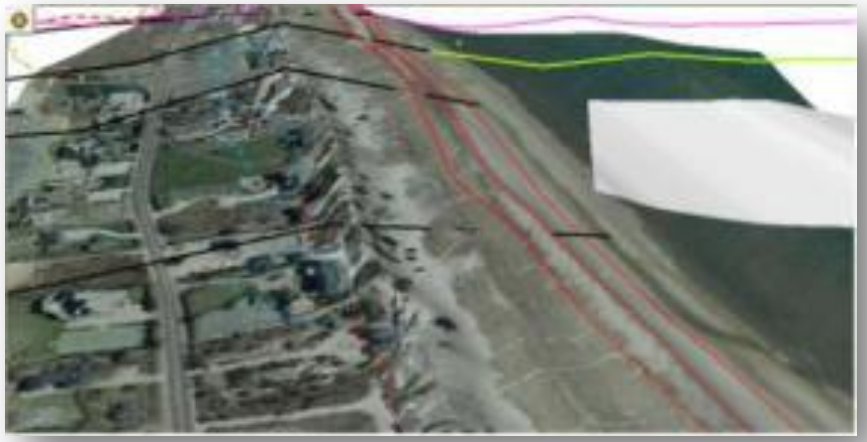


RiskMAP
Increasing Resilience Together

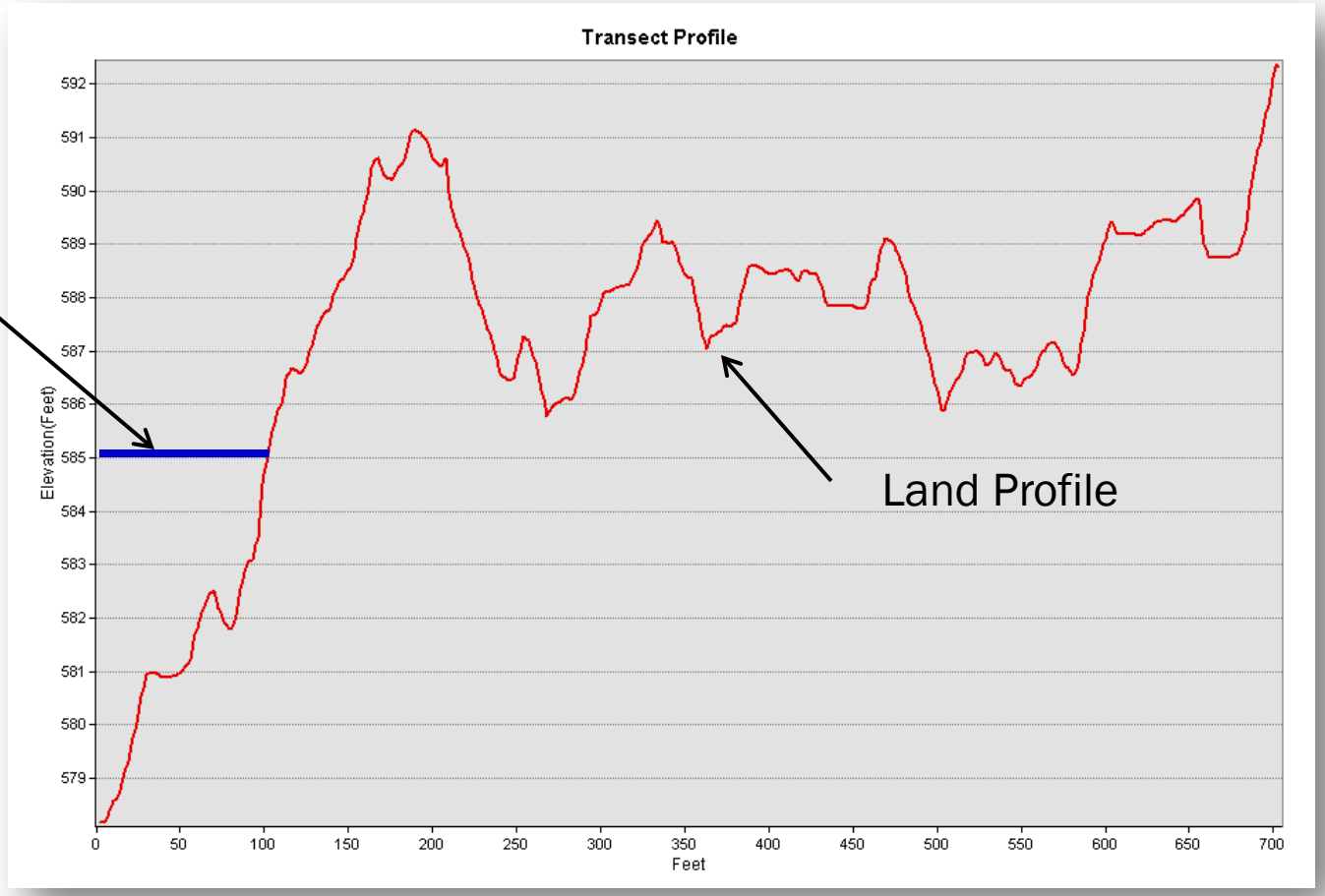
Great Lakes Coastal Flood Study
greatlakescoast.org

Transect Placement

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



Coastal Transect

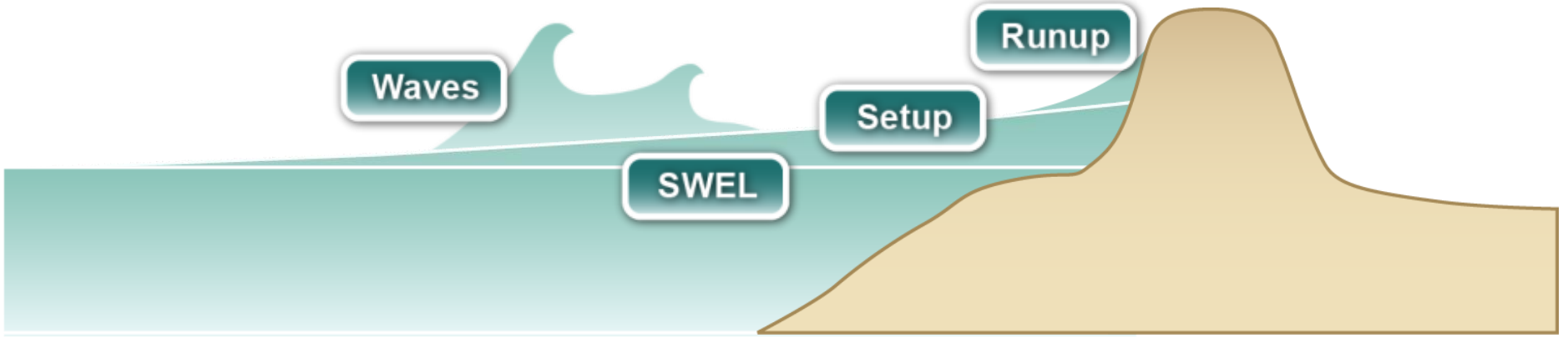


Basic Elements of a Coastal Hazard Analysis

FEMA

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)



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Coastal Flood Hazard Zones

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

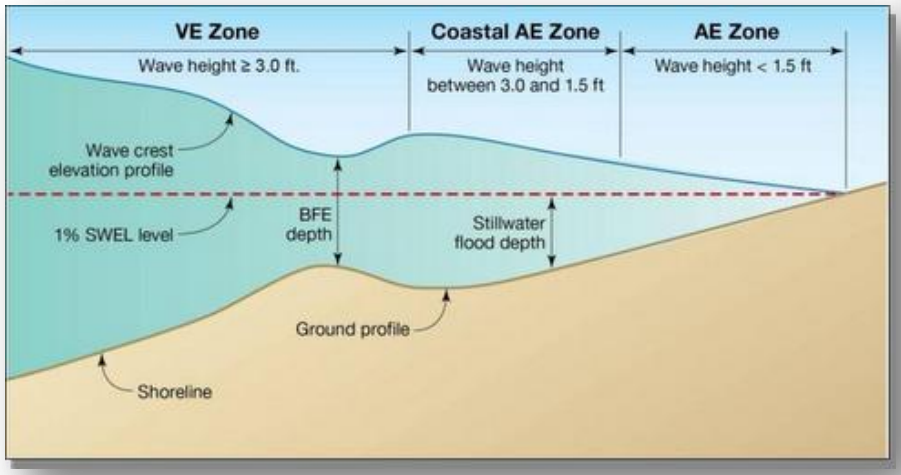
How is Limit of Moderate Wave Acton (LiMWA) Defined?

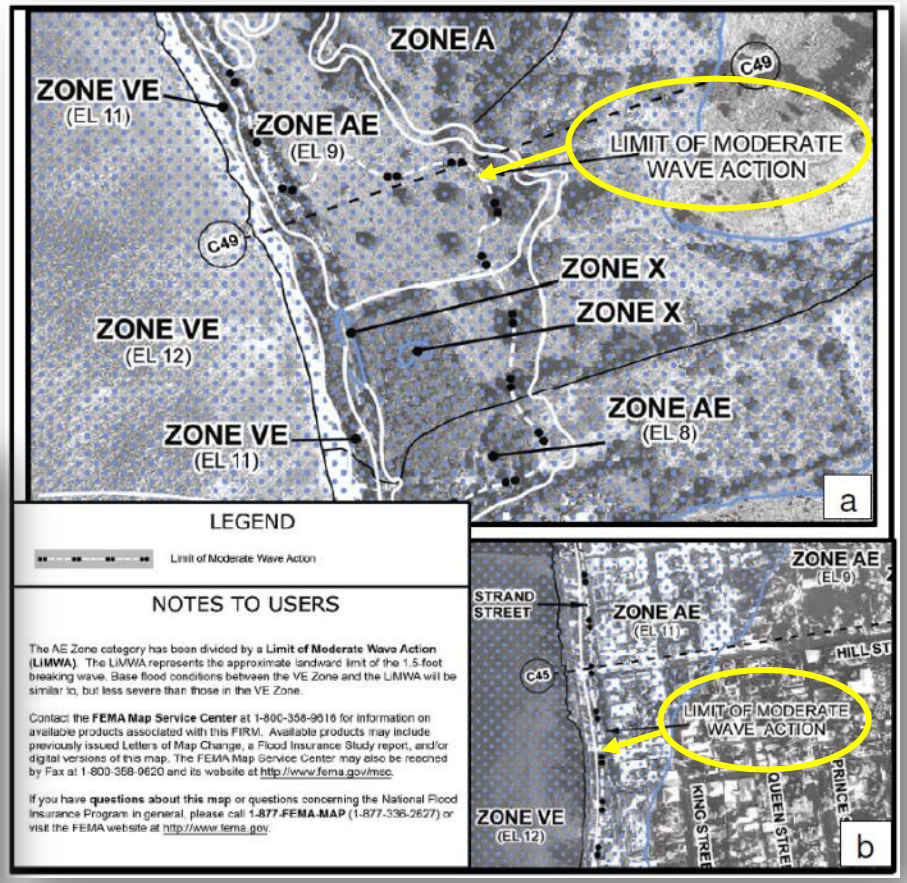
- LiMWA is the line mapped to delineate the inland extent of wave heights of at least 1.5 feet
  - Wave heights as small as 1.5 feet can cause significant damage to structures
- LiMWA is the same as coastal AE zones and can trigger coastal building codes for certain communities
- Community Rating System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

Limit of Moderate Wave Action (LiMWA)

FEMA Procedure Memorandum No. 50, 2008

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





RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Wave Action - Structural Risk

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

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

V Zones for Lake Michigan?

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

FEMA

Coastal Flood Risk Products

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

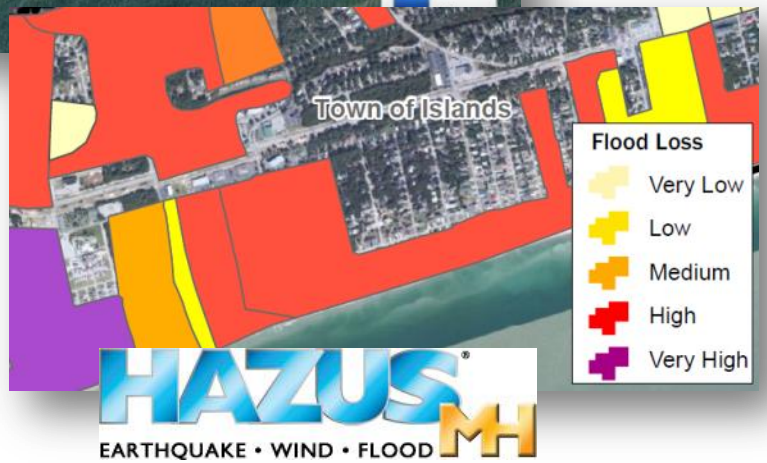
RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Standard Flood Risk Products

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

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

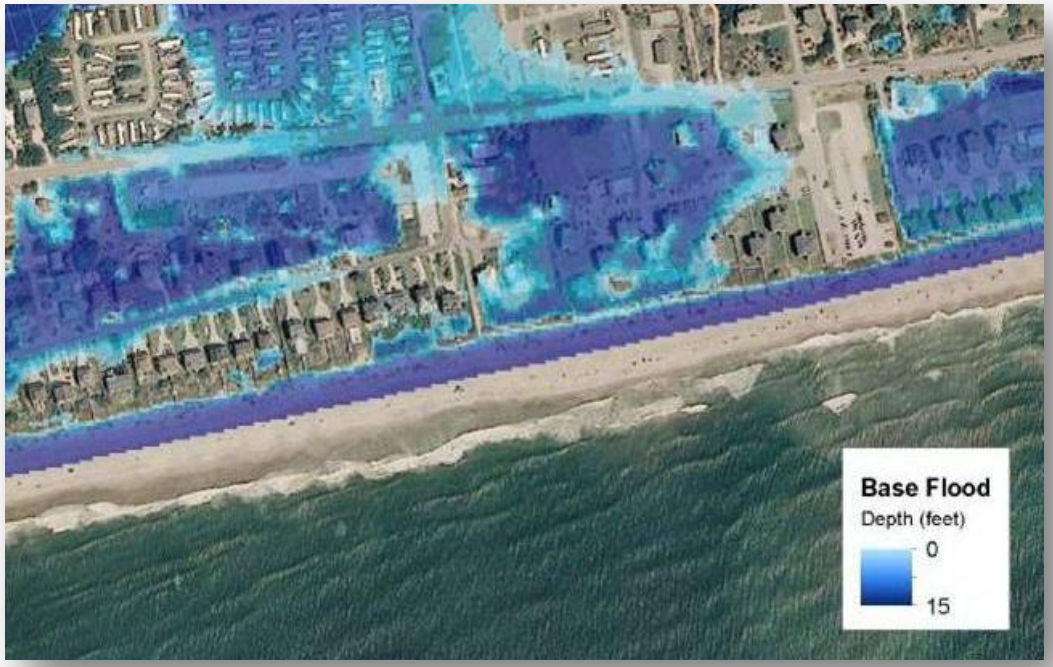


RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

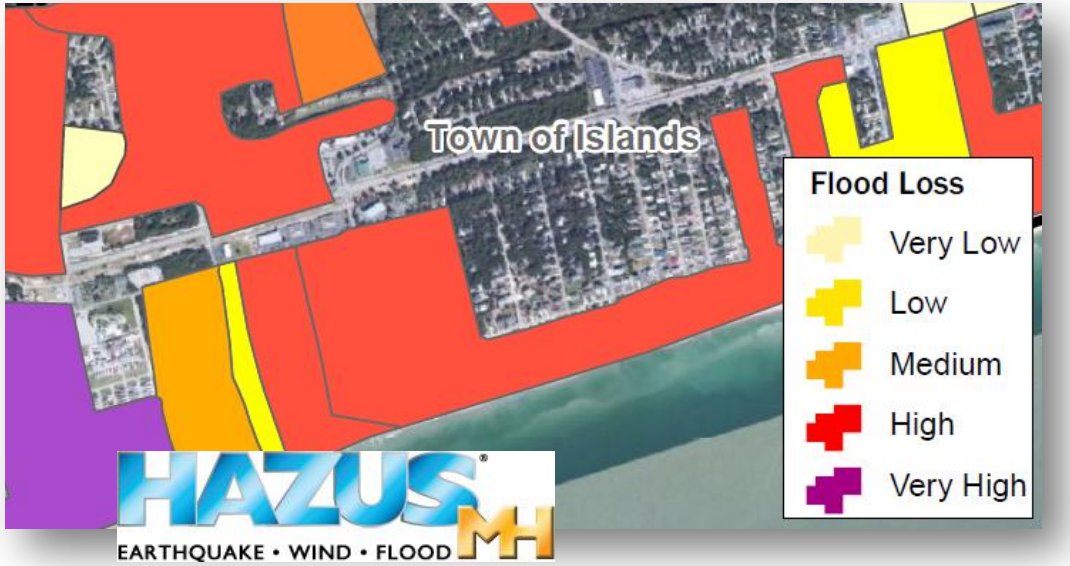
Coastal Depth Grid

- 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

FEMA

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Coastal Non-Regulatory Products in Development

FEMA

Erosion

Red Lantern Restaurant, Lake Michigan, IN

Lake Levels

Lake Michigan Shoreline
Reference

Shoreline Feature Dataset

Upper Peninsula Shoreline
Reference

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Shoreline Features Database

Shoreline Material
Sand
Cohesive
Cobble
Diamicton*
Shingle
Bedrock
Artificial

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

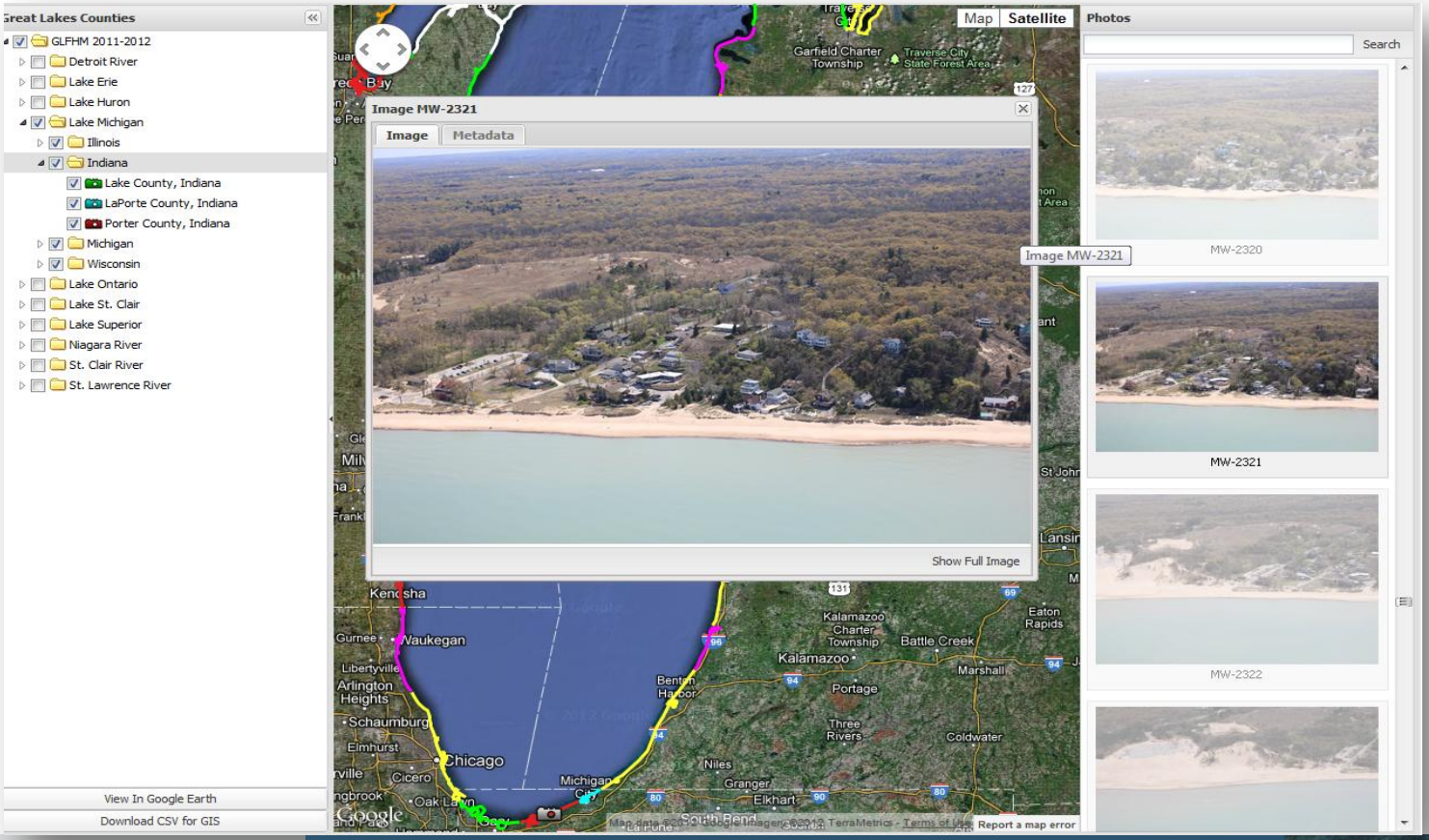
Primary Coast Type
High Dune, 10'+
Dune, 2' - 10'
High Bluff, 10'+
Bluff, 2' - 10'
Coastal Wetland
Flat Coast

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

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

USACE Oblique Aerial Photo Viewer

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

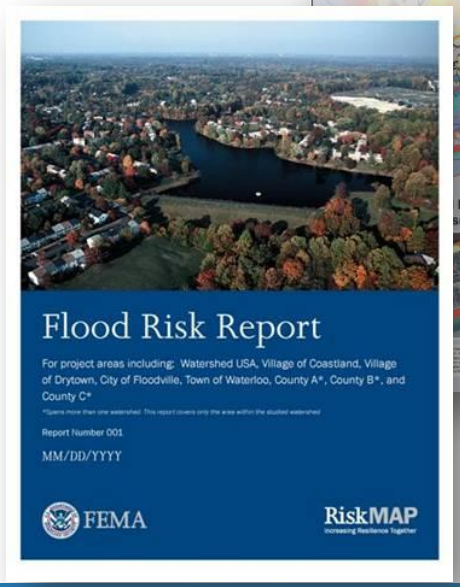


RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Coastal Flood Risk Map and Report

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



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

FEMA

How does this apply to my community?

- NFIP Compliance
- Local impacts of coastal study

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

National Flood Insurance Program (NFIP)

FEMA

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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/

FEMA

Hazard Mitigation

- Opportunities
- Grant Funding

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Great Lakes Coastal Flood Study
HM Resources, Strategies & Actions

FEMA

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

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

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Local Hazard Mitigation Plans

Risk MAP
Risk MAP products and Datasets

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

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

Mitigation Actions/Projects

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Mitigation Actions

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

FEMA Funding Opportunities

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

HMGP is a post-disaster grant program.

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

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Mitigation Grants/Programs: Other Federal Agencies (OFA)

FEMA

US Army Corps of Engineers®

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Meet the Action Form

Mitigation Action Form

Contact Information

Please enter the primary contact assc

1. **Full Name:**

2. **Title and Organization :**

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

Mitigation Action Information

4. **Mitigation Activity Name**

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

6. **Hazard Type?**

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

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

☐ *Local Plans and Regulations*
*Category*_____

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

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

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

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

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

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

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

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

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

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

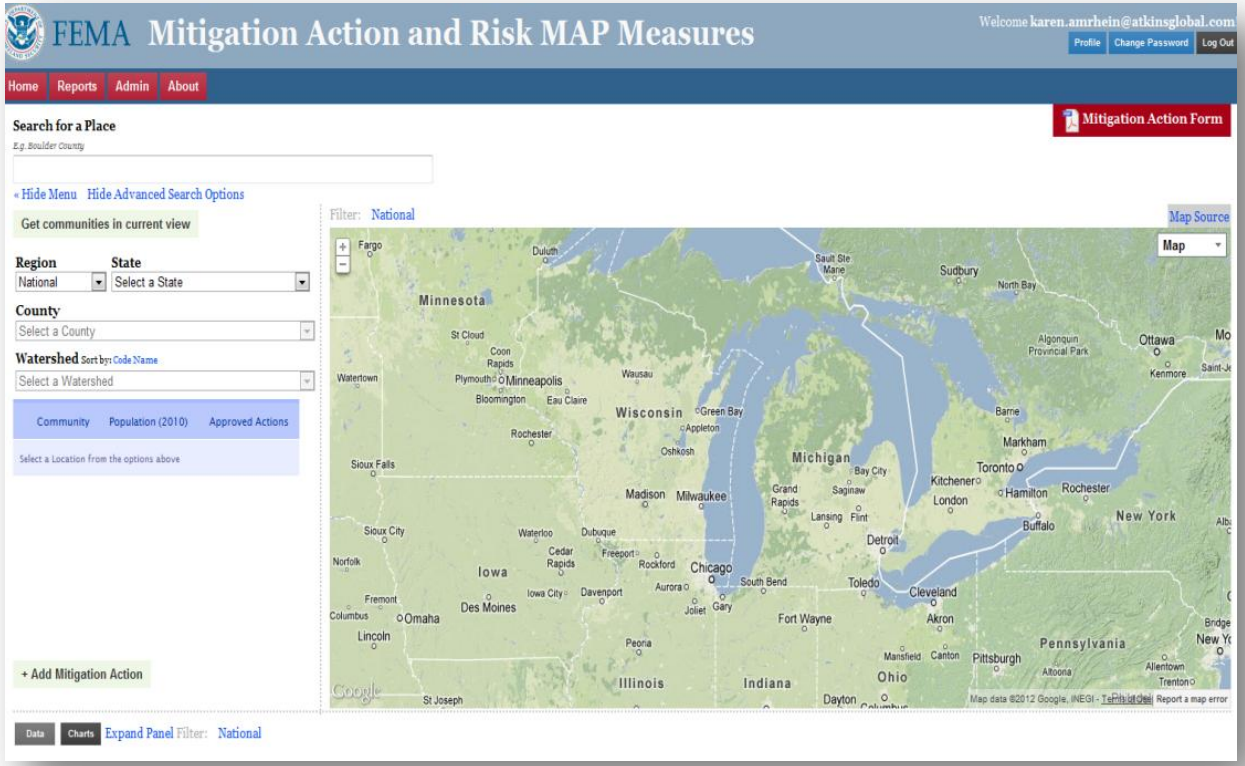
12. **What is the status of this action?**

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

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

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

Next Steps

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

FEMA

Questions?

RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

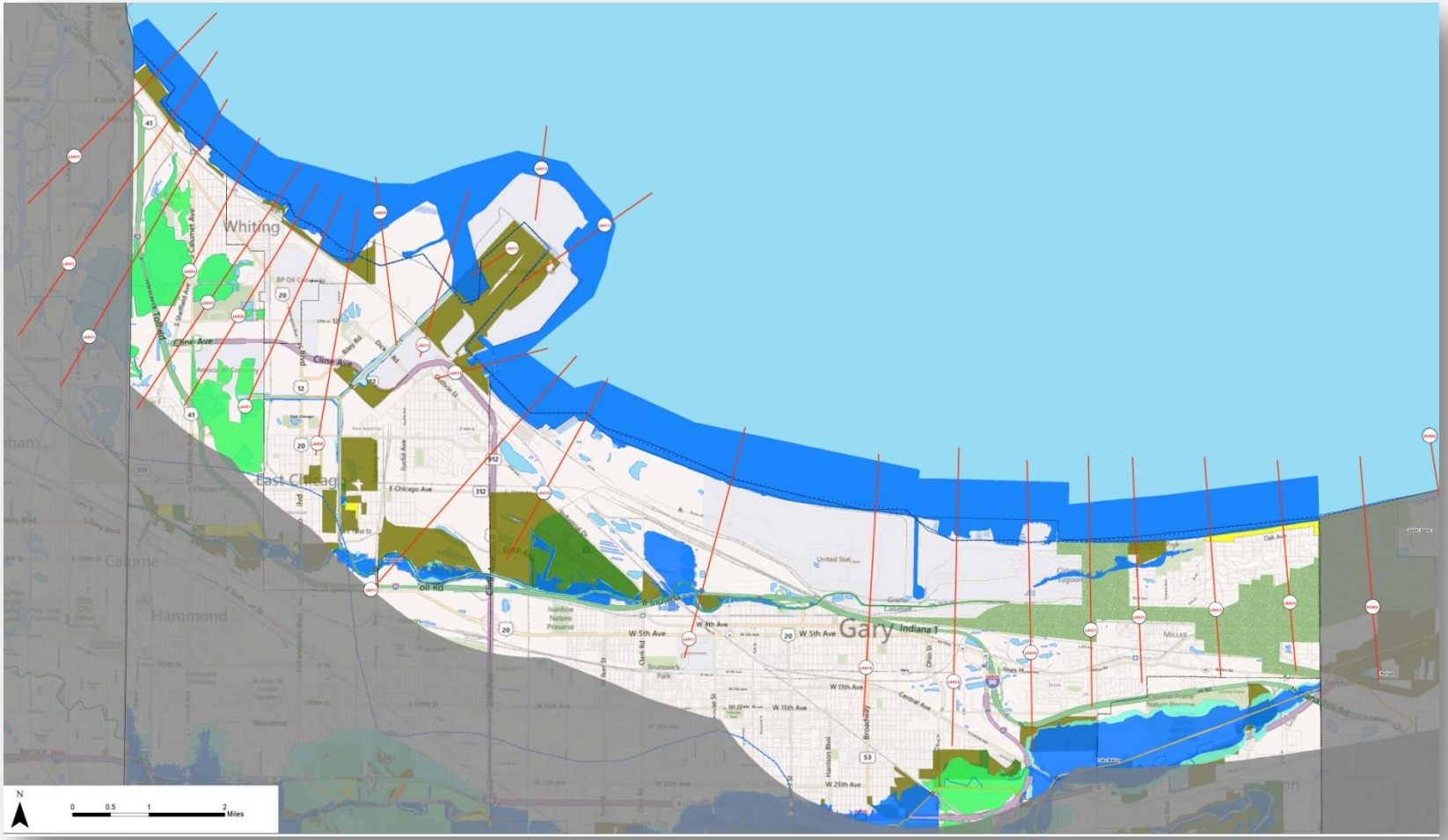
FEMA

Interactive Session

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

RiskMAP
Increasing Resilience Together

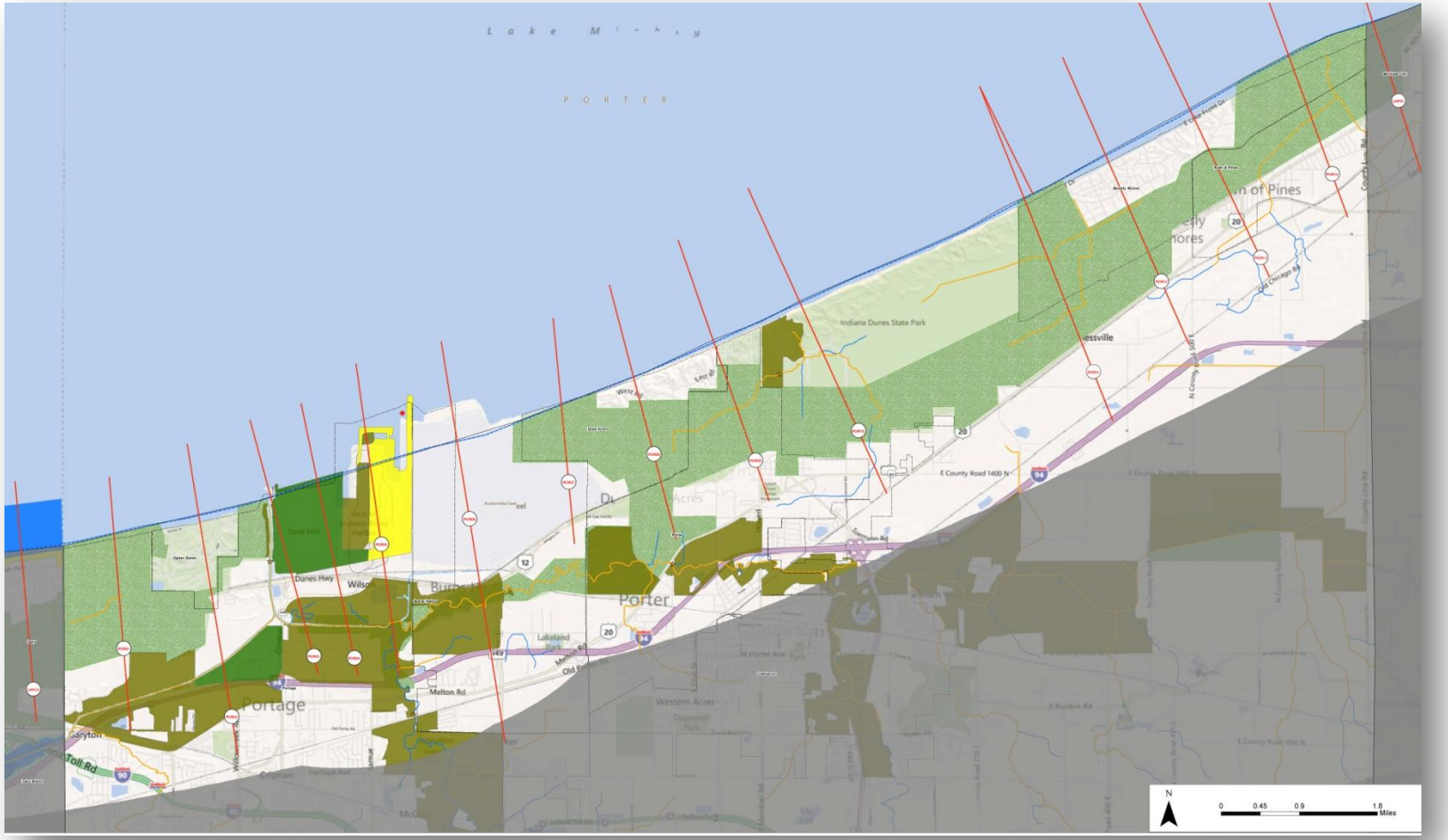
Lake County, IN – Discovery Map



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

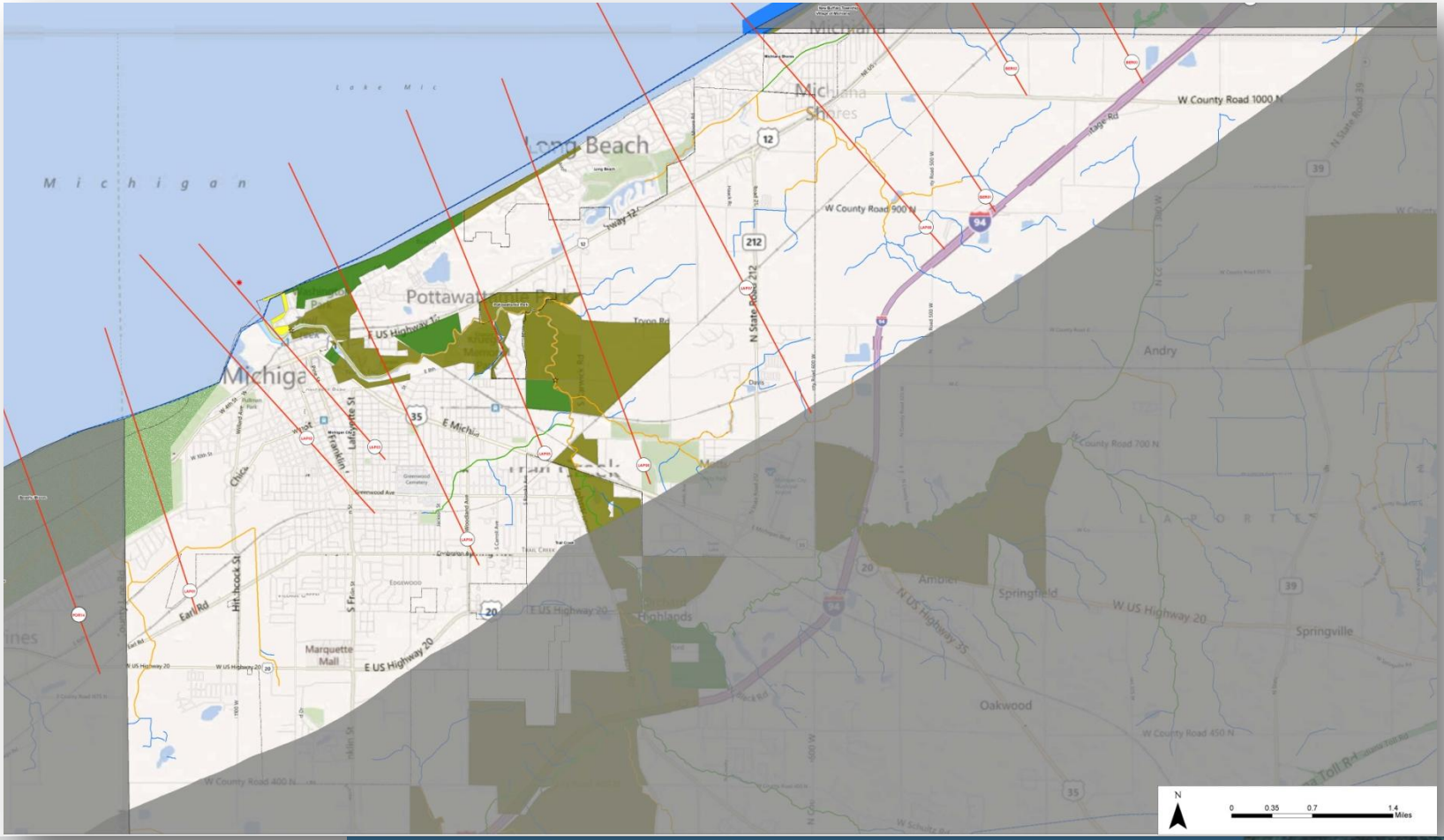
Porter County, IN Discovery Map



RiskMAP
Increasing Resilience Together

Great Lakes Coastal Flood Study
greatlakescoast.org

LaPorte County, IN 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
- Indiana Partners
  - Darrin Miller @ dmiller@dnr.IN.gov
  - Jan Crider, SHMO @ jcrider@dhs.in.gov
- STARR
  - Stacey Roberts (technical) @ stacey.roberts@starr-team.com
  - Holly Davis (outreach) @ holly.davis@starr-team.com
- Online
  - info@greatlakescoast.org
  - http://www.greatlakescoast.org/

Optional Interactive Stations

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

Attachment H.

Locally Identified Mitigation Projects

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
Lake County Hazard Mitigation Plan 2012	Lake County	Equip public facilities and communities to guard against damage caused by secondary effects of hazards.
Lake County Hazard Mitigation Plan 2012	Lake County	Minimize the amount of infrastructure exposed to hazards.
Lake County Hazard Mitigation Plan 2012	Lake County	Evaluate and strengthen the communication and transportation abilities of emergency services throughout the community.
Lake County Hazard Mitigation Plan 2012	Lake County	Improve emergency sheltering in the community.
Lake County Hazard Mitigation Plan 2012	Lake County	Support compliance with the NFIP.
Lake County Hazard Mitigation Plan 2012	Lake County	Review and update existing, or create new, community plans and ordinances to support hazard mitigation.
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct new studies/research to profile hazards and follow up with mitigation strategies.
Lake County Hazard Mitigation Plan 2012	Lake County	Raise public awareness on hazard mitigation.
Lake County Hazard Mitigation Plan 2012	Lake County	Improve education and training of emergency personnel and public officials.
Lake County Hazard Mitigation Plan 2012	Lake County	Continue to Pursue Opportunities for Intergovernmental Cooperation Capital Improvement Projects that address severe flooding and erosion problems threatening residential areas and public facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to residents in mobile homes, nursing homes, and assisted living facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Continue Implementation of Stormwater Ordinance in the County
Lake County Hazard Mitigation Plan 2012	Lake County	Continue Maintenance Program of Principal Regulated Drain System in Lake County
Lake County Hazard Mitigation Plan 2012	Lake County	Pursue Federal funding for significant identified flooding problems in unincorporated areas, along regulated drains. Ranburn Woods, Schererville Heights, Baldwin Hills, Stateline reservoir
Lake County Hazard Mitigation Plan 2012	Lake County	Integrate current local datasets with FEMA and EMA datasets to provide on the spot analysis for rapid response using computerized parcel data system & GIS
Lake County Hazard Mitigation Plan 2012	Lake County	Evaluate current training and increase if necessary for the following: elected officials, department heads; the goal is to improve emergency response and damage assessment reporting
Lake County Hazard Mitigation Plan 2012	Lake County	Improve Dike Ditch and levee west of U.S. 41 in West Creek Township; levee, which protects almost 3,000 acres is deteriorating
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct stream maintenance along Turkey Creek and its tributaries and maintain debris management in Singleton Ditch
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for approximately 20 homes in Shelby, Wildwood, Pons Riverside, and Ranburn Woods areas
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generators/transfer switches for Lions Club in Shelby and Multi-Purpose Center in Calumet Township
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a mass notification system similar to Reverse 911

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a comprehensive drainage study to determine future risk areas and identify solutions
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate Chase St. from 25th to 35th in Calumet Township, SR 2 at the viaduct east of U.S. 41 in West Creek Township, and Main Street west of Lowell
Lake County Hazard Mitigation Plan 2012	Lake County	Establish a new shelter at Lake Dalecarlia
Lake County Hazard Mitigation Plan 2012	Lake County	Install dry hydrants throughout the county
Lake County Hazard Mitigation Plan 2012	Lake County	Improve capacity to respond and remediate future flood events. Purchase sandbagging machines, portable pumps for north/south watersheds
Lake County Hazard Mitigation Plan 2012	Lake County	Continue coordination of flood response agencies to increase the capacity to address flood issues
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase and install new warning sirens in southern Lake County
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a program for public education regarding flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase generator/transfer switch for Gary Sanitary District
Lake County Hazard Mitigation Plan 2012	Lake County	Harden and flood proof the Calumet Township Multi-Purpose Center, Genesis Center, courthouse, critical facilities, and other public buildings
Lake County Hazard Mitigation Plan 2012	Lake County	Procure 4WD emergency vehicles for rescue and recovery
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to schools
Lake County Hazard Mitigation Plan 2012	Lake County	Improve drainage to Sleepy Hollow Ditch
Lake County Hazard Mitigation Plan 2012	Lake County	Include flood best management practices (BMPs) in Cedar Lake Comprehensive Plan
Lake County Hazard Mitigation Plan 2012	Lake County	Implement wetland retention in the southern portion of the town to mitigate flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Update zoning ordinances and incorporate into GIS layer
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a program to improve communications for students
Lake County Hazard Mitigation Plan 2012	Lake County	Enforce floodplain ordinances for new construction
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for repetitive loss properties; conduct a study for Brownfields redevelopment of fuel soils along Morris Street
Lake County Hazard Mitigation Plan 2012	Lake County	Install curbs and gutters to improve drainage
Lake County Hazard Mitigation Plan 2012	Lake County	Adjust the height of Cedar Creek Dam to regulate discharge from the lake (dam overtopped during 2008 flooding)
Lake County Hazard Mitigation Plan 2012	Lake County	Install a new siren on the southwest side of the town
Lake County Hazard Mitigation Plan 2012	Lake County	Introduce Nixle to the residents of Cedar Lake
Lake County Hazard Mitigation Plan 2012	Lake County	Implement new plans for public education including distribution of first aid kits, weather radios, and pamphlets
Lake County Hazard Mitigation Plan 2012	Lake County	Procure emergency generators and/or transfer switches for the City Hall
Lake County Hazard Mitigation Plan 2012	Lake County	Replace culverts and broken field tiles
Lake County Hazard Mitigation Plan 2012	Lake County	Remove the abandoned railroad viaduct to relieve flooding issues
Lake County Hazard Mitigation Plan 2012	Lake County	Update flood ordinances for new subdivisions
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a Blackboard study for mass communication
Lake County Hazard Mitigation Plan 2012	Lake County	Establish new shelters throughout the community
Lake County Hazard Mitigation Plan 2012	Lake County	Develop method to alert the public regarding hazards affecting Crown Point

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Replace damaged culverts
Lake County Hazard Mitigation Plan 2012	Lake County	Complete CSO mitigation project
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase generators/transfer switches for fire departments
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct stream maintenance
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study for Combined Sewer Operation Recommendations
Lake County Hazard Mitigation Plan 2012	Lake County	Create a database for identification of special needs population and institute a plan for rescue and recovery
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage system along major roadways
Lake County Hazard Mitigation Plan 2012	Lake County	Improve the conveyance system for ditches to improve water quality
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a detailed flood study of Hart Ditch from the bridge crossing at Hart Street to the bridge crossing at U.S. Route 30
Lake County Hazard Mitigation Plan 2012	Lake County	Minimize flooding by diverting or retaining stormwater
Lake County Hazard Mitigation Plan 2012	Lake County	Enforce development restrictions to comply with the NFIP
Lake County Hazard Mitigation Plan 2012	Lake County	Improve stormwater drainage to decrease localized damage caused by pooling in yards, basements, and streets
Lake County Hazard Mitigation Plan 2012	Lake County	Enhance coordination and collaboration between the Town of Dyer and Red Cross of Northwest Indiana
Lake County Hazard Mitigation Plan 2012	Lake County	Participate in the Community Rating System
Lake County Hazard Mitigation Plan 2012	Lake County	Procure educational trailers and literature to distribute to schools and town residents at public events
Lake County Hazard Mitigation Plan 2012	Lake County	Develop and implement a voluntary immunization program for first responders
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to residents in mobile homes, nursing homes, and major businesses
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generators for critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Establish a volunteer emergency response team
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase a mobile messaging board system to notify residents of traffic conditions, road closures, and other events
Lake County Hazard Mitigation Plan 2012	Lake County	Establish safe rooms in all community buildings
Lake County Hazard Mitigation Plan 2012	Lake County	Apply to become an NWS Storm Ready Community
Lake County Hazard Mitigation Plan 2012	Lake County	Add GPS units to snow plows and emergency vehicles
Lake County Hazard Mitigation Plan 2012	Lake County	Institute Reverse 911
Lake County Hazard Mitigation Plan 2012	Lake County	Improve shelters throughout the community
Lake County Hazard Mitigation Plan 2012	Lake County	Rehabilitate the 145th Street Pumping Station to relieve flooding for several hundred homes
Lake County Hazard Mitigation Plan 2012	Lake County	Install backflow valves in the Roxana neighborhood
Lake County Hazard Mitigation Plan 2012	Lake County	Harden all four fire stations and the police station
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate storm water and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Develop and implement a voluntary immunization program for first responders
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generator/transfer switch for the WWTP and schools
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade existing and install new warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to schools
Lake County Hazard Mitigation Plan 2012	Lake County	Implement new plans for public education including distribution of first aid kits, weather radios, and pamphlets
Lake County Hazard Mitigation Plan 2012	Lake County	Strengthen mutual aid agreements

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Produce 4WD emergency vehicles for rescue and recovery
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase a sewer vacuum truck for preventative maintenance
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a program for public education regarding flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage systems along I-65 exit, Clay Ave, 15th Ave, 5th Ave, I-80/94
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Secure funding to complete construction of the levees
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for properties along 25th and Clay to State St (approx 50 homes); Black Oak and East Glen Park areas; and 35th Ave.
Lake County Hazard Mitigation Plan 2012	Lake County	Retrofit critical facilities with backflow valves and inertial valves
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase generator/transfer switch for Gary Sanitary District
Lake County Hazard Mitigation Plan 2012	Lake County	Procure 4WD emergency vehicles for rescue and recovery
Lake County Hazard Mitigation Plan 2012	Lake County	Construct a viaduct for railroad crossing on the west side of the City; currently, the tracks cut off emergency transportation
Lake County Hazard Mitigation Plan 2012	Lake County	Harden and flood-proof the Cal Township Multi-Purpose Center, Genesis Center, courthouse, critical facilities, and other public buildings
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to schools
Lake County Hazard Mitigation Plan 2012	Lake County	Establish adequate sheltering in the town
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a mass notification system
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to schools and police dispatch center
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade existing and install new warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Develop a public education program to explain hazards affecting the town
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct stream maintenance
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage system along N. Broad St. from 45th to Ridge Rd and along W. Main St from Elgin to Kennedy
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to review levee infrastructure; existing levee does not meet certification standards due to pipes running through levee walls
Lake County Hazard Mitigation Plan 2012	Lake County	Harden all three fire stations and the police station
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Develop a flood preparedness and response plan
Lake County Hazard Mitigation Plan 2012	Lake County	Maintain channels and storm sewers to reduce localized flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct detailed flood studies to determine Base Flood Elevations for waterways connected to Lake Michigan
Lake County Hazard Mitigation Plan 2012	Lake County	Restrict development within the 100- and 500-year floodplains
Lake County Hazard Mitigation Plan 2012	Lake County	Enhance coordination and collaboration between the City of Hammond and Red Cross of Northwest Indiana
Lake County Hazard Mitigation Plan 2012	Lake County	Update and enhance HAZUS-MH with local GIS data to improve future HAZUS-MH modeling

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Develop an education program informing property owners within the “Levee Protection Zone” that their properties are still at risk from flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Participate in the Community Rating System
Lake County Hazard Mitigation Plan 2012	Lake County	Install a warning siren near the intersection of I-94 and Indianapolis Boulevard
Lake County Hazard Mitigation Plan 2012	Lake County	Adopt a resolution requiring Weather Alert Radios in municipally owned critical facilities. Promote Weather Alert Radios to all non-municipally owned critical facilities and all other City residents and businesses.
Lake County Hazard Mitigation Plan 2012	Lake County	Establish public outreach programs to educate residents on the hazards affecting the City
Lake County Hazard Mitigation Plan 2012	Lake County	Develop and implement a voluntary immunization program for first responders
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generators for critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Develop a "Good Neighbor Program" to encourage residents to maintain contact with their neighbors during emergencies
Lake County Hazard Mitigation Plan 2012	Lake County	Establish safe rooms in all community buildings
Lake County Hazard Mitigation Plan 2012	Lake County	Establish stormwater retention ordinance for new development
Lake County Hazard Mitigation Plan 2012	Lake County	Flood-proof flood stations along the levee and provide with generators
Lake County Hazard Mitigation Plan 2012	Lake County	Repair storm sewers
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a watershed study
Lake County Hazard Mitigation Plan 2012	Lake County	Construct retention ponds to reduce localized flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Replace culverts near Spring Creek
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for two homes along Cady Marsh Ditch
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase generators for Lincoln Center and Town Hall
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct stream maintenance on Little Cal River
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate Kennedy overpass and Cline Ave
Lake County Hazard Mitigation Plan 2012	Lake County	Install inertial valves and backflow valves at critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Combine the fire department, police department, and town hall into a new EOC
Lake County Hazard Mitigation Plan 2012	Lake County	Follow up on implementation of Nixle notification system
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to residents in mobile homes, nursing homes, and assisted living facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade the City’s drainage infrastructure
Lake County Hazard Mitigation Plan 2012	Lake County	Rebuild the community center
Lake County Hazard Mitigation Plan 2012	Lake County	Replace damaged culverts
Lake County Hazard Mitigation Plan 2012	Lake County	Reduce inflow and infiltration into the sanitary sewers throughout the City under the Hobart Sanitary District’s jurisdiction
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generator/transfer switch for City Hall
Lake County Hazard Mitigation Plan 2012	Lake County	Institute an FM early warning system
Lake County Hazard Mitigation Plan 2012	Lake County	Acquire land for construction of detention ponds to mitigate stormwater impact on neighborhoods, lakes, and rivers.
Lake County Hazard Mitigation Plan 2012	Lake County	Develop an EAP for Lake George and complete any necessary repairs to reduce chances of overtopping
Lake County Hazard Mitigation Plan 2012	Lake County	Establish public outreach programs to educate residents on the hazards affecting the City; establish Are You Ready? Packets
Lake County Hazard Mitigation Plan 2012	Lake County	Install additional warning sirens

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase a sewer camera for inspection
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to all schools
Lake County Hazard Mitigation Plan 2012	Lake County	Repair broken or damaged culverts
Lake County Hazard Mitigation Plan 2012	Lake County	Construct a new EOC
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-outs in the Riverside area
Lake County Hazard Mitigation Plan 2012	Lake County	Restrict development within the 100- and 500-year floodplains
Lake County Hazard Mitigation Plan 2012	Lake County	Improve critical portable water facilities with backup generators, buried service lines, SCADA, additional monitoring/sampling points, additional pumps, improved chemical containment, etc.
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade existing and install new warning sirens and educate the public about the siren alerts
Lake County Hazard Mitigation Plan 2012	Lake County	Implement new plans for public education including distribution of door-to-door flyers
Lake County Hazard Mitigation Plan 2012	Lake County	Procure emergency generators for schools
Lake County Hazard Mitigation Plan 2012	Lake County	Institute Rapid Notification System
Lake County Hazard Mitigation Plan 2012	Lake County	Develop and implement a Voluntary Immunization Program for first responders
Lake County Hazard Mitigation Plan 2012	Lake County	Establish a Swift Water Response Team
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade sanitary system
Lake County Hazard Mitigation Plan 2012	Lake County	Procure emergency portable pumps
Lake County Hazard Mitigation Plan 2012	Lake County	Procure a vactor truck
Lake County Hazard Mitigation Plan 2012	Lake County	Develop and implement an EMA/CERT program; educate, train, and acquire appropriate equipment for emergency personnel to support emergency response agencies
Lake County Hazard Mitigation Plan 2012	Lake County	Establish an Emergency Response Command Center to secure centralized communication during an emergency situation
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a detailed flood study of Deep River, Little Calumet River, and Burns Ditch
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase equipment for fire response during flood events
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase additional equipment for first responders including pumper and ladder truck for the fire department and two ambulances for EMS
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a program for public education regarding hazard preparedness
Lake County Hazard Mitigation Plan 2012	Lake County	Procure emergency generators for all critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate roads that frequently flood: Wyoming St; 23rd and 24th at Colorado; 28th Ave; east of Clay, North of Central; 4000 block off of Hwy 51; Old Hobart Rd North
Lake County Hazard Mitigation Plan 2012	Lake County	Install inertial valves and backflow valves at critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase lightning protection systems for key municipal and critical infrastructure
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade stormwater system
Lake County Hazard Mitigation Plan 2012	Lake County	Procure new and/or upgrade existing fire hydrants
Lake County Hazard Mitigation Plan 2012	Lake County	Improve critical potable water facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a detailed study to review levee infrastructure
Lake County Hazard Mitigation Plan 2012	Lake County	Harden the Boys and Girls Club to make it an effective shelter
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and construct a second point for Ingress/Egress for the C.S.L. & INV. CO's Liverpool addition
Lake County Hazard Mitigation Plan 2012	Lake County	Construct an animal shelter

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Establish public outreach programs to educate residents on the hazards affecting the town
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to determine potential buy-out properties
Lake County Hazard Mitigation Plan 2012	Lake County	Procure sandbagging equipment
Lake County Hazard Mitigation Plan 2012	Lake County	Install three additional warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase new generators for critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a watershed study
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase portable pumps for flooding
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to determine shelter capacity in the town
Lake County Hazard Mitigation Plan 2012	Lake County	Repair older and damaged bridges
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate 205th and Monon
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade EMS equipment and provide more training to first responders
Lake County Hazard Mitigation Plan 2012	Lake County	Establish an emergency vehicle fleet (4WD, snowmobile, water craft)
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a program for distribution of weather radios to the public at a reduced cost
Lake County Hazard Mitigation Plan 2012	Lake County	Develop underground water stores
Lake County Hazard Mitigation Plan 2012	Lake County	Harden fire station to make it an effective shelter
Lake County Hazard Mitigation Plan 2012	Lake County	Use local radio station for weather announcements
Lake County Hazard Mitigation Plan 2012	Lake County	Establish shelters in the town
Lake County Hazard Mitigation Plan 2012	Lake County	Work with neighboring communities to improve sewer backup; add capacity to Town's sewer system
Lake County Hazard Mitigation Plan 2012	Lake County	Replace existing or install new culverts in the following areas: Broadway, Beaver Dam Ditch, Turkey Creek
Lake County Hazard Mitigation Plan 2012	Lake County	Procure more equipment for volunteer fire departments
Lake County Hazard Mitigation Plan 2012	Lake County	Install additional warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage system along major roadways
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate roads in the southeast quadrant of the town
Lake County Hazard Mitigation Plan 2012	Lake County	Construct a retention pond in the northern part of town
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a mass notification system such as Nixle
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generators for critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Establish a CERT program
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase generators for all lift stations
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute a newsletter for public education regarding potential hazards facing the town
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to evaluate bridge infrastructure at Northcote Ave
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines north of Ridge Road
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for 35 homes behind the levee; convert to green space
Lake County Hazard Mitigation Plan 2012	Lake County	Follow up on implementation of Nixle notification system
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct stream maintenance in Harts Ditch
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a watershed study
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate roads that frequently flood
Lake County Hazard Mitigation Plan 2012	Lake County	Install inertial valves and backflow valves at critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade existing warning sirens and complete installation of lightning detection systems at parks
Lake County Hazard Mitigation Plan 2012	Lake County	Establish an FM station to alert the public of weather announcements

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Develop an evacuation plan for domestic animals
Lake County Hazard Mitigation Plan 2012	Lake County	Develop a program to distribute weather radios to all critical facilities, especially nursing homes and schools
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Install a warning siren on the fire station
Lake County Hazard Mitigation Plan 2012	Lake County	Construct a new EOC to be combined with Central dispatch and fire station; current building is out of date regarding building codes
Lake County Hazard Mitigation Plan 2012	Lake County	Address localized flooding at Fountain Park
Lake County Hazard Mitigation Plan 2012	Lake County	Upgrade existing and install new warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Complete a watershed study
Lake County Hazard Mitigation Plan 2012	Lake County	Replace sewer truck
Lake County Hazard Mitigation Plan 2012	Lake County	Institute a buy-out plan for properties along Turkey Creek, Kennedy Ave, Summer St, and Starlight Dr.
Lake County Hazard Mitigation Plan 2012	Lake County	Harden critical facilities, especially fire stations and schools; currently, only dispatch is hardened
Lake County Hazard Mitigation Plan 2012	Lake County	Procure generators for fire stations and lift stations
Lake County Hazard Mitigation Plan 2012	Lake County	Establish public outreach programs to educate residents on the hazards affecting the Town
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage systems along Kennedy Ave and Eagle Ridge
Lake County Hazard Mitigation Plan 2012	Lake County	Repair damaged dike located off Rohrman Rd.
Lake County Hazard Mitigation Plan 2012	Lake County	Retrofit bridge at railroad intersection (U.S. 41 and U.S. 30) to improve drainage issues
Lake County Hazard Mitigation Plan 2012	Lake County	Develop an alternative communication center as backup
Lake County Hazard Mitigation Plan 2012	Lake County	Distribute weather radios to all critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to determine potential buy-out properties
Lake County Hazard Mitigation Plan 2012	Lake County	Improve stormwater drainage to decrease localized damage caused by pooling in yards, basements, and streets
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generator for Community Center
Lake County Hazard Mitigation Plan 2012	Lake County	Implement new plans for public education including distribution of first aid kits, weather radios, and pamphlets
Lake County Hazard Mitigation Plan 2012	Lake County	Harden fire station
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage system along U.S. 41
Lake County Hazard Mitigation Plan 2012	Lake County	Install an additional warning siren
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines
Lake County Hazard Mitigation Plan 2012	Lake County	Clear trees and debris from rivers, creeks, and/or ditches, especially around St. John Ditch at Hart St.; Blaine St and 101st N; Bull Run at 109th St.
Lake County Hazard Mitigation Plan 2012	Lake County	Procure generators for lift stations, well sites, and water treatment plant
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage systems in the following areas: Watts subdivision, lateral drain under U.S. 41; downstream to Schererville; 85th Ave at Parrish
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate 109th at Bull Run and 85th at Parrish
Lake County Hazard Mitigation Plan 2012	Lake County	Replace culverts at 9300 and Columbia; St. John Ditch @ Hart St; Blaine St. and 101st N; 85th and Parrish
Lake County Hazard Mitigation Plan 2012	Lake County	Create a database for identification of special needs population and institute a plan for rescue and recovery

Name of Plan	County	Hazard Mitigation Actions and Strategies
Lake County Hazard Mitigation Plan 2012	Lake County	Develop a program to distribute weather radios to all critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Procure generators for critical facilities
Lake County Hazard Mitigation Plan 2012	Lake County	Establish public outreach programs to educate residents on the hazards affecting the town
Lake County Hazard Mitigation Plan 2012	Lake County	Procure a back-up storm pump for retention basin
Lake County Hazard Mitigation Plan 2012	Lake County	Install warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Purchase a sewer vacuum truck for preventative maintenance
Lake County Hazard Mitigation Plan 2012	Lake County	Assess and upgrade drainage system along 117th/113th Ave
Lake County Hazard Mitigation Plan 2012	Lake County	Elevate the following roads: 117th, Arizona, 109th
Lake County Hazard Mitigation Plan 2012	Lake County	Install/repair culverts at 117th, Co. Line Rd, and 109th
Lake County Hazard Mitigation Plan 2012	Lake County	Enlarge existing detention basin in Hidden Creek Subdivision; Install new diversion storm water pipe; and replace 103rd Avenue Culvert
Lake County Hazard Mitigation Plan 2012	Lake County	Procure back-up generators for Town Hall and Township Office
Lake County Hazard Mitigation Plan 2012	Lake County	Harden critical facilities, especially fire stations and municipal buildings
Lake County Hazard Mitigation Plan 2012	Lake County	Implement a mass notification system such as Nixle
Lake County Hazard Mitigation Plan 2012	Lake County	Establish a new shelter
Lake County Hazard Mitigation Plan 2012	Lake County	Enlarge existing detention basin in Hidden Creek Subdivision; install new diversion storm water pipe; and replace 103rd Avenue culvert
Lake County Hazard Mitigation Plan 2012	Lake County	Clear trees and debris from rivers, creeks, and/or ditches, especially around Deer Creek and Hidden Creek
Lake County Hazard Mitigation Plan 2012	Lake County	Create a database for identification of special needs population and institute a plan for rescue and recovery
Lake County Hazard Mitigation Plan 2012	Lake County	Install additional warning sirens
Lake County Hazard Mitigation Plan 2012	Lake County	Conduct a study to determine potential buy-out properties
Porter County Hazard Mitigation Plan 2011	Porter County	Retrofit critical facilities and structures with structural design practices and equipment that will withstand natural disasters and offer weather-proofing.
Porter County Hazard Mitigation Plan 2011	Porter County	Equip public facilities and communities to guard against damage caused by secondary effects of hazards.
Porter County Hazard Mitigation Plan 2011	Porter County	Minimize the amount of infrastructure exposed to hazards.
Porter County Hazard Mitigation Plan 2011	Porter County	Evaluate and strengthen the communication and transportation abilities of emergency services throughout the community.
Porter County Hazard Mitigation Plan 2011	Porter County	Improve emergency sheltering in the community.
Porter County Hazard Mitigation Plan 2011	Porter County	Support compliance with the NFIP.
Porter County Hazard Mitigation Plan 2011	Porter County	Review and update existing, or create new, community plans and ordinances to support hazard mitigation.
Porter County Hazard Mitigation Plan 2011	Porter County	Conduct new studies/research to profile hazards and follow up with mitigation strategies.
Porter County Hazard Mitigation Plan 2011	Porter County	Raise public awareness on hazard mitigation.
Porter County Hazard Mitigation Plan 2011	Porter County	Improve education and training of emergency personnel and public officials.
Porter County Hazard Mitigation Plan 2011	Porter County	Ensure that all communities participate in the NFIP
Porter County Hazard Mitigation Plan 2011	Porter County	Establish an active LEPC
Porter County Hazard Mitigation Plan 2011	Porter County	Distribute weather radios to critical facilities
Porter County Hazard Mitigation Plan 2011	Porter County	Conduct a sewer upgrade to separate stormwater and sanitary sewer lines

Name of Plan	County	Hazard Mitigation Actions and Strategies
Porter County Hazard Mitigation Plan 2011	Porter County	Conduct stream and ditch maintenance, particularly Peterson ditch, Little Cal, and Coffee Creek
Porter County Hazard Mitigation Plan 2011	Porter County	Conduct a study to determine shelter capacity; establish new shelters, safe rooms, and warming centers as necessary; equip with generators and necessary response materials
Porter County Hazard Mitigation Plan 2011	Porter County	Institute a mass notification system, e.g. Reverse 911 or Blackboard Connect, to cover all communities within the county
Porter County Hazard Mitigation Plan 2011	Porter County	Procure generators or transfer switches for all essential facilities
Porter County Hazard Mitigation Plan 2011	Porter County	Develop a debris management program for vegetation removal
Porter County Hazard Mitigation Plan 2011	Porter County	Purchase new equipment for managing debris, e.g. chippers and tub grinders
Porter County Hazard Mitigation Plan 2011	Porter County	Repair drainage tiles and culverts and redirect surface runoff
Porter County Hazard Mitigation Plan 2011	Porter County	Upgrade existing and install new warning sirens
Porter County Hazard Mitigation Plan 2011	Porter County	Improve and enforce floodplain ordinances regarding new construction
Porter County Hazard Mitigation Plan 2011	Porter County	Work with a corps of engineers to redesign levees in order to minimize damages to future development, especially agricultural areas
Porter County Hazard Mitigation Plan 2011	Porter County	Institute a buy-out plan for repetitive loss properties
Porter County Hazard Mitigation Plan 2011	Porter County	Elevate roads that frequently flood including Meridian and 950N, Meridian and 1100N, SR 149 and 700N or repave older roads
Porter County Hazard Mitigation Plan 2011	Porter County	Develop a database of special needs populations to be housed at a facility that can serve as a shelter