FEMA

Delaware Bay / River Coastal Flood Risk Study

FEMA REGION II and III
September 19, 2012

RiskMAP
Increasing Resilience Together

Agenda

- Risk MAP Program Overview
- Risk MAP Non-Regulatory Products & Datasets
- Region II New Jersey Coastal Flood Study & Outreach
- Region III Delaware and Pennsylvania Studies & Outreach
- Storm Surge Results and Coastal Hazard Analyses
- Questions

The Paradigm Shift: Map Mod to Risk MAP

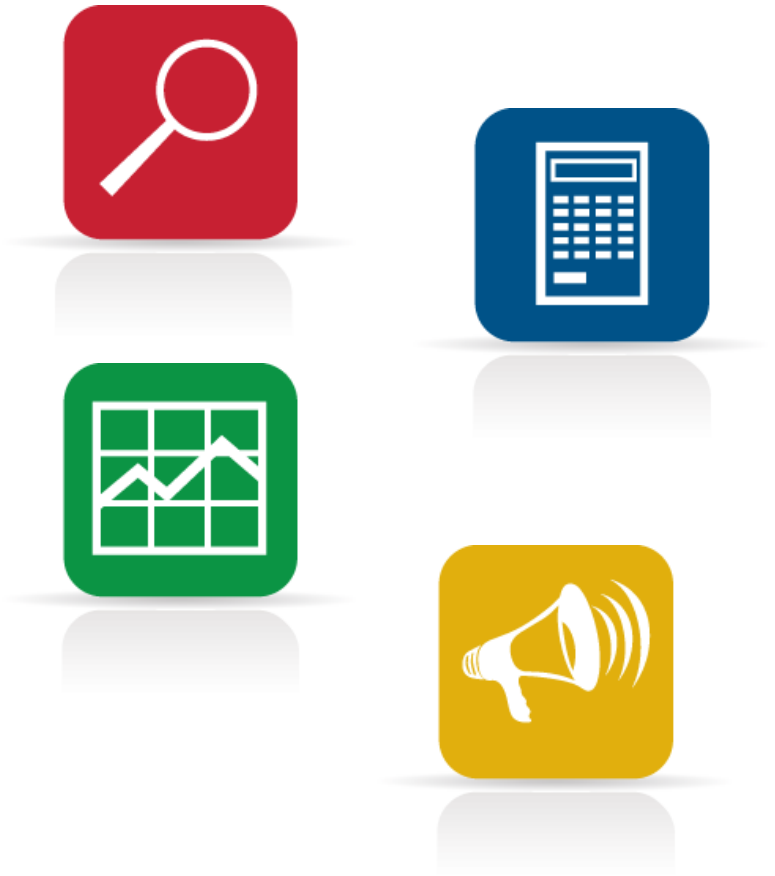
- Map Modernization used increasingly-available technology to increase the quality, reliability, and availability of flood hazard maps and data
- It focused on digitizing maps to provide timely, accurate information to community planners

Risk MAP further enhances the maps, involves communities during the assessment and planning stages, and guides and encourages them to communicate risk to their constituents

What is Risk MAP?

In 2009, FEMA developed the Risk Mapping, Assessment, and Planning (Risk MAP) initiative. The goal of Risk MAP is to deliver, in collaboration with State, local, and Tribal entities, quality data that increases public awareness and leads to action that reduces risk to life and property

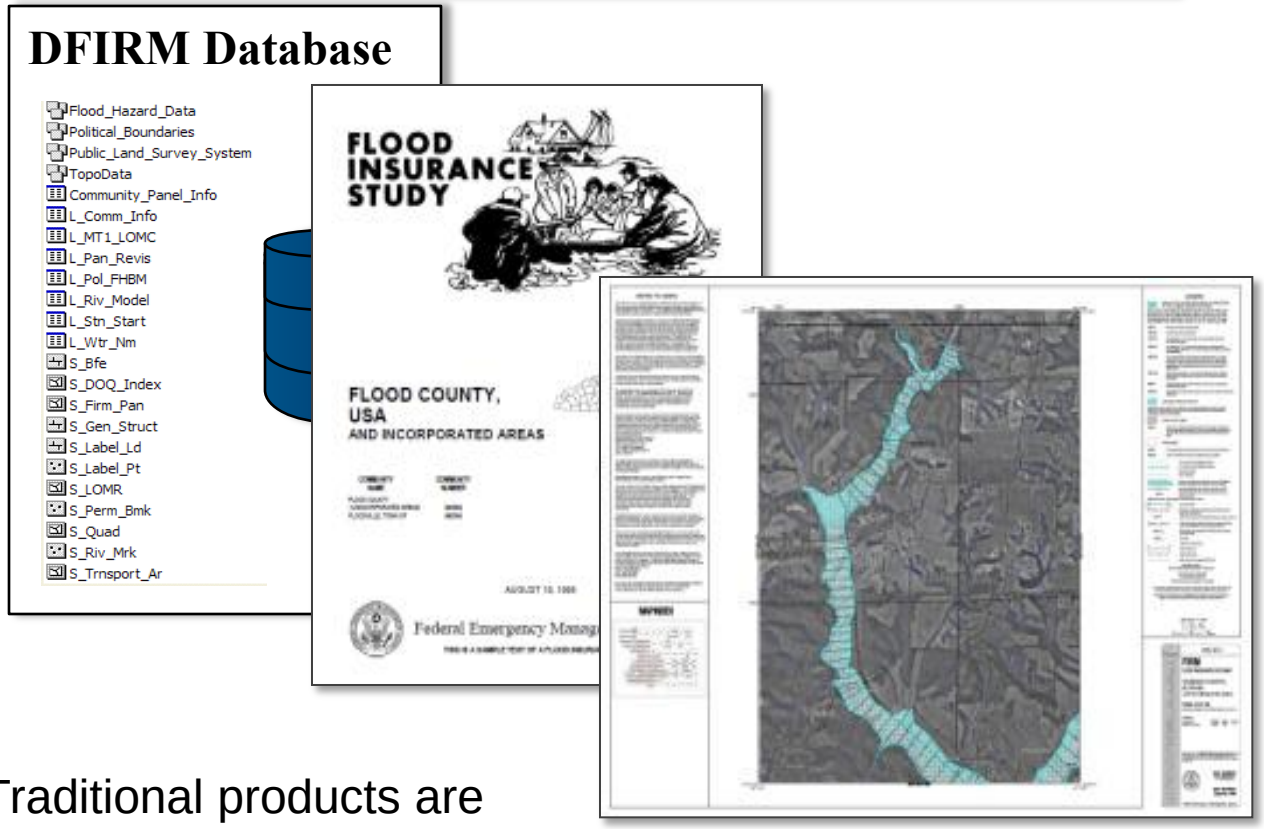
Risk MAP Strategies



- Prioritization
- Elevation Data Acquisition
- Watershed Approach
- Engineering and Mapping
- Risk Assessment
- Mitigation Planning Support
- Risk Communications

Risk MAP Flood Risk Products

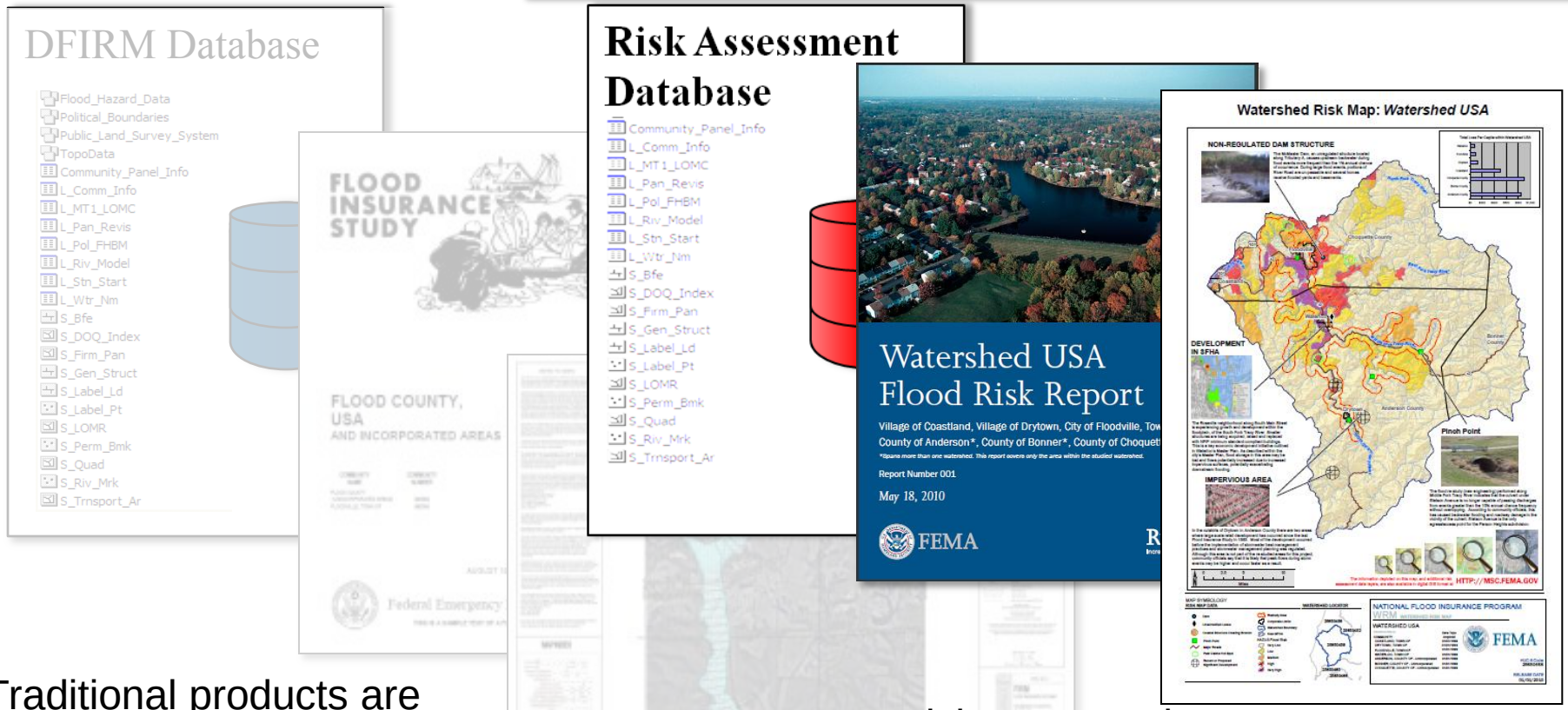
Traditional Regulatory Products



Traditional products are regulatory and subject to statutory due-process requirements

Risk MAP Flood Risk Products

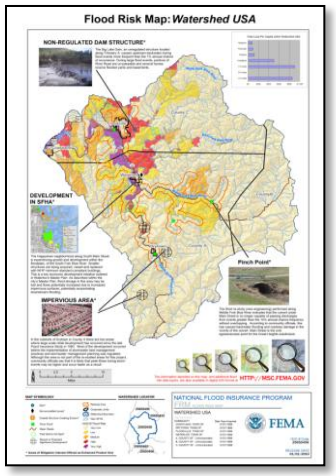
Non-Regulatory Flood Risk Products



Traditional products are regulatory and subject to statutory due-process requirements

Risk MAP products are non-regulatory and are not subject to statutory due-process requirements

Flood Risk Products and Data Model

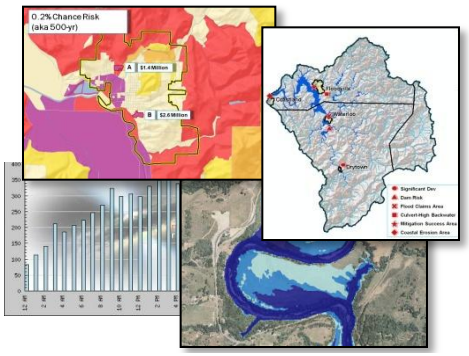


Flood Risk Map

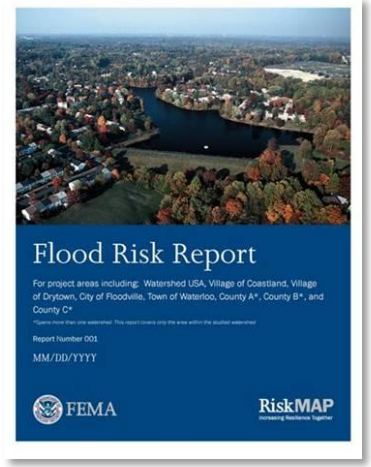
Flood Risk Database

Flood Risk Assessment Data
Flood Depth & Analysis Grids

Changes Since Last FIRM Data
Areas of Mitigation Interest



Ad-Hoc Flood Risk Analyses



Flood Risk Report

Required and Optional Coastal Flood Risk Datasets

Standard Coastal Flood Risk Datasets (Required)

- Changes Since Last FIRM
- 1% Annual Chance Depth Grid
- Flood Risk Assessments (HAZUS Loss Analysis)
- Areas of Mitigation Interest

Enhanced Coastal Flood Risk Datasets (Optional)

- Coastal Increased Inundation Areas
- Coastal Wave Height Grid
- Primary Frontal Dune Erosion Areas
- Eroded Dune Peak

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Non-Regulatory Products

Changes Since Last FIRM Dataset

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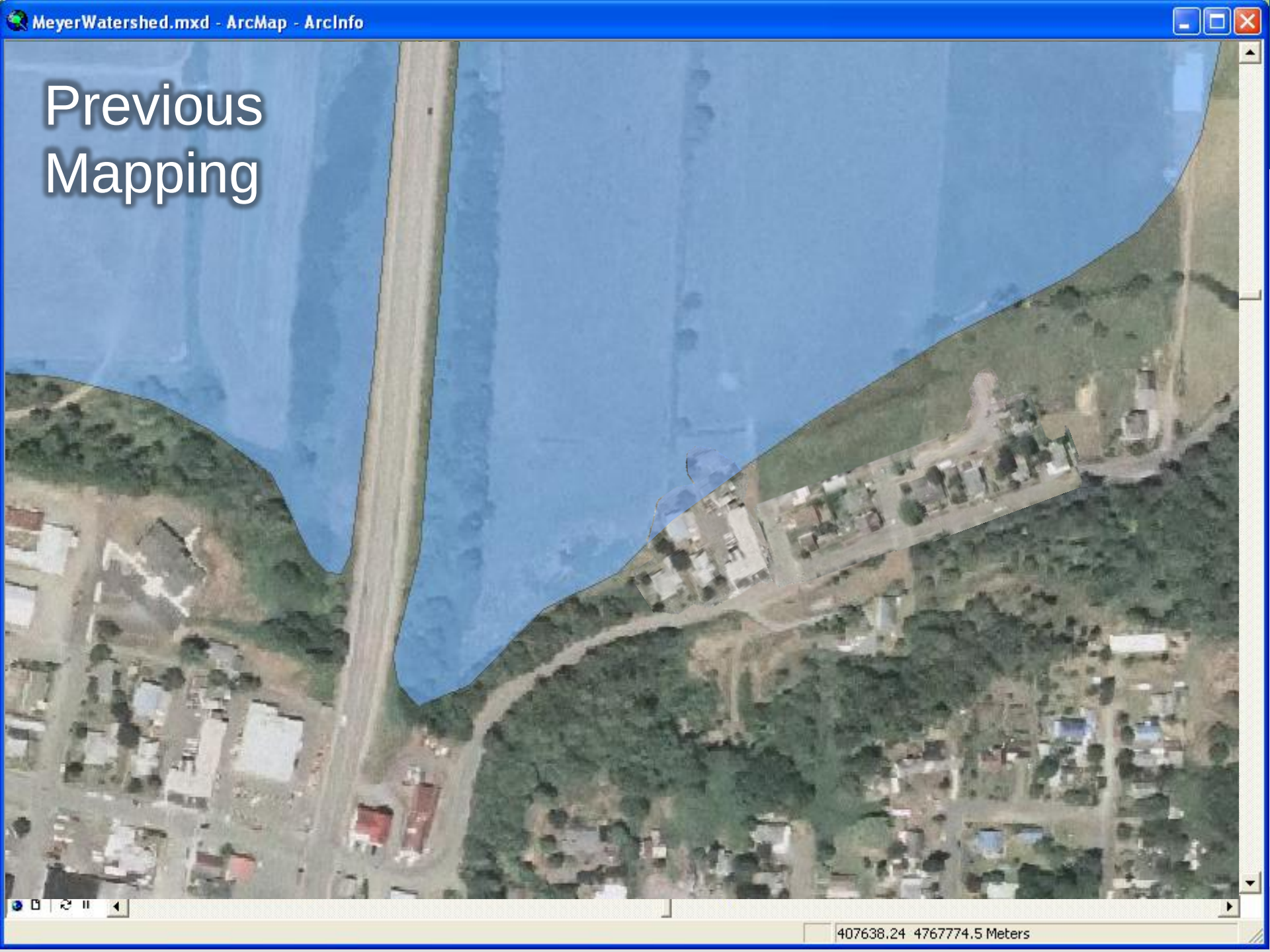
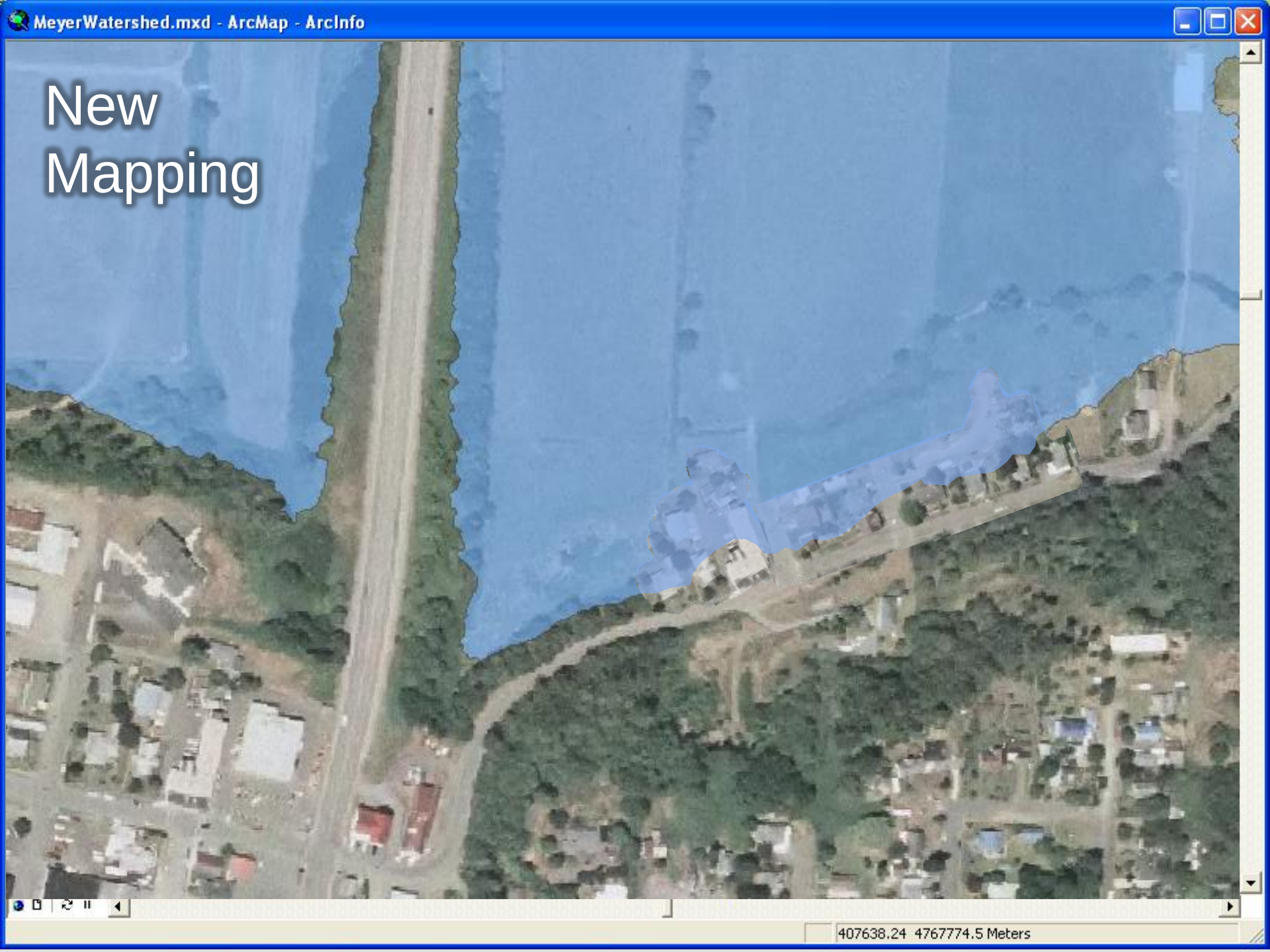
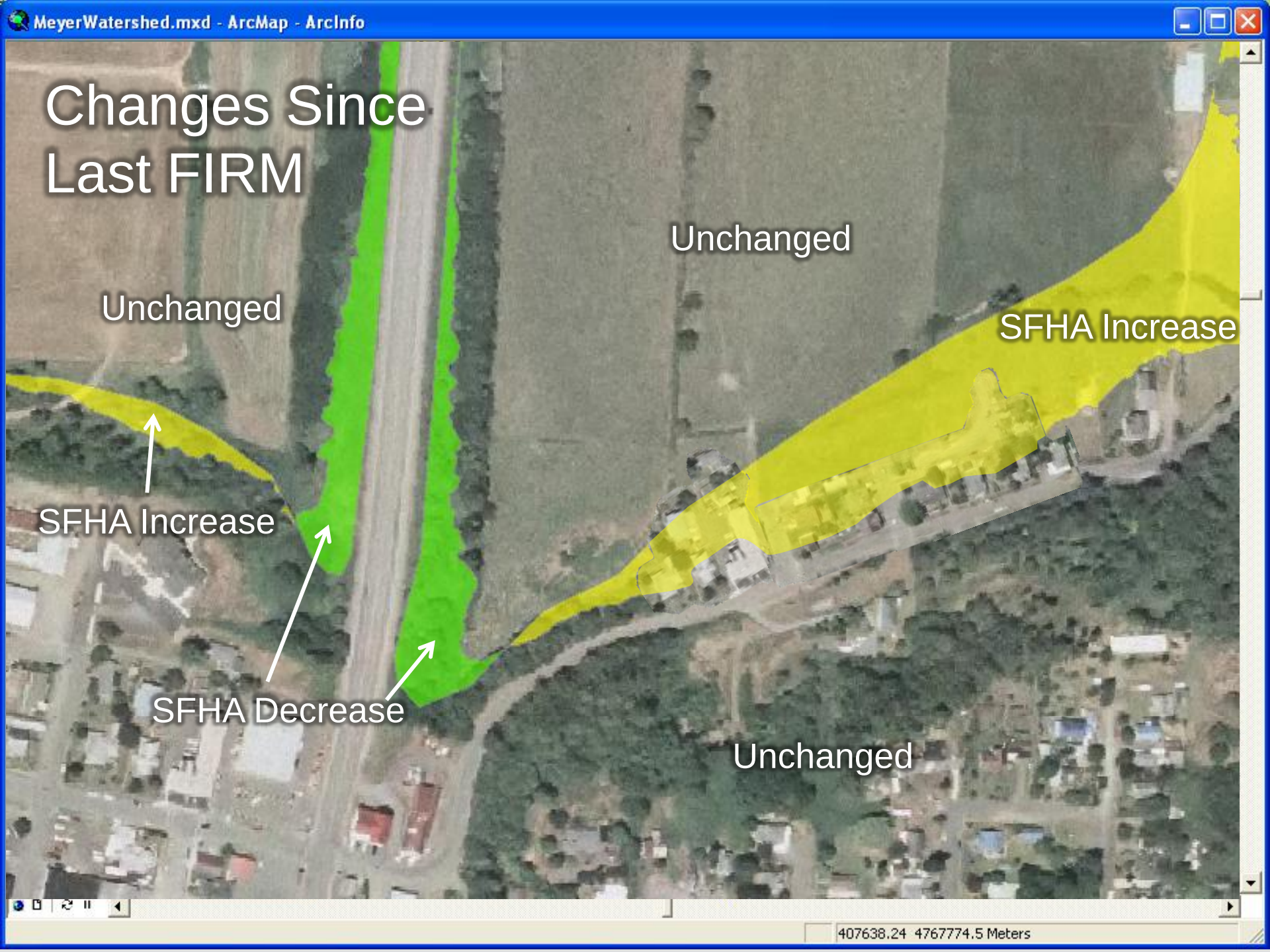
Purpose of Changes Since Last FIRM

- **Identify Areas and Types of Flood Zone Change:**
  - Compares current effective (previous) with proposed (new) flood hazard mapping. (all inputs must be digital)
  - Flood zone changes are categorized and quantified
- **Provide Study/Reach Level Rationale for Changes Including:**
  - Methodology and assumptions
  - Changes of model inputs or parameters (aka Contributing Engineering Factors)
- **Offer Stakeholders Transparency and Answers to:**
  - Where have my flood hazards increased or decreased?
  - Why may have my flood hazards increased or decreased?
  - Which communities are subject to new BFEs or ordinance adjustments.


MeyerWatershed.mxd - ArcMap - ArcInfo
Previous Mapping
407638.24 4767774.5 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
New
Mapping
407638.24 4767774.5 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
Changes Since Last FIRM
Unchanged
Unchanged
SFHA Increase
SFHA Increase
SFHA Decrease
Unchanged
407638.24 4767774.5 Meters

Changes Since Last FIRM (CSLF) Features and Benefits

- **Makes it easy for communities and homeowners to identify the impacts of new maps on the regulatory floodplain**
  - Identifies new at risk properties eligible for Preferred Risk Policy
- **Assists in prioritizing mitigation actions**
  - Essential in determining where flood risk mitigation strategies are needed
  - New areas may be found at risk to flooding
  - Mitigation might be focused on slowing, or reducing future increases in flooding
- **Helps identify reasons for changes**

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Risk MAP
Non-Regulatory Products

Flood Depth & Analysis Grids (DAGs)

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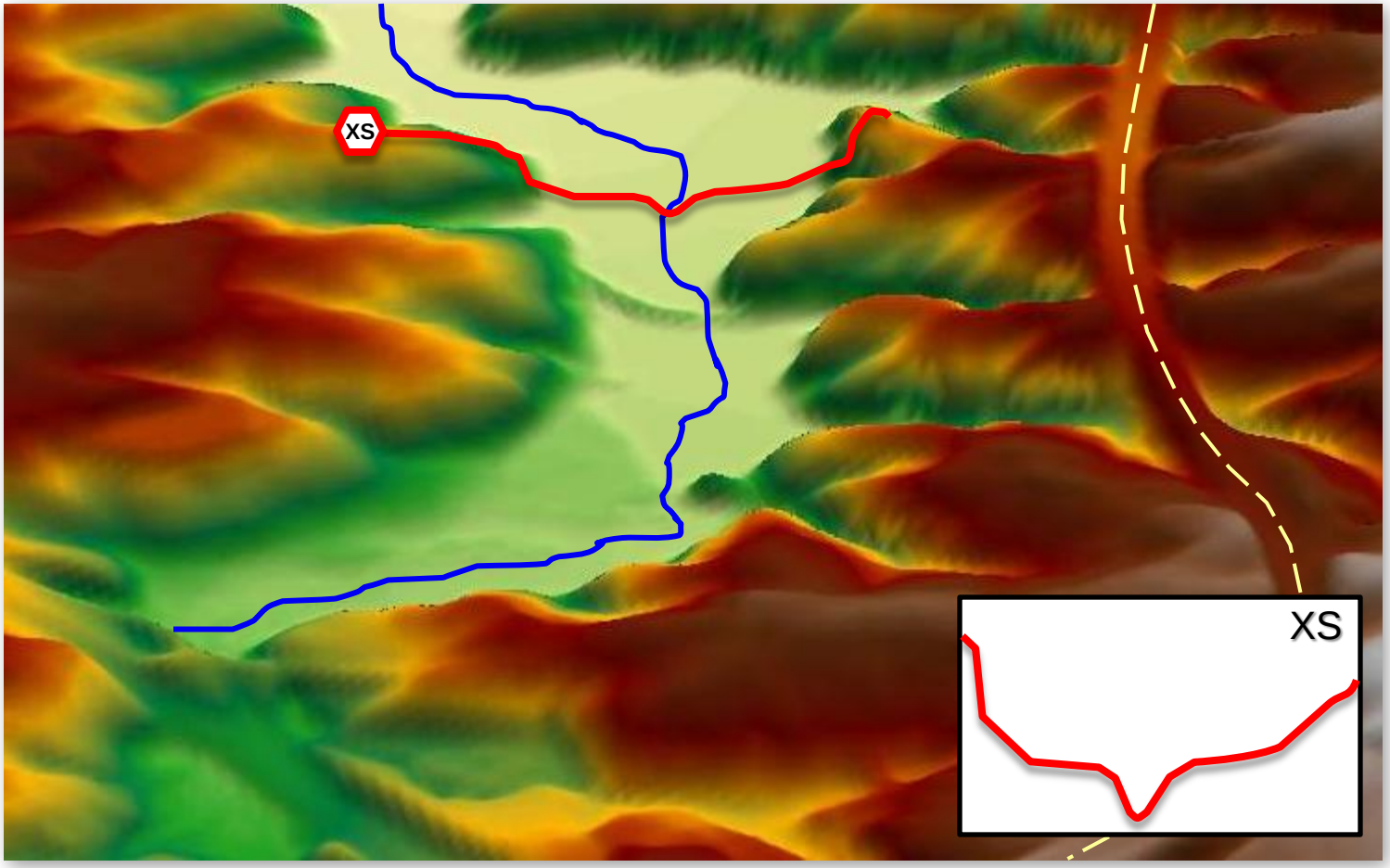
Purpose of Flood Depth & Analysis Grids

- Communicate / 'Show' Flood Inundation as Function of Event's Magnitude or Severity
- Serve as Key Inputs to HAZUS Risk Assessment Analyses
- Serve as pre-screening criteria for mitigation project potential
- Increase Flood Risk Awareness as Acknowledged from Varied Contexts (Depth, Probability, Velocity, etc.)
- Communicate that Hazard, and by extension Risk, varies within the mapped floodplain

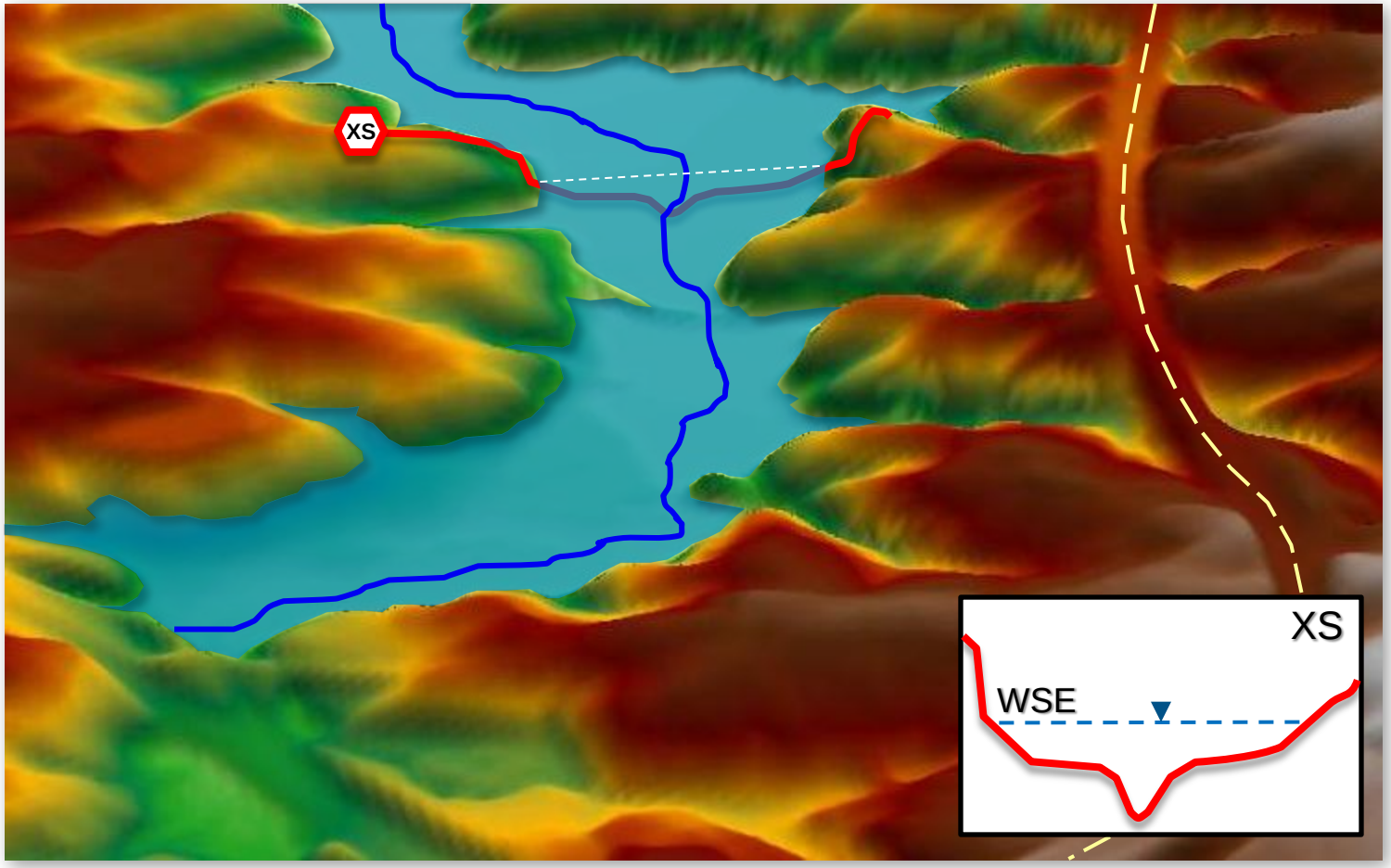
Flood Depth Grids

- **Flood Depth Grid Creation Process**



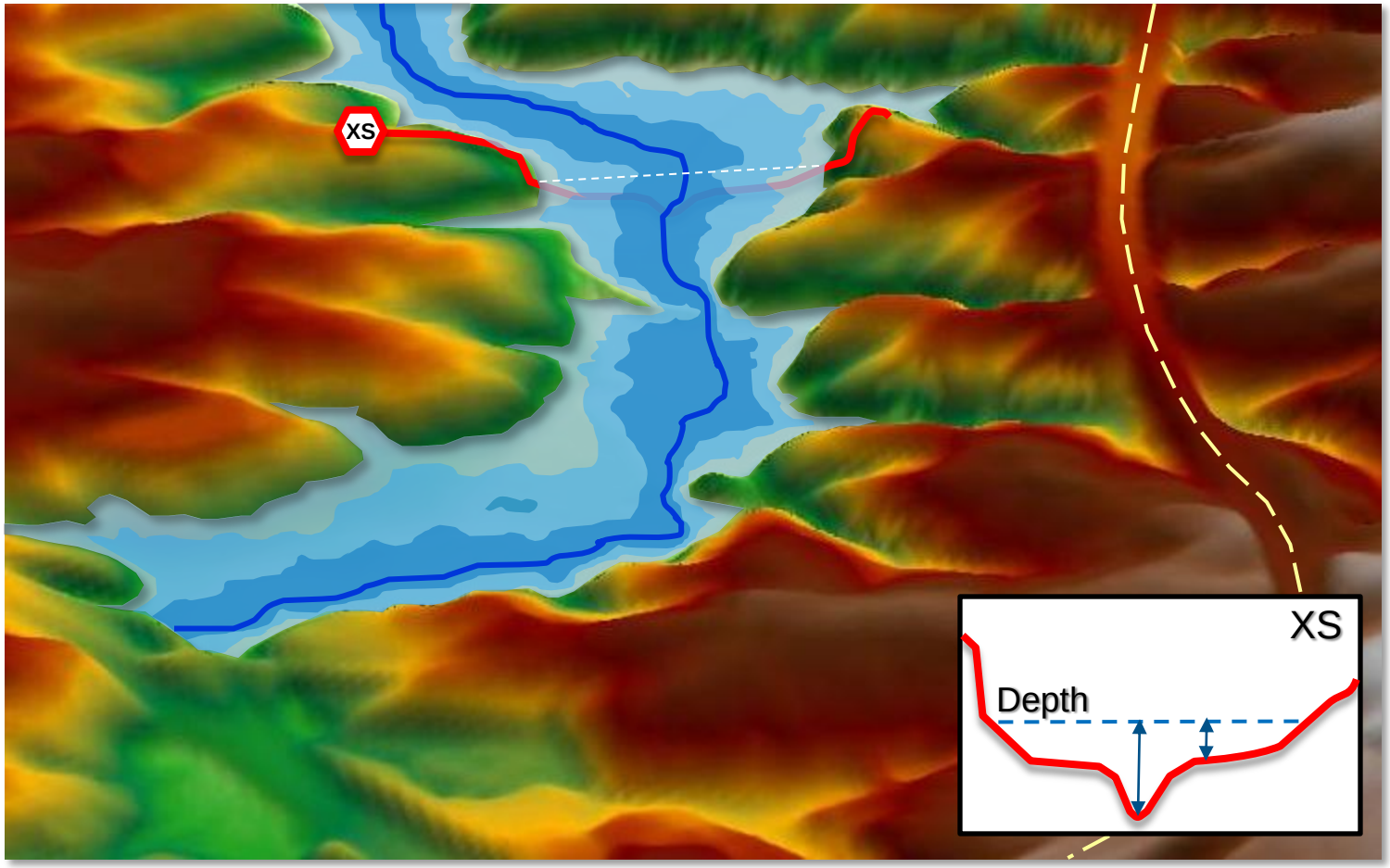
Flood Depth Grids

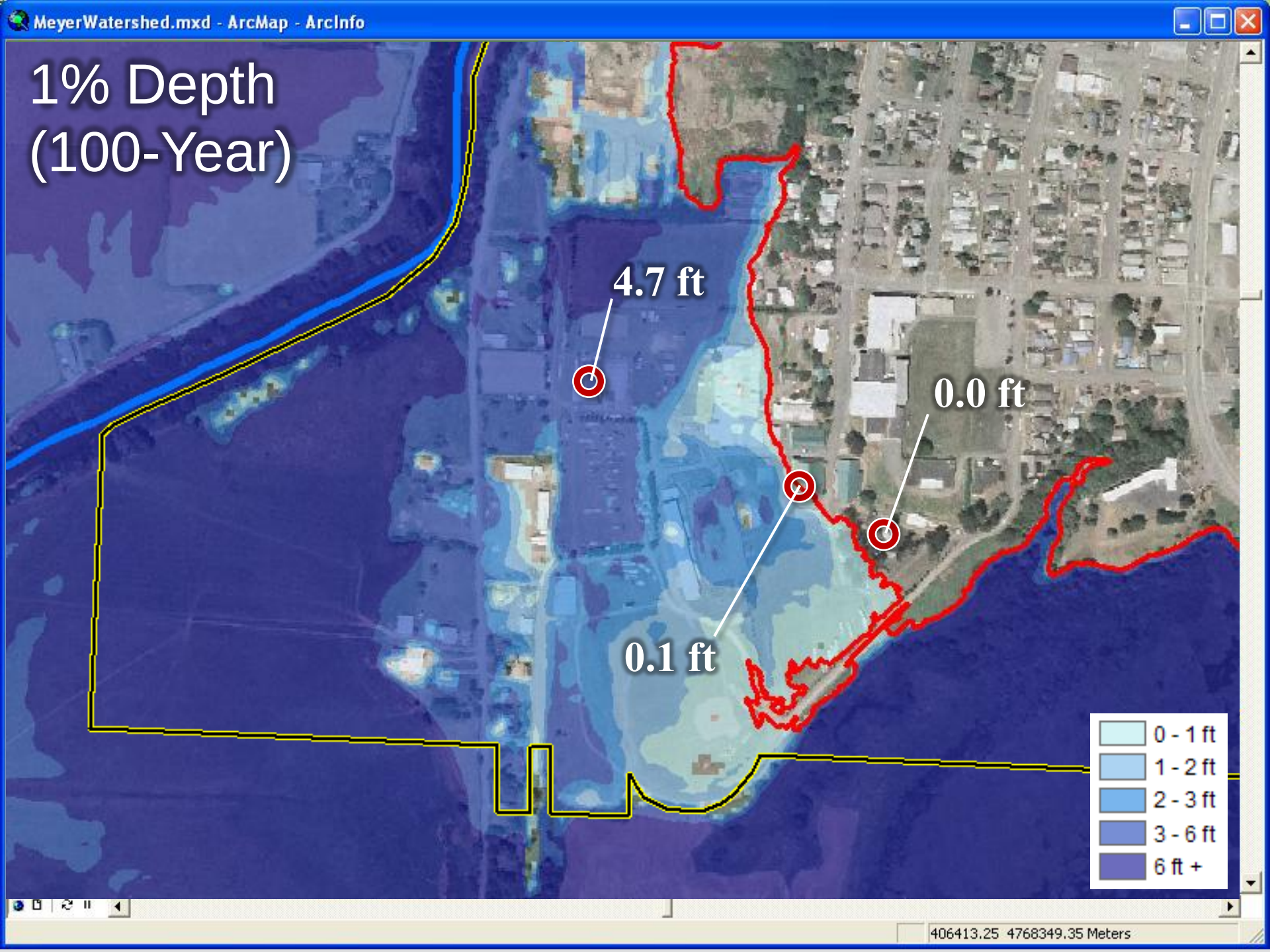
- **Water Surface Elevations (WSE) Calculated and WSE Grid Produced**



Flood Depth Grids

- **Depth Grid Calculated as Difference between WSE and Ground**




MeyerWatershed.mxd - ArcMap - ArcInfo
1% Depth
(100-Year)
4.7 ft
0.0 ft
0.1 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters

Depth Grids
Features and Benefits

- **Assists with mitigation prioritization based on risk**
- **Assists local permit officials by identifying areas of high hazard**
  - Clearly depicts high flood risk areas for future planning
  - Assists with advanced recovery planning and disaster preparedness
- **Assists with cost effectiveness screening**
  - Evaluating cost effectiveness of potential mitigation projects (including BCA support)
- **Effective visual tool to communicate risk to public**

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Risk MAP
Non-Regulatory Products

Flood Risk Assessment Data

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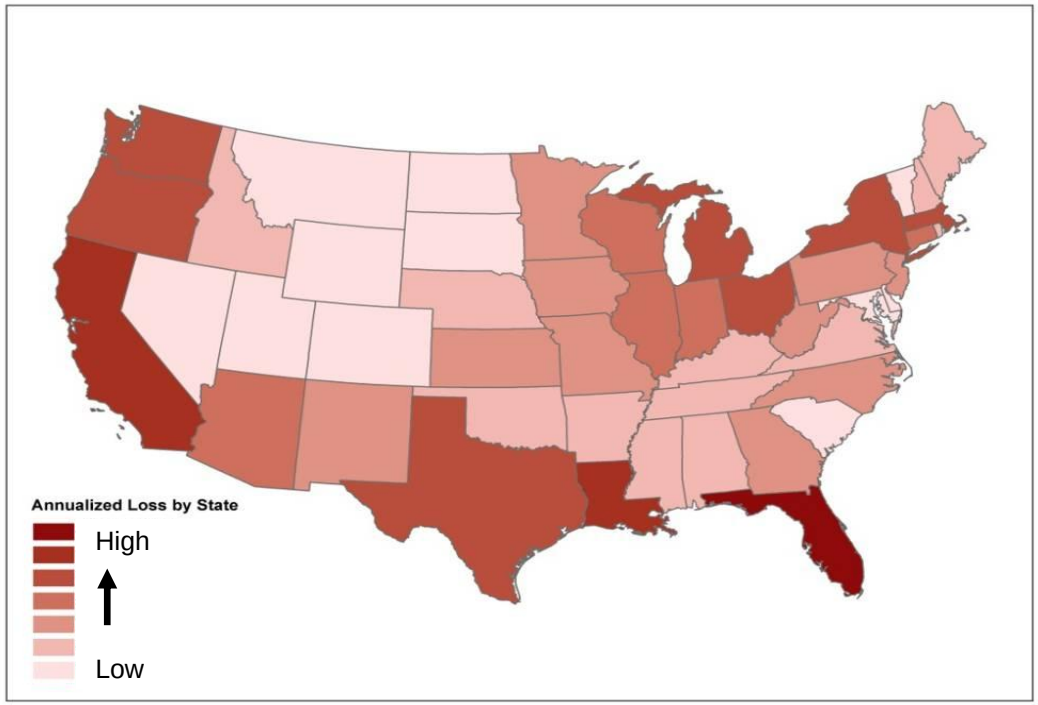
Flood Risk Assessment Dataset
(Purpose and Intended Uses)

- **Identifies Areas with Higher Relative Flood Risk:**
  - Floodprone Areas
  - Vulnerable people and property
- **Quantifies Risk by Providing Flood Loss Estimates:**
  - Potential damage severity for different flood frequencies
  - Identify locations with possible cost effective mitigation options
- **Improves (refines) Existing Flood Risk Estimates:**
  - 2010 Average Annualized Loss Dataset

2010 AAL HAZUS Study

- **2010 HAZUS-MH Flood Average Annualized Loss Estimation (AAL) was performed for continental U.S. using MR4**
- **Inputs:**
  - County-wide study regions
  - 30 meter DEM
  - Default Census data
- **Parameters**
  - 10 square mile drainage area threshold
- **Final output included**
  - Total exposure
  - Average Annualized Loss
    - Annualized Loss Ratio

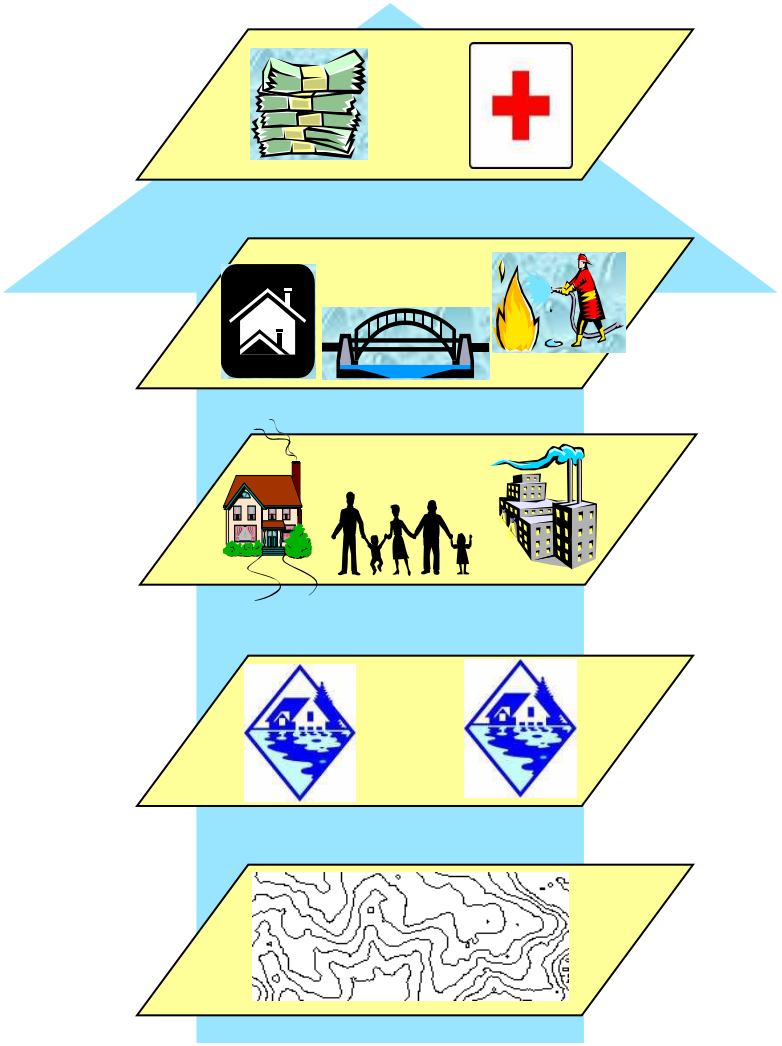


Refined HAZUS Analysis

- **Overview:**
  - Depth grids imported into HAZUS
    - Will always be created for new or revised study areas

  - HAZUS run for each return period and annualized results
  - HAZUS results exported and stored in Flood Risk Database

How HAZUS-MH estimates losses



Produces maps, tables, and reports

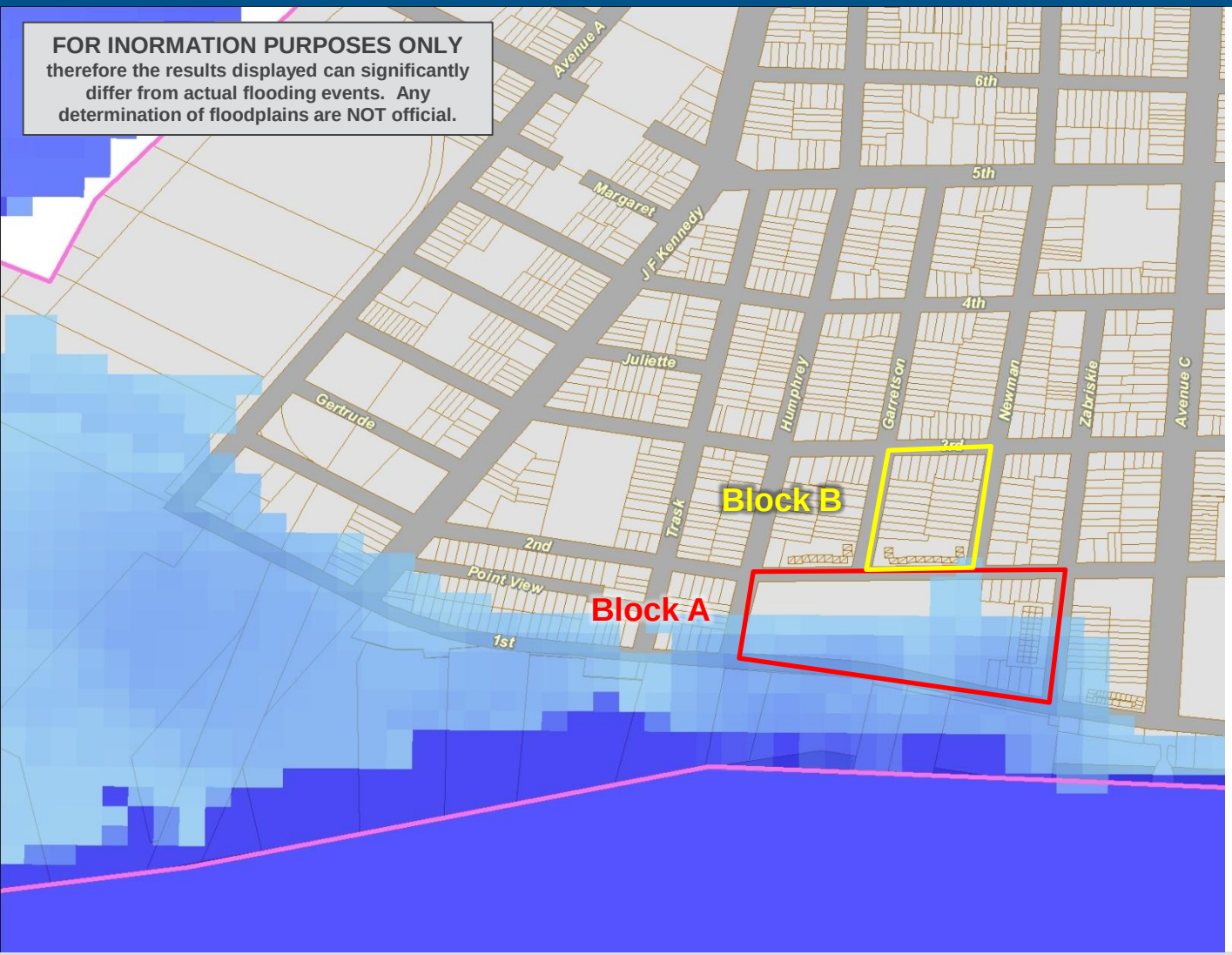
Analyzes social and economic impacts

Considers what is at risk

Identifies hazard

Analyzes physical landscape

Bayonne City: 1% (100 Year) Flood



Legend

- Bayonne City Limits
- Land Parcel

1% (100 yr) Flood

Value

High : 11.0149

Low : 0.0001

Block A

- **$6,658,000** total loss from building damage
- **622** tons of debris

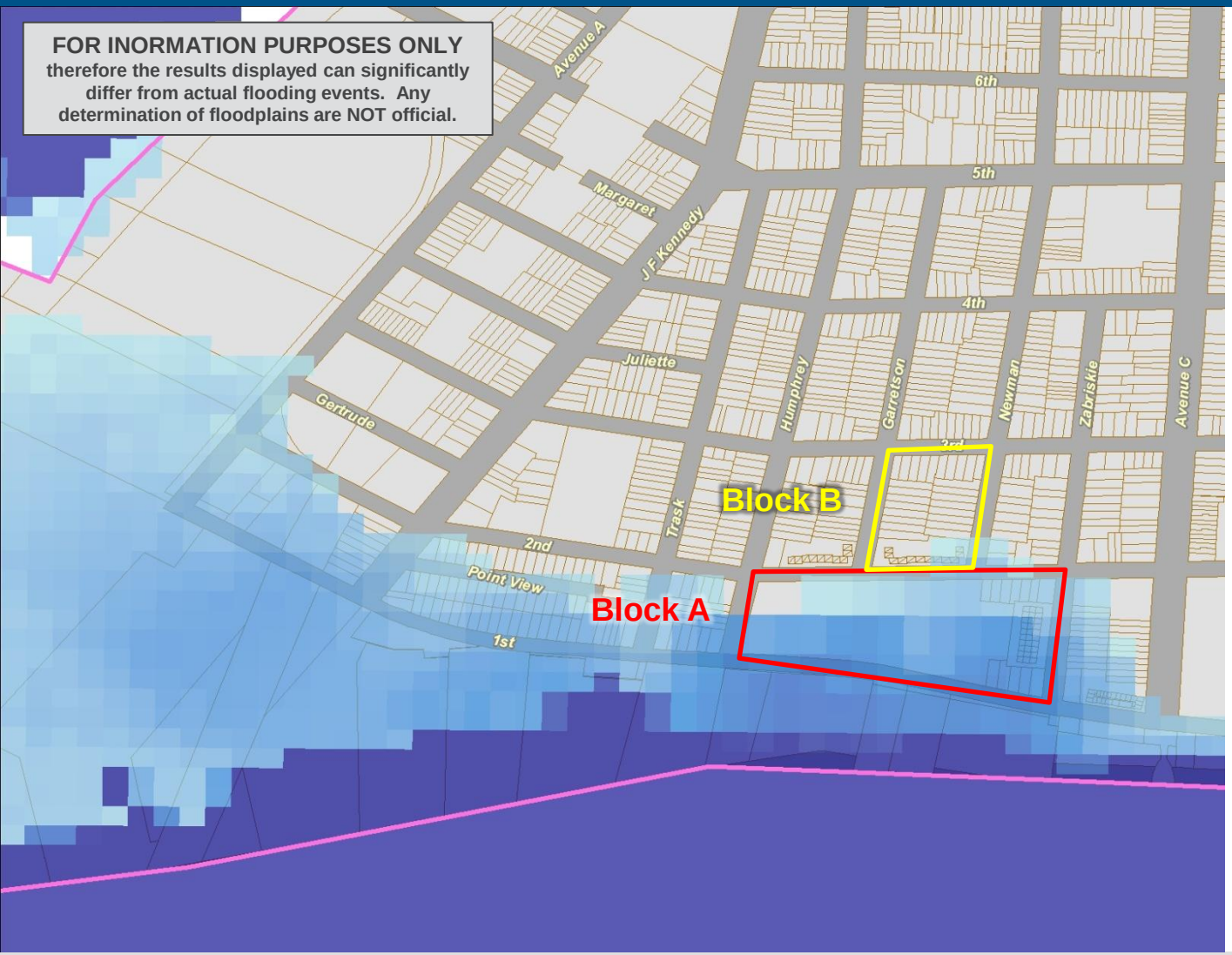
Block B

- **$5,000** total loss from building damage
- **1.3** tons of debris

Sources:

- *HAZUS-MH 2.0 Level 1 Loss Estimation Analysis*
- *Census 2000 data for population and housing stock & Census 2010 TIGER roads file*
- *Parcel Data was developed during the Parcels Normalization Project in 2008-2011 by*
- *NJ Office of Information Technology, Office of Geographic Information Systems (OGIS)*

Bayonne City: 0.2% (500 Year) Flood



Legend

- Bayonne City Limits
- Land Parcel

0.2% (500 yr) Flood

Value

High : 12.6191

Low : 0.0001

Block A

- **$16,836,000** total loss from building damage
- **1,323** tons of debris

Block B

- **$363,000** total loss from building damage
- **8** tons of debris

Sources:

- *HAZUS-MH 2.0 Level 1 Loss Estimation Analysis*
- *Census 2000 data for population and housing stock & Census 2010 TIGER roads file*
- *Parcel Data was developed during the Parcels Normalization Project in 2008-2011 by*
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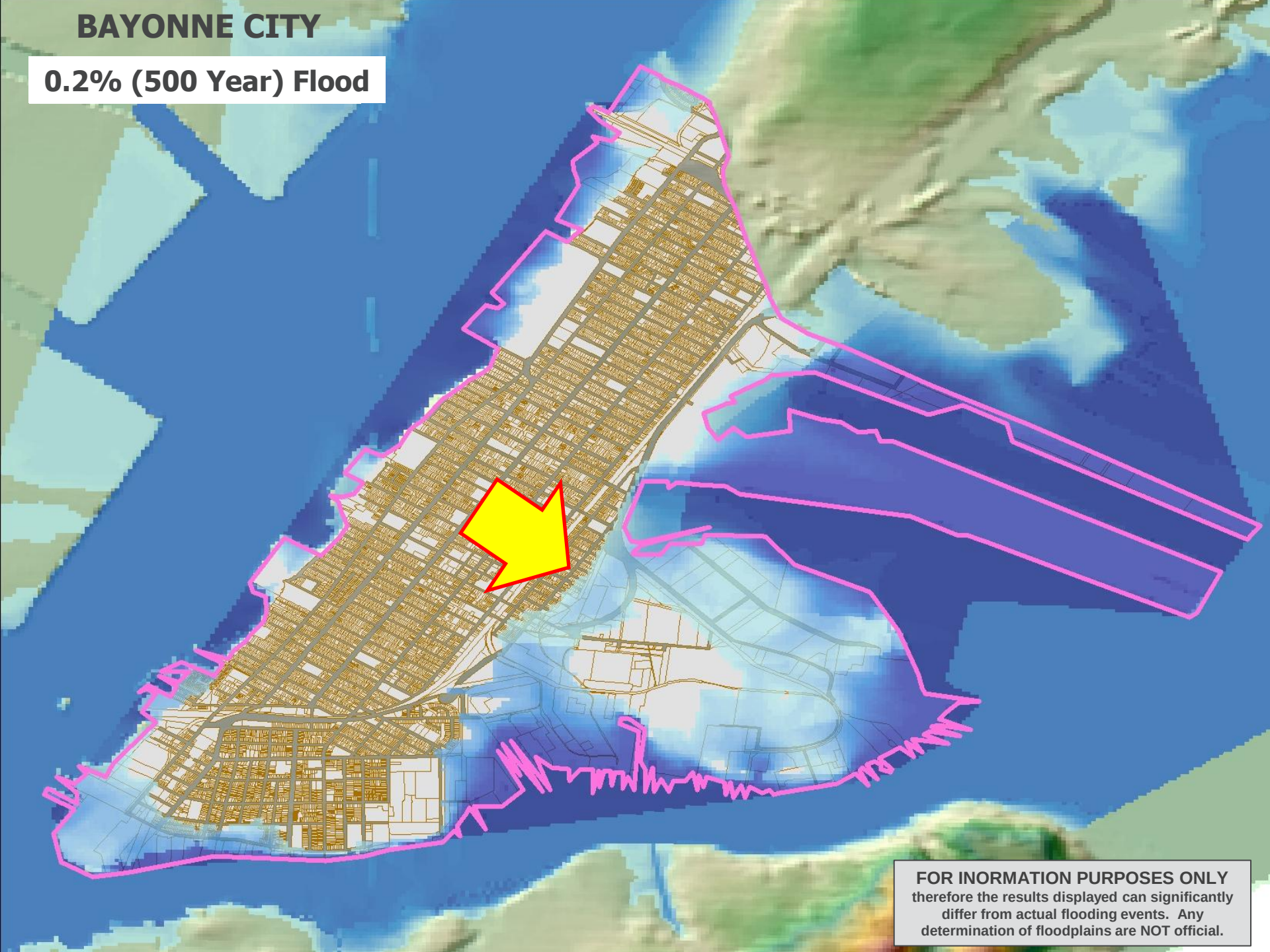
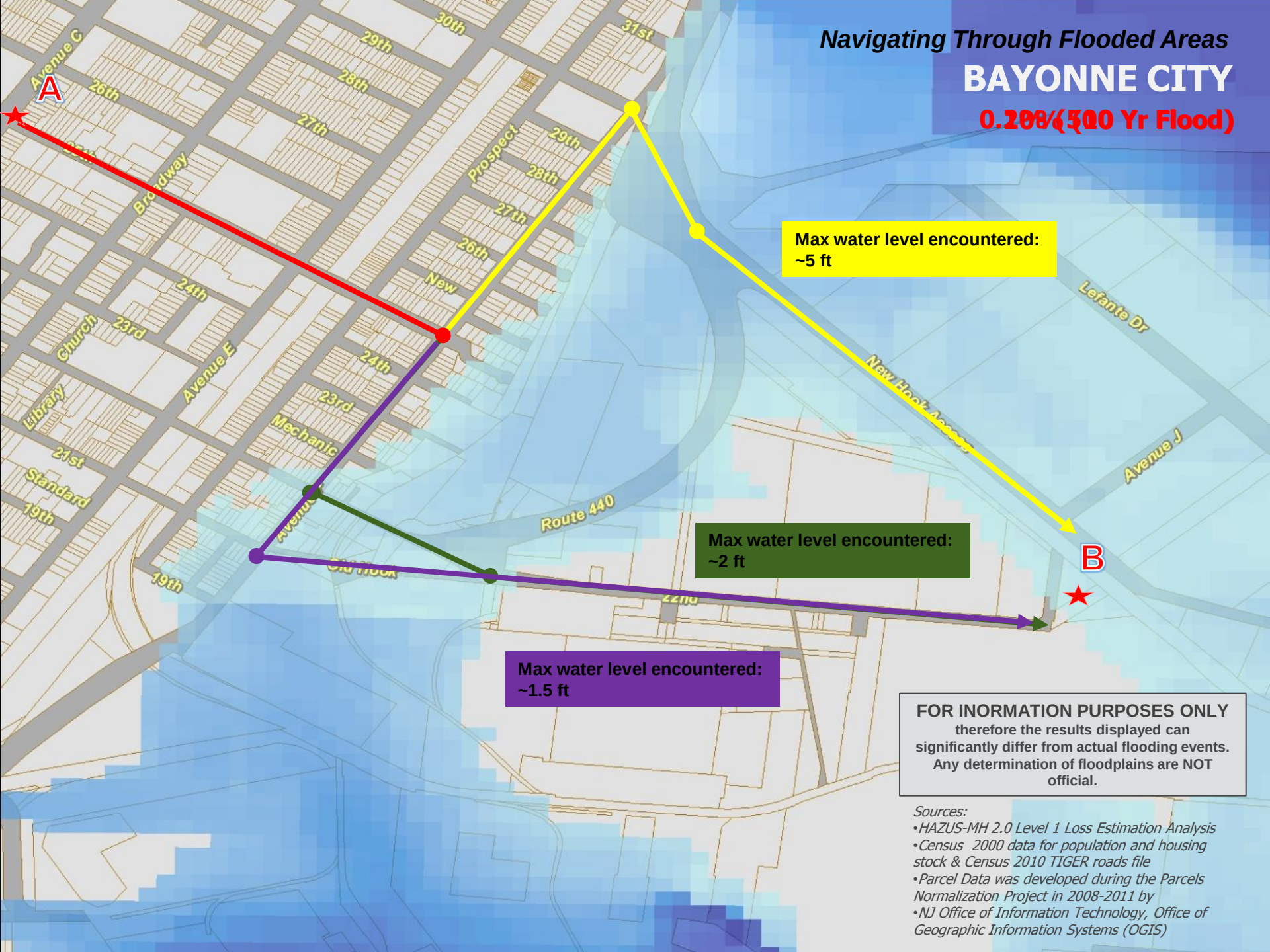
BAYONNE CITY

0.2% (500 Year) Flood

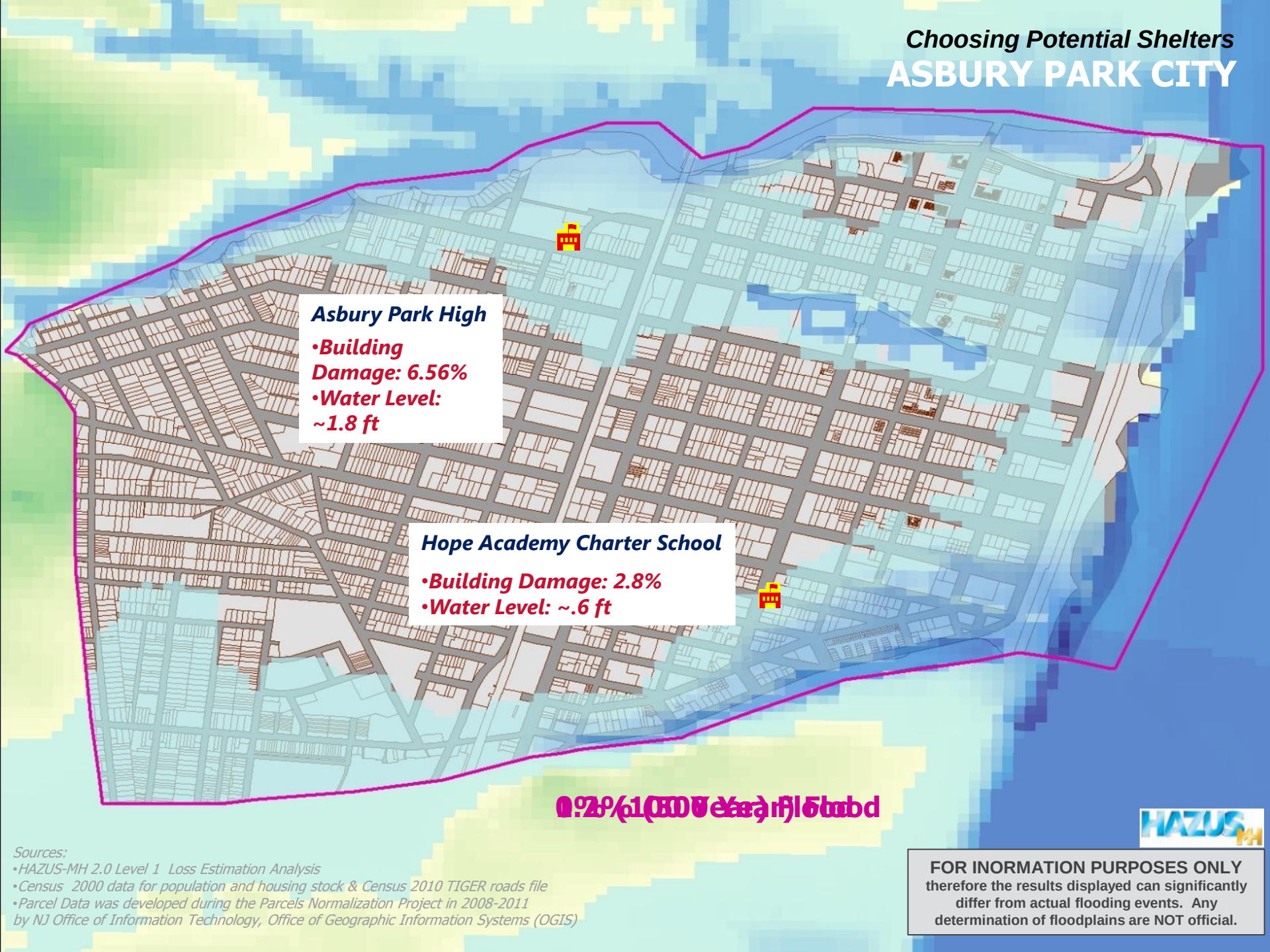


FOR INORMATION PURPOSES ONLY
therefore the results displayed can significantly differ from actual flooding events. Any determination of floodplains are NOT official.


Navigating Through Flooded Areas
BAYONNE CITY
0.2%(500 Yr Flood)
A
B
Max water level encountered:
~5 ft
Max water level encountered:
~2 ft
Max water level encountered:
~1.5 ft
FOR INORMATION PURPOSES ONLY
therefore the results displayed can significantly differ from actual flooding events. Any determination of floodplains are NOT official.
Sources:
•HAZUS-MH 2.0 Level 1 Loss Estimation Analysis
•Census 2000 data for population and housing stock & Census 2010 TIGER roads file
•Parcel Data was developed during the Parcels Normalization Project in 2008-2011 by
•NJ Office of Information Technology, Office of Geographic Information Systems (OGIS)
Avenue C
26th
29th
30th
31st
28th
27th
Broadway
Prospect
New
24th
23rd
Church
Avenue E
Library
21st
Standard
19th
Mechanic
Route 440
Lefante Dr
Avenue J

Choosing Potential Shelters

ASBURY PARK CITY



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•Parcel Data was developed during the Parcels Normalization Project in 2008-2011 by NJ Office of Information Technology, Office of Geographic Information Systems (OGIS)

FOR INORMATION PURPOSES ONLY
therefore the results displayed can significantly differ from actual flooding events. Any determination of floodplains are NOT official.

Risk Assessment Conclusion Features and Benefits

- Identifies areas of higher flood risk by census block
- Quantifies potential future flood losses to existing structures
- Improves ability to identify effective mitigation actions, or areas requiring higher building code requirements, or use of flood resilient designs and construction materials
- Supports mitigation plan updates through improved risk quantification
- Supports disaster recovery planning by showing areas of highest expected damages

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Risk MAP
Non-Regulatory Datasets

Areas of Mitigation Interest

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Areas of Mitigation Interest Purpose and Intended Uses

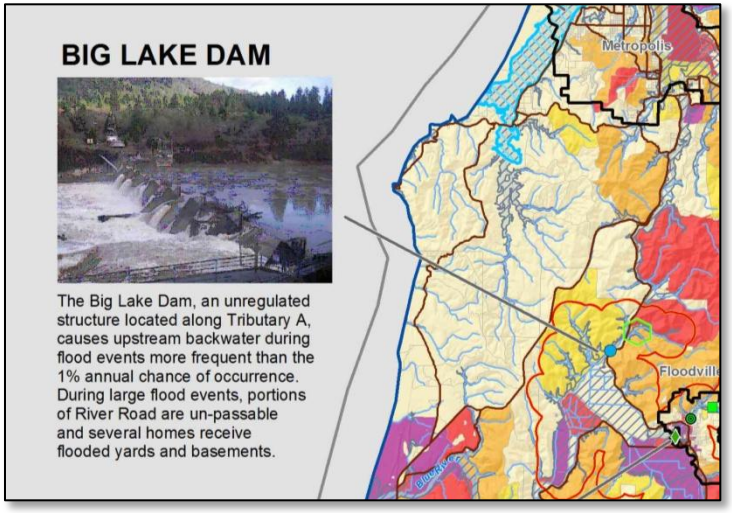
- Identify areas that may be affecting flood risk that would benefit from a raised local awareness
- Raise awareness by local stakeholders of areas within and upstream of the watershed that may be contributing to flood risk and associated interrelationships
- Provide input to local mitigation plans

Overview - Areas of Mitigation Interest

Items that may have an impact (positive or negative) on the identified flood hazards and/or flood risks

Examples include:

- Riverine and coastal flood control structure
- At risk essential facilities and emergency routes that could overtopped
- Stream flow constrictions (e.g. undersized culverts and bridge openings, etc.)
- Previous assistance and claims “Hot Spots” (clusters of IA and PA claims, RL, SRL)
- Significant land use changes
- Significant riverine or coastal erosion
- Locations of successful mitigation projects



Example Area of Mitigation Interest

Broome County, NY

- Frank Evangelisti's testimonial video for the 2011 ASFPM town hall meeting

- **http://youtu.be/4p3cu8eTV7s**

Broome County, NY
Example Area of Mitigation Interest

- Re-designed everything when the developer (Keystone Associates) saw the new Broome County preliminary maps and raised the site in City of Binghamton two feet putting the finished floor of the building two feet above the new 1% (100-year) event

- Due to the new flood maps and a developer making prudent risk management decision, the new development was saved from the 2011 floods

Areas of Mitigation Interest Features and Benefits

- Informs decisions makers on where mitigation actions or additional building code requirements are needed
- Useful in formulating building code enhancements and prioritizing mitigation actions and identifying needed resources
- Helps visually communicate flood risk to the public
- Allows neighboring communities in a watershed study area to see factors that may impact them, fostering collaboration

Risk MAP Non-Regulatory Products & Datasets - Summary

Risk MAP Non-Regulatory Products/Datasets provide a resource to help focus and prioritize the most cost effective mitigation measures

Risk MAP Products/Datasets Being Considered for NJ Portion of the Delaware Bay:

- Flood Risk Map, Report, Database
- Changes Since Last FIRM
- Flood Depth Grid – 1% annual chance
- Flood Risk Assessment (HazUS)
- Areas of Mitigation Interest

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Delaware Bay Coastal Flood Risk Study

Status Update

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New Jersey Side – *Overview*

- **Project Team**
  - Local Officials
  - New Jersey Department of Environmental Protection (Cooperating Technical Partner)
  - FEMA
    - Risk Assessment, Mapping, and Planning Partners (RAMPP), a joint venture of Dewberry, URS, and ESP
    - Regional Support Center

New Jersey Side - *Status Update*

Project	Status	Schedule
Cape May	Overland Wave Height Analysis is in Progress	Projected Preliminaries: Fall 2013
Cumberland and Salem	Overland Wave Height Analysis is in Progress	Projected Preliminaries: Summer 2013
Gloucester and Camden	Overland Wave Height Analysis Being Ordered	Overland Wave Height Analysis to be completed by: Summer 2013
Burlington	Overland Wave Height Analysis and FIRM Production Being Ordered	TBD

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NJ Coastal Study

Risk Communications and Coastal Outreach Strategy

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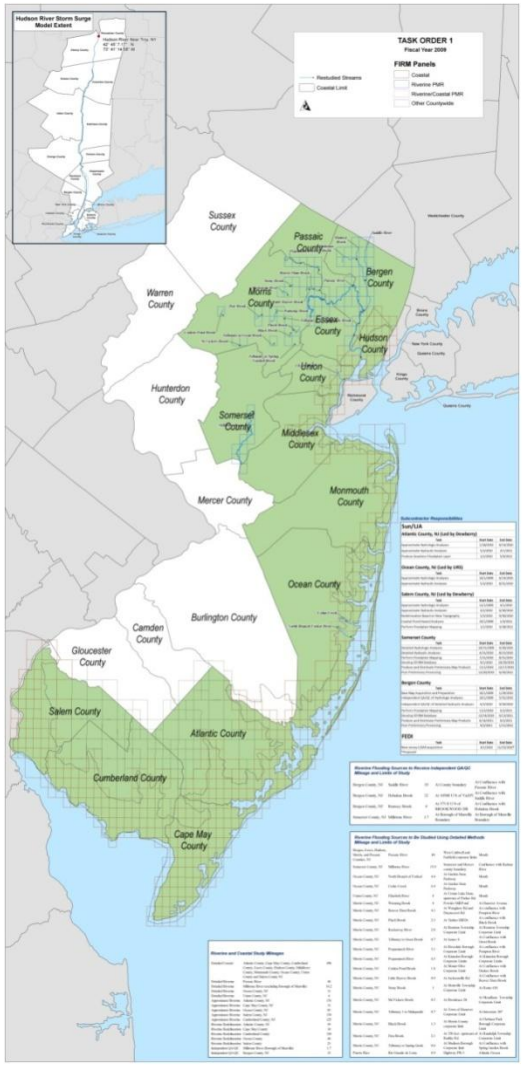
NJ Coastal Outreach – Recent Activities



- **Risk Assessment:**
  - May, 2012: Ocean, Essex
  - April, 2012: Hudson
  - Feb, 2012: Monmouth, Middlesex, Union
  - Dec, 2011: Atlantic, Cape May
- **NFIP & CRS:**
  - March, 2012: Ocean
- **Mitigation Planning:**
  - Dec, 2011: Ocean, Monmouth
- **Hazard Mitigation Assistance (HMA)**
  - Dec, 2011: Middlesex & Union
- **Introduction to Risk MAP**
  - 2010-Mid-2011: Cape May, Atlantic, Ocean, Monmouth, Middlesex, Union, Hudson, Cumberland, Salem, Morris, Bergen, Somerset, Essex, Passaic

Coastal Study
Technical Advisory Panel (TAP)

- Technical Advisory Panel (TAP) was established to engage coastal study subject matter experts
- **Several Meetings were held**
- **Members Include:**
  - **Academics and Non-Profit Agencies:**
    - Jacques Cousteau National Estuarine Research Reserve (under Rutgers University)
    - Richard Stockton College Coastal Research Center
    - Monmouth University Urban Coast Institute
    - Barnegat Bay National Estuary Program
    - Sustainable Jersey, Climate Adaption Task Force
  - **State and Local Governments:**
    - New Jersey Department of Environmental Protection
    - New York State Department of Environmental Conservation
    - New York City (multiple departments: Office of Long Term Planning and Sustainability, Buildings and Planning)
  - **Other Federal Agencies:**
    - NOAA; USGS; USACE;

Coastal Outreach Advisory Team (COAT)

- The Coastal Outreach Advisory Team was established to support the New Jersey and New York City Coastal Flooding Outreach and Education Program
- Technical Advisory Panel (TAP) is focused on technical aspects of the flood risk program
- COAT will focus on public understanding of the program

Risk Communication Strategy
Resources

- **Region II Coastal Website:**
  - **www.Region2Coastal.com**

- **Region III Coastal Website:**
  - **www.R3Coastal.com**

Resources

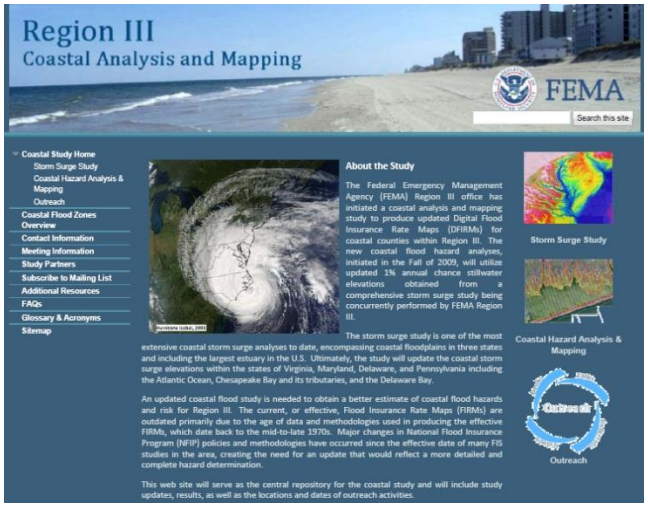
- **FEMA:** www.fema.gov
- **Floodsmart, the official site of the National Flood Insurance Program (NFIP):** www.floodsmart.gov
- **Risk Assessment, Mapping and Planning Partners:** www.RAMPP-team.com
- **Hazus-MH software:** http://www.fema.gov/plan/prevent/hazus/index.shtm
- **Hazus User Groups:** http://www.fema.gov/plan/prevent/hazus/hz_users.shtm#4
- **Risk MAP Non-Regulatory Products:** Appendix N and O

Reg III-Delaware and Pennsylvania *Status Update*

Project	Status	Schedule
New Castle County Delaware	Overland Wave Height Analysis completed	Projected Preliminaries: 11/30/2012
Kent County Delaware	Preliminaries Issued	Preliminaries: 8/30/2012
Sussex County Delaware	Overland Wave Height Analysis completed	Projected Preliminaries: 11/30/2012
Bucks, Philadelphia, Delaware Counties Pennsylvania	Coastal Hazard Analyses initiated	Projected Preliminaries; 7/1/2013

R3 Coastal Study Outreach Efforts

- **Coastal Outreach Strategy**
- **COAT-Coastal Outreach Advisory Team**
- **Website – www.r3coastal.com**
- **Property Locator Tool**
- **Outreach factsheets**
- **Outreach meetings**
  - Regional Storm surge Results
  - Initial Risk MAP Coordination Meetings
  - Flood Risk Review Meetings
  - Final Community Coordination Meetings
  - Open Houses
  - Resilience Meetings
- **USACE support**



Reg III-Watershed Activities

Project	Status	Schedule
Lower Delaware (02040202)	Non-Regulatory Risk MAP products Pennsylvania side	Products July 2013
Brandywine Christina (02040205)	Watershed Study partially funded and presently in negotiations	Projected Preliminaries: 12/2014
Crosswicks-Neshaminy (02040201)	Neshaminy Sub-basin presently in negotiations	Schedule not determined at this time

Questions & Feedback

- **Please explore the www.RAMPP-TEAM.com/nj.htm and www.Region2Coastal.com websites for study updates**

Contact Information

- **FEMA**

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Region III Project Engineer: Robin Danforth, P.E. / 215-931-5573 / Robin.Danforth@fema.dhs.gov