Risk MAP

Mapping | Assessment | Planning

IAFSM 2011 Annual Conference

March 9, 2011

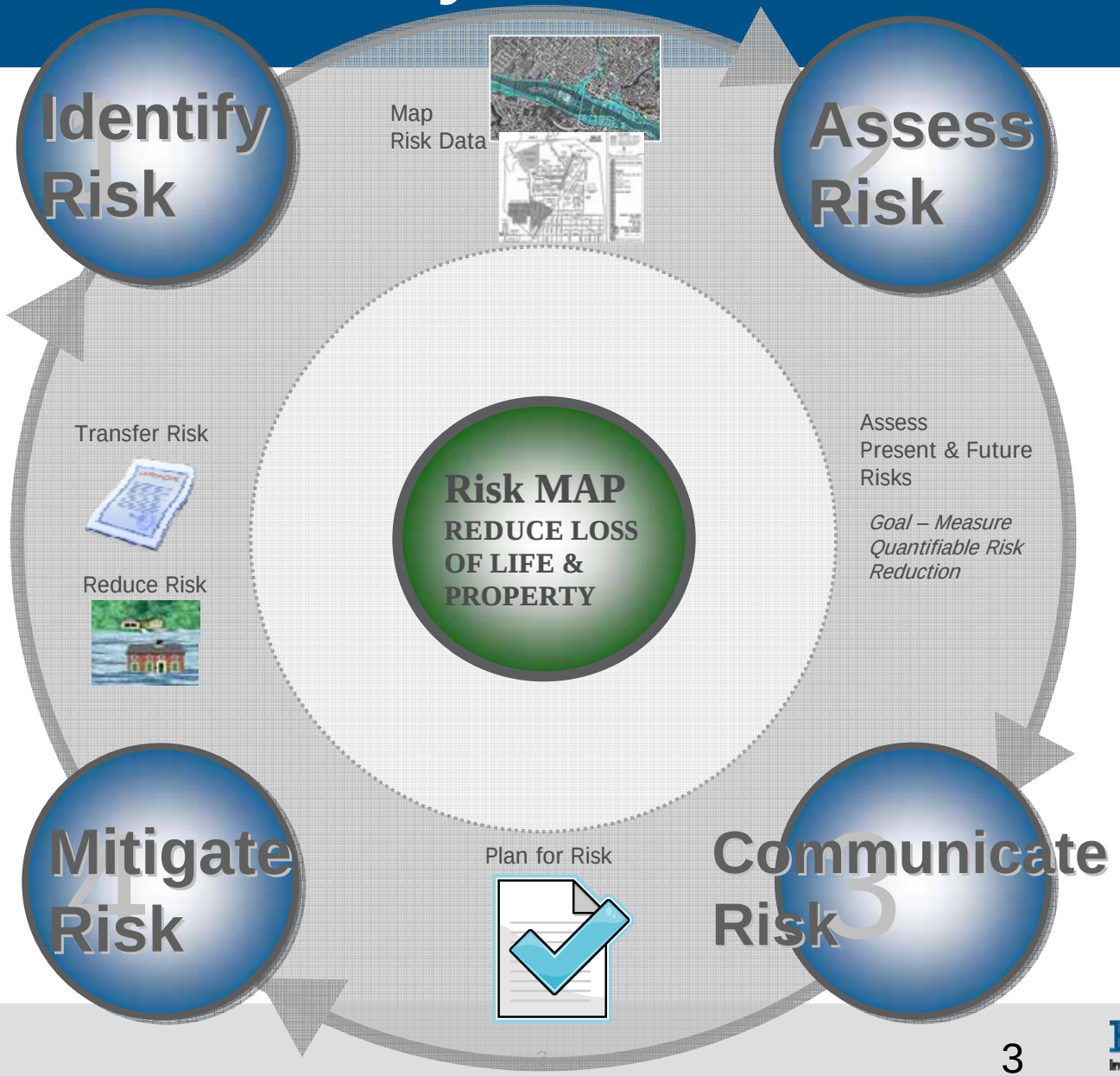
Suzanne Vermeer, P.E., CFM – FEMA Region V

RiskMAP
Increasing Resilience Together

Agenda

- **Risk MAP Vision and Alignment**
- **Status of Studies**
- **Watershed Approach**
- **Project Prioritization**
- **New Datasets in Risk MAP**
- **New Products in Risk MAP**
- **Additional Outreach Meetings**

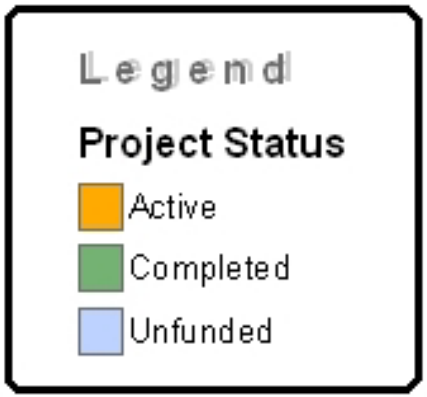
Risk MAP Lifecycle

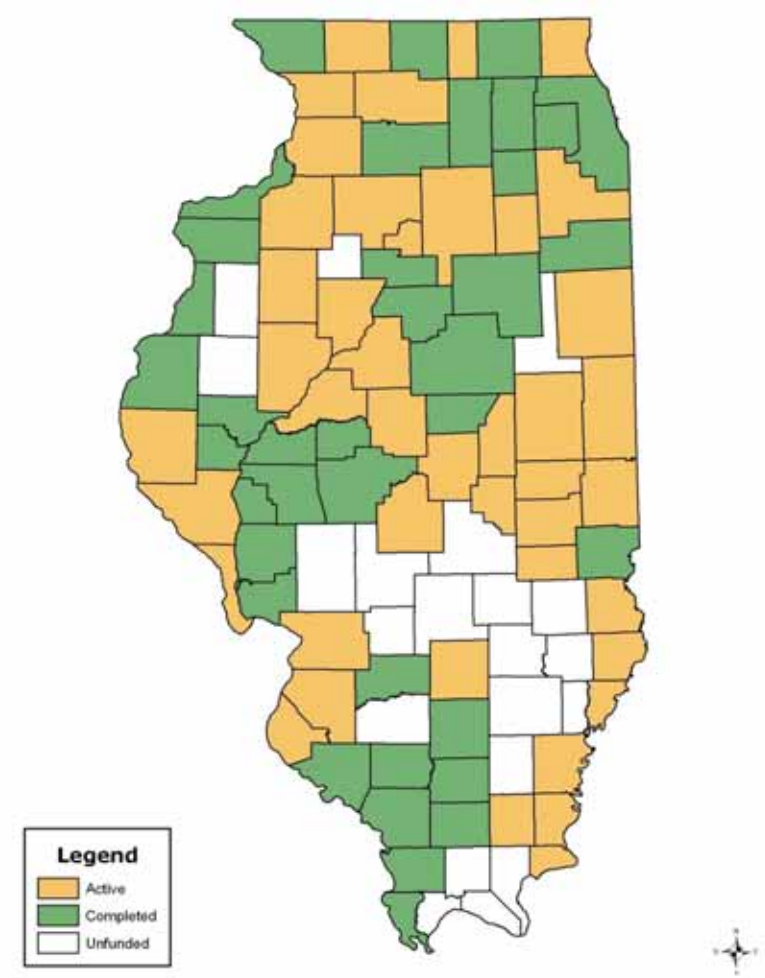


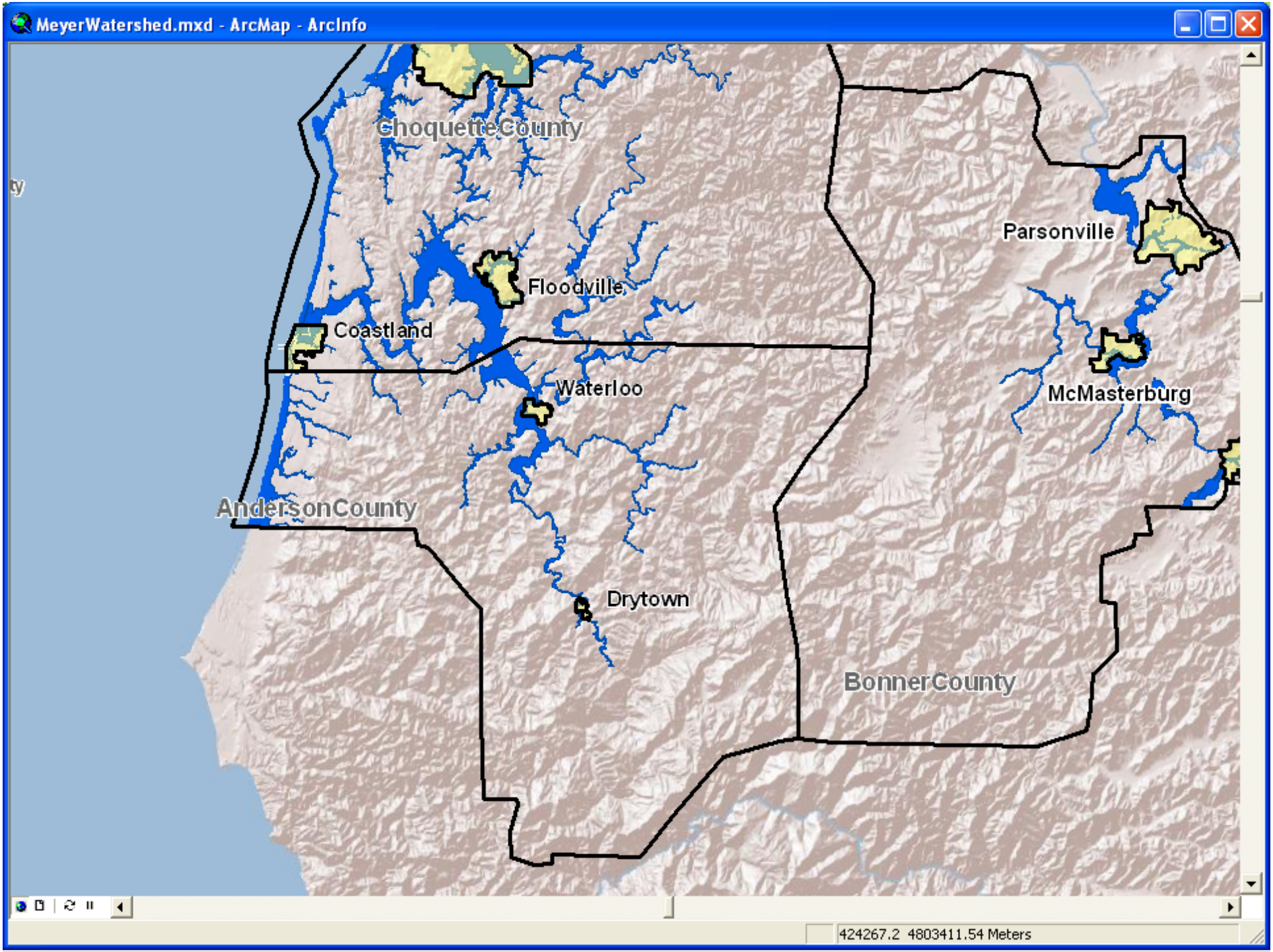
Risk MAP (Mapping, Assessment Planning)

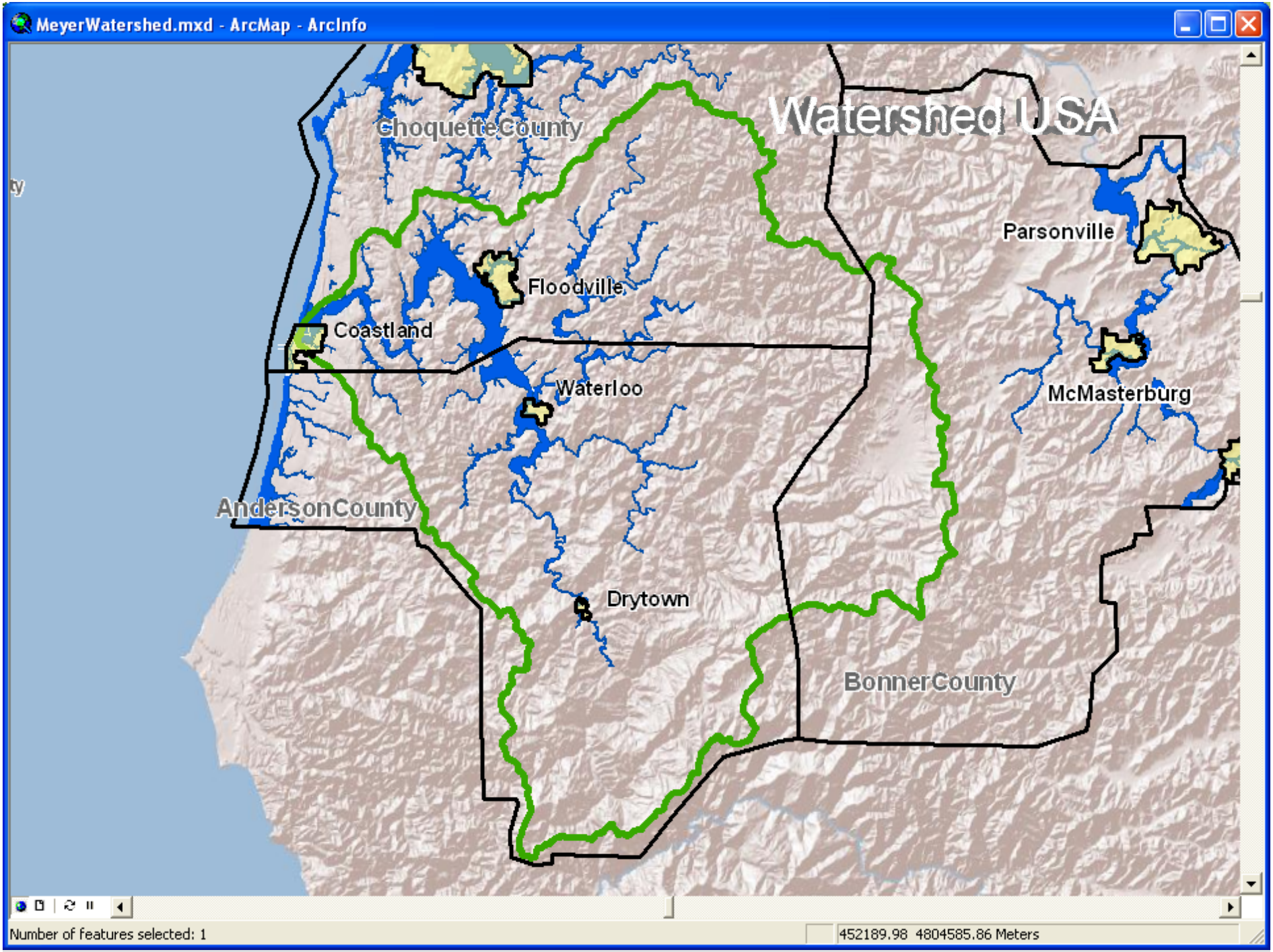
Through collaboration with State, Local, and Tribal entities, Risk MAP will deliver quality data that increases public awareness and leads to action that reduces risk to life and property

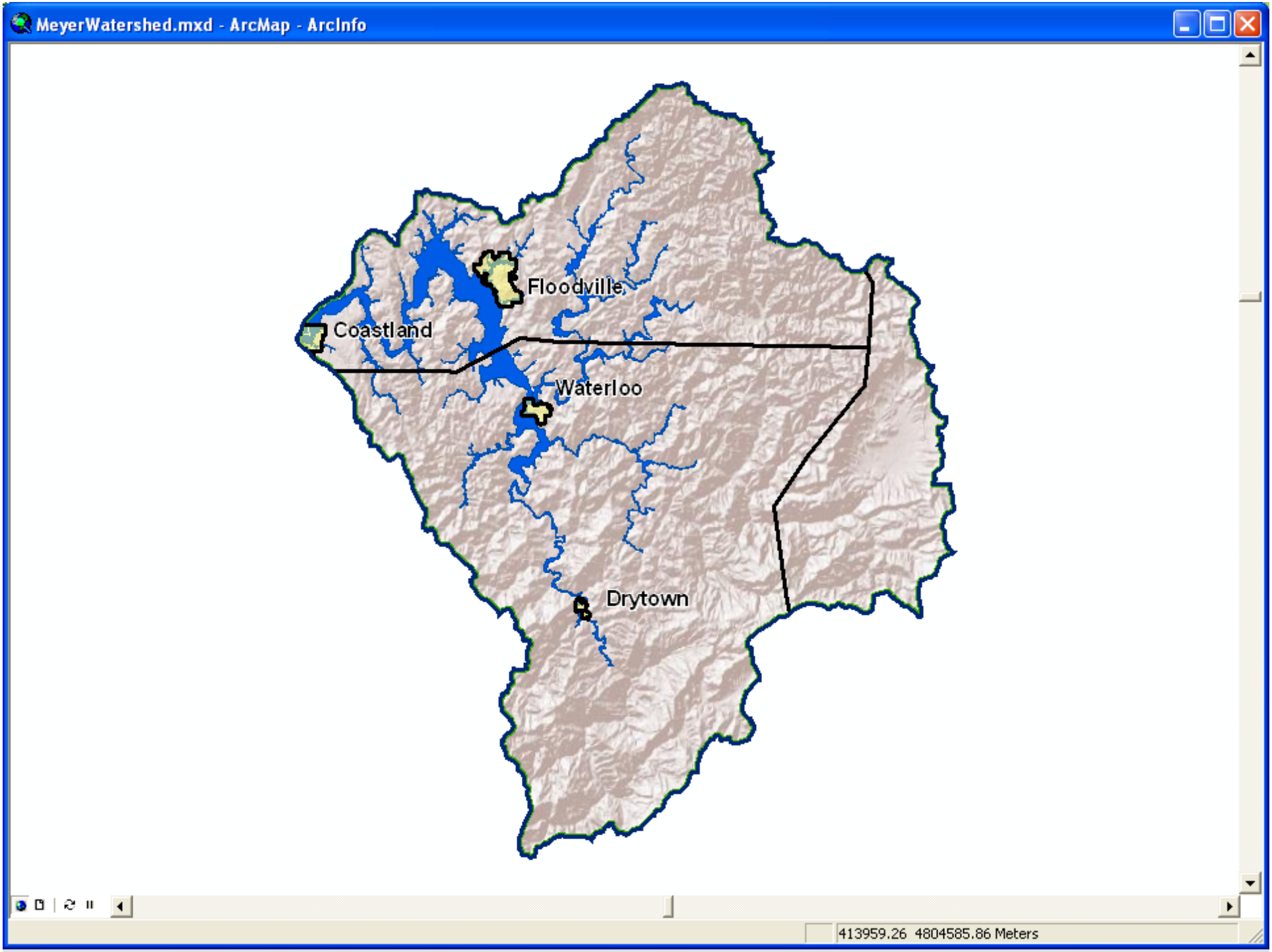
FEMA's Map Modernization Program



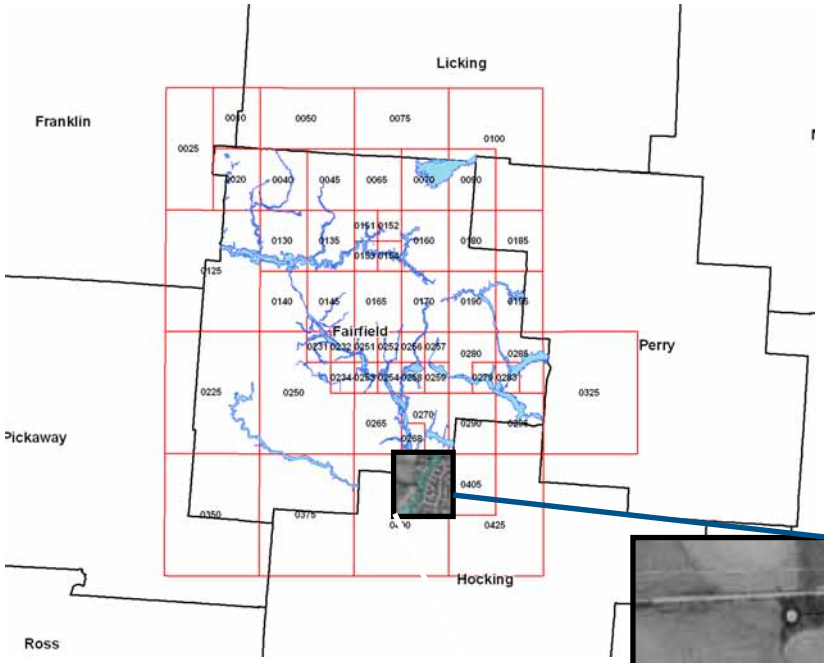



MeyerWatershed.mxd - ArcMap - ArcInfo
ChoquetteCounty
Floodville
Coastland
Waterloo
Parsonville
McMasterburg
AndersonCounty
Drytown
BonnerCounty
424267.2 4803411.54 Meters

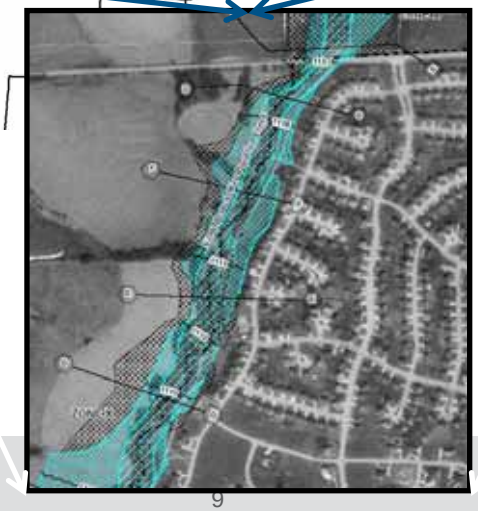

MeyerWatershed.mxd - ArcMap - ArcInfo
Watershed USA
ChoquetteCounty
Floodville
Coastland
Waterloo
Parsonville
McMasterburg
AndersonCounty
Drytown
BonnerCounty
Number of features selected: 1
452189.98 4804585.86 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
Floodville
Coastland
Waterloo
Drytown
413959.26 4804585.86 Meters

Geographic Approach / Strategy

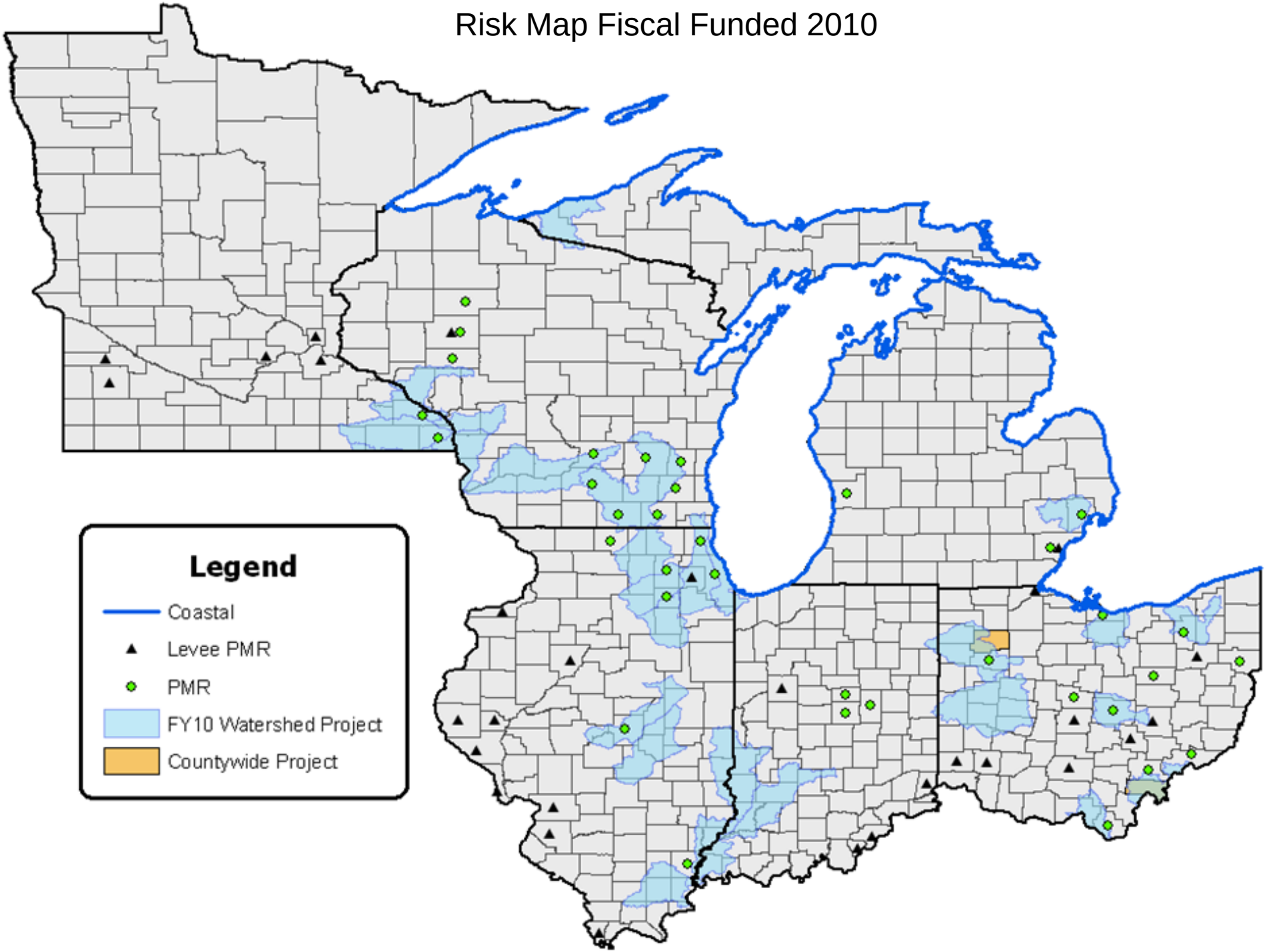


Countywide



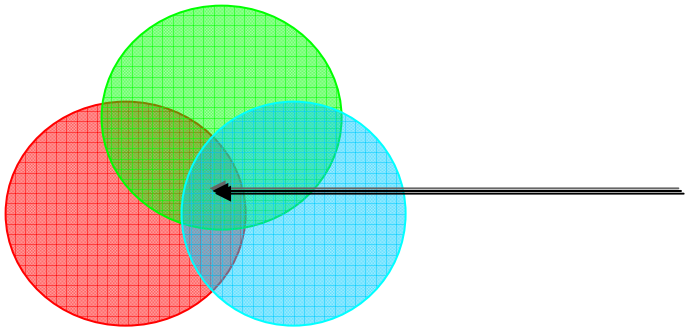
Watershed

Risk Map Fiscal Funded 2010



Prioritization – Sequencing – Planning

Risk	**HAZUS - Annualized Loss Study**	• **Available for FY-2011 Sequencing**
Needs	**CNMS and Stream Inventory** *- Phase 3 -*	• **Available for FY-2011 Sequencing**
Topography	**High Resolution Topography Available** *- ongoing inventory -*	• **Available for FY-2011 Sequencing**
Contribution	**Cash-Match or Partner Contribution ($)**	• **Being considered for future prioritization** *- FY-TBD -*



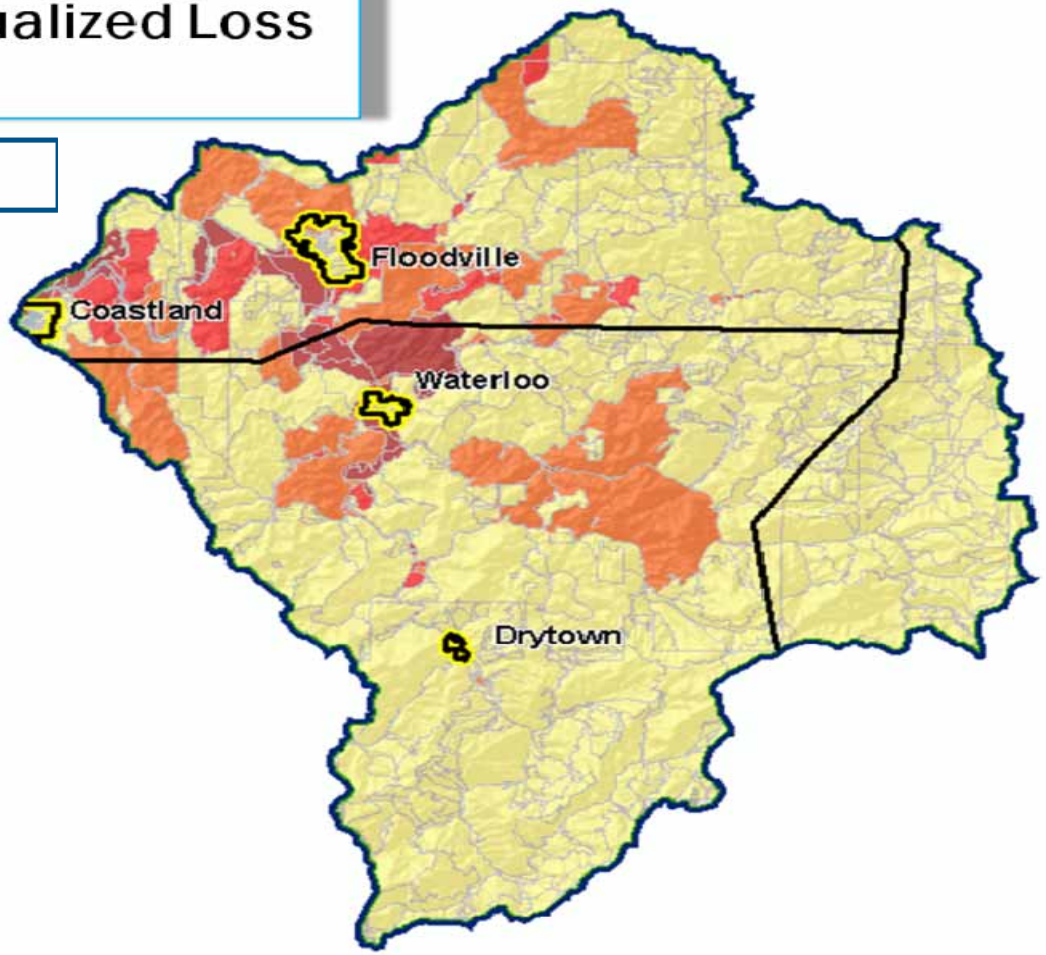
Example trifecta hotspot

Trifecta-based prioritization can not occur without state-based input !

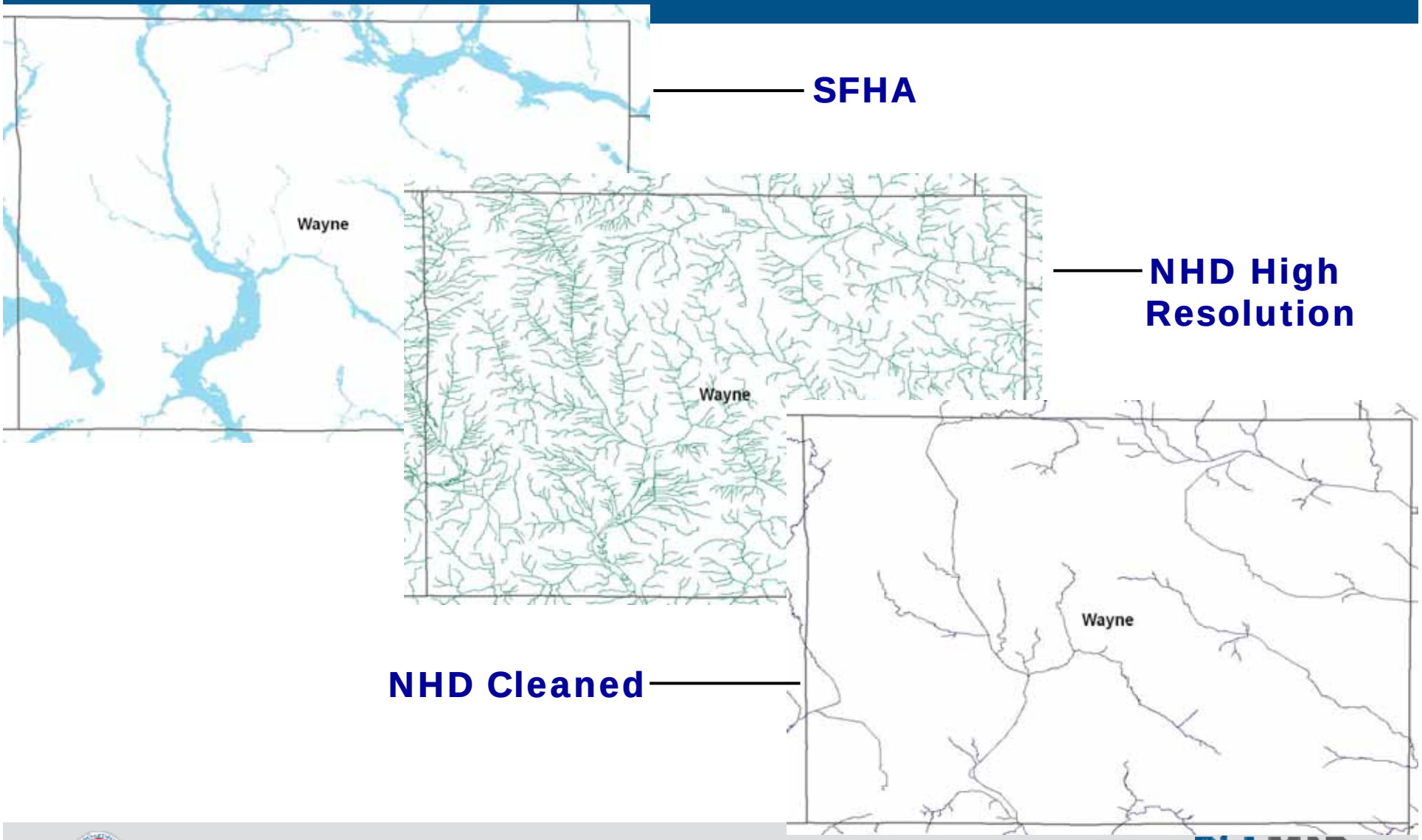
Risk Management (estimated flood losses - HAZUS)

Average Annualized Loss (AAL)

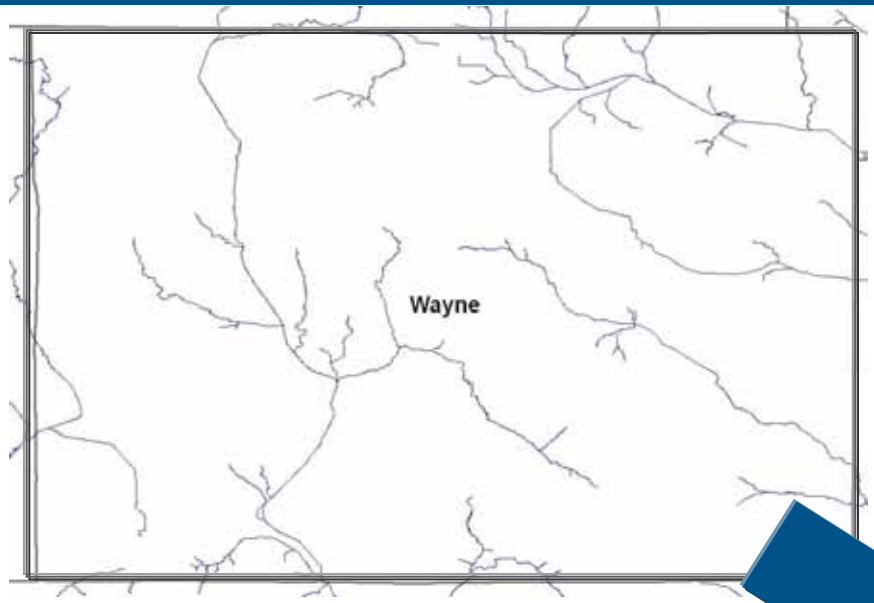
Mn HAZUS Level II

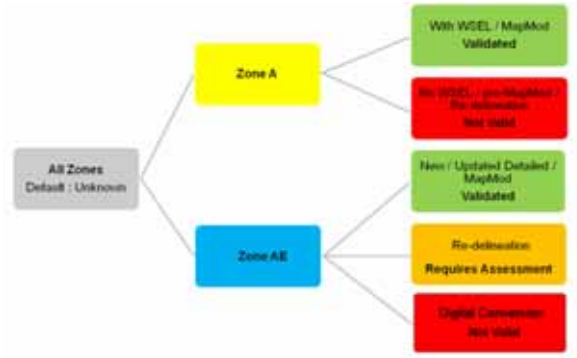


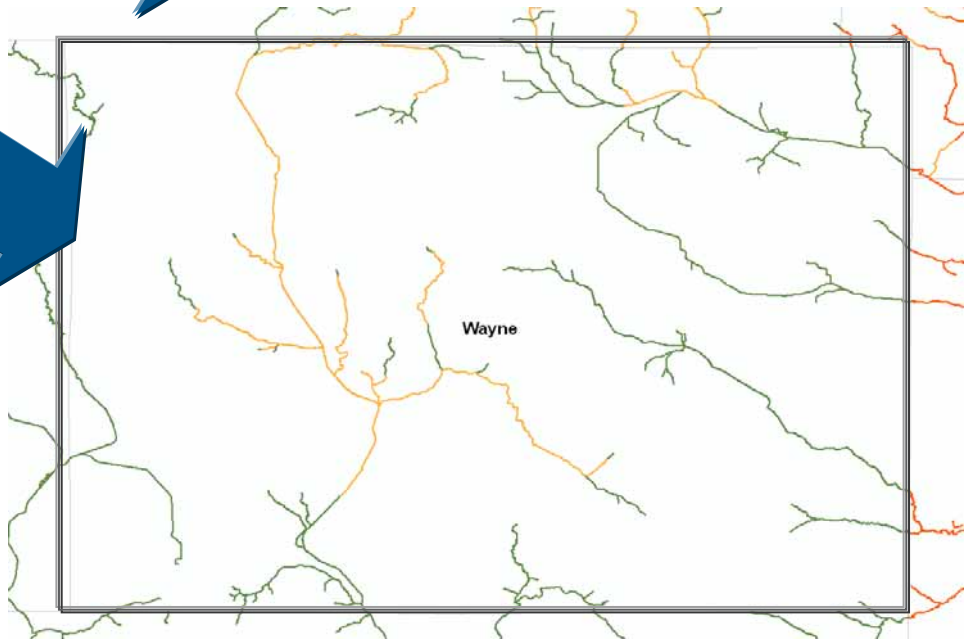
Coordinated Needs Management Strategy (CNMS)



Coordinated Needs Management Strategy (CNMS)



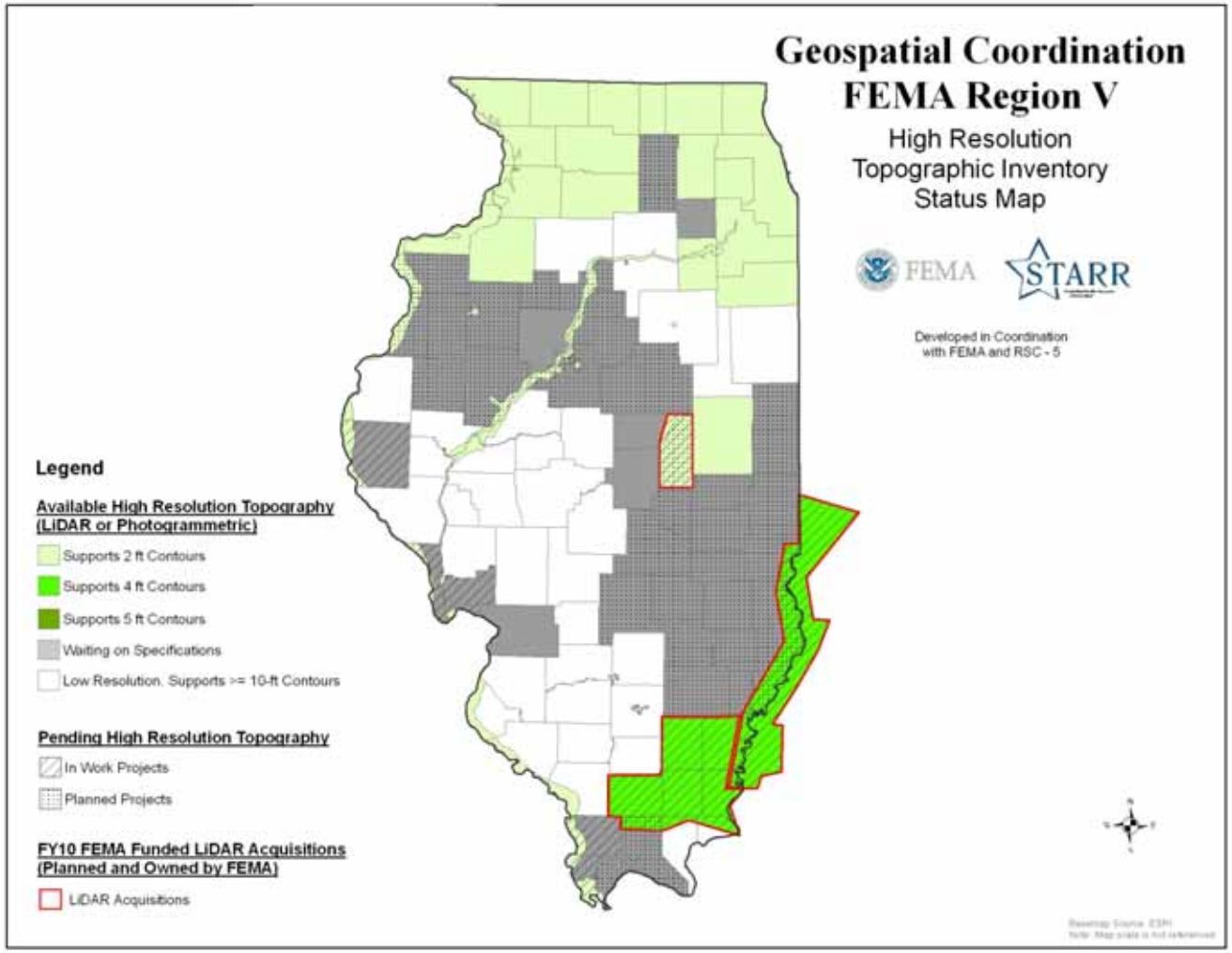




Which studies are valid?
Which studies are not?

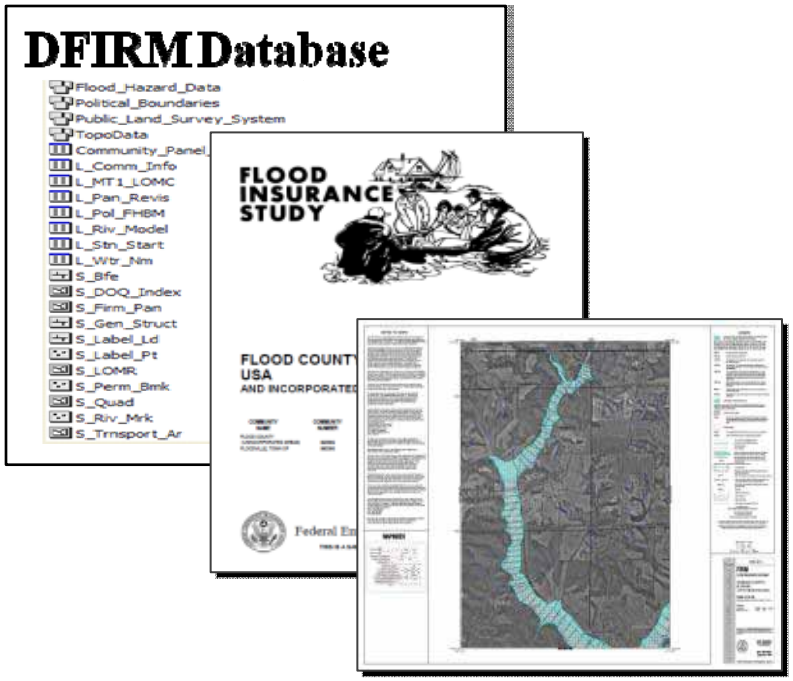
CNMS (i.e. IDNR-OWR) tells us!

Topographic Data Inventory



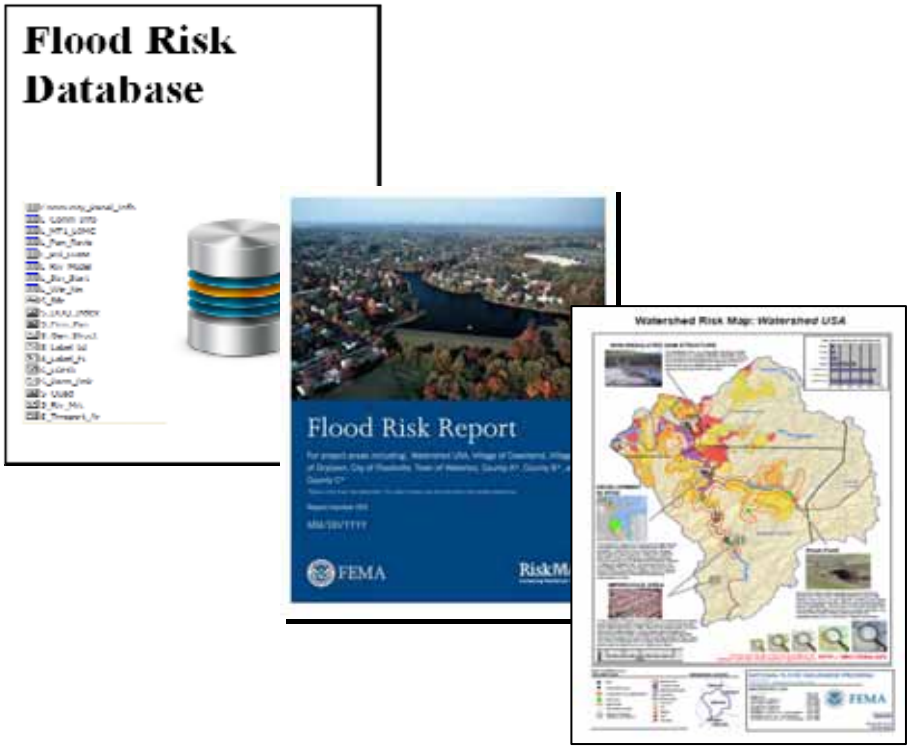
Risk MAP Program Product Comparisons

Traditional Regulatory Products



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

Non-Regulatory Products



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

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Flood Risk Datasets

- **Changes Since Last FIRM**
- **Flood Depth & Analysis Grids**
- **Flood Risk Data**
- **Areas of Mitigation Interest**

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Changes Since Last FIRM Dataset

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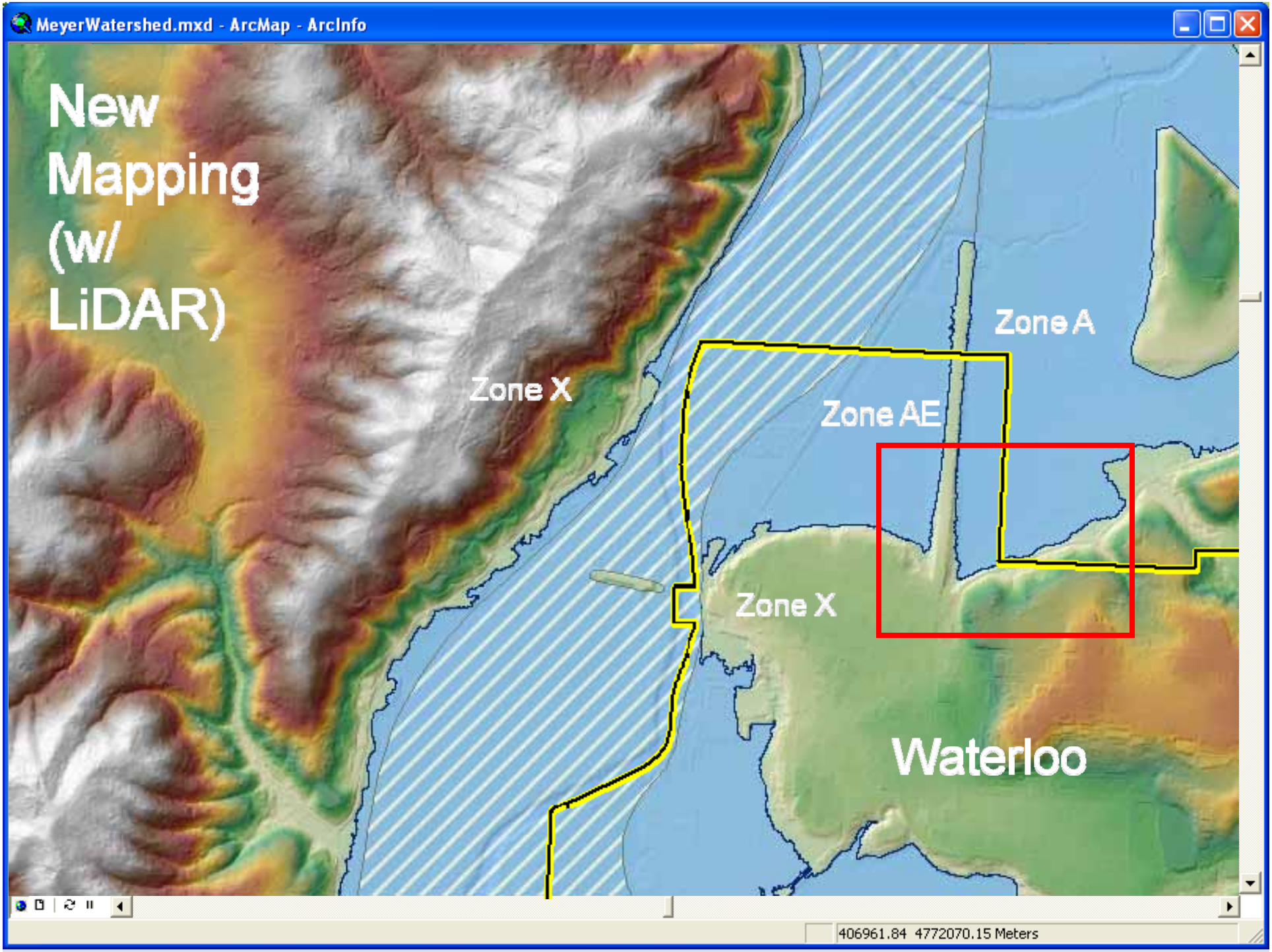
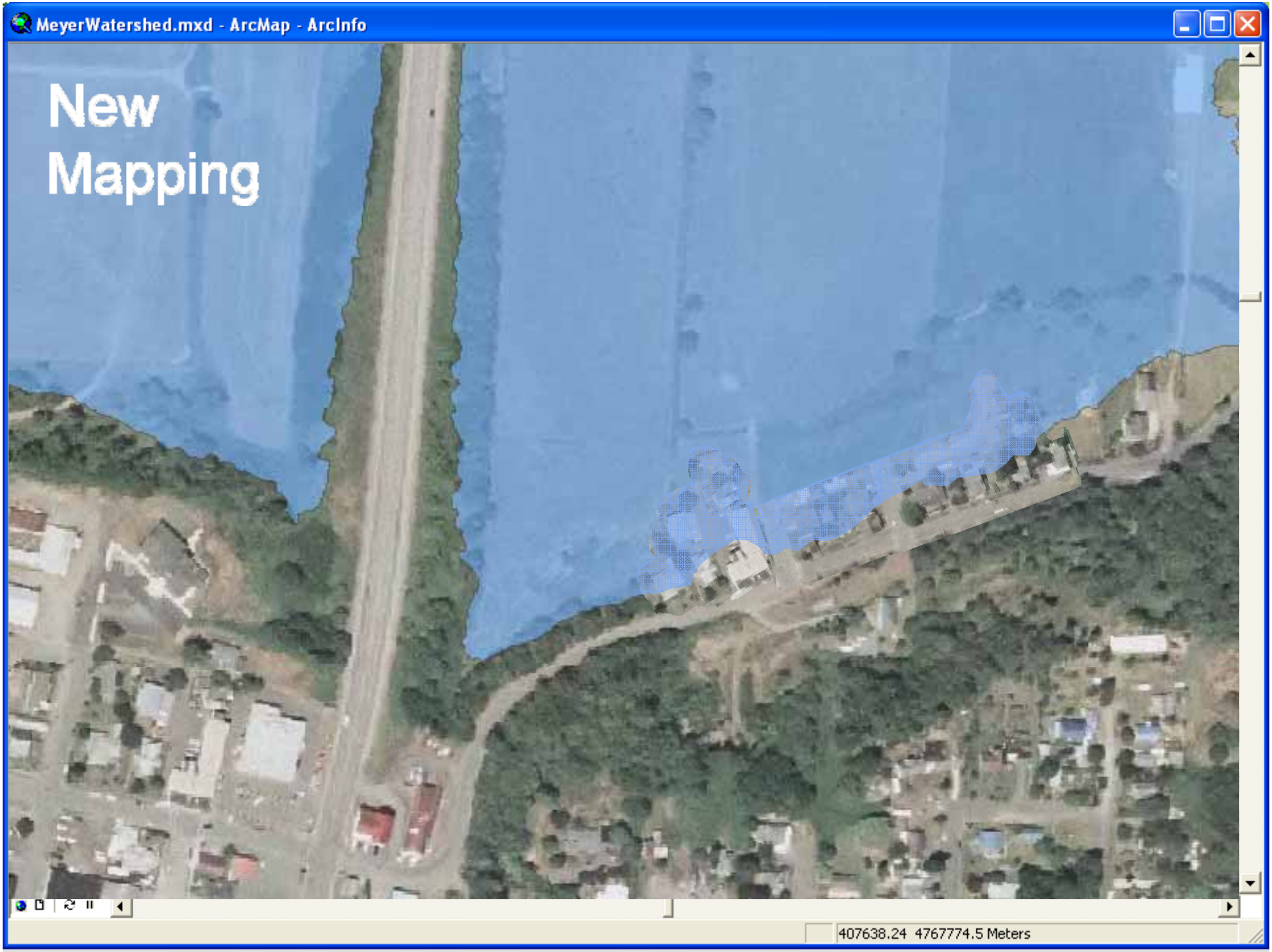
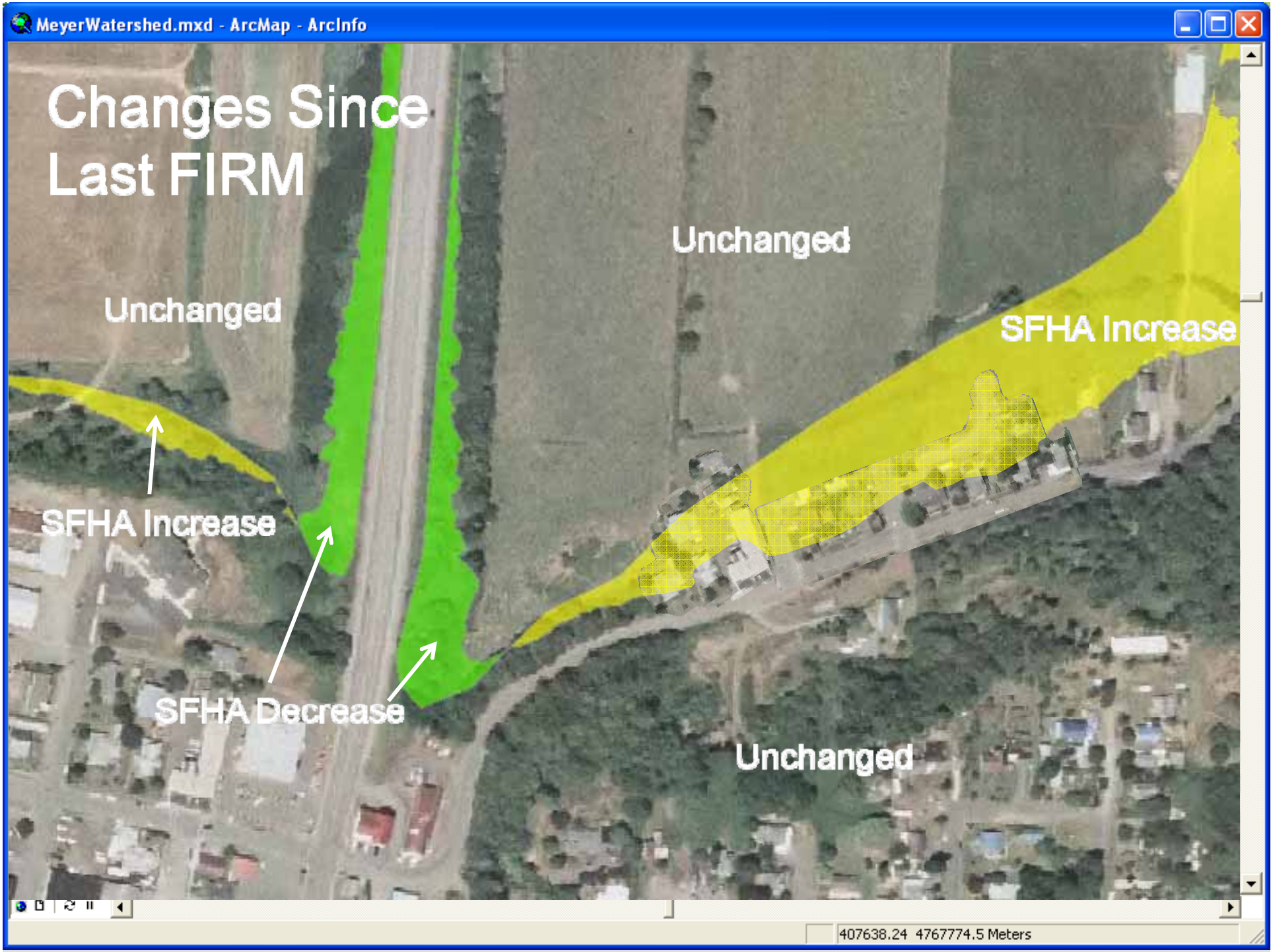
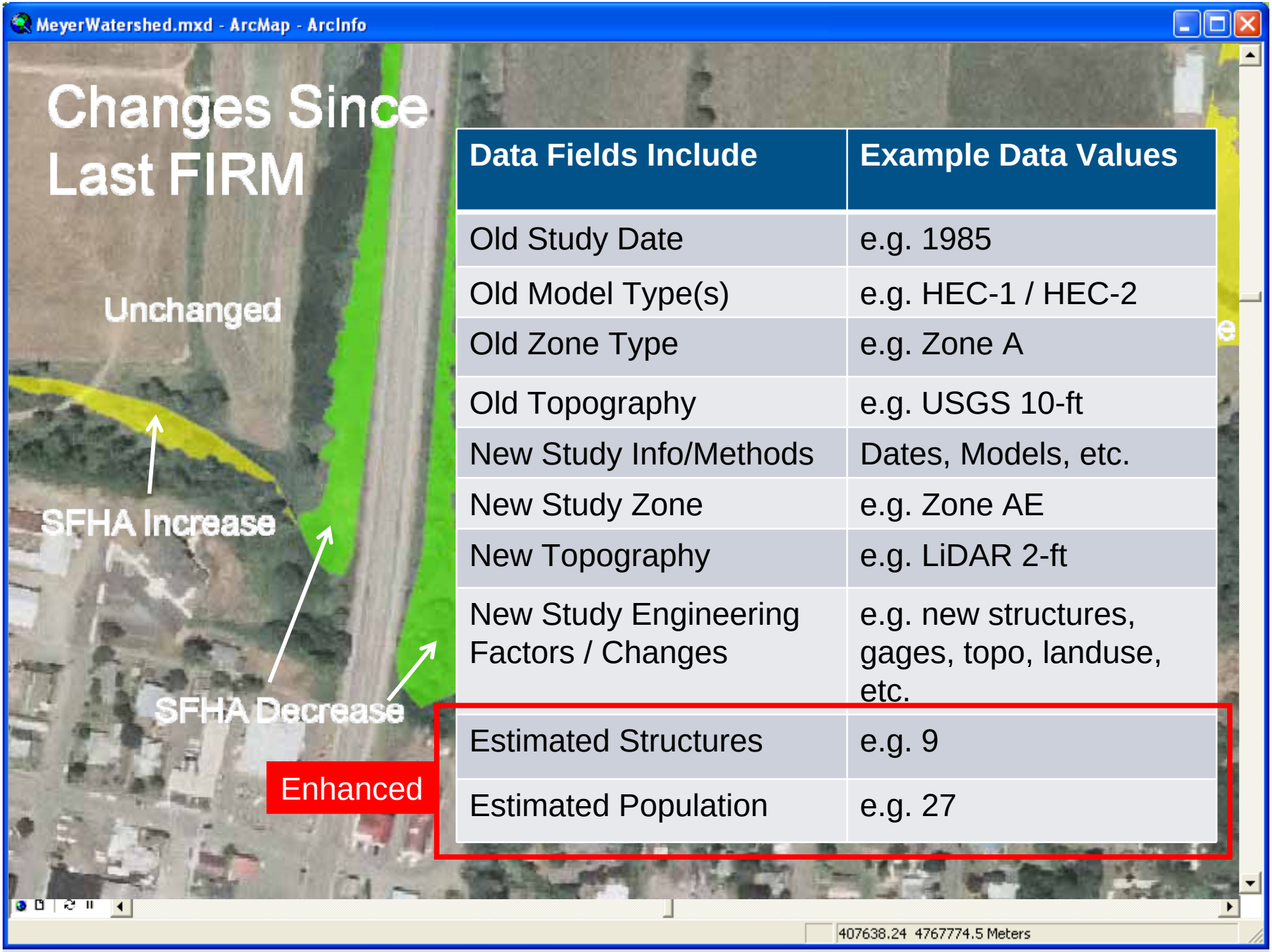
MeyerWatershed.mxd - ArcMap - ArcInfo
Previous Mapping (old topo)
Zone A
Zone X
Zone AE
Zone X
Waterloo
406961.84 4772070.15 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
New Mapping (w/ LiDAR)
Zone X
Zone A
Zone AE
Zone X
Waterloo
406961.84 4772070.15 Meters


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



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

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Flood Depth & Analysis Grids

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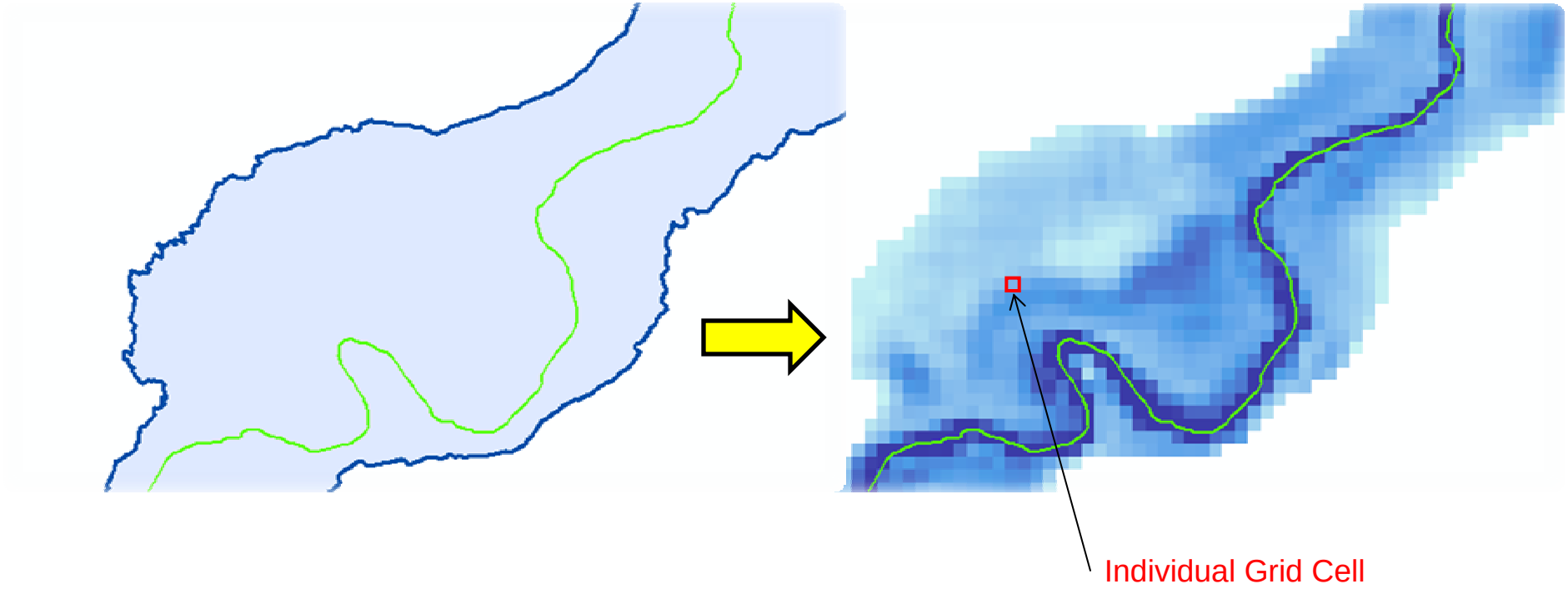
Flood Depth Grids

- **Each Grid Cell has a Unique Value**

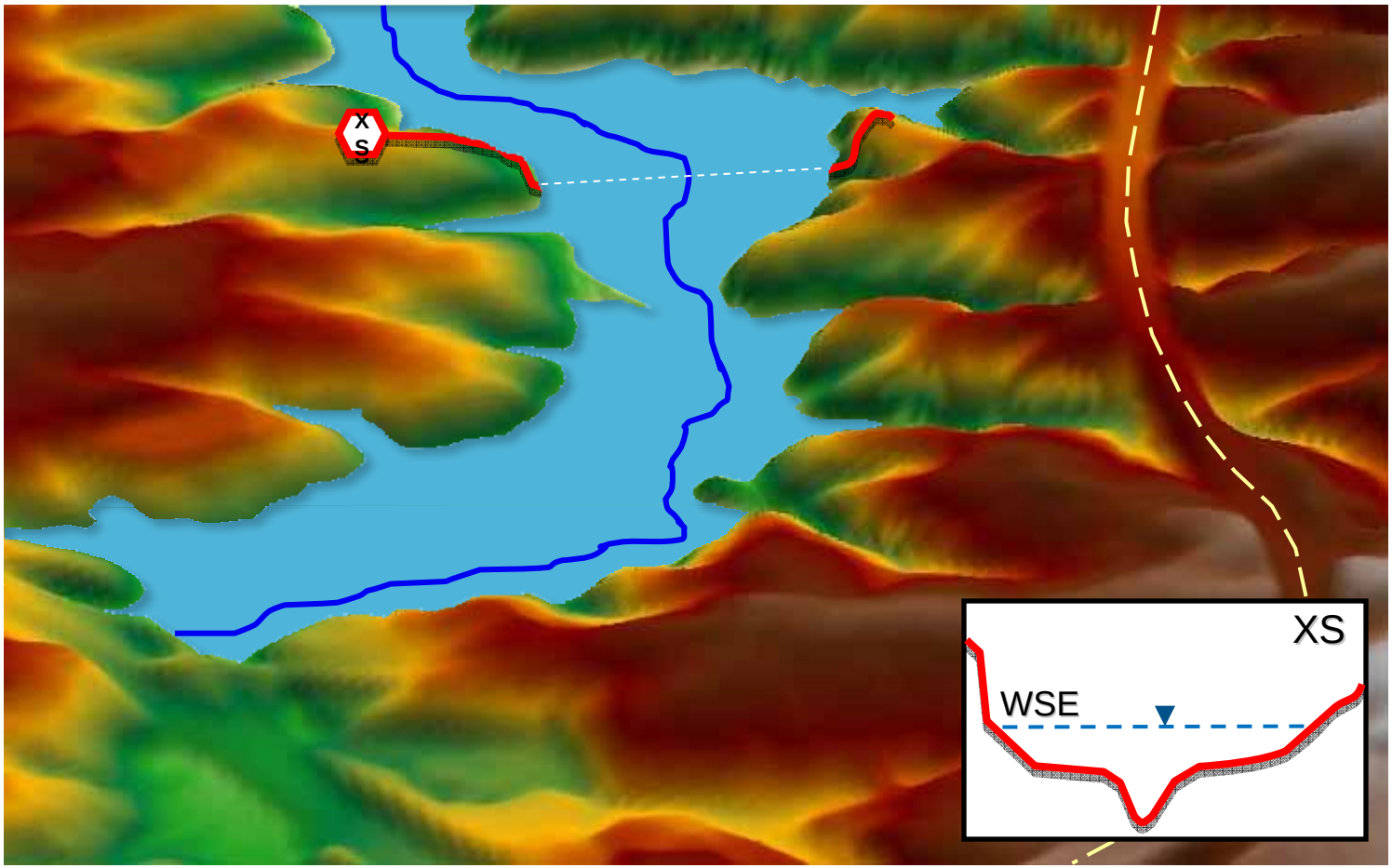
FIRM 1% Annual Chance (100-yr) Floodplain

1% Annual Chance Depth Grid



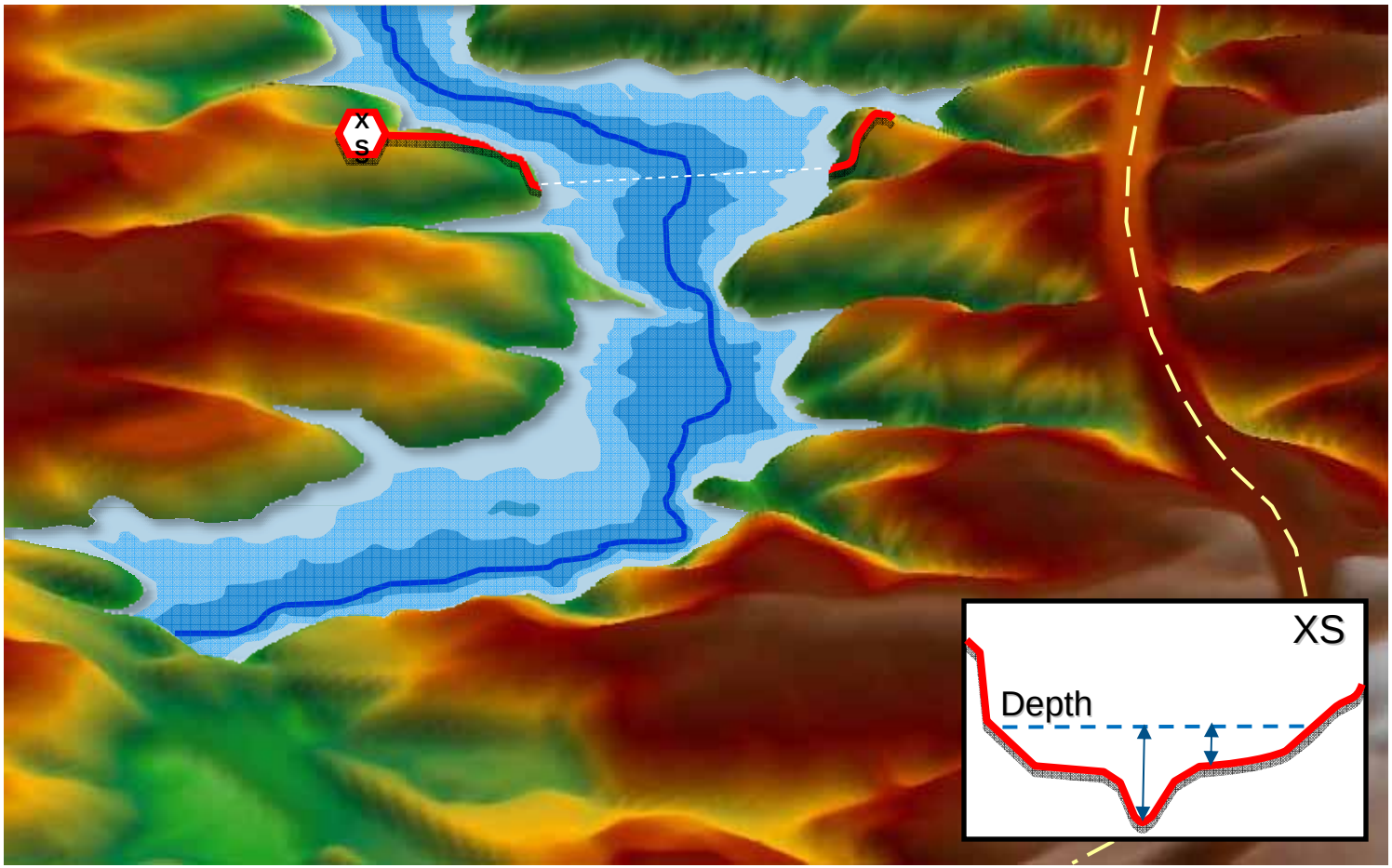
Flood Depth Grids

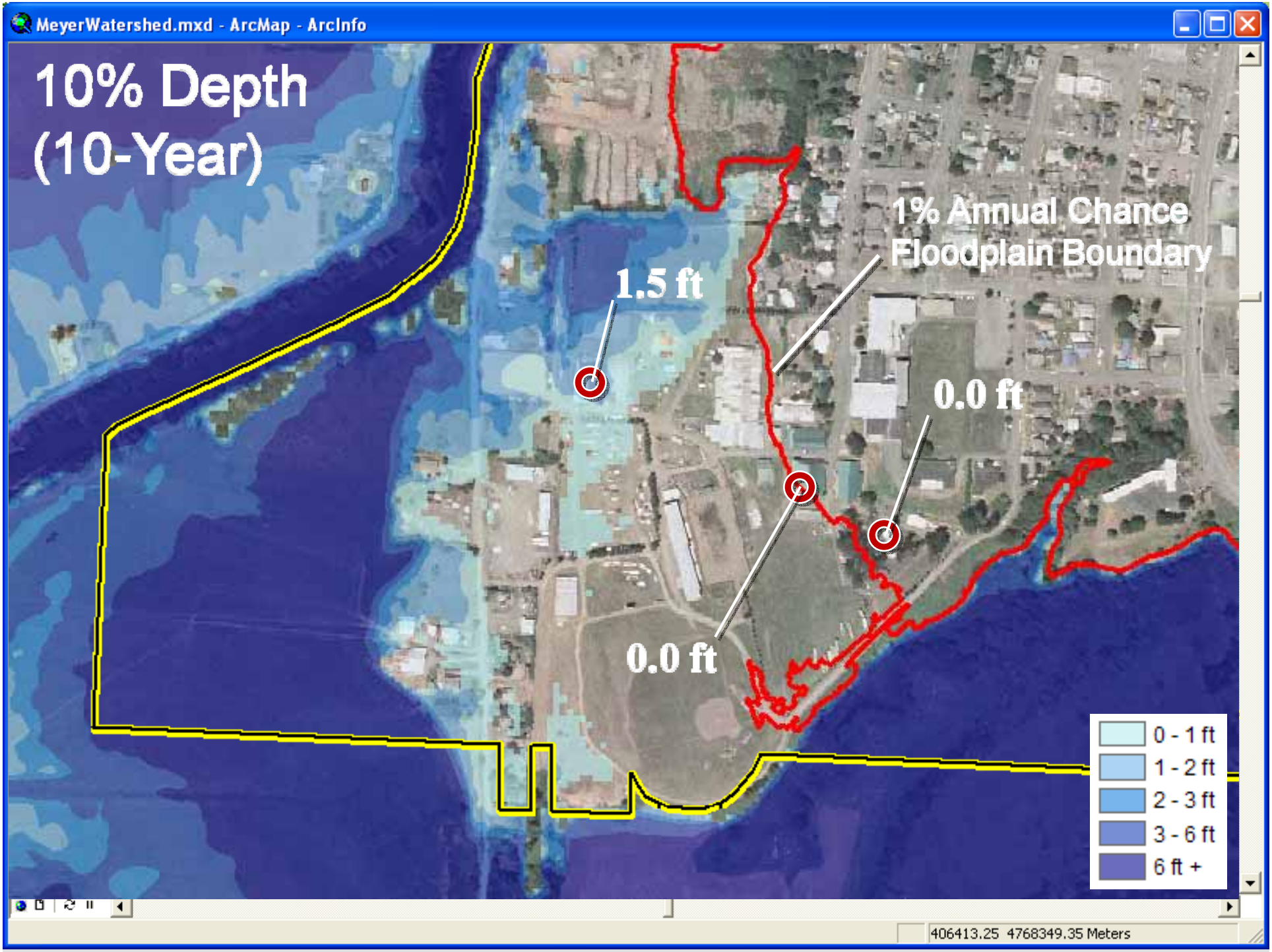
- **Water Surface Elevations (WSE) Calculated and WSE Grid Produced**

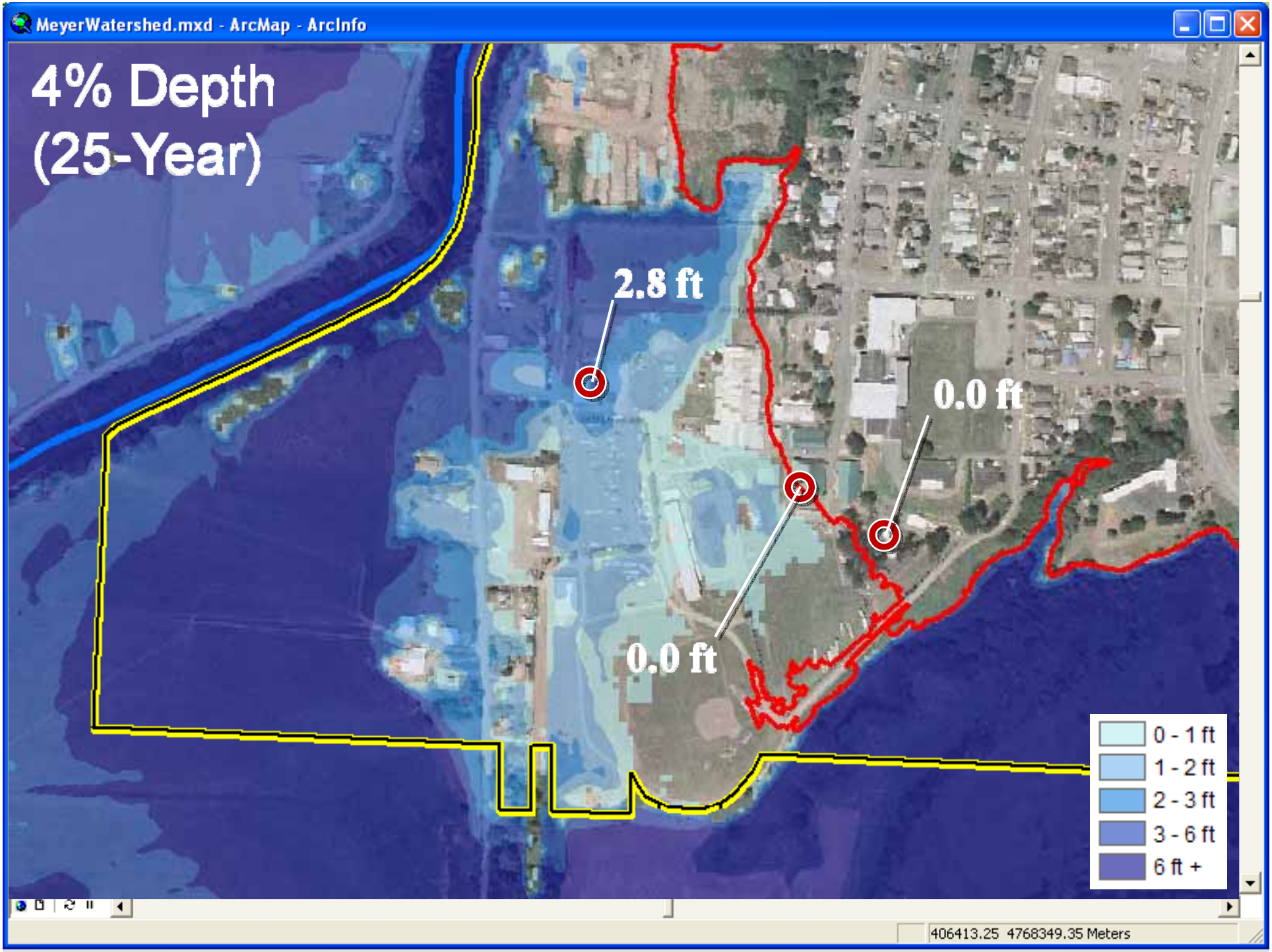


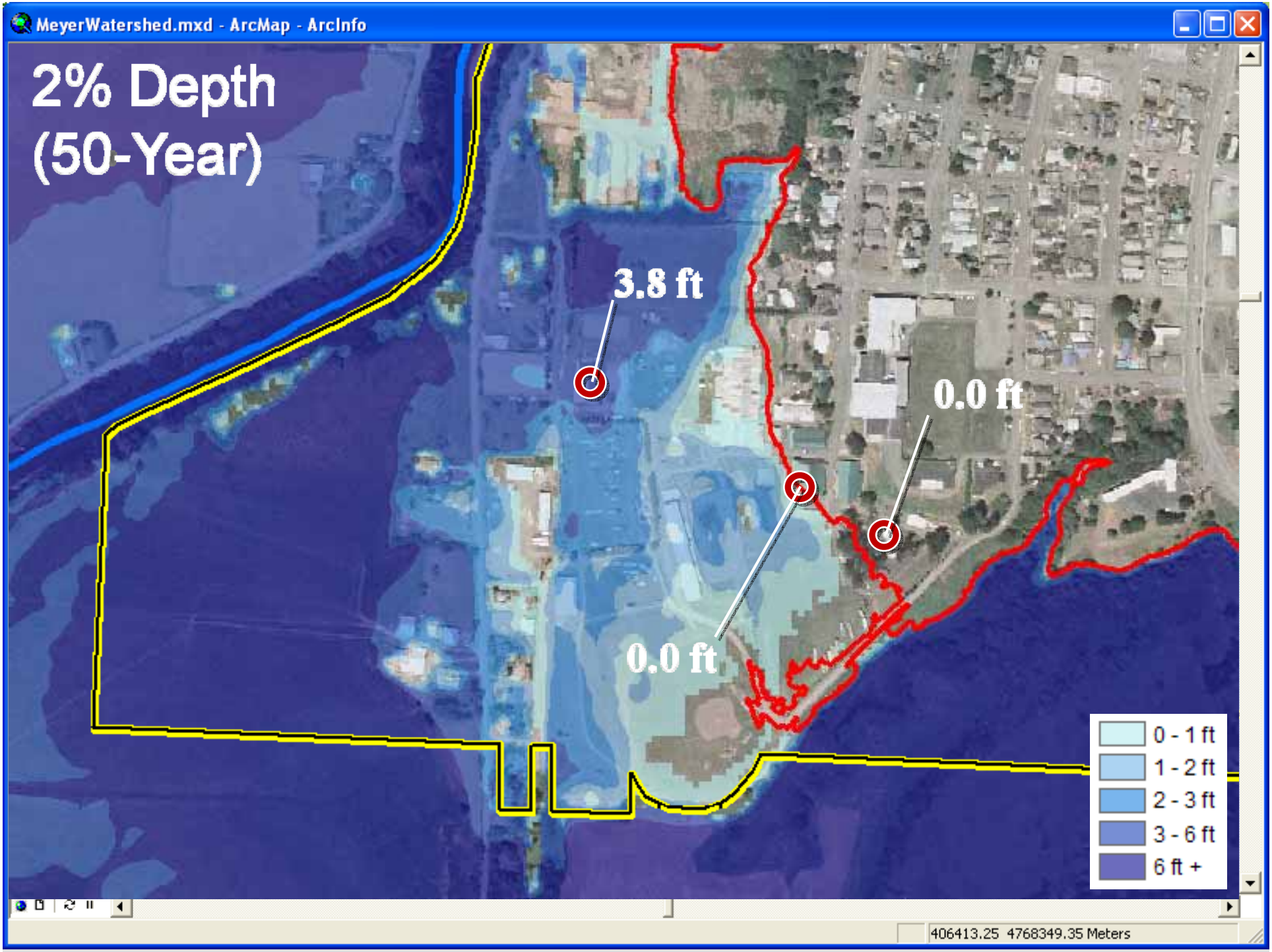
Flood Depth Grids

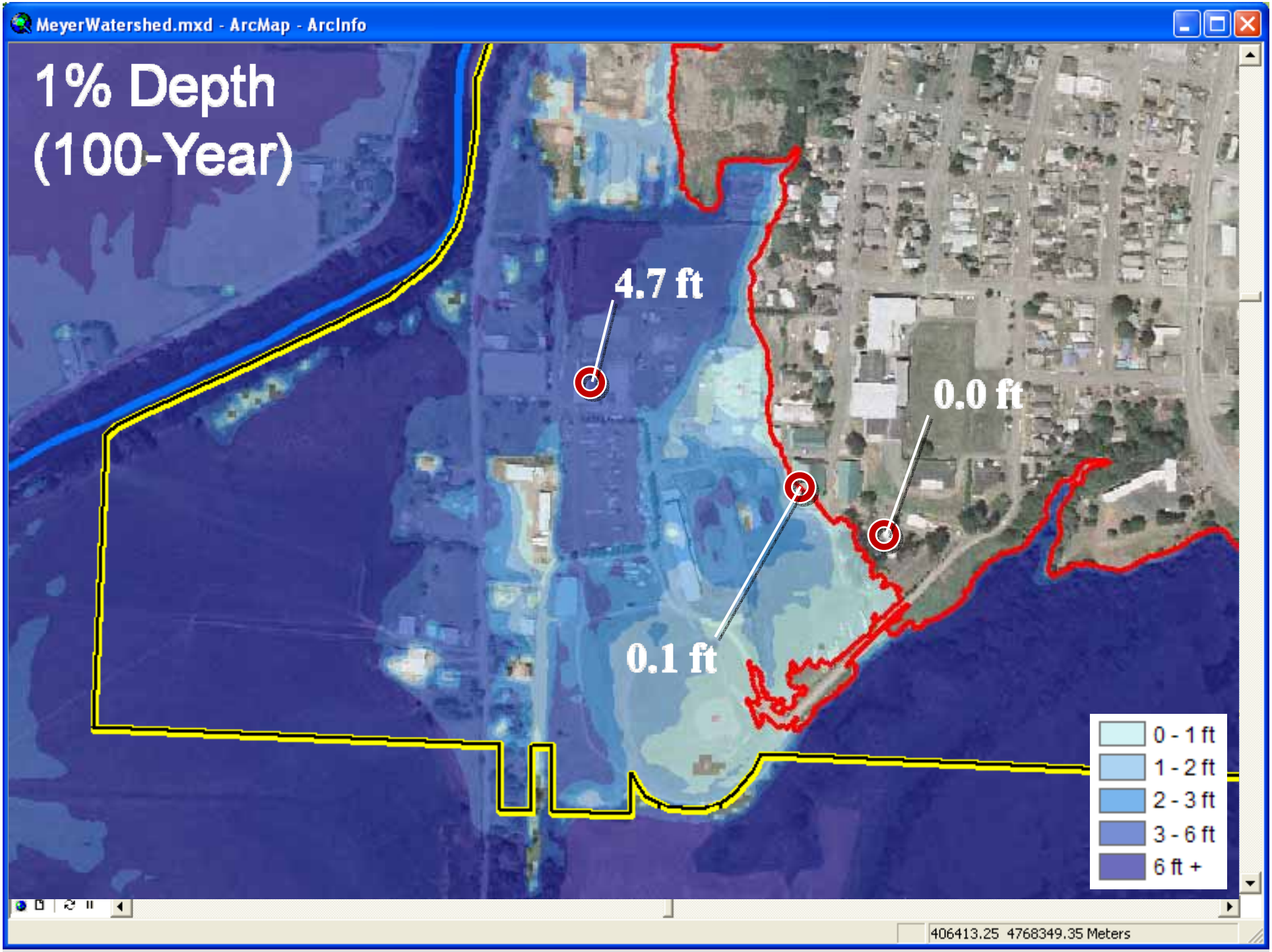
- **Depth Grid Calculated as Difference between WSE and Ground**

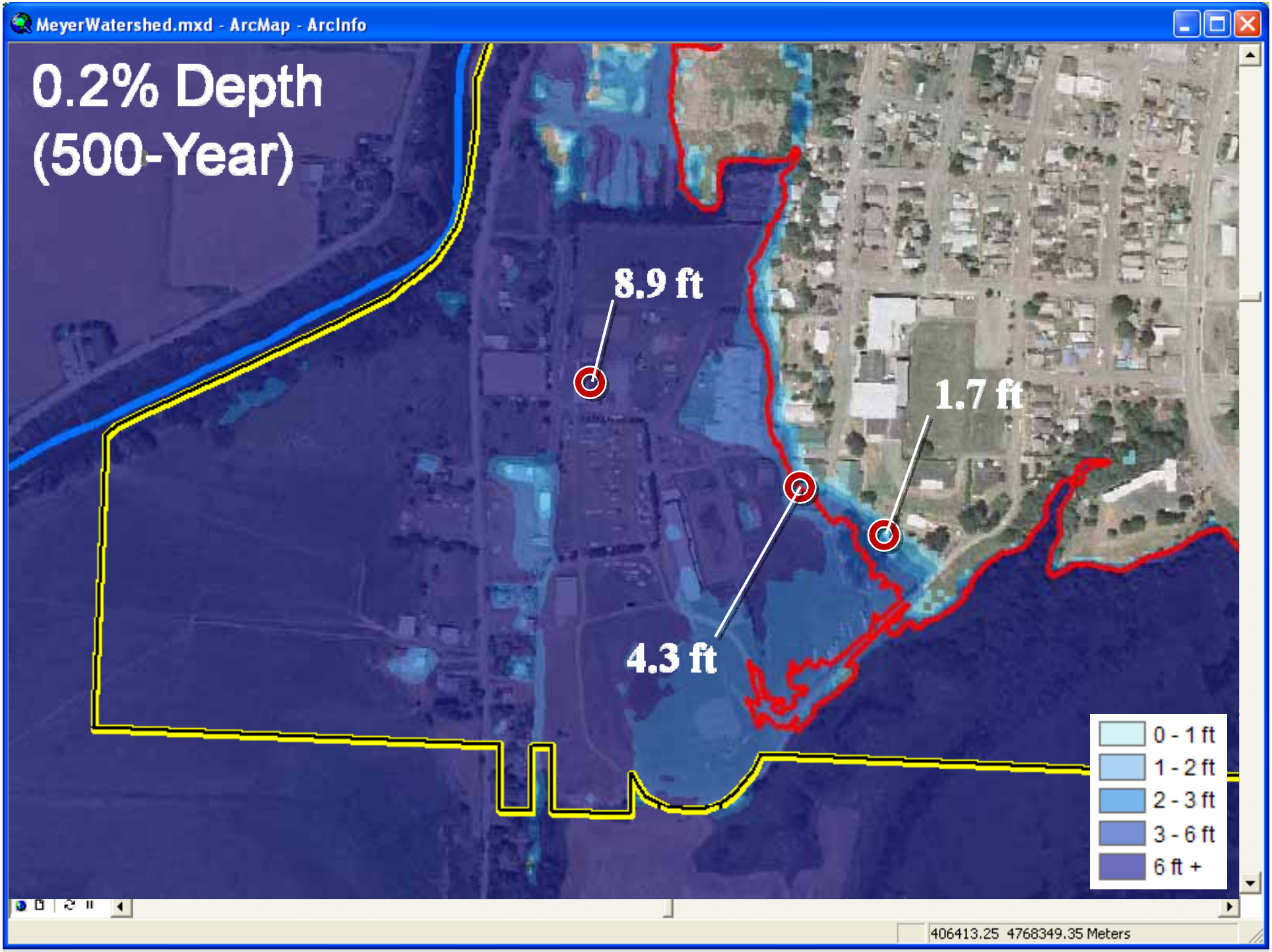



MeyerWatershed.mxd - ArcMap - ArcInfo
10% Depth
(10-Year)
1% Annual Chance
Floodplain Boundary
1.5 ft
0.0 ft
0.0 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
4% Depth
(25-Year)
2.8 ft
0.0 ft
0.0 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters


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


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


MeyerWatershed.mxd - ArcMap - ArcInfo
0.2% Depth
(500-Year)
8.9 ft
1.7 ft
4.3 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters

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Flood Risk Assessment Data

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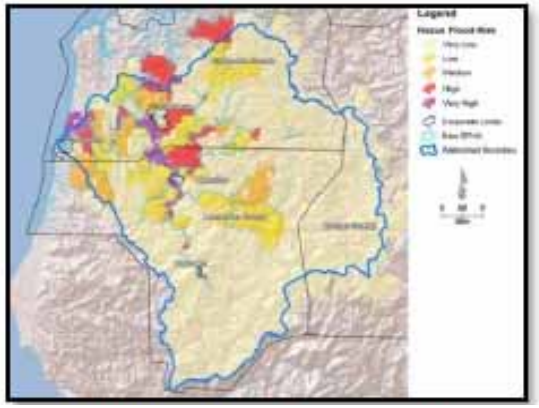
Flood Risk Assessment Datasets

- **Flood Risk Assessment Data**
  - 2010 HAZUS Average Annualized Loss (AAL) Study
  - Refined HAZUS and Other Risk Analyses

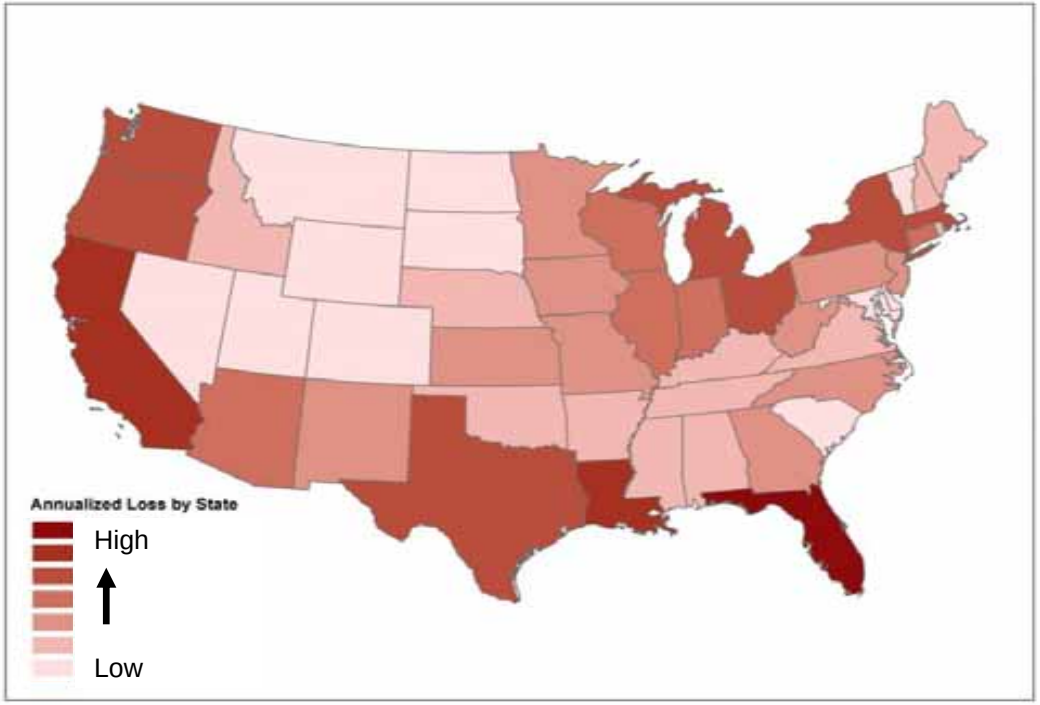
HAZUS MH

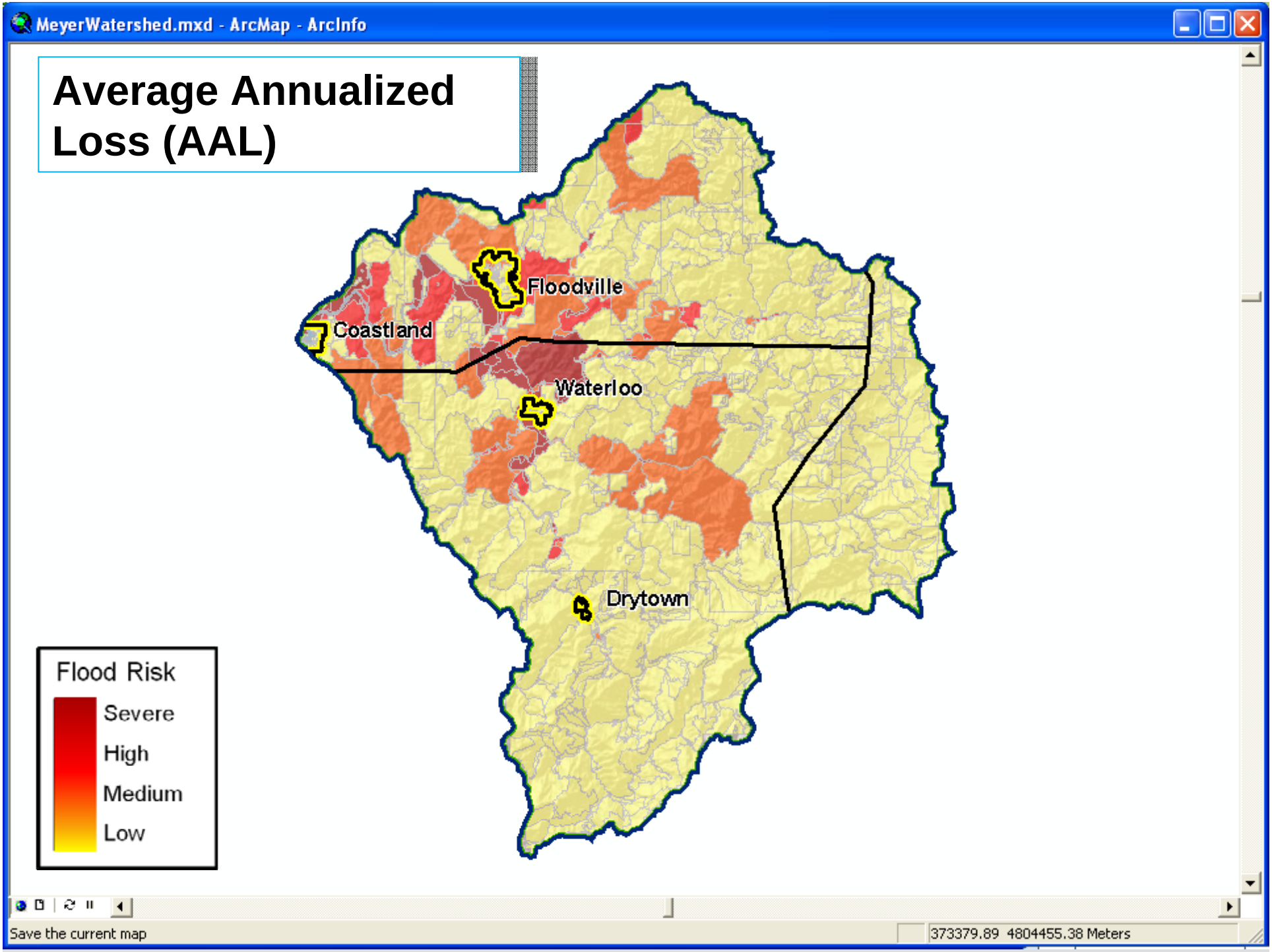


Flood Risk Assessment

2010 AAL HAZUS Study

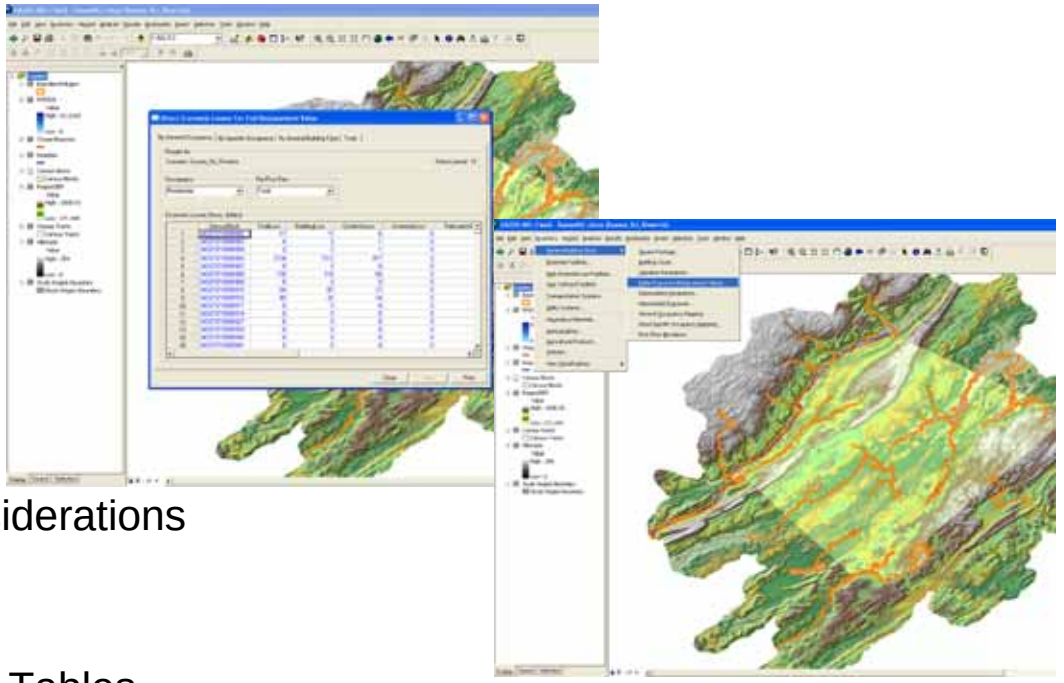
- **2010 HAZUS-MH Flood Average Annualized Loss Estimation (AAL) was performed for continental U.S. using MR4**
- **Inputs:**
  - County-wide study regions
  - 30 meter DEM
  - Default Census data
- **Final Output included**
  - Total exposure
  - Average Annualized Loss
    - Annualized Loss Ratio

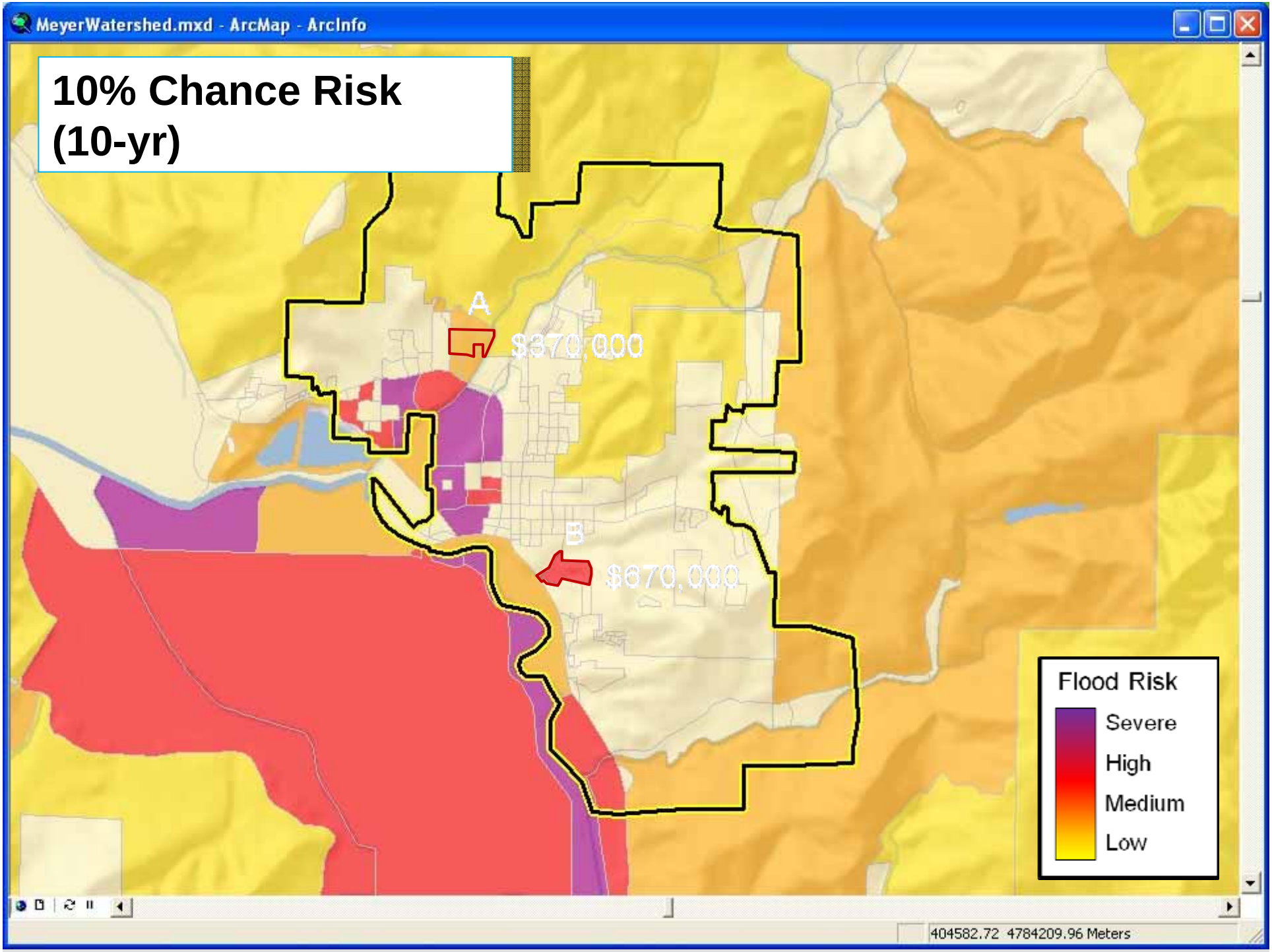


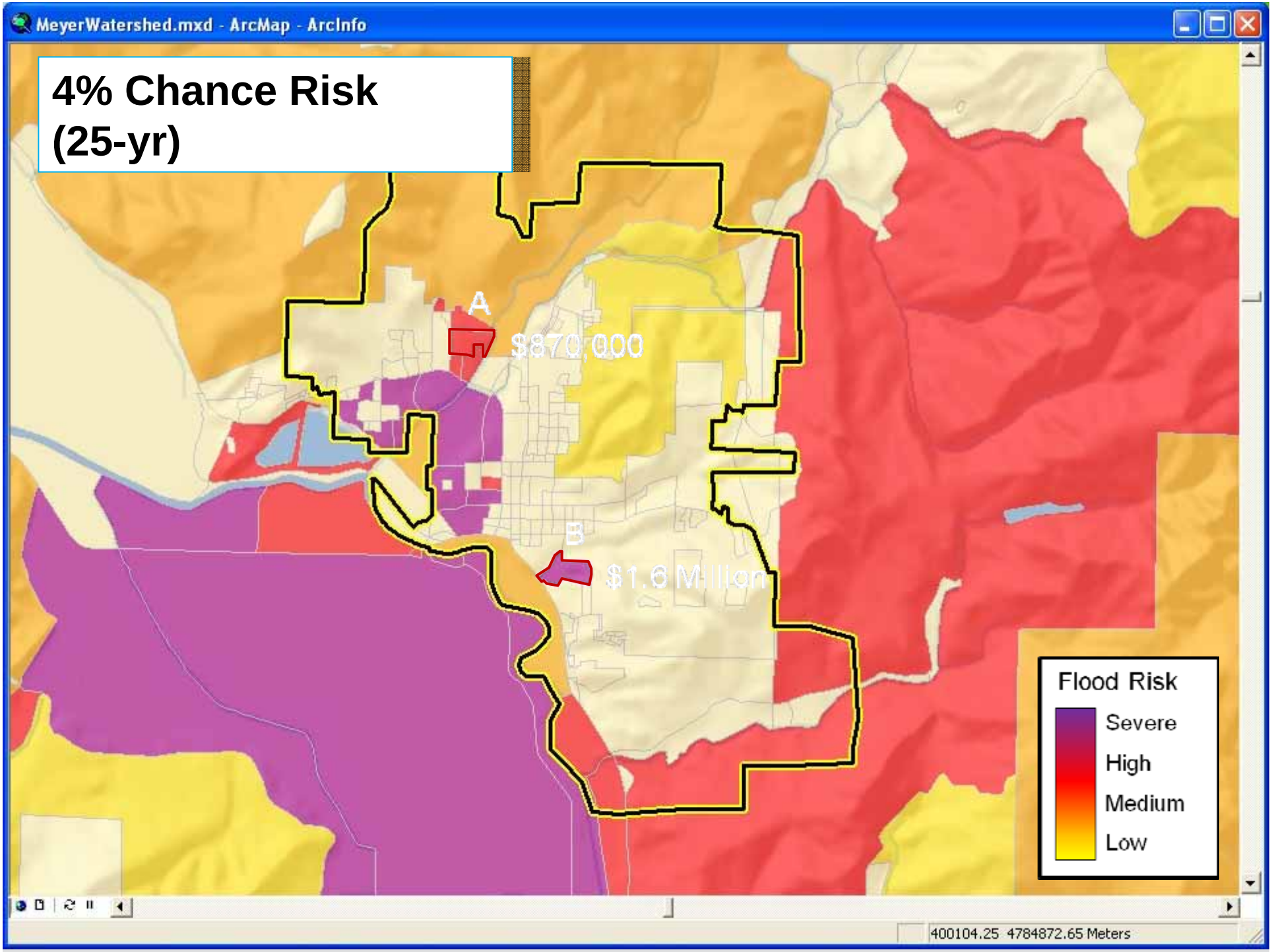

MeyerWatershed.mxd - ArcMap - ArcInfo
Average Annualized Loss (AAL)
Floodville
Coastland
Waterloo
Drytown
Flood Risk
Severe
High
Medium
Low
Save the current map
373379.89 4804455.38 Meters

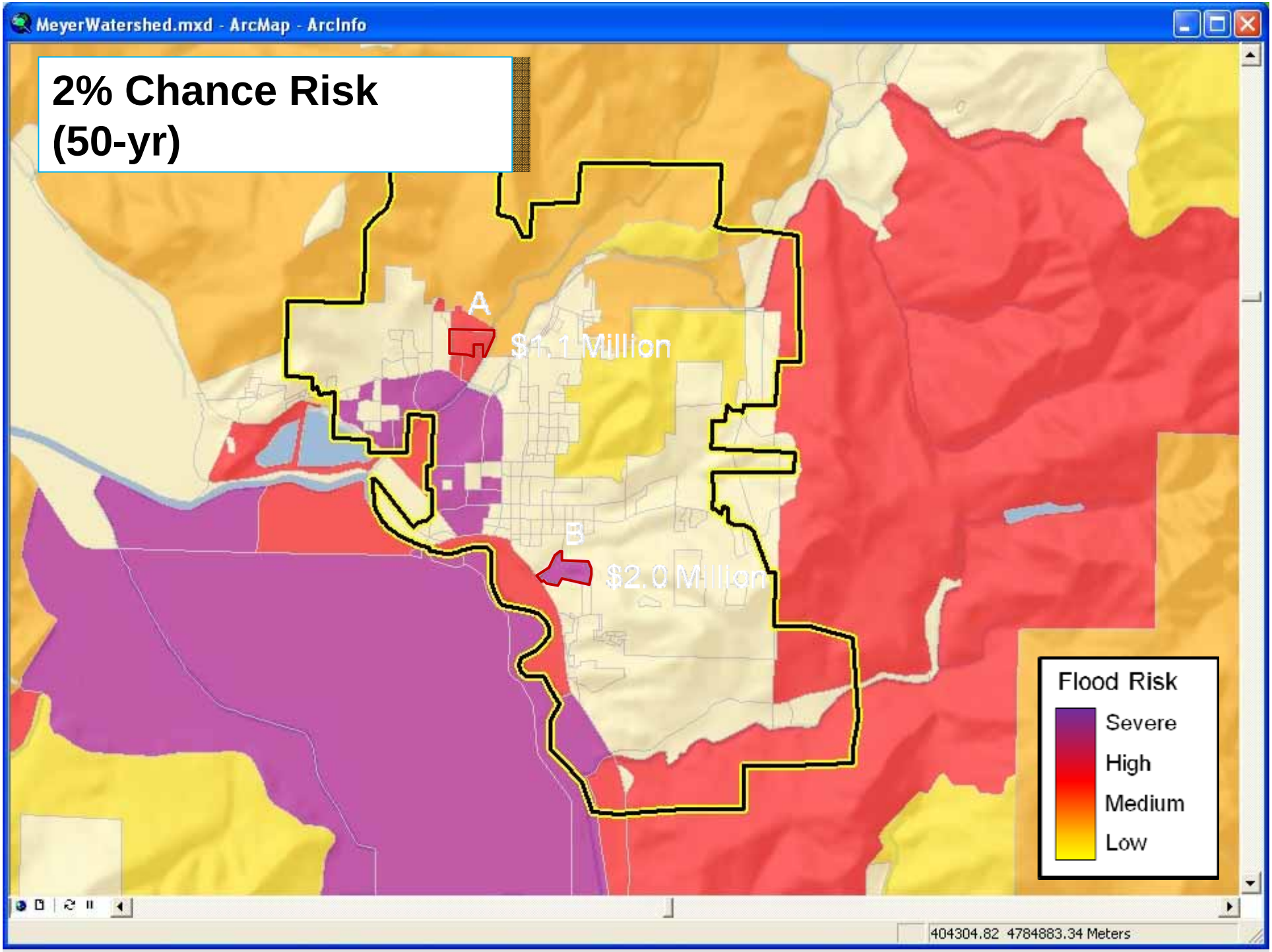
Estimation of Losses

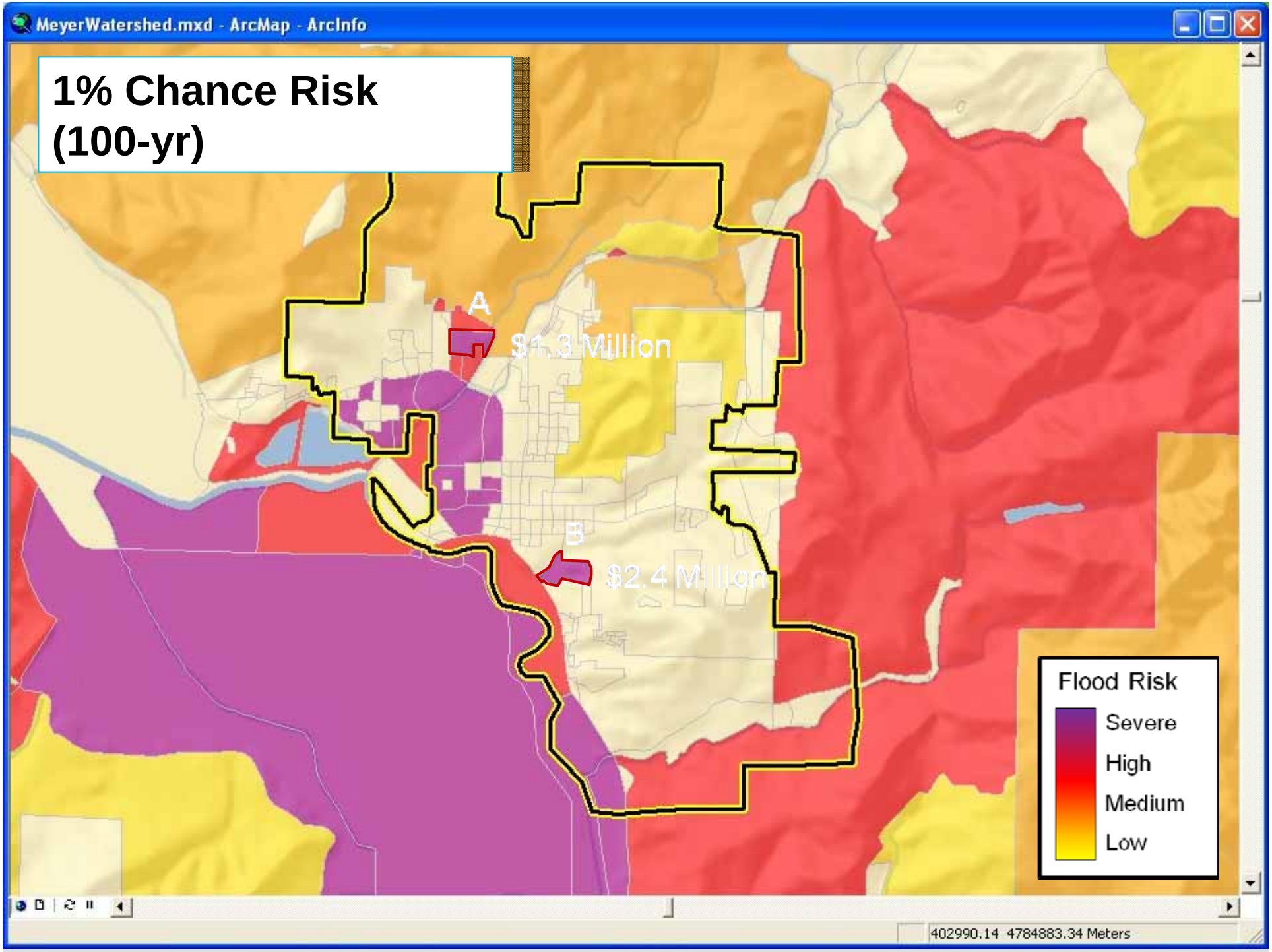
- **Dollar Losses**
  - Residential Loss
  - Commercial Loss
  - Other Asset Loss
- **Percent Damage**
  - Evaluates Building Stock
  - Structure and Content Considerations
- **Business Disruption**
  - Considers Total Occupancy Tables
  - Considers Lost Income and Wages

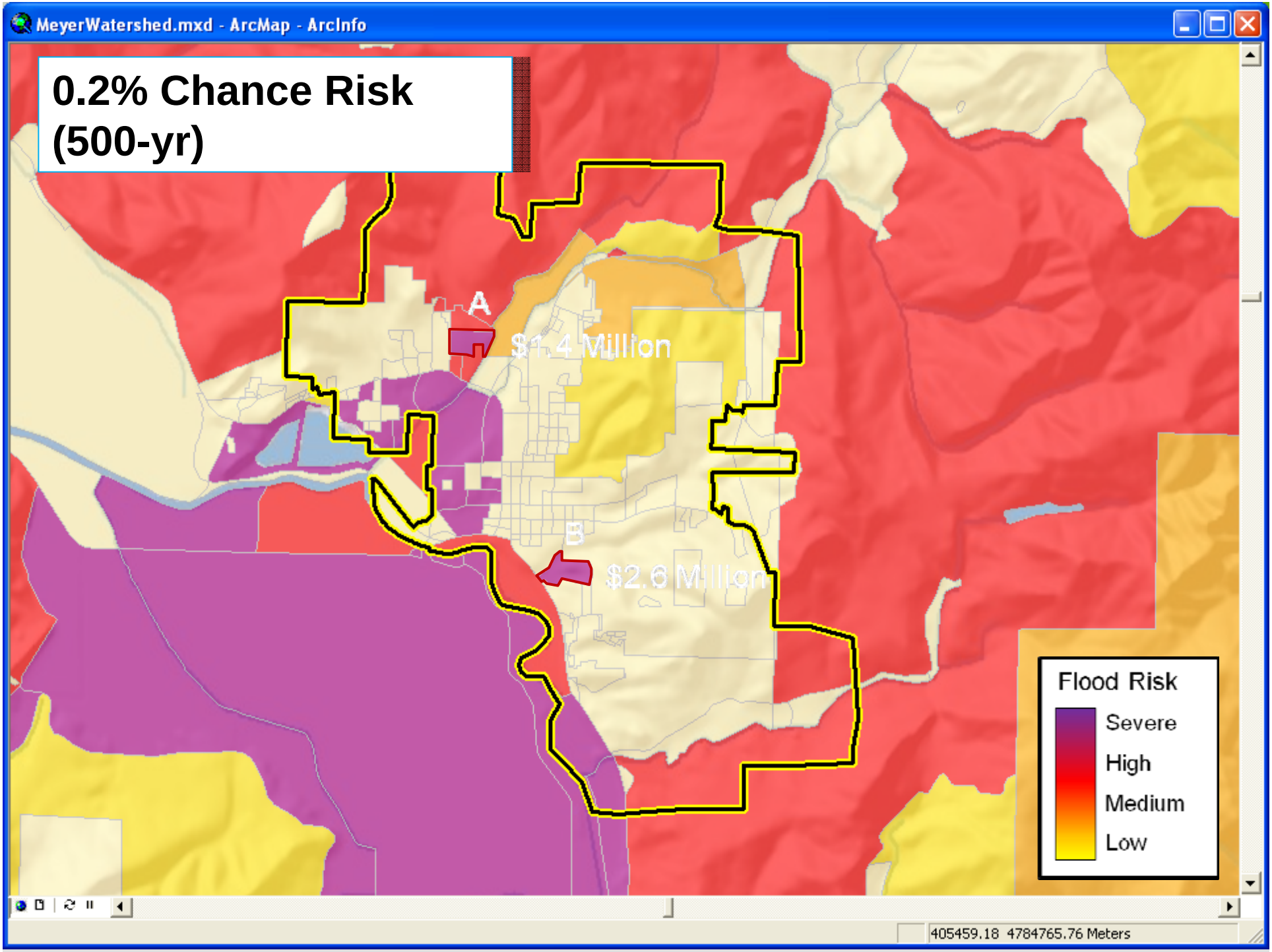


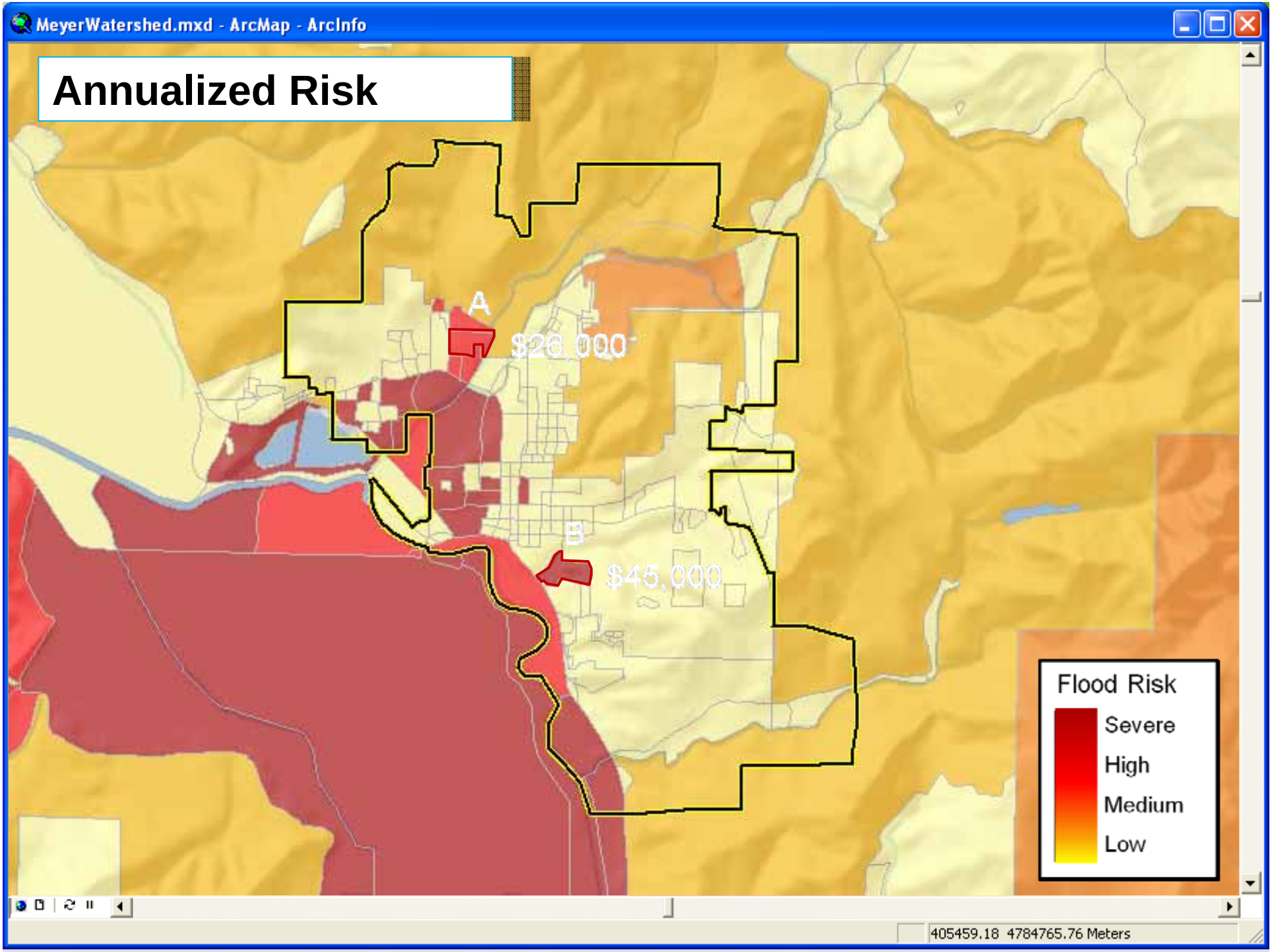

MeyerWatershed.mxd - ArcMap - ArcInfo
10% Chance Risk
(10-yr)
A
$370,000
B
$670,000
Flood Risk
Severe
High
Medium
Low
404582.72 4784209.96 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
4% Chance Risk
(25-yr)
A
$870,000
B
$1.6 Million
Flood Risk
Severe
High
Medium
Low
400104.25 4784872.65 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
2% Chance Risk
(50-yr)
A
$1.1 Million
B
$2.0 Million
Flood Risk
Severe
High
Medium
Low
404304.82 4784883.34 Meters

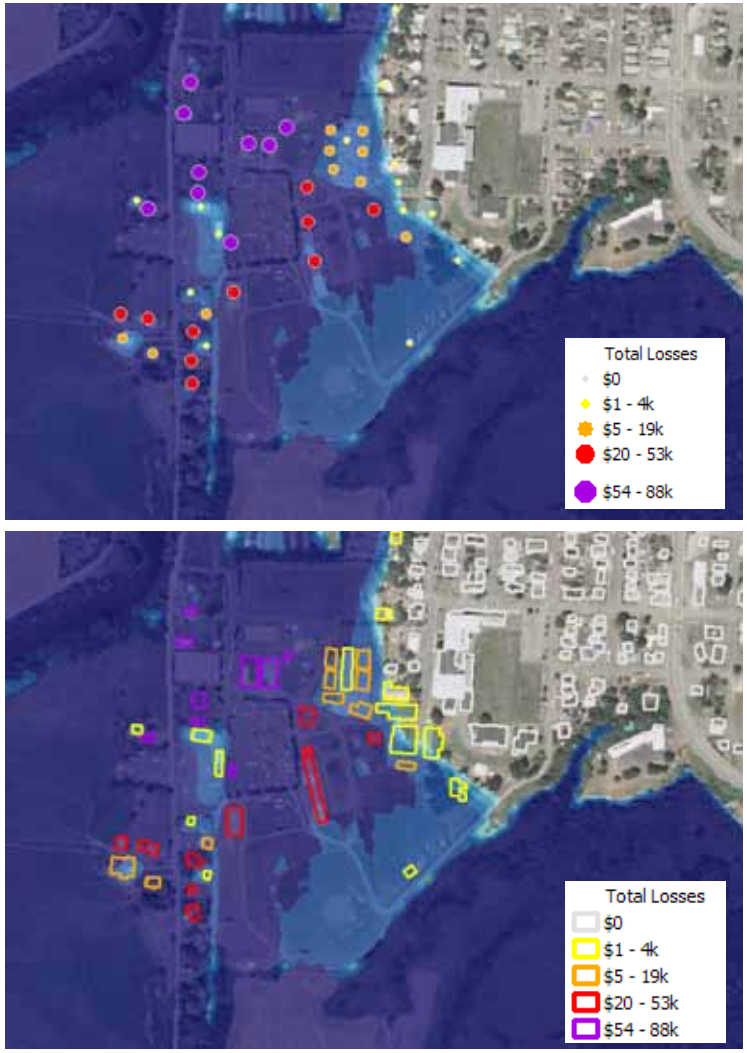

MeyerWatershed.mxd - ArcMap - ArcInfo
1% Chance Risk
(100-yr)
A
$1.3 Million
B
$2.4 Million
Flood Risk
Severe
High
Medium
Low
402990.14 4784883.34 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
0.2% Chance Risk
(500-yr)
A
$1.4 Million
B
$2.6 Million
Flood Risk
Severe
High
Medium
Low
405459.18 4784765.76 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
Annualized Risk
A
$26,000
B
$45,000
Flood Risk
Severe
High
Medium
Low
405459.18 4784765.76 Meters

Enhanced Risk Assessment Analyses

- **Enhancements could include:**
  - Risk Assessments at site-specific locations
  - Incorporation of locally-provided inventory data (first-floor elevations and/or parcel data)
  - Additional sources of flood depth grids
  - Supplemental HAZUS analyses or other types of analyses



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Areas of Mitigation Interest (Enhanced)

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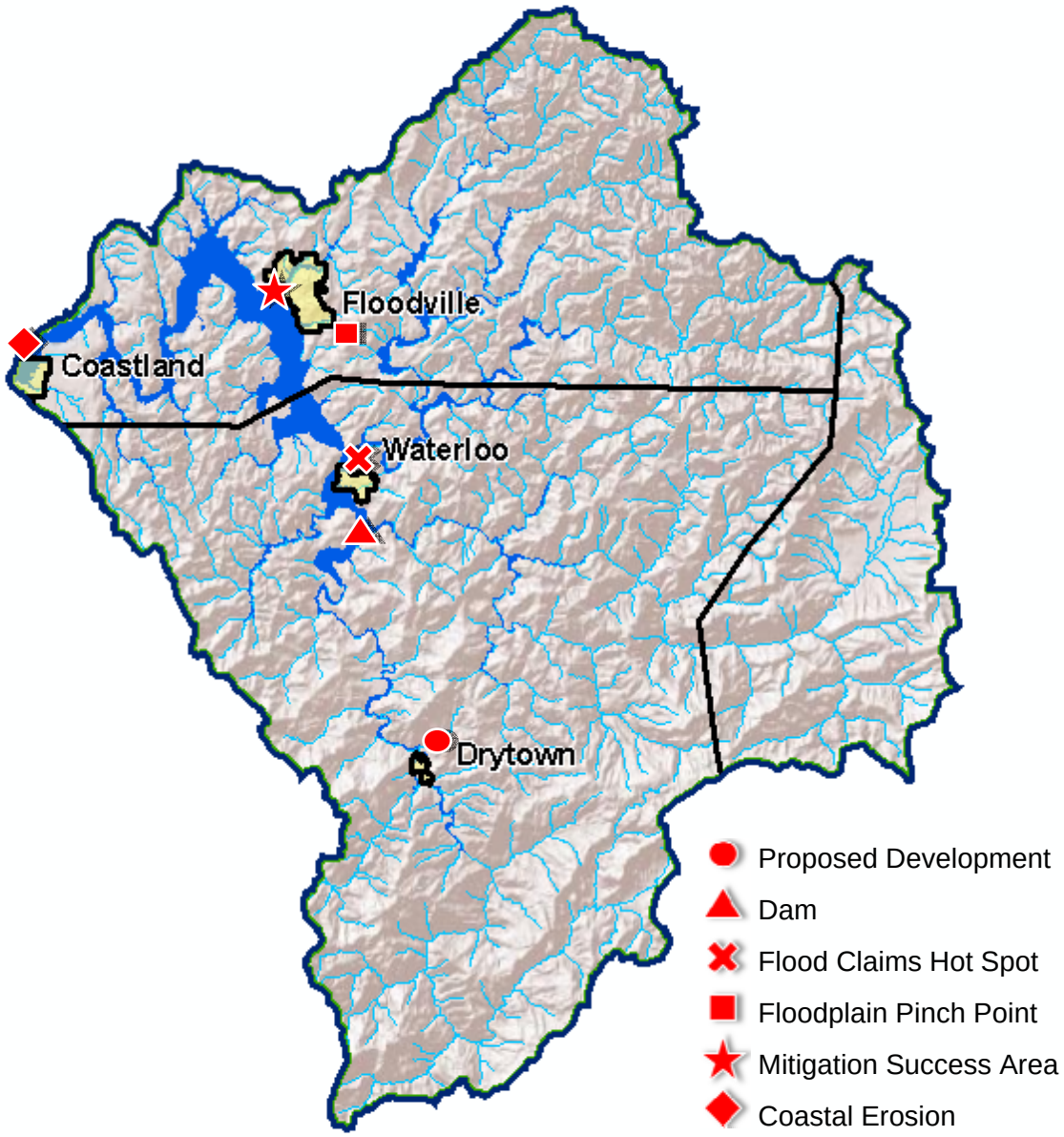
MeyerWatershed.mxd - ArcMap - ArcInfo

Flood Claims Hot Spot

Description:
Quietwater neighborhood has flooded on 4 separate occasions since 1995. The results have produced over 36 claims from 16 structures. Of these structures, 12 are Repetitive Loss and 2 are Severe Repetitive Loss

Source:
State NFIP and SHMO
Waterloo Planning and Zoning Dept



Create a Spatial Bookmark

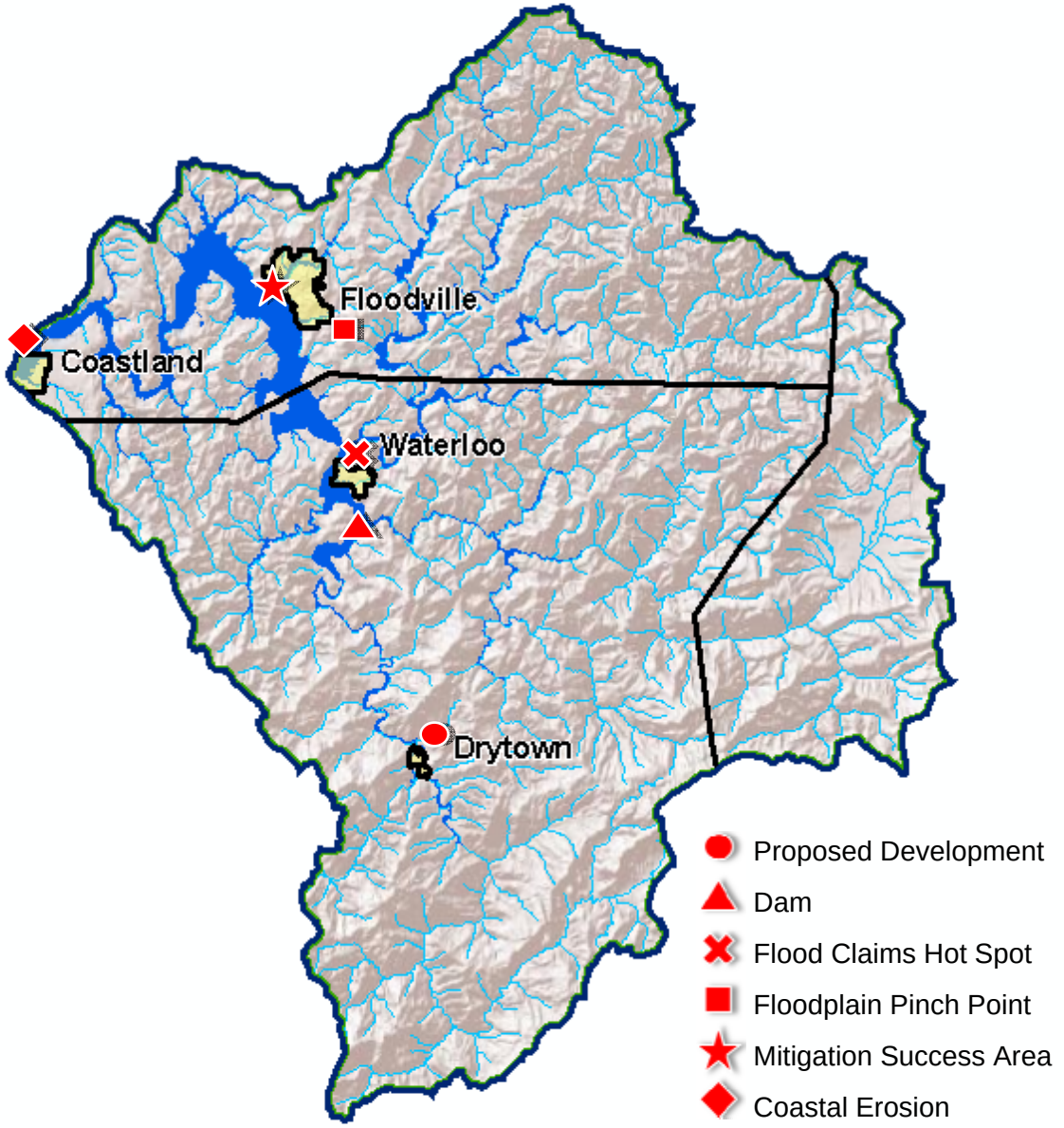
378860.06 4803411.54 Meters

MeyerWatershed.mxd - ArcMap - ArcInfo

Dam Location

Description:
The Blue River Dam was built in 1950 and is classified as 'high hazard'. According to the Emergency Action Plan (EAP), approximately 250 structures are located immediately downstream of this dam within its inundation mapping limits.

Source:
County Engineering Dept



Create a Spatial Bookmark

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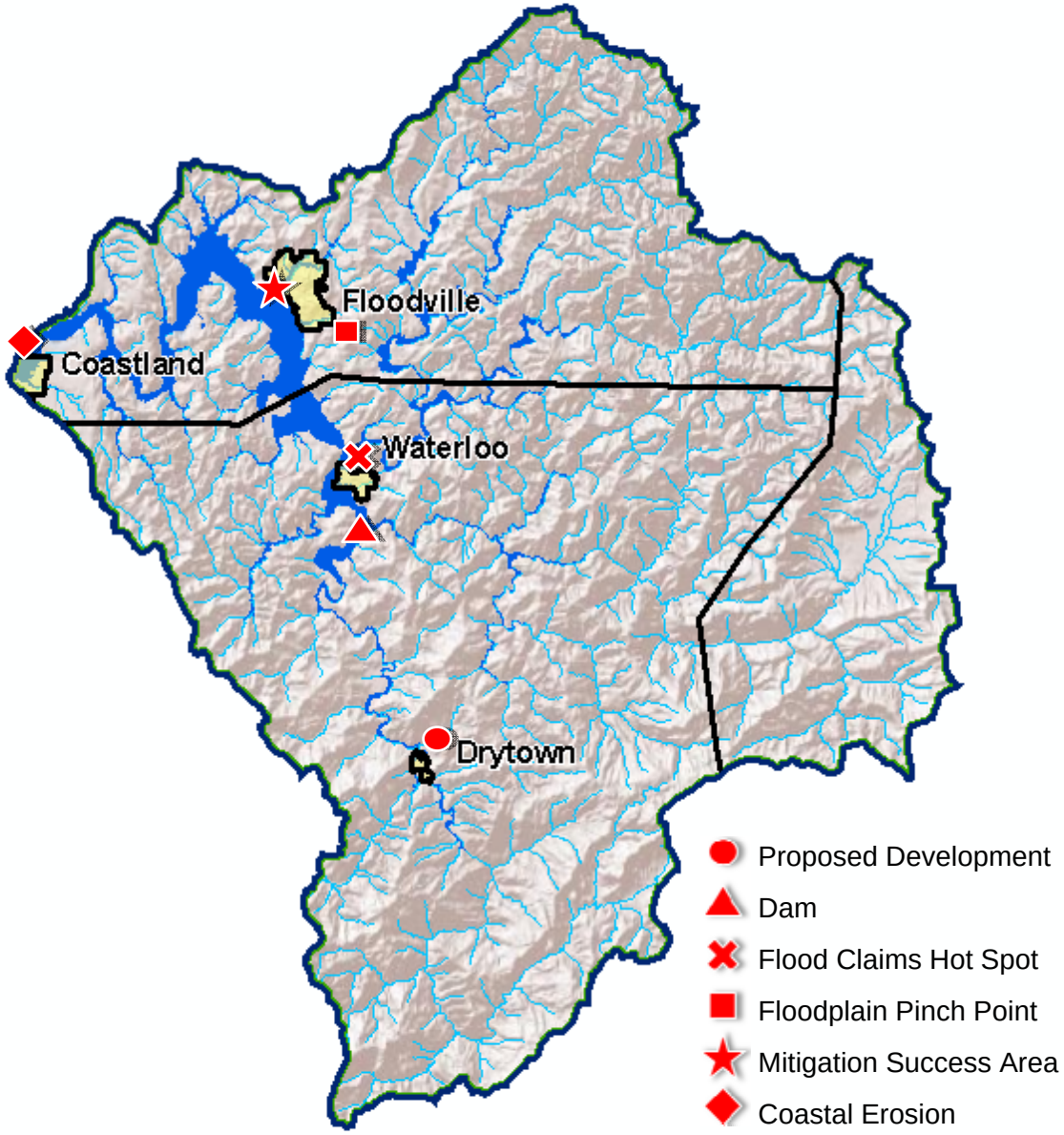
MeyerWatershed.mxd - ArcMap - ArcInfo

Coastal Erosion Area

Description:
Structures along Sunny Beach experienced significant erosion following a series of April 2009 storm surges. Affected structures include approximately 12 residential and 4 commercial businesses determined vital to local economy.

Source:
Coastland Emergency Management and Economic Development Depts



Create a Spatial Bookmark

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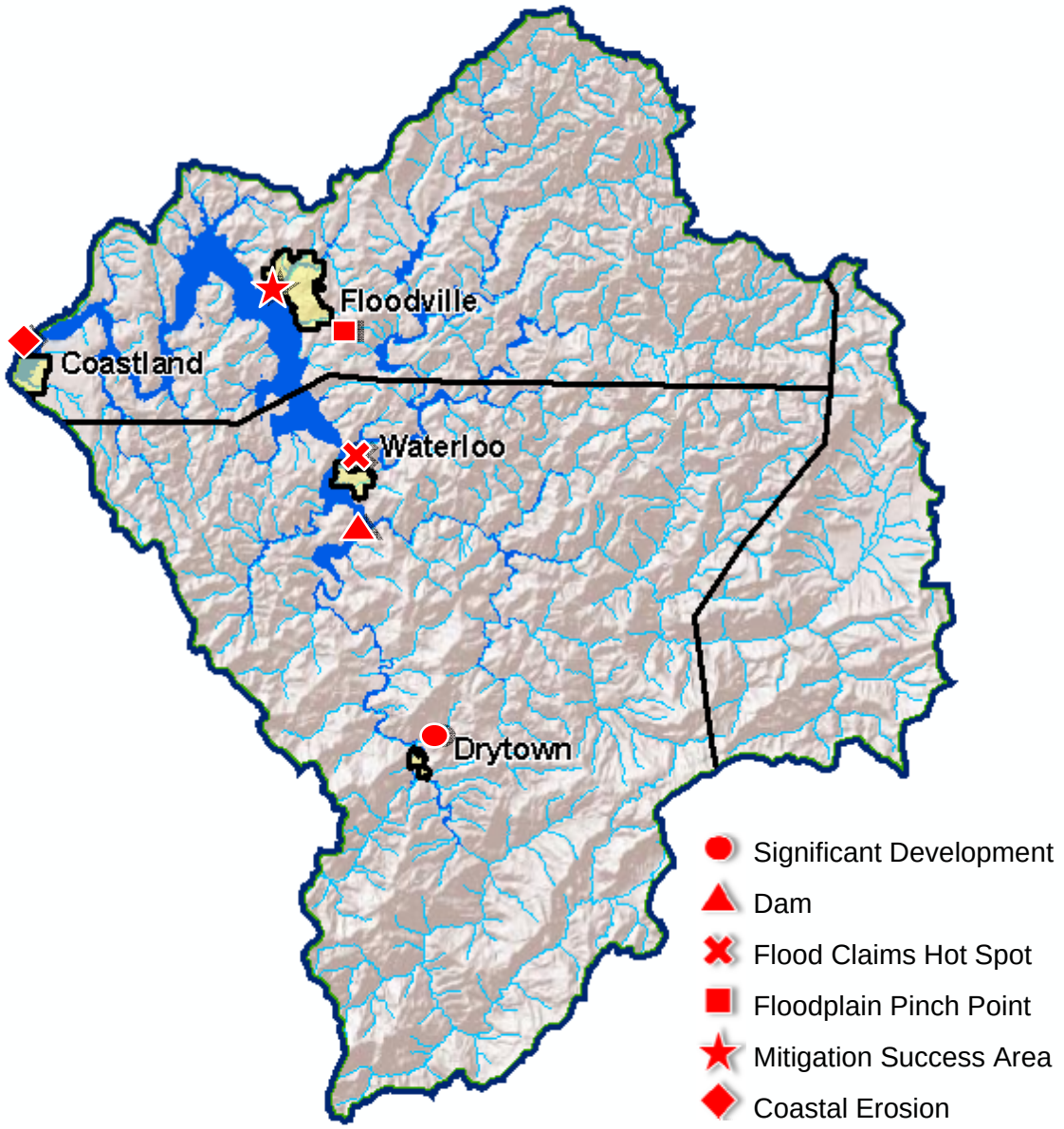
MeyerWatershed.mxd - ArcMap - ArcInfo

Mitigation Success Area

Description:
The City of Floodville successfully mitigated 7 structures through a 2005 HMGP buyout and elevation project.

Source:
State Hazard Mitigation Officer
Floodville Planning Dept



Create a Spatial Bookmark

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Areas of Mitigation Interest
Sources of Data

- Community Provided Data
  - Interviews and questionnaire from Discovery Meeting
  - Mining of existing mitigation plans
- Engineering Data
  - Review of existing H&H models
  - Engineering data from other reports (e.g. USACE)
- Other Government Agency Data
  - Claims data (inc. RL, SRL, clusters, etc)
  - CNMS data
  - Flood control structures

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Flood Risk Products

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

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Flood Risk Database (red = enhanced)

Changes Since Last FIRM

- Horizontal Changes and Results
- Structure/Population counts impacted by change

Depth & Analysis Grids

- Depth (10, 04, 02, 01, 0.2 percent chance)
- Percent Annual Chance
- Percent 30-Year Grid
- Delivery of Water Surface Elevation (multi-freq)
- Water Surface Elevation Change Grid (1%)
- Velocity Grids, Annualized Depth, Top and Toe of Levee
- Multi Freq Grids for Levee and Coastal Areas, etc.

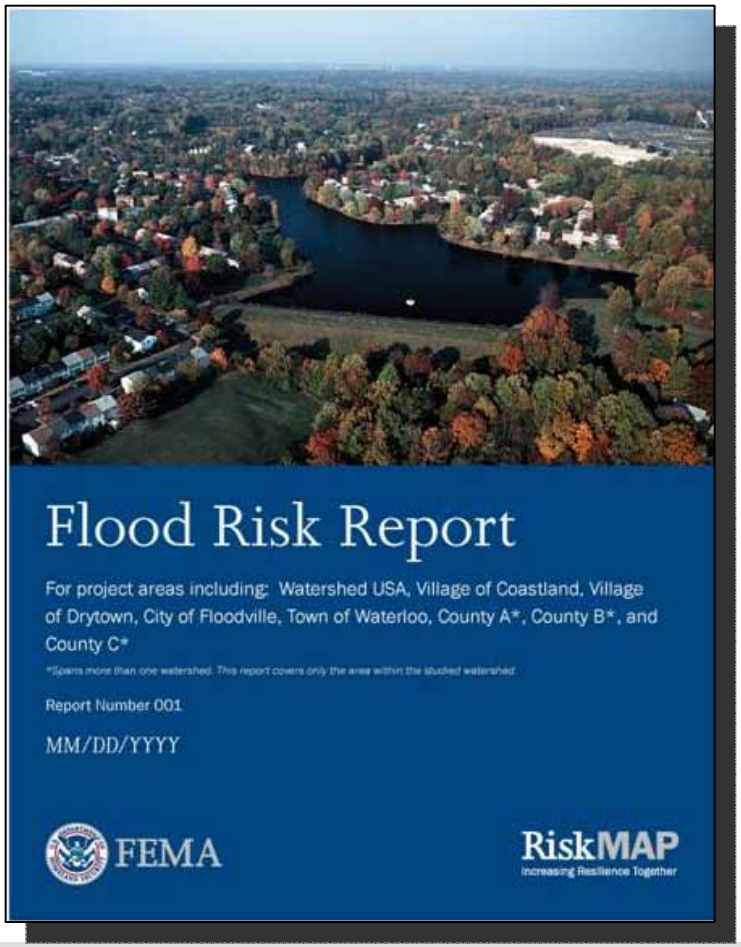
Flood Risk Assessment

- Average Annualized Loss – 2010
- Refined Flood Risk Assessment
- HAZUS or Non-HAZUS with improved data/assumptions

Areas of Mitigation Interest

- Areas of Mitigation Opportunity or Awareness

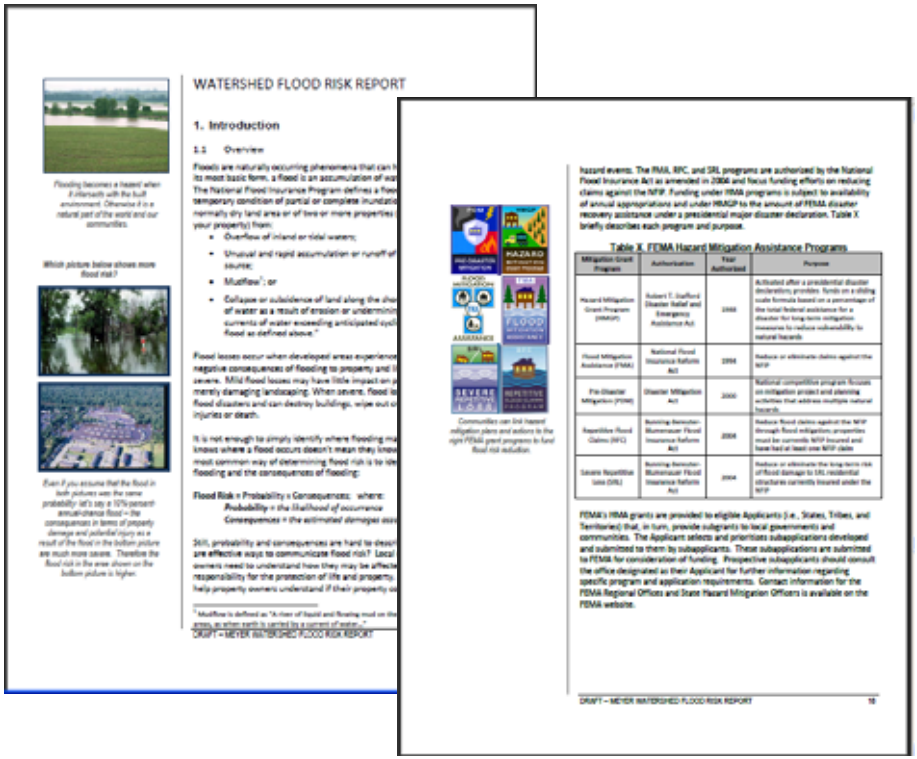
Flood Risk Report Content Overview



- **Background:**
  - Purpose, Methods
  - Risk Reduction Practices
- **Project Results**
  - Changes Since Last FIRM
  - Depth & Analysis Grids
  - Flood Risk Assessment
  - (enhanced analyses)
    - e.g. Areas of Mitigation Interest
- **Summarized by Locations**
  - Communities and Watersheds

Flood Risk Report Content – Details

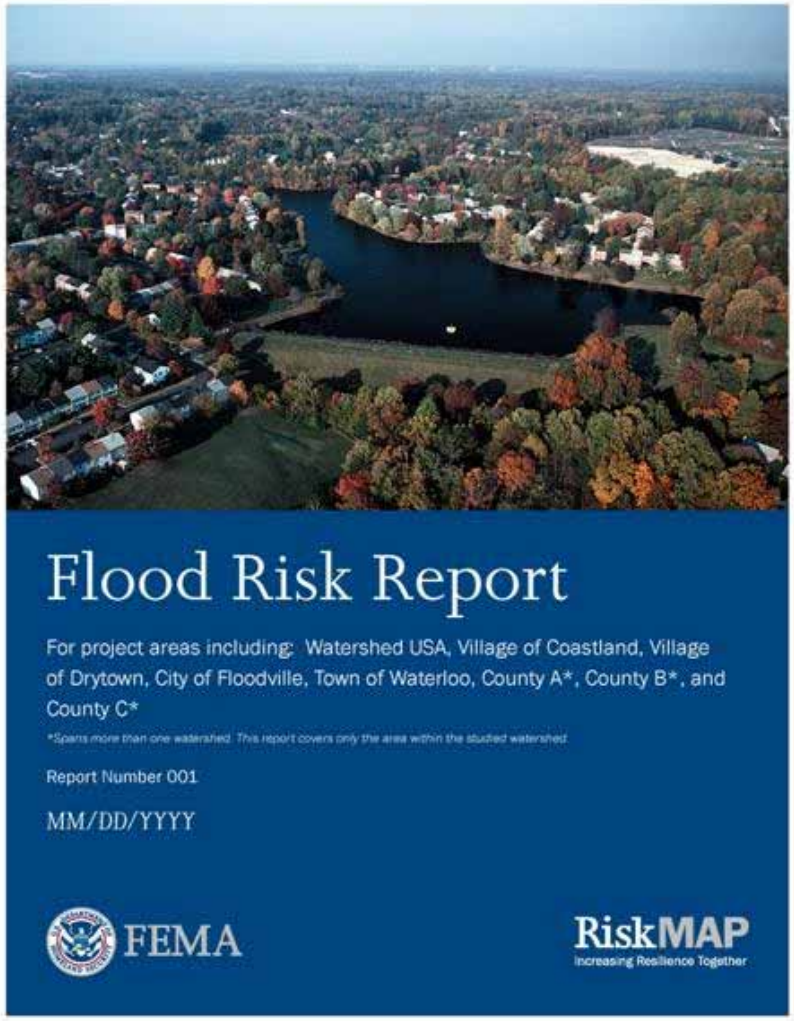
Risk Awareness Information


WATERSHED FLOOD RISK REPORT

1. Introduction

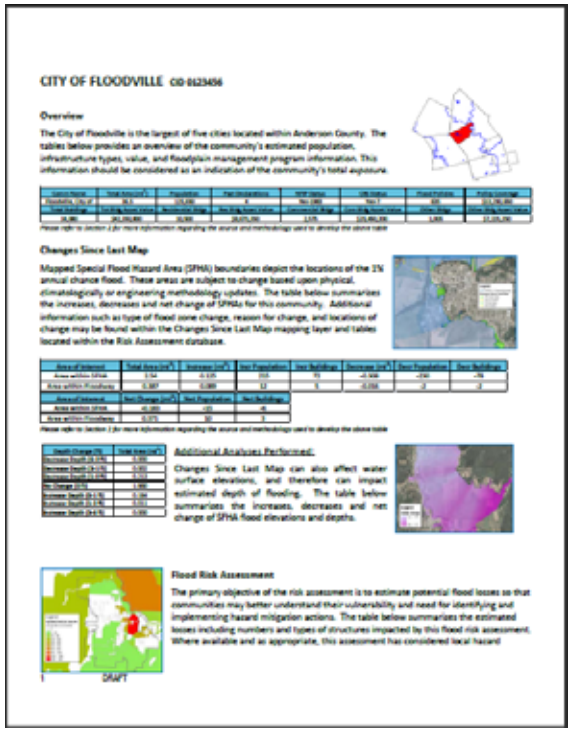
1.1 Overview

Table X. FEMA Hazard Mitigation Assistance Programs



Flood Risk Report Content – Details

Community Summaries


CITY OF FLOODVILLE CID 0123456

Overview

The City of Floodville is the largest of five cities located within Anderson County. The tables below provides an overview of the community's estimated population, infrastructure types, value, and floodplain management program information. This information should be considered as an indication of the community's total exposure.

Changes Since Last Map

Mapped Special Flood Hazard Area (SFHA) boundaries depict the locations of the 1% annual chance flood. These areas are subject to change based upon physical, climatologically or engineering methodology updates. The table below summarizes the increases, decreases and net change of SFHAs for this community. Additional information such as type of flood zone change, reason for change, and locations of change may be found within the Changes Since Last Map mapping layer and tables located within the Risk Assessment database.

Please refer to Section 2 for more information regarding the source and methodology used to develop the above table

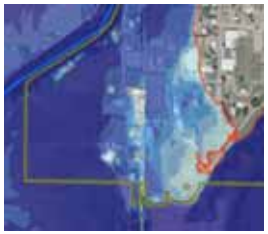
Additional Analyses Performed:

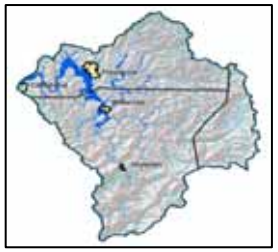
Changes Since Last Map can also affect water surface elevations, and therefore can impact estimated depth of flooding. The table below summarizes the increases, decreases and net change of SFHA flood elevations and depths.

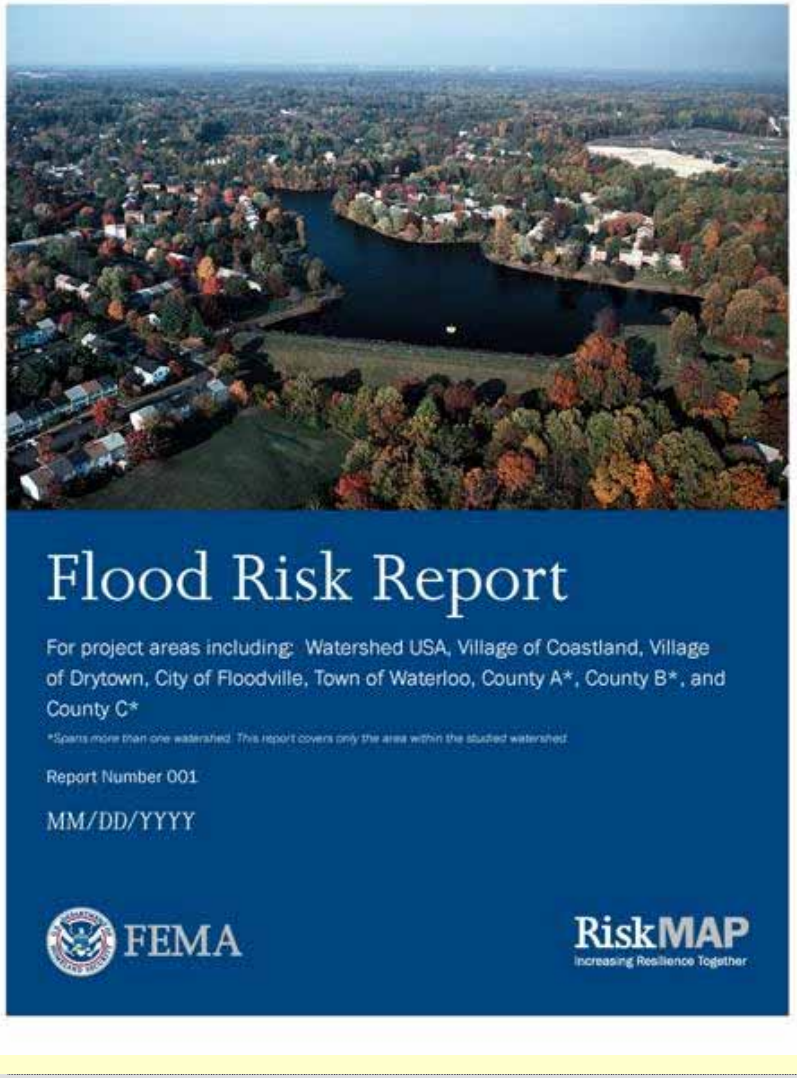
Flood Risk Assessment

The primary objective of the risk assessment is to estimate potential flood losses so that communities may better understand their vulnerability and need for identifying and implementing hazard mitigation actions. The table below summarizes the estimated losses including numbers and types of structures impacted by this flood risk assessment. Where available and as appropriate, this assessment has considered local hazard

1 DRAFT

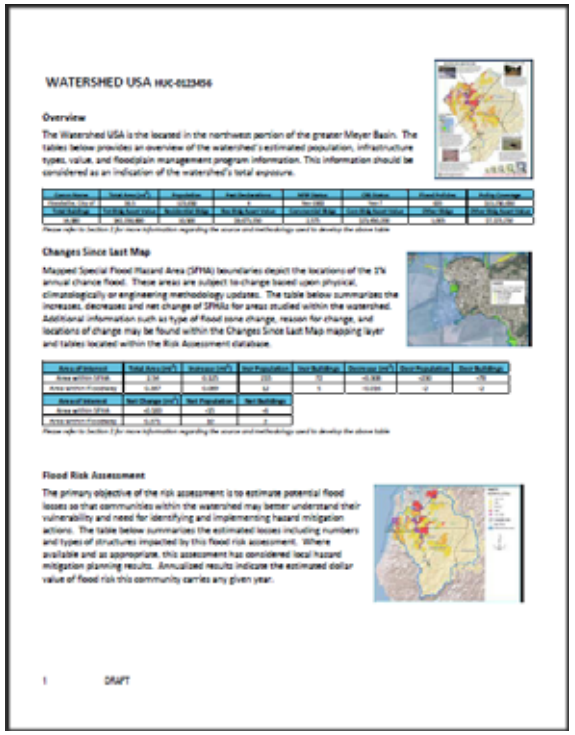






Flood Risk Report Content – Details

Watershed /Project Level Summary


WATERSHED USA HUC-0123456

Overview

The Watershed USA is the located in the northwest portion of the greater Meyer Basin. The tables below provides an overview of the watershed's estimated population, infrastructure types, value, and floodplain management program information. This information should be considered as an indication of the watershed's total exposure.

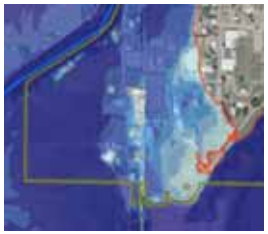
Changes Since Last Map

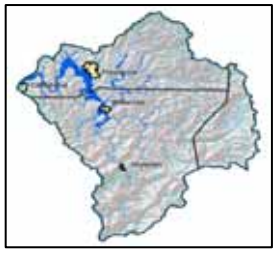
Mapped Special Flood Hazard Area (SFHA) boundaries depict the locations of the 1% annual chance flood. These areas are subject to change based upon physical, climatologically or engineering methodology updates. The table below summarizes the increases, decreases and net change of SFHAs for areas studied within the watershed. Additional information such as type of flood zone change, reason for change, and locations of change may be found within the Changes Since Last Map mapping layer and tables located within the Risk Assessment database.

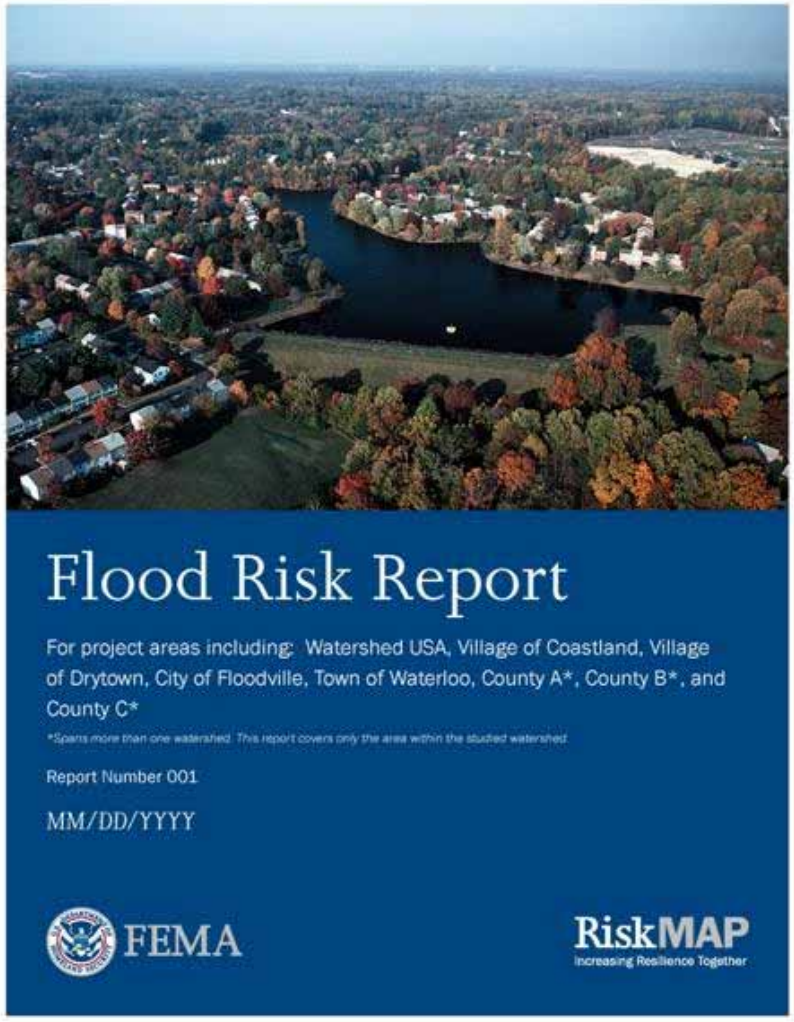
Flood Risk Assessment

The primary objective of the risk assessment is to estimate potential flood losses so that communities within the watershed may better understand their vulnerability and need for identifying and implementing hazard mitigation actions. The table below summarizes the estimated losses including numbers and types of structures impacted by this flood risk assessment. Where available and as appropriate, this assessment has considered local hazard mitigation planning results. Annualized results indicate the estimated dollar value of flood risk this community carries any given year.

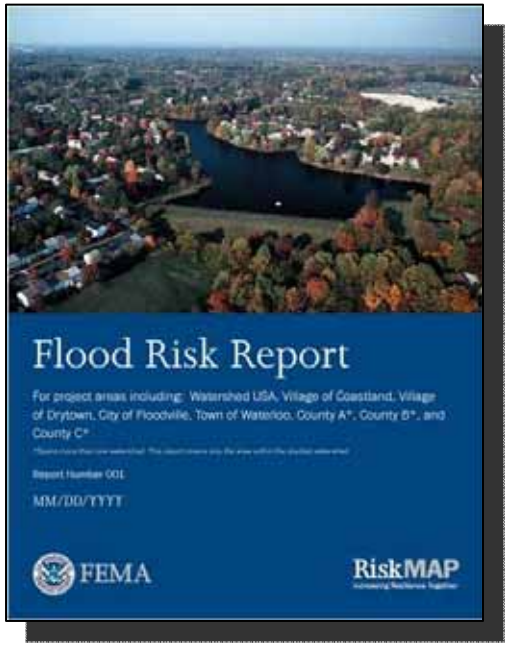
1 DRAFT

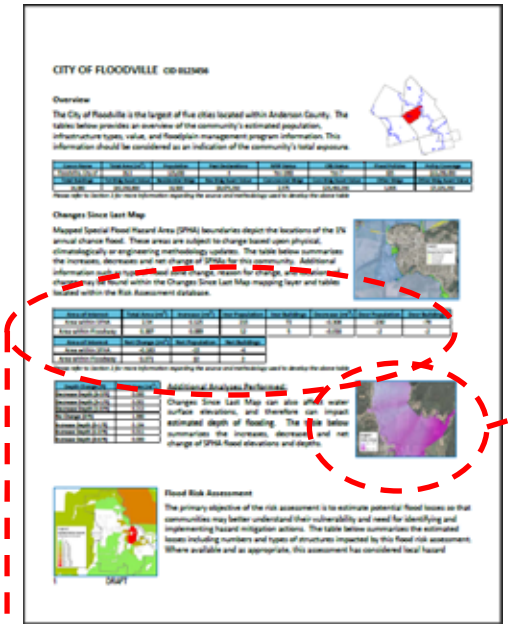






CSLF within the Flood Risk Report



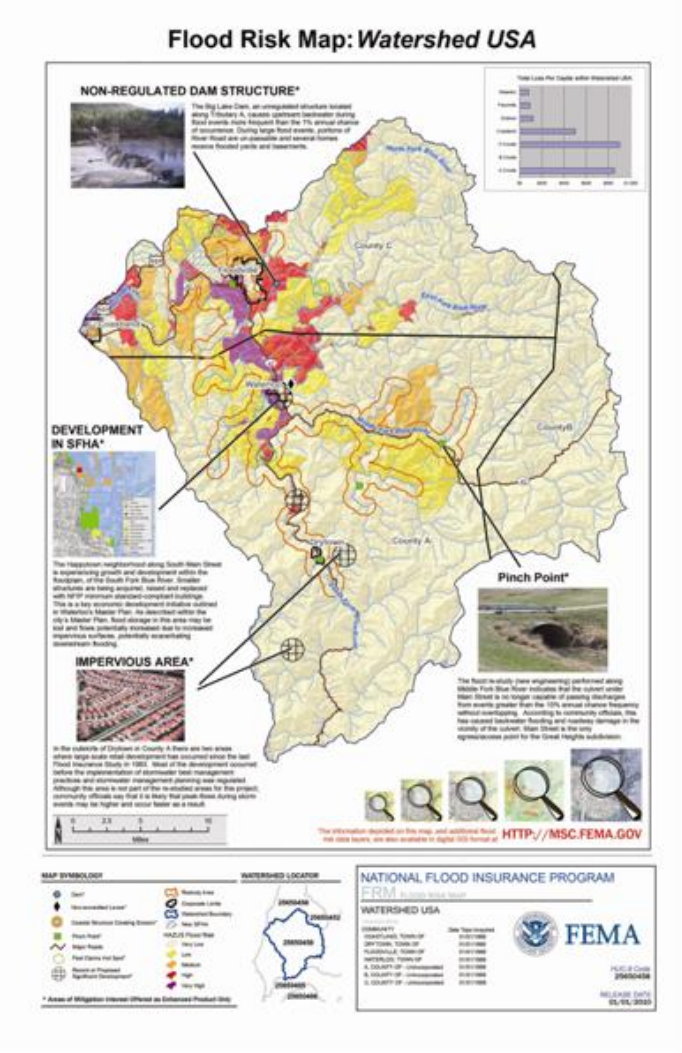


Area of Interest	Total Area (mi^2)	Increase (mi^2)	Incr Population	Incr Buildings	Decrease (mi^2)	Decr Population	Decr Buildings
Area within SFHA	21.082	1.038	1,785	4,939	-2.556	-1,909	-647
Area within Floodway	3.2121	0.739	100	42	-0.1328	-17	-17

Area of Interest	Net Change (mi^2)	Net Population	Net Buildings
Area within SFHA	-1.519	-124	4,291
Area within Floodway	3.0793	83	25

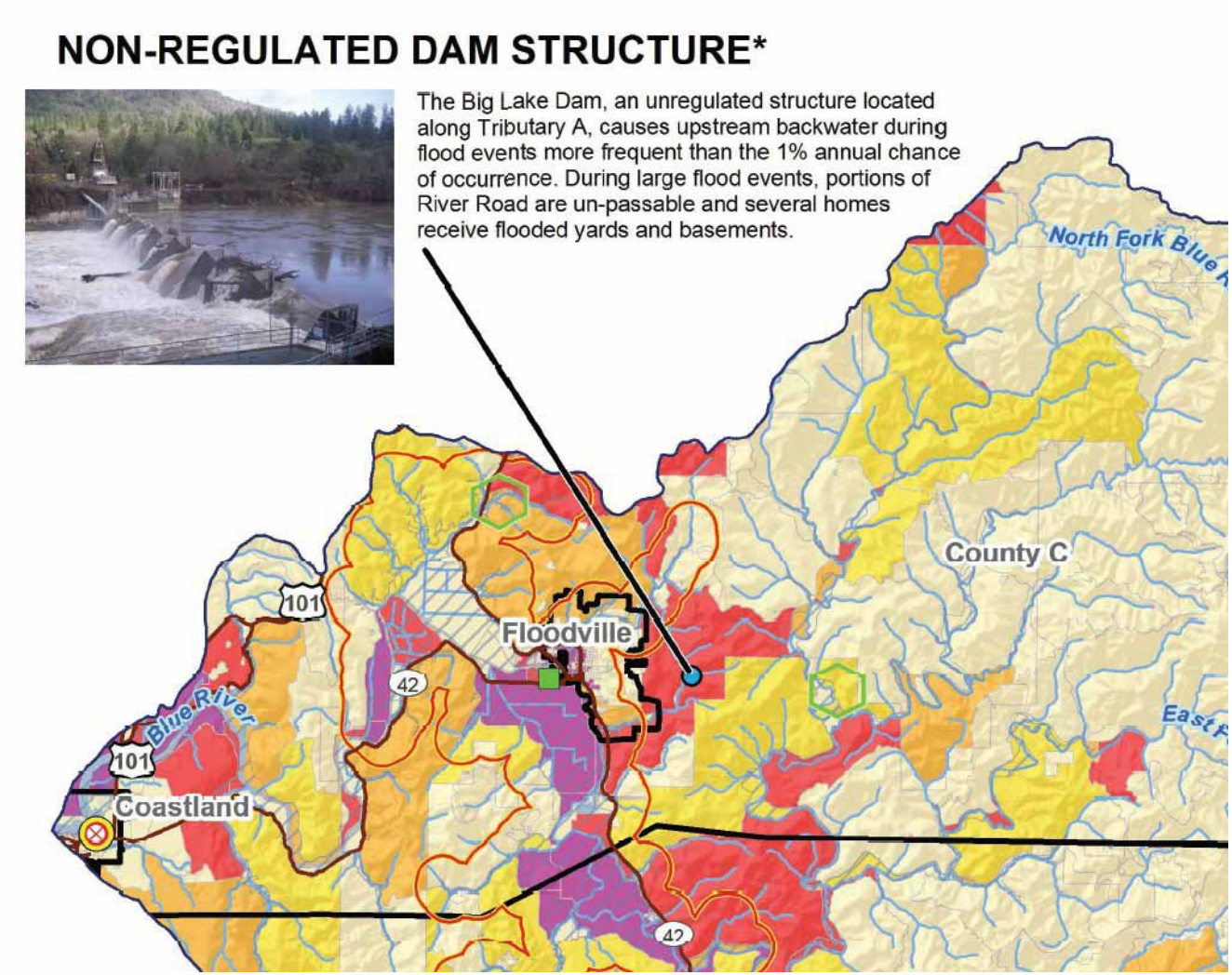
Enhanced

Flood Risk Map



- **Visually Promotes Risk Awareness**
  - Contains results of Risk MAP project non-regulatory datasets
  - Promotes additional flood risk data not shown but located within the Flood Risk Database

Flood Risk Map



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The Process of Flood Risk Assessment

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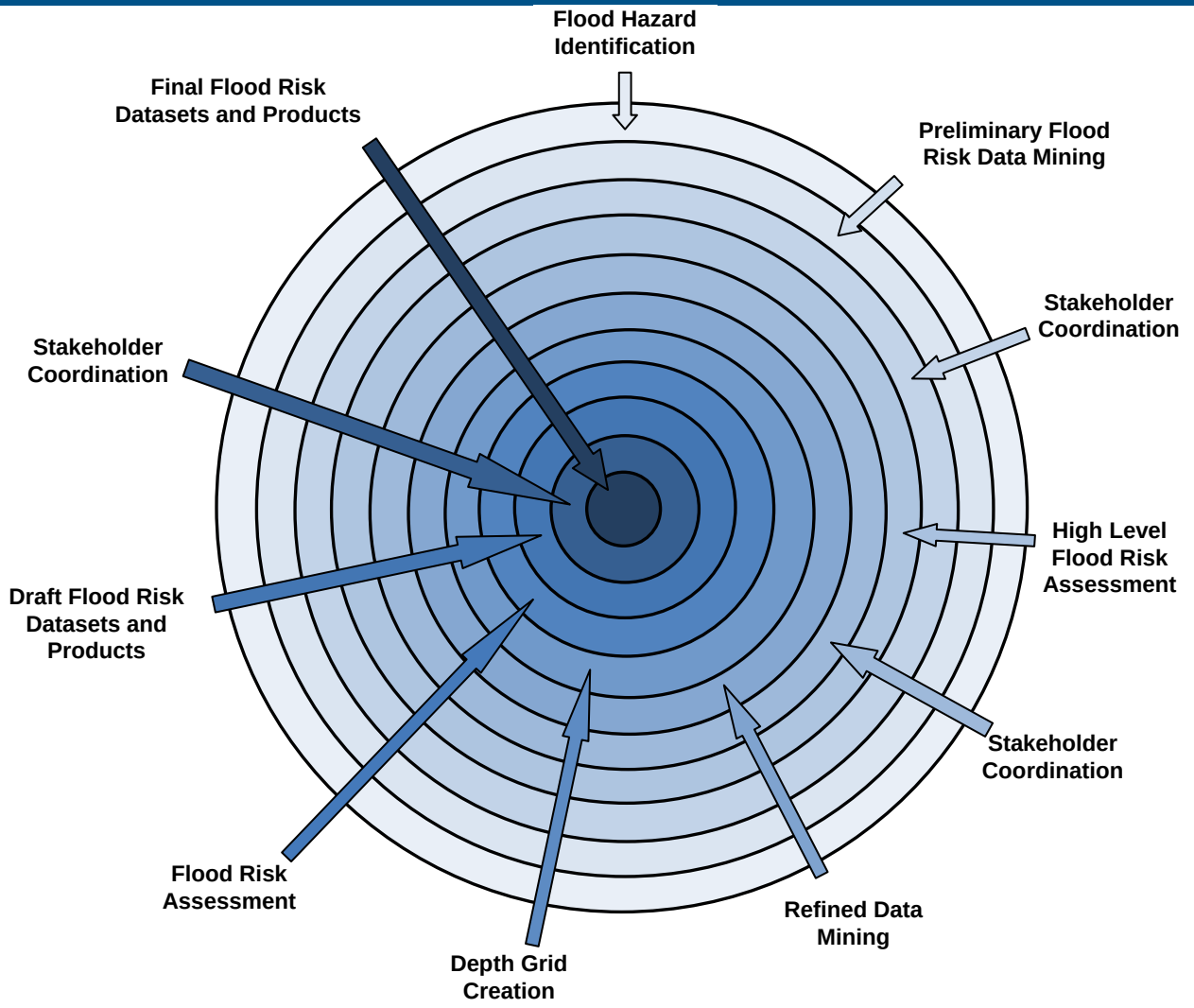
Flood Risk Assessment Process

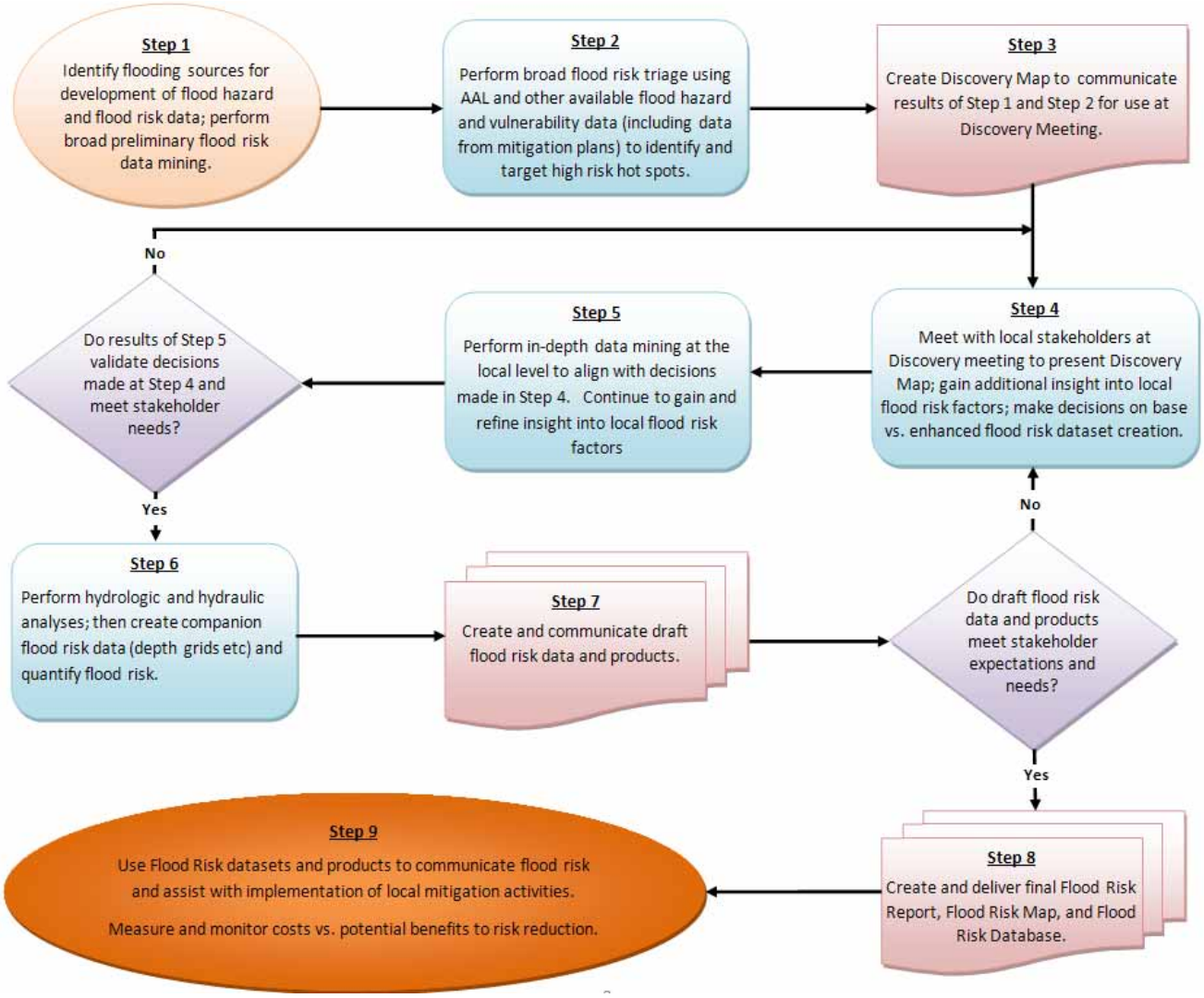
- **Flood Risk Assessment is an iterative process**
- **The iterative process starts as a broad sweep to initially gain a high level understanding of the relative flood risk and to ultimately hone in on a refined quantification of vulnerability.**
- **The process must include frequent sanity checks with stakeholders to ensure it remains on target. Stakeholders include, but are not limited to:**
  - Local planners
  - Local mitigation specialists
  - Local emergency managers
  - Local business leaders
  - Local elected officials

Iterative Product and Data Development Paradigm

Flood risk assessment is an iterative process that starts with flood hazard data, includes significant stakeholder coordination, and ends with flood risk quantification.



Flood Risk Assessment Process



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Flood Risk Products – Project Lifecycle Overview

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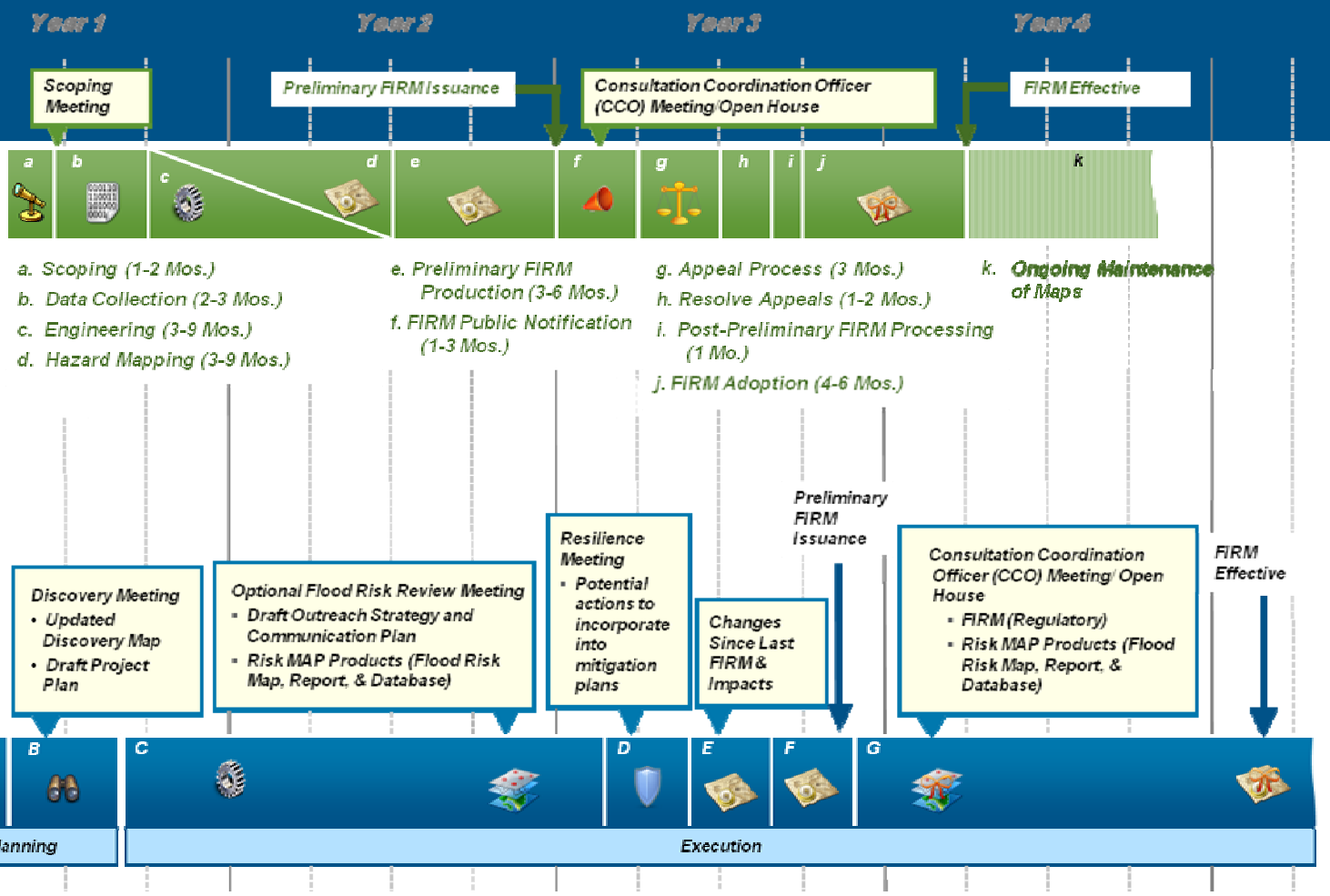
Map Modernization & Risk MAP Timelines



A. Planning & Budgeting (3 Mos.)

B. Discovery (2-4 Mos.)

C. Data Development & Sharing (9-15 Mos.)

D. Risk Awareness & Mitigation Outreach (1-3 Mos.)

E. Proposed NFIP Map Changes & Impacts (1-3 Mos.)

F. Preliminary NFIP Map Release & Mitigation Plan Path Forward (1-3 Mos.)

G. Due Process & Path Forward (9-15 Mos.)

Discovery Meeting

- **Occurs after intense up-front coordination with watershed stakeholders**
- **Discuss Discovery Map, watershed vision, flood risks and mitigation needs**
- **Not a data-collection meeting**
- **Outputs**
  - Discovery Map
  - A project charter and scope of work are developed if it is decided that a Risk MAP project will occur

Resilience Meeting

- **Occurs after Data Development and Sharing, but before preliminary map is released**
- **To assess Risk MAP products and potential actions to incorporate into mitigation plans**
- **Meeting is focused on flood risk, not "in or out" discussions**
  - Change Map product not discussed or shown at this meeting

CCO/Open House Meeting

- **Focus is on preliminary map release and way ahead**
- **Discussion also includes a review of actions taken to reduce risk, progress toward watershed vision, understanding of path ahead, and adoption FIRM and FIS**

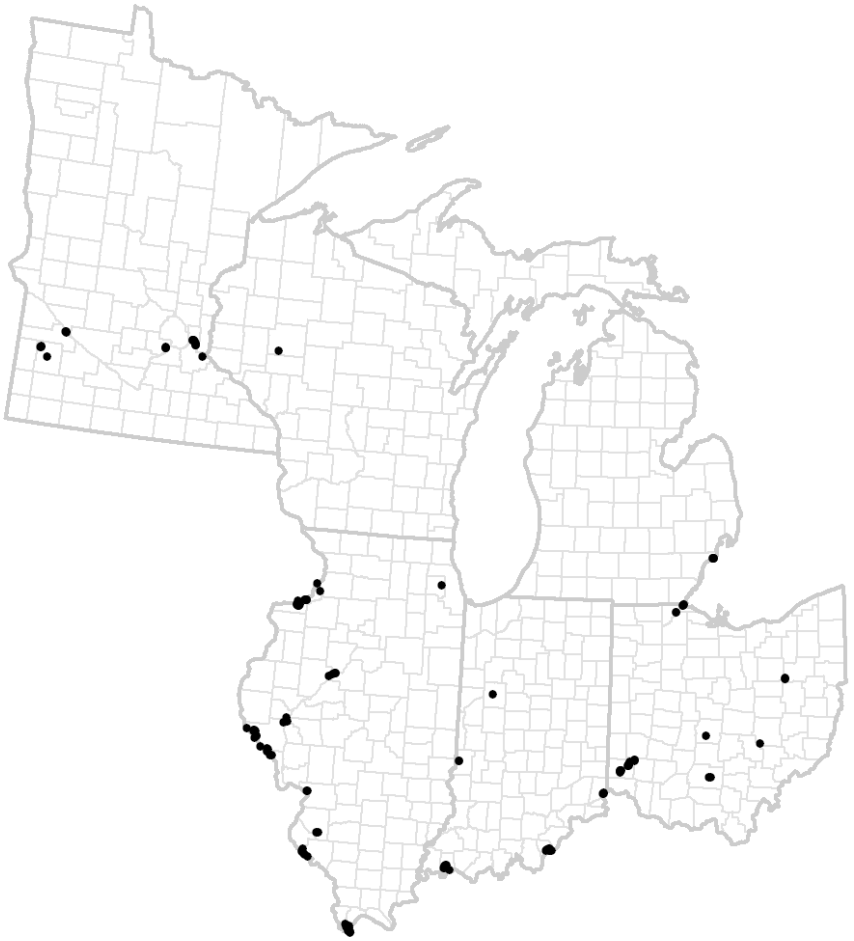
Optional Meeting

- **May include**
  - Follow-up Discovery Meeting
  - Project Kickoff Meeting
  - Congressional briefing
  - Flood Study Review Meeting
  - Outreach discussion meeting
  - Other meeting as appropriate

Challenges (i.e. opportunities)

Levees

Provisionally Accredited Levees



Questions / Discussion

Suzanne Vermeer, P.E., CFM
FEMA Region V – Risk Analysis
(312) 408-5245
suzanne.vermeer@dhs.gov

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