FEMA

New Tools for Mitigation & Outreach

Louie Greenwell – Stantec

RiskMAP
Increasing Resilience Together

Our Discussion Today

- **Background – What is Risk MAP?**
- **FEMA Products**
- **Overview of RiskMAP Data Sets**
  - Changes Since Last FIRM
  - Depth and Analysis Grids
  - Risk Assessment Results
  - Areas of Mitigation Interest
- **Overview of RiskMAP Products**
  - Flood Risk Database
  - Flood Risk Report
  - Flood Risk Map
- **Datasets & Products in Action**

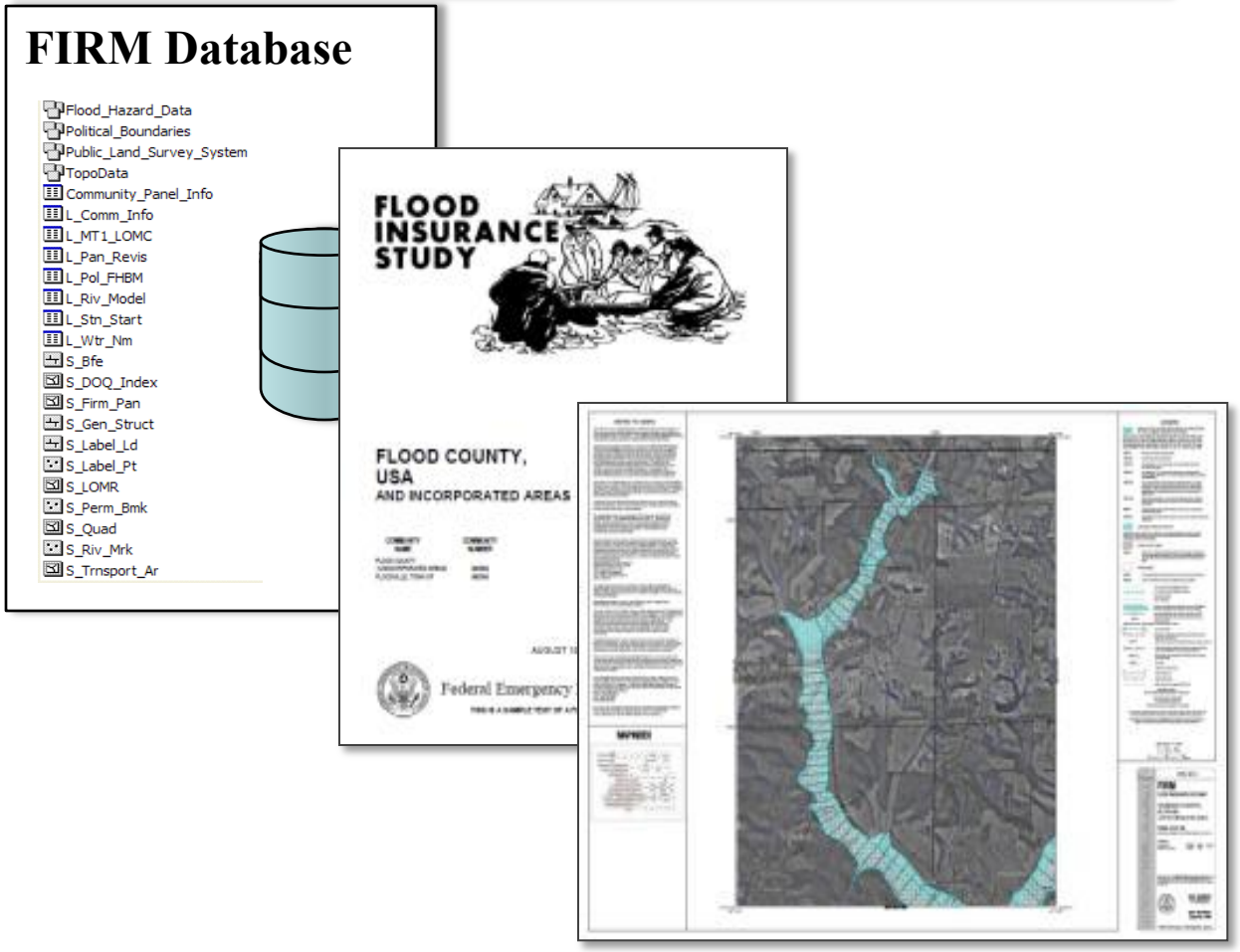
Risk MAP (Mapping, Assessment, Planning) Vision

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

Risk MAP: Increasing Value Through Ownership

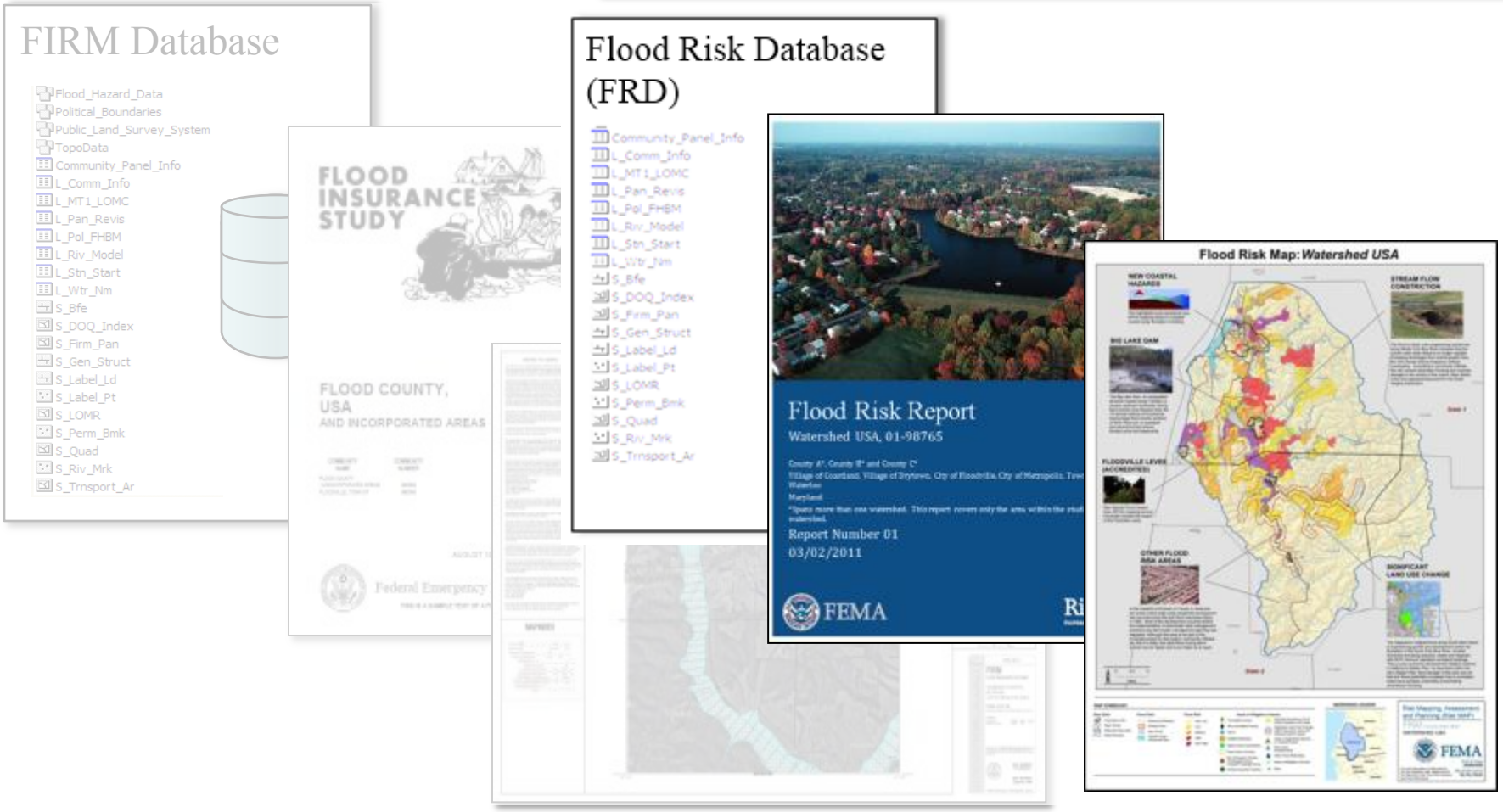
FEMA Product Comparisons

Traditional Regulatory Products



Program Product Comparisons

Non-Regulatory Flood Risk Products

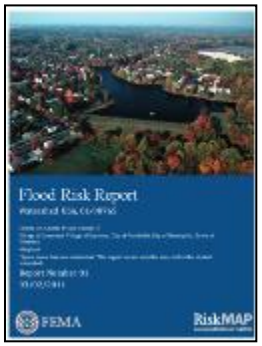


Flood Risk Products and Datasets

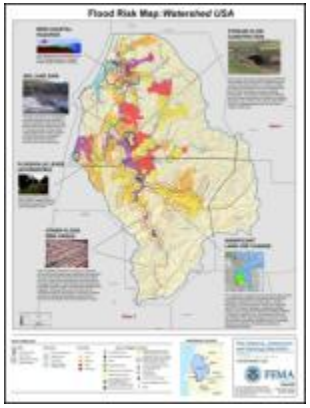
Three Flood Risk Products

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

Flood Risk Database



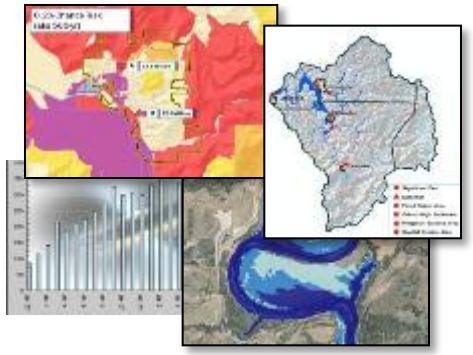
Flood Risk Report



Flood Risk Map

Four Flood Risk Datasets

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



Flood Risk Datasets

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Flood Risk Datasets

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

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Changes Since Last FIRM Dataset

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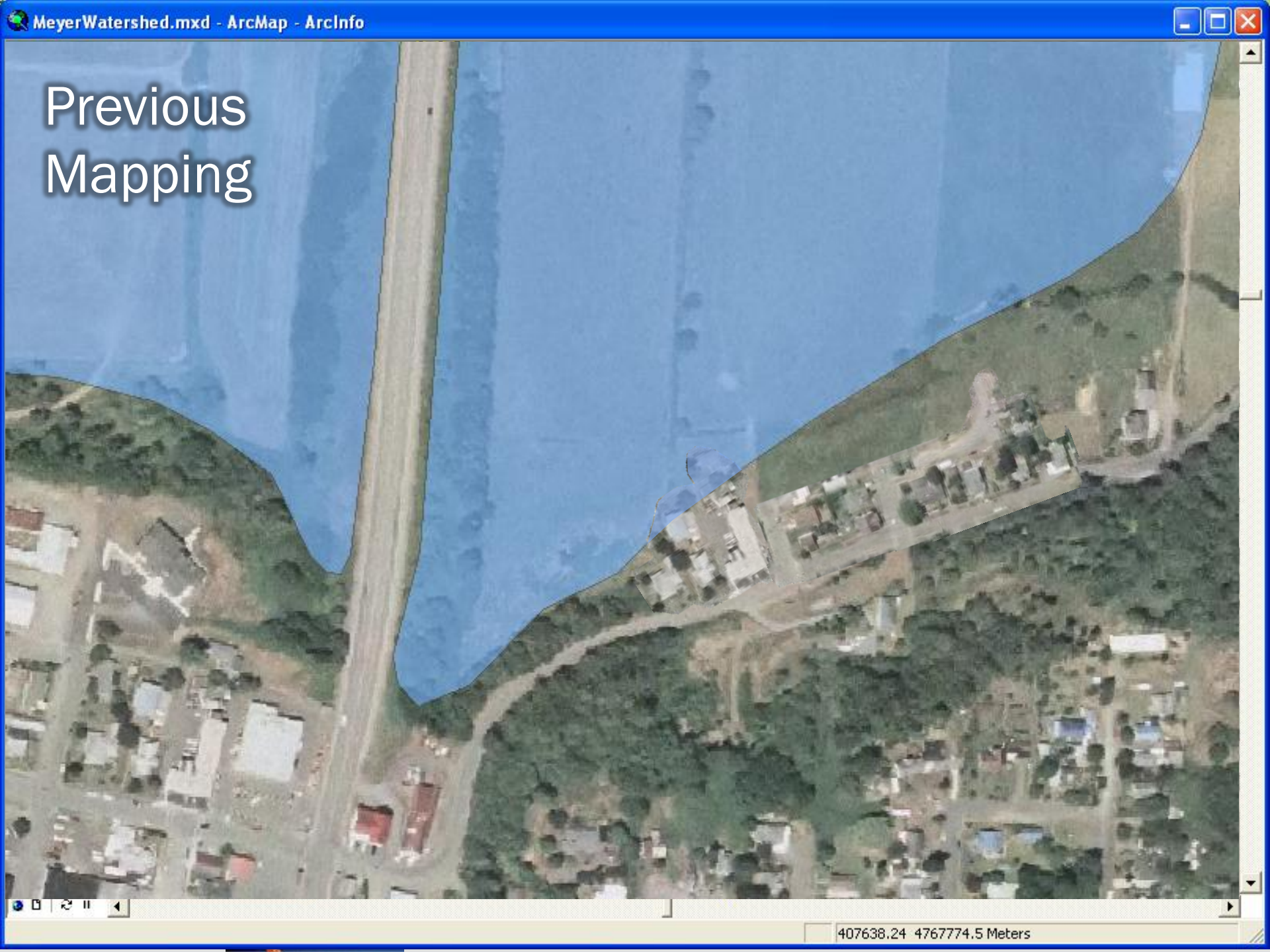
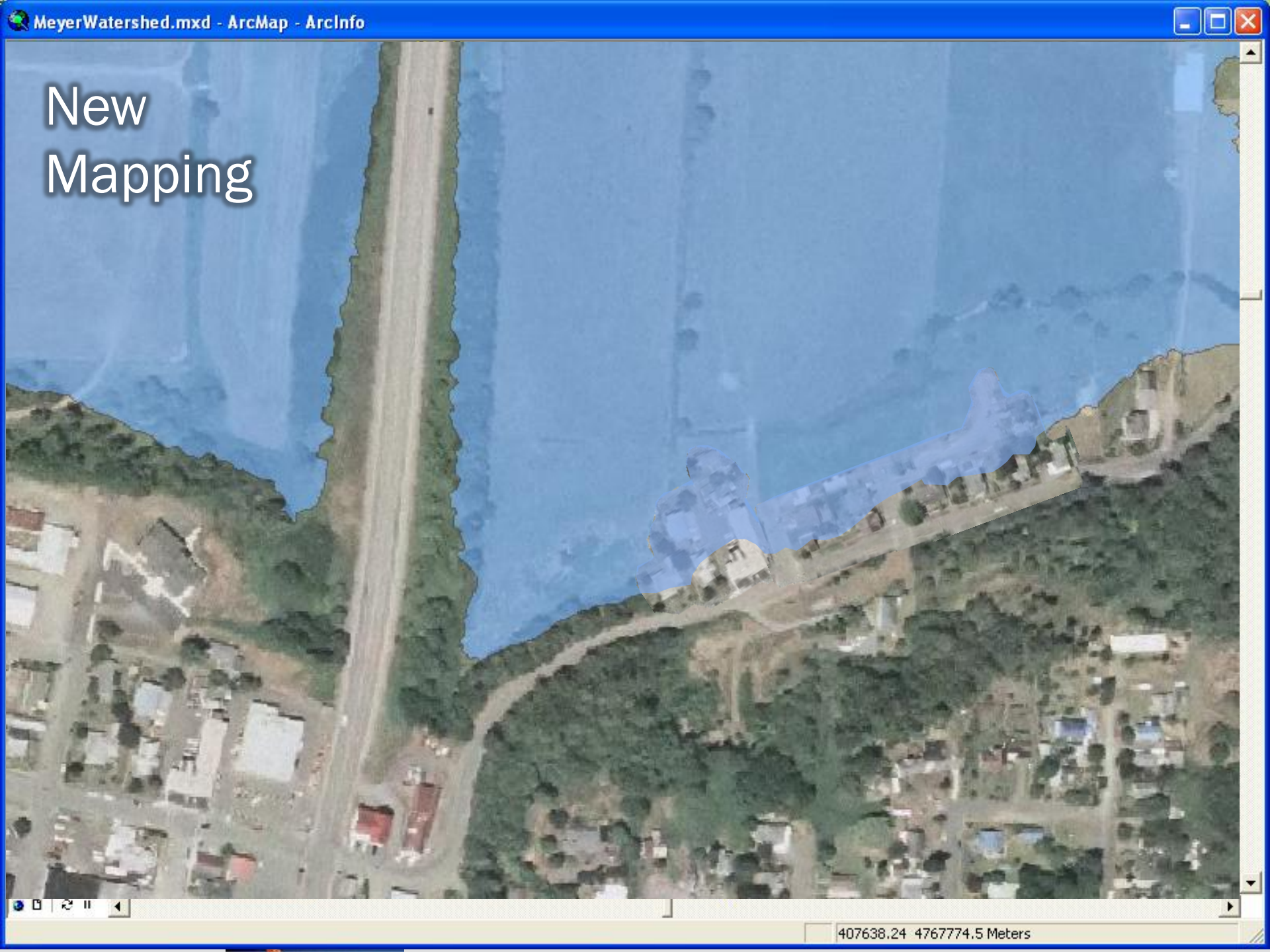
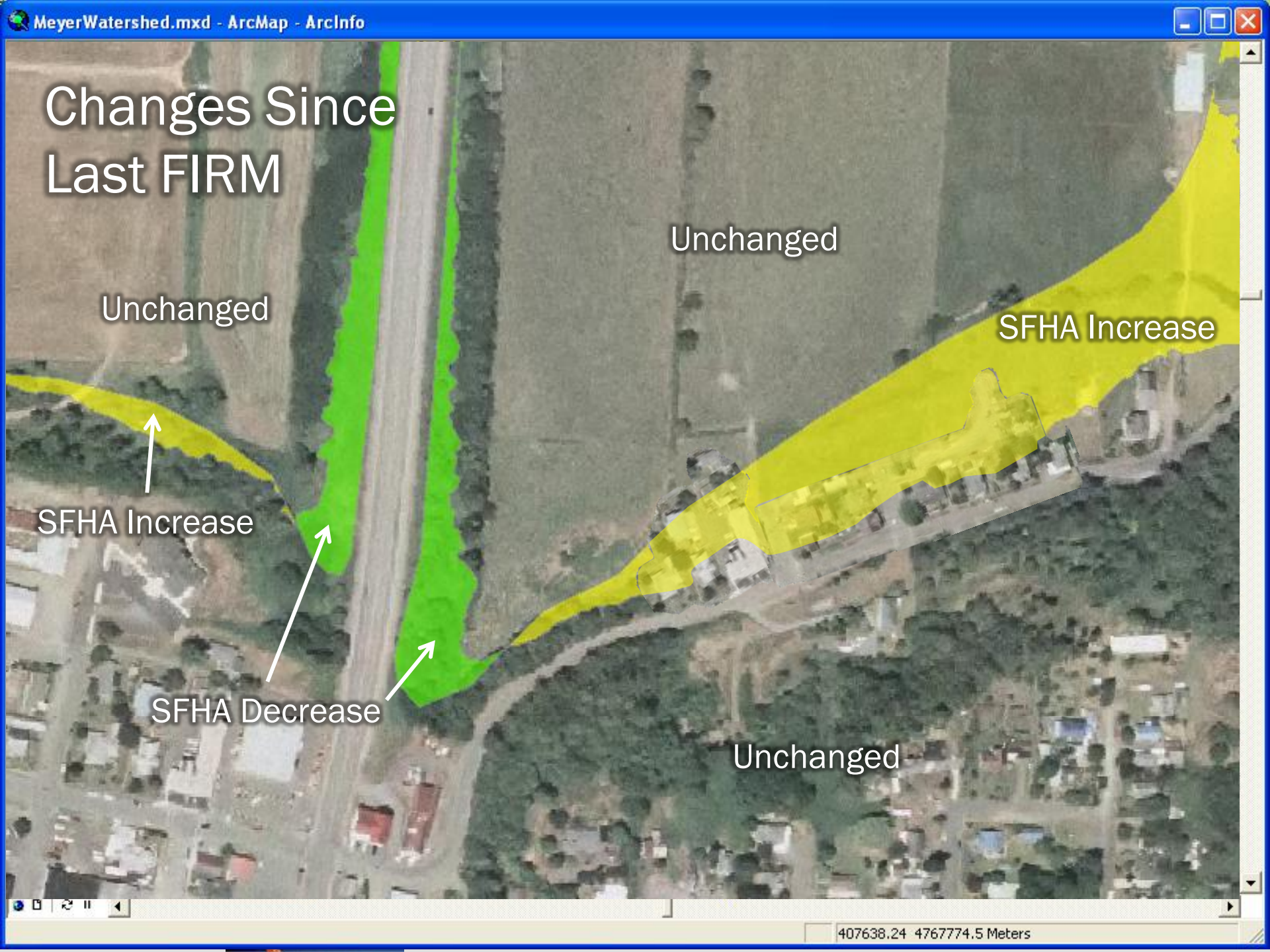
Purpose of Changes Since Last FIRM

- **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 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

- **Contributing Engineering Factors**

Factor	FRD Field *	Description
New Terrain Data	TOPO_CHNG	This field is used to indicate a change in the topographic information used in the modeling or used to re-delineate the floodplain boundaries
Peak Discharge Changes	PEAKDSCHNG	This field is used to indicate a change to the study's peak discharges that may have impacted the analysis
Change in Hydraulic or Coastal Model	MDLMETHODS	This field is used to indicate changes to primary assumptions associated with the updated hydraulic or coastal model
Flood Control Structure Change	FLD_CTRLCHG	This field is used to indicate a change to the study's major flood control structure(s) that may have impacted the analysis
Levee Accreditation Change	LEVEECHG	This field is used to indicate a change to the accreditation status of a levee
Hydraulic Structure Change	HYDSTRCHG	This field is used to indicate a change to the study's number of hydraulic structures that may have impacted the analysis
Sedimentation Change	SEDCHG	This field is used to indicate significant changes to channel sedimentation
Erosion Change	EROSIONCHG	This field is used to indicate significant changes to channel erosion or scour
Channel Configuration Change	CHANNELCHG	This field is used to indicate significant changes to channel geometry
Stream Runoff Change	RUNOFFCHG	This field is used to indicate changes in stream runoff caused by land use, vegetation or imperviousness changes that may have impacted the analysis
Dune Change	DUNECHG	This field is used to indicate changes to primary frontal dunes since last the last study.
Other Change	OTHCHG	This field is used to indicate other changes the Mapping Partner believes to have contributed to the results of the analysis.

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Flood Depth & Analysis Grids

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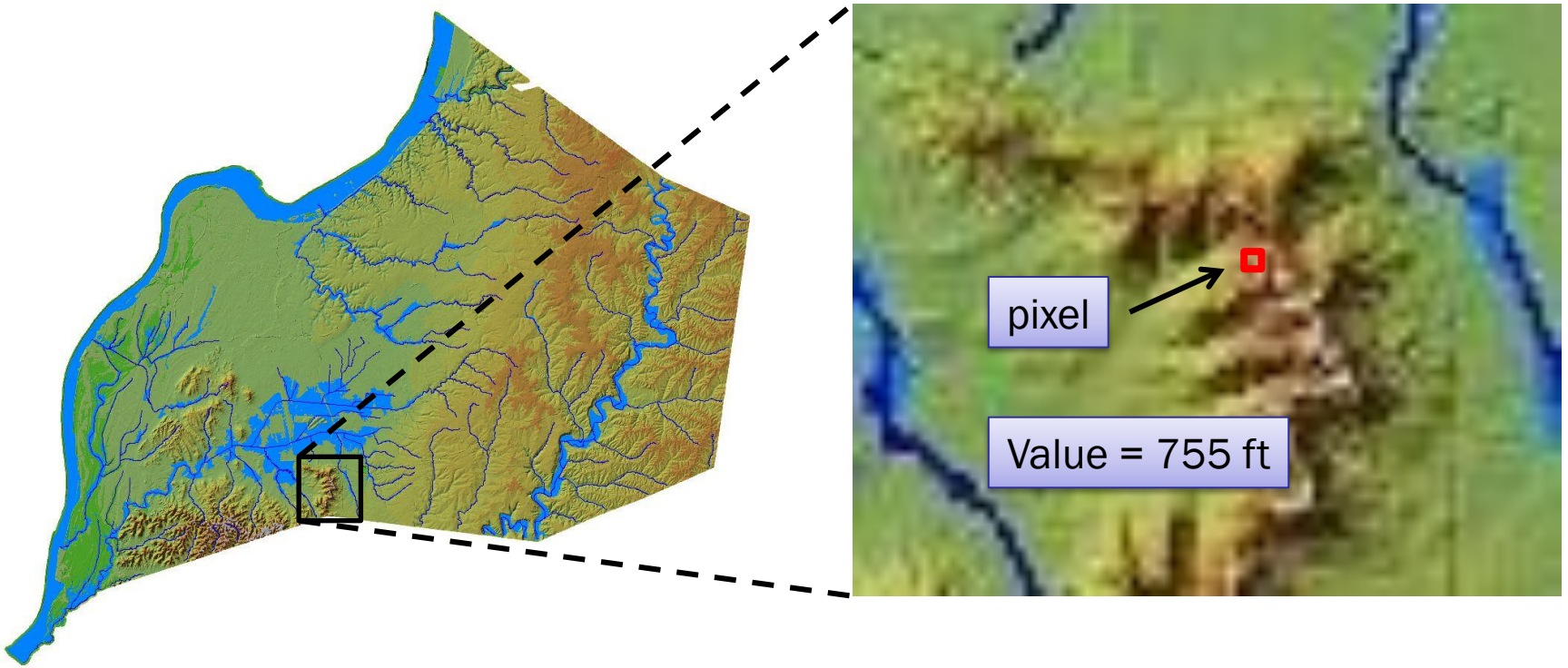
What is a “Grid” ?

- a matrix of cells (or pixels) organized into rows and columns (or a grid) where each cell contains a value representing information, such as temperature, elevation, depth, etc. - esri



Purpose of Flood Depth & Analysis Grids

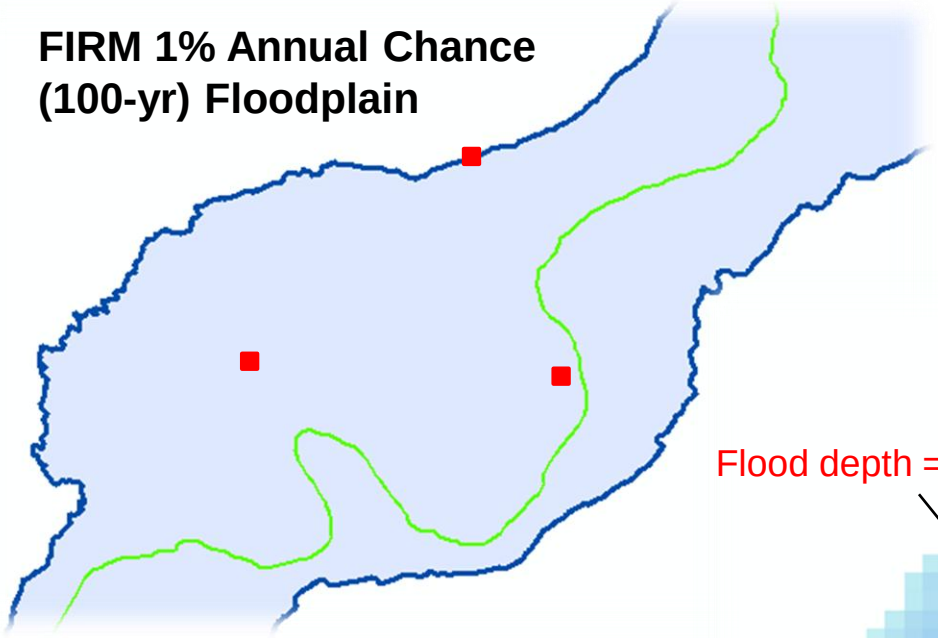
- Communicate / 'Show' Flood Inundation as Function of Event's Magnitude or Severity
- Serve as Key Inputs to HAZUS Risk Assessment Analyses
- Serve as pre-screening criteria for mitigation project potential (e.g. BCA > 1.0 with positive 10-yr depths)
- Increase Flood Risk Awareness as Acknowledged from Varied Contexts (Depth, Probability, Velocity, etc.)
- Communicate that Hazard, and by extension Risk, varies within the mapped floodplain

Flood Depth and Analysis Grids

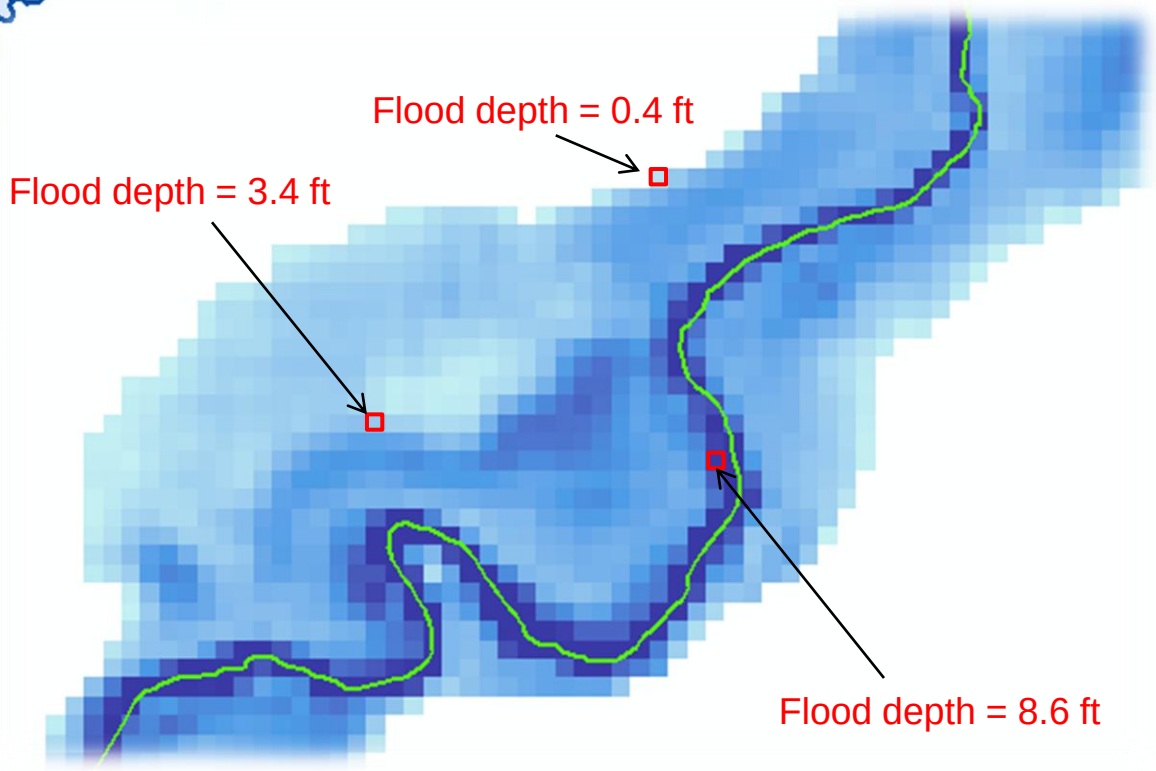
- **Grids include:**
  - Flood Depths for various Frequencies
  - Water Surface Elevation
  - Water Surface Elevation Change Since Last FIRM (1%)
  - Percent Annual Chance of Flooding
  - 30-yr Percent Chance of Flooding
  - Velocity
  - Hillshade

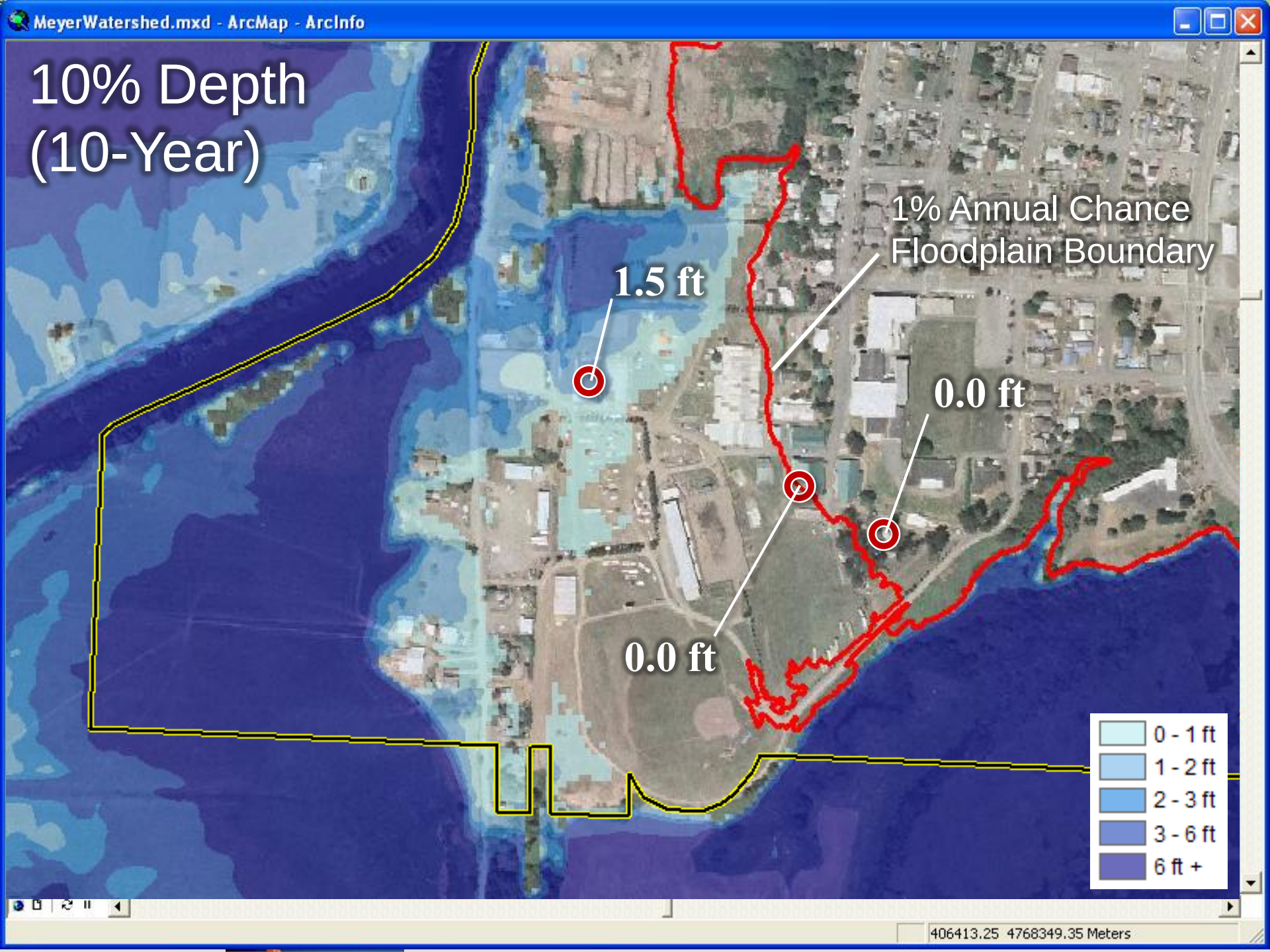
How are Grids better?

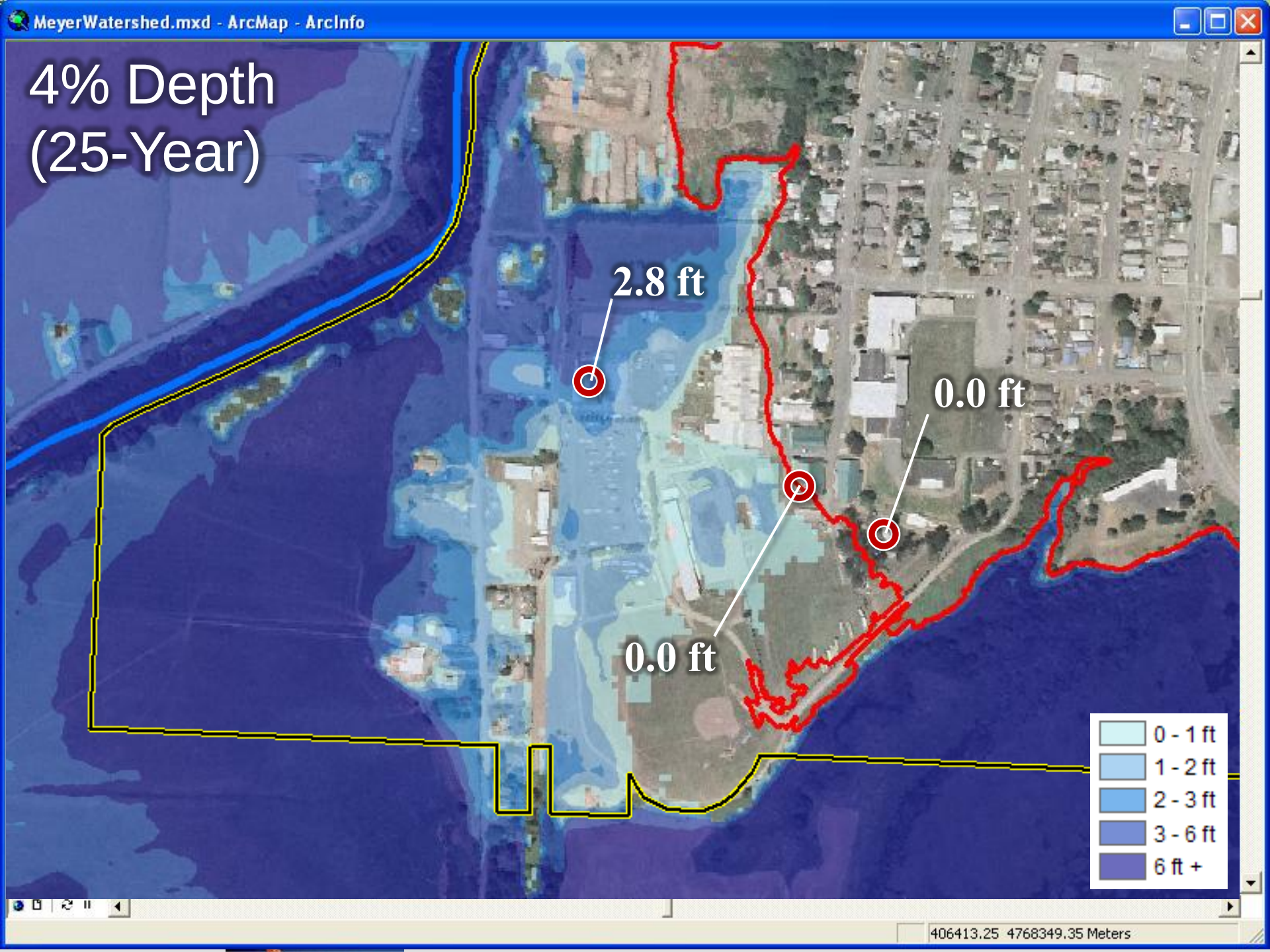
FIRM 1% Annual Chance (100-yr) Floodplain

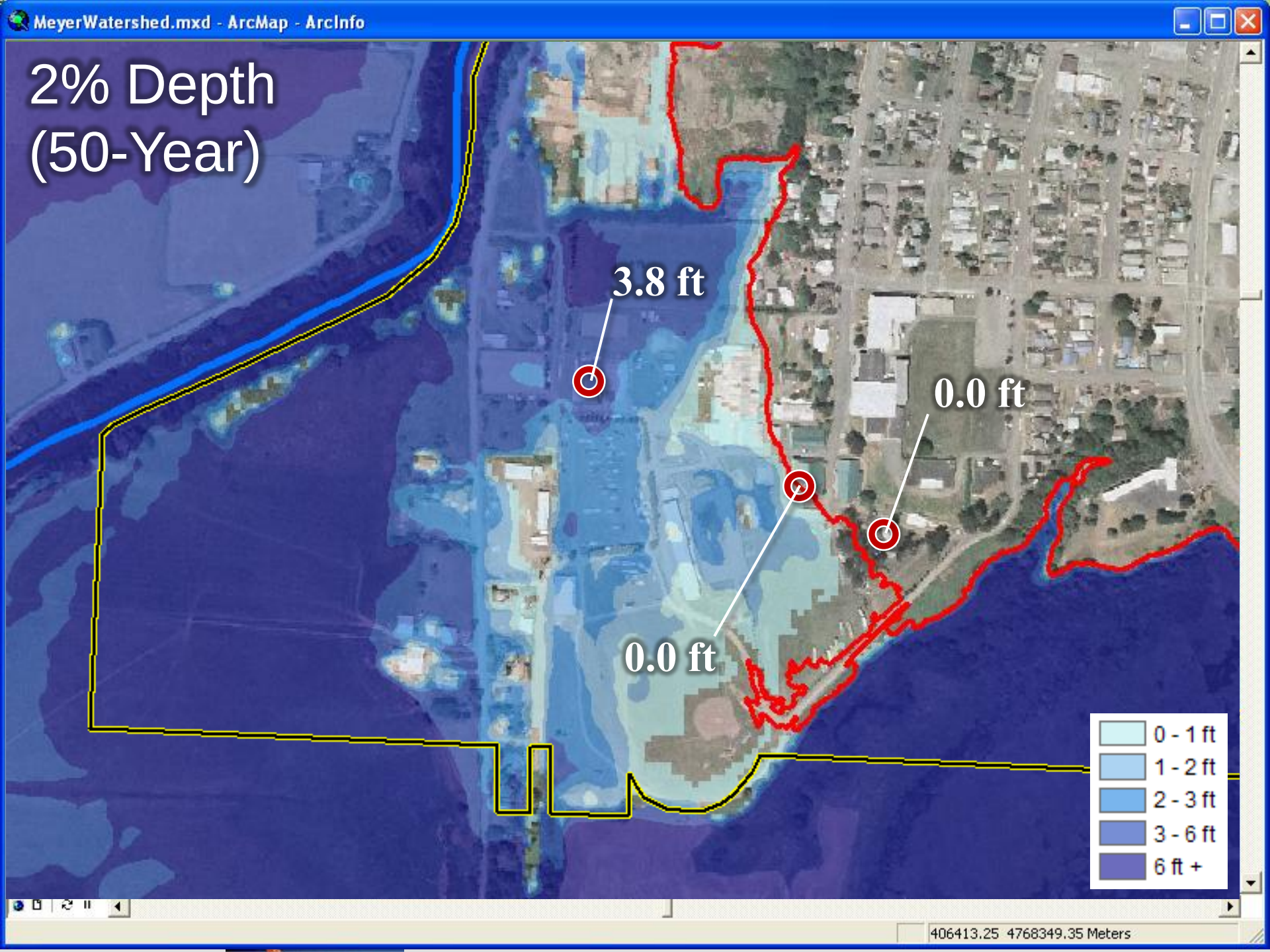


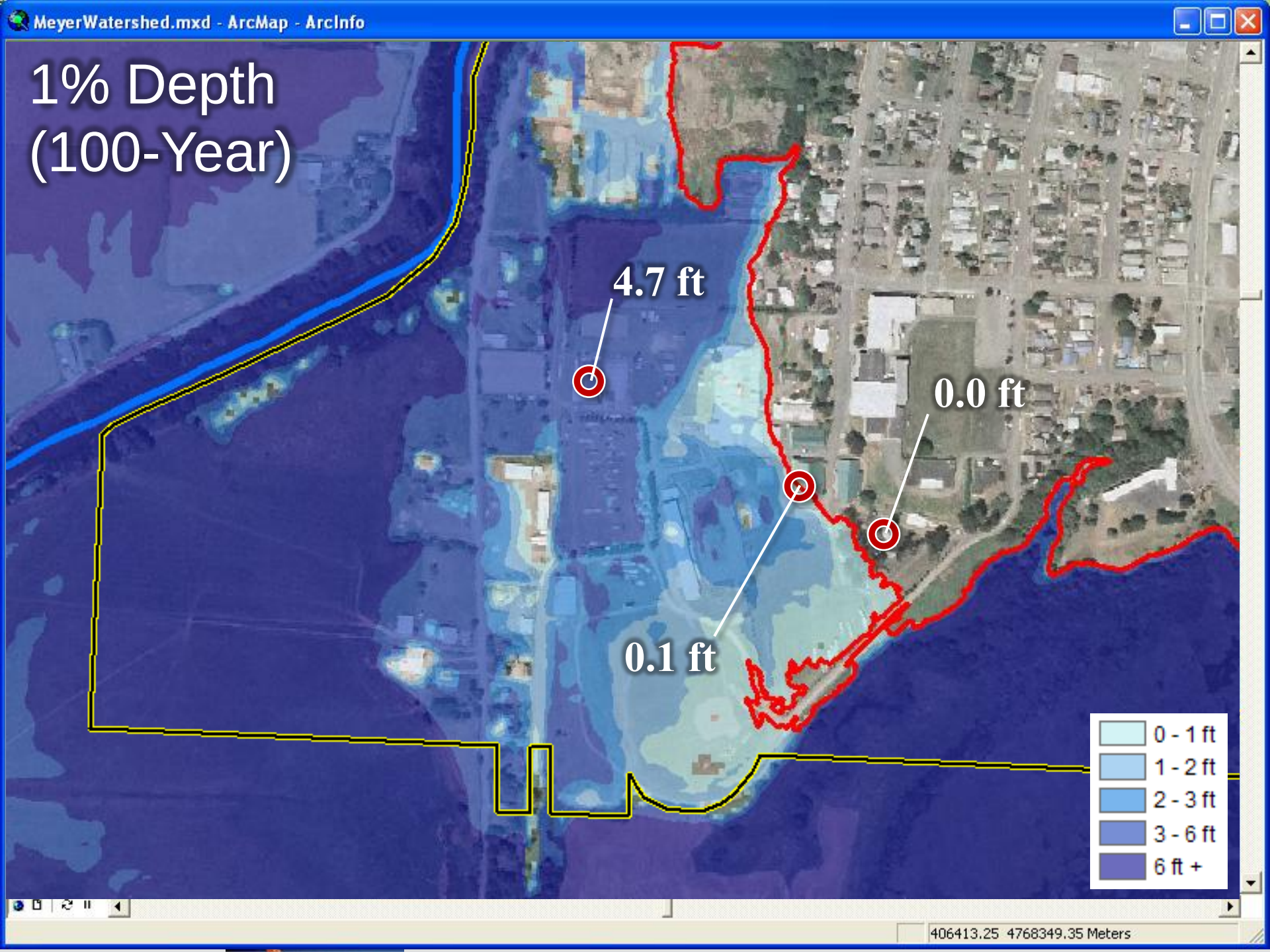
1% Annual Chance Depth Grid

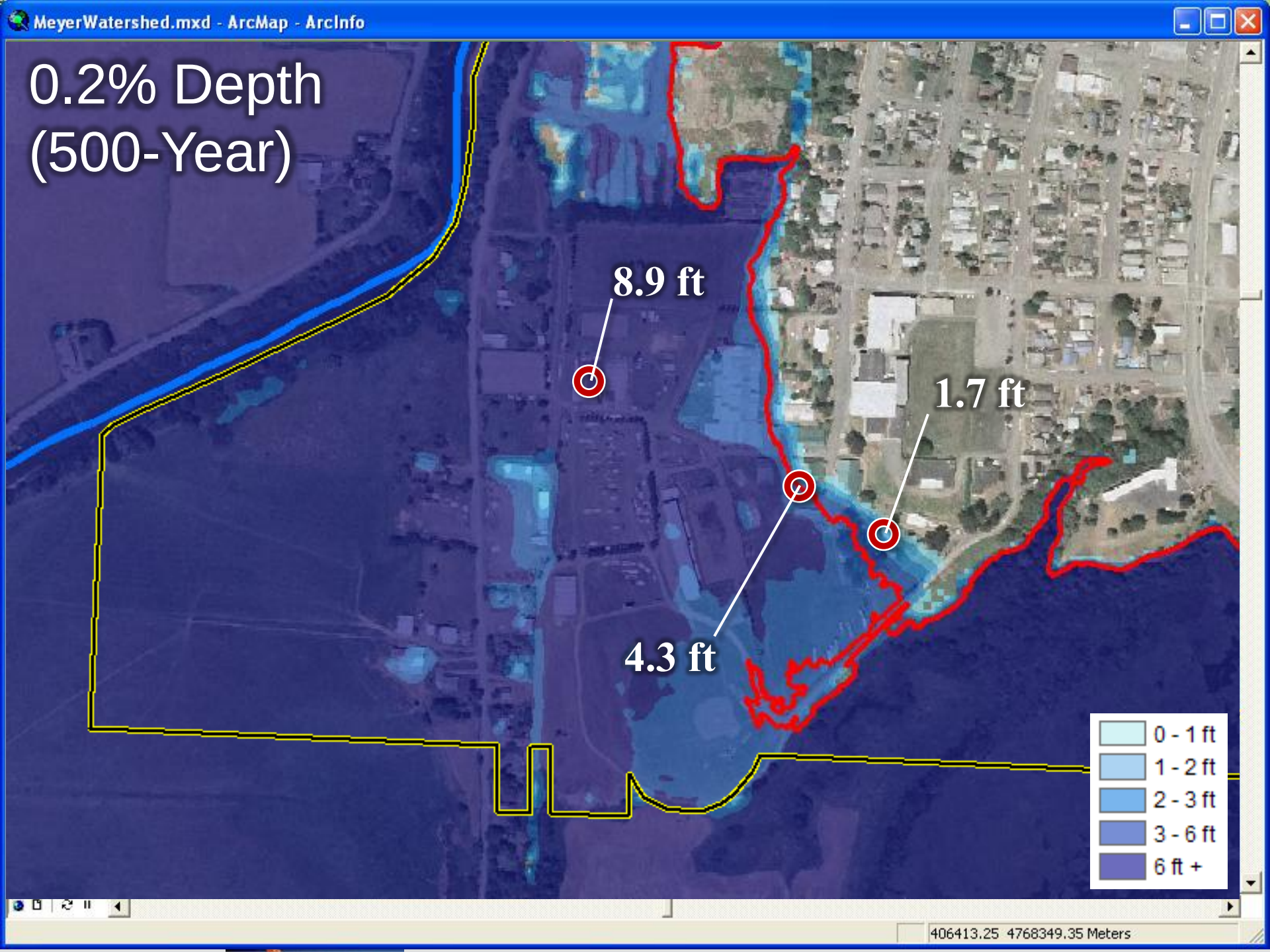


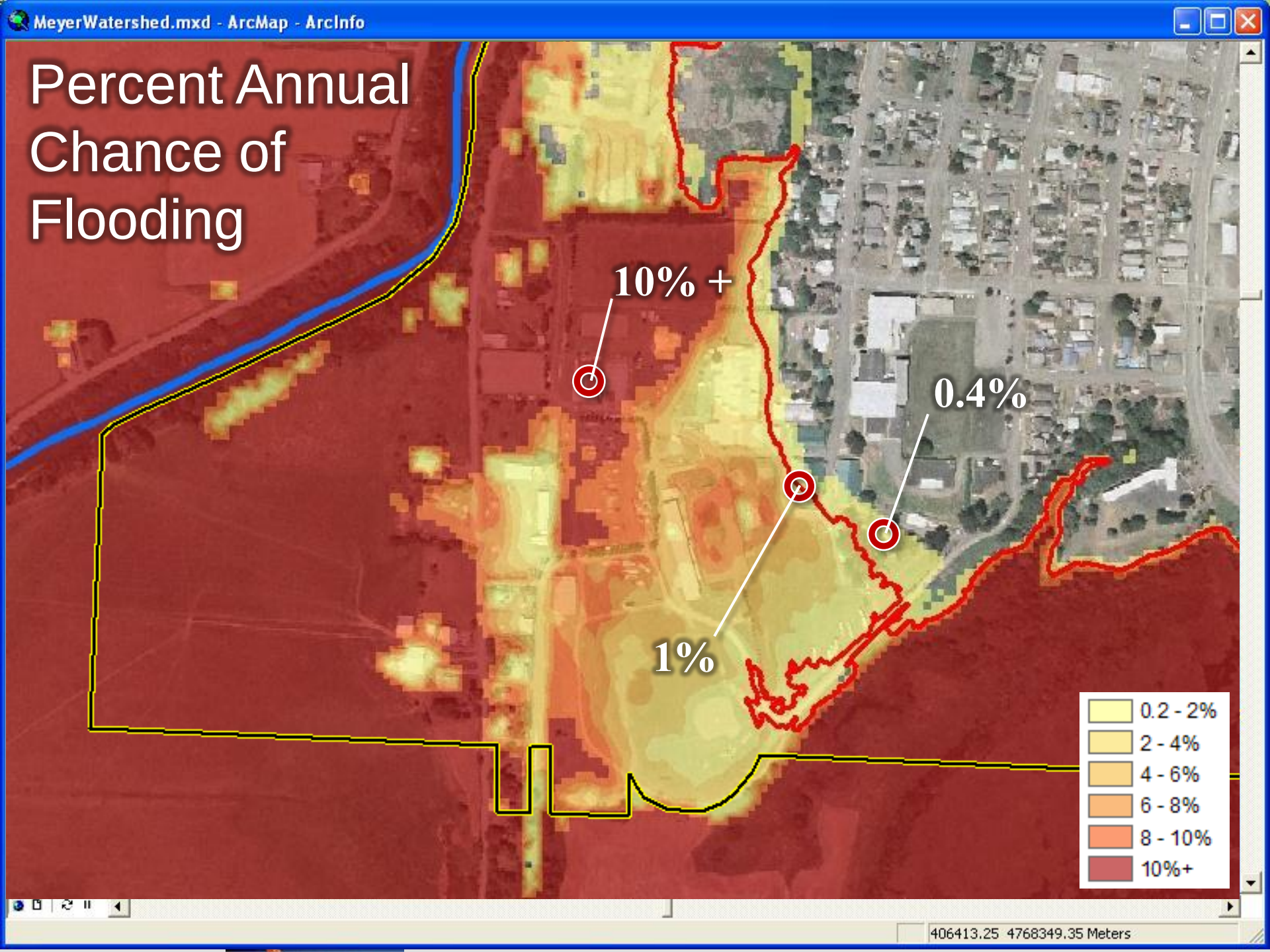

MeyerWatershed.mxd - ArcMap - ArcInfo
10% Depth
(10-Year)
1% Annual Chance
Floodplain Boundary
1.5 ft
0.0 ft
0.0 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters

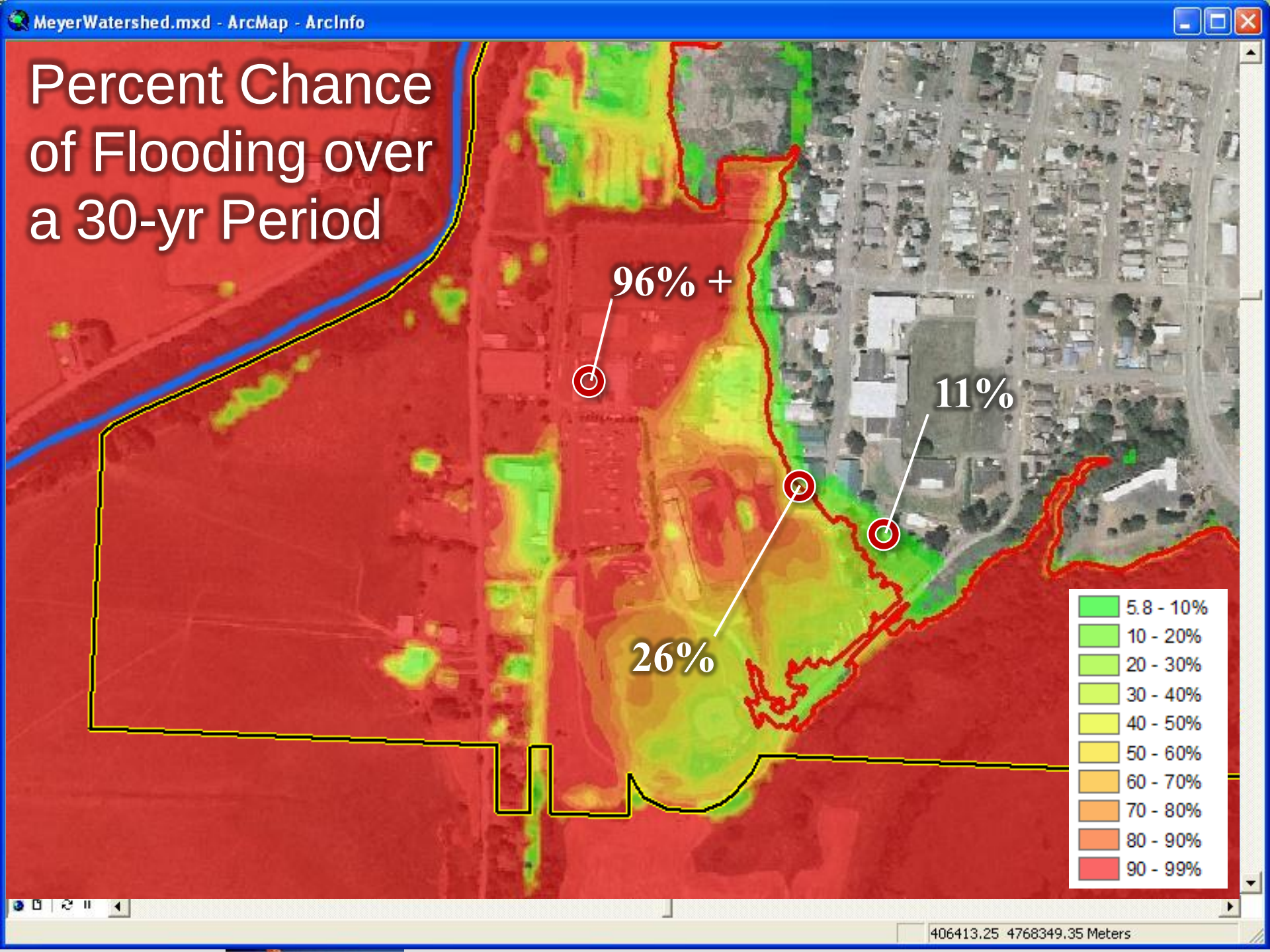

MeyerWatershed.mxd - ArcMap - ArcInfo
4% Depth
(25-Year)
2.8 ft
0.0 ft
0.0 ft
0 - 1 ft
1 - 2 ft
2 - 3 ft
3 - 6 ft
6 ft +
406413.25 4768349.35 Meters


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


MeyerWatershed.mxd - ArcMap - ArcInfo
Percent Annual Chance of Flooding
10% +
0.4%
1%
0.2 - 2%
2 - 4%
4 - 6%
6 - 8%
8 - 10%
10%+
406413.25 4768349.35 Meters


MeyerWatershed.mxd - ArcMap - ArcInfo
Percent Chance of Flooding over a 30-yr Period
96% +
11%
26%
5.8 - 10%
10 - 20%
20 - 30%
30 - 40%
40 - 50%
50 - 60%
60 - 70%
70 - 80%
80 - 90%
90 - 99%
406413.25 4768349.35 Meters

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Flood Risk Assessment Data

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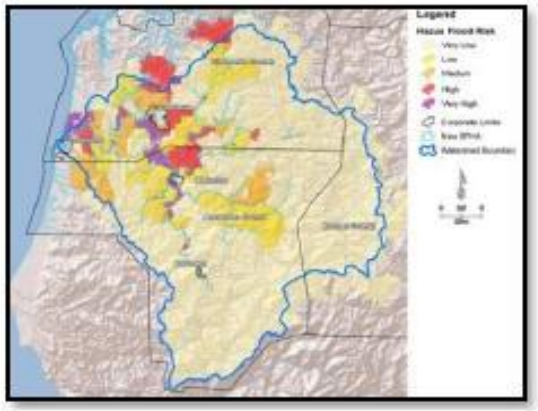
Flood Risk Assessment Data Purpose and Intended Uses

- **Identify Areas and Communicate Relative Flood Risk:**
  - Flood prone areas
  - Vulnerable people and property
- **Provide Flood Risk $:**
  - Potential damage severity for different flood frequencies
  - Identify locations with possible cost effective mitigation options
- **Improve Estimates for Flood Risk $:**
  - Losses from Average Annualized Loss (AAL) Study
  - Refined losses from new flood study depth grids
  - Refined general building stock data from local sources

Flood Risk Assessment Datasets

- **Flood Risk Assessment Data**
  - 2010 HAZUS Average Annualized Loss (AAL) Study
  - Refined HAZUS
  - User-defined Facilities

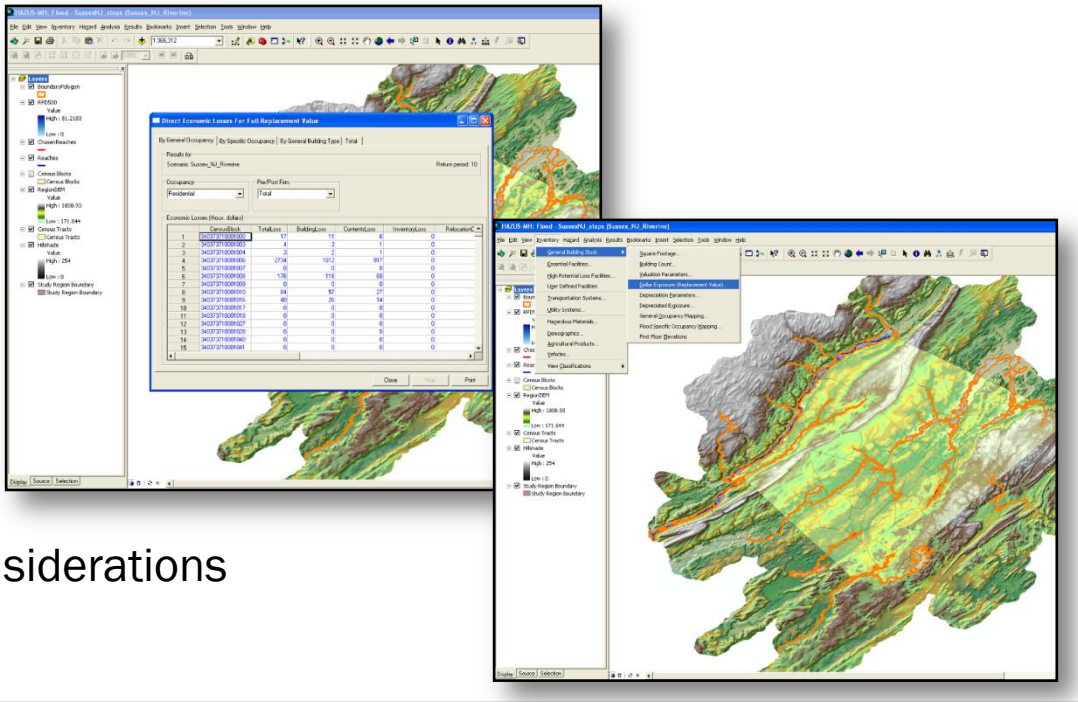
HAZUS MH

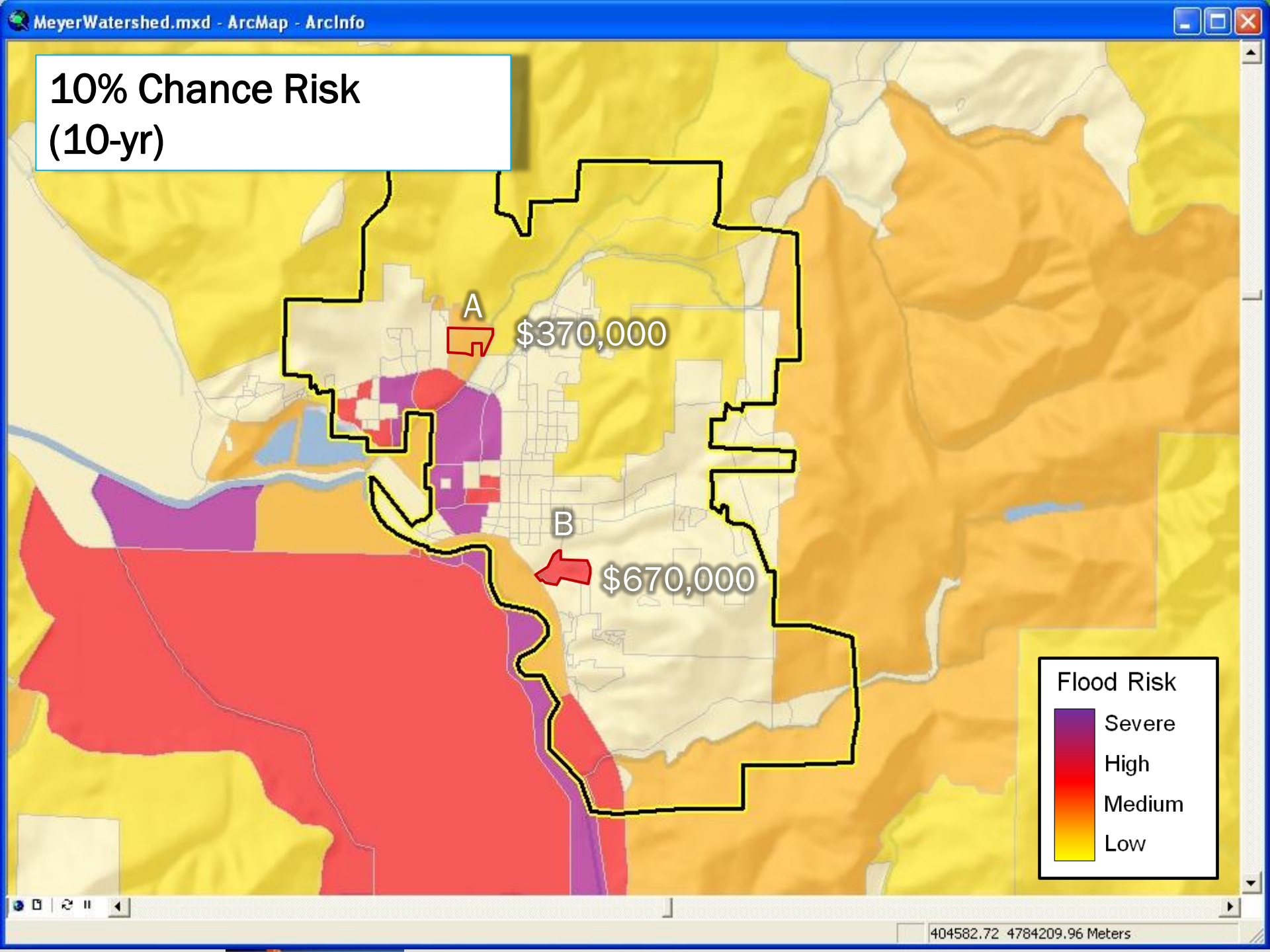


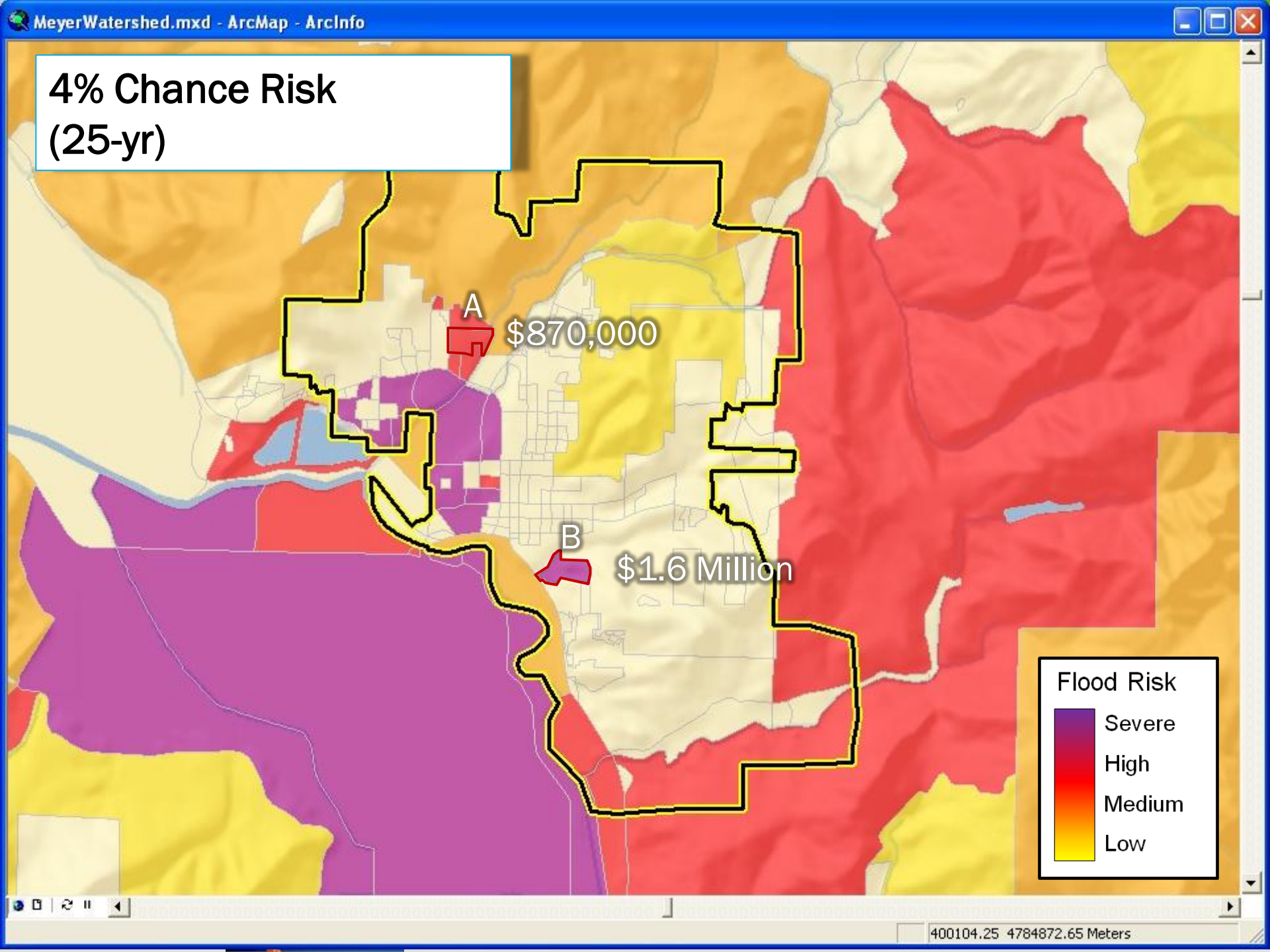
Flood Risk Assessment

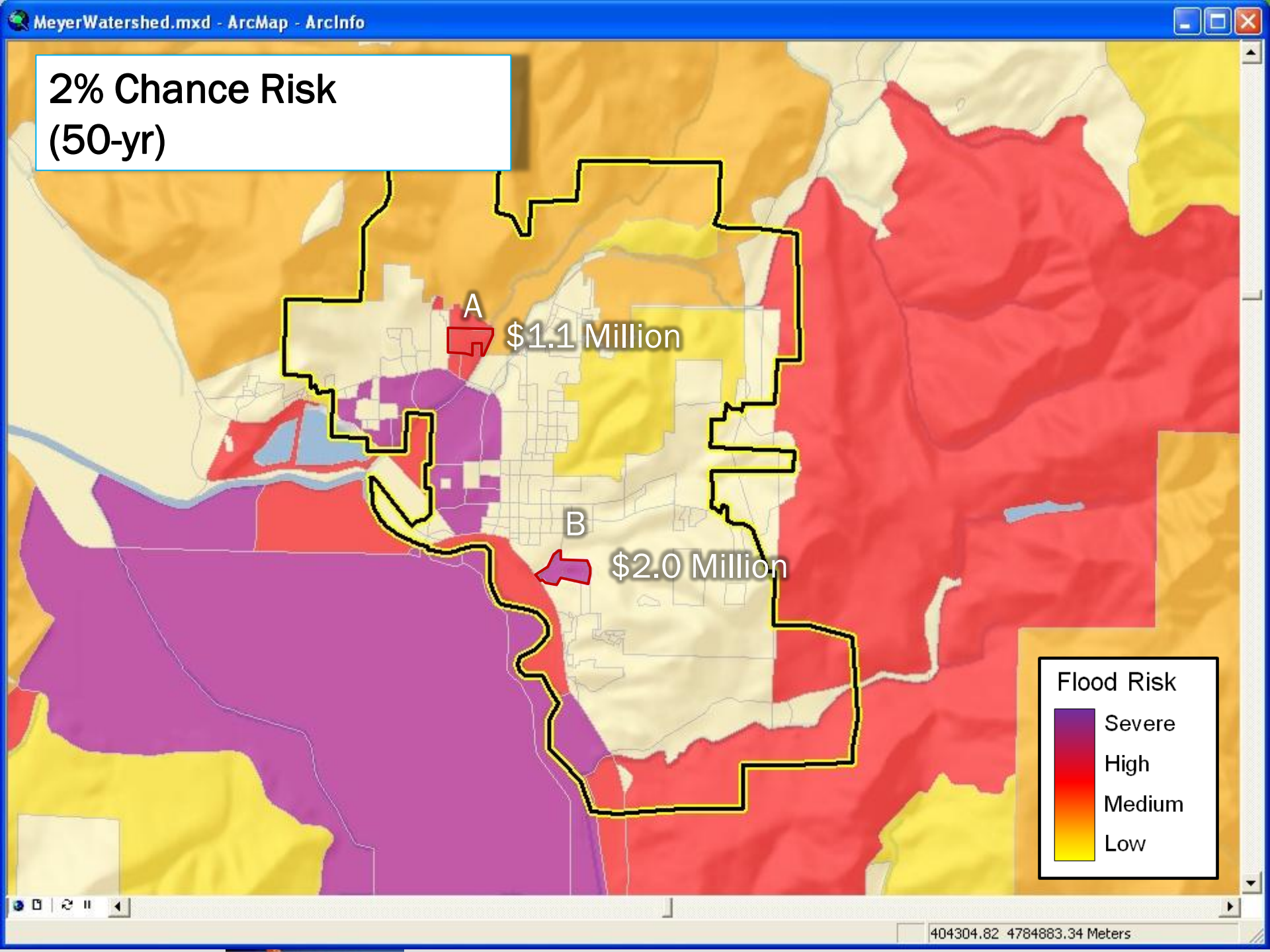
Flood Risk Assessment Data
Refined HAZUS Analysis

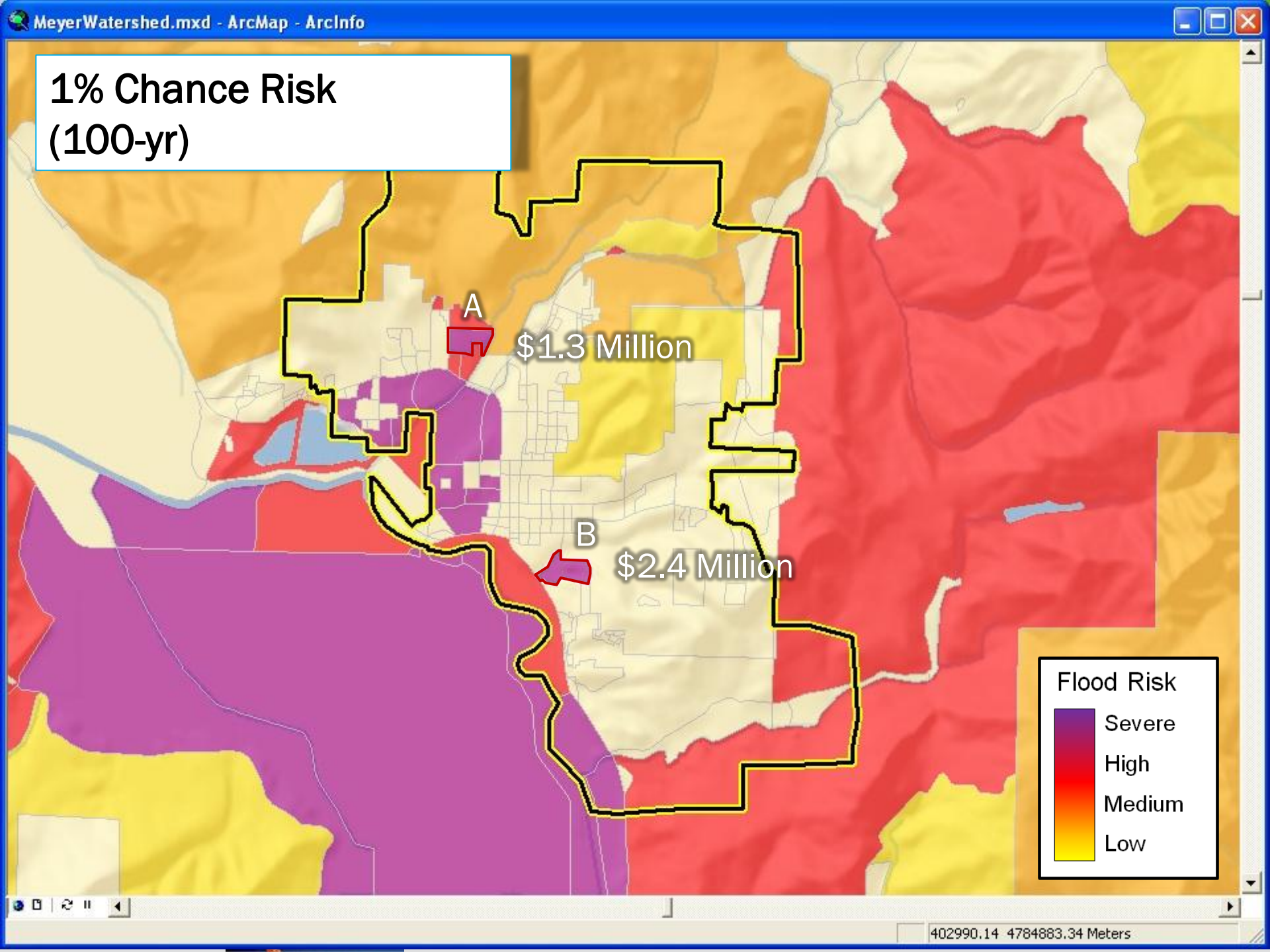
- **Overview**
  - Depth Grids from new study areas imported into HAZUS
  - HAZUS run for each return period, losses estimated, and annualized
  - HAZUS results exported and stored in Flood Risk Database
- **Estimation of Losses**
  - Dollar Losses
    - Residential Loss
    - Commercial Loss
    - Other Asset Loss
  - Percent Damage
    - Evaluate Building Stock
    - Structure and Content Considerations
  - Business Disruption

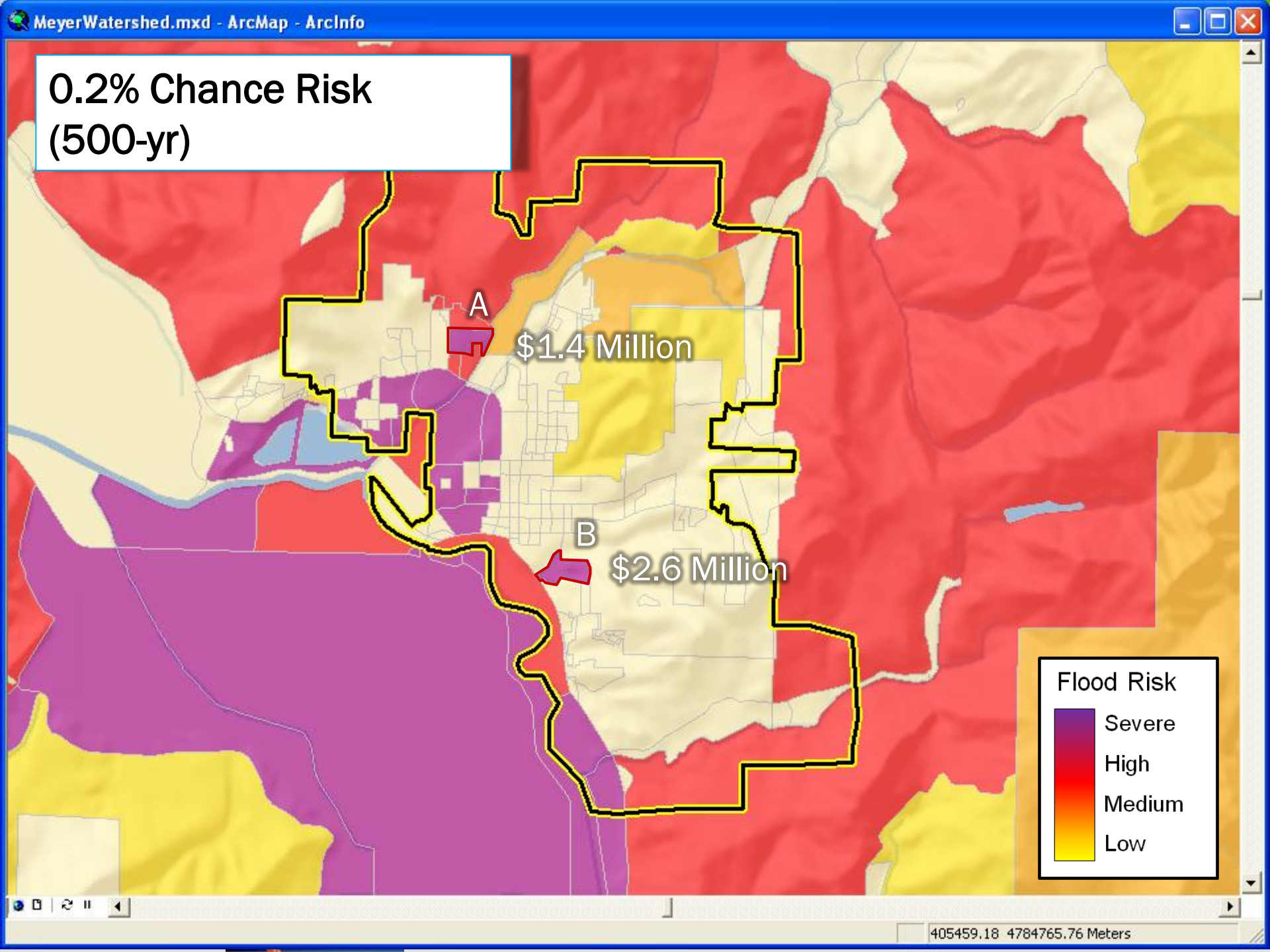


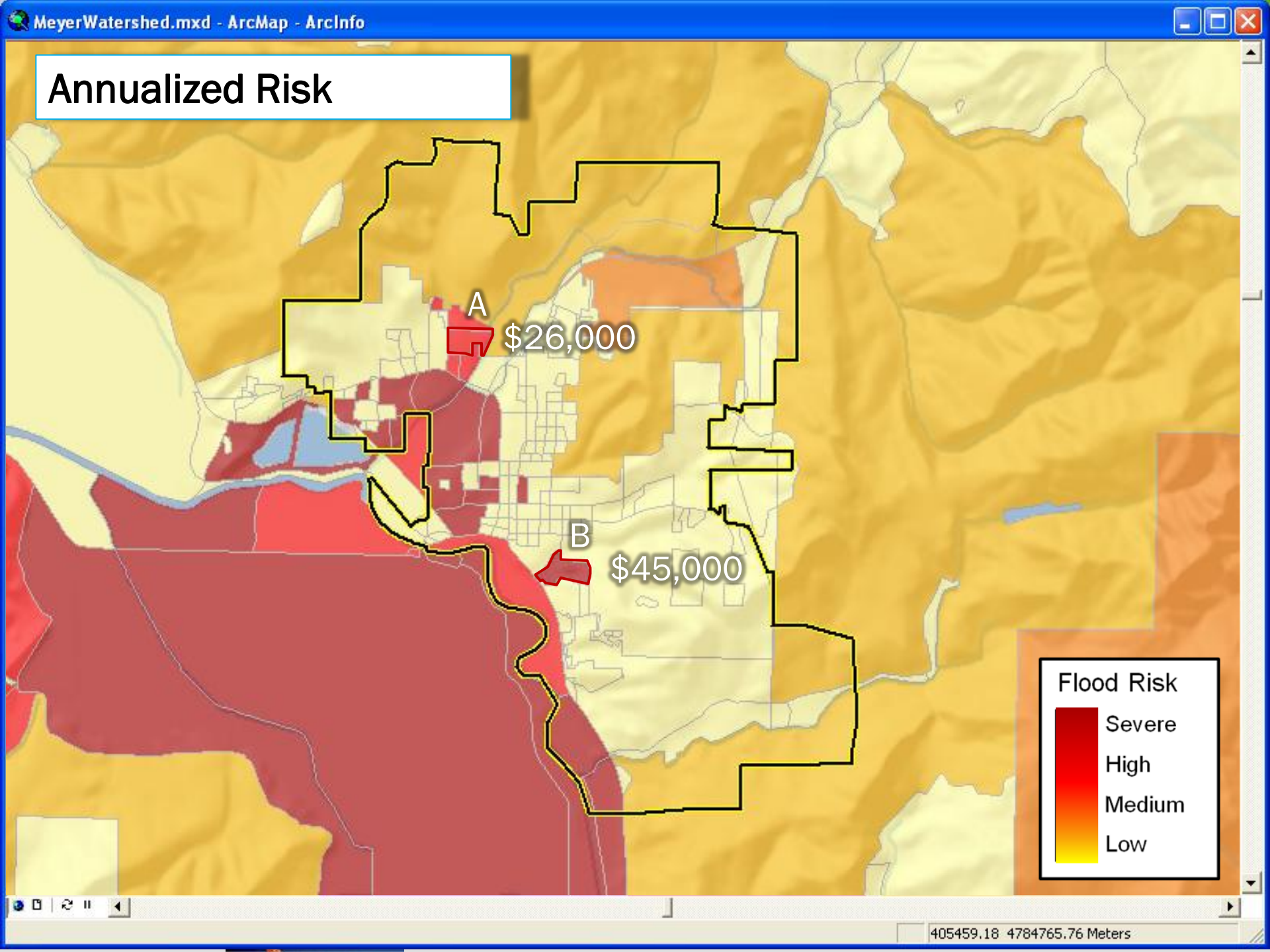

MeyerWatershed.mxd - ArcMap - ArcInfo
10% Chance Risk
(10-yr)
A
$370,000
B
$670,000
Flood Risk
Severe
High
Medium
Low
404582.72 4784209.96 Meters


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

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Areas of Mitigation Interest

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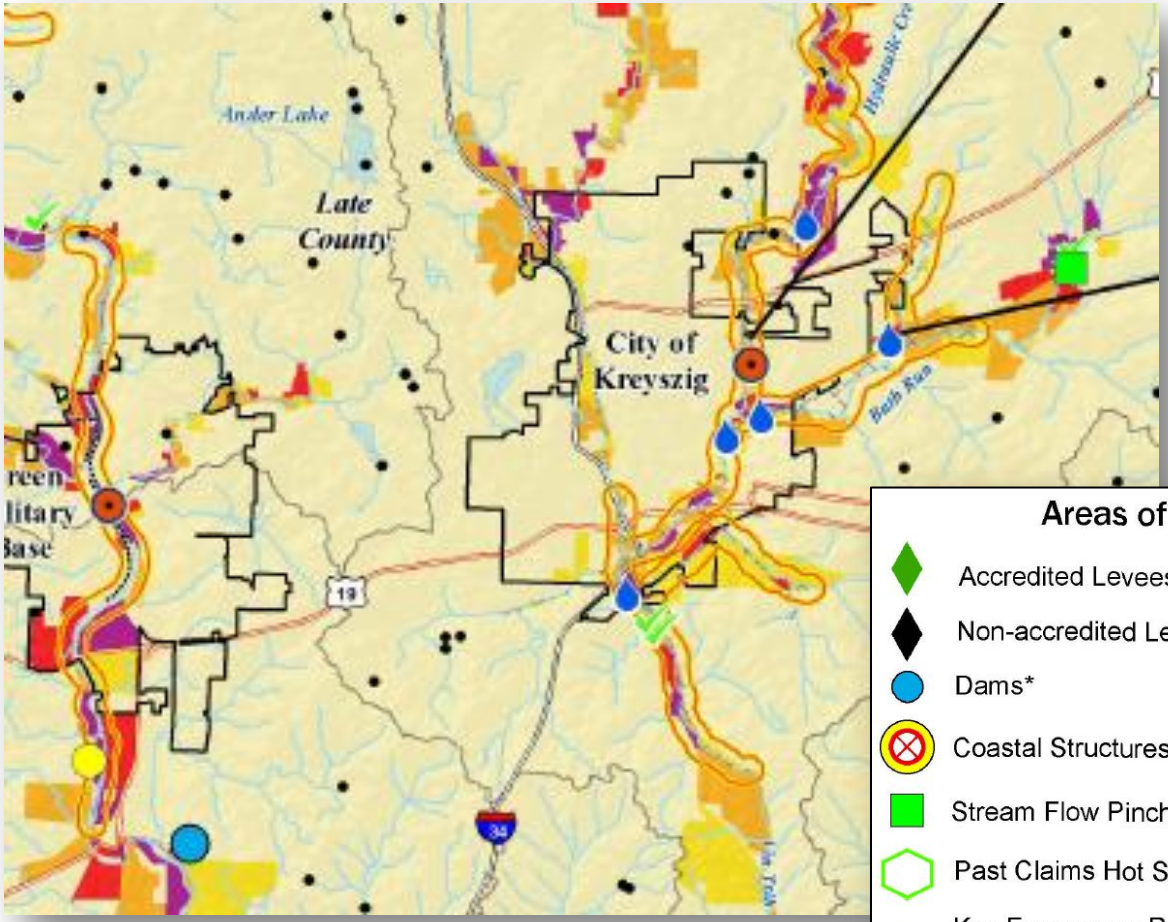
Areas of Mitigation Interest Purpose and Intended Uses

- 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

Areas of Mitigation Interest Points on the Flood Risk Map



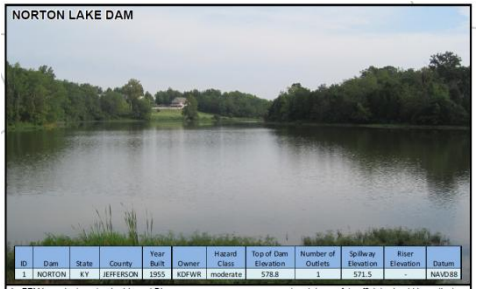
Areas of Mitigation Interest

- Accredited Levees*
- Non-accredited Levees*
- Dams*
- Coastal Structures*
- Stream Flow Pinch Point*
- Past Claims Hot Spot*
- Key Emergency Routes Overtopped During Frequent Flooding Events*
- Individual Assistance (IA) and Public Assistance (PA) Data*
- Significant Land Use Changes*
- Areas of Significant Riverine or Coastal Erosion*
- Significant Hydraulic Embankments*
- Other Flood Risk Areas*
- Areas of Mitigation Success*

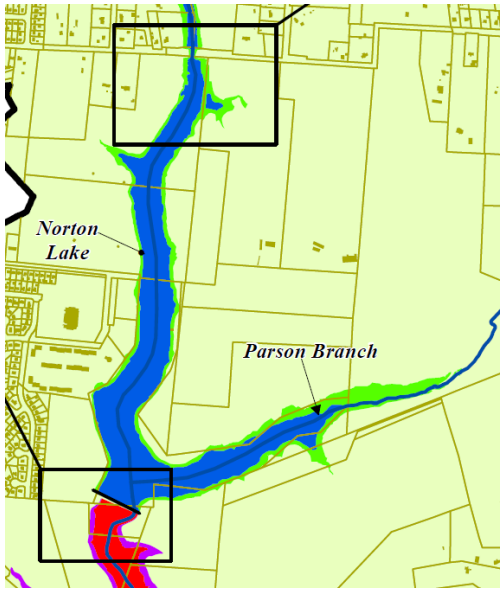
Areas of Mitigation Interest Example

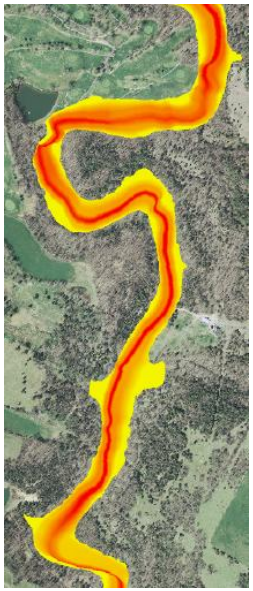
Non-Regulatory Datasets – Dams

- Leverages existing analysis from dam safety officials
- Flexible depending on varying state regulations & methods
- Enhanced datasets include:
  - Basic dam characteristics
  - Upstream inundation areas delineated
  - Downstream inundation areas delineated
  - Assorted depth and analysis grids (depth, velocity, arrival time)
  - Easements & critical facilities
  - Flood risk assessments
  - Additional Areas of Mitigation Interest categories
- Data would be used to communicate risks & promote mitigation



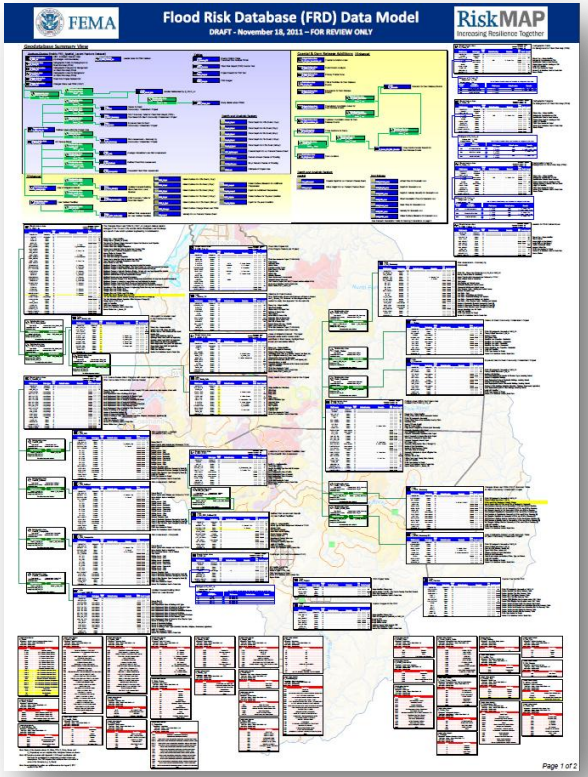
Emergency Spill-Crest Failure: Population at Risk = 450
Sunny Day Failure: Population at Risk = 266
100 Year Flood Event: Population at Risk = 167



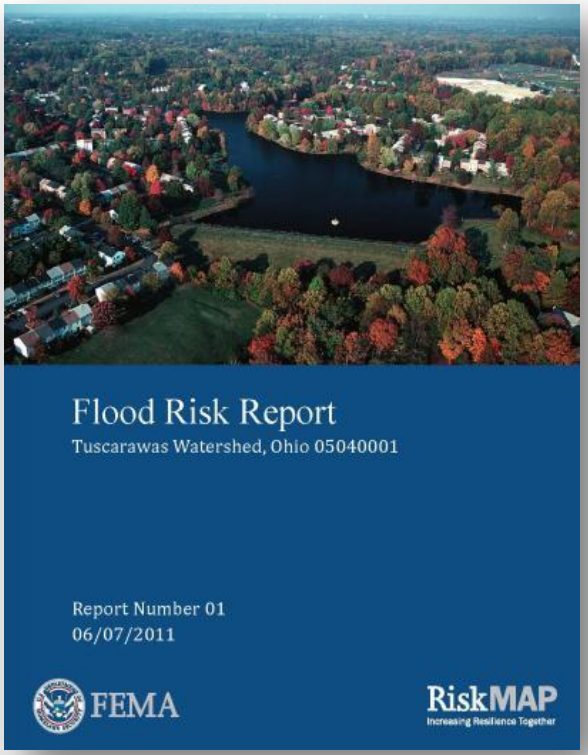


How are these datasets delivered?

Flood Risk Database



Flood Risk Report



Flood Risk Map

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Using Non-Regulatory Products for Outreach & Mitigation

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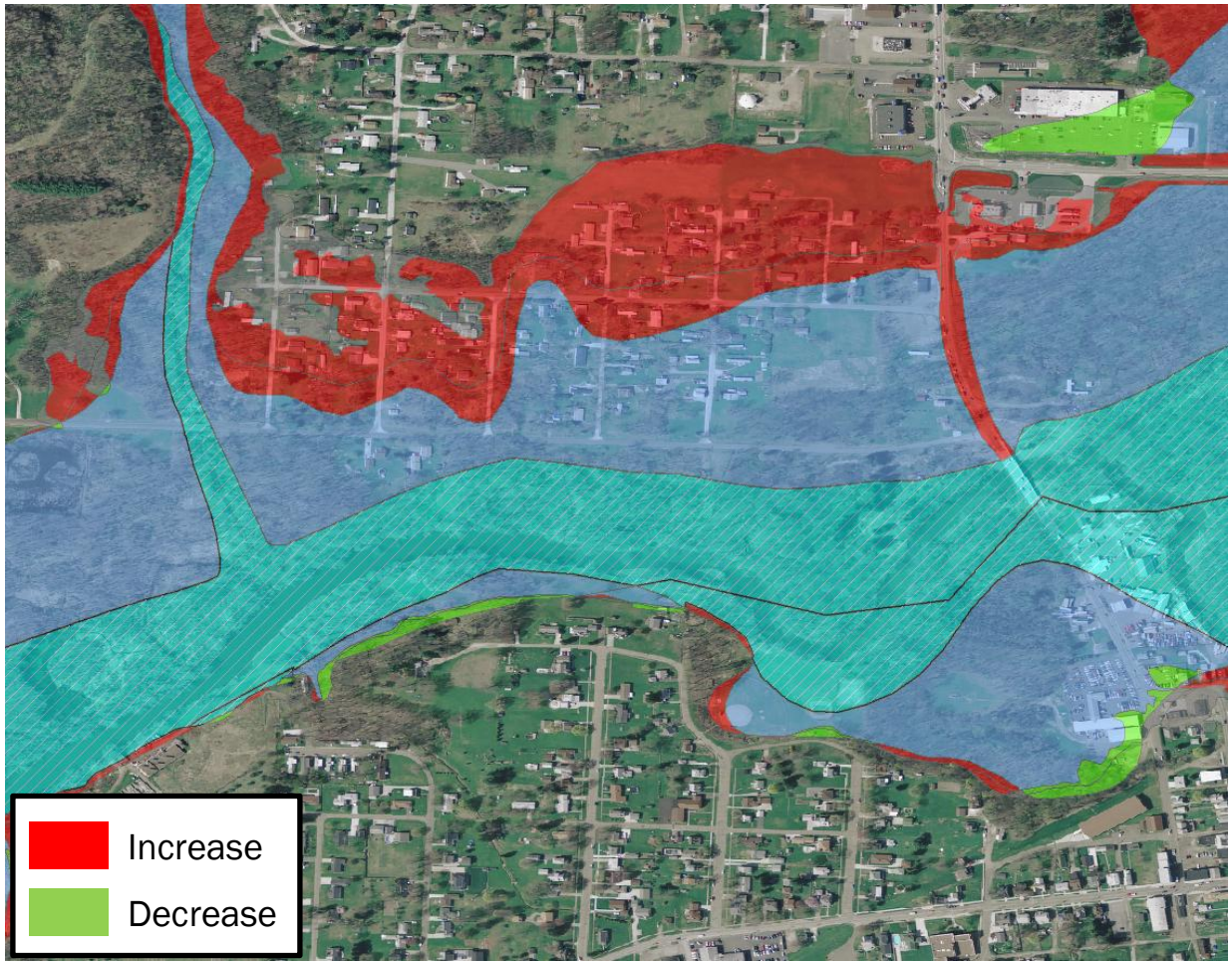
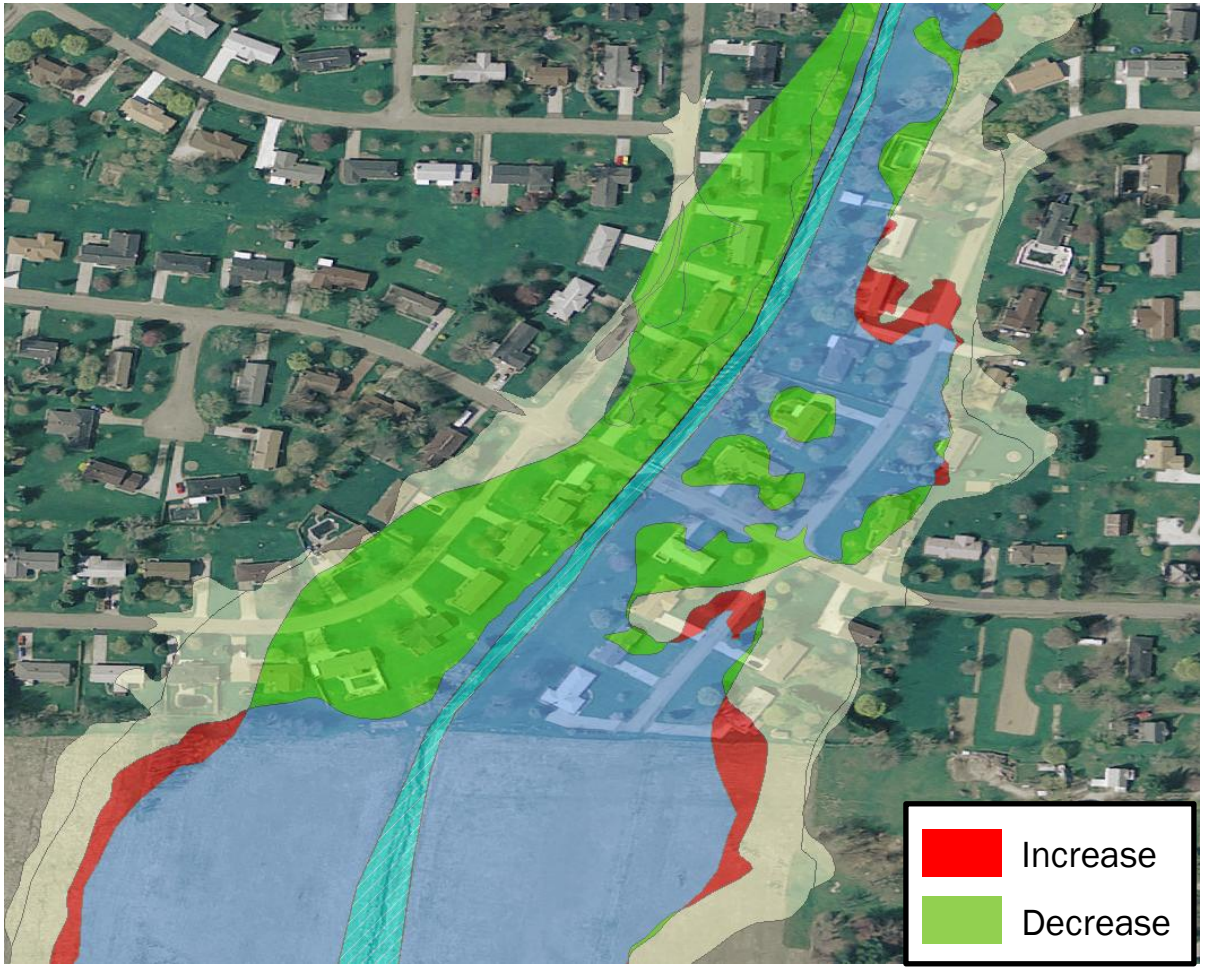
Changes Since Last FIRM

- Increases to floodplain - outreach to property owners re: flood insurance



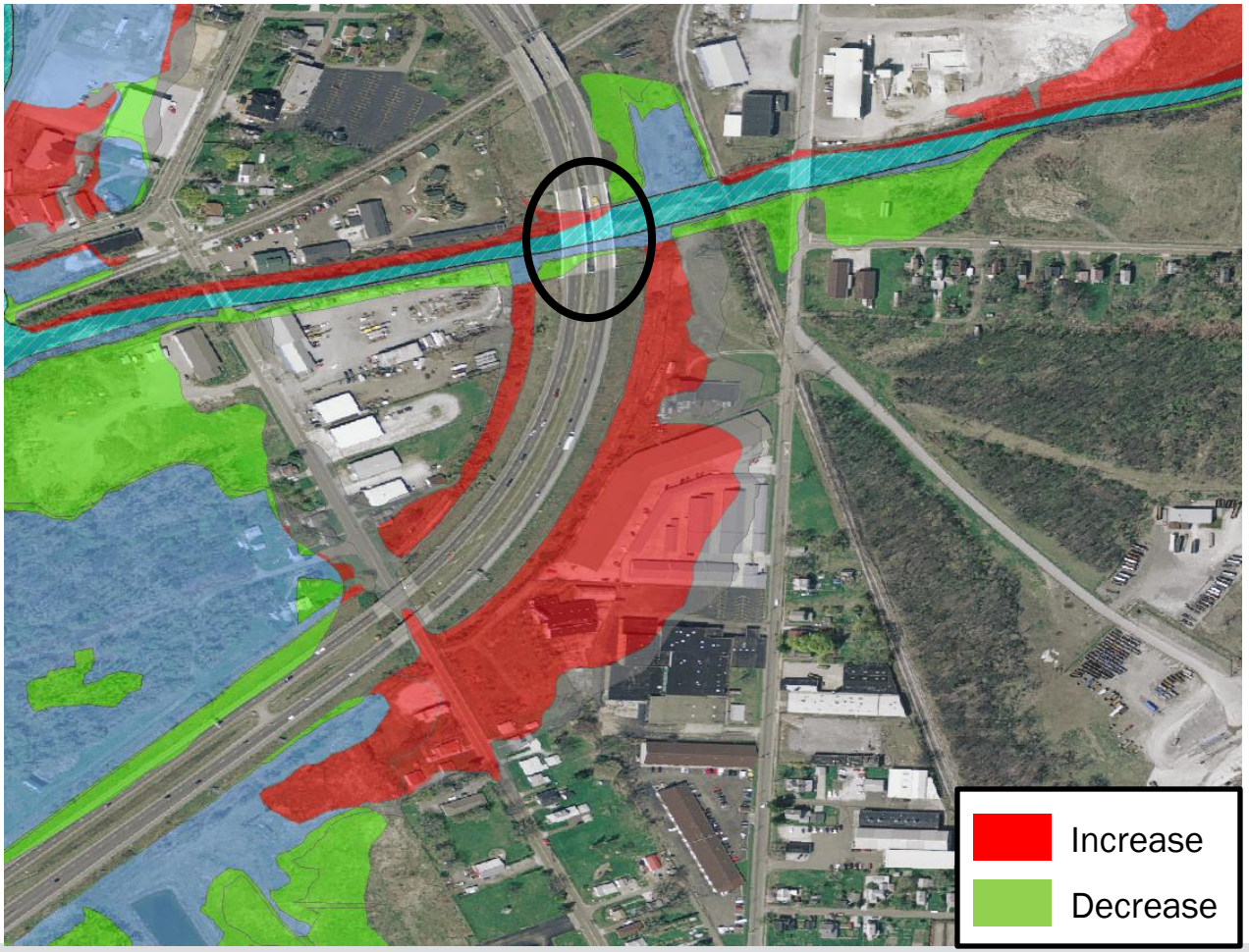
Changes Since Last FIRM

- Decreases to floodplain - outreach to property owners re: flood insurance



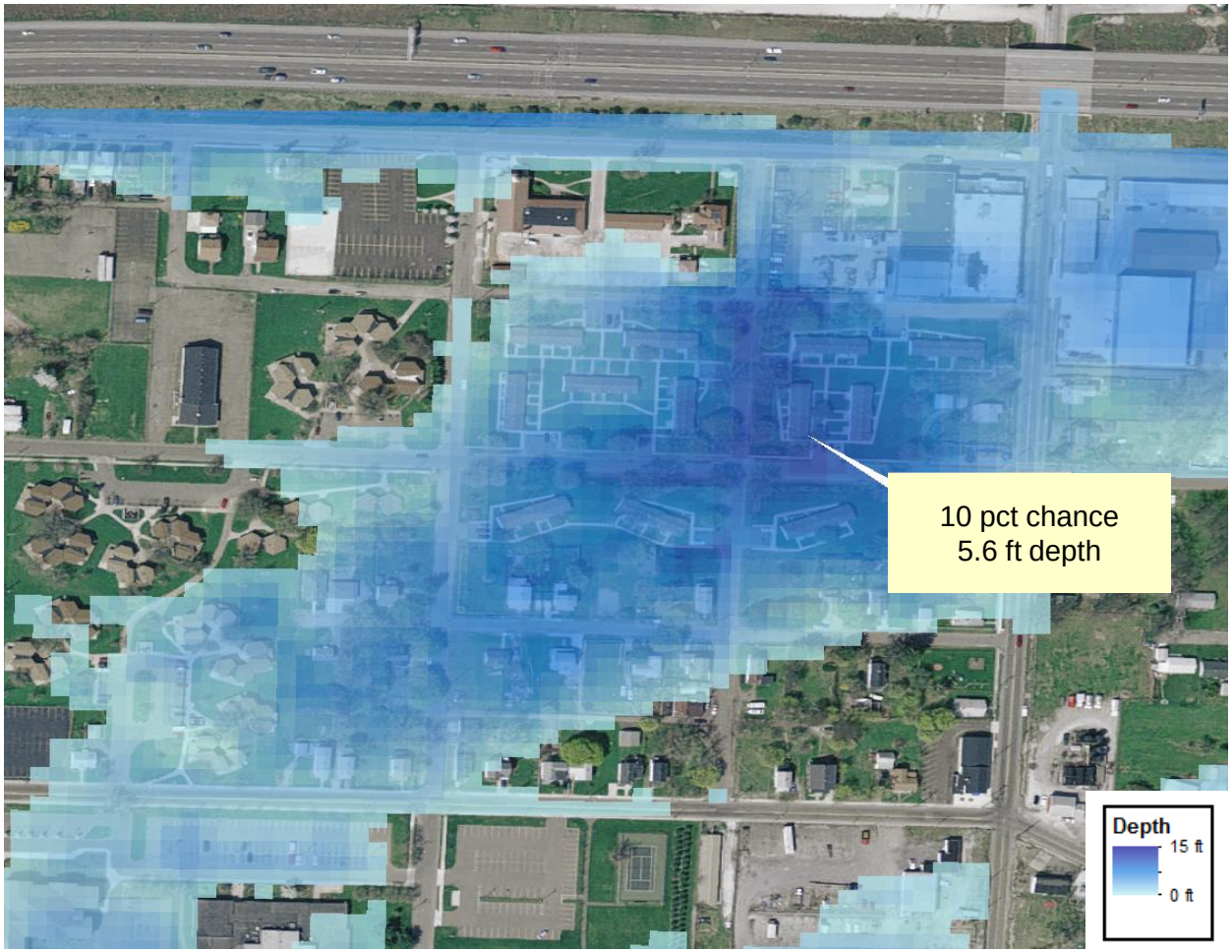
Changes Since Last FIRM

- **Review engineering factors to explore potential mitigation solutions**
  - Hyd. structures
  - Sedimentation
  - Runoff
  - Erosion



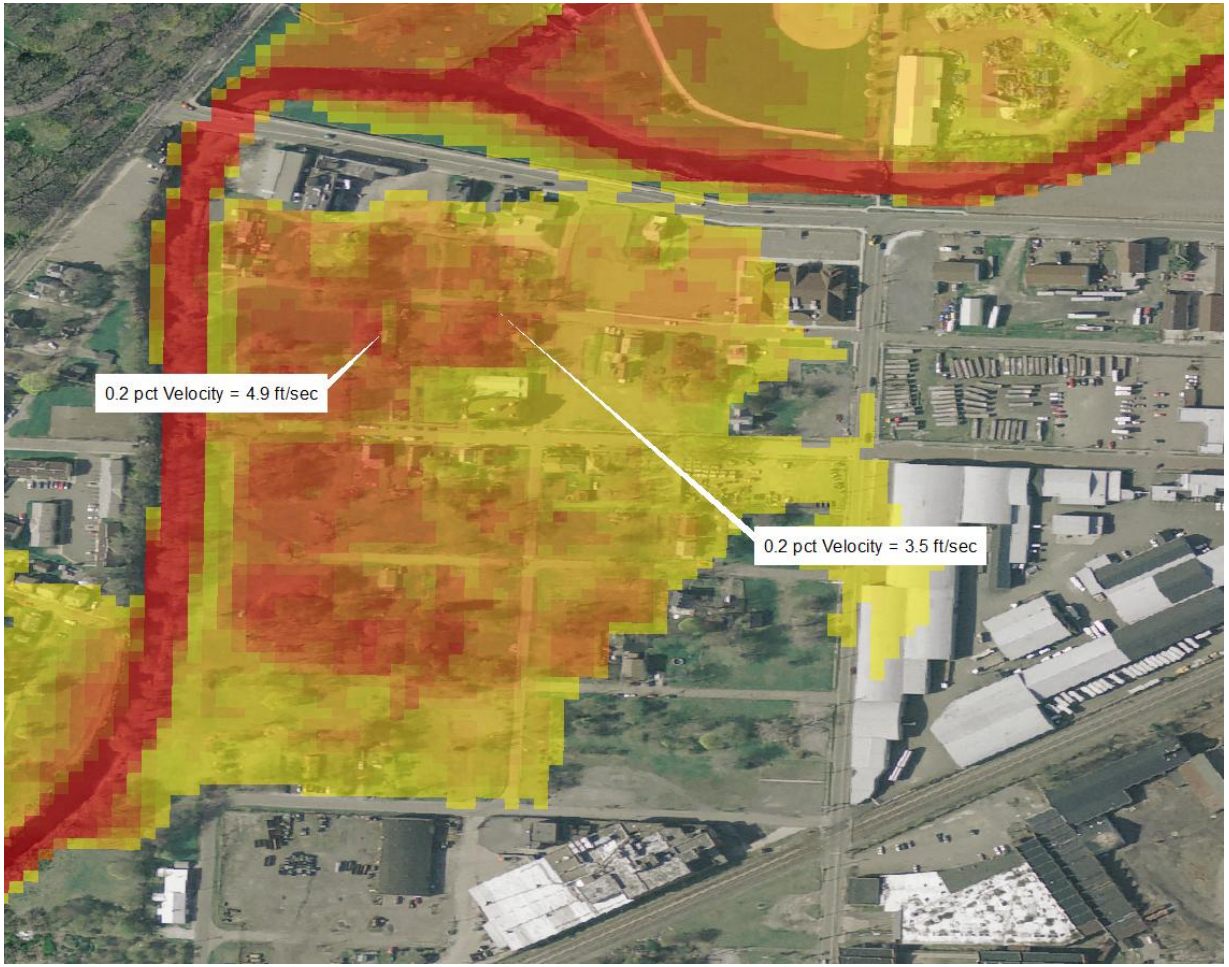
Depth & Analysis Grids

- **Depth of Flooding**
  - Deep/shallow flooding
  - High frequencies



Depth & Analysis Grids

- Velocity grids: stream stabilization

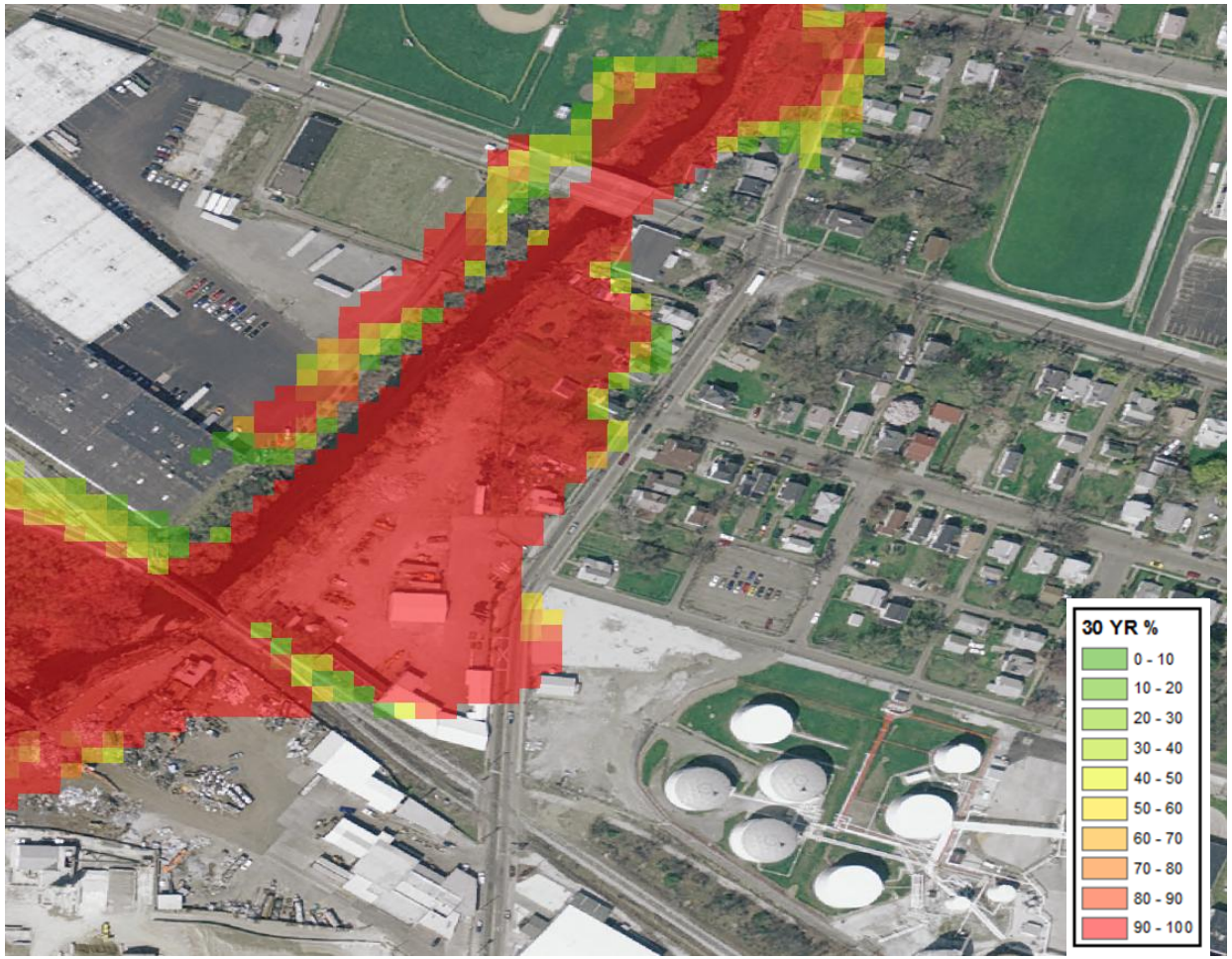


Depth & Analysis Grids

- 30-Year Percent Chance:

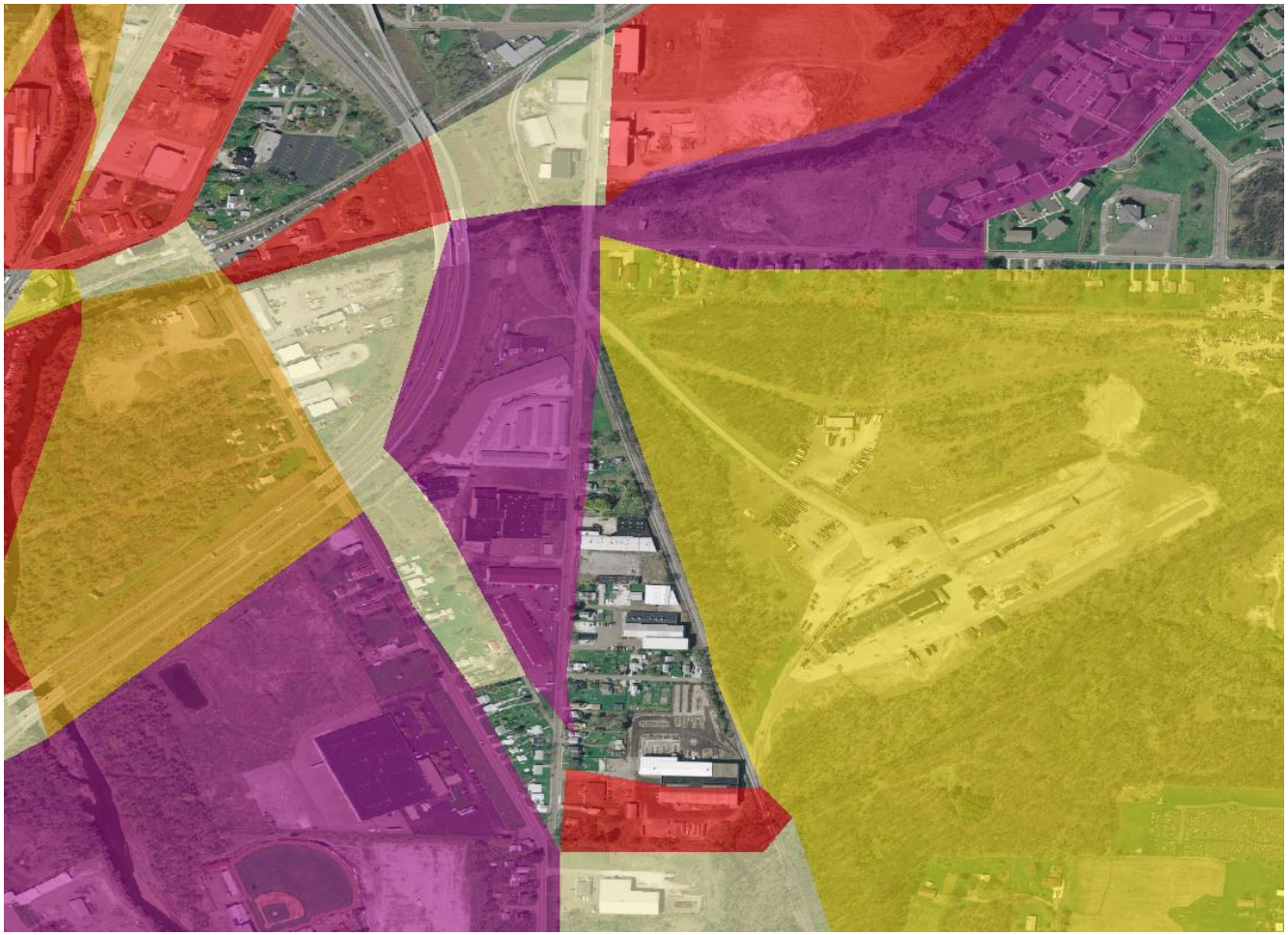
outreach to owners &

insurance providers



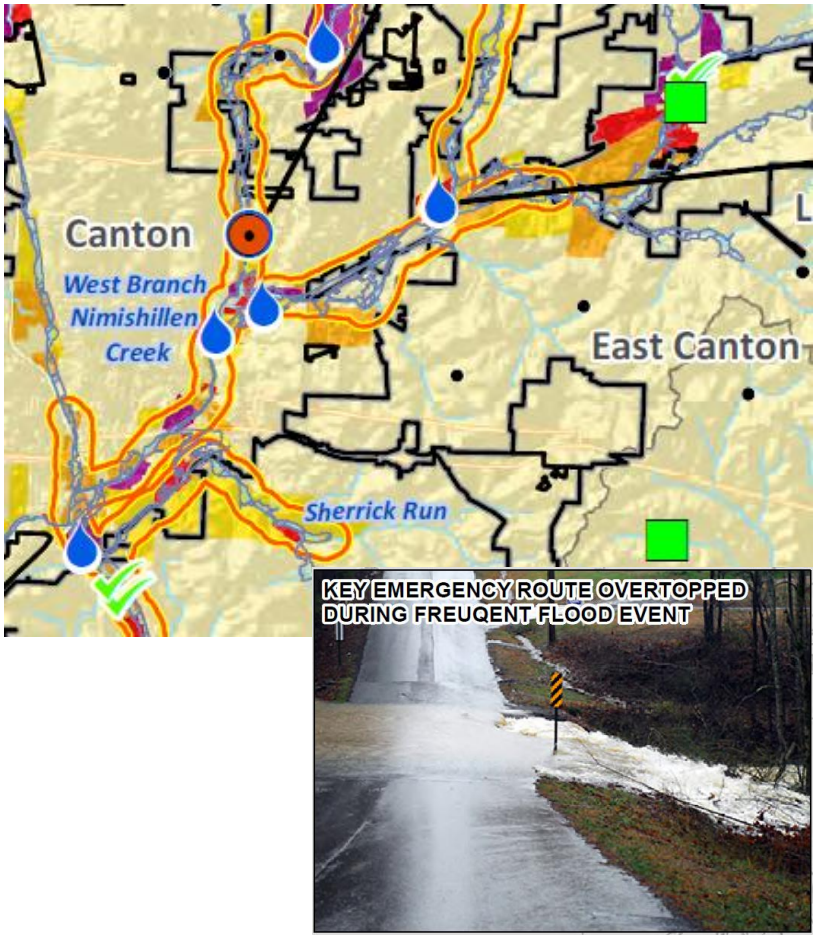
Risk Assessment

- **Estimated Lossess**
  - Where do we expect to see high losses?
  - What infrastructure is vulnerable?
  - What are the anticipated $$?



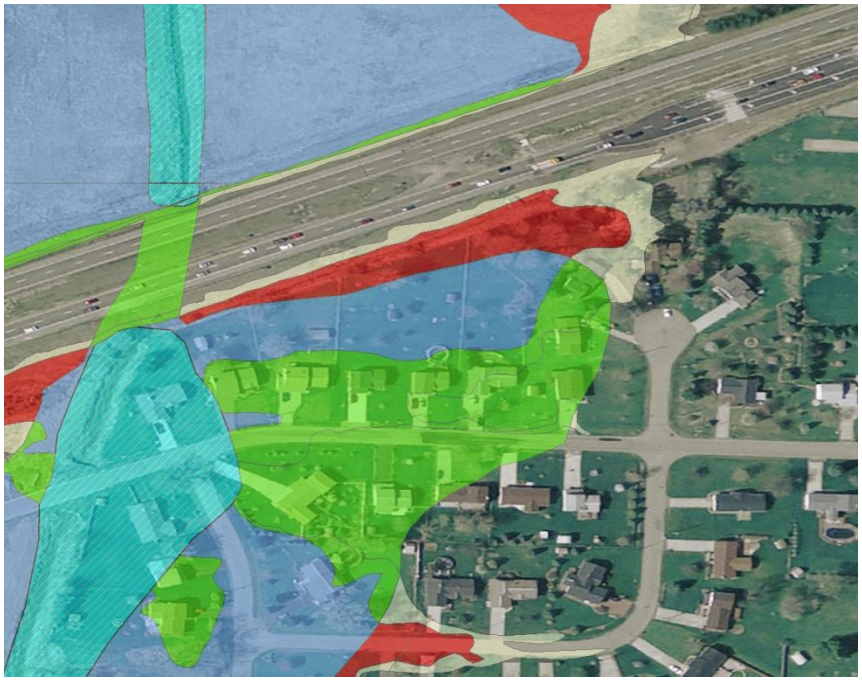
Areas of Mitigation Interest

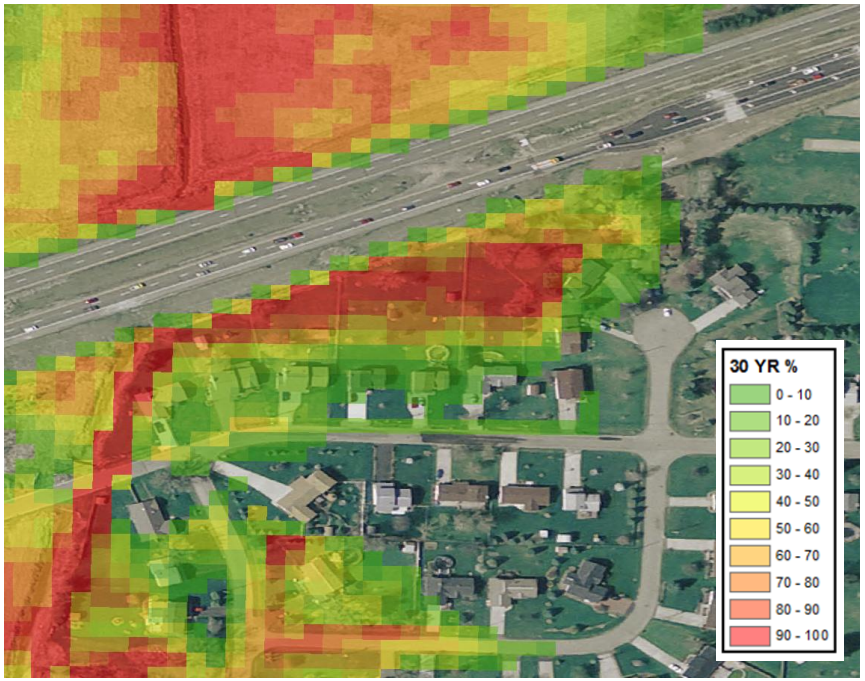
- **Can come from multiple sources throughout the Risk MAP lifecycle**
  - Federal, State, Local, other
  - Discovery, Data Development & Sharing, Flood Risk Review, Resilience
- **Data exploration by the project team as preparation for various meetings**
- **Serves as a record of mitigation opportunities**



Data Combinations

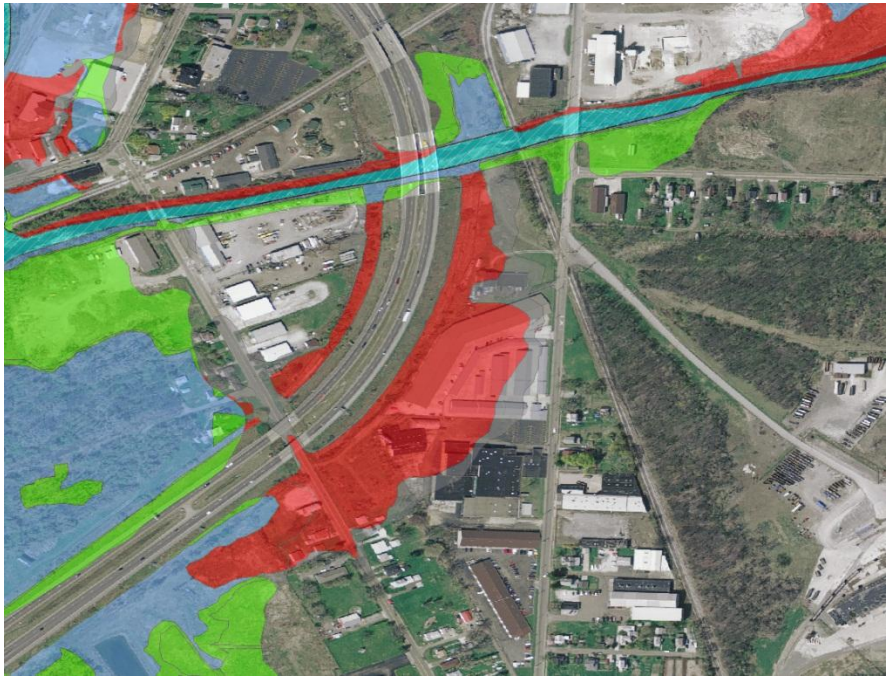
- **CSLF / Depth & Analysis Grids**
  - Decreases / remaining 30-year percent chance of flooding

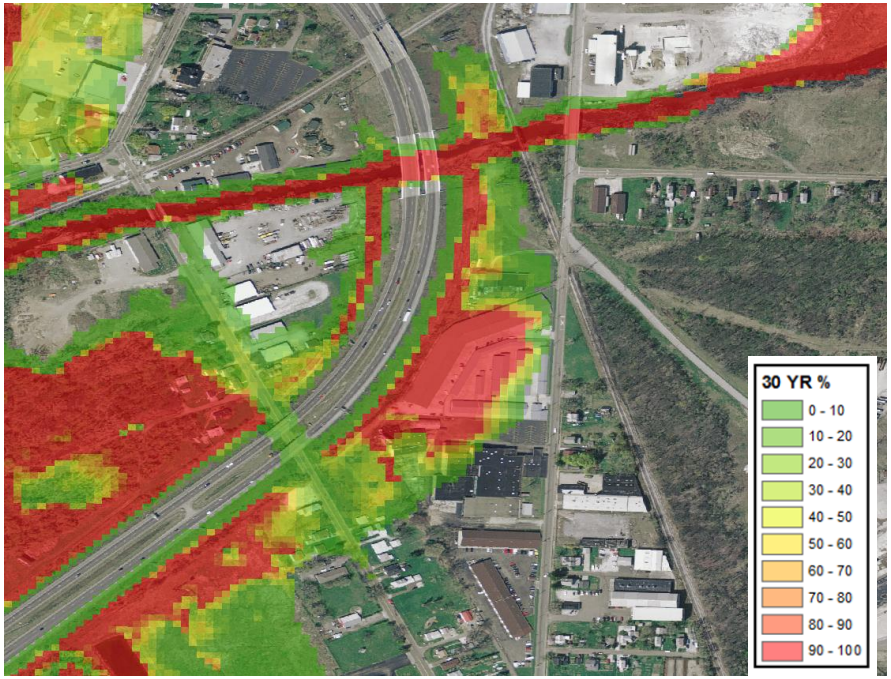




Data Combinations

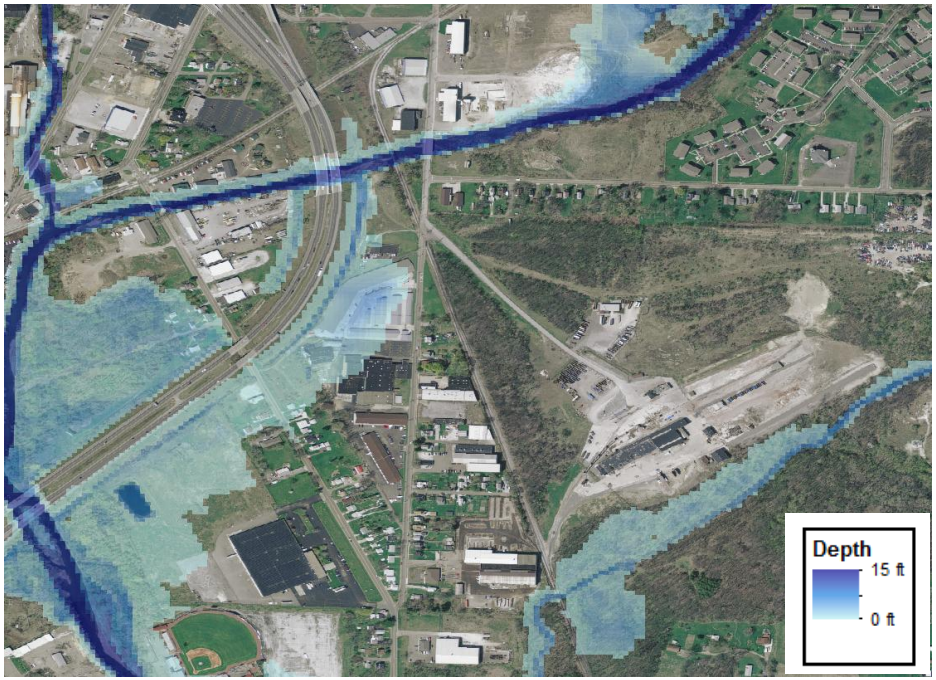
- **CSLF / Depth & Analysis Grids**
  - Increases / deep water / > 6ft / 25-yr event





Data Combinations

- **Risk Assessment / Depth & Analysis Grids**
  - High total losses / shallow flood depths / 10 or 25-year event



Summary

- **Risk MAP Goals:**
  - 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