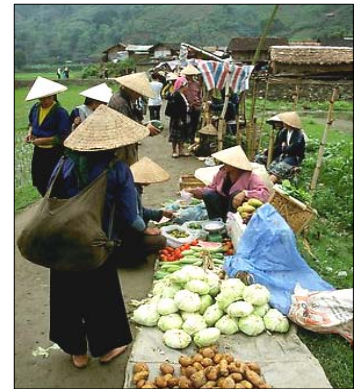


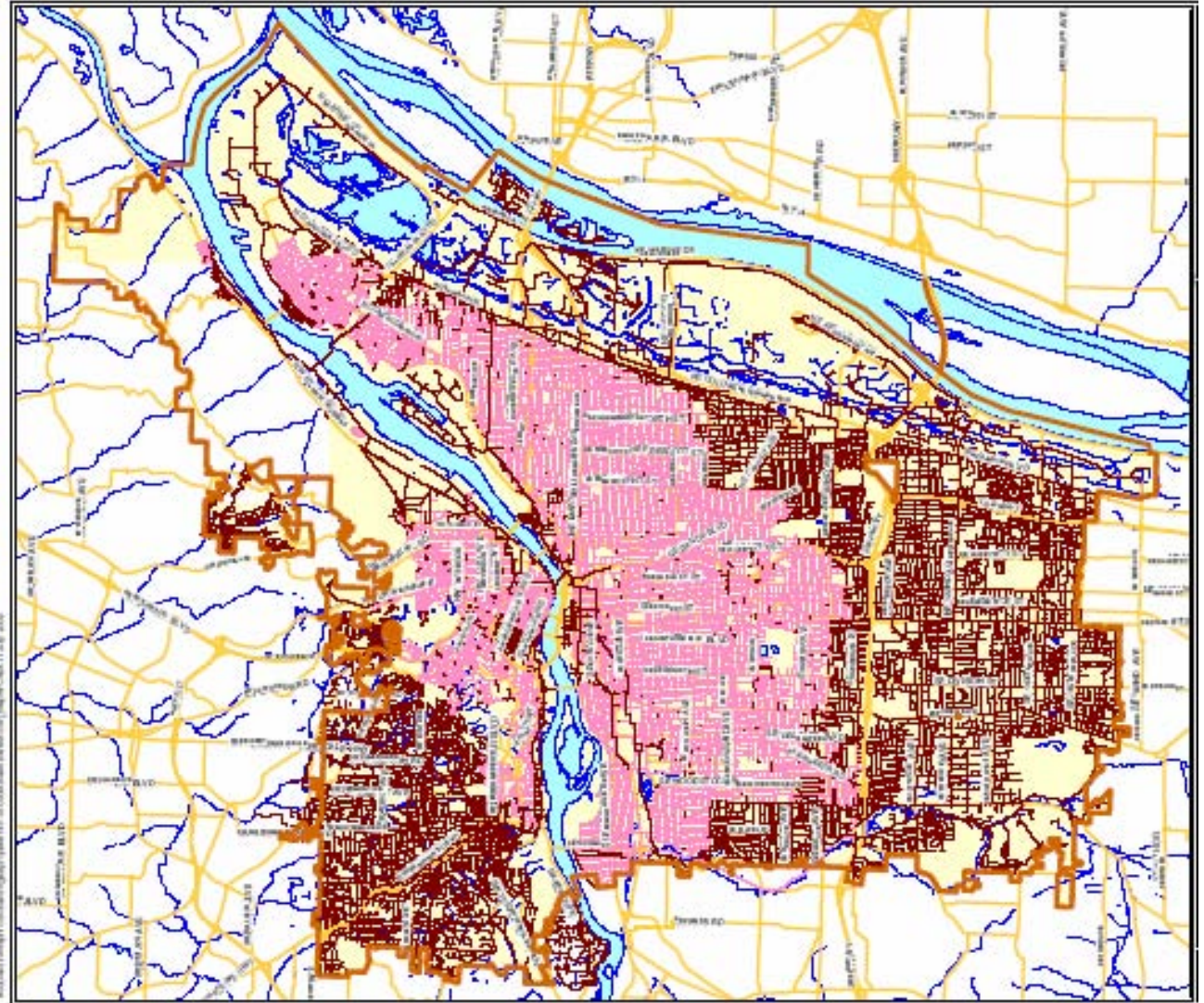
US EPA ARCHIVE DOCUMENT

Using Market Forces to Implement Sustainable Stormwater Management

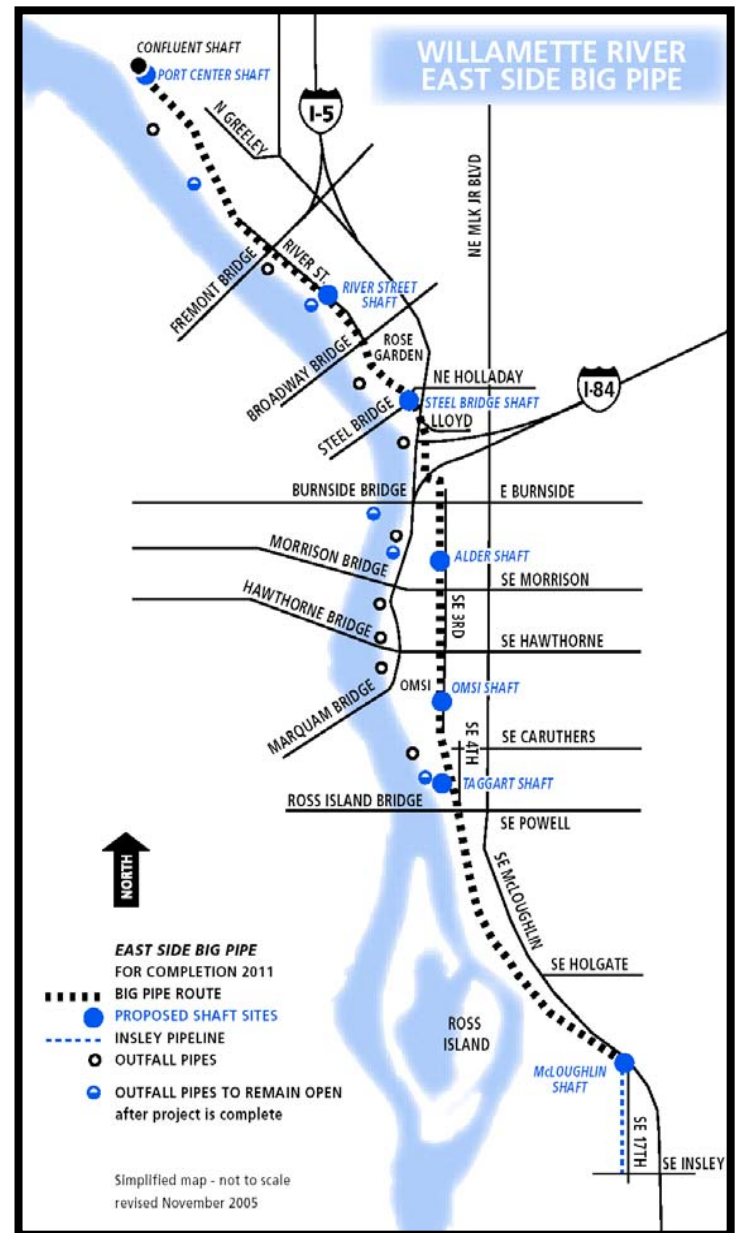
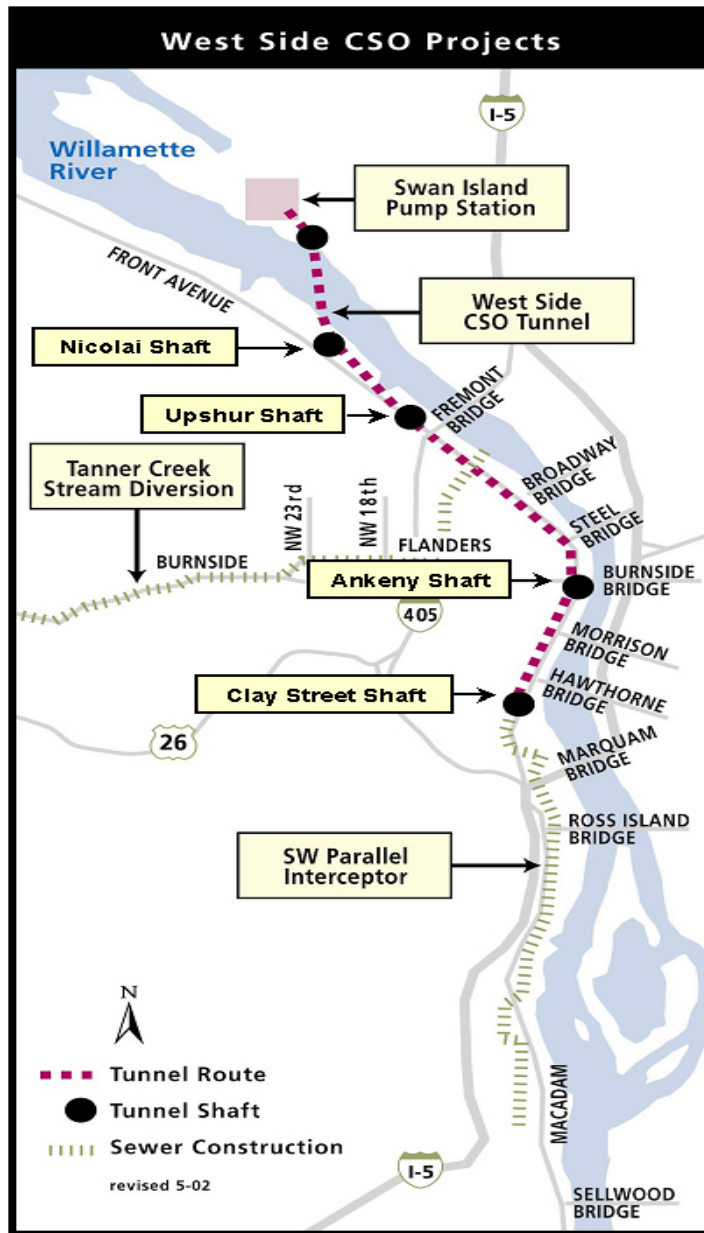


Portland's Stormwater System

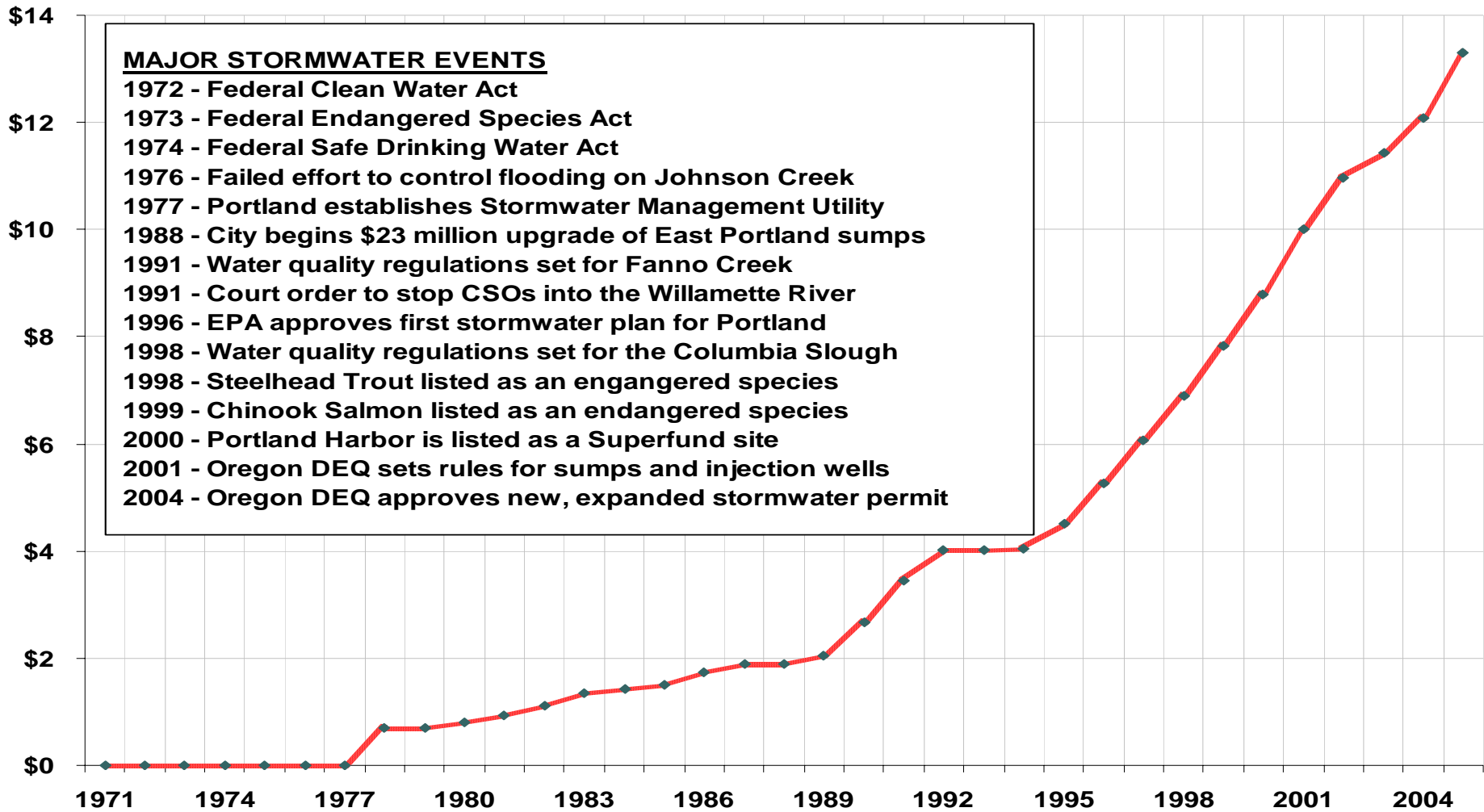
- 861 miles of combined sewers (pink)
- 932 miles of separated sanitary sewers (red)



Portland's "Big Pipe" Isn't Big Enough



Monthly Household Stormwater User Fee



Project Overview

**Phase One
Feasibility**

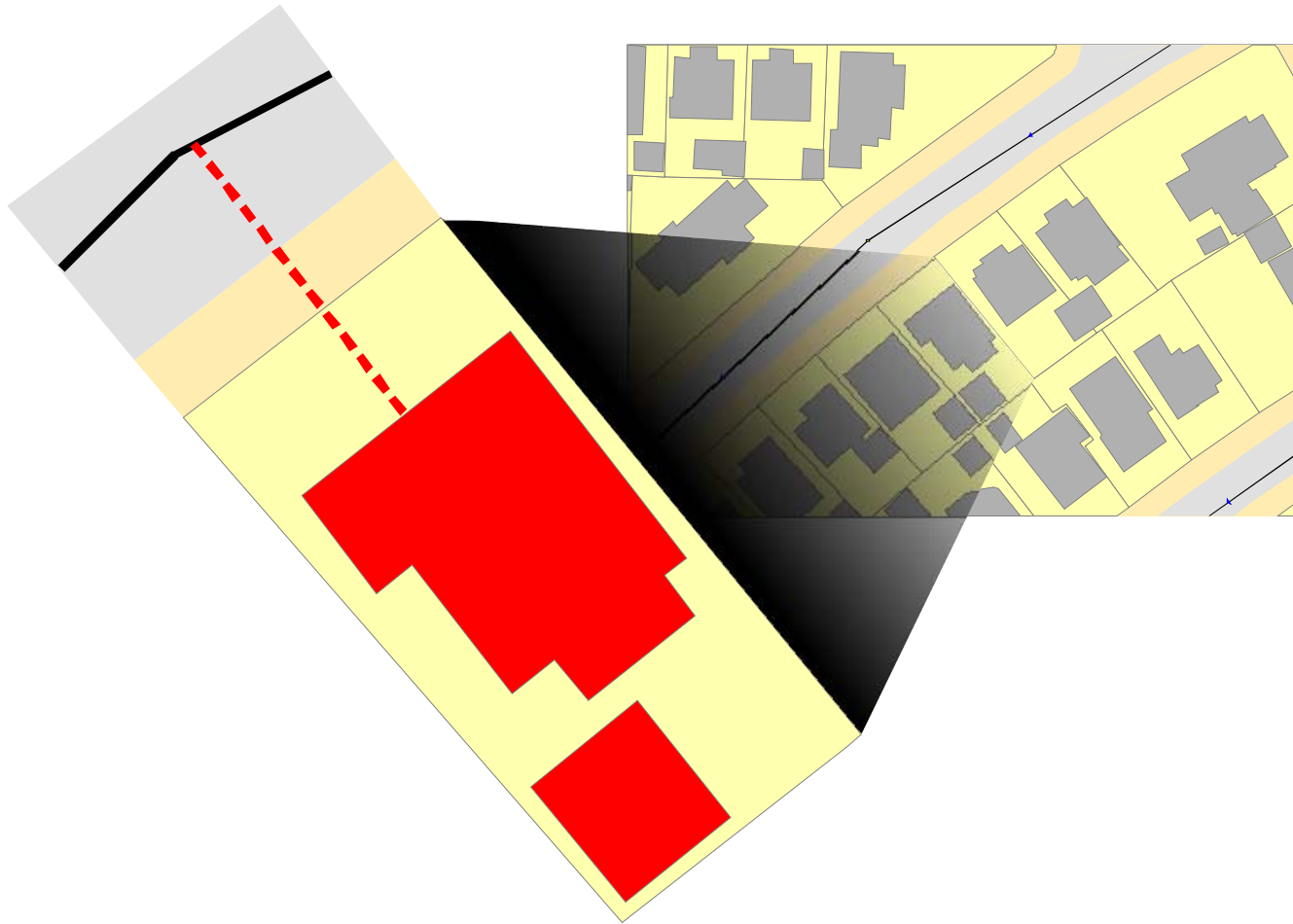
**Phase Two
Market
Analysis**

**Phase
Three
Pilot Test**

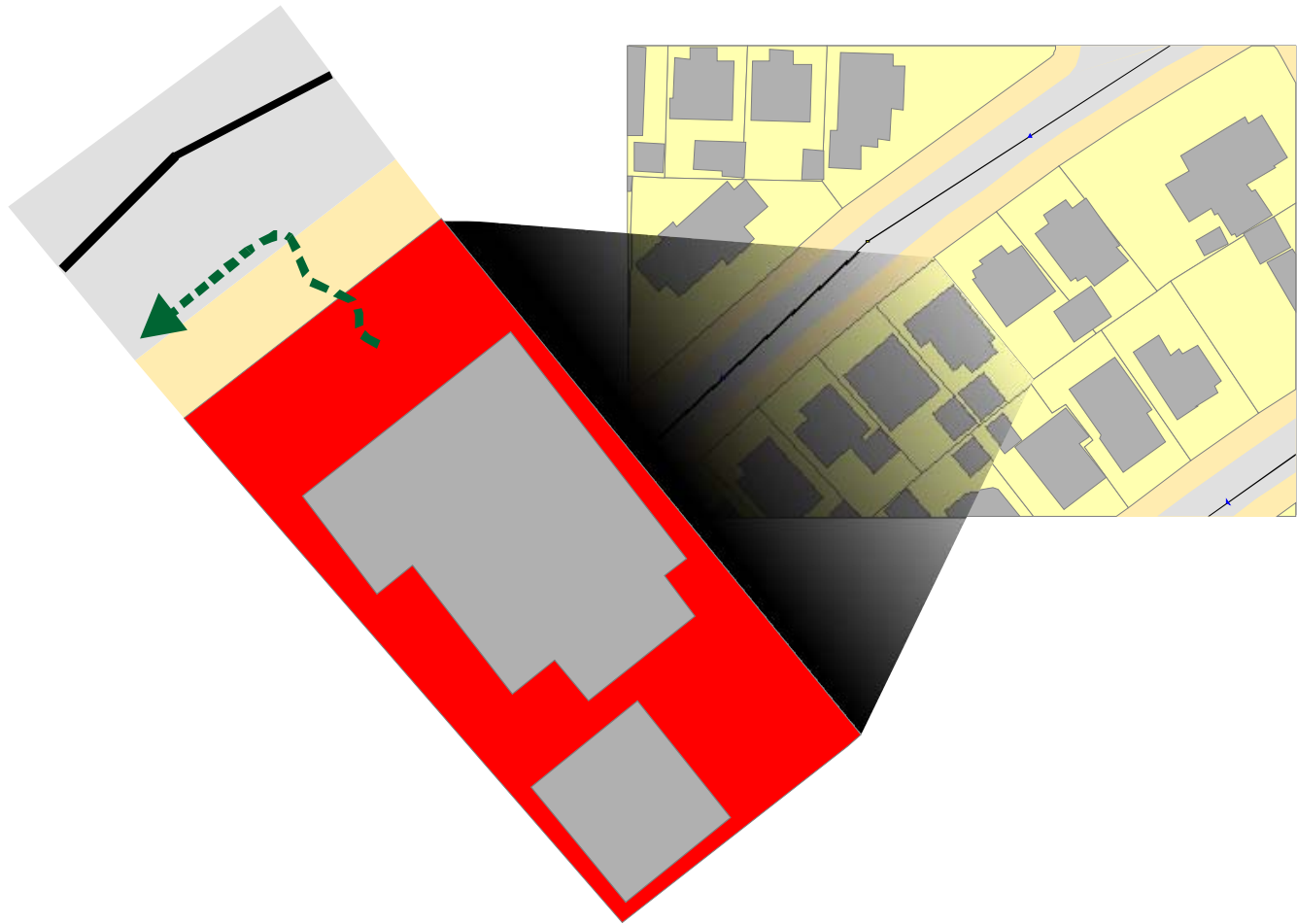
Project Support Tools

- Explicit model for combined sewer systems
- GRID model for pollutant load estimation
- Stormwater BMP effectiveness evaluation
- Simplified scenario evaluation tool

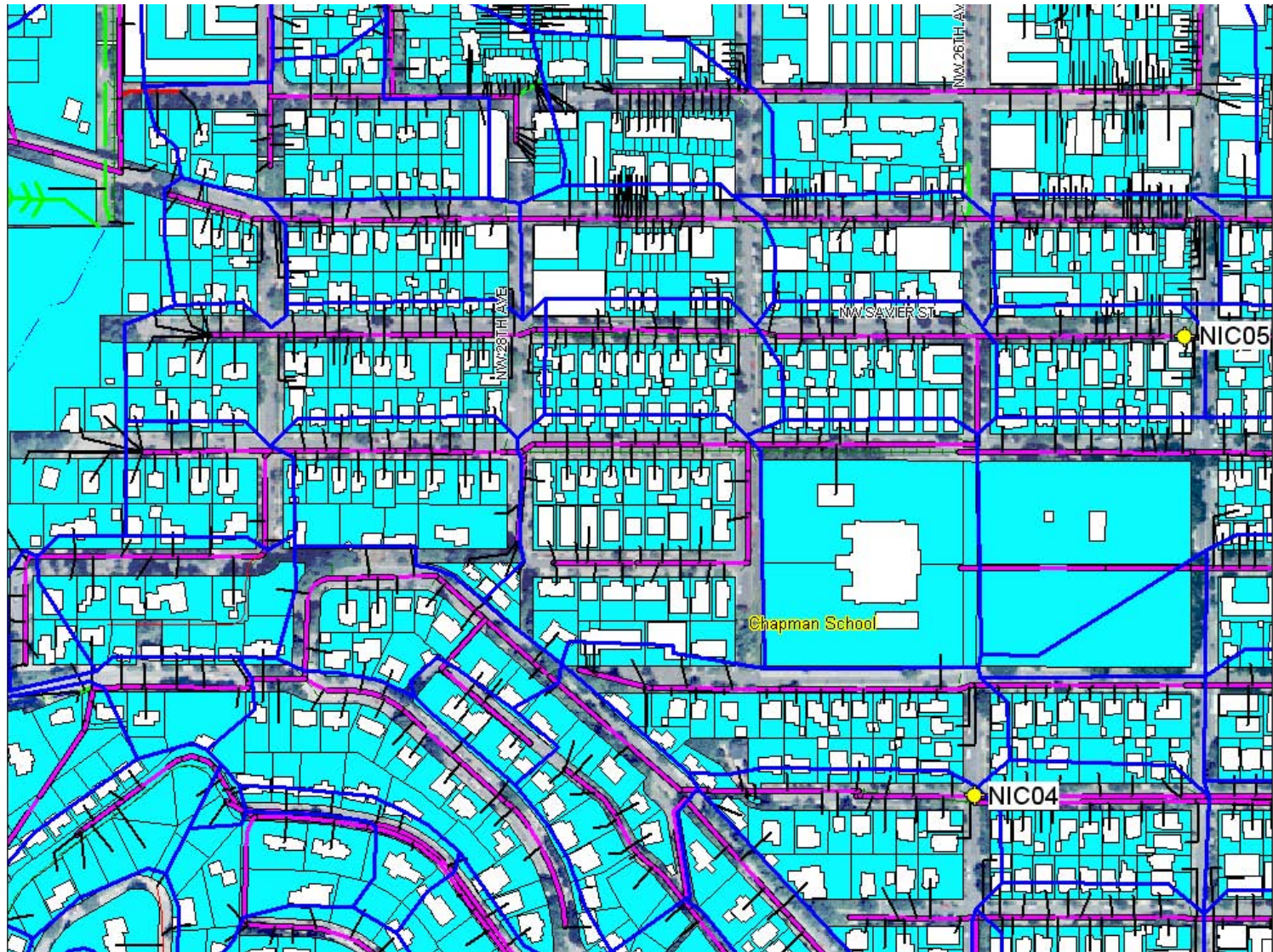
Directly Connected Subcatchments



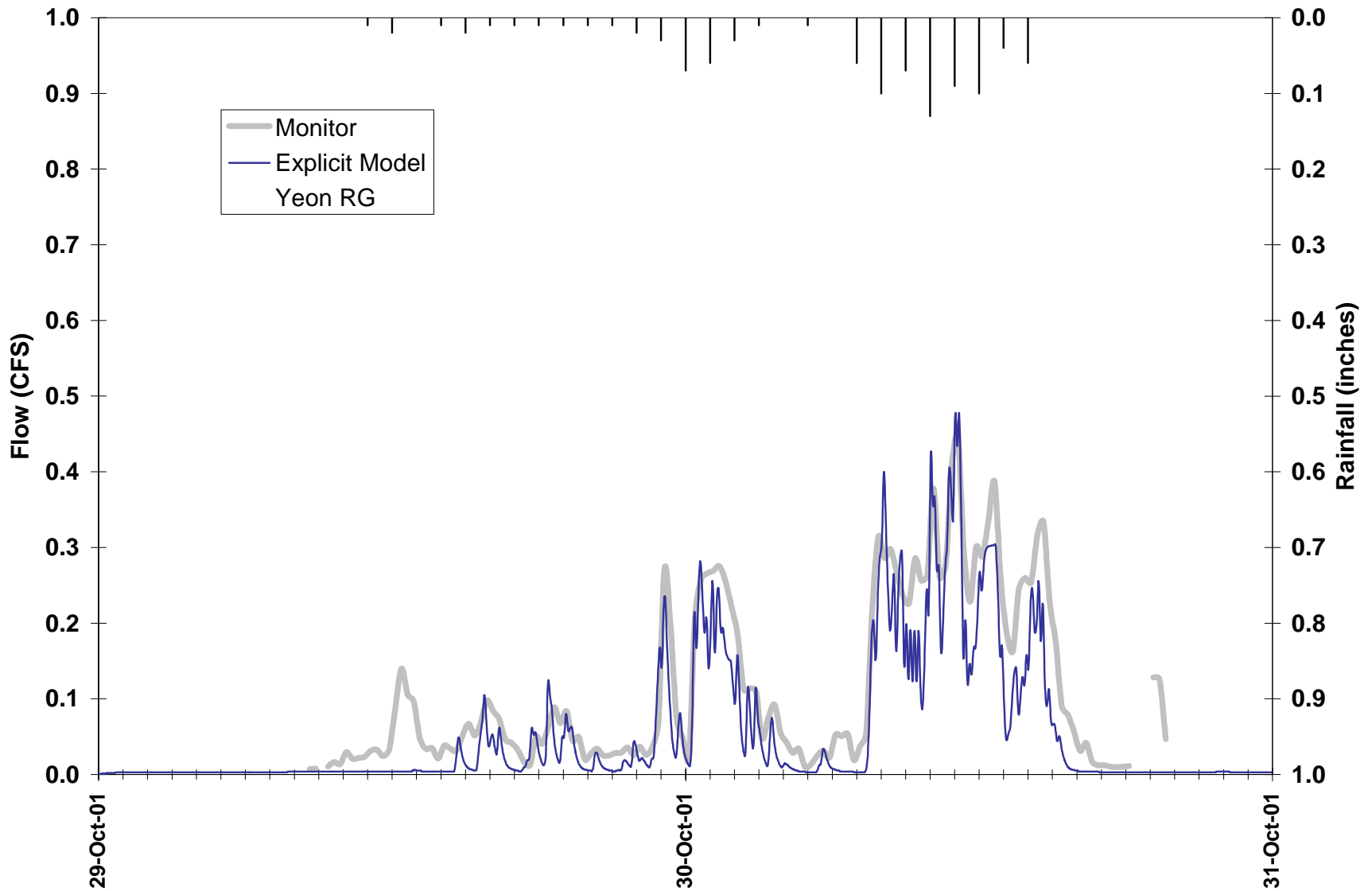
Surface Water Subcatchments



Model Elements



Calibration



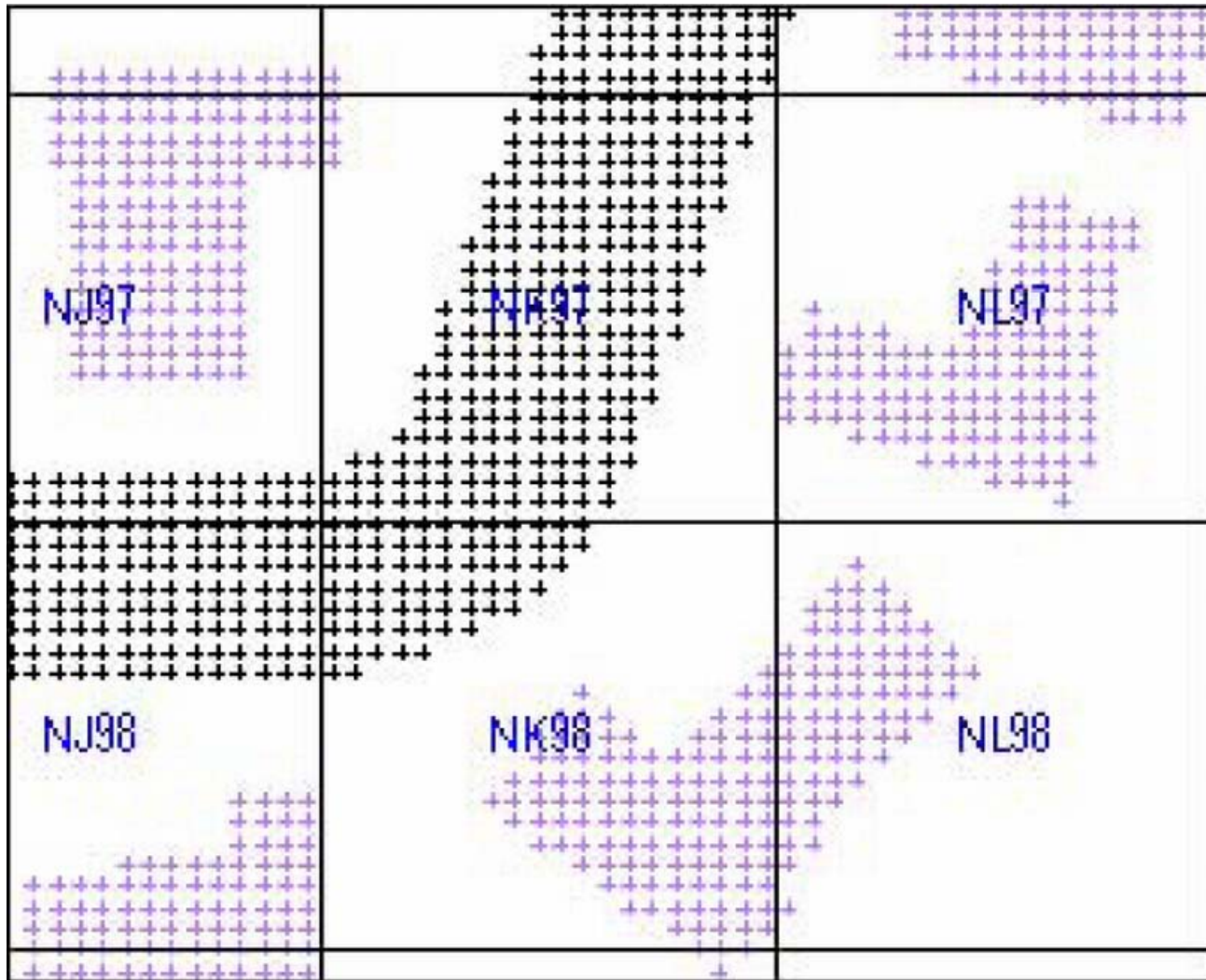
Verification



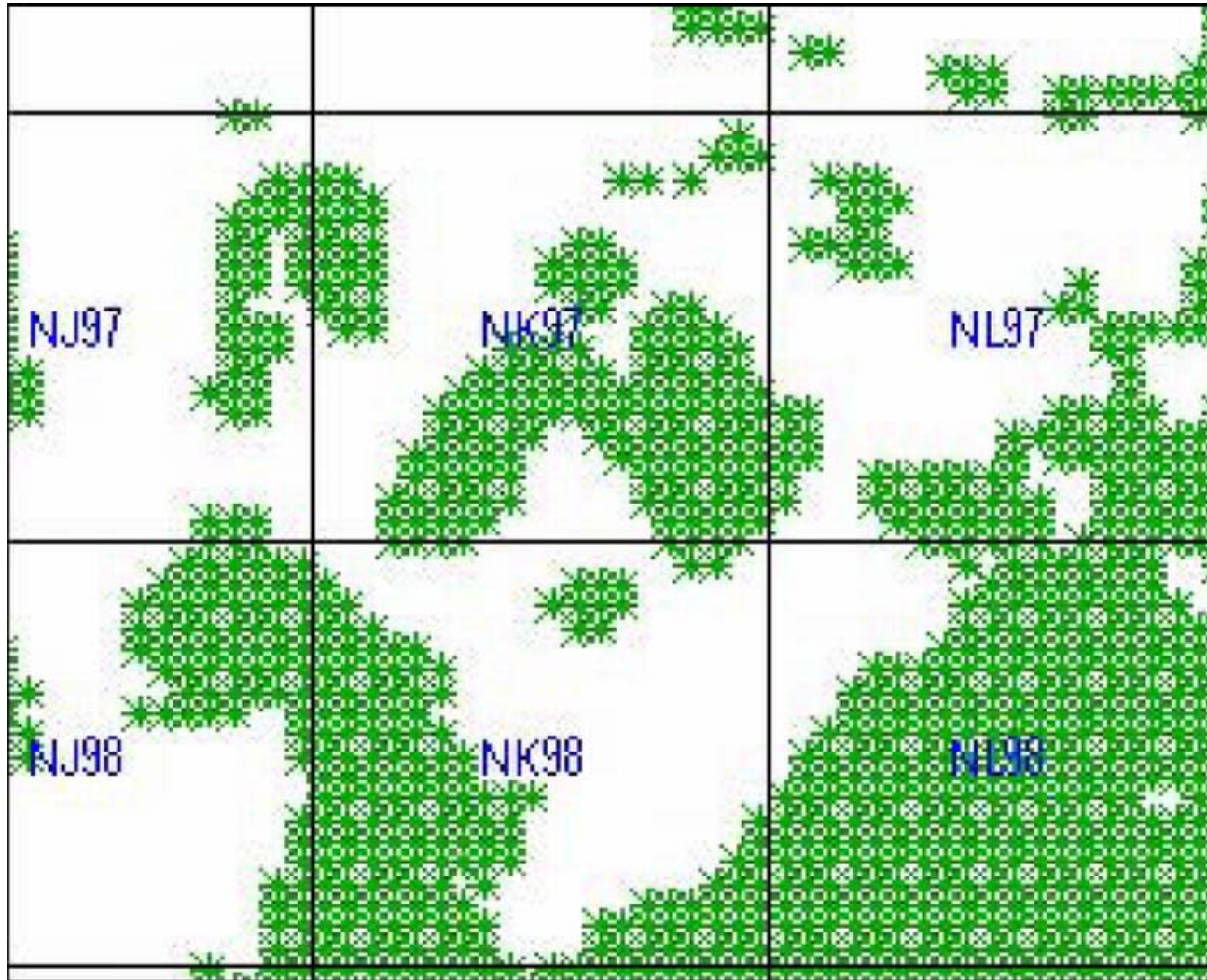
Example Residential Area in 200 ft. Grids



Impervious Surface



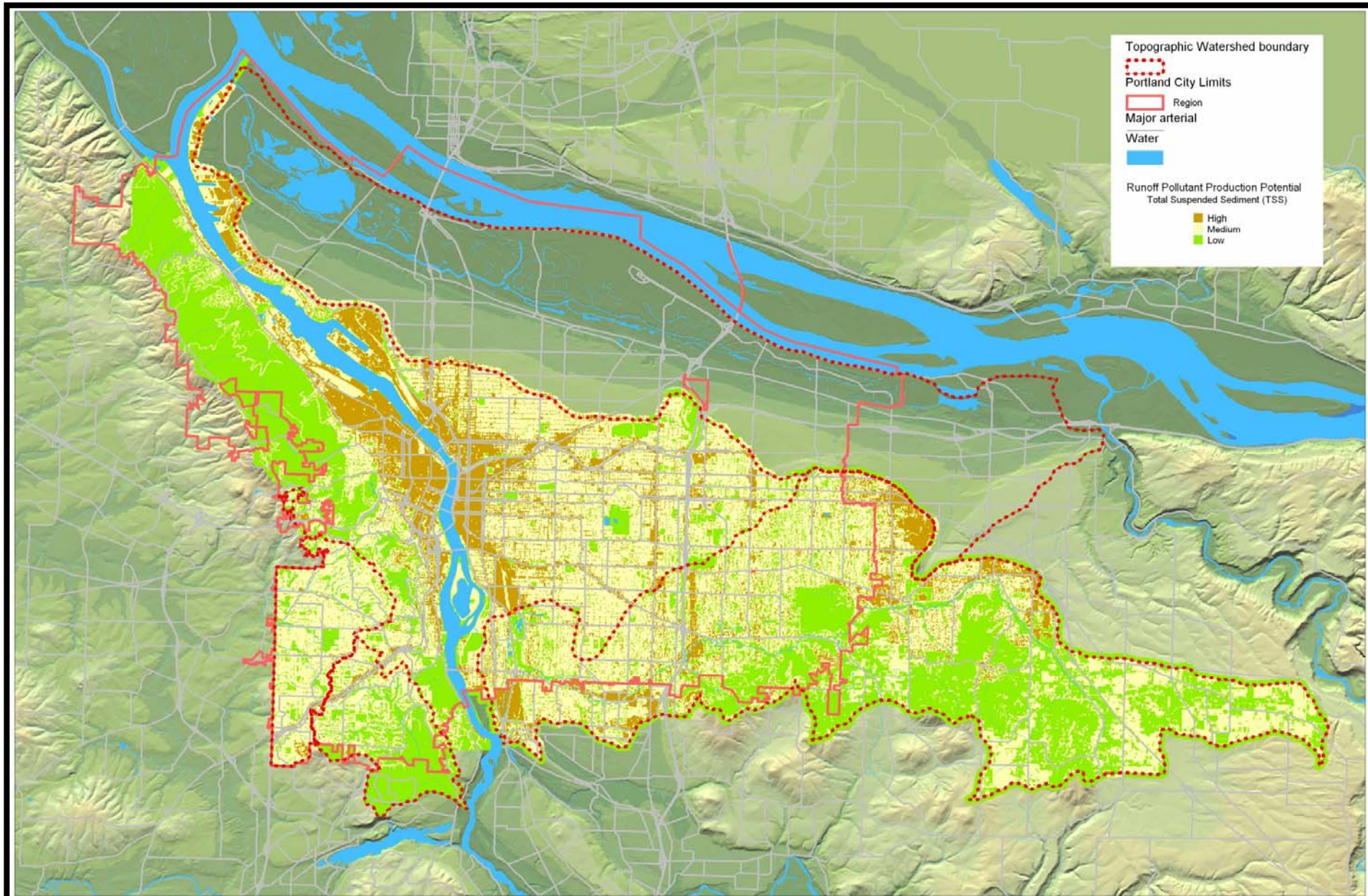
Vegetative Cover



Land Use



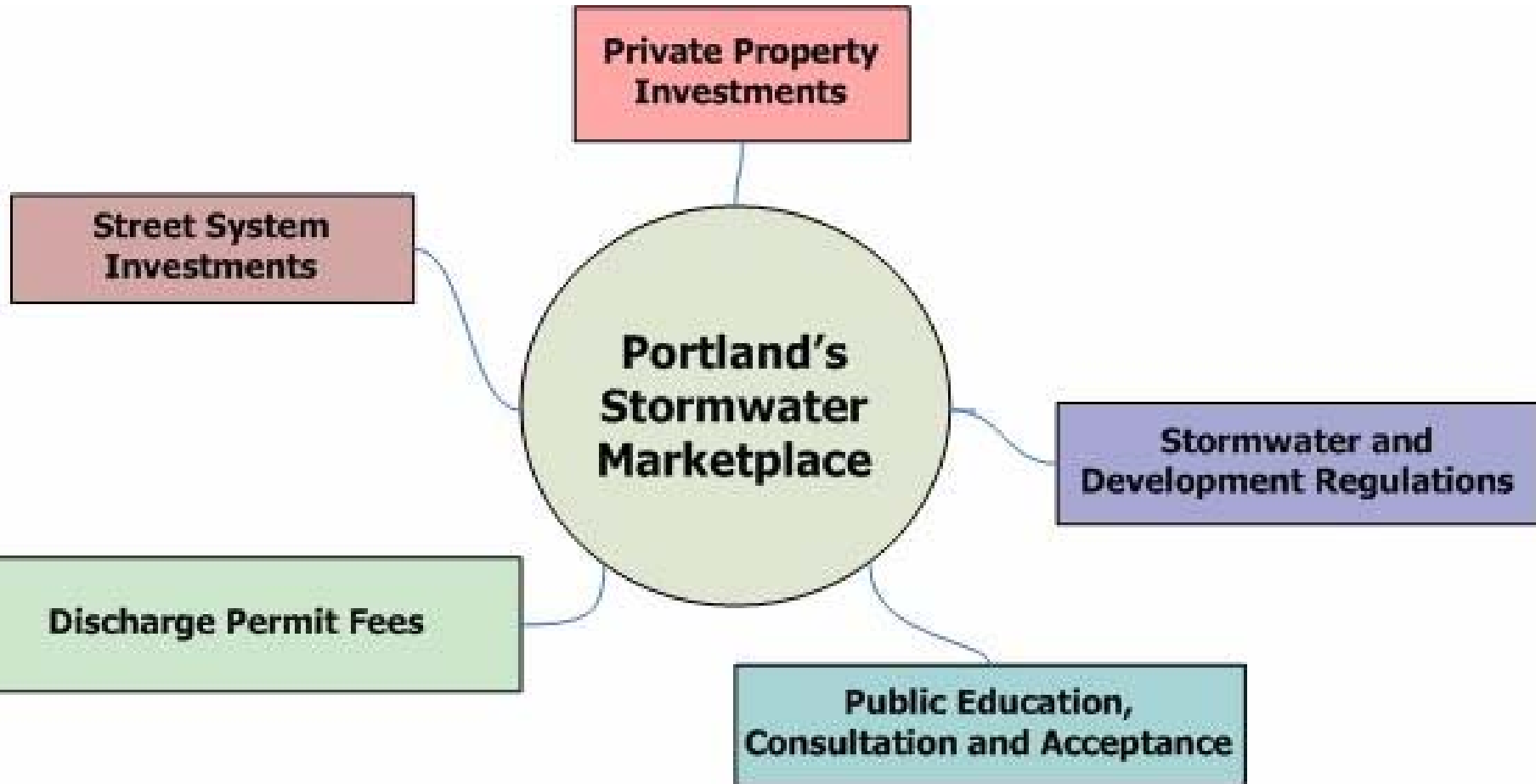
GRID Model Output

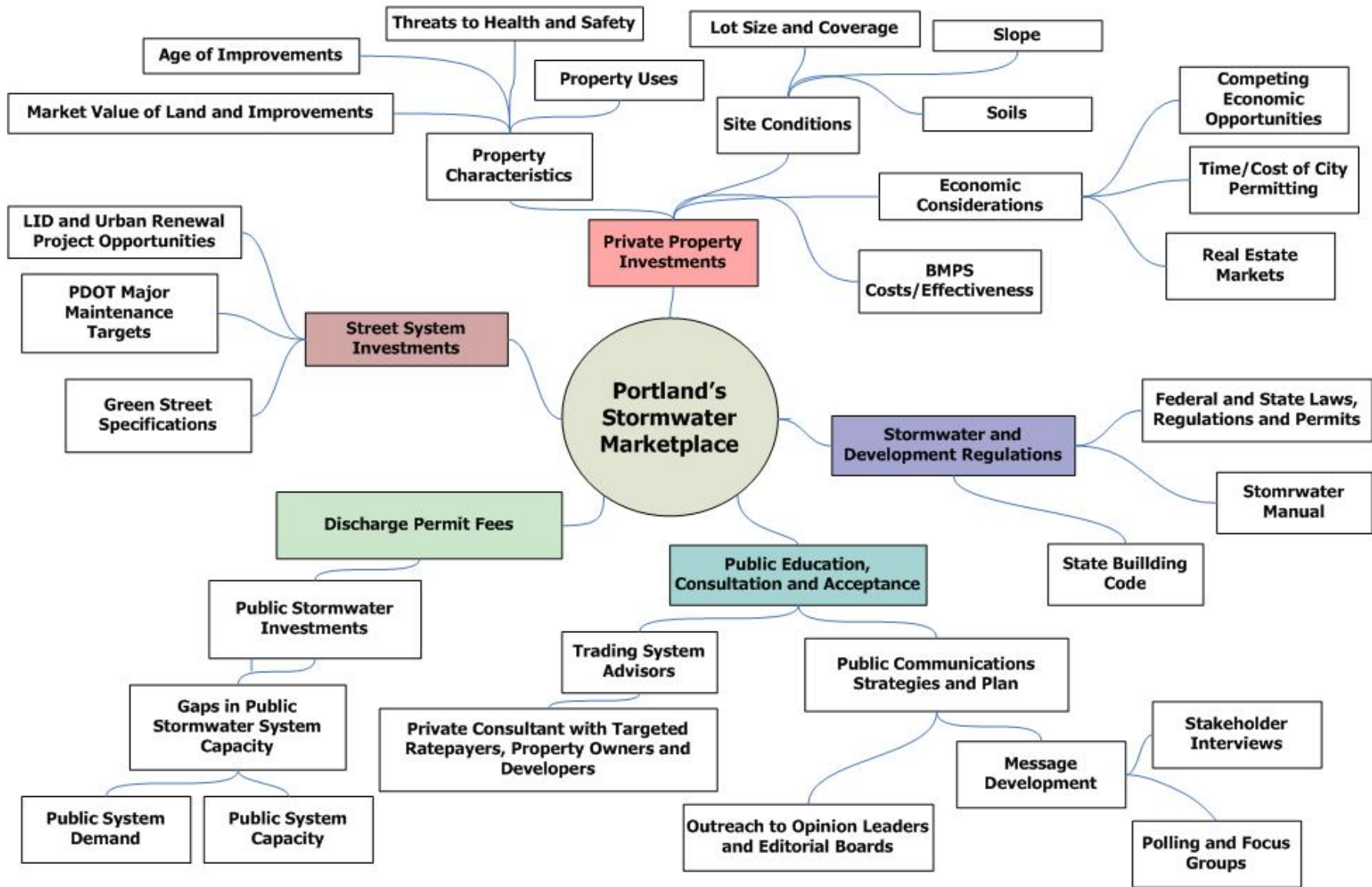


BMP Effectiveness Evaluation

- Master spreadsheet by BMP – collected/derived information for all BMPs
 - Structural, non-structural, instream
 - Variety of pollutants and conditions
 - Information sources
 - Range of BMP effectiveness values and associated conditions at extremes
 - Default values
 - Qualifications
 - Certainty (H, M, L)

Putting the Pieces Together





IS A MARKET FEASIBLE?

GLOBAL Assumptions

- discount rate
- program costs (unusual BMPs)
- cost exchange for private
- rain event **?** toggle

Re-development Reduction (as variable)

	Q	TSS
Current	20	10,000
target	15	7,000
reduction	5	3,000

Basin-specific targets?

Simple Model

- X vol. red inputs
- X Based on 25 yr. event
- X capacity to analyze other events

Bmp #	25yr. Event	10yr. 2yr.
Bmp #1	.08	
Bmp #2	.05	
Bmp #3	.003	
Bmp #4	.017	
Bmp #5	.100	

Can build capacity, but will not use

Variables that can be changed as data improves

Emphasize: Impervious Acres Managed

N.W. Neighborhood : Base Case

Scenario Planning

Public	Constraint (acres)	A	B	C	A*B	A*C	D	TOTAL COST/BMP
Capacity Exp.								
Demand Red								
Structural BMP #1	70	25						
Non-Structural BMP #2	30	30	.08	100	2.00	2,500	\$ 2,000/ac	50 K
Non-Structural BMP #3	X	-	.05	20	1.50	600	\$ 1,000/ac	30 K
Non-Structural BMP #4	X	15	.003	80	.00	-	-	0
Non-Structural BMP #5	X	-	.017	70	.00	-	-	0
Non-Structural BMP #6	X	-	.10	40	1.50	600	\$ 4,000/ac	60 K
PRIVATE Reduction					5	3,700		140 K

GRID + other

Bmp #	25yr. Event	other events?
Bmp #1	100	
Bmp #2	20	
Bmp #3	80	
Bmp #4	70	
Bmp #5	40	

(max fusible acreage)

BMP Constraint Matrix

	NW	MJ	L
Bmp #1	70	X	100
Bmp #2	30	50	80
Bmp #3	X	25	X
Bmp #4	X	47	120
Bmp #5	55	X	X

PRIVATE

ACTUAL Reduction

Scenario Creation

1. allows iteration of BMP combination
2. facilitates evaluation of private participation levels.
3. sensitivity of inputs easily determined
4. Base Case/mkt. checked to City assumptions

how is this bounded?
how many acres can be managed by private.

Depending on cost incentives, 3 MKT cases examined @

City Cost	
\$ 125K	25%
\$ 180K	15%
\$ 250K	5%
Base Case	\$ 290K 0%

reduction in flow from PRIVATE.

Control Variables

compare on COST + Qualitative criteria

- A) Ecosystem Services
- B) Biological Communities
- C) Habitat enhancement

Graphical & Summary OUTPUTS

Next Steps...

- Evaluation Tool Development
 - Establish inputs (BMP constraints, performance, costs)
- Development of Base Case
 - Establish base case (current plan)
 - Input into and test evaluation tool (calibrate as needed)
- Development of Market Case
 - Establish market case
 - Input into evaluation tool
- Marketplace Strategies Evaluation
- Base Case and Market Case Comparison

Surprising Results

- Challenge of documenting project costs
 - Site issues/perspectives create significant variation
- Challenge of documenting benefits
 - Site issues/treatment trains create significant variation
- Smaller scale analysis not always easier
 - Fewer planned BMPs reduced power of analysis
- More interest in markets than models
 - Quantification must precede policy but...



How CNS Has Helped

- Allowed work to proceed
 - Work would not be done without the grant
- Increased visibility
 - Interest in/knowledge of ecosystem services increased
- Created collaboration among city bureaus
 - Engineers and planners working together to conduct analysis
- Provided networking opportunities
 - Contacts in Maryland, Ohio, Washington(s), Michigan



Desired Feedback

- Help documenting/checking assumptions
 - How can we reduce the level of uncertainty?
- How best to create regulatory flexibility
 - How can we get regulatory agencies to experiment?
- How to simplify the presentation of the project
 - How can we make the project relevant to regular folks?
- Thoughts on greatest threats/risks of approach
 - What are we neglecting or forgetting?

