ASSESSING THE EFFECT OF URBAN GREENING ON STORM WATER TREATMENT IN SYRACUSE, NY

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Acknowledgement

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Outline

- Background
- Objectives
- Field Infiltration Tests
- Modeling Framework
- Results and Conclusions
- Future Work

Urban Stormwater Runoff

As a result of an expansion of impervious surfaces in the urban areas, **urban stormwater runoff** is generated when precipitation events flow over impervious surface and water does not percolate into the ground. Excess water in storm drains contributes to combined sewer overflows (CSOs) and urban waterway pollution.

A Street View after a major storm in Aug. 2010, China

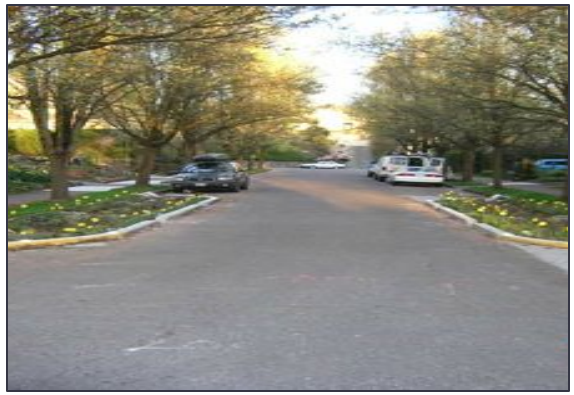
A Storm Flooded the Street in Pocomoke City, MD

Green Infrastructure (GI)

Portland streetscape.
Photo courtesy of Martina Keefe

- GI uses trees and other vegetation in urban and suburban areas are used to manage and treat precipitation naturally.
- GI preserves natural systems and uses engineered systems such as porous paving, rain barrels, green roofs, rain gardens, and vegetated swales.

Green Infrastructure Examples



Vegetated Curb Extensions. Photo courtesy of the Portland Bureau of Environmental Services.
Inc.

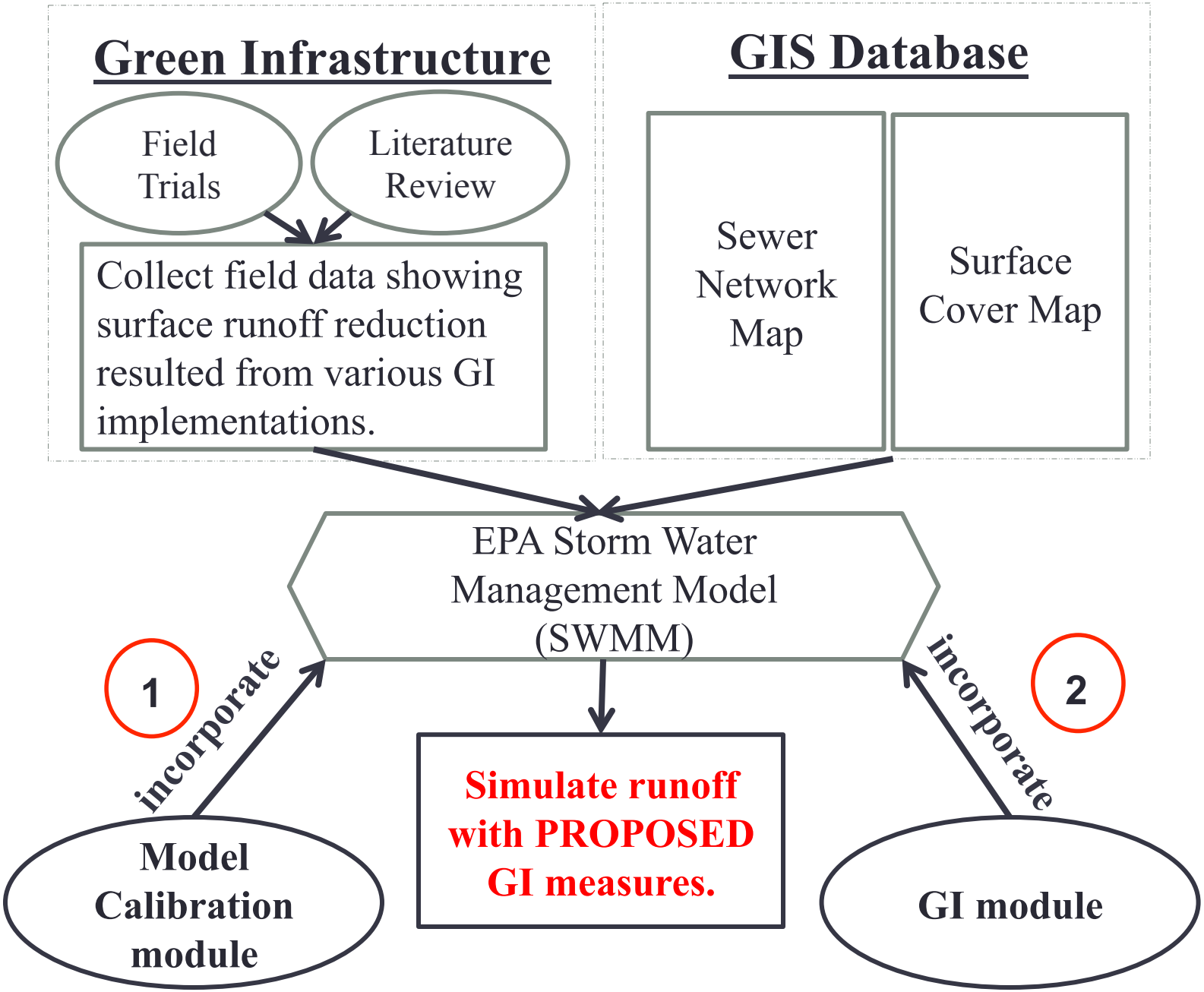
The Flexi-pave Bridge Entrance to Moon Library
at SUNY-ESF.

Chicago City Hall Green Roof. Photo courtesy of Roofscapes, Inc.
EPA

Rain Barrel. Photo courtesy of NRDC.

Objectives

The objective of this study is to develop a stormwater model, which would quantify the changes of stormwater runoff resulting from Green Infrastructure (GI) implementations.


Green Infrastructure
Field Trials
Literature Review
Collect field data showing surface runoff reduction resulted from various GI implementations.
GIS Database
Sewer Network Map
Surface Cover Map
EPA Storm Water Management Model (SWMM)
1
incorporate
2
incorporate
Simulate runoff with PROPOSED GI measures.
Model Calibration module
GI module

Infiltration Rate Tests of Porous Paving

Flexi-pave™ sidewalk and driveway at 515 Tully Street

Research supported by Syracuse Center of Excellence.

Infiltration Rate Tests of Rain Gardens

Some Infiltration Rate Test Results

- **Some Results**

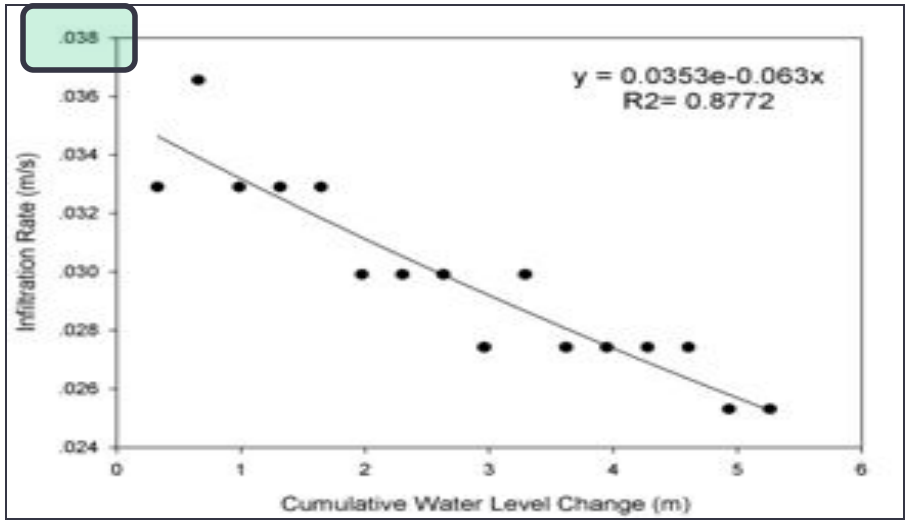


Fig 1: Flexi-pave™

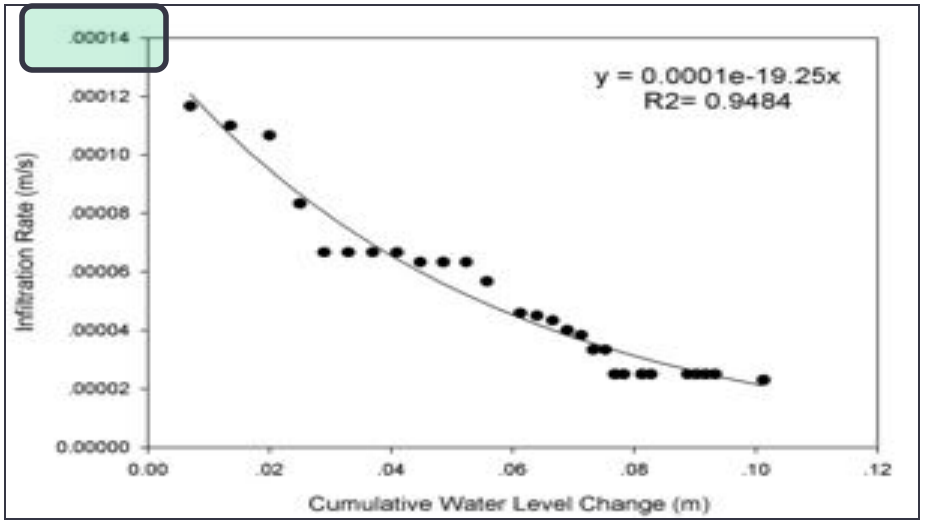
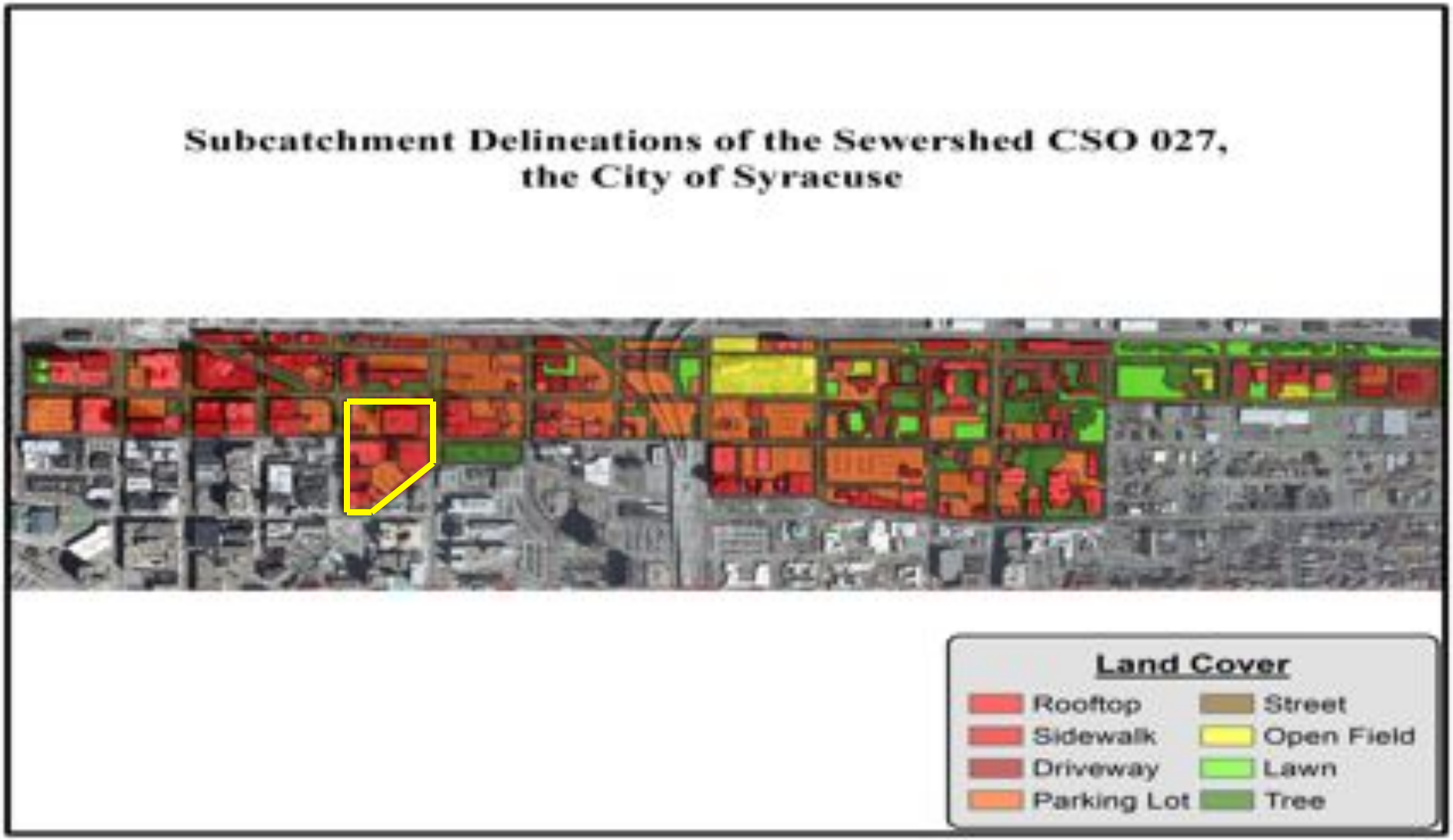
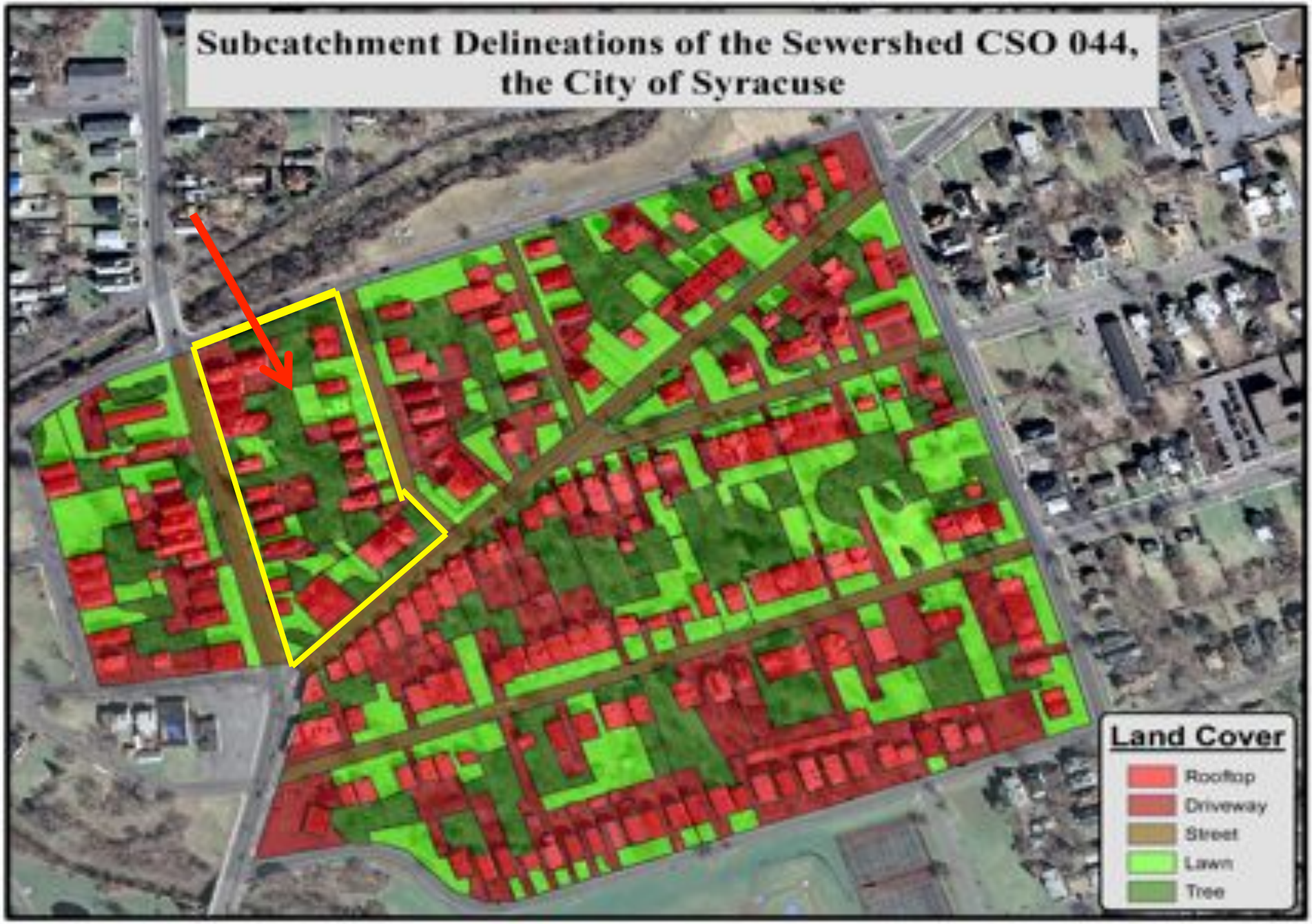
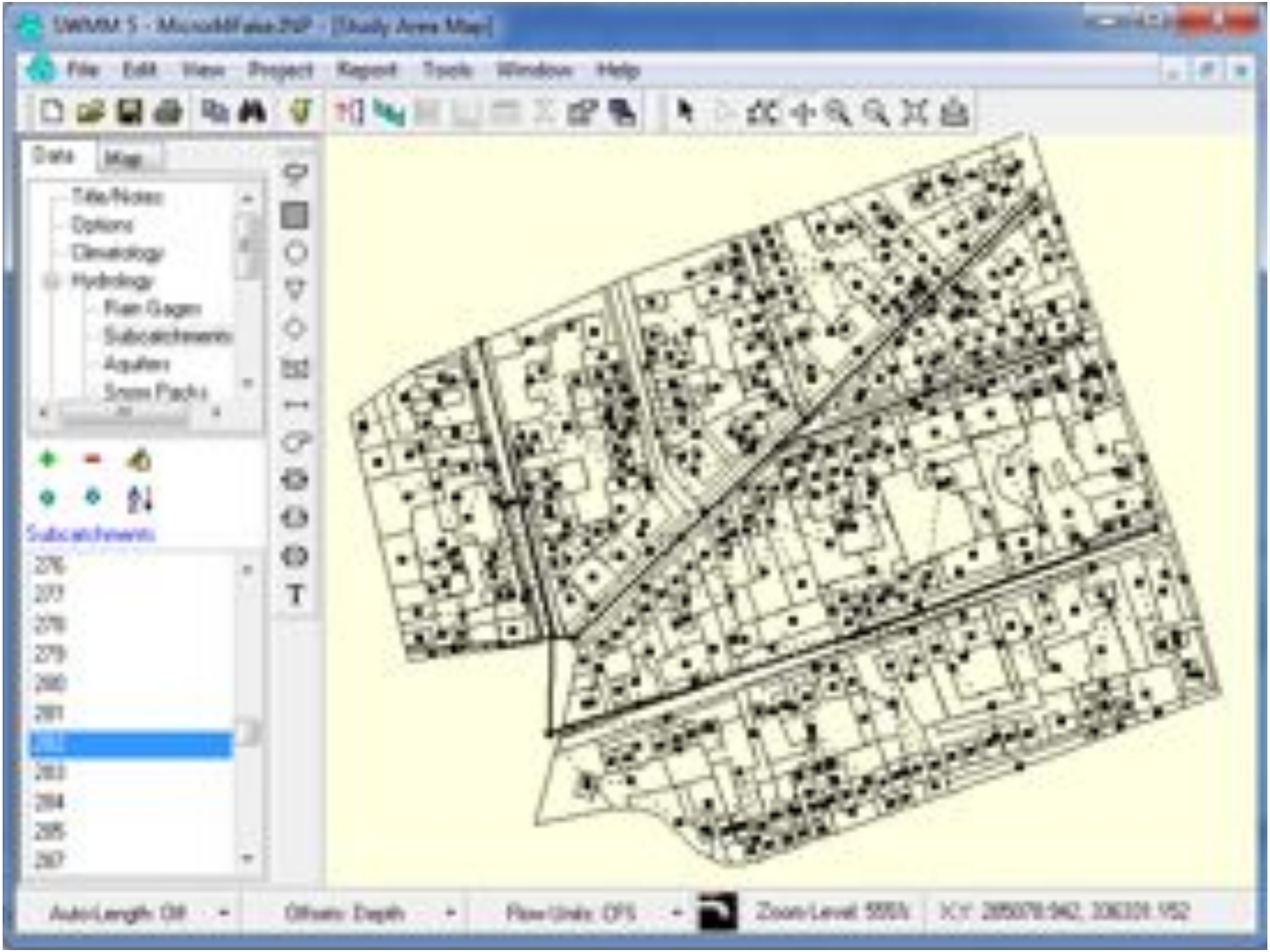


Fig 2: Concrete Paver with 2.5% voids

Some GIS Data (Micro- & Macro Scale)




Subcatchment Delineations of the Sewershed CSO 044, the City of Syracuse
Land Cover
Rooftop
Driveway
Street
Lawn
Tree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Aquifers
Snow Packs
Subcatchments
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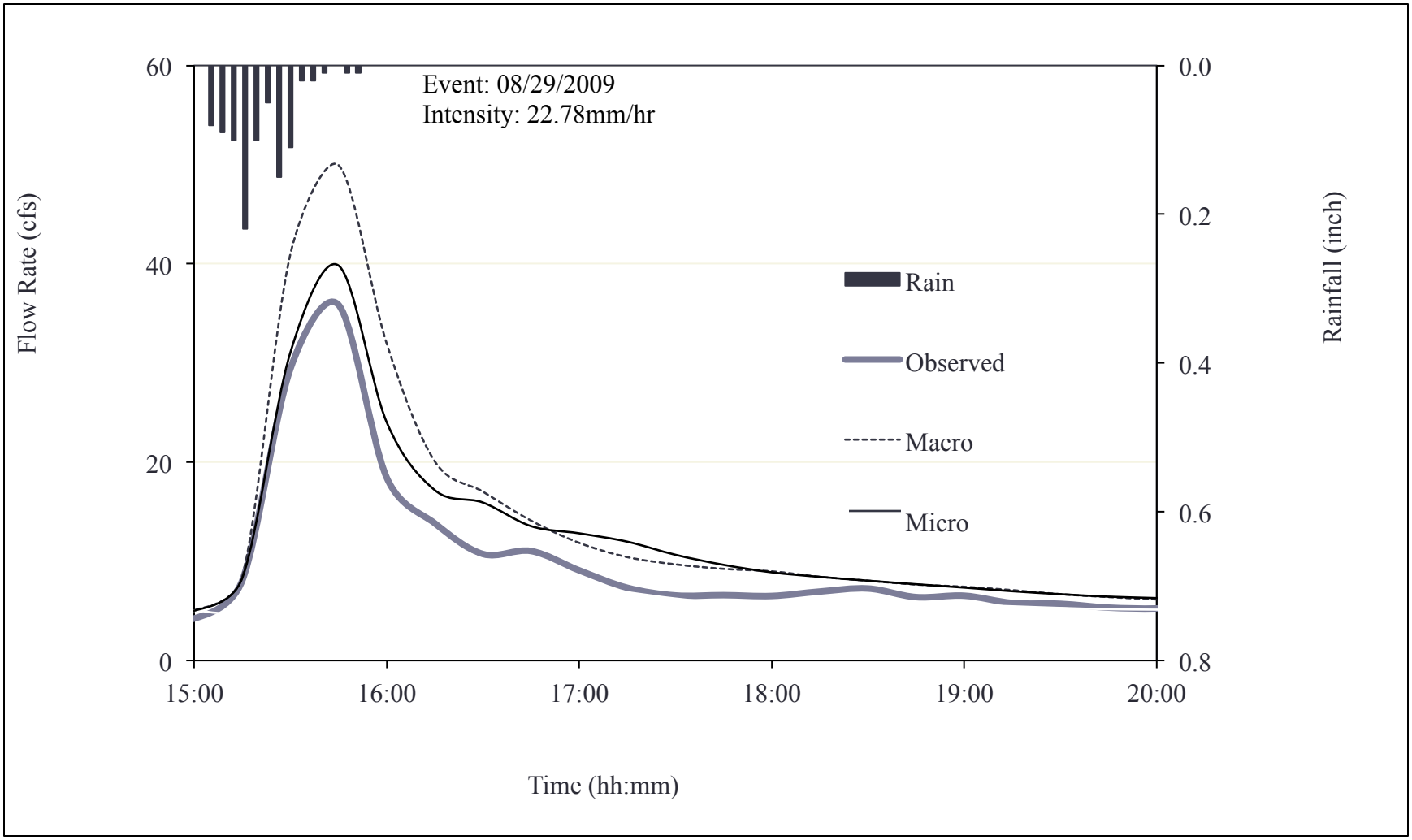
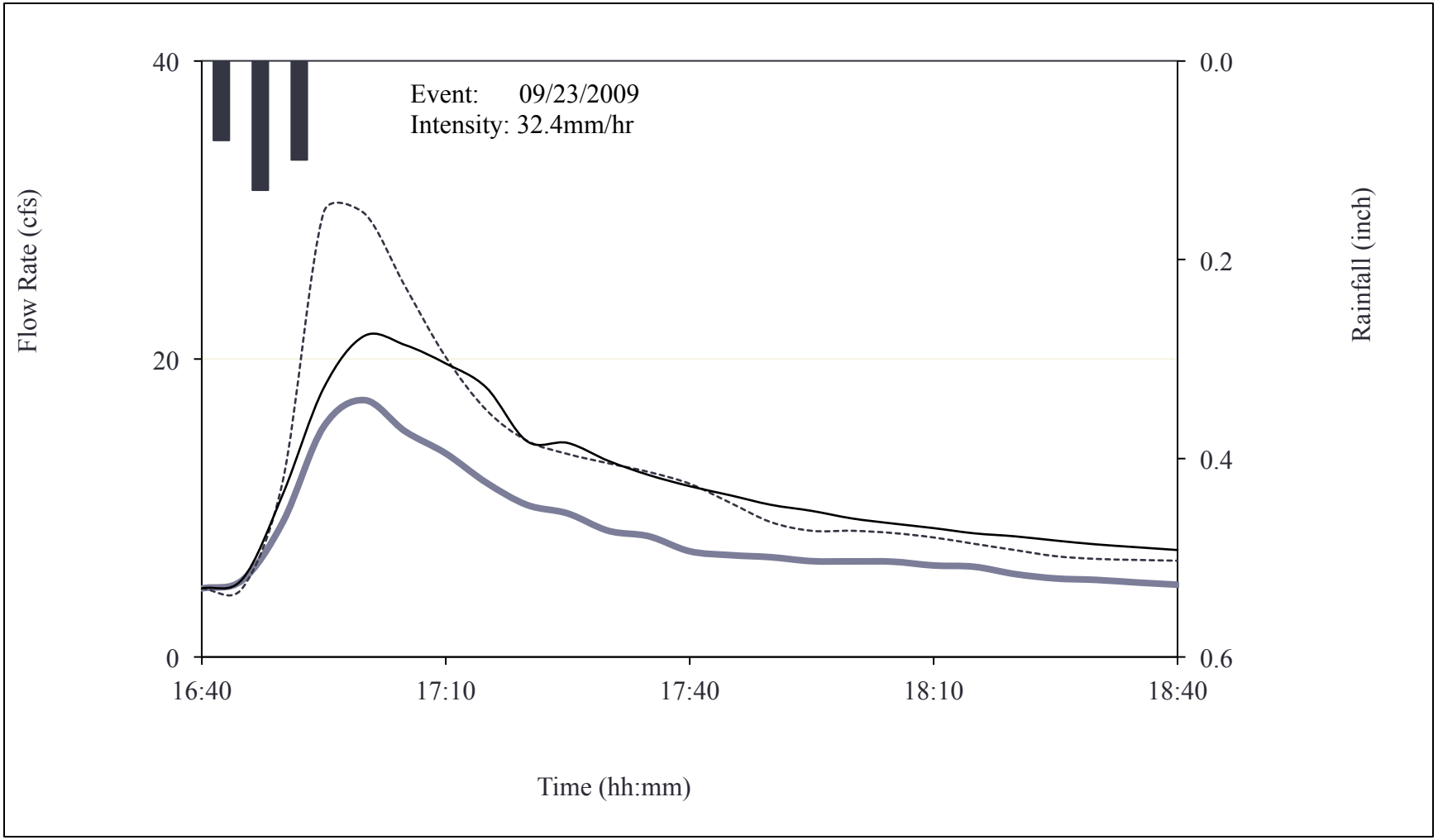
Modeled Runoff

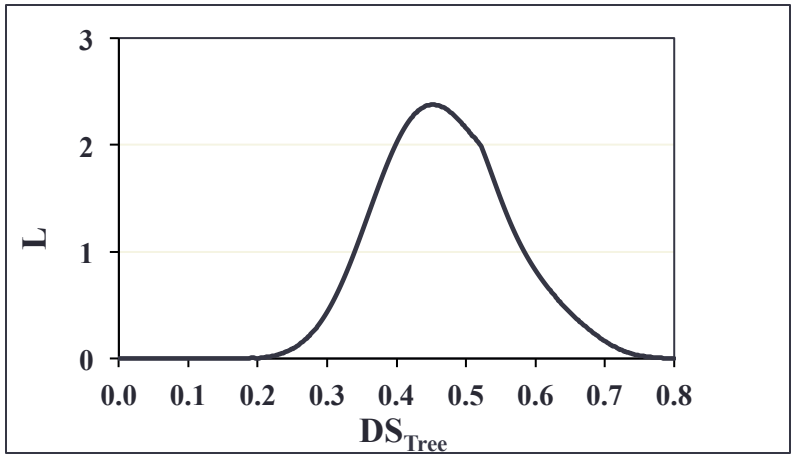


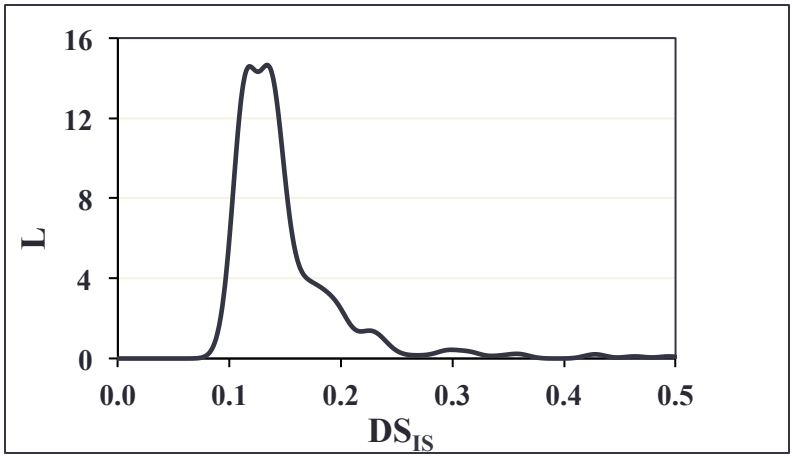
Modeled Runoff



Optimal Parameters

- The GI parameters were calibrated using the incorporated model calibration procedure. And the optimal parameter values (with corresponding confidence level) was applied to simulate the GI effect.



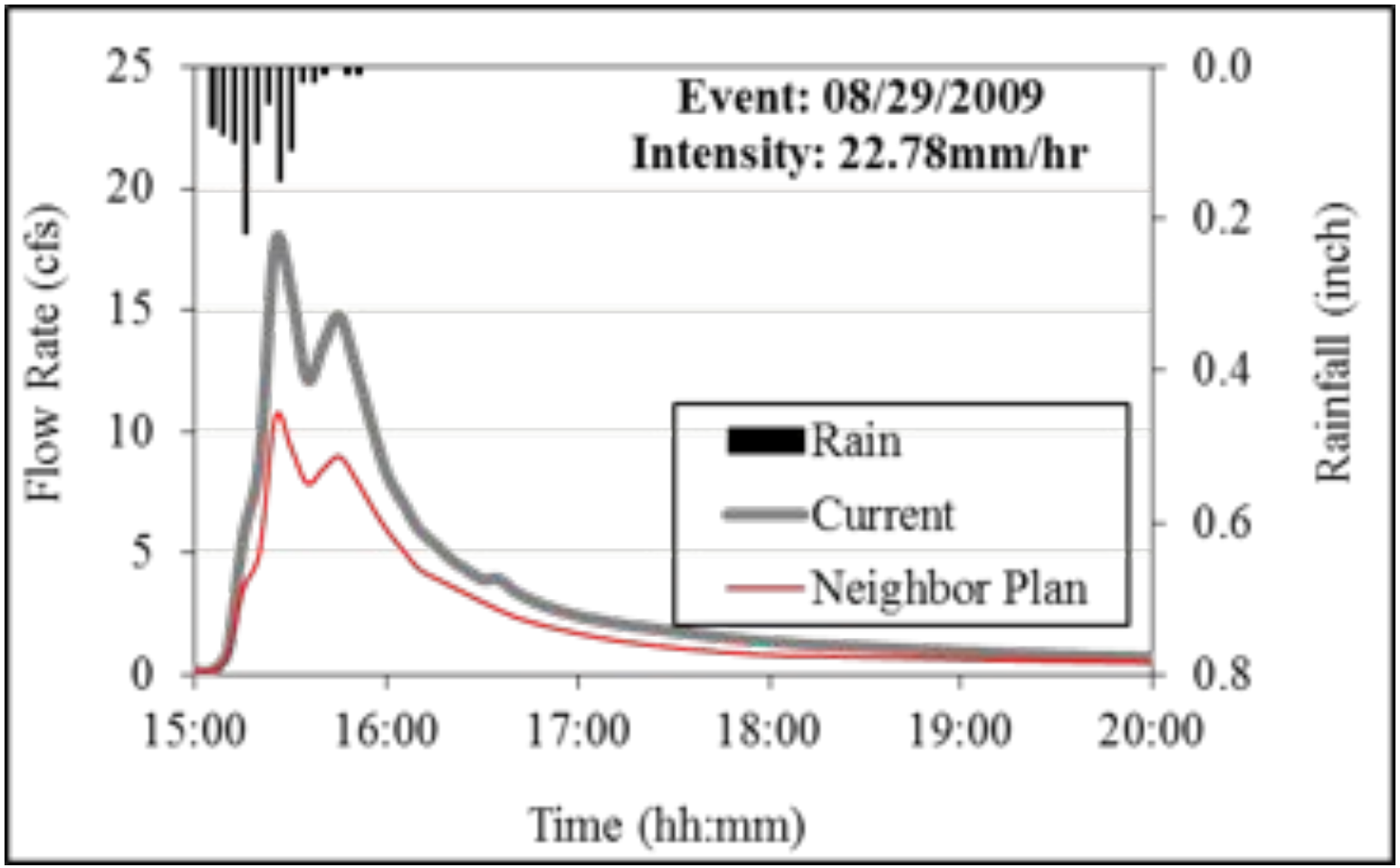


Modeling GI Effect

Scenario: Plant Trees in the Neighborhood:

We assume that 80% of the residents in the studied site would be willing to plant trees in their backyard and trees would cover 50% of available space in the participants' backyard (The area of trees increased by 9% of the total study area).

Some Modeling Results



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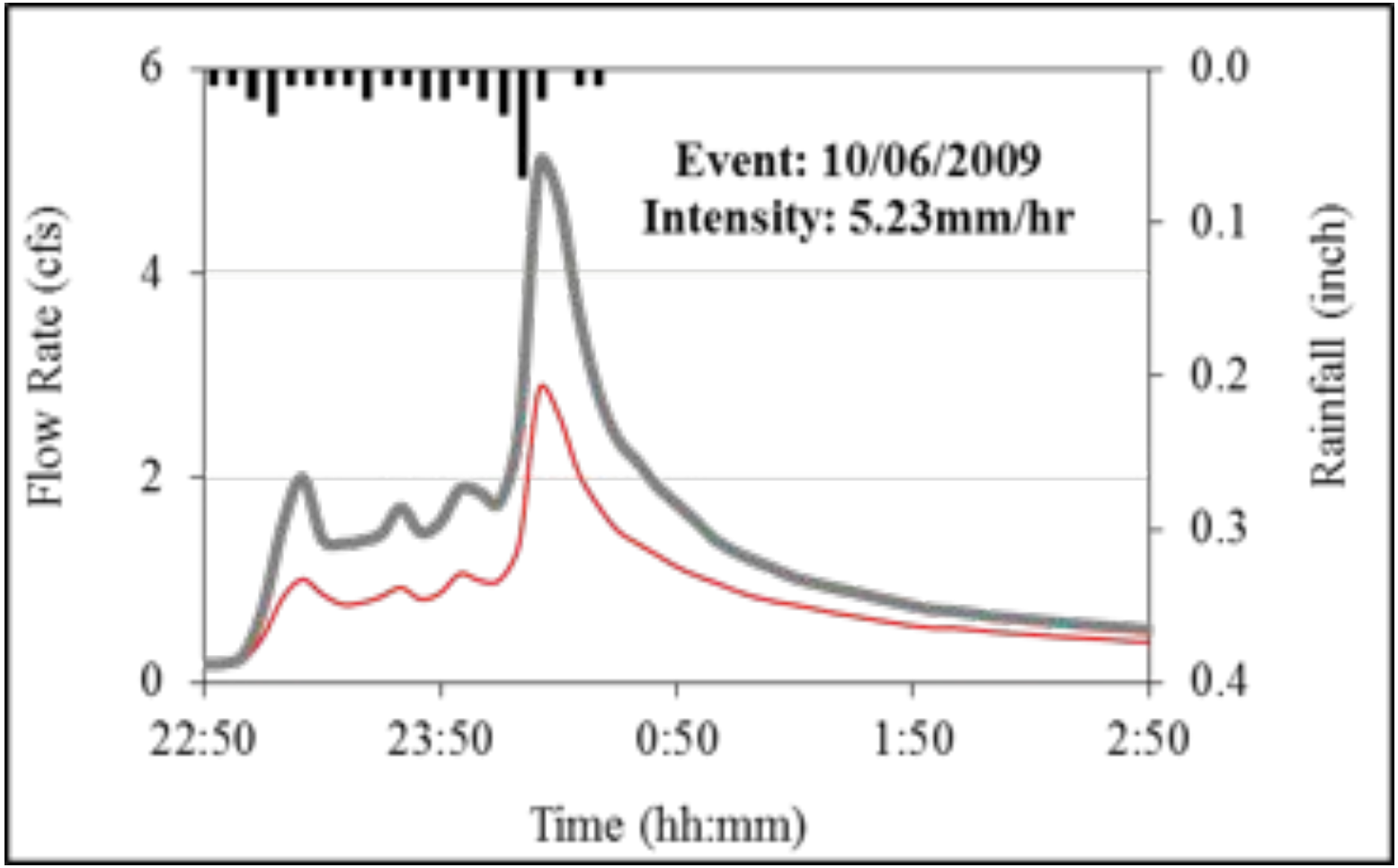

Future Work

Integrate citizen knowledge, attitudes, and behavioral intention towards GI in the stormwater model to project the potential urban storm water runoff reduction from future GI implementations.

Thanks!