Bridgewater State University Green Parking Lot

Stormwater Management & Monitoring Program

Marshall Conant Science Building
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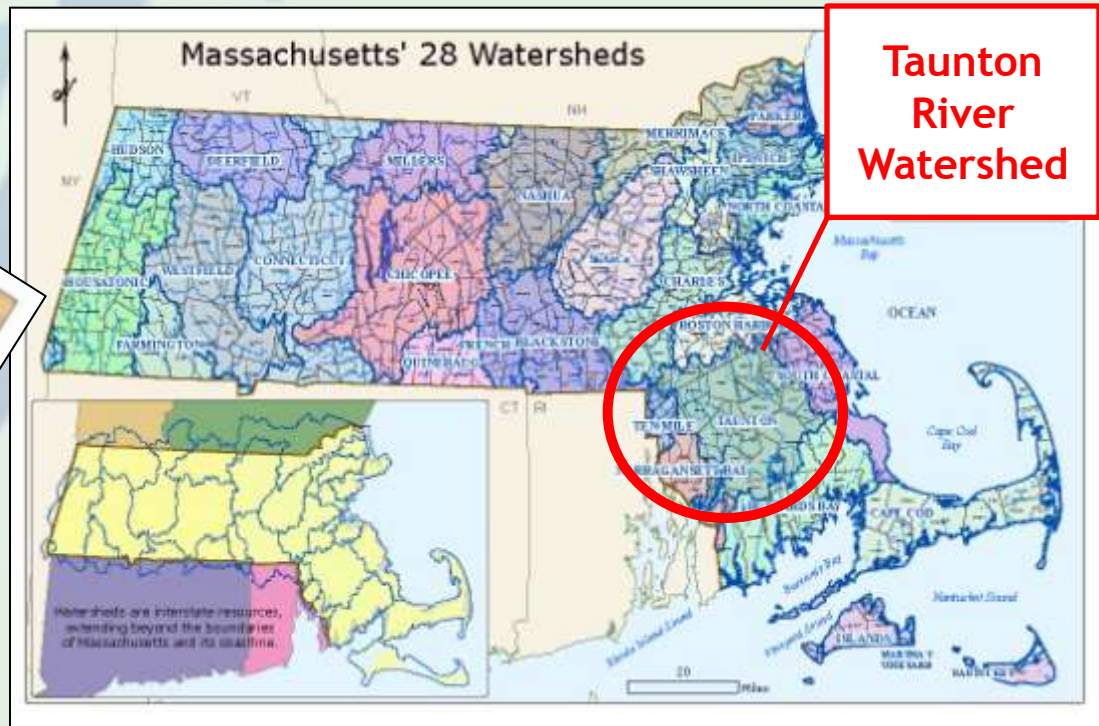
Horsley Witten Group, Inc.

Taunton River Watershed Plan

Goal: Balance the water budget

Objective: Demonstrate site design techniques/practices

Process: 3 year study and plan development, demonstrations



Taunton Watershed Demonstration Projects

LID parking lot design and teaching tool at Bridgewater State University

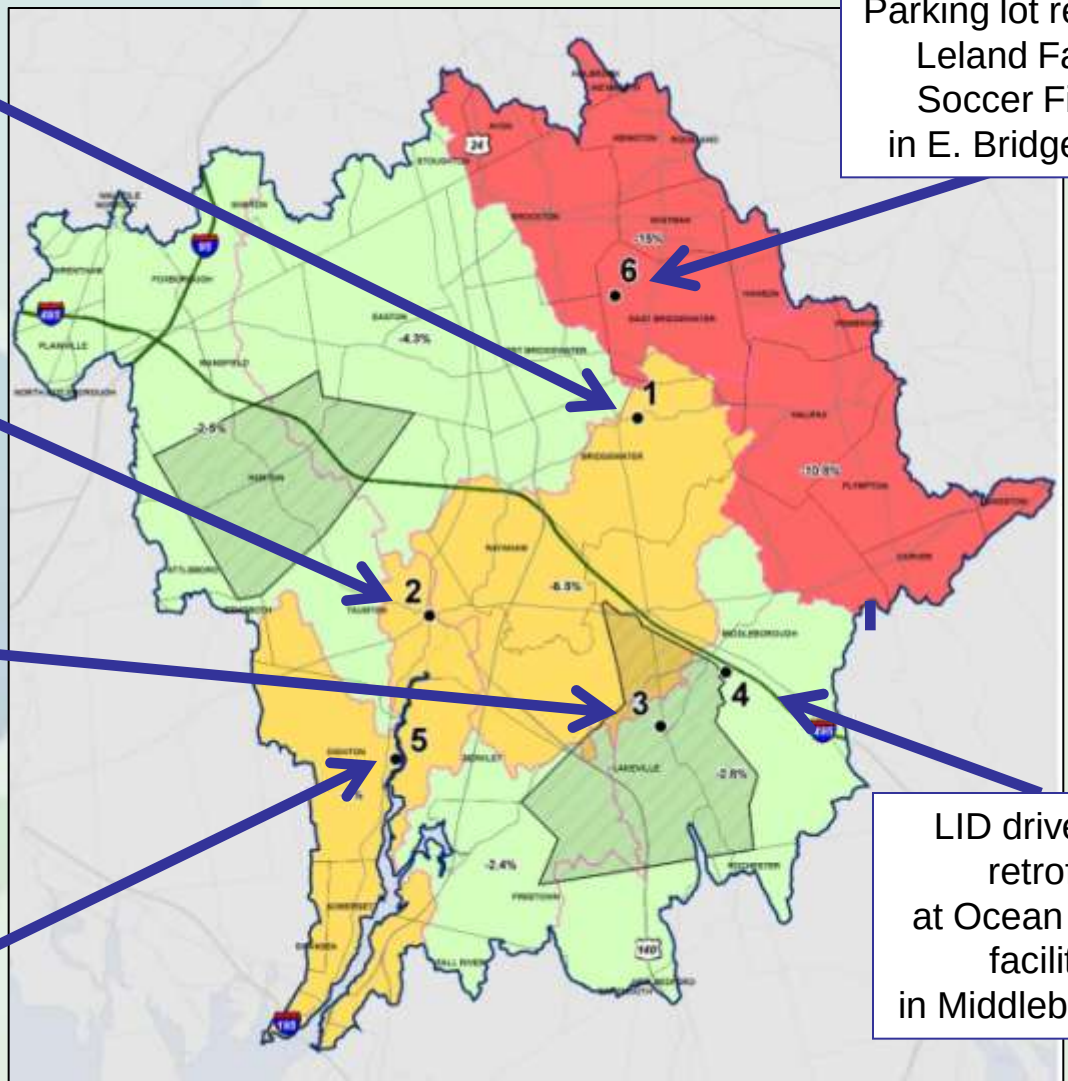
Parking lot retrofit at Leland Farms Soccer Fields in E. Bridgewater

Mill River park and riverwalk at Taunton City Hall

Innovative wastewater disposal at Ted Williams Park in Lakeville

LID driveway retrofit and teaching tool at Bristol Aggie School in Dighton

LID driveway retrofit at Ocean Spray facility in Middleborough



What is Stormwater?

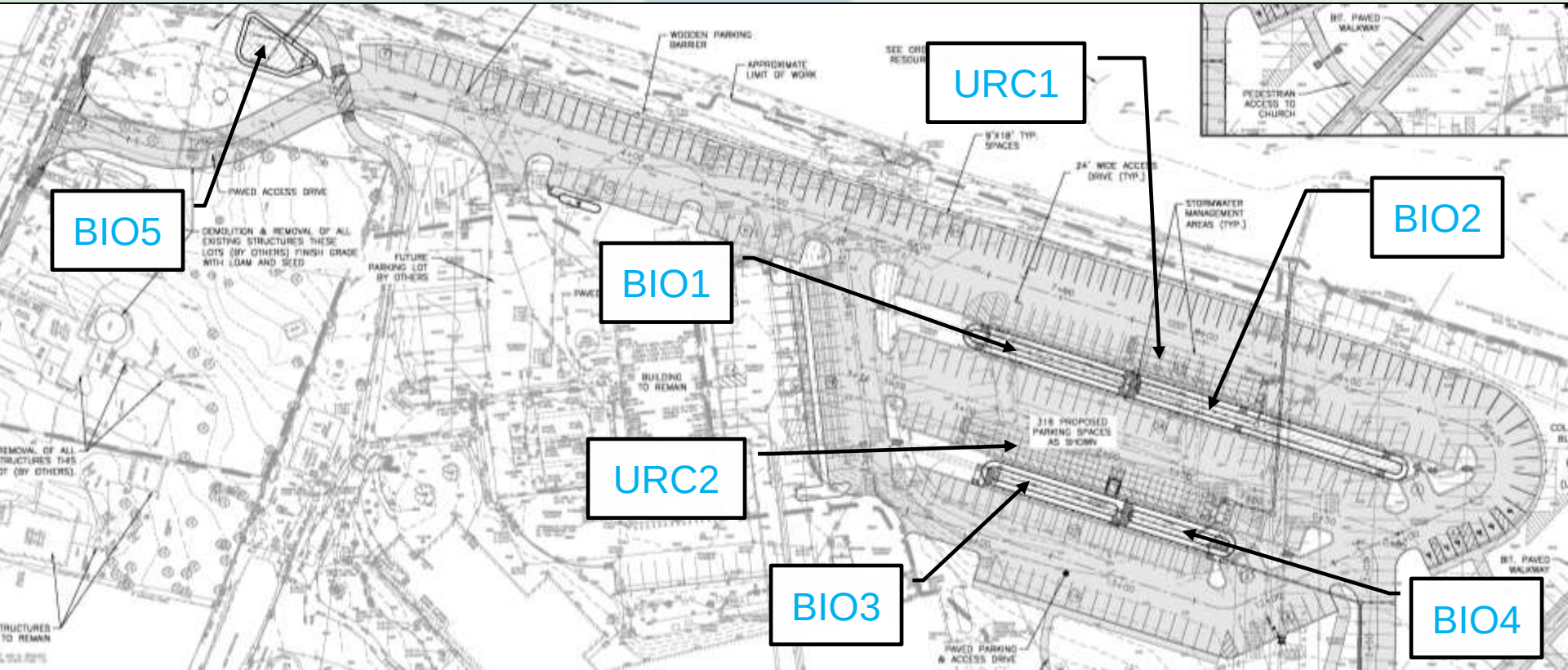
Project Goals & Objectives

- Improve existing parking lot infrastructure
- Provide stormwater management
- Create an outdoor classroom
- Enhance surrounding resource areas
  - Taunton River

Parking Lot Design

Project Design Elements

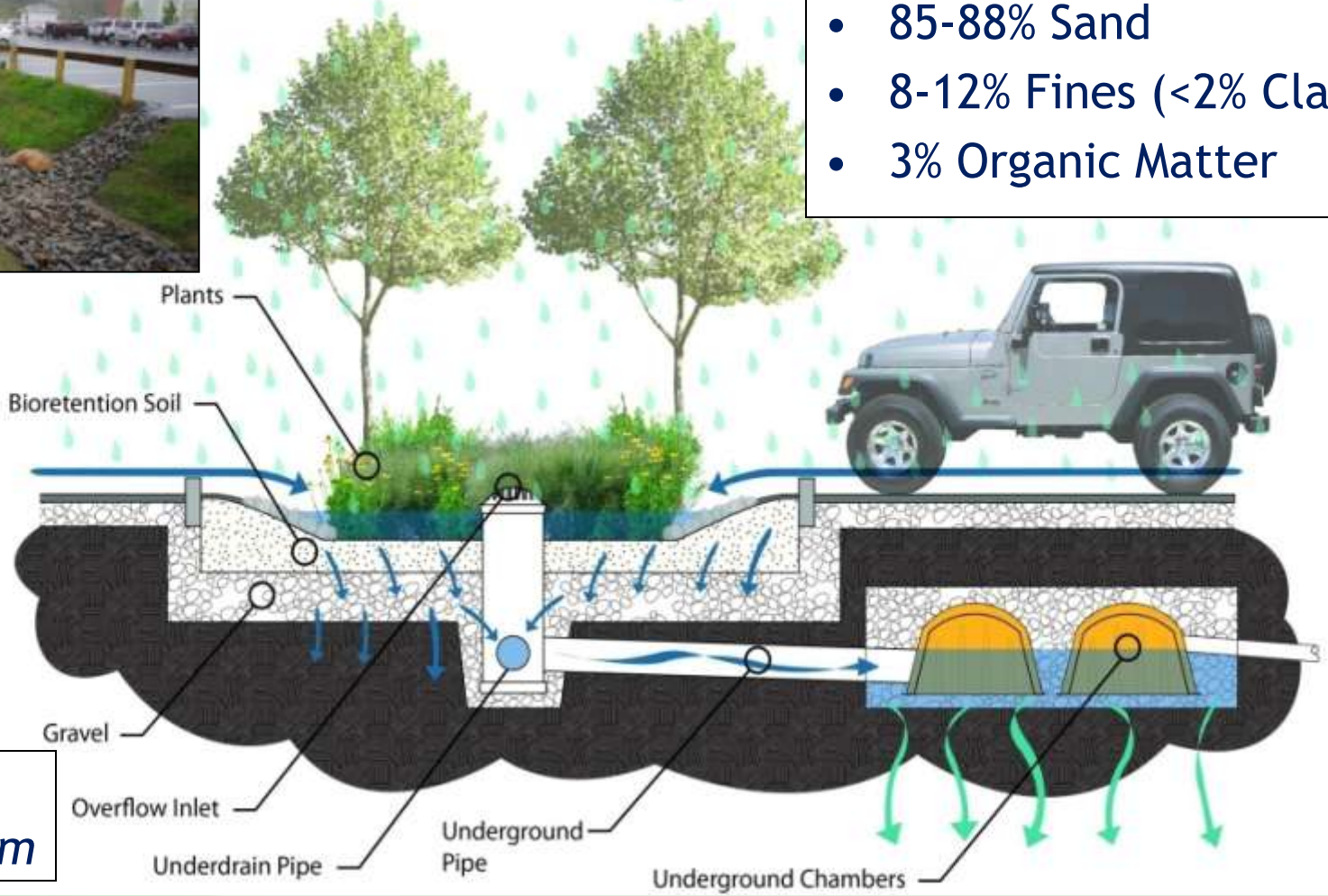
- Drainage Area = 5 ac (2.5 ac impervious)
- 50 additional parking spaces (no new imperv.)
- New stormwater management system



Bioretention Treatment Areas

Bio Soil Specification

- 85-88% Sand
- 8-12% Fines (<2% Clay)
- 3% Organic Matter



Sized to treat 1-inch storm

Underground Recharge Chambers

StormTech SC-740™ Chambers (140 total)

- Chambers sized for 1-inch storm & to match preconstruction peak flowrates
- Sizing depends on soil infiltration rates
  - Raynham Silt Loam (C soil): 0.27 in/hr

Project Construction

Preconstruction (Spring 2012)

Project Construction

Demolition & Site Grading

Witten Group, Inc.

Project Construction

Recharge Chamber Installation

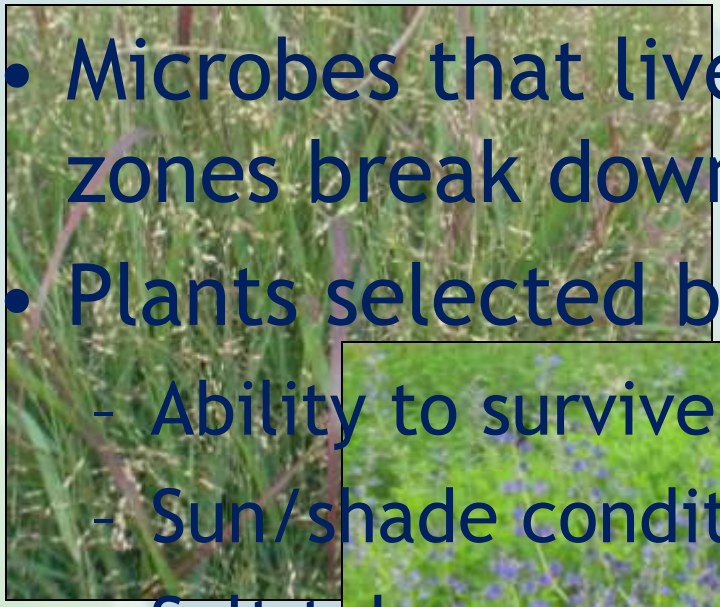
Project Construction

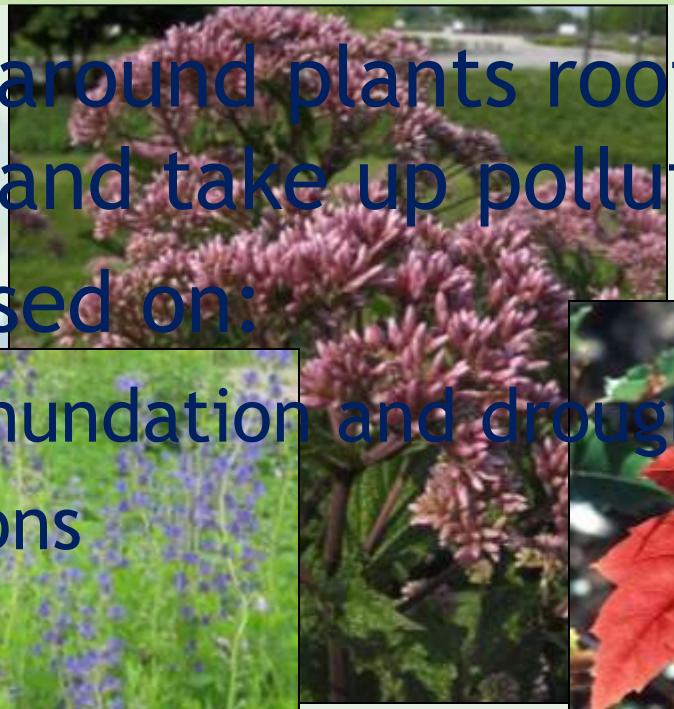
Bioretention Areas – Underdrain System

Project Construction

Bioretention Areas – Filter Media

Bioretention Landscaping





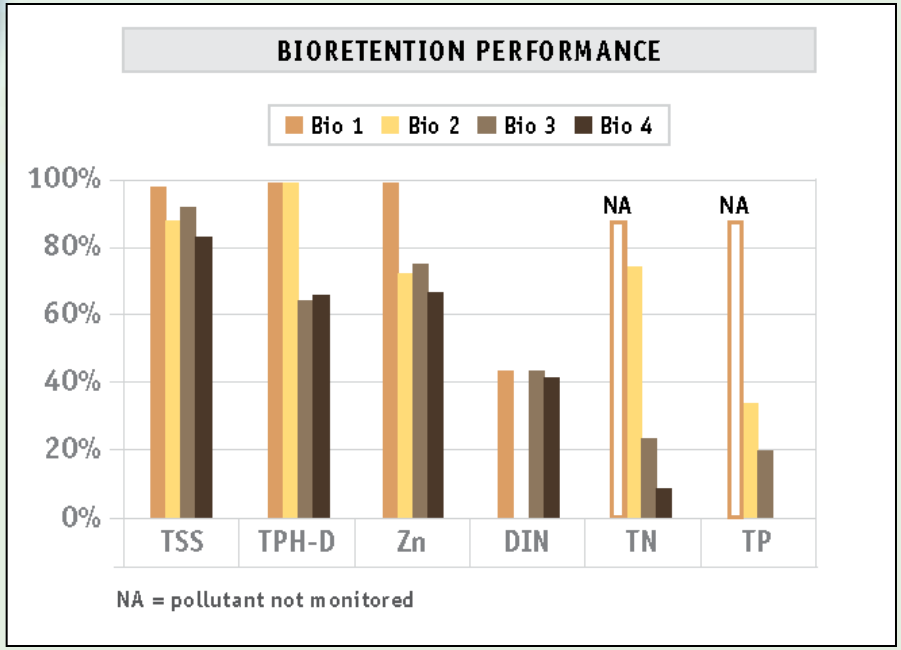
- Microbes that live around plants root zones break down and take up pollutants
- Plants selected based on:
  - Ability to survive inundation and drought
  - Sun/shade conditions
  - Salt tolerance
  - Maintenance requirements
  - Are they native?
- Plants mostly perennials & grasses
  - Switch grasses, False Indigo, Joe Pye Weed
  - Trees for shading

Project Construction

Monitoring Chambers

Monitoring Program Goals

- Determine flow balance
- Measure pollutant concentrations
  - Nitrogen / Nitrates
  - Phosphorus
- Determine bioretention treatment performance

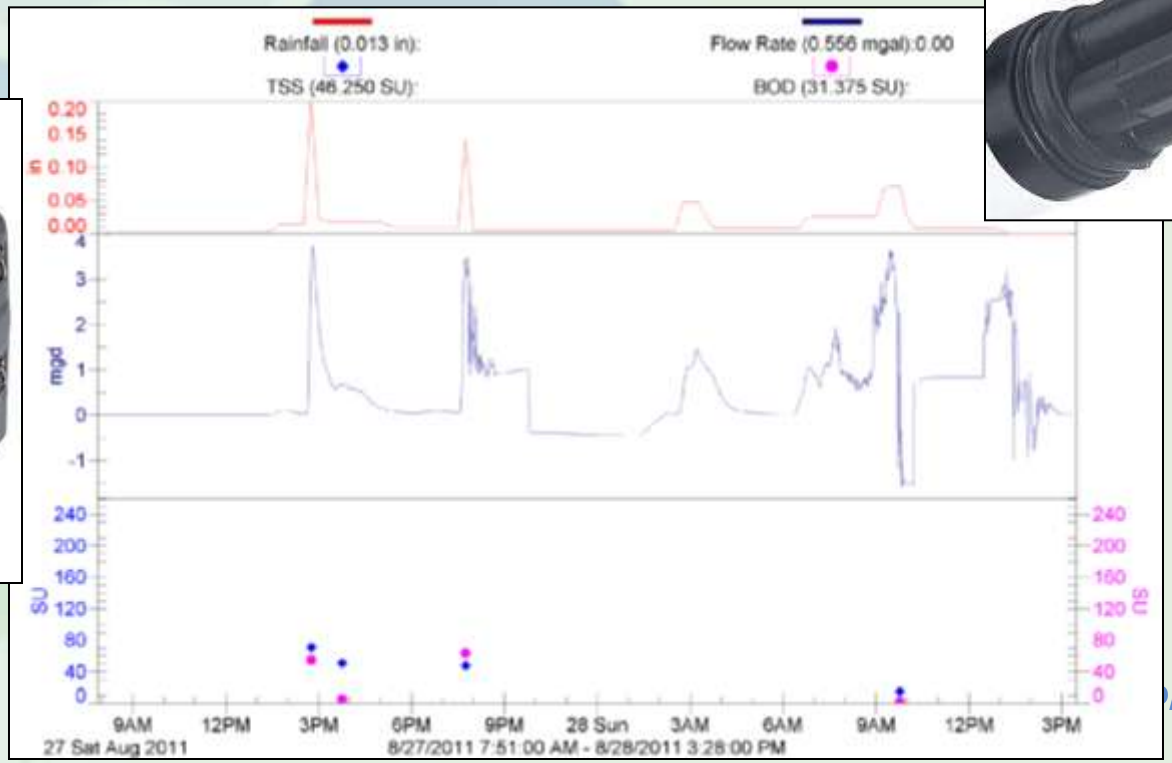


Source: UNH Stormwater Center 2012 Biennial Report

Monitoring Equipment

Automated sampling technology

- Teledyne ISCO™ portable samplers
- Hach Hydrolab MS5™ multi-parameter sondes
- ISCO Flowlink™ software



Monitoring Installation

- Sampler tubing all underground
- Confined Space Entry required
  - BSU Power Plant

Stormwater Sample Processing

BRIDGEWATER STATE UNIVERSITY

Watershed Access Laboratory:

Center for STEM Education

- Dr. Kevin D. Curry
- Kim McCoy

Next Steps

- Complete equipment installations
- Set up wireless communication
- Provide Flowlink™ software training
- Assist with sampling plan & protocol development
- Implement monitoring program
- Provide sampling technical assistance over the next 8-12 months

Acknowledgements

- Karen Jason, Facilities Mgmt & Planning
- Cathy Bozek and Alison Bowden, The Nature Conservancy
- Dr. Kevin D. Curry, Watershed Access Lab
- BSU Power Plant Staff
- Nitsch Engineering, Boston, MA
- Lawrence-Lynch Corp, Falmouth, MA
- Taunton Watershed Project Steering Committee
- Senator Pacheco, Taunton

Questions

Project Costs

- Sampling Equipment: $40,000
- Monitoring Chambers & Shed: $40,000
- Bioretention Areas: $70,000
  - $15/SF or $28,000/imperv. acre treated
- Recharge Chambers: $127,000
  - $910/chamber
- Total Drainage Improvements: $360,000
- Total Project Costs: $1,500,000

Operation & Maintenance

Bioretention Maintenance Schedule		
General Maintenance		
Task	**Frequency**	**Time of the Year**
Bioretention inspection	Min. once per month & after major storm events.	Spring thru Fall
Debris removal	Min. once per month & after major storm events.	Spring thru Fall
Sediment removal	Min. once per year or when sediment is > 3"	April
Plant Maintenance		
Task	**Frequency**	**Time of the Year**
Pruning and Plant Thinning	Min. once per year	Early Spring
Mowing (side slopes)	Monthly	April-October
Weeding	Monthly	April-October
Watering	Drought conditions only	July-August
Disease and pest control	As required	As required
Plant Replacement	As required	Spring or Fall preferred
Fertilizing	Should not be required	
Mulch Maintenance		
Task	**Frequency**	**Time of the Year**
Remove & replace existing mulch	Once every two years or as required	April
Re-mulch void areas	Min. 2x per year & after major storm events	July & November
Infiltration Maintenance		
Task	**Frequency**	**Time of the Year**
Soil Media Replacement		
Tilling	As needed	If standing water does not drain after 48 hours
Snow Removal	Not required	Not required