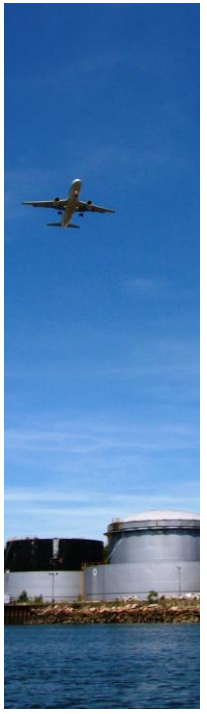
12/10/13

Alewife 604B BMP Development Project

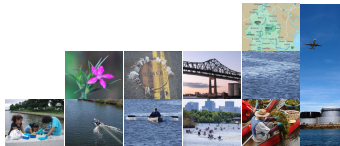
Public Meeting at Arlington Stormwater Awareness series

Patrick Herron
Water Quality Monitoring Director
Mystic River Watershed Association (MyRWA)
patrick@mysticriver.org

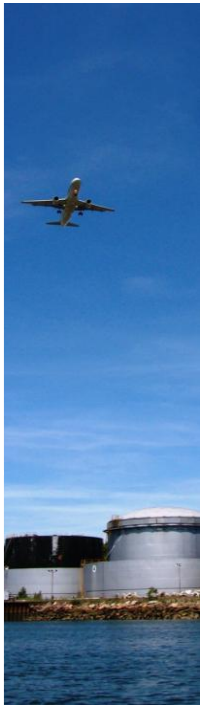


Tonight's agenda

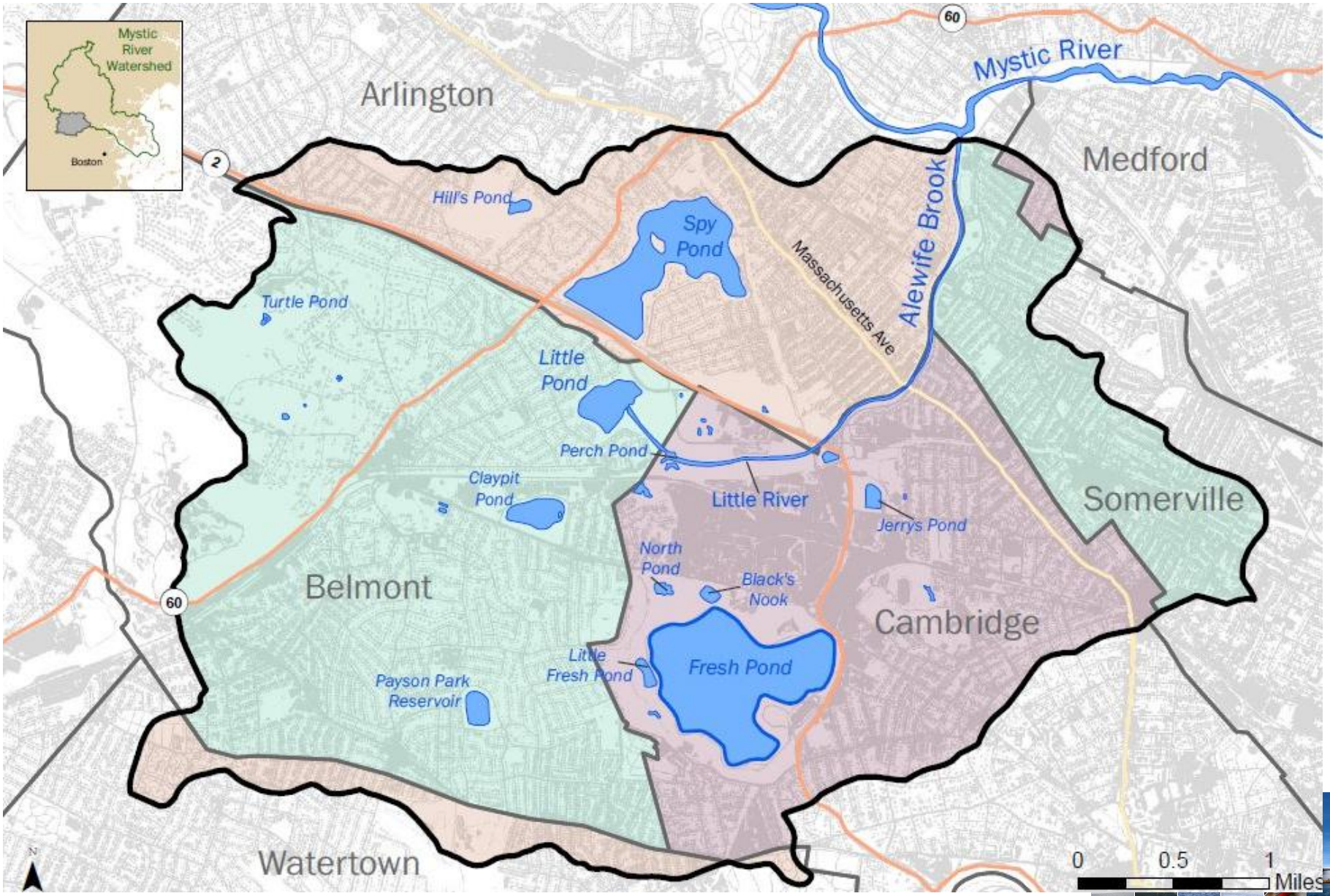
- Introduction
  - Water quality impairments in the watershed
  - Project purpose and scope
  - Green infrastructure
- Site identification workshop
- Next steps



INTRODUCTION

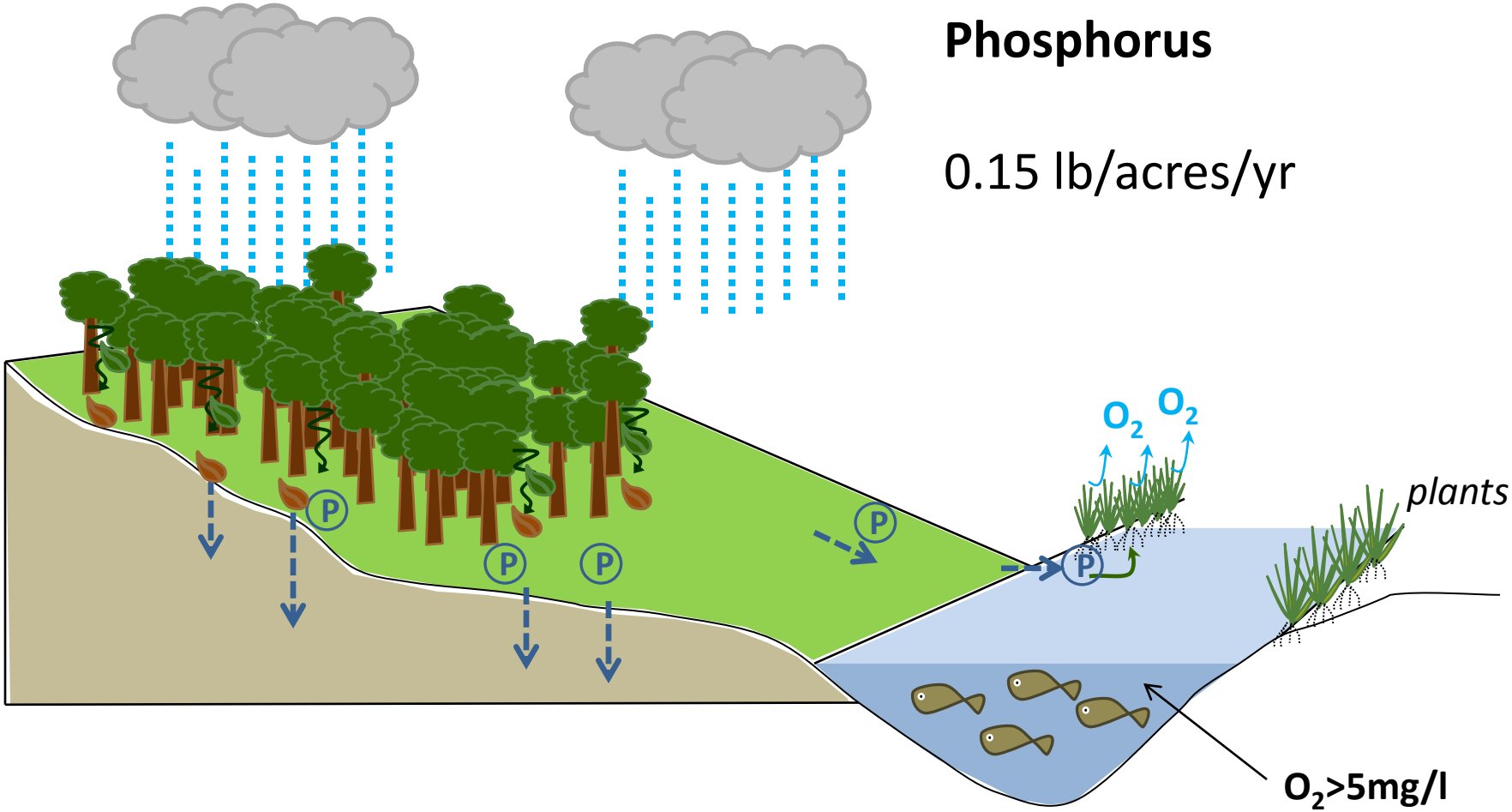


Alewife Brook subwatershed

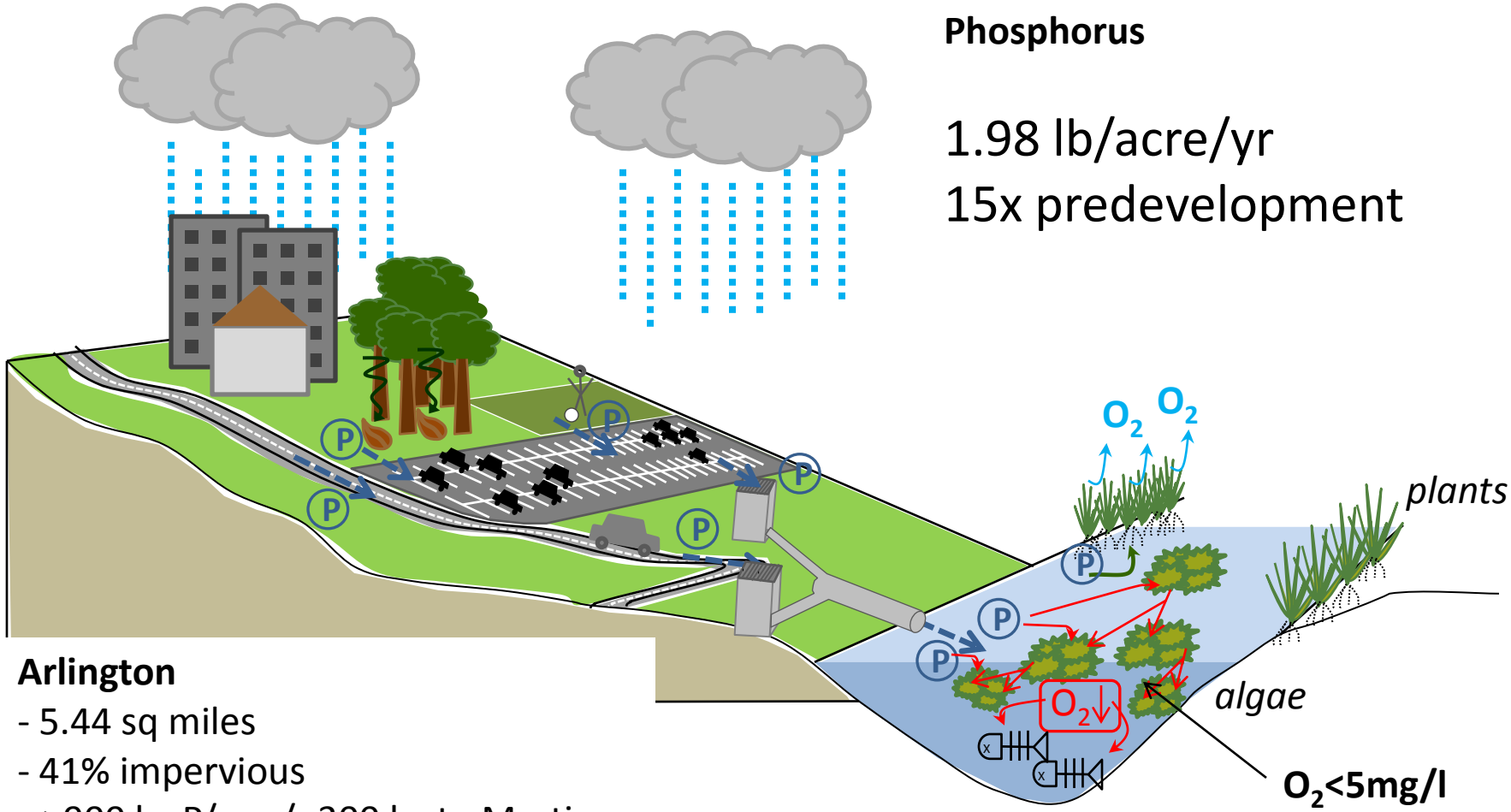


Water quality impairments in the watershed

Undeveloped watershed



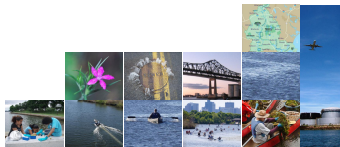
Developed landscape - Eutrophication



Phosphorus

1.98 lb/acre/yr
15x predevelopment

Arlington
- 5.44 sq miles
- 41% impervious
-->900 kg P/yr +/- 300 kg to Mystic River



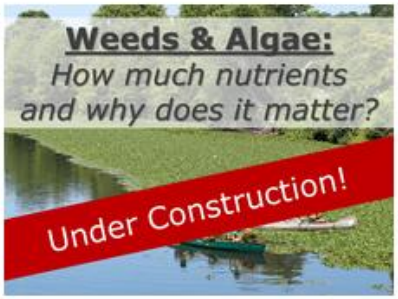
MyRWA water quality website

HOME | WATERSHED INFO | PROJECTS & PROGRAMS | EVENTS | PUBLICATIONS | MAKE A DIFFERENCE | ABOUT US

HOW IS WATER QUALITY IN THE MYSTIC RIVER WATERSHED?

The Mystic River Watershed Association has been collecting water quality data and studying this question for over a decade and has your answer! Because there are so many measures of water quality, it is best to ask this question in a few different ways. To begin answering this question, choose the path below that interests you most.

Click an image for more information.



Click here for information about the Mystic Monitoring Network.

Mystic River Watershed Association 20 Academy Street, Suite 306, Arlington, MA 02476-6401 (781)316-3438

Photo Credits: Red-Eared Slider Turtle by David Fichter; River Herring by Patrick Herron; Sailing On Upper Mystic Lake by Ken Legler; Great Blue Heron by John Harrison; Mystic River from the ... Tanasijevic; Sunny Morning after Fresh Snow Storm on the Mystic River by Rich Jarvis; Water

http://mysticriver.org/water-quality-explore/

MyRWA water quality website

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I LOVE THIS STUFF: MORE WATER QUALITY INFORMATION PLEASE!

More information coming soon!

2013 Raw Data

Select a characteristic from the drop-down menu to view the results for each month: Total Phosphorus

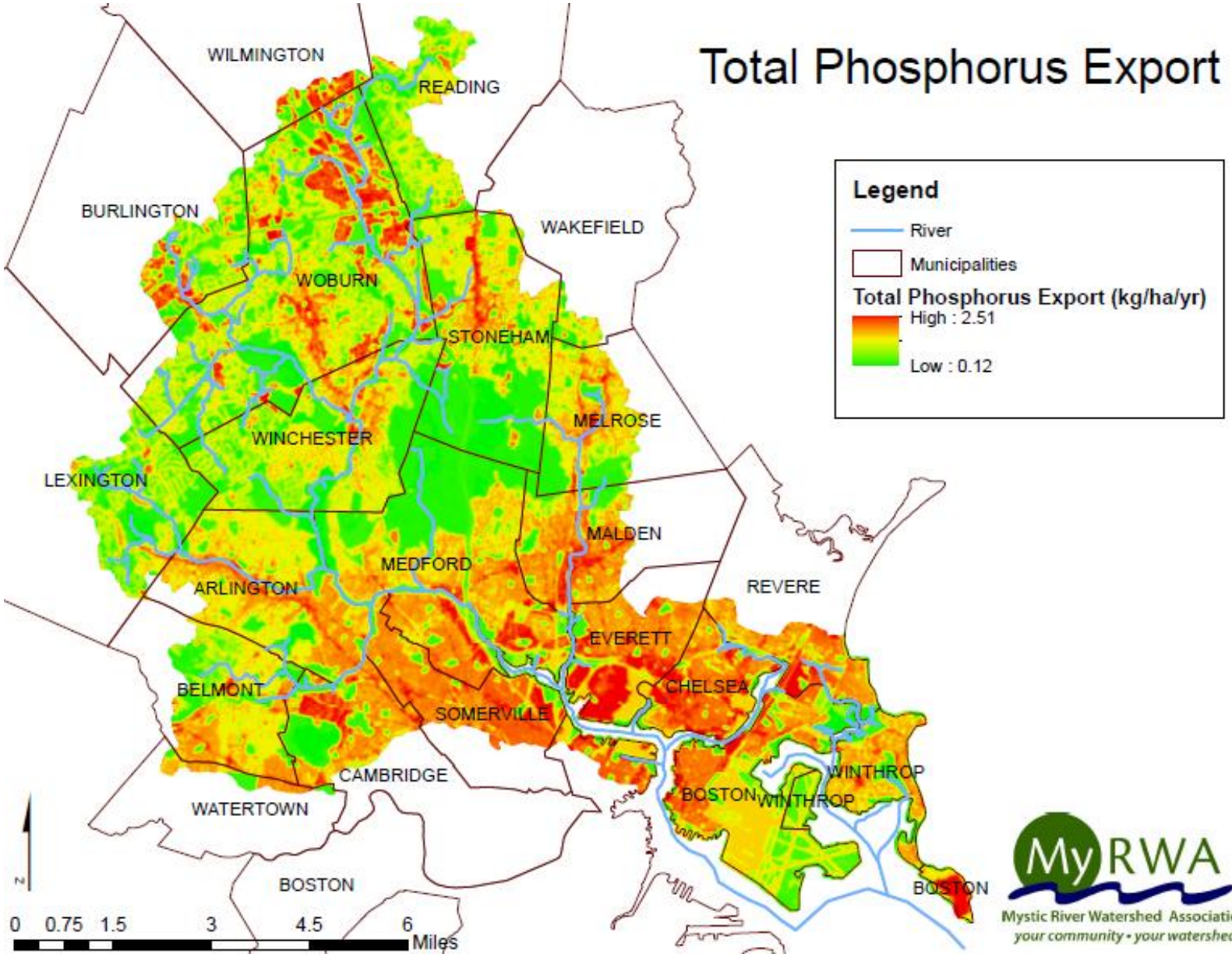
Learn more about these characteristics and sampling dates at th Monitor Resources page.

2013 Total Phosphorus (mg/l)

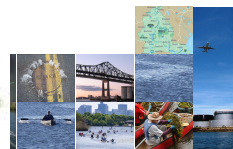
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Aberjona River (Lower)	0.0480	0.0719	0.0371	0.0390	0.0442	0.0610	0.0567	0.0443	0.0470
Aberjona River (Middle)	0.0587	0.0771	0.0401	0.0327	0.0398	0.0527	0.0384	0.0342	0.0380
Aberjona River (Upper)	0.0628	0.0730		0.0430	0.0473	0.0479	0.0309	0.0560	0.0318
Alewife Brook	0.0893	0.1060	0.0721	0.1023	0.0848	0.1558	0.0938	0.0847	0.1008
Belle Isle Inlet	0.8010	0.1770	0.2010	0.0465	0.1030	0.0740	0.2620	0.1040	0.0875
Chelsea River	0.0310	0.0250	0.0865	0.0200	0.0330	0.0410	0.0530	0.0395	0.0490
Malden River	0.0676	0.0804	0.0519	0.0493	0.1059	0.0743	0.0865	0.0587	0.0813
Meetinghouse Brook	0.0535	0.0424	0.0358	0.0953	0.0365	0.0400		0.0298	0.0853
Mill Brook	0.1172	0.0639	0.0534	0.0584	0.0652	0.0838	0.0652	0.0499	0.0619
Mill Creek	0.7110	0.0585	0.0420	0.0580	0.0530	0.0750	0.0765	0.0910	0.0950
Mystic River (Lower)	0.1890	0.0250	0.0390	0.0520	0.0350	0.0650	0.0560	0.0460	0.0420
Mystic River (Middle)	0.0840	0.0440	0.0370	0.0290	0.0395	0.0540	0.0690	0.0340	0.0600
Mystic River (Upper)	0.0373	0.0362	0.0310	0.0315	0.0197	0.0330	0.0391	0.0278	0.0297
Upper Mystic Lake	0.0409	0.0329	0.0280	0.0252	0.0186	0.0398	0.0427	0.0254	0.0256
Winn Brook	0.0784	0.0845	0.0597	0.0511	0.0709	0.1028	0.0952	0.0970	0.1662

http://mysticriver.org/in-depth-water-quality/

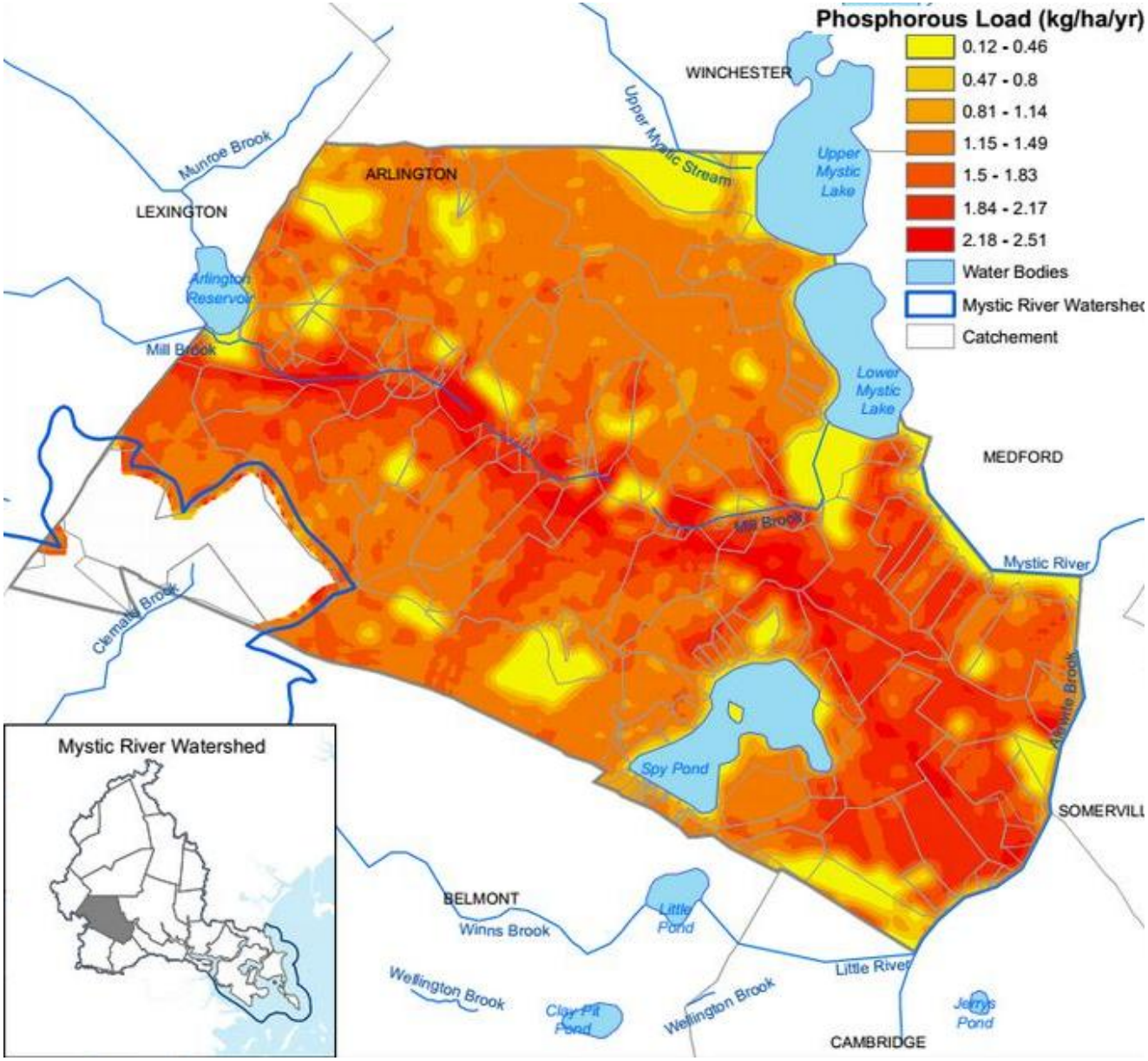
Total Phosphorus source geography in the watershed



MyRWA
Mystic River Watershed Association
your community • your watershed



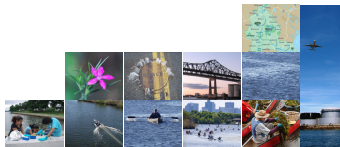
Total Phosphorus source geography in Arlington




Project purpose and scope

Why are we engaged in this project?

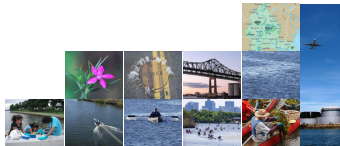
- Problem
  - Too many nutrients are being carried off of the land area
- Objectives of the project
  - Initiate a conversation
  - Identify pollution sources
  - Identify opportunities
  - Develop conceptual designs for two structures
  - Share key expertise among municipalities



Green stormwater infrastructure for Arlington

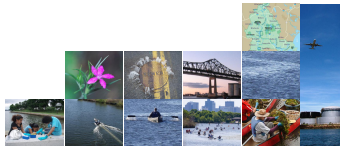
Glossary

- LID (Low Impact Development)
  - Definition: Planning and design approach to restore pre-development hydrology of urban and developing watersheds
- BMPs (Best Management Practices)
- Green (stormwater) infrastructure



Low Impact Development toolbox

- Preserve Existing Vegetation and Soils
- Re-vegetate Impervious Land
- **Bioretention swale and basin (rain garden)**
- **Permeable pavements**
- **Constructed wetland**
- Green Roof
- Street Trees
- Rainwater Harvesting



Bioretention basin / Raingarden

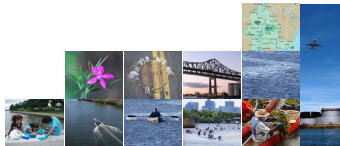
Hardy School, Arlington

Raingarden - Hardy School, Arlington

$3,700 Materials
$830 Labor
Design (In-kind)
Excavation (In-kind)
Volunteers
MyRWA Staff Outreach

Low Impact Development (LID)

- Characteristics
  - Small scale facilities
  - Manage runoff as close to source as possible
  - Mimic natural processes
  - Slow down, cleanse, infiltrate and reuse rainwater
- Benefits
  - Reduce localized flooding
  - Improve water quality
  - Reduce stream erosion
  - Improve quality of life
  - Cost effectiveness



Bioretention Basin: Green Street Application

Curb Extension, Portland OR

Peabody square, Dorchester

Bio(retention) Swale
MIT Campus – Cambridge , MA

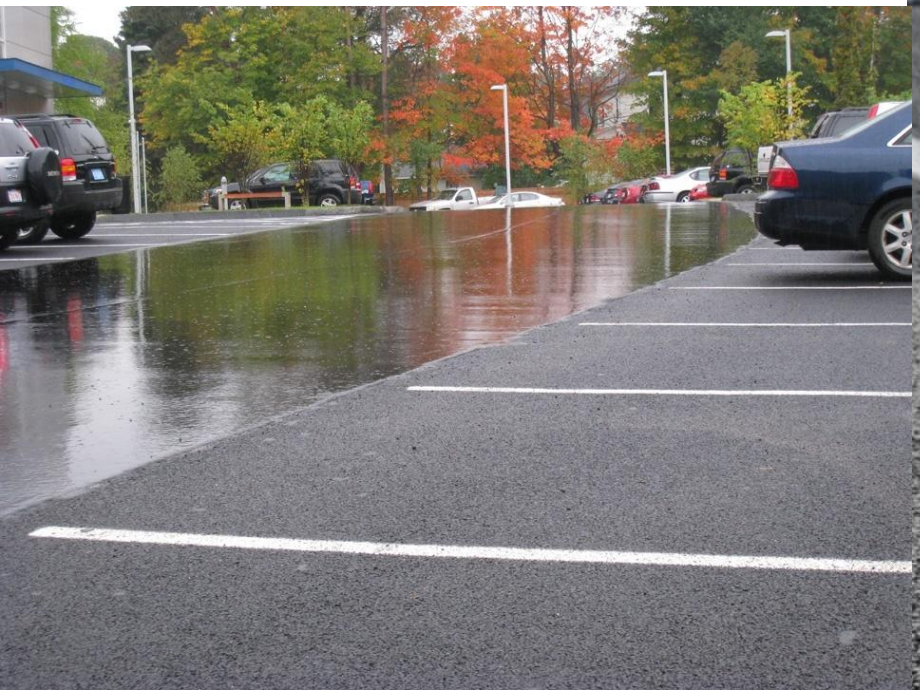
Bioretention Swale –Chelsea, MA

Swale – Berlin (Germany)

Bioretention Swale – near Paris (France)


Porous paving

Porous paving

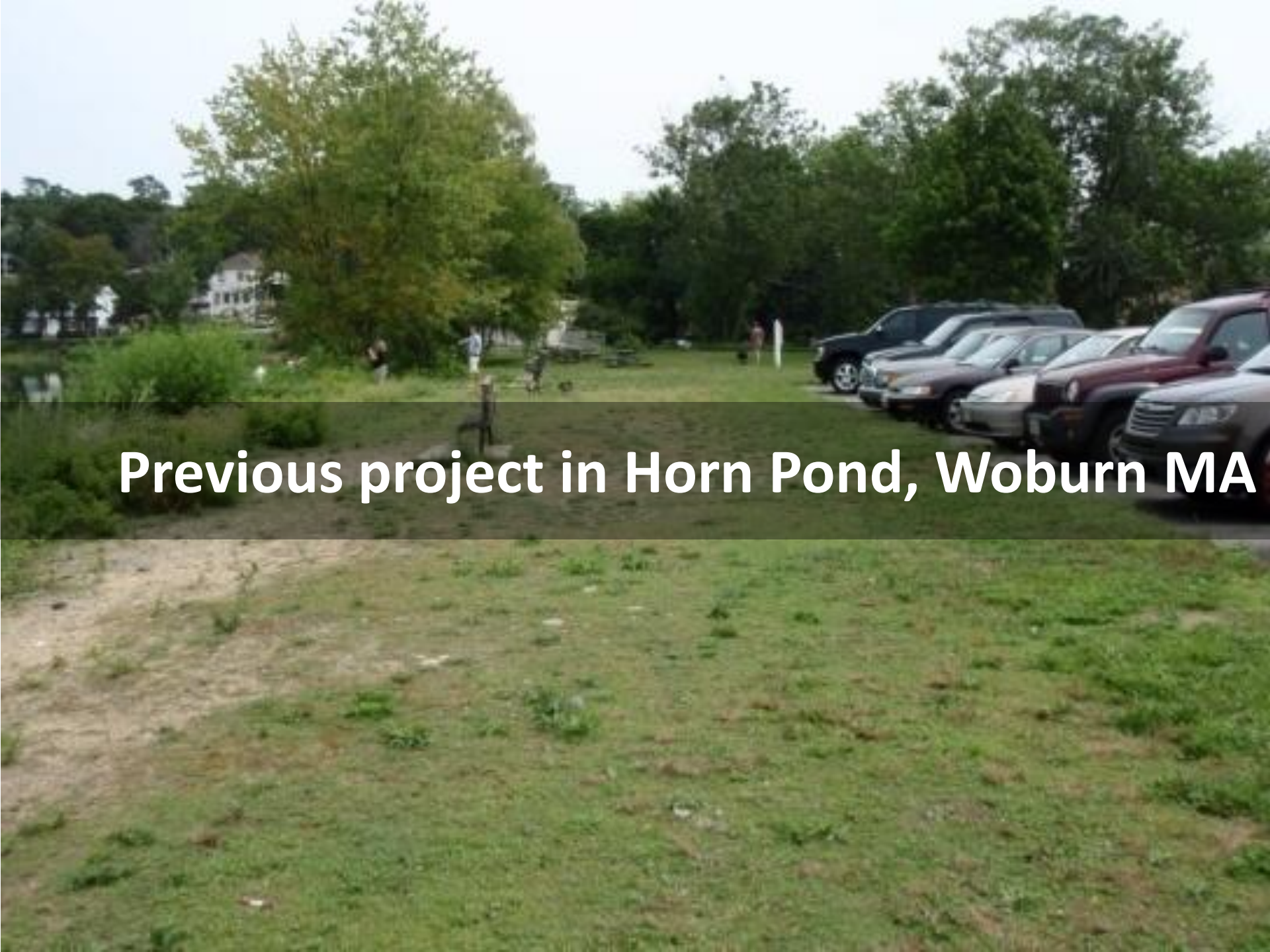


Porous Asphalt Winter Conditions - Welch School, Peabody MA

Permeable Pavers (Interlocking and Grid Types)

Constructed wetlands

Constructed wetlands


Previous project in Horn Pond, Woburn MA

Previous project in Horn Pond, Woburn MA
LID Retrofit opportunity: Vegetated swale

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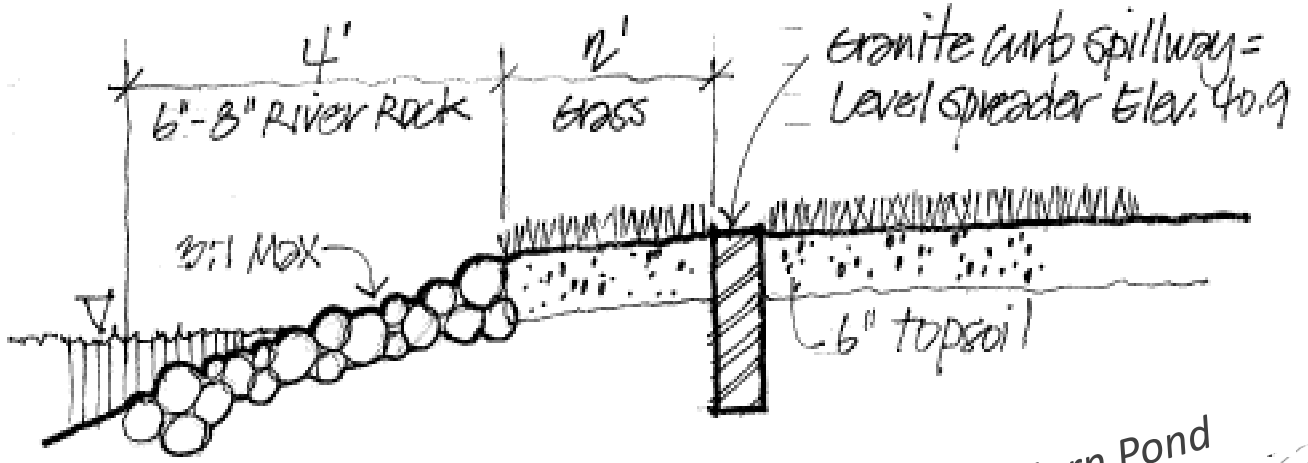
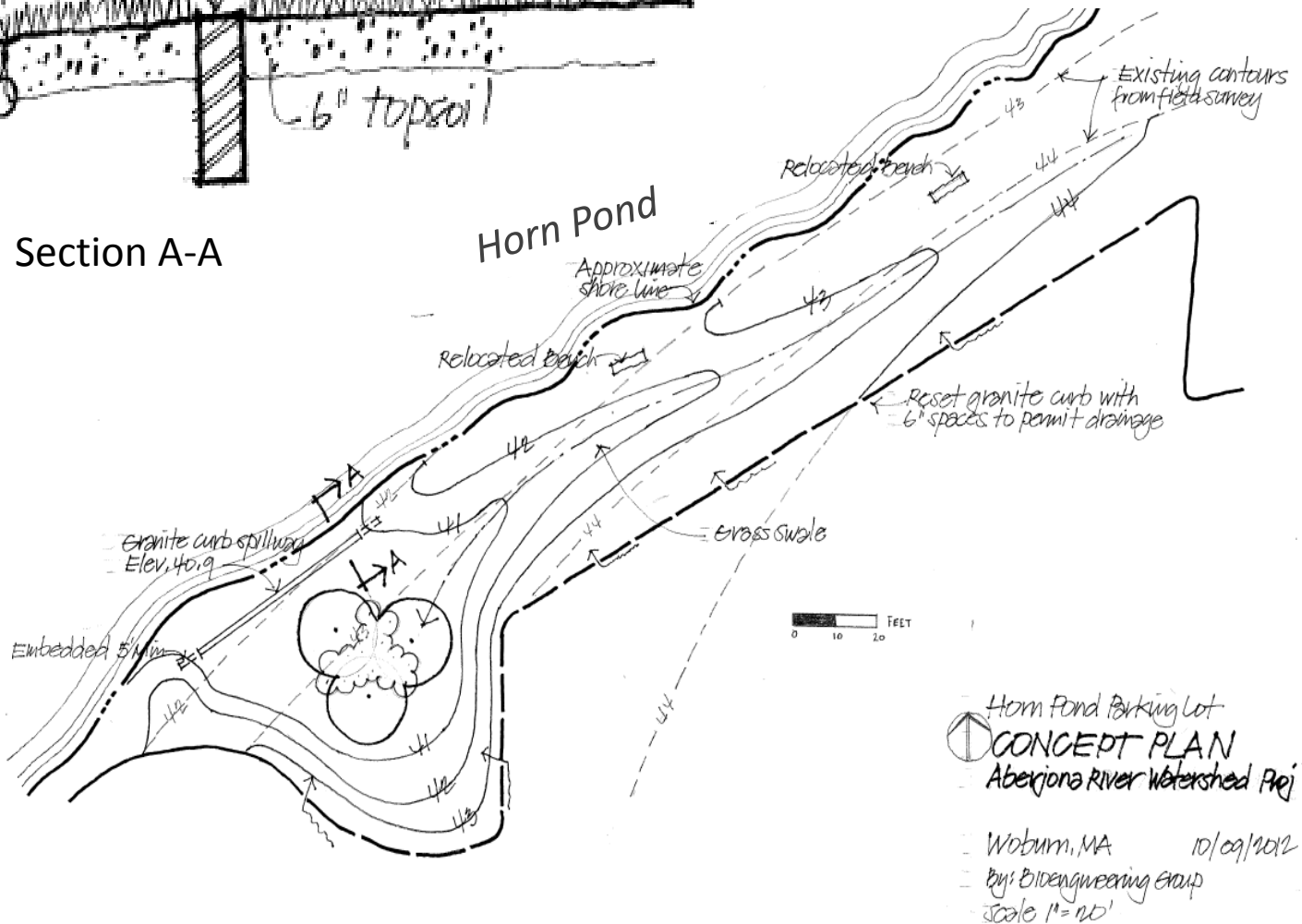


Section A-A

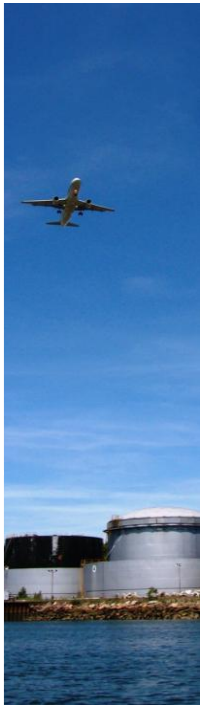


Previous project in Horn Pond, Woburn MA
LID Retrofit opportunity: Vegetated swale

- Water Quality Improvements:
  - 82% Total Suspended Sediment (TSS) removal
  - 60% Total Phosphorus removal (ave.)
  - 40% Total Nitrogen removal (ave.)
  - 70% Metals removal (ave.)
  - 48% Organics removal (ave.)
- Project Benefits:
  - Improved Water Quality
  - Reduced Erosion/ Sedimentation
  - Ease of Maintenance
  - Improved Aesthetics

Estimated Cost: $15,600.

SITE IDENTIFICATION WORKSHOP

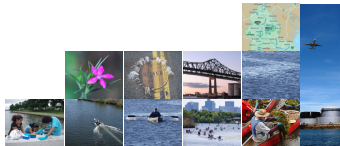


Stormwater quality concerns

What part of the land area or drainage area (e.g. street, parking lot, development) do you have the greatest concern about stormwater water quality?

e.g.

- heavily used parking lot that drains directly to water body
- significant road surface draining direcetly without treatment



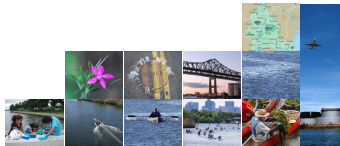
Stormwater quality concerns

Stormwater quality concerns

Stormwater quality concerns

Most significant flooding issues

Where are the most significant flooding issues in your town?

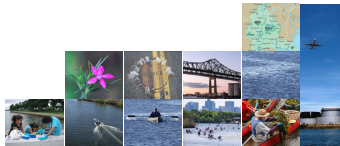


Public projects

What public projects will occur within the next five years within the community ?

e.g.

- development or redevelopment of road
- parking lot
- school
- library
- public offices

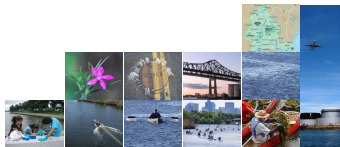


Private projects

What private properties, partners or projects will be amenable toward incorporating green infrastructure

e.g.

- Condo development
- Businesses
- Churches
- Non-profits
- Private homeowner

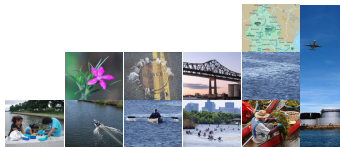


Best opportunities to incorporate green stormwater infrastructures

What do you identify as some of the best opportunities to incorporate green stormwater infrastructures?

Positive siting characteristics could include

- treating a large impervious surface
- placement in a visible location for education
- ease of maintenance
- aesthetics/recreational space
- traffic calming
- heat island reduction
- wildlife habitat
- energy efficiency (green roof)
- costs
- educational/pilot project

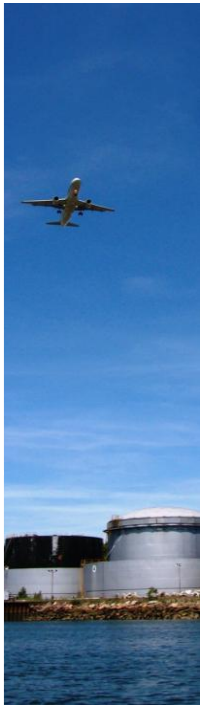


Workshop conclusion

NEXT STEPS


Wilmington
Reading
Burlington
Wakefield
Woburn
Stoneham
Lexington
Winchester
Melrose
Arlington
Medford
Malden
Everett
Revere
Somerville
Chelsea
Belmont
Cambridge


SEWER



Additional ideas?

Contact:

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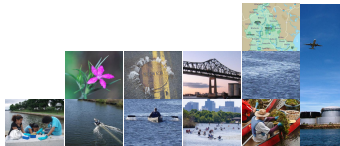
Mystic River Watershed Association

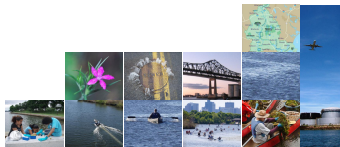
patrick@mysticriver.org

(781) 316 3438

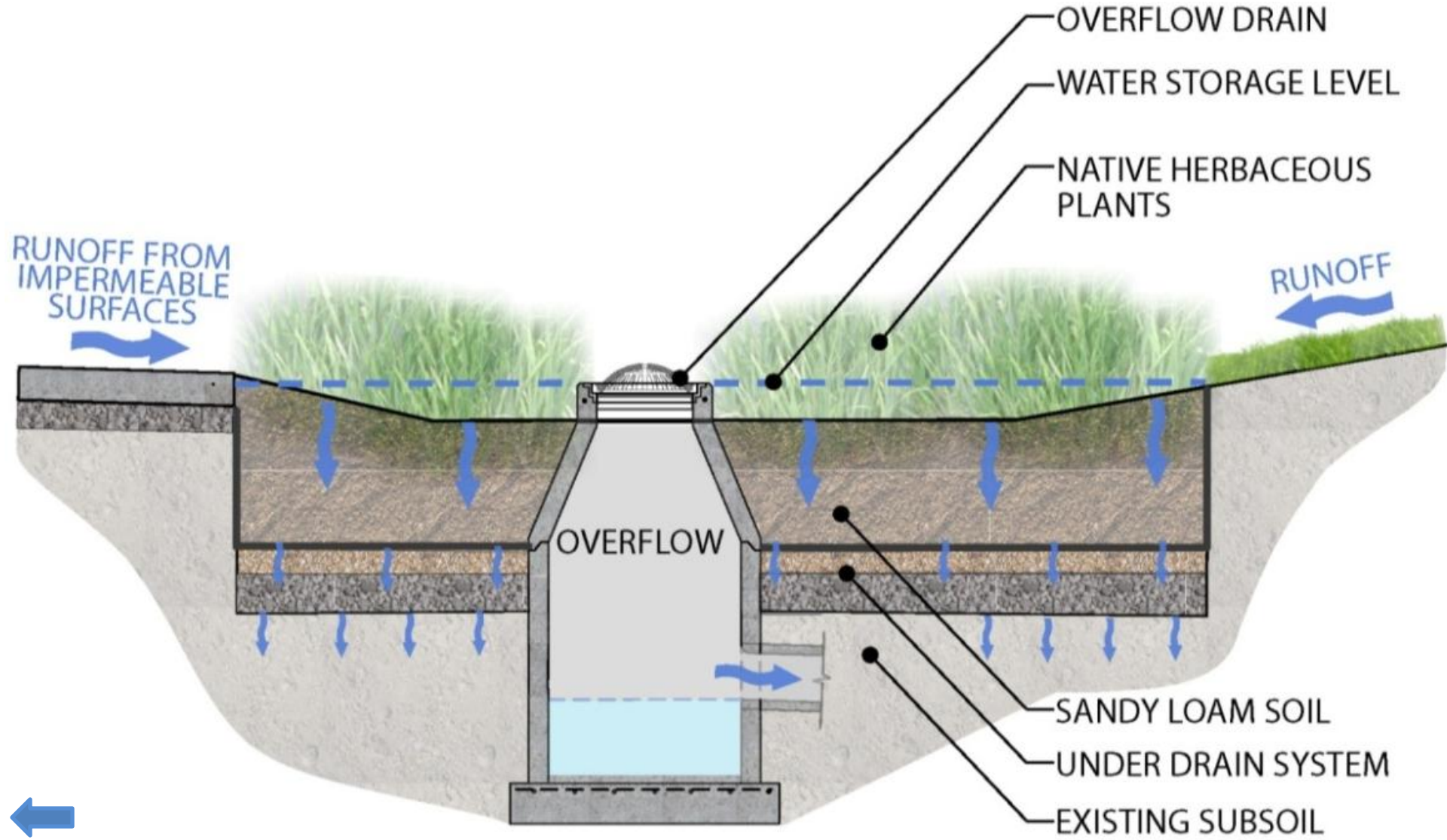


Upcoming dates:

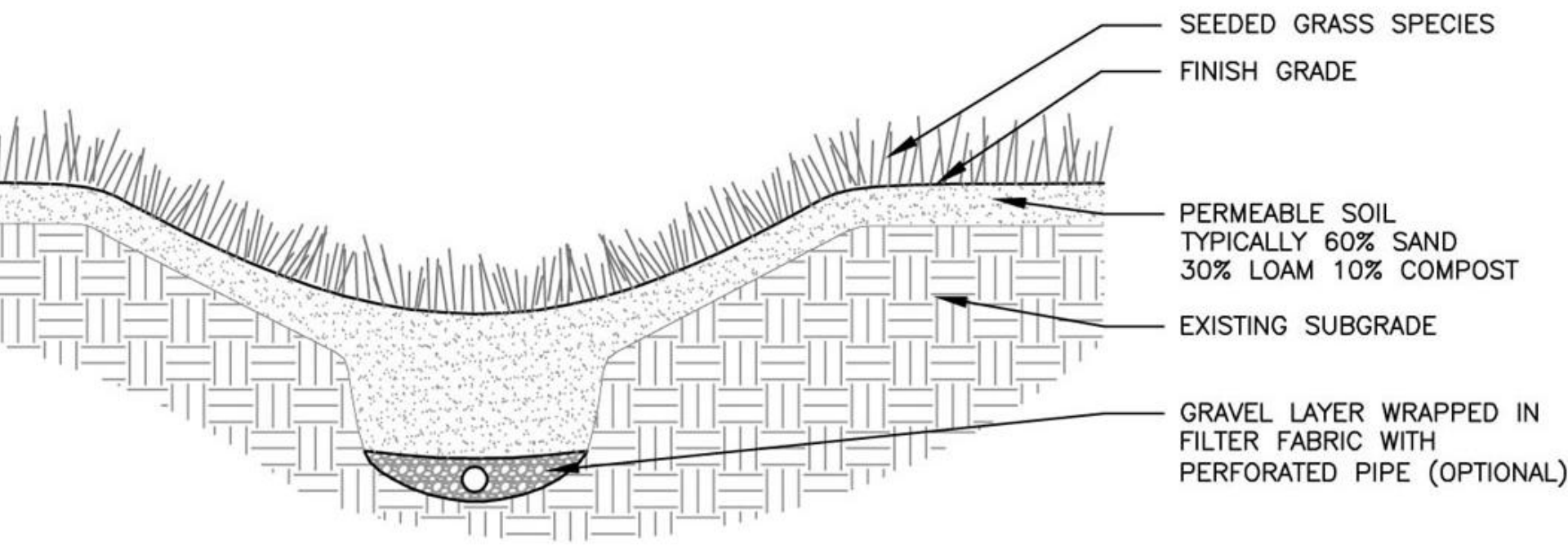
January 13th - 17th	Prioritization workshop Municipal Staff, key stakeholders, Bioengineering Group
Feb – March	Site visits by bioengineering Group (5 sites)
May	Development of conceptual design on two sites



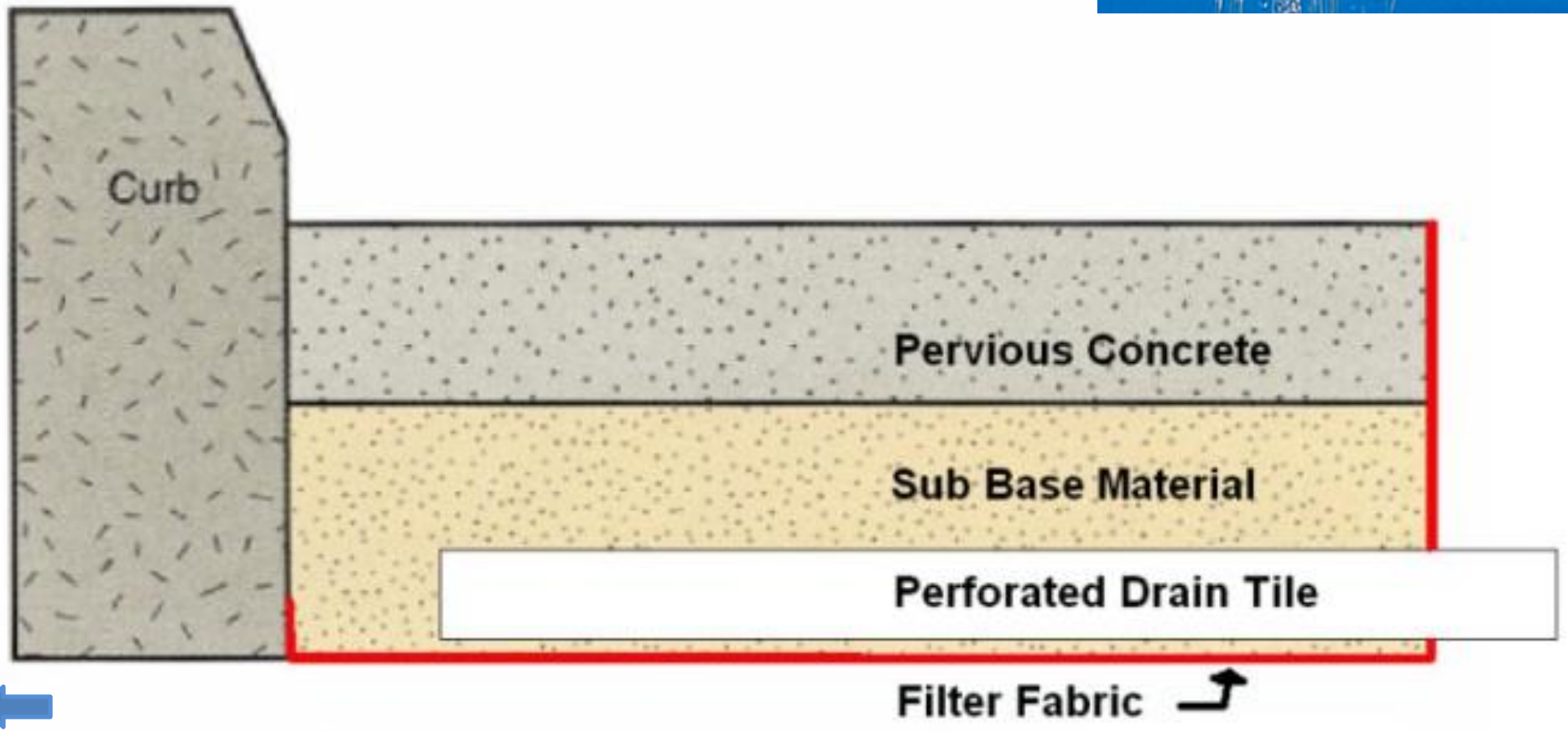
Bioretention Basin – illustrative section



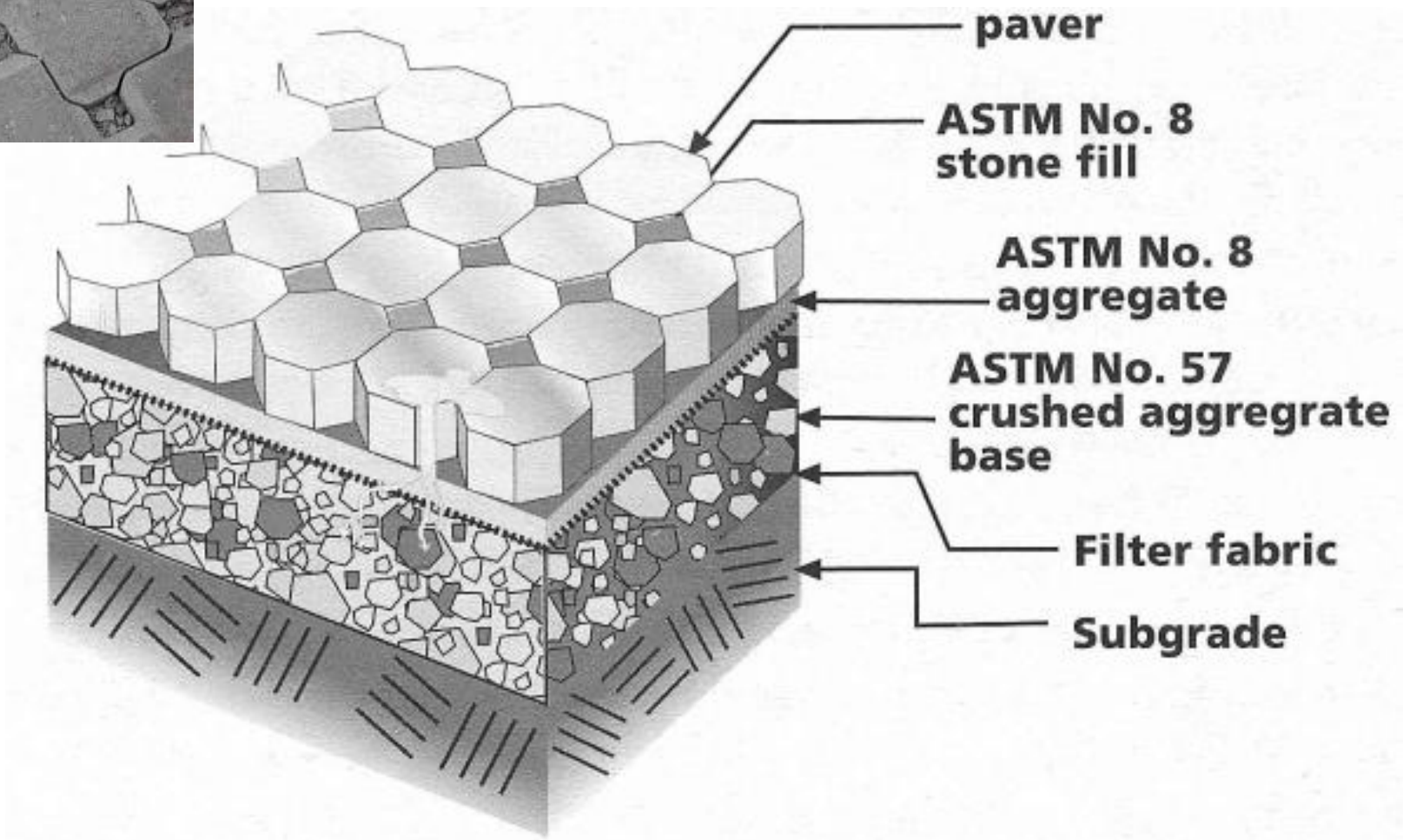
Bioretention Swale – illustrative section



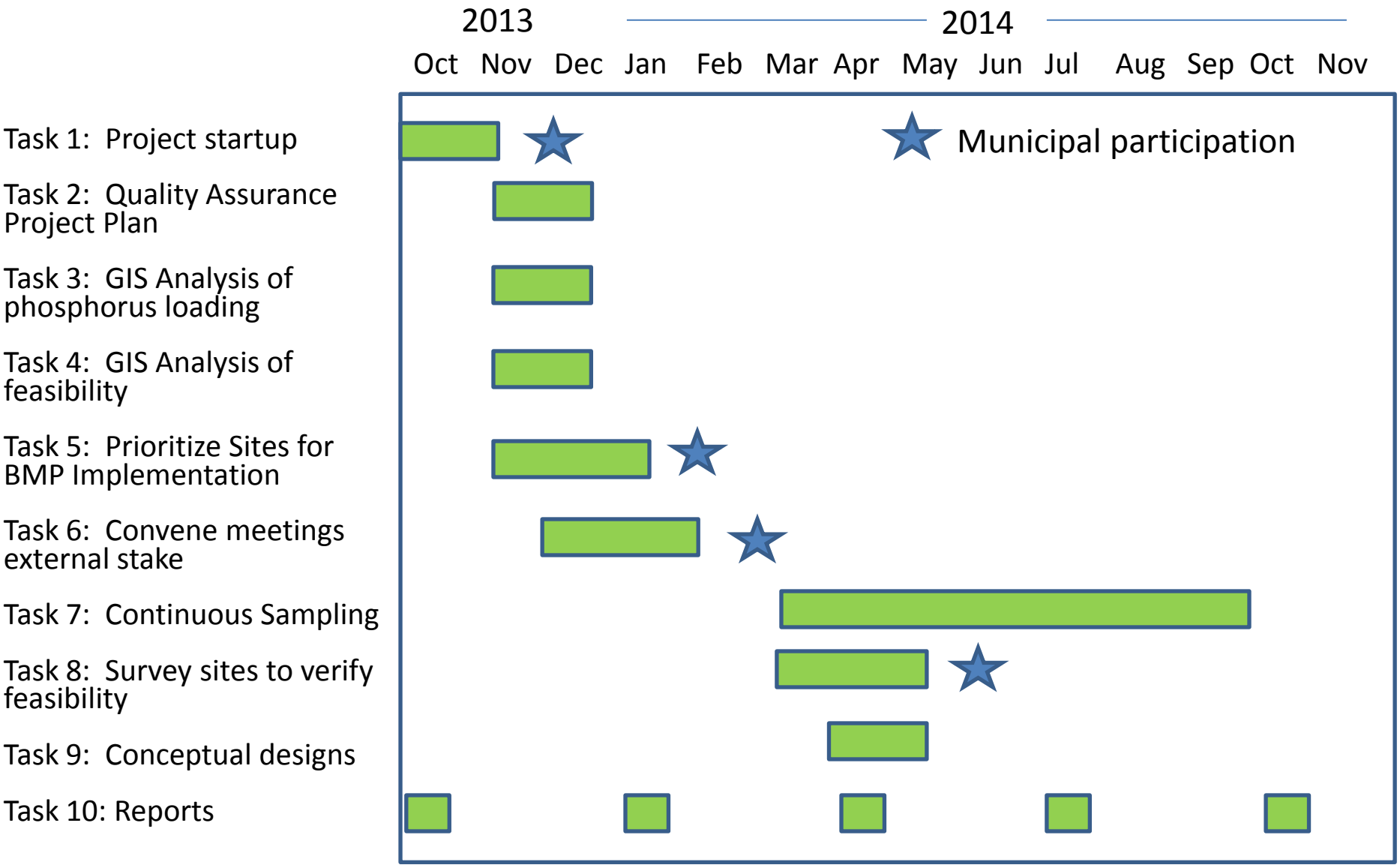
Porous pavement – illustrative section



Permeable pavers – illustrative 3D-section

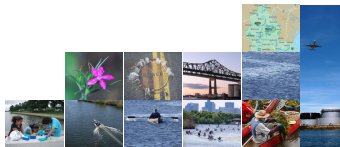


Project Schedule



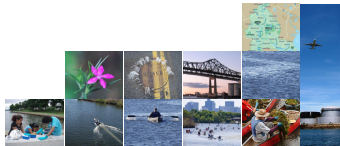
LID Resources

- University of New Hampshire Stormwater Center
  - unh.edu/unhsc
- US EPA Green Infrastructure
  - water.epa.gov/infrastructure/greeninfrastructure/
    DEP
- Low Impact Development Center
  - lowimpactdevelopment.org
- Boston Complete Streets
  - bostoncompletestreets.org
- Boston Water & Sewer Commission: Stormwater BMP Guidance Document (2013)
- Charles River Watershed Association
  - http://www.crwa.org/bluecities.html



Site Suitability

- Resource Area (Buffers)
- Terrain (Slope)
- Soils and Subsoils (Infiltration)
- Hydrology (Depth to SHWT)
- Contamination
- Utilities



Maintenance

	Bioretention basin	Bioretention swale	Constructed wetland	Porous pavement	Permeable pavers
Capital cost	$8 - $12/sq ft	$5 - $10/linear ft	$0.75-$2.00/sq ft ($30k – $80k/acre)	$2-$3/sq ft	$8 - $12/sq ft
Maintenance	•Confirm plant growth •Irrigate during plant establishment •Remove invasive species •Remove sediment and debris as necessaryPeriodically inspect drainage structures •Swales: mow and remove vegetation once/year			•Periodic inspection during and after rain events to confirm proper drainage •Vacuum sweeping 2-4 times per year •Annual inspection of paver blocks for deterioration •Replace gravel as necessary	

LID BMP Costs

- Design
- Testing and Permitting
- Construction
- Maintenance
- Monitoring