

Using Stormwater Challenges as a Driver for Going Green in Newburyport

Jennifer K. Lachmayr, PE, BCEE



Agenda

Background

Little River Flood Study

Little River Pilot Program

Vision for Implementation

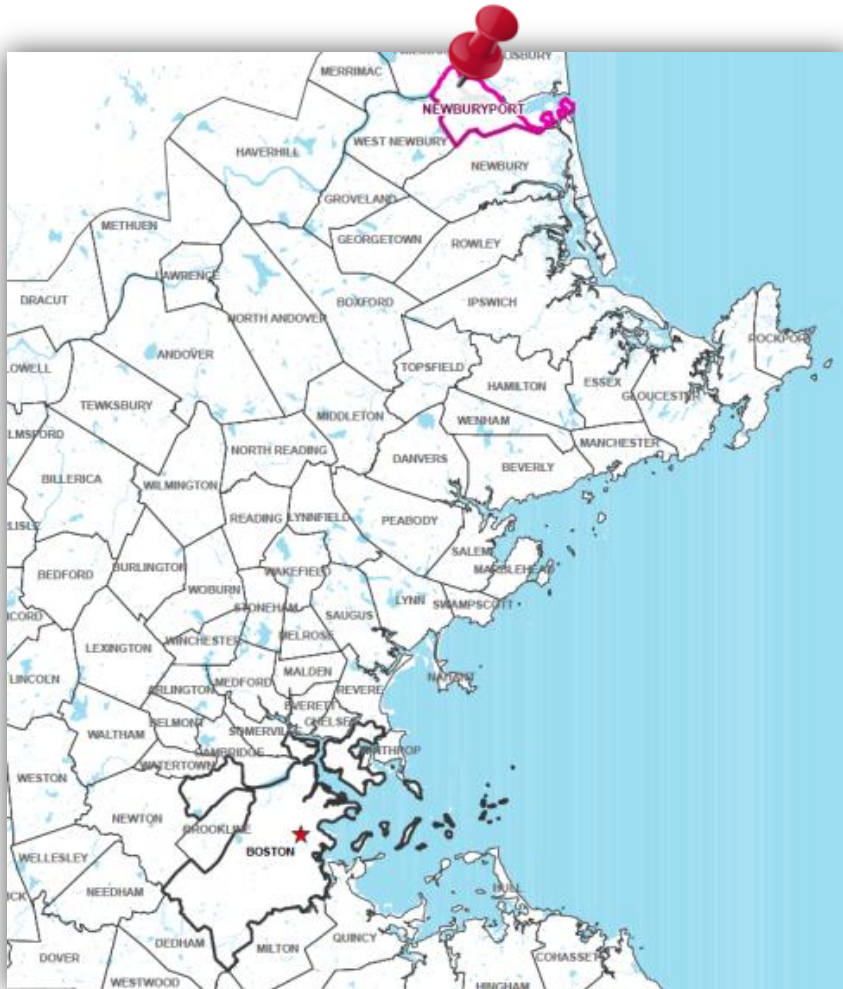
Sample Incentive Programs





Background

City of Newburyport, MA



35 miles northeast of Boston
on the Merrimack River

Population 17,400

Incorporated 1764

Historic Seaport

Business Park

Newburyport Seeks Green Solutions



Photo credit: True North

Massachusetts Green Community

Solar City

Tree City

DPW Used Oil Burner

5 Year Energy Reduction Plan

Solarize Newburyport & Salisbury Solar Field

Stretch Energy Code

Health & Sanitation Ordinance

Wind Turbine Ordinance

Zero Waste Pilot

Enhanced Recycling/Yard Waste Collection

Rail Trail Project

WWTP and WTP Upgrades

Hope that Emerald City coming soon!

Current Land Use & Infrastructure

Current Land Use (Zoning-Based)



Residential
74%



Industrial
16%



Commercial 3%



Other (Mixed
use, etc.)
7%

Stormwater Infrastructure



200,000
linear feet
of Pipe



500
Manholes



2,800 Catch
Basins



175 Outfalls



Many
Culverts

City of Newburyport's Evolution of Stormwater Management

2003

Moving Forward

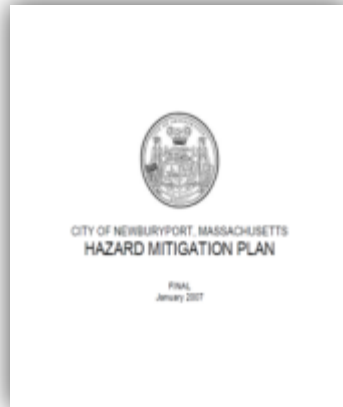
EPA MS4
Permit &
Flood Issues

Stormwater
Master Plan

Hazard
Mitigation
Grants

Ordinance &
Regulations

Green
Infrastructure



What is Green Infrastructure?

- Stormwater management strategy that mimics natural hydrologic processes
- GI is integrated combination of infiltration, evapotranspiration, storage, water harvesting and re-use
- Typically employing “high performance landscaping” or functional landscaping

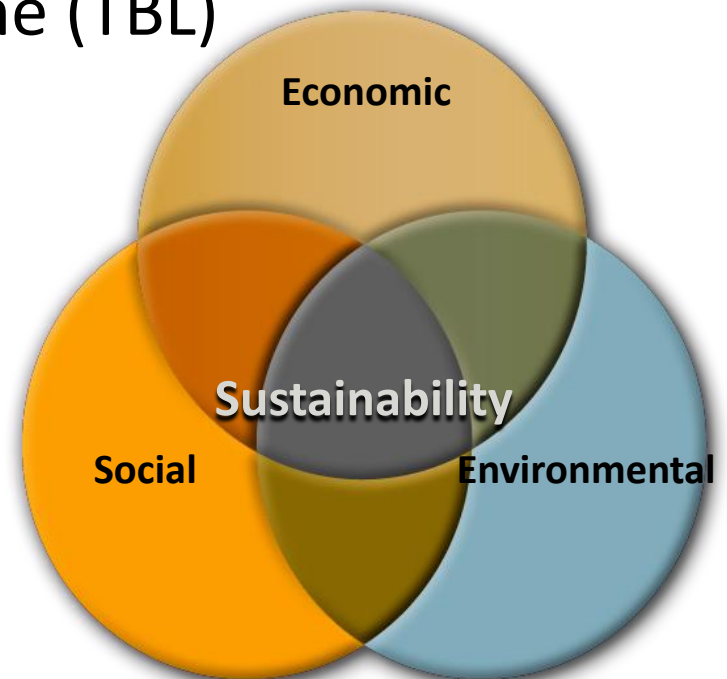






Why Green Infrastructure?

- Shifting perspectives in stormwater management - volume management
- Regulatory changes
- Sustainability – triple bottom line (TBL)

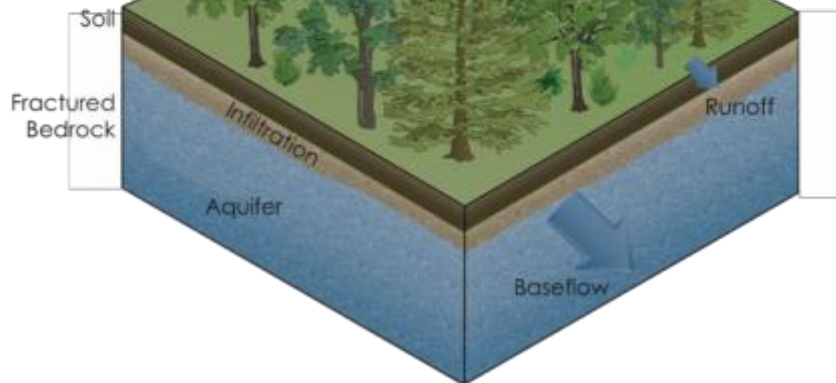


Fundamental Issue: Altered Water Balance

Annual Rainfall 36"



Evapotranspiration



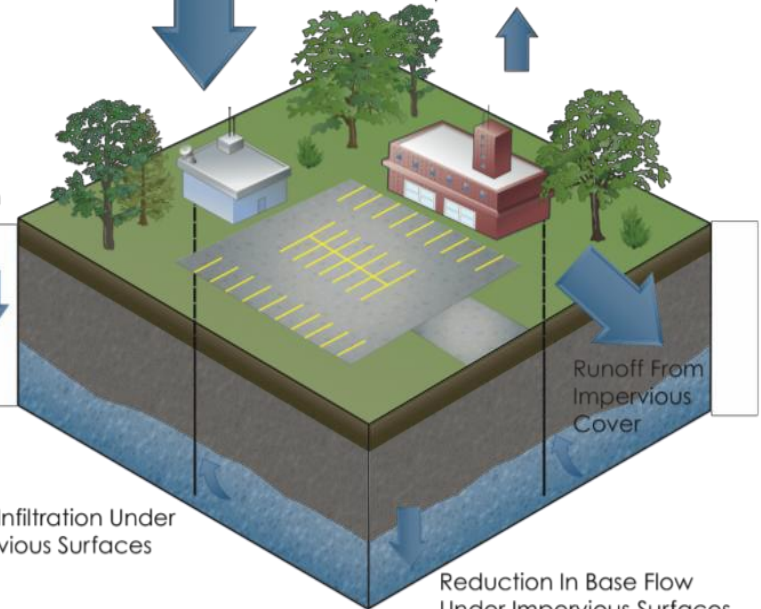
Annual Rainfall
36" / YR



Evaporative Loss From
Impervious Surfaces



Reduced Infiltration
Through Regraded
and Compacted
Soils In Grasses



0" Of Infiltration Under
Impervious Surfaces

Reduction In Base Flow
Under Impervious Surfaces

Volume-Based Hydrology (VBH)

Analogous to traffic management...

- **Wider** roads...
bigger pipes and ditches...
“Build it and they will come.”
- **More** traffic signals...**more** detention...still **more** traffic/volume
- Timed traffic signals...
timed/coordinated discharges
- Multi-modal...infiltrate...ex-filtrate... evaporate...redirect/reuse



Regulatory Changes



- **EPA and States** requiring 80%-95% rainfall frequency SOV as a essential means of water quality improvement
- Integrated site design and **Green Infrastructure** being incorporated in many MS4 permits
- **Volume-based approaches** being incorporated into local rules
- **CSO** rules are incorporating GI



Value Proposition

GI values...more than just stormwater management

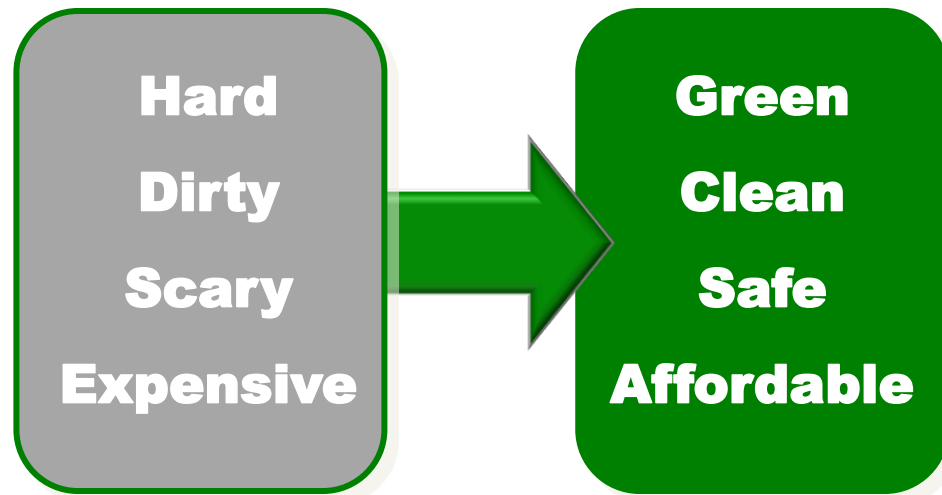
- Green infrastructure supports sustainable communities
- The decisions to go “green” are made at executive level
- It is value-based decision



“Green infrastructure cleans the air and water, replenishes aquifers, reduces flooding, and moderates the climate. And the benefits go beyond improving the environment”

(Green Infrastructure a Landscape Approach, APA 2013)

Strategic Vision for Green Infrastructure



Clean our Water

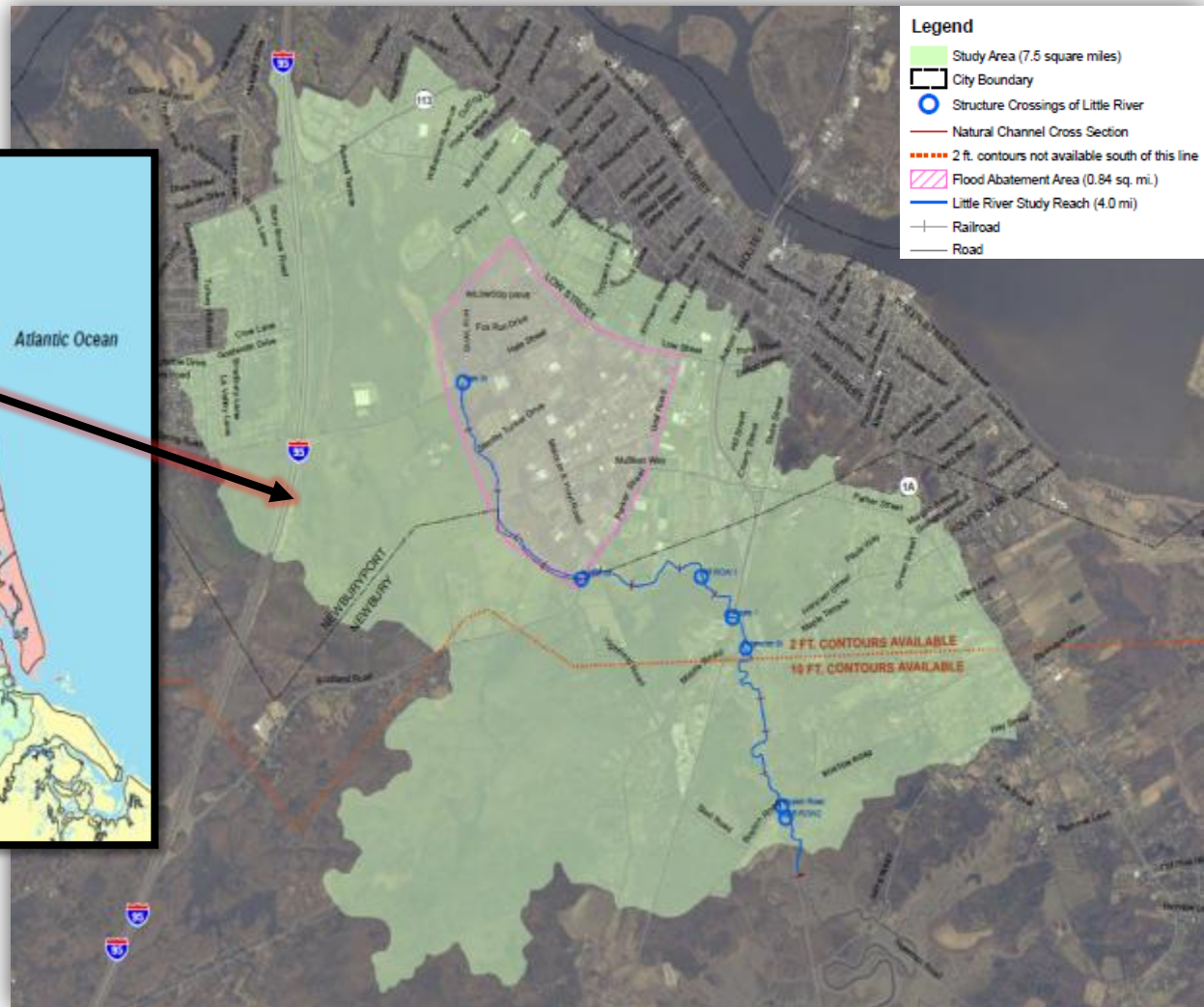
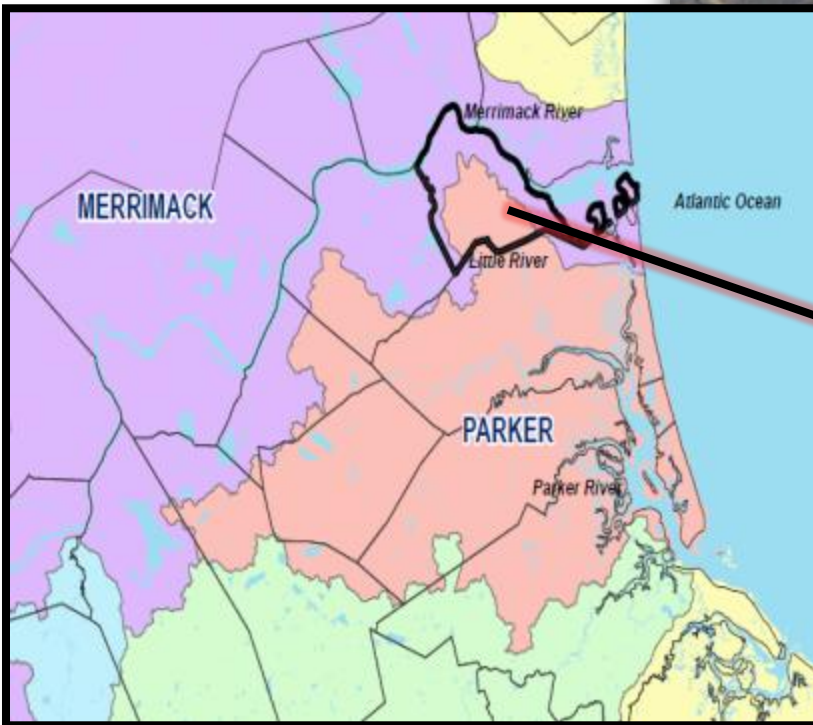
*Revitalize our Neighborhoods and
Business Districts*

Add Value

An aerial photograph of a coastal town, likely Little River, South Carolina. The town is built on a peninsula or along a riverbank, with numerous buildings, streets, and green spaces. A large bridge spans across a wide body of water, likely the Little River, connecting the town to the mainland. The water is filled with many small boats, and there are large marinas or docks. The sky is clear, and the overall scene is bright and sunny.

Little River Flood Study

Little River Flood Study Study Area



Little River Flood Study

Project Background

Business Park area built along the Little River (~1960s), tributary to Parker River

> 60 businesses

Conservation Commission Order of Conditions for swale maintenance

History of flooding, more frequently in recent years

May 2006 – all entrances to the park were flooded. Many are critical routes of egress.

Environmental and Economic losses



Flooding Areas & Egress Routes



Malcolm Hoyt Road, Mother's Day Flood
Photo courtesy of Joe Teixeira, Newburyport Conservation Commission

Little River Flood Study

How did we get to Green?

Flood Study results indicate Little River is backed up at the Parker Street culvert



FEMA determined not to fund project



Conventional alternatives are expensive



Green solutions are important to the City





Little River Flood Study Impervious Area

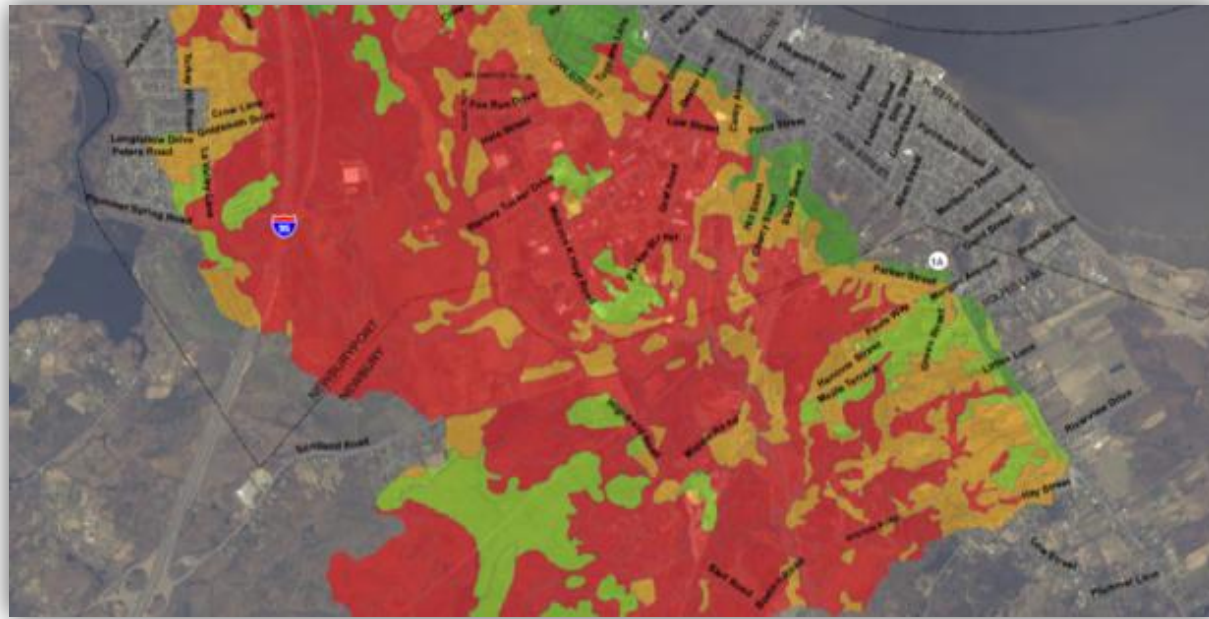
Approximately
37% is City-owned
property

Vast majority of
City-owned
property is roads

Legend

- Building
- Driveway
- Parking Area
- Road; Sidewalk
- Municipal Boundary
- Drainage Basins

Impervious Surface	Area (ac)	Percent of Total Impervious
Building	145	27%
Driveway	42	8%
Parking Area	167	31%
Roads and Sidewalks	191	35%
Total	545	100.0%



Legend

NRCS Hydrologic Soil Group

- A
- B
- C
- D
- City Boundary
- Railroad
- Road

Little River Flood Study Soils

Infiltration BMPs
not a good option
for D soils

Focus will need to
be on storage,
retention and
slowed release



Little River Flood Study Existing Ponds, Swales & Storage Areas

Opportunities for
improvement in
both:

Storage

Conveyance





Little River Flood Study Maintenance is Missing!

Residents in watershed are dumping yard waste and other items

Swales are overgrown and not functioning as designed

An aerial photograph of a coastal town, likely Little River, South Carolina. The image shows a large harbor filled with numerous sailboats and yachts. A multi-lane bridge spans across the water, connecting the town to the mainland. The town itself is densely packed with buildings, mostly in shades of brick and white, surrounded by green trees. The sky is clear and blue.

Little River Pilot Program

Little River Pilot Program

Thinking Outside of the Box

Traditional Green Practices

- Narrower streets
- Green medians
- Green roofs
- Infiltration techniques

Pilot Area Site Constraints

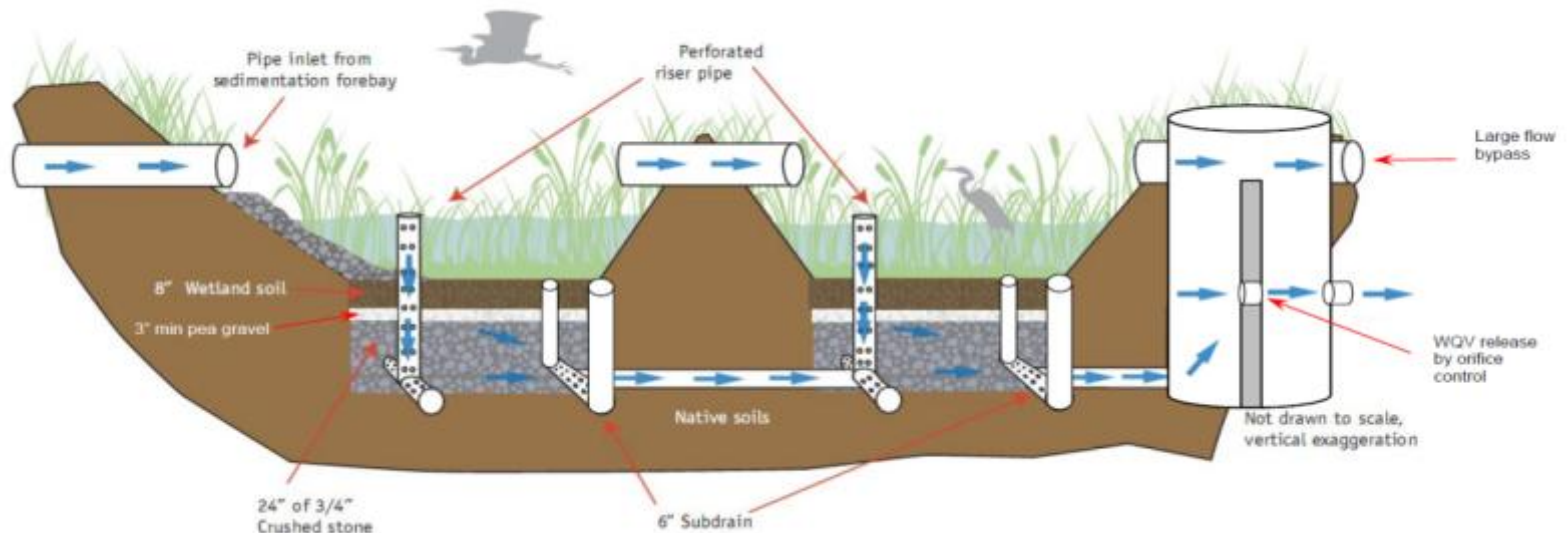
- Tractor Trailers, industrial materials transport
- Old buildings
- Poor soils

Any successful program in this area must obtain buy in from local businesses!

Little River Pilot Program

Realistic Solutions

- Existing ponds and storage areas can be restored & retrofitted
- Gravel Wetlands & Naturalized Detention
- Porous Pavement with underdrains to storage areas
- Cisterns (rooftop runoff)
- Maintenance & landscaping





Vision for Implementation

Emerald City Criteria

Natural Resources Defense Council's *Rooftops to Rivers II* (2011)

Table ES-1: "Emerald Cities," listed darkest to lightest by the number of key green infrastructure actions taken

City	Long-term green infrastructure (GI) plan	Retention standard	Requirement to use GI to reduce some portion of the existing impervious surfaces	Incentives for private-party actions	Guidance or other affirmative assistance to accomplish GI within city	Dedicated funding source for GI
Philadelphia, PA	★	★	★	★	★	★
Milwaukee, WI		★	★	★	★	★
New York, NY	★		★	★	★	★
Portland, OR		★	★	★	★	★
Syracuse, NY	★		★	★	★	★
Washington, D.C.		★	★	★	★	★
Aurora, IL	★	★			★	★
Toronto, Ontario, Canada	★	★		★	★	
Chicago, IL		★		★	★	
Kansas City, MO				★	★	★
Nashville, TN	★				★	★
Seattle, WA				★	★	★
Pittsburgh, PA		★				
Rouge River Watershed, MI					★	

Stormwater Rules & Regulations Are Key to Success

****Begin by understanding what the development patterns are like in your area.****

More stringent thresholds for Stormwater Permitting

- Half an acre, quarter of an acre, 10,000 square feet of land disturbance
- Addition of 10 or more parking spaces, addition of 25% more impervious surface, etc.

On-site management of runoff.

- Retain or infiltrate first inch on site.
- Retain first half inch, first inch, etc.

Green first

- Applicants must demonstrate that they have made a complete evaluation of possible low impact development measures that could be used on site.

Vision for Implementation

Pilot Area – Public Property & Collaboration with Businesses

- Landscaping & Maintenance
- Permits and on-site stormwater management
- Green first
- Retrofits of existing ponds
- Cisterns, porous pavement, building improvements

Private Property

- Participation in collaborative efforts
- Permits and on-site stormwater management
- Green first
- Maintenance requirements
- Cisterns, rain barrels, building improvements

City-wide

- Increase tree canopy
- Decrease impervious area
- Identify other potential green projects and collaboration opportunities
- Stormwater management districts
- Green Infrastructure Master Plan
- Future regulations for addressing TMDLs & existing properties with large impervious areas

Implementation Public / Private Collaborative Effort

NOW

- More stringent thresholds for projects requiring stormwater permit
- On-site management (quantity and quality) of first 1-inch of runoff redevelopment & new development
- Swale maintenance & restoration project
- Green first in all projects
- Planting plan

FUTURE

- Pond retrofits
- Cisterns
- Landscaping & irrigation Plan
- Porous Pavement
- Building Improvements



Photos courtesy of Joe Teixeira, Newburyport Conservation Commission

Implementation

Public / Private Collaboration



Benefits of Membership:

- Economic Development for the Park
- Improved Appearance for the Park
 - Road Paving
 - Updated Signage and Landscape
- Park Maintenance
 - Maintenance of Drainage Swales
 - Improved Drainage for the Park
- Improvements to Park Zoning for Building Use
- Support the maintaining of a Single Tier Tax Rate
- United Voice on any Issues Facing the Park
- Sustainability as Clean and Energy Efficient Businesses

Formed in 2012 by

Concerned
businesses

City Officials

City and businesses in the Pilot Area are working together on shared goals:

Common landscaping
plan

Maintenance Issues

Zoning / Policies

Sustainability

Potential for future collaboration with Homeowners' Associations and downtown business district!

Implementation Private Property

NOW

- More stringent thresholds for projects requiring stormwater permit
- On-site management (quantity and quality) of first 1-inch of runoff redevelopment & new development
- Green first in all projects

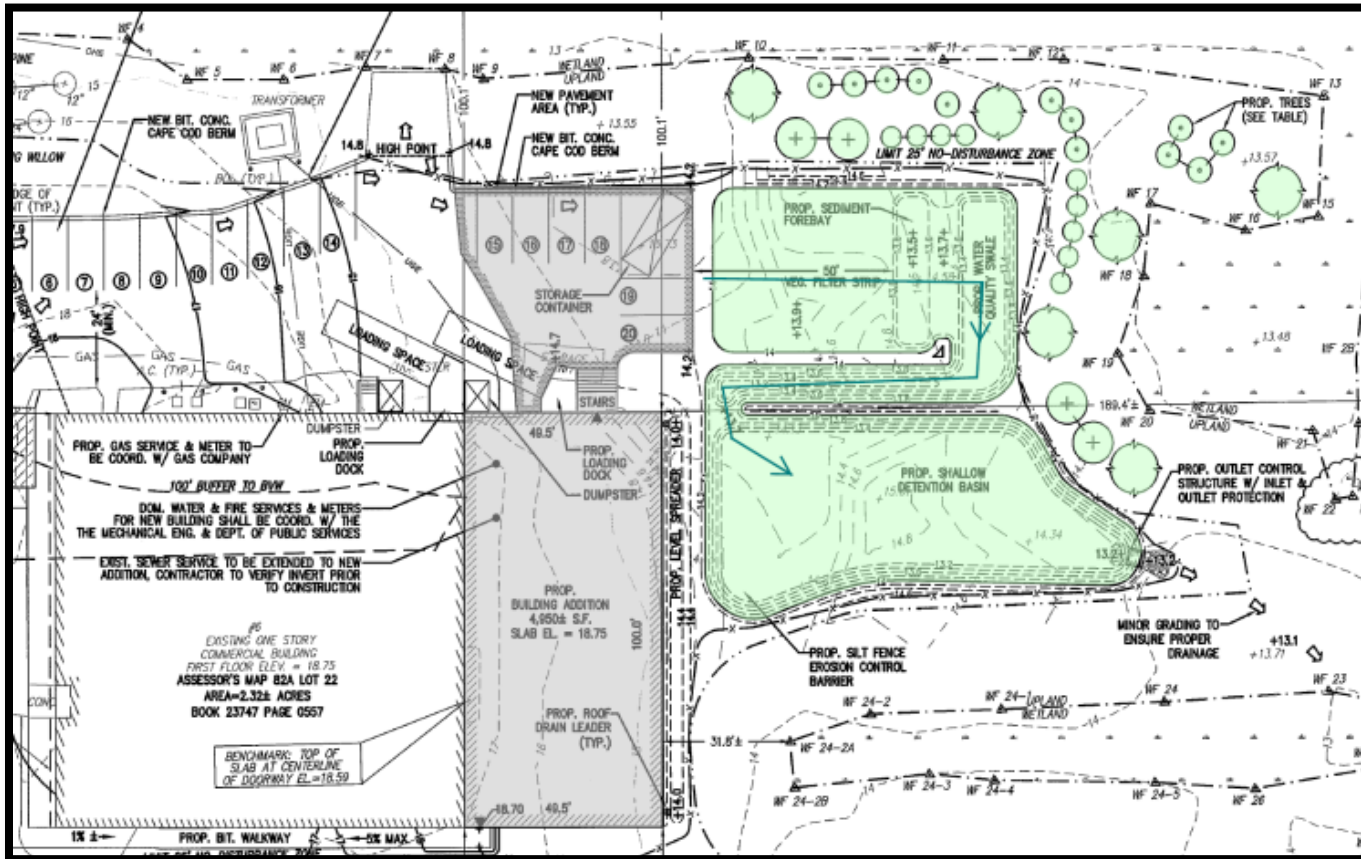
FUTURE

- Encourage participation in collaborative efforts
- Gravel Wetland or Naturalized Detention
- Rain Barrels & Cisterns
- Porous Pavement
- Building Improvements
- Infiltration techniques, where possible



Photos courtesy of Joe Teixeira,
Newburyport Conservation Commission

Implementation City's First Stormwater Permit



- Building & parking lot expansion at private property in Pilot Area
- Vegetated filter strip, water quality swale, detention pond, and planting plan

Design By: Scott P. Cameron, P.E., McKenzie Engineering Group, Inc.

City-wide Implementation Public Property

NOW

- More stringent thresholds for projects requiring stormwater permit
- On-site management (quantity and quality) of first 1-inch of runoff redevelopment & new development
- Maintenance of existing culverts / conveyance
- Look to Green first in all City projects
- Tree Planting

FUTURE

- New DPS building – incorporate green design
- Review of municipal buildings to identify opportunities for GI
- Porous Pavement
- City-wide long-term Green Infrastructure Master Plan
- Increase Tree Canopy / Tree Master Plan



Implementation Potential Future Incentives



Expedited permit review / technical review

City labor design assistance

Fee discounts

Grant programs

Incentives for businesses who follow LEED

Incentives for businesses that bring Green jobs to the City

Conclusions

Policies/Regulations are important and should be updated as programs evolve

Engage stakeholders and look for partnerships

Incentives can be targeted to both the owner and the developer

Incentives can promote smart growth and urban revitalization



CONTACT INFORMATION

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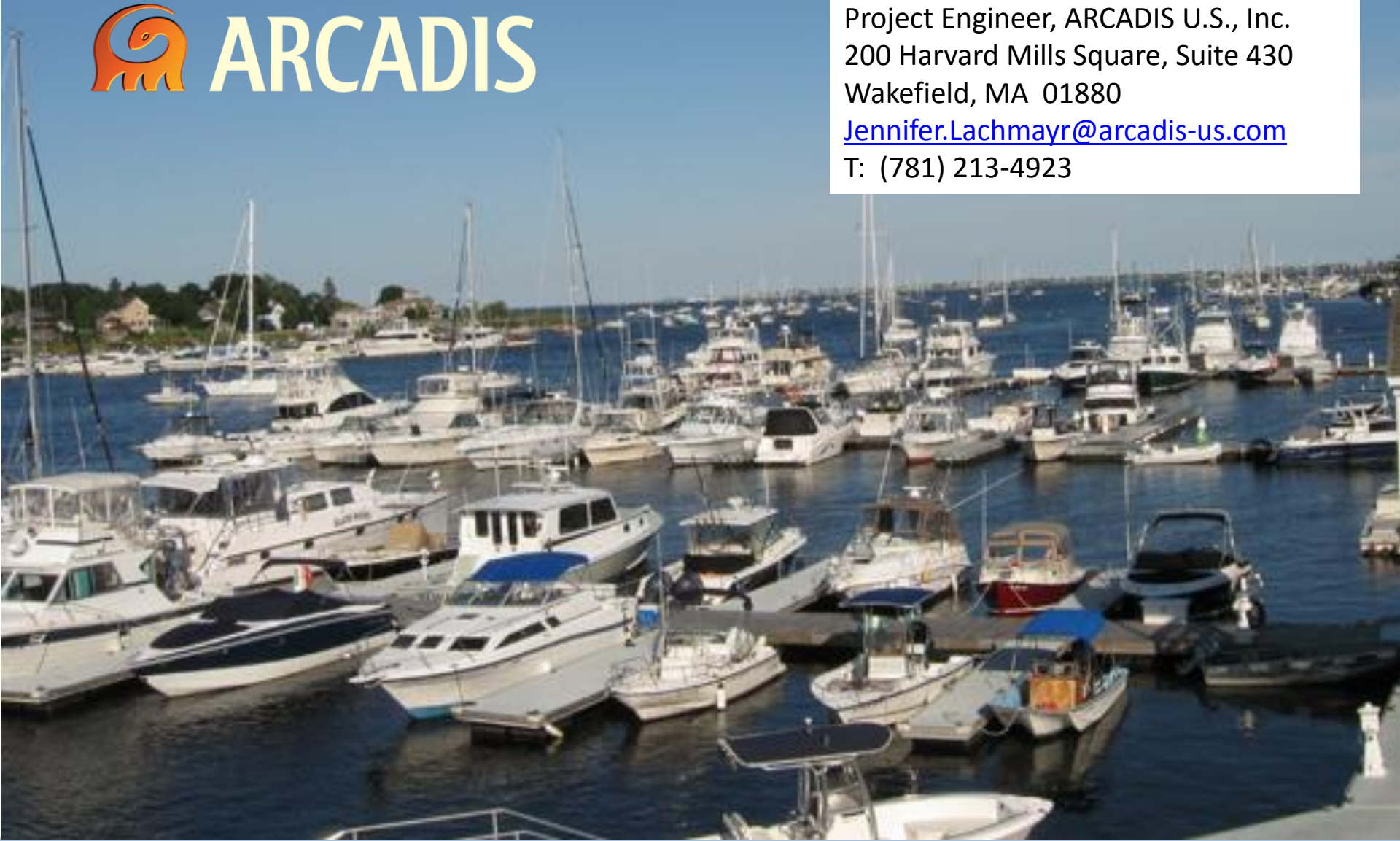
Project Engineer, ARCADIS U.S., Inc.

200 Harvard Mills Square, Suite 430

Wakefield, MA 01880

Jennifer.Lachmayr@arcadis-us.com

T: (781) 213-4923



Audience Poll Question

Significant obstacles to application of Green Infrastructure are:

(choose all that apply)

- A. Lack of technical standards
- B. Current codes and standards
- C. Local soil and geology
- D. Funding
- E. Local Expertise



Audience Poll Question

Has your home state promulgated rules for use of Green Infrastructure?



Audience Poll Question

Is your home City subject to a Consent Decree that prescribes Green Infrastructure?



Audience Poll Question

Choose all that apply

- A. Local policy makers understand the value of Green Infrastructure
- B. The local design community is supportive of Green Infrastructure
- C. Local developers are employing Green Infrastructure
- D. Public-Private partnerships are essential for redevelopment
- E. The economics of Green Infrastructure is well understood.



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