

# Community Collaboration on Cost-Effective LID Solutions: *Challenges & Opportunities*

NEIWPCC Nonpoint Source Pollution Conference  
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Stefanie Covino, Mass Audubon  
[scovino@massaudubon.org](mailto:scovino@massaudubon.org)



# Five quick points to set the stage...

1. Communities today are facing many pressures, including jobs and housing
2. Costs of providing municipal services often rise faster than revenues, including water infrastructure maintenance
3. There's not time to address long-term NPS pollution and climate change
4. Stormwater regulations are important, and solutions also need to be cost-effective
5. We will share lessons learned in a collaborative approach to municipal assistance addressing these topics in urban-rural settings

5.b. I promise things get more interesting from here...

# Project goal & non-municipal partners

To enhance municipal understanding and adoption of sustainable land use techniques such as LID and GI throughout the Blackstone Watershed



# What we offered

1. Local Engagement
2. Workshops
3. Technical Assistance
4. Fact Sheets
5. Interpretive Displays



# Presentation today

- ✓ Overview of issue & solutions offered
- ✓ Tips in presenting information along the way
- ✓ What we accomplished through partnerships
- ✓ Lessons learned
- ✓ Challenges to Change
- ✓ Partners: Multiplying our impact

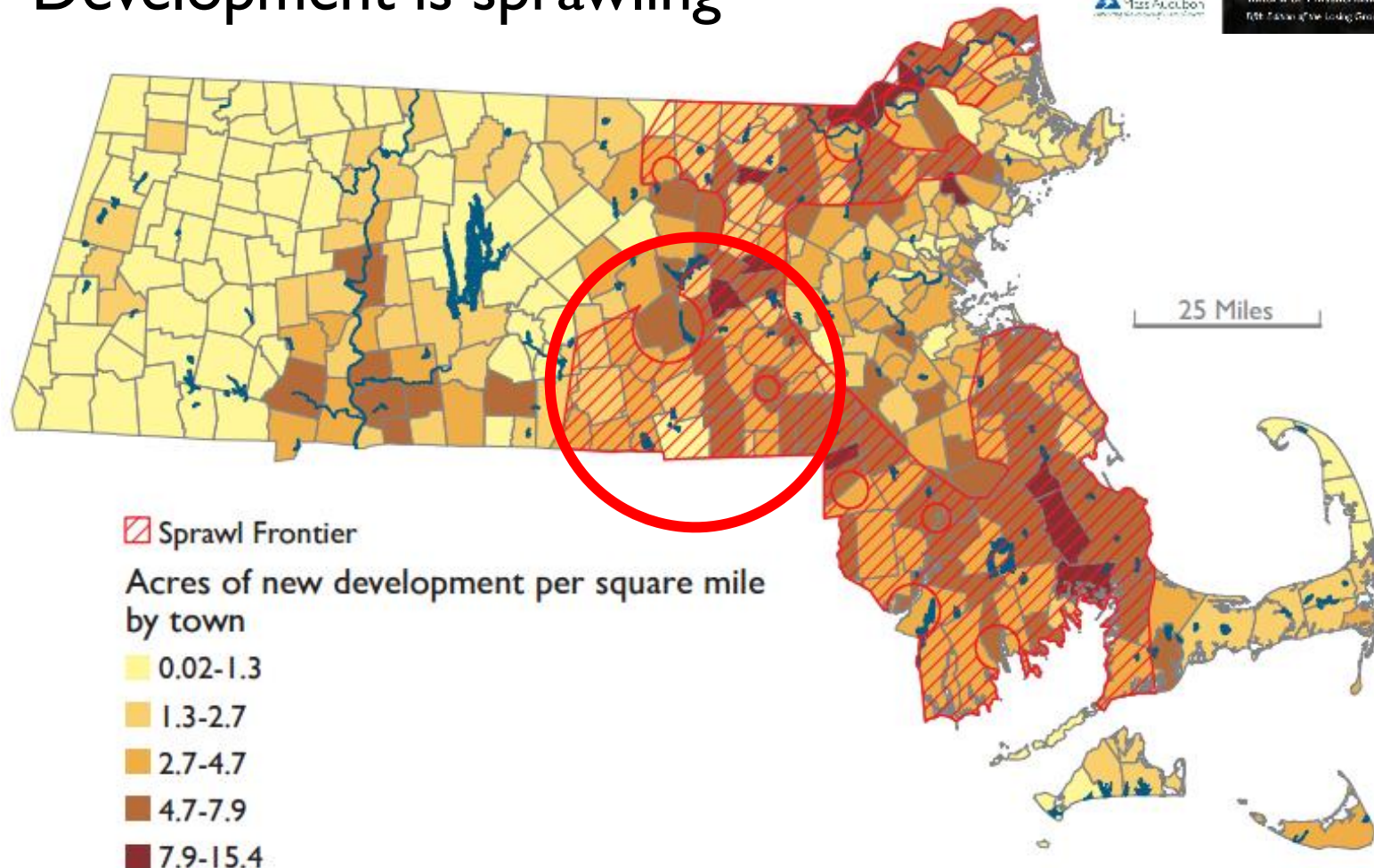


# What's the problem?

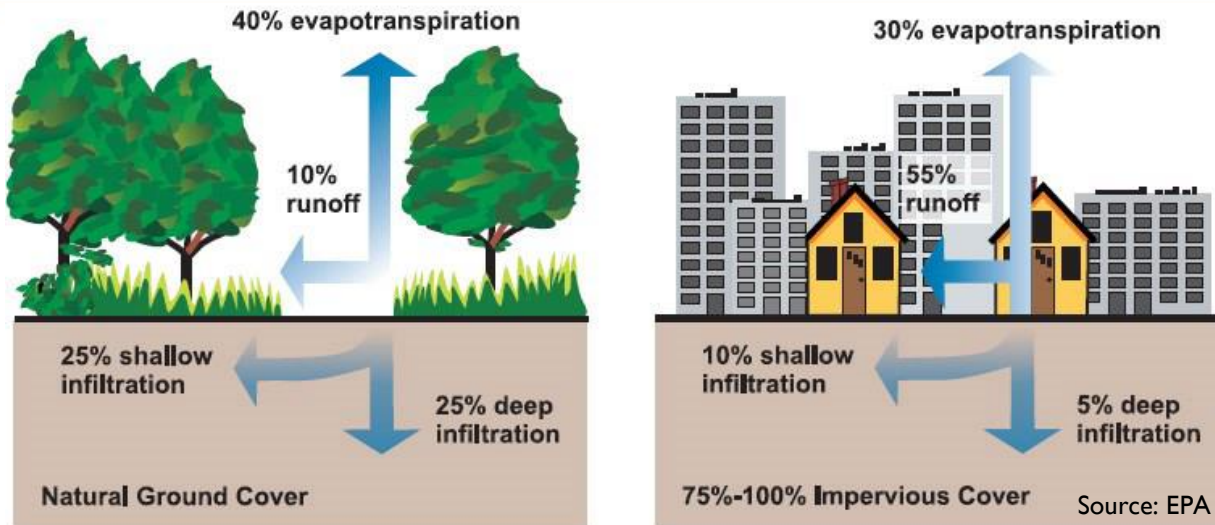
Development is sprawling



Mass Audubon  
Conservation Science Center



# What's the problem?



Impervious  
surface



Runoff



# We need to change course

Traditional development

Impervious surfaces

Thirsty Lawns

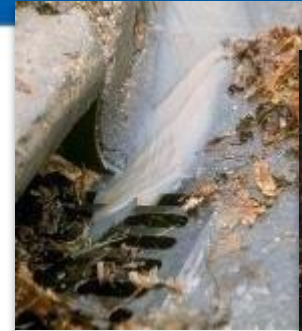
Stormwater runoff

Groundwater depletion

Water quality impairment

Infrastructure impacts

Financial and regulatory burdens



# What is Low Impact Development?

“ LID is an approach to land development (or re-development) that **works with nature to manage stormwater** as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that **treat stormwater as a resource** rather than a waste product. ”

- EPA



Source: Whole Buildings Design Guide, [wbdg.com](http://wbdg.com)

# Use relevant current situation

## *LID keeps water where you need it most*

Communities are running out of water and having to purchase MWRA water

This takes money away from infrastructure repairs that we need to solve these issues



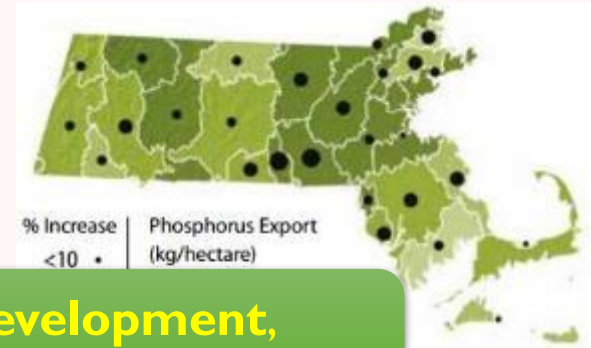
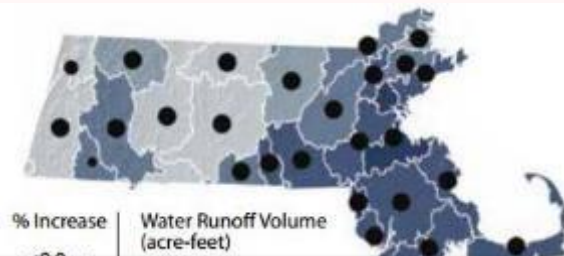
**make  
sure  
water that  
*falls* in our  
communities  
*stays* in our  
communities**

# Show there are choices – and consequences

## *The value of green: impervious, runoff, nutrients*

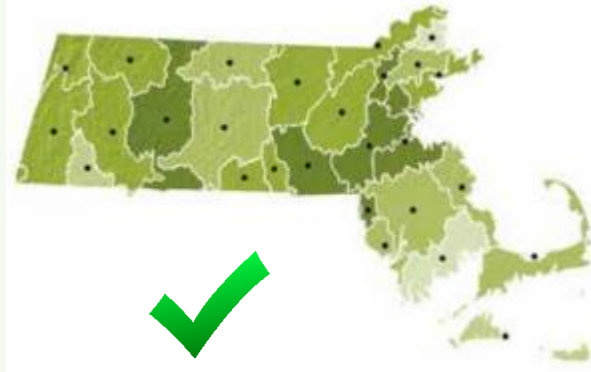
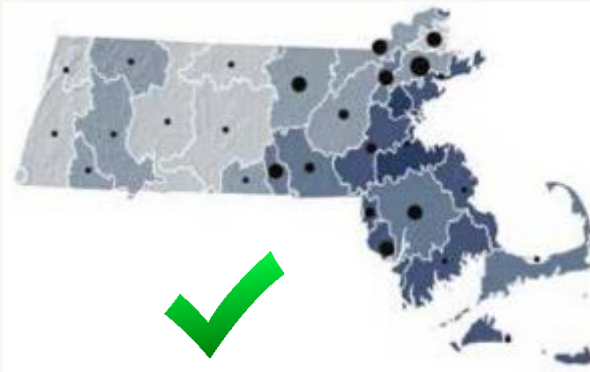
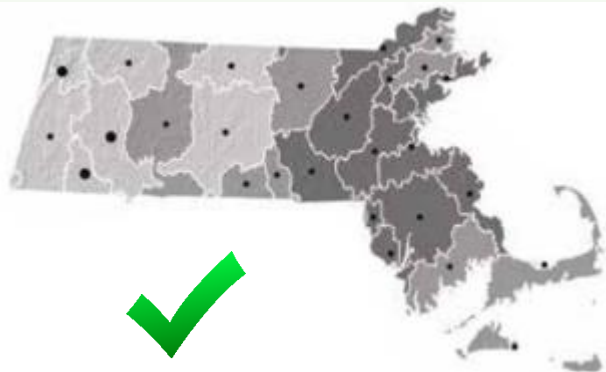
Source: Harvard Forest Changes to the Land 2014

If we continue to follow opportunistic growth, in 2060:



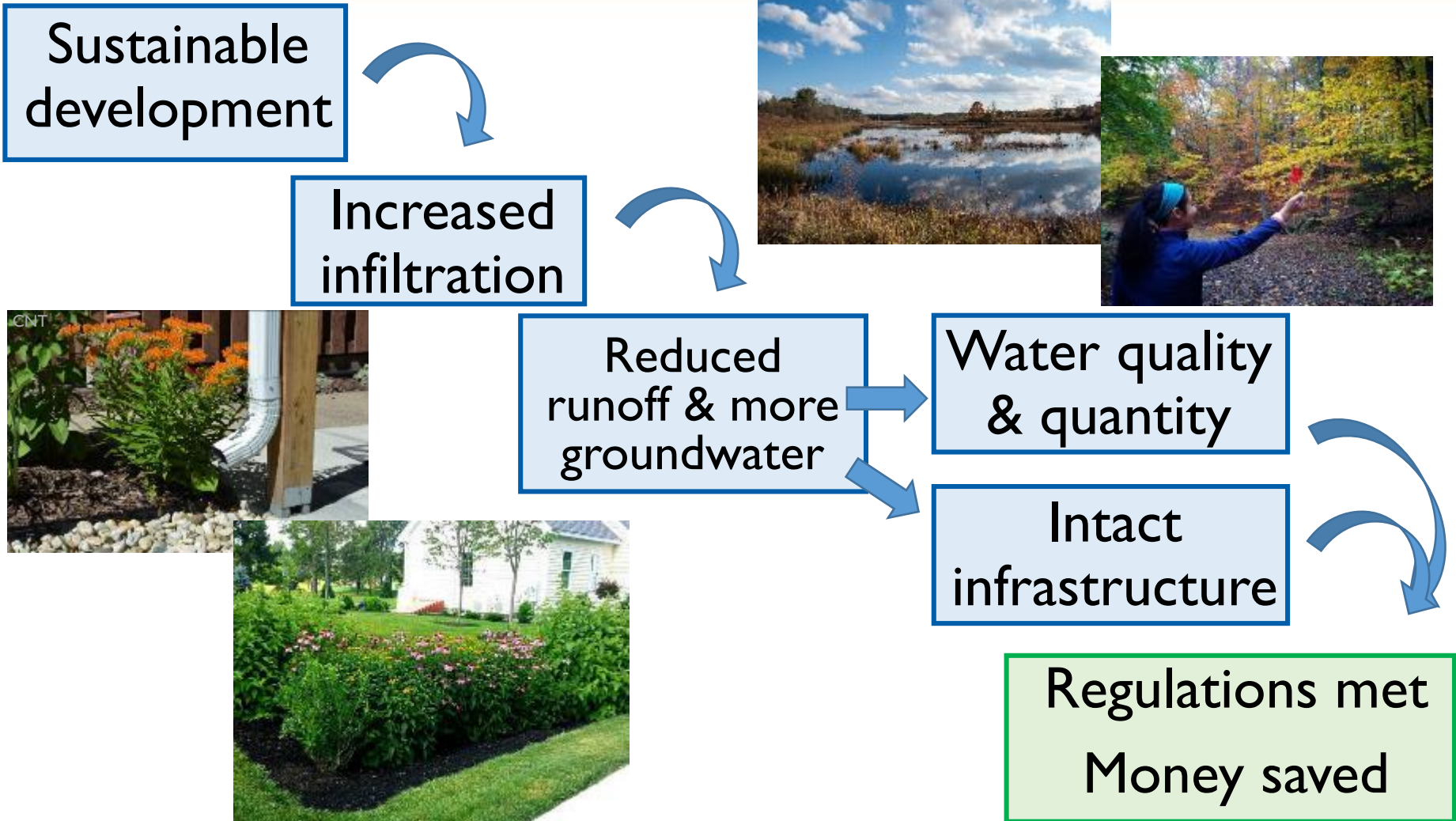
These allow for nearly the **same amount of development**, but 2/3 of it is **clustered** development

If we value forests as infrastructure, in 2060:



# Offer solutions, not just problems












## *A different direction: Greening your community*



# Offer actions that offer the best bang for the buck (from your partners' perspective)

Possible Action	Addresses Stormwater (MS4)	Addresses Water Management Act Mitigation	Helps with Climate Resilience
Revise bylaws to allow for & encourage LID	x	x	x
Replace culverts to meet stream crossing standards	x	x	x
Acquire/preserve property for resource protection	x	x	x
Adopt the Community Preservation Act to fund conservation efforts	x	x	x

# Benefits: Offer something for everyone

Benefit	Reduces Stormwater Runoff				Reduces Air Pollution	Reduces Noise Pollution	Increases Energy Efficiency	Increases Property Value	Increases Biodiversity	Increases Community Livability	Improves Community Livability				Improves Habitat	Cultivates Public Education Opportunities
	Reduces Water Treatment Needs	Improves Water Quality	Reduces Grey Water Needs	Reduces Land Use							Reduces Air Pollution	Increases Energy Efficiency	Increases Property Value	Increases Biodiversity		
Practice																
Green Roofs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Tree Planting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Bioretention & Infiltration	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Permeable Pavement	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○
Water Harvesting	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

(there are a lot of benefits)



Yes



Maybe



No

# Free ecosystem services: *the cost argument for communities*

Every \$1 invested in land conservation offers a **\$4 Return on Investment** in terms of these ecosystem service values

- **Flooding:** Floodplains provide flood protection and reduce infrastructure damage
- **Public Health:** Managing stormwater and reducing retention ponds reduces creation of mosquito habitat
- **Air Quality & Public Health:** Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences as well as reducing nitrogen dioxide and particulate matter
- **Water Quality:** Streamside vegetation filters pollutants and reduces erosion
- **Water Quantity:** Forests and wetlands store water, improve water quality, and recharge groundwater
- **Recreation:** Clean, flowing waters support recreation, including boating, fishing, and swimming while open space provides areas for hiking and biking
- **Quality of Life:** Open space and street trees create a more enjoyable walking environment, benefiting community connection, health, and economic benefit in downtowns and commercial areas
- **Property Value:** Healthy, mature trees add an average of 10-30% to a property's value

# Reduced clearing & grading costs: *the cost argument for developers*

- A 20-unit development with two-acre lots requires 40 acres to be cleared and graded
- Conservation subdivisions offer the same amount of housing but preserve 50% of land – and \$200,000+



The more  
land you save,  
the more  
**money** you  
save.

# Reduced paving & maintenance: *the cost argument for DPWs*

## Road Diets

Narrowing just 2 miles of road by 4 feet/lane saves



**\$ 500,000 \$**

Plus savings on repair, salting, plowing...

Not building the road through a sprawling development in the first place? Savings grow to the *millions*.

# Make it applicable:

## *Floods, droughts, and you!*

**As ConCom members, you can help!**

- ✓ Educating community members, homeowners, and local officials
- ✓ Encouraging use of native plants
- ✓ Encouraging use of stormwater management through LID
- ✓ Requesting developers consider LID in projects
- ✓ Working with other local boards on LID & preservation of natural GI



# Offer relevant takeaways (and repeat often) *Where you start depends on who you are*

**Conserve** the natural green infrastructure already providing free ecosystem services

**Integrate** LID and green infrastructure design into development

**Restore** the resiliency of urban landscapes through LID in redevelopment



conserve



restore



protect



save money

**What we could accomplish  
with partners...**

**we could never  
have accomplished  
on our own**

# I. Community engagement



**municipal  
officials**



**communities**

## **Needs:**

- Educate general community
- Engage multiple departments and entire boards
- Review bylaws/regulations holistically to encourage LID throughout
- Address maintenance, costs, and practical application



## 2. Workshops

5

workshops

114

attendees



# Workshop Information

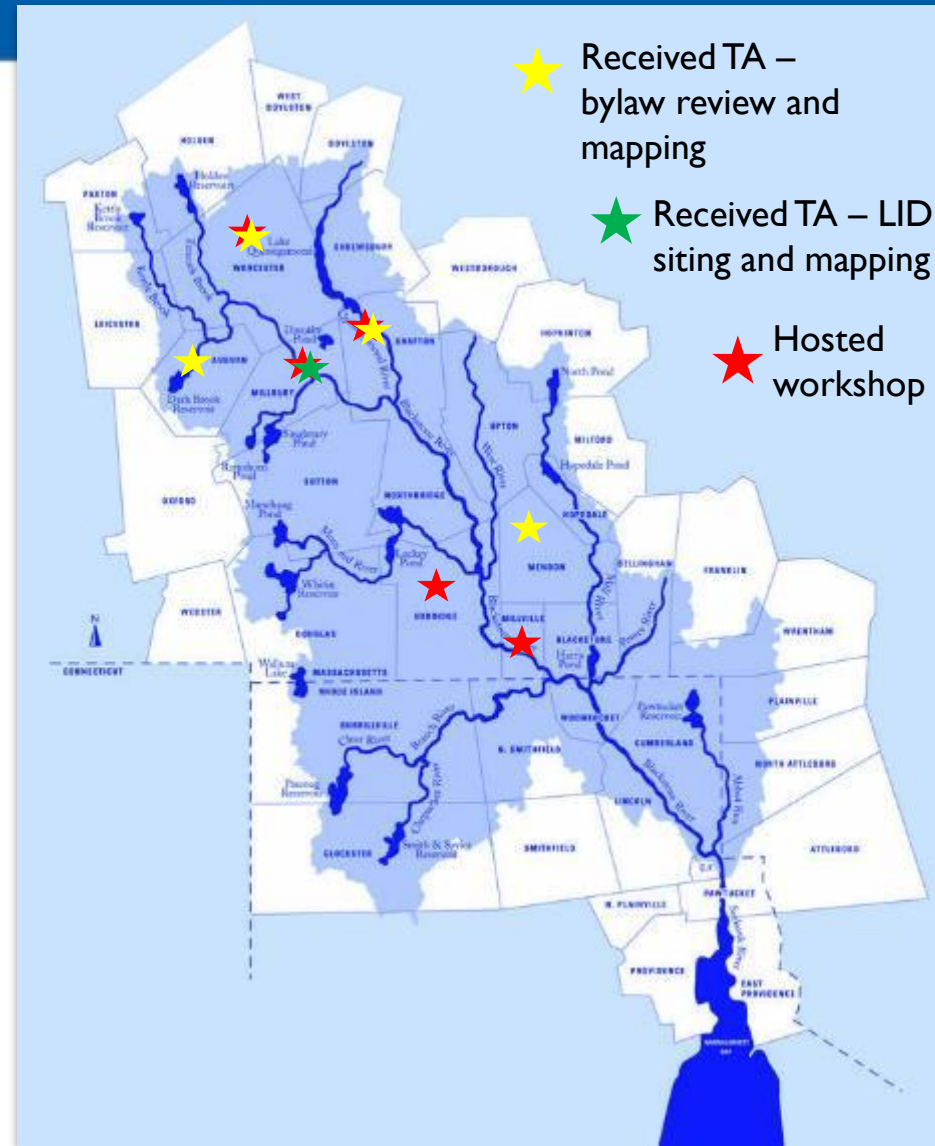


**attendees**

# 3. Technical Assistance

**5** communities

- Mapping
- Bylaw review
- LID siting and downtown greening





# Bylaw Review of Local Land Use Standards Relative to LID



conserve



restore

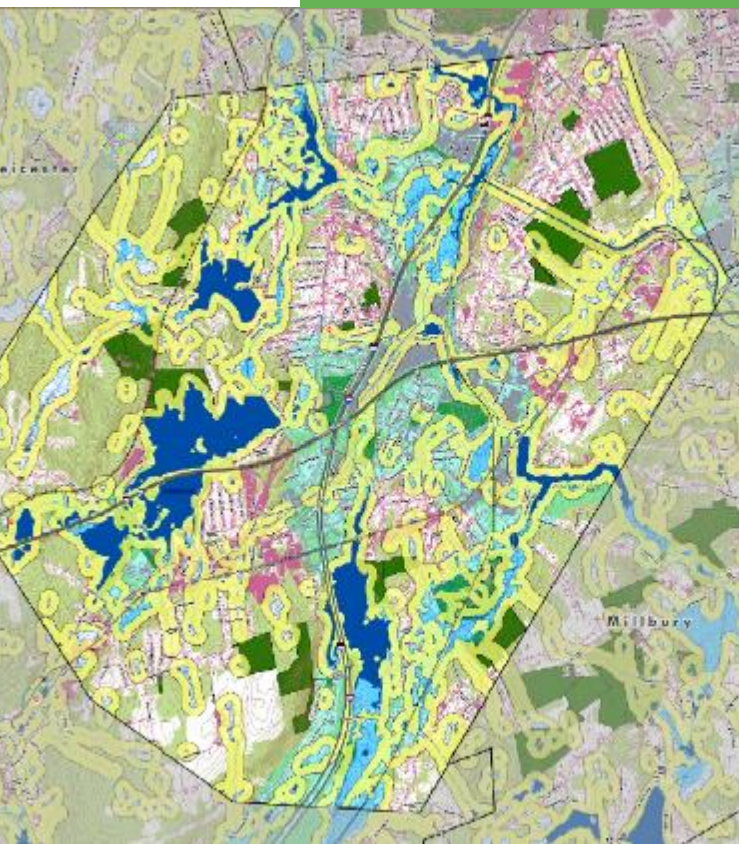


protect



save money

Auburn Zoning Bylaw Review Committee  
April 19, 2016



Green Infrastructure & Impervious Surface Base Map:  
AUBURN

**Legend**

Map Symbols:  
 - Green: Wetlands  
 - Yellow: Impervious Surface  
 - Blue: Water  
 - Pink: Residential  
 - Light Green: Open Space  
 - Dark Green: Forest  
 - Grey: Road  
 - Black: Boundary

Map Scale:  
 0 0.2 0.4 0.6 Miles

Map Title:  
 Green Infrastructure & Impervious Surface Base Map:  
 AUBURN

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0 0.2 0.4 0.6 Miles

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Green Infrastructure & Impervious Surface Base Map:  
AUBURN

MA Open Space Residential Design Best Practices Factors	Best Practice	Good	Fair	Auburn Open Space Residential Development Zoning S. 4.2
<b>Permit Type</b>	Mandatory	By Right	Special Permit	Special Permit, PB
<b>Land area to which the zoning is applicable</b>	All developable land zoned residential	Land of particular environmental sensitivity	Only a small amount of developable land	All developable land zoned residential
<b>Minimum Open Space</b>	≥ 75%	65-75%	50-65%	30% RA & RE, 40% RC & RR
<b>Yield Calculation</b>	By formula	Sketch plan with selected percolation test(s)	Full plan with full percolation tests	Based on dimensional standards (only slightly less than conventional)
<b>Minimum parcel size</b>	None	5-10 acres	≥ 10 acres	6 acres
<b>Review Process</b>	Flexible "OSRD" 4 Step	Cluster layout	No detailed analysis of site characteristics in relation to design	Generic site analysis
<b>Ownership of Open Space</b>	Appropriate to the resources present. For example, agricultural land by the farmer, watershed land by a water dept. or district, habitat land by the conservation commission, or recreational open space by a parks and recreation commission or homeowners association.			HA with CR, land trust, or town CC, no linkage to site values specified
<b>Dimensional Standards; area, frontage, etc.</b>	None set or small minimums	Formulaic reduction with specified minimums	Specified, < than for standard subdivision	Specified, only slightly < conventional, some > and buffer strips
<b>Quality of open space conserved: Specificity of local priorities for natural, cultural, and historic resource conservation</b>	Local priorities clearly and unambiguously stated and mapped for use in site design.	Lack of specificity regarding local conservation priorities; no map of priority locations	No indication of local conservation priorities, or language that refers only to regulated resource areas.	Only general references to wetlands, steep slopes, etc.

# 4. Fact Sheets

>80

Communities  
so far

Distributing at  
all major events  
& online



# 5. Interpretive Display

10,000  
annually

## When it RAINS....

When it rains, water runs off impervious surfaces—roofs, roads, driveways, and parking lots—collecting pollutants and sediments along the way. This flow, into catch basins and pipes that drain directly into local streams and ponds, reducing the quality of our local waters for swimming and boating, tourism and fishing, and drinking water.

Forests, wetlands, fields, and other open spaces act as natural filters, picking up pollutants, reducing sediments, recharging groundwater, and keeping our watersheds healthy. As more land gets developed, this natural "green infrastructure" is reduced, lessening a community's ability to manage this type of pollution. This is especially an issue in highly developed urban environments such as Worcester. About 75% of the phosphorus in the Blackstone River and significant amounts of nitrogen flowing into the Hattergess Bay are from stormwater runoff!

The Blackstone River watershed, which spans 545 square miles and encompasses thousands of acres of rivers, ponds, lakes, and reservoirs, begins here at the headwaters of Broad Meadow Brook. With that in mind, we redeveloped our parking lot and Education Center using low impact development to reduce impervious surfaces and provide areas for stormwater to be collected and filtered before entering local waterways. The reduced stormwater is now filtered through our rain gardens, significantly improving on-site water quality here. These types of improvements can protect Broad Meadow Brook as well as the rest of the Blackstone River Watershed.

### A Garden for a Rainy Day

A rain garden is designed to capture, hold, and filter runoff from roofs, parking lots, and streets. It allows water to infiltrate the ground and filter out pollutants before reaching local waterways. The diagram shows a cross-section of a rain garden with layers of mulch, plants, and soil, with arrows indicating the flow of water from the surface into the ground.

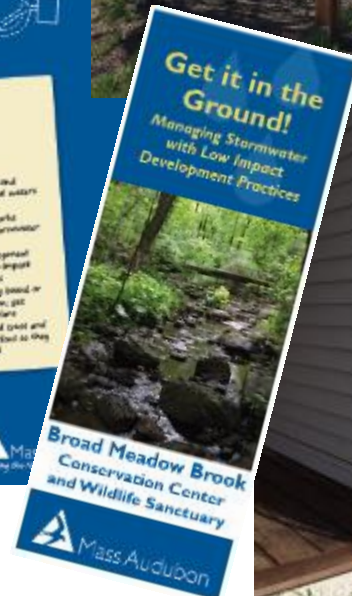
### Five Ways to Manage Stormwater

- No-Flow Open Space Areas**  
This area is used more often in order to decrease the volume of stormwater runoff in the spring and fall, and reduce the risk of flooding.
- Stormwater Capture**  
This garden is located near areas of the parking lot that are used for parking cars. It captures and stores stormwater runoff, allowing it to infiltrate the ground and filter out pollutants before reaching local waterways.
- Rain Gardens**  
These gardens, built in urban environments, capture and store stormwater runoff, allowing it to infiltrate the ground and filter out pollutants before reaching local waterways.
- Permeable Pavement**  
These pavements have openings between them or gaps between and below them to allow water to flow through and into the ground instead of running off. This also reduces the risk of flooding by reducing the volume of water that runs off.
- Rain Barrel**  
Stormwater is collected in a rain barrel, which can be used for irrigation or other purposes. This reduces the volume of stormwater runoff that enters local waterways.

### What You Can Do

There are lots of ways you can help manage stormwater and keep local waters clean and healthy:

- Example ways to help:**
  - Devise a way to catch or collect rain in a rain barrel.
  - Clean up your yard, patio, and driveway of debris.
  - Avoid or minimize use of chemicals and fertilizers in your yard.
- Landscaping and lawn improvements:**
  - Plant a rain garden.
  - Plant a tree.
  - Collect and run-off in a rain barrel and use it to water your garden.
  - Replace pavement with permeable surfaces.
- In Your Community:**
  - Talk with your neighbors and friends about keeping local waters clean and healthy.
  - Encourage your public works department to install stormwater management features.
  - Advocate for local development rules that allow for low-impact development approaches.
  - Join your local planning board or community council, get involved in municipal planning.
  - Support your local land and water conservation organizations so they can protect more land.



# Lessons Learned

- Outreach & understanding your audience is crucial
- Opportunities exist everywhere – make it relevant
- It's been done – share local examples
- Real examples and costs are compelling
- Start from where your audience is; don't assume!
  - Land use → water?
  - What is stormwater?

## Benefits of LID



Reduced flooding



Improved water



Manage water



Recreation



Public health



Habitat creation



Climate change mitigation



Property value



Energy savings

# Lessons Learned: Where are communities on LID?

- Heard about LID, want more specifics
- Few communities have OSRD bylaws
  - By right, 4-step process, maintained
- Common Findings
  - Rigid dimensional requirements
  - Few LID incorporations/not addressed
  - Minimum (not max) parking
  - Doesn't address clearing/grading
  - Wide roads with curbing and sidewalks
  - Nonnative (sometimes invasives) required



# Challenges to Change

- Capacity
  - Few full time staff in small towns
  - Comprehensive planning takes time
- Public understanding
- Local champions to stay the course
  - Zoning bylaw changes require TM; take time
- Large scale support
  - State-level
  - Regional Planning Agencies



# Secret Sauce to Success

- Offer many benefits to different audiences
  - Financial, regulatory, social
- Examples at various scales & setting (urban & rural)
- Engaging broad audiences in ways they understand
  - Public & private / Kids & adults
- Offers small steps and simple solutions
  - Demonstration sites
  - Narrower roads or adding signage
- Offering non-regulatory solutions



# We're multiplying our impact through partnerships – because we're all in this together

**NARRAGANSETT BAY  
ESTUARY PROGRAM**



MassDevelopment



THE UNIVERSITY  
OF RHODE ISLAND  
GRADUATE SCHOOL  
OF OCEANOGRAPHY



**NASHUA RIVER  
WATERSHED  
ASSOCIATION**



OPEN SPACE  
INSTITUTE

The Nature  
Conservancy



IPSWICH RIVER  
WATERSHED ASSOCIATION  
The Voice of the River



**LandVest**

**The Blackstone  
River Coalition**

**Taunton River**  
Watershed Alliance



FOUNDATION FOR METROWEST



# Thank you!

For more information, please visit  
[www.massaudubon.org/shapingthefuture](http://www.massaudubon.org/shapingthefuture)



Stefanie Covino  
[scovino@massaudubon.org](mailto:scovino@massaudubon.org)



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[http://www.foundationformetrowest.org/](http://www.foundationformetrowest.org)



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