Is Your Community Climate Resilient?
Bylaws and Best Practices - How-to Training

Thursday, October 27, 2022

Middleborough, MA



Heidi Ricci, Mass Audubon
Stefanie Covino, Blackstone Watershed Collaborative
Danica Belknap, SRPEDD
Tara Lewis, Cape Cod Commission
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The SNEP Network is a project of the New England Environmental Finance Center and is funded by the U.S. Environmental Protection Agency's Southeast New England Program.
www.snepnetwork.org

LOOKOUT FOUNDATION



- Introduction & Overview
- Challenges and Solutions
- Local Bylaws & Review Tool
- Case Studies, Regulations, & Financial Context
- Break
- Let's Go! (Working Session)
- Report-Outs and Discussion
- Next Steps and Resources

Introduction and Overview

Heidi Ricci
Director of Policy and Advocacy

Mass Audubon

Learning Objectives

Following this training, participants will:

- Understand links between climate impacts and land use
- Define Nature Based Solutions, Green Infrastructure, and Low Impact Development (LID)
- Understand the role of local regulations in reducing costs and impacts
- Gain experience through an interactive exercise in using the bylaw review tool to prioritize local updates
- Learn about case studies and resources



Wellfleet Bay Wildlife Sanctuary, South Wellfleet. Photo by Dennis Welsh.



Great Blue Heron © Amy Erb

GO WILD
Mass Audubon's Action Agenda

2021-2026

Mass Audubon
Protecting the nature *of Massachusetts*

Action Agenda Goals

Resilient Landscapes



Protect + Steward

Ensure **30%** of Massachusetts is protected by 2026.

Inclusive and Equitable Access



Listen + Engage

Protect and provide access to **20** new urban greenspaces.

Double participation of low-income communities and communities of color in our programs.

Climate Policy

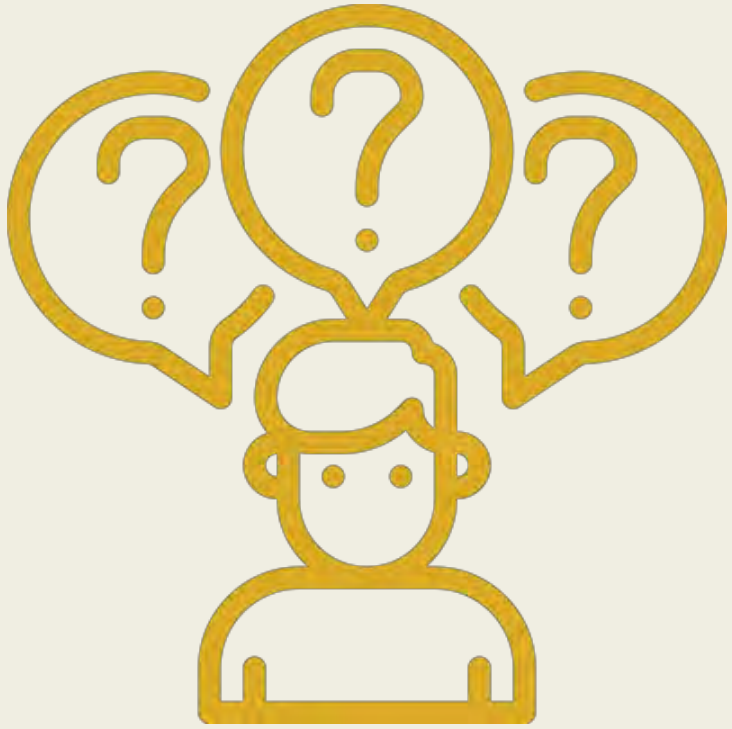


Mobilize + Advocate

Achieve full implementation of the state's 2050 net zero carbon emissions goal by mobilizing our **135,000** members to drive for climate policies.

Annual Development & Housing Permits





Questions?



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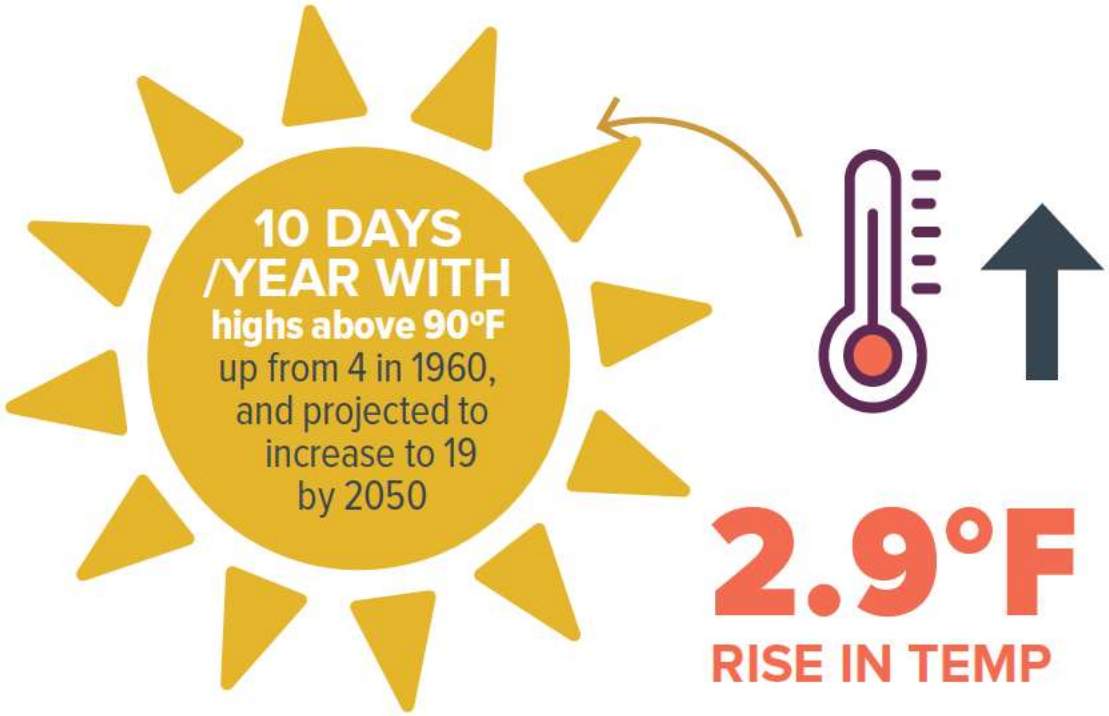
Climate change

Development

Challenges We're Facing

Stefanie Covino,
Blackstone Watershed Collaborative

Blackstone Watershed Collaborative



2.9°F
RISE IN TEMP

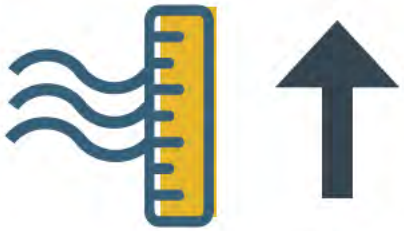


11 DAYS
GROWING SEASON



55%
STRONGER
STORMS

more rain
and less snow
in winter, and
more frequent
droughts

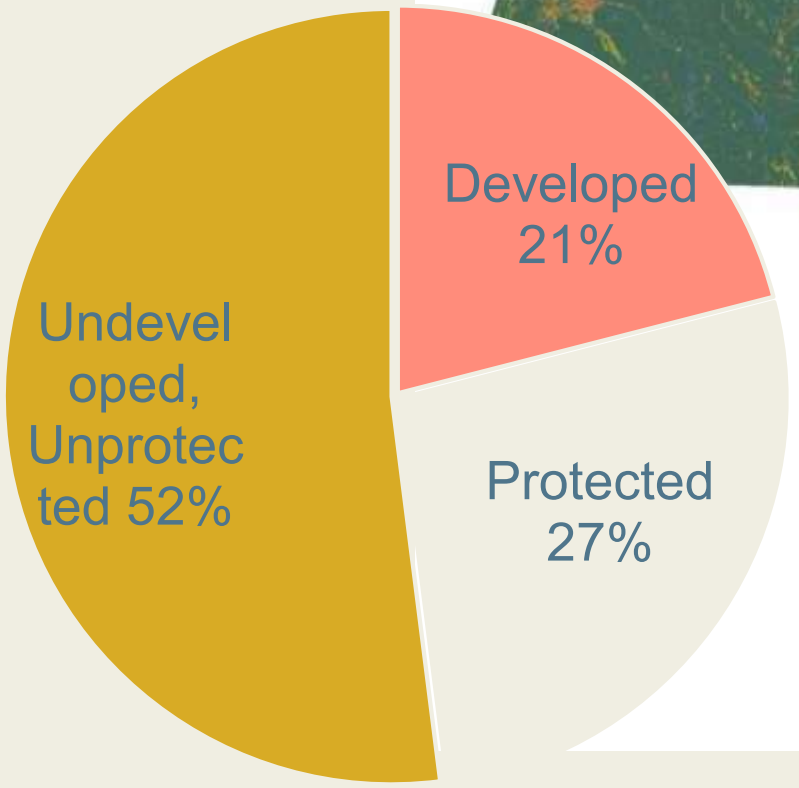


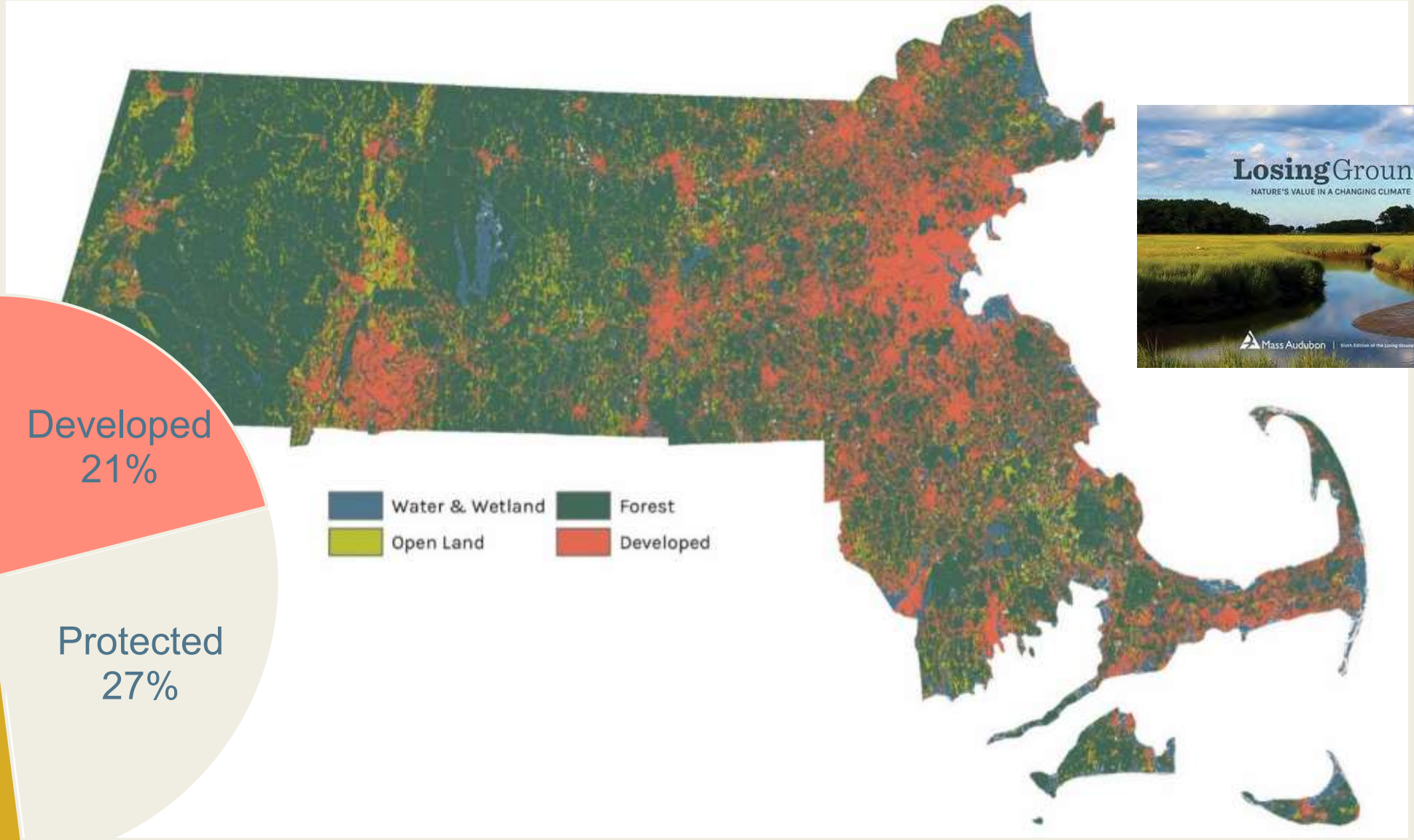
11" SEA LEVEL
RISE SINCE
1922, AS MEASURED
IN BOSTON HARBOR



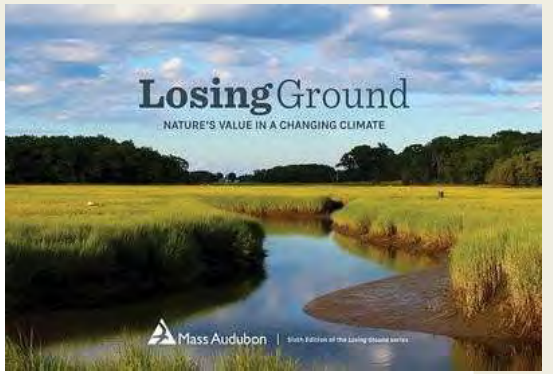
Our climate really is changing...!

This is exacerbated by our land use patterns





Development is sprawling



Pittsfield
Springfield
Worcester
Lowell
Boston
New Bedford
91
90
495
93
95
195
495

RATE OF DEVELOPMENT

slowest
0 acres/sq. mile

fastest
11.3 acres/sq. mile

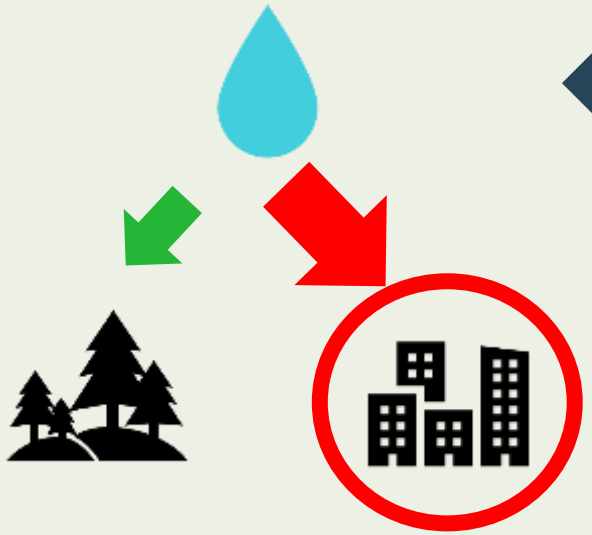
Sprawl Frontier

Climate change

increased temperature

extreme precipitation

increased drought



Development

impervious surfaces

nutrients

warmer waters

flashy systems & flooding

drinking water shortages

Real solutions: Nature based solutions

NBS protect, restore, and/or manage an existing ecological system or mimic natural processes, to protect public health and clean water, increase natural hazard resilience, and/or sequester carbon



Conserve natural areas already serving these functions



Integrate nature into new and re-development



Restore resilience in urban areas through engineered solutions

Nature based solutions: GI & LID

Green Infrastructure (GI)

refers to conservation or restoration of natural features and processes that already provide benefits to nature and people



Low impact development (LID)

offer more engineered actions or strategies that seek to mimic green infrastructure and its benefits



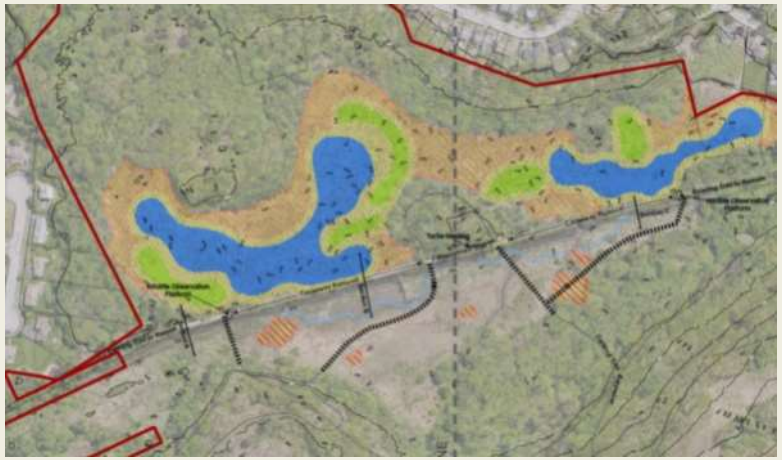
Examples of Nature Based Solutions



Culvert replacement



Street trees



Wetland restoration



Bioswales

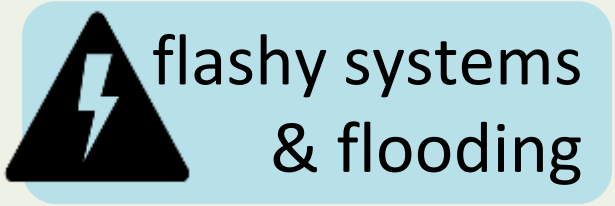


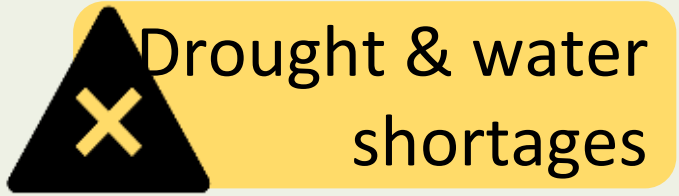
Permeable pavement

NBS address hazards & offer community benefits



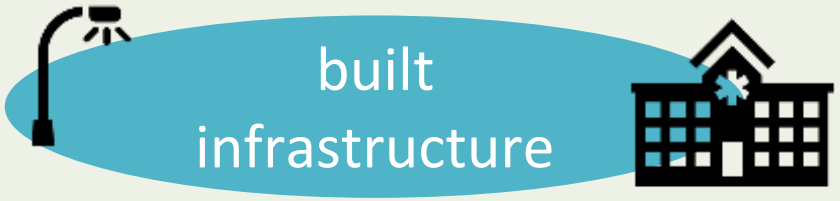


















Avoided costs



Enhanced safety



Improved resilience



Let’s poll the audience!

Green Infrastructure (GI):

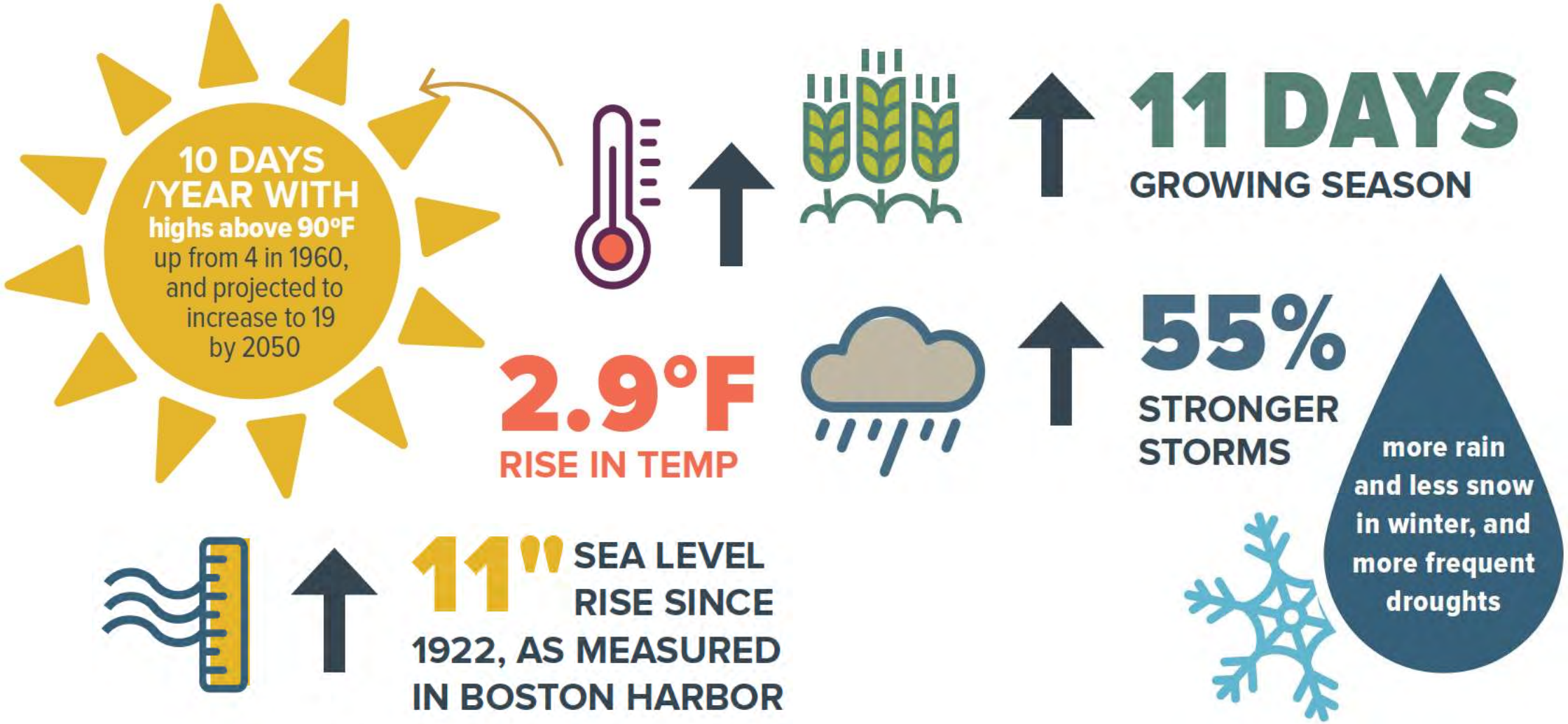
Humans harnessing nature for use as an infrastructural system.

A network of waterways, wetlands, woodlands, wildlife habitats, and other natural areas that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to health and quality of life



Green Infrastructure Network (GIN)





Is our climate really changing…?

Is it bad? By the year 2100, climate change in Massachusetts may result in…

Temperature: ↑ **3 to 11°F**

Growing Season: ↑ **5 weeks**

Sea Level Rise: ↑ **3 to 7'**

Strong Storms: ↑ **47%**



David L. Ryan/The Boston Globe via Getty

Source: NCICS State Summaries, Fourth National Climate Assessment, and NE CSC

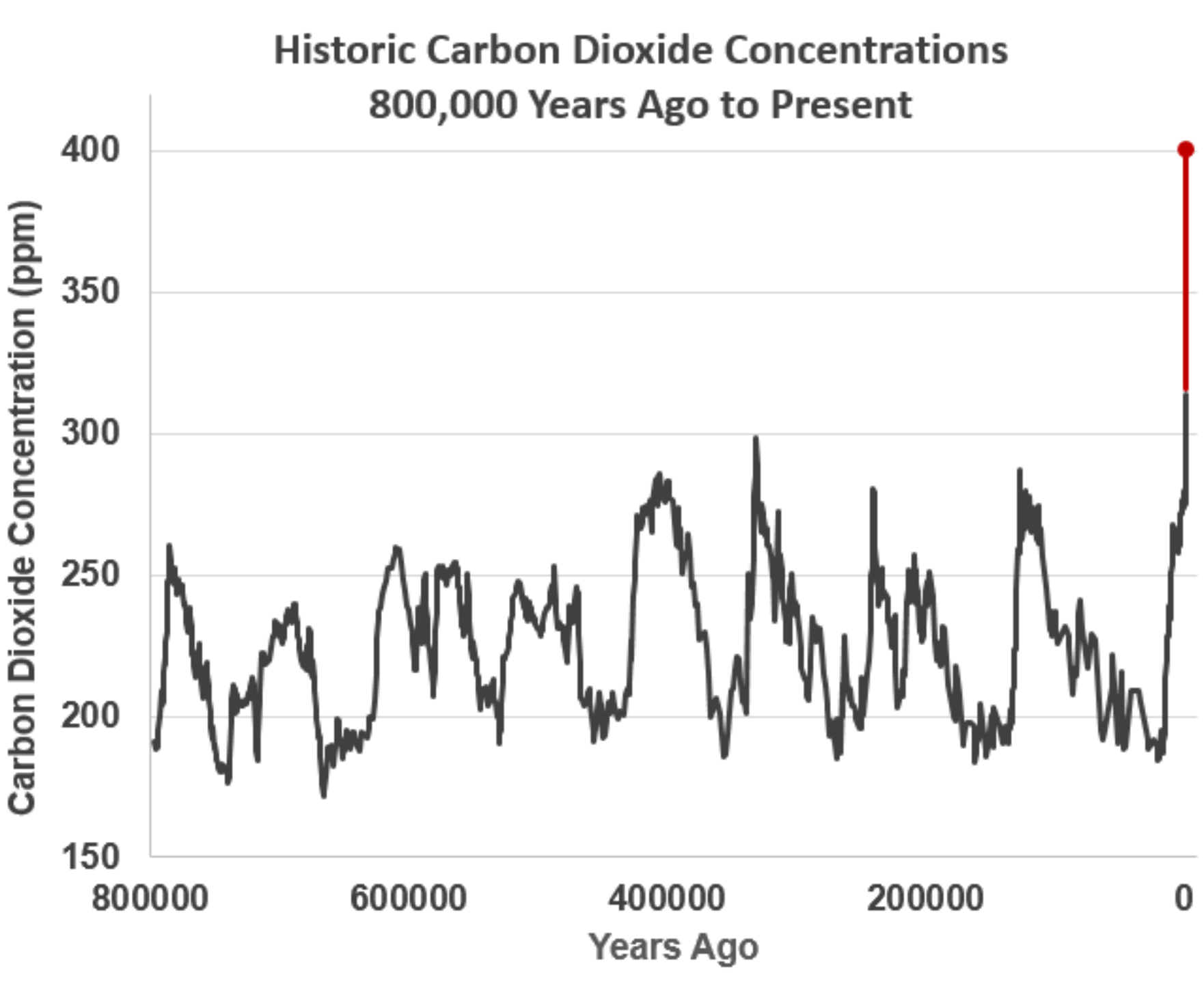
Is it us?

A **natural change** of 100ppm normally occurs over a period of

5,000 to 20,000 years.

The **recent increase** of 100ppm has taken

120 years.



Climate Change

1. Experts agree.
2. It’s real.
3. It’s bad.
4. It’s us.
5. We can fix it.


There are real solutions that already exist:
One of the best climate change actions is preserving the natural environment.



Nature Works!

Carbon sequestration



Nature Works!

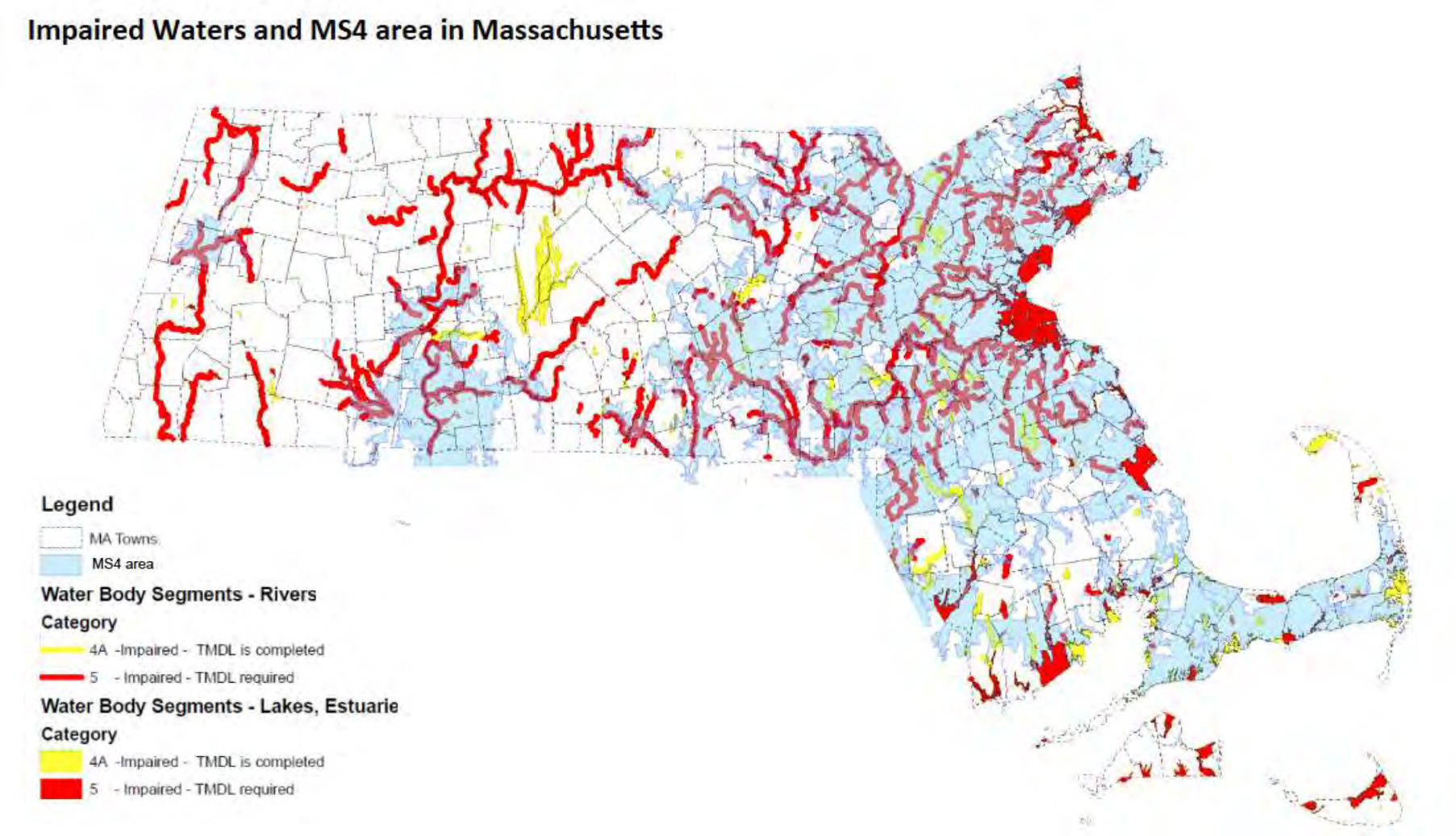
Clean air

Nature Works!

Water filtration



Impaired waters in Massachusetts



Nature Works!

Buffering storm effects and flooding



Hurricane Sandy aftermath
Point Pleasant, NJ

Nature-based solutions at every scale

Rural and urban

Conserve available open space providing ecosystem services



Integrate concepts into new development at neighborhood scales



Restore resilience in urban areas at site specific scale



Hazards











Nature-based solutions

- Open space preservation
- Low Impact Development
- Ecosystem Restoration

Municipal benefits



Avoided Costs



Enhanced Safety



Environmental Services

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In summary

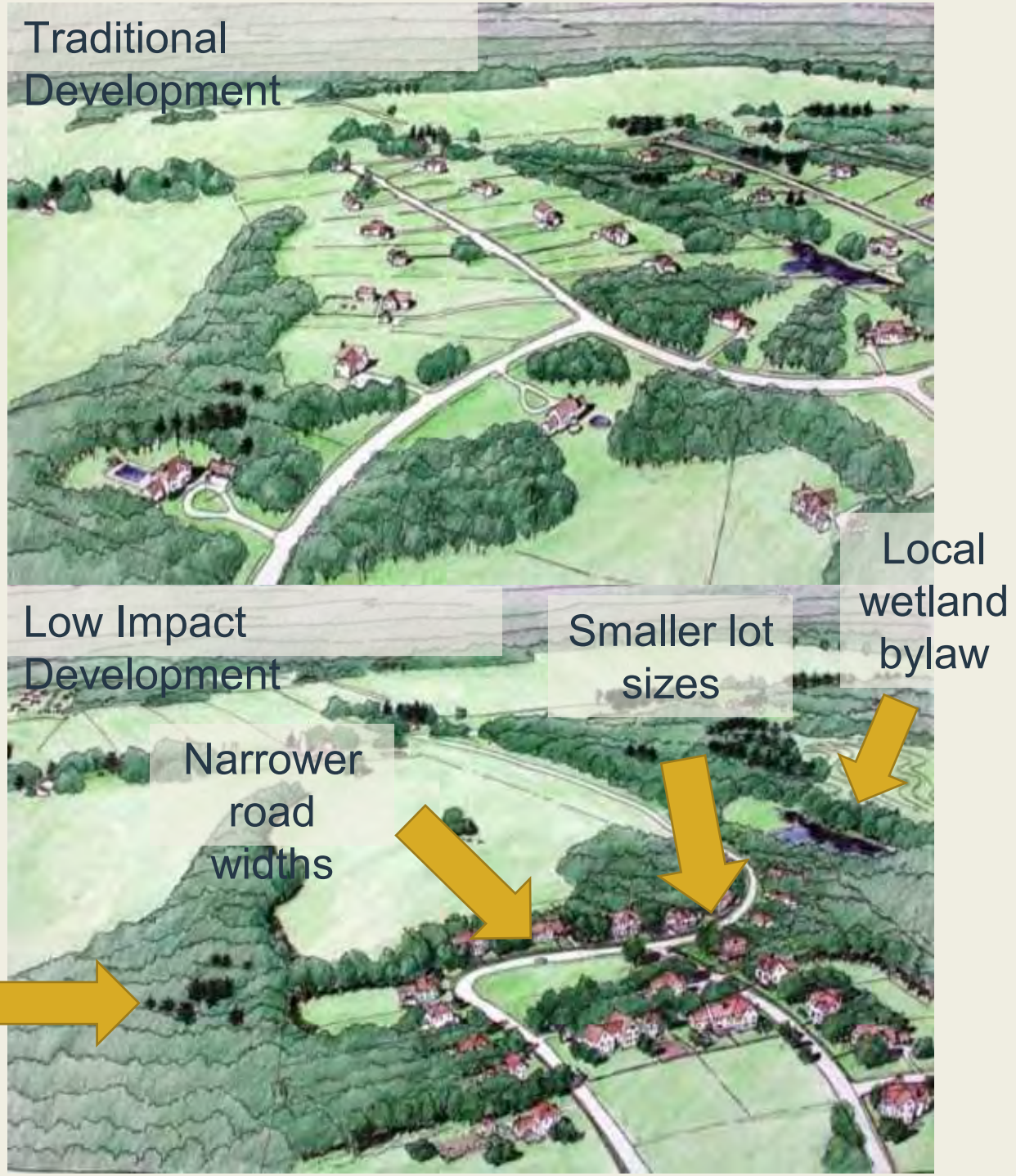
- Building community resilience to climate change and protecting community resources are critical areas of concern.
- We can look to nature for solutions to many climate challenges.

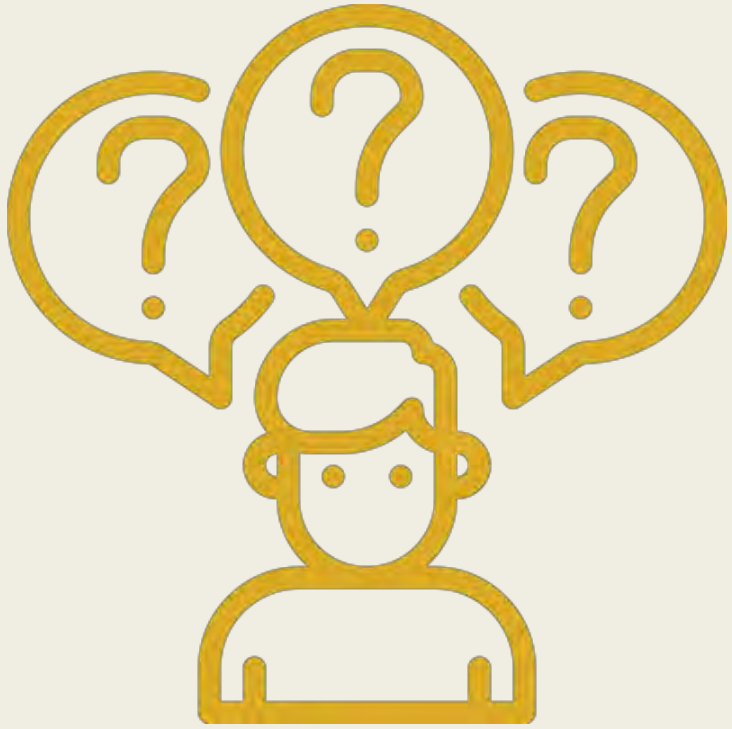


LID in practice



Preservation of existing mature vegetation





Questions?



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- Challenges and Solutions
- **Local Bylaws & Review Tool**
- Case Studies, Regulations, & Financial Context
- Break
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How Can Communities Utilize These Solutions?

Local Bylaws and Review Tool

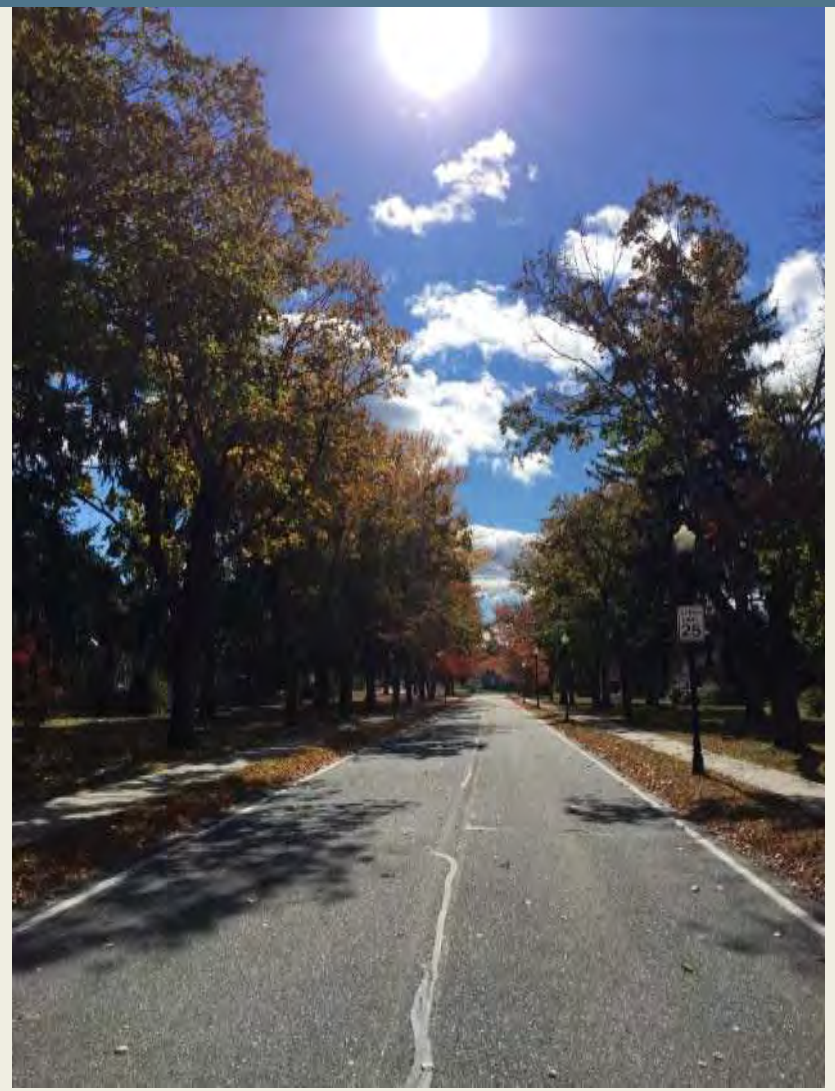
Danica Belknap
Senior Environmental Planner

SRPEDD
Southeastern Regional Planning & Economic Development District

Why bylaw review?
You get what you zone for!

Communities often **unintentionally discourage** sustainable growth by…

- Requiring large lots, strict dimensional requirements
- Requiring wide, curbed roads
- Requiring non-native species
- Not prioritizing LID or preservation of natural features



Mass Audubon

Bylaw Review Tool

massaudubon.org/bylawreview



Supporting LID in Your Community

How to Compare Local Land Use Regulations with Best Practices

Key Areas of Analysis

The following analysis framework is designed to assist communities in Massachusetts in applying cost-effective Low Impact Development (LID) techniques. Specifically, this template enables you to evaluate local land use regulations in relation to models and examples from the Commonwealth of Massachusetts' Smart Growth/Smart Energy Toolkit and other sources in relation to the use of LID and Green Infrastructure (GI) techniques. The focus is primarily on residential development, but the concepts are also applicable to other forms of development and redevelopment.

Best practices minimize the alteration of natural green infrastructure such as forests; reduce creation of impervious surfaces; support retention of naturally vegetated buffers along wetlands and waterways; minimize grading and alterations to natural flow patterns; and support the use of LID techniques as the preferred, most easily permitted methods for managing stormwater.

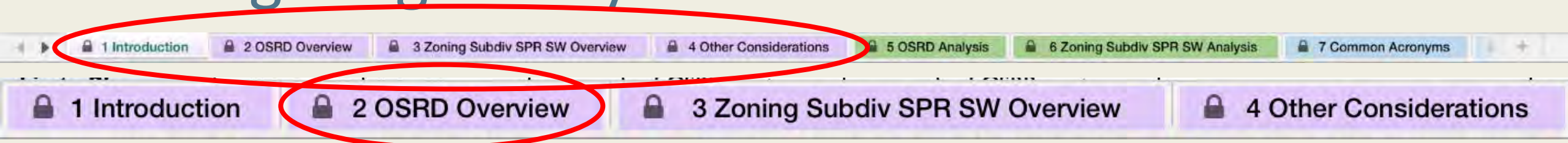
Get more details on LID's many cost-savings and other benefits at: www.massaudubon.org/LIDCost.

Local coordination across municipal boards and permits is also important for supporting LID. Application of these practices can result in significant savings in infrastructure maintenance costs, as well as improved water quality and protection of water supplies, while supporting property values and overall quality of life. Sustainable development through the application of LID in all aspects of land and water management is a multi-faceted issue that can only successfully be addressed by working together among different departments and perspectives.

Key Areas of Analysis

1. **Overall site design**: Open Space Residential Design (OSRD) vs. conventional subdivisions
2. **Project design and layout standards in relation to LID**: road layout and width, curbing, drainage, sidewalks, parking, landscaping
3. **Maintenance and operations, mechanisms for enforcement**: Who is responsible for maintaining drainage/LID (municipal or homeowner); easements, homeowner association option; municipal inspection and administration systems (this is needed regardless of who is responsible)

Navigating the Bylaw Review Tool: Sheet 2



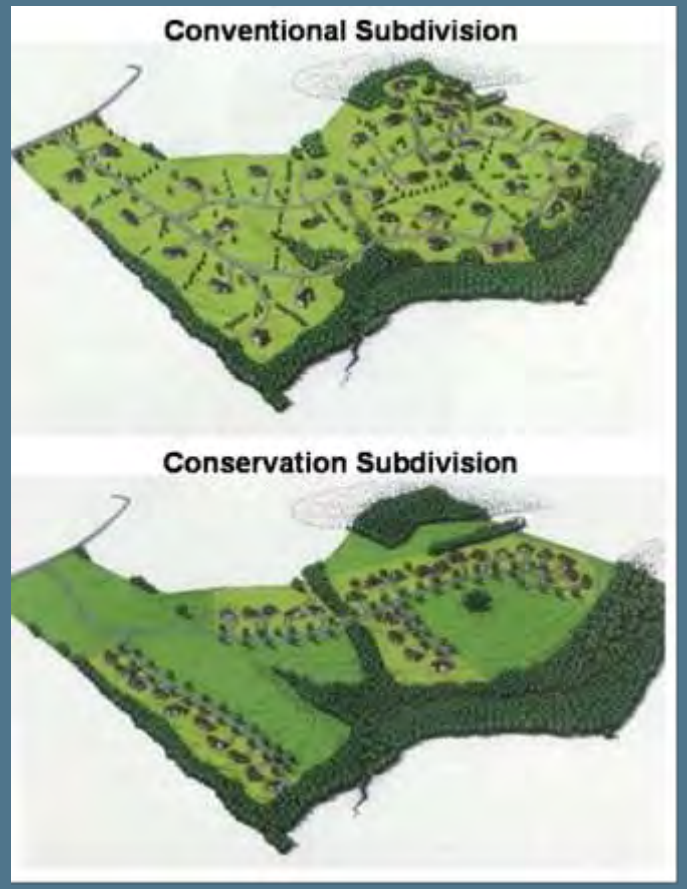
Open Space Residential Design (OSRD) Overview

This section reviews how local bylaws for cluster, Open Space Residential Design (OSRD), or Natural Resource Protection Zoning (NRPZ) compare to the state's recommended best practices. Communities may currently have multiple bylaws that cover this in different residential areas, in which case they can each be compared to the model regulations. However, in most cases, we would encourage simplification and the use of a single OSRD bylaw with local priorities clearly defined.

Communities may also have no cluster, OSRD, or NRPZ bylaws on the books. In this case, the state's best practice model (see resources below) can be used to create one. If the community closely follows the model, they'll meet the characteristics described within the analysis. However, the analysis still provides a quick checklist.

Some of the most important aspects of OSRD in any community include: the four-step review process that carefully considers the natural landscape before drawing lot lines; the minimum amount of open space protected; the incorporation of LID practices; and allowing this type of development by right instead of special permit.

Open Space Residential Design (OSRD)



Does my community have an OSRD Bylaw?

- **Also known as:**
  - Open Space Design (OSD)
  - Conservation Subdivision
  - Natural Resource Protection Zoning (NRPZ)
  - Cluster Zoning

- **Where to find**
  - May be a stand-alone bylaw, or may be a part of the Zoning Bylaw
  - Check your Planning Board's documents webpage

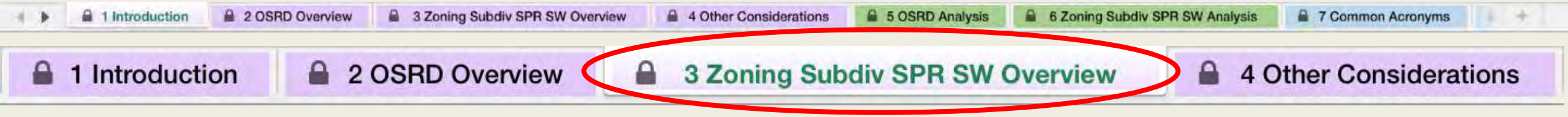
Open Space Residential Design

- An alternative to conventional subdivisions that:
  - Clusters development to preserve open space
  - Sets natural land aside for conservation
  - Offers flexible subdivision regulations
  - Encourages site-specific design that prioritizes preservation of notable features
  - Includes a streamlined permitting process

Example: Sherborn

- Allows OSRD by-right as a "preferred alternative" to conventional subdivisions in all residential districts

Navigating the Bylaw Review Tool: Sheet 3



Zoning Bylaws, Subdivision Rules and Regulations, Site Plan Review, and Stormwater/LID Overview

This section reviews not only the individual bylaws and regulations, but also how they work together and how consistent they are. Communities often update portions of bylaws or regulations in a piecemeal way over decades, leading to inconsistencies among various provisions. This color-coded analysis provides a quick overview of not only which rules are out of date and not meeting best practices for LID and preservation of Green Infrastructure, but also how certain topics (such as siting of LID) may be inconsistent between different parts of the local land use rules.

Not all factors (such as road width, siting of LID, limits on clearing and grading, or allowing common drives) may be addressed in each of the sections considered (Zoning bylaws, Subdivision Rules and Regulations, Site Plan Review (SPR), and Stormwater/LID bylaw). Where that factor is not usually included within a regulation or bylaw, you'll notice that "*(Not Applicable)*" will appear in that box. For example, setbacks and frontage requirements are addressed under Zoning, but often not under other bylaws or regulations. Those boxes are available for editing where desired.

The analysis is broken into five goals, each with factors that address the goal:

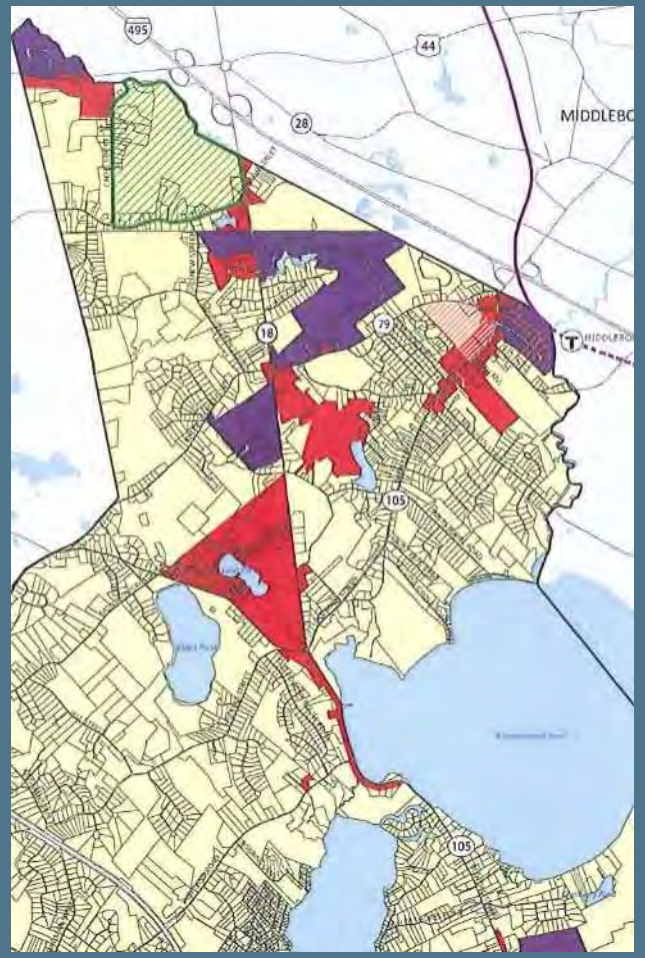
Avoid sprawl through smart zoning and regulations

1. Protect natural resources and open space
2. Promote efficient, compact development patterns and infill
3. Smart designs that reduce overall imperviousness
4. Adopt GI Stormwater management provisions (LID)
5. Encourage efficient parking





Zoning Bylaw





What does a Zoning Bylaw do?

- Regulates built form
- Regulates allowable uses

Where to find?

- Check your community's Planning Board webpage for General and/or Zoning Bylaws

Zoning Bylaws

- Design flexibility for developers to incorporate creative LID solutions
- Limit impervious area
- Allow LID materials such as permeable pavement by right

Example: Framingham

- Requires developers and designers to minimize impact on natural environment, including robust tree protections

F. Land Disturbance

1. Purpose and Intent

The purpose of the Land Disturbance and Stormwater Management (LDSM) By-Law is to provide a thorough review of construction, development, and/or redevelopment projects that have the potential to adversely impact natural resources, man-made structures, abutting properties and/or the Town's infrastructure. Projects subject to the LDSM By-Law shall be designed so as not to impact water quality, or surface flows; shall protect all properties, storm drainage systems, public roadways, natural water bodies from potential flooding, overloading, and/or clogging resulting from development; and shall not cause any significant alteration to topography or significant clearing of land. Moreover, projects shall be designed so as not to create adverse conditions during or after construction that would alter and/or destroy aquatic or wildlife habitat, and/or cause environmental degradation.

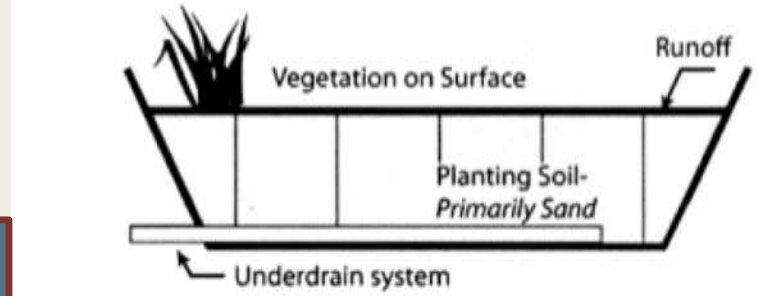
Subdivision Rules and Regulations

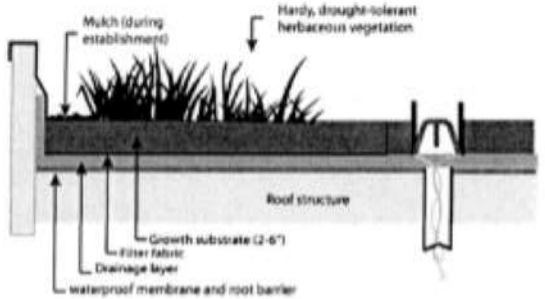


- **Subdivision Rules and Regulations**
  - Adopted by the Planning Board
  - Governs the subdivision of land into two or more lots
- **Where to find**
  - Planning Board regulations on municipal website

Subdivision Rules and Regulations

- Reduce the total amount of pavement required
- Explicitly encourage the adoption of LID for stormwater management





Example: Northampton

- Requires developers to consider a host of specific LID techniques; provides informative illustrations

Chapter 290. Subdivision of Land

[HISTORY: Adopted by the Planning Board of the City of Northampton 12-11-2014, as amended 1-8-2015. Subsequent amendments noted where applicable.]

Site Plan Review



- **Site Plan Review**
  - Adopted by Planning Board
  - A process for reviewing and imposing conditions on a proposed development
  - May be triggered by size of project or type of use

- **Where to find**
  - May be a standalone bylaw, or may be a part of the Zoning Bylaw
  - Check your Planning Board’s documents webpage

Site Plan Review

- Can prioritize LID as part of design review
- Require developers to minimize disturbance of existing natural environment
- Consider thresholds that trigger review

Example: Franklin

- Created a detailed guidebook outlining LID standards for SPR projects



Low Impact Design Condominium Complex

Source: Town of Franklin Department of Planning and Community Development

Stormwater/LID Bylaw


Horsley Witten Group, Inc.

- **Stormwater Bylaw & Regulations**
  - Regulate stormwater management in new and re-development
  - May require permit
- **LID Bylaw**
  - Encourage LID practices with specific design guidelines
- **Where to find**
  - May be a standalone bylaw, or may be a part of the Zoning Bylaw
  - Check your Planning Board's documents webpage

Stormwater & LID Bylaws

- Stormwater or Wetlands bylaws can implement LID through:
  - Allowing or requiring the use of LID stormwater control measures

Example: Westwood (Stormwater Bylaw)

- Mandates performance and design guidelines emphasizing LID techniques and conservation

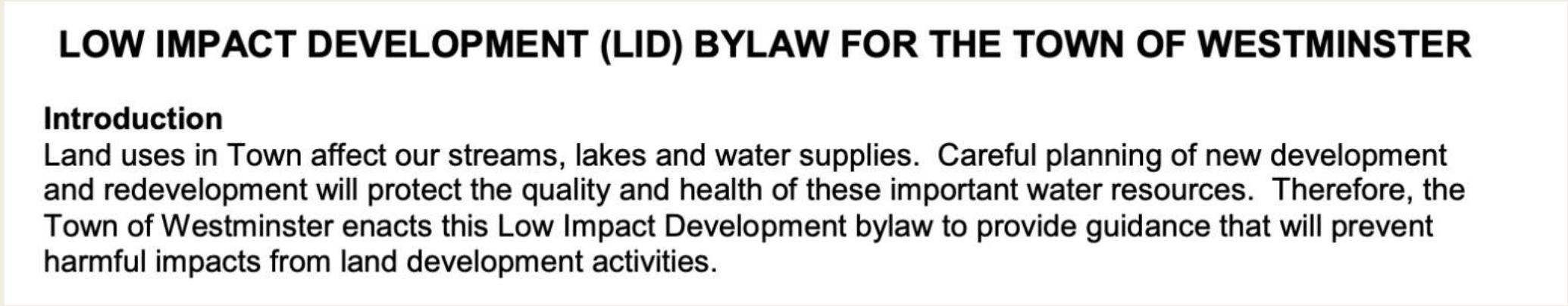
LID Bylaw

- Your community might also adopt a separate LID Bylaw

Example: Westminster is one of few towns with a dedicated LID Bylaw

Example: Westminster

- Compiles community-wide LID requirements in a central location for convenience and clarity

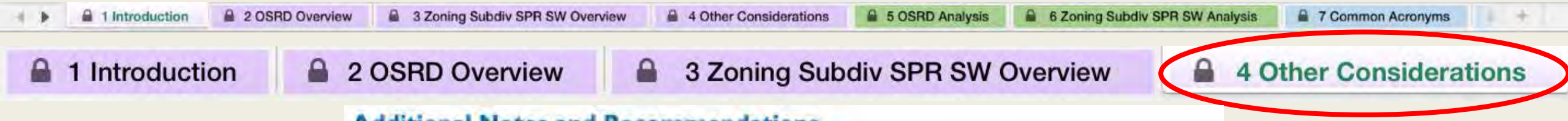


LOW IMPACT DEVELOPMENT (LID) BYLAW FOR THE TOWN OF WESTMINSTER

Introduction

Land uses in Town affect our streams, lakes and water supplies. Careful planning of new development and redevelopment will protect the quality and health of these important water resources. Therefore, the Town of Westminster enacts this Low Impact Development bylaw to provide guidance that will prevent harmful impacts from land development activities.

Navigating the Bylaw Review Tool: Sheet 4



Additional Notes and Recommendations

Stormwater Calculations
Ensure your regulations reference the most updated data on storm intensities from the Northeast Climate Center at http://www.nrcc.cornell.edu/

Landscaping and Recommended Trees
Ensure your local landscaping regulations require native, pollinator friendly species such as those here: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_015043.pdf

Additional Considerations

Funding and Maintenance:

- Ensure sufficient funding for DPW to perform maintenance of stormwater management facilities, whether conventional or LID.
- Consider reduced costs of paving, plowing, salt when comparing LID maintenance costs with conventional designs
- Create mechanisms for enforcement of maintenance agreements; establish regulations/fines for property owners who fail to maintain stormwater facilities.

Training, Demonstration Projects, and Public Education:

- Provide opportunities for and encourage municipal staff and committee/board members to participate in LID workshops or conferences.
- Implement LID demonstration programs at city or town hall, schools, DPW, etc.

Nonpotable Uses of Clean Stormwater:

- Local plumbing codes should allow the use of clean (e.g. rooftop) rainwater for landscape irrigation and interior non-potable uses such as toilet flushing.

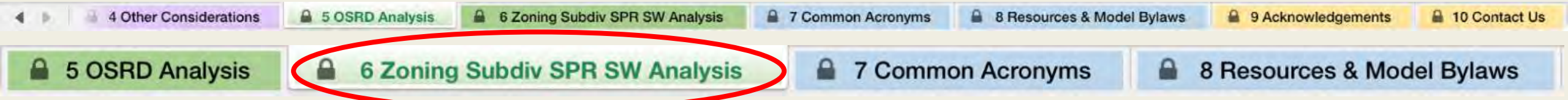
Navigating the Bylaw Review Tool: Sheet 5



MA Open Space Residential Design Best Practices Factors	Conventional	Better	Best Practice	Community's OSRD
Permit Type	Special Permit	By Right	Mandatory	
Land area to which the zoning is applicable	Only a small amount of developable land	Land of particular environmental sensitivity	All developable land zoned residential	
Minimum Open Space	50-65%	65-75%	≥ 75%	
Yield Calculation	Full plan with full percolation tests	Sketch plan with selected percolation test(s)	By formula	
Minimum parcel size	≥ 10 acres	5-10 acres	None	
Review Process	No detailed analysis of site characteristics in relation to design	Cluster layout	Flexible "OSRD" 4 Step	
Ownership of Open Space	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.			
Dimensional Standards; area, frontage, etc.	Specified, < than for standard subdivision	Formulaic reduction with specified minimums	None set or small minimums	

MA Open Space Residential Design Best Practices Factors	Conventional	Better	Best Practice	Community's OSRD Used PMUD bylaw in Zoning (Genral Bylaws (§11.29) & PMUD Rules and Regs instead
Permit Type	Special Permit	By Right	Mandatory	Special Permit
Land area to which the zoning is applicable	Only a small amount of developable land	Land of particular environmental sensitivity	All developable land zoned residential	PMUD Overlay Distrit only - relatively small area within general use and industrial zoning districts
Minimum Open Space	50-65%	65-75%	≥ 75%	30% (Zoning §11.29)
Yield Calculation	Full plan with full percolation tests	Sketch plan with selected percolation test(s)	By formula	n/a
Minimum parcel size	≥ 10 acres	5-10 acres	None	5ac min / 44ac max (Zoning §11.29)
Review Process	No detailed analysis of site characteristics in relation to design	Cluster layout	Flexible "OSRD" 4 Step	n/a
Ownership of Open Space	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.			permanent cons restriction required w/ easement to town for maintenance (Zoning §11.29)
Dimensional Standards; area, frontage, etc.	Specified, < than for standard subdivision	Formulaic reduction with specified minimums	None set or small minimums	reduced min setbacks: 6' front, 10' side, 20' rear min lot area: 5ac min frontage same as standard: 175' min 20' between buildings

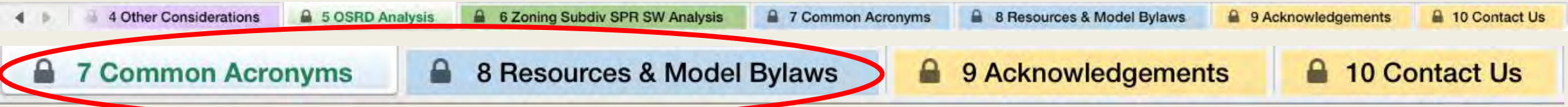
Navigating the Bylaw Review Tool: Sheet 6



Factors	Conventional	Better	Best	Community's Zoning	Community's Subdivision Rules & Regulations	Community's Site Plan Review	Community's Stormwater/LID Bylaw/Regulations
GOAL 1: PROTECT NATURAL RESOURCES AND OPEN SPACE							
Soils managed for revegetation	Not addressed	Limitations on removal from site, and/or requirements for stabilization and revegetation	Prohibit removal of topsoil from site. Require rototilling and other prep of soils compacted during construction	*(Not applicable)*			
Limit clearing, lawn size, require retention or planting of native vegetation/naturalized areas	Not addressed or general qualitative statement not tied to other design standards	Encourage minimization of clearing/ grubbing	Require minimization of clearing/grubbing with specific standards				
Require native vegetation and trees	Require or recommend invasives	Not addressed, or mixture of required plantings of native and nonnative	Require at least 75% native plantings				
GOAL 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL							
Lot size	Required minimum lot sizes	OSRD/NRPZ preferred. Special permit with incentives to utilize	Flexible with OSRD/NRPZ by right, preferred option		*(Not applicable)*	*(Not applicable)*	*(Not applicable)*
Setbacks	Required minimum front, side, and rear setbacks	Minimize, allow flexibility	Clear standards that minimize and in some instances eliminate setbacks		*(Not applicable)*	*(Not applicable)*	*(Not applicable)*
Frontage	Required minimum frontage for each lot/unit	Minimize especially on curved streets and cul-de-sacs	No minimums in some instances, tied into other standards like OSRD design and shared driveways.		*(Not applicable)*	*(Not applicable)*	*(Not applicable)*
Common driveways	Often not allowed, or strict limitations	Allow for 2-3 residential units	Allow for up to 4 residential units, preferrably constructed with permeable pavers or pavement				*(Not applicable)*

Factors	Conventional	Better	Best	Community's Zoning (Article 11 of general bylaws)	Community's Subdivision Rules & Regulations	Community's Site Plan Review (Zoning Bylaw, general bylaws §11.23 & SPR Rules and Regs)	Community's Stormwater/LID Bylaw/Regulations (N/A)
GOAL 3: SMART DESIGNS THAT REDUCE OVERALL IMPERVIOUSNESS							
Road ROW width	50-75', fully cleared and graded	40-50', some flexibility in extent of clearing	20-50'depending on road type	not addressed	min widths: 60' primary, 50' major/secondary, 42' minor (§ IV. B. 3.)	as per subdivision rules and regs	*(Not applicable)*
Access Options	No common drives allowed, dead end allowed with limit on length and # of units	Allow dead end with limit on length and # of units. Allow common drives up to 2-3 units	Allow one way loop streets. Allow common drives up to 4 units, and alleys and rear-loading garages where suitable.	multi family dwellings driveway requirements: min 20ft wide, max 200ft long, cannot shed water on public ways (§11.6 G)	dead ends allowed on minor steets only, max length 750' with turnaround (§ IV. B. 2.)	*(Not applicable)*	*(Not applicable)*
Dead Ends/Cul-de-sacs	120 ft or more minimum turnaround	Minimize end radii – 35 ft	Allow hammerhead turnaround	*(Not applicable)*	minimum 50' turnaround radius (§ IV. B. 2.)	*(Not applicable)*	*(Not applicable)*
Cul-de-sacs	Full pavement standard	Encourage center landscaping with bioretention	Require center landscaping with bioretention	*(Not applicable)*	PB may require landscaped island in non-residential (§ IV. B. 2.) not required, no mention of bioretention; not addresssed in residential	*(Not applicable)*	*(Not applicable)*
Curbing	Curbing required full length both sides of road	Allow curb breaks or curb flush with pavement to enable water to flow to vegetated LID features	Open drainage with roadside swales and no curbs preferred	*(Not applicable)*	full length, both sides on primary/major streets; at intersections only on secondary/minor streets (§ IV. B. 3.) granite curbs required along major/primary streets; granite or bituminous cape cob berms along other streets (§ IV. B. 5.) no mention of water drainage into vegetation strips	not addressed	*(Not applicable)*
Roadside Swales	Allowed as an option	Preferred over closed drainage	Preferred, with criteria for proper design. Adoption of technical specifications and design templates for green infrastructure recommended	*(Not applicable)*	not mentioned, but vegetation strips are required along roadsides (§ IV. B. 3.); vegetation strips must slope towards street (§ IV B. 4.)	non-structual surface water drainage encouraged; swales not specified	*(Not applicable)*
Utilities	Off sets required contributing to wide road ROWs	Not specified, flexible	Allow under road, sidewalks or immediately adjacent to roads to enable placement of roadside swales.	Underground utilities required in PMUD (§11.29J)	under road utilities, no specifications on location	not addressed	*(Not applicable)*

Navigating the Bylaw Review Tool: Sheet 7-8



Common Acronyms

BoA	Board of Appeals
BoH	Board of Health
BMP	Best Management Practice
CC	Conservation Commission
CR	Conservation Restriction pursuant to MGL 184, S.31-33
DPW	Department of Public Works
GI	Green Infrastructure
HA	Homeowner's Association
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer System
NRPD	Natural Resource Protection Development
NRPZ	Natural Resource Protection Zoning
OS	Open Space
OSRD	Open Space Residential Design
PB	Planning Board
ROW	Right of Way
RS	Residential Single
RG	Residential General
SPR	Site Plan Review
SP	Special Permit
SPGA	Special Permit Granting Authority

Resources and Model Bylaws/Regulations

For additional information on best practices, model LID and OSRD bylaws and regulations, case studies, and other related resources see:

www.massaudubon.org/LIDCost
- Five free fact sheets on Cost-Effective LID
- Presentations and other resources

Additional resources
- Massachusetts Smart Growth/Smart Energy Toolkit, including case studies and model bylaws:
- www.mass.gov/envir/smart_growth_toolkit/
- Massachusetts Smart Growth Model Open Space Design/Natural Resource Protection Zoning: www.mass.gov/files/documents/2017/11/03/Open Space Design (OSD)-Natural Resource Protection Zoning (NRPZ)_0.pdf
- Metropolitan Area Planning Council's (MAPC) LID Toolkit www.mapc.org/resource-library/low-impact-development-toolkit/
- MA-APA *Neighborhood Road Design Guidebook* https://www.apa-ma.org/wp-content/uploads/2018/12/NRB_Guidebook_2011.pdf
  MAPC's Environmental Planning Services: https://www.mapc.org/our-work/expertise/environment/
- EPA's Water Quality Scorecard, which was reviewed and incorporated into this analysis framework in July 2017, including using the 5 goals listed: www.epa.gov/smartgrowth/water-quality-scorecard

Navigating the Bylaw Review Tool: Sheet 9-10



Contact Us

For questions regarding this analysis or how to implement LID in your community, please feel free to contact us:

Mass Audubon
advocacy@massaudubon.org

www.massaudubon.org/advocacy

Mass Audubon



Where to start with updates?

Image: Urban flooding in Florence, MA

Photo source:
Dodson & Flinker, 2021

How to amend local regulations

- **General Bylaws**
  - Town Meeting or City Council
  - Majority vote needed
  - Can be proposed through citizen petition

- **Zoning Bylaws**
  - Two-thirds majority vote usually needed*
  - Planning Board public hearing

- **Rules and Regulations**
  - Adopted by majority vote of the board overseeing those regulations

Note: Always consult with Town Counsel before adopting updates to ensure consistency with state law

Identify actions with the greatest impact

Soils managed for revegetation	Not addressed	Limitations on removal from site, and/or requirements for stabilization and revegetation	Prohibit removal of topsoil from site. Require rototilling and other prep of soils compacted during construction	*(Not applicable)*	erosion and siltation. Does specify proximity to water body, steep slopes and easily eroded soils as particular concerns. (S4110) "The subdivision as designed will not cause substantial and irreversible damage to the environment, which damage could be avoided or ameliorated through an alternative development plan." (S 3450) For roadway construction, loam/topsoil removed must be stockpiled on site for landscaping shoulders, adjacent house lots (S 4265).	Not addressed, aside from requiring site plans minimize soil erosion.	Erosion and Sediment Control Plan required that minimizes soil erosion and control sedimentation during construction. Phasing required to prevent disturbance over area >/= 5,000 sq ft at a time. (Stormwater bylaw section 7)
Limit clearing, lawn size, require retention or planting of native vegetation/naturalized areas	Not addressed or general qualitative statement not tied to other design standards	Encourage minimization of clearing/ grubbing	Require minimization of clearing/grubbing with specific standards	no more than 2 acres may be stripped or filled more than 6" (s3433) removal >50 cy in 1 year requires special permit (s3610)	No specific standards set, only must minimize area disturbed and number of mature trees removed (S 4110). "The subdivision as designed will not cause substantial and irreversible damage to the environment, which damage could be avoided or ameliorated through an alternative development plan." (S 3450) 5% of area of land subdivided shall be park(s) or open space (S4140).	Not specifically addressed, aside from saying site plan must minimize cut/fill volume, number of 6" trees removed, area of wetland vegetation displaced, etc.	Erosion and Sediment Control Plan requires phasing to limit disturbed area to no more than 5,000 sq ft at a time, and plan/schedule for vegetative controls/stabilization. No specific requirements stated; no mention of native species. (Stormwater bylaw sec 7)
Require native vegetation and trees	Require or recommend invasives	Not addressed, or mixture of required plantings of native and nonnative	Require at least 75% native plantings	"species common to the area" required in sec. 3530, does not specify native	Trees planted must be "long-lived species adapted to the local environment and approved by the Planning Board." Native not specified. (S 4530)	Not addressed.	Not addressed.

Go after “low-hanging fruit”

Factors	Conventional	Better	Best	Zoning: RM / RSA/ RSB/ RSC/ RG	Subdiv Regs	Site Plan
DIMENSIONAL REQUIREMENTS						
Lot size	Required minimum lot sizes	OSRD/NRPZ preferred. Special permit with incentives to utilize	Flexible with OSRD/NRPZ by right, preferred option	RM - 20k; RSA - 15k; RSB - 40k; RSC - 20k; RG - 12k	(Not applicable)	(Not applicable)
Setbacks	Required minimum front, side, and rear setbacks	Minimize, allow flexibility	Clear standards that minimize and in some instances eliminate setbacks	Depth: RM - 125', RSA - 125', RSB - 150, RSC - 125, RG - 100 Front: 30' except for 40' RSB Side: 12, 12, 20, 12, 12 Rear: 25, 25, 40, 25, 25	(Not applicable)	(Not applicable)
Frontage	Required minimum frontage for each lot/unit	Minimize especially on curved streets and cul-de-sacs	No minimums in some instances, tied into other standards like OSRD design and shared driveways.	120, 110, 140, 120, 100	(Not applicable)	(Not applicable)
Common driveways	Often not allowed, or strict limitations	Allow for 2-3 residential units	Allow for up to 4 residential units	Allowed by SP up to 2 – only if it is "the most appropriate" way to serve residences.	Not addressed	Section VI part B Cluster Plans sh... frequent driveway... but no mention ... drives
Limit impervious area – Rural Districts in high density areas, require post-development infiltration to = or > predevelopment	Not usually addressed in zoning and subdivision regs for rural/suburban residential	<15%	<10%	Not addressed	Not addressed	No mention of ... impervious in ... areas.
Allow easy siting of LID features (bioretention, swales, etc.)	Often not addressed, may require waivers from subdivision standards	Encouraged along road ROW	Allowed on lots, common open space, or road ROW, easement recorded	Surface drainage does not address LID.	Not addressed within drainage requirements. LID difficult to site by requiring wide roads and vertical curbing.	Does not addre... although difficult ... requiring wide ... vertical curbing ... F does encourag... drainage, but do... specifically site ... may be used.
Permeable paving	Often not addressed, may require waivers from subdivision standards	Allowed on private residential lots for parking, patios, etc.	Allowed for residential drives, parking stalls, spillover parking spaces, emergency access ways (with proper engineering support for emergency vehicles) Two track design allowed for driveways and secondary emergency access ways (where required).	(Not applicable)	Section V, part E.4. - Does not address permeable pavement as an option for roadways. Can also listed as an option within Section X.	Not addressed



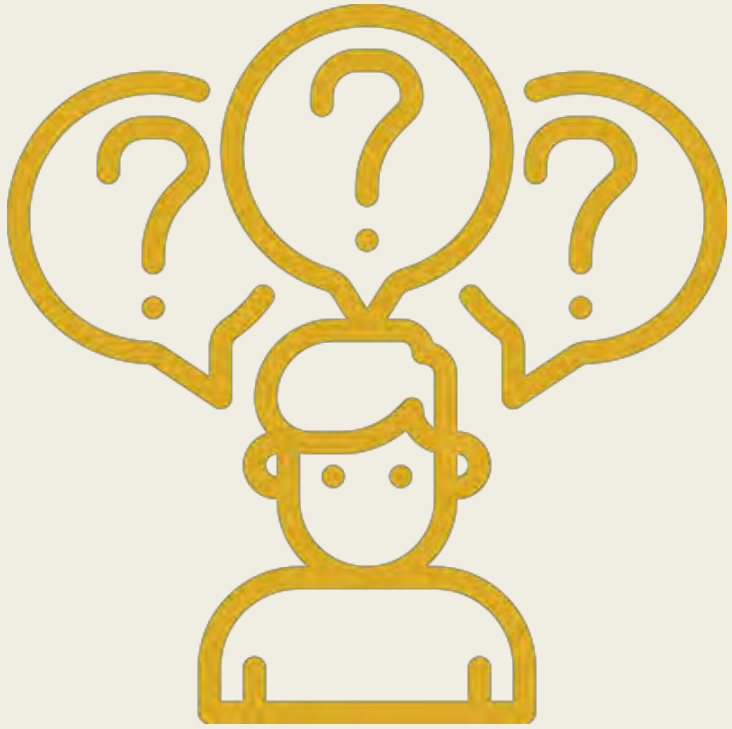
Photo source:
Devens Subdivision Rules and Regulations

Don’t reinvent the wheel!

Smart Growth/Smart Energy Toolkit Model Bylaws (https://www.mass.gov/service-details/smart-growth-smart-energy-toolkit-module-bylaws)



Model Open Space Design / Natural Resource Protection Zoning



Questions?



- Introduction & Overview
- Challenges and Solutions
- Local Bylaws & Review Tool
- **Case Studies, Regulations, & Financial Context**
- Break
- Let's Go! (Working Session)
- Report-Outs and Discussion
- Next Steps and Resources

Regional Bylaw Review for Stormwater Management

(USING THE MASS AUDUBON BYLAW REVIEW TOOL)

Tara Nye Lewis

October 27, 2022

CAPE COD COMMISSION

Pleasant Bay





- Pleasant Bay
  - 6,162 acres
  - 13 sub-embayments
- Watershed Area: 11,760 acres
  - Pleasant Bay Alliance established in 1987
  - TMDL established in 2007
  - All 4 towns are MS4 communities
  - 2018 – MassDEP issued a Watershed Permit

Technical Assistance Objectives

Identify opportunities to strengthen local regulations and create regional consistency

Improve climate resilience

Minimize cost / maximize impact of stormwater planning

Take advantage of overlap between Watershed and MS4 Permits

The Role of Bylaw Review

Approximately 40% of impervious cover within Pleasant Bay can be directly influenced by town activities - likely lower than this in many sub-watersheds

This is important from a stormwater perspective as well as a cost perspective



Recent work by EPA in the Taunton River watershed found that up to 40% of future retrofit costs, (largely borne by towns), could be avoided through administration of improved local regulations

Bylaw Review Method



1 | Locate town bylaws and regulations

2 | Mass Audubon’s Bylaw Review Tool

3 | Summarize findings for each Town

Detailed Workflow

1. Determine which bylaws and regulations may contain stormwater management and performance standards, i.e., Zoning, Subdivision of Land, Board of Health, etc.
2. Recommend starting with one bylaw – e.g., Wetlands Protection Bylaw
3. Initial pass at the 30K-foot level by doing word and phrase searches
4. Enter info into the Audubon Tool - Zoning Subdiv SPR SW (tab 6)
5. Second pass - read the bylaws
6. Once bylaw review complete and Audubon Tool filled in, color-coded the cells based on conventional, better, best
7. Write summary of findings

MS4 PERMIT COMPLIANCE



ADDED MS4 GOALS

Discharge detection & elimination (S2.3.4.a)

As-built of stormwater treatment systems (S2.3.6.a.iii)

Post-construction stormwater management for new and redevelopment (S2.3.6)

Stormwater Management & MS4 Compliance

Factors	Conventional	Better	Best
Discharge detection & elimination (S 2.3.4.a)	Not addressed	discharges and connects noted and or limits set on quantity and quality.	Illicit discharges and connections are probibited, investigated and eliminated
As-built (S 2.3.6)	Not addressed	Recommended	Required, written instructions, electronic submission
Construction site SW runoff control (S 2.3.5)	Not addressed	Required but w/o specifications	Required w/ written procedures for site inspections and enforcement of ESC - defining who is responsible and who has authority to enforce
Site Plan Review (S 2.3.5)	Not addressed	Require but w/o written specfications	Required, written instructions/standards
Post construction SW management for new development (S 2.3.6)	Not addressed	Allow LID	SF and or remove 90% TSS post-construction & 50% TP generated from the post-construction impervious surface area on the site. Use LIDs to the

Before You Begin



Time commitment – prepare to commit 30-40 hours per town



Phone a friend – reach out to someone who has gone through the review process



MS4 Permit – read it



Checklist for Evaluating Your Municipal Stormwater Bylaw under the 2016 MS4 Permit – helpful for understanding the MS4 permit and bylaws

LOCAL FINDINGS

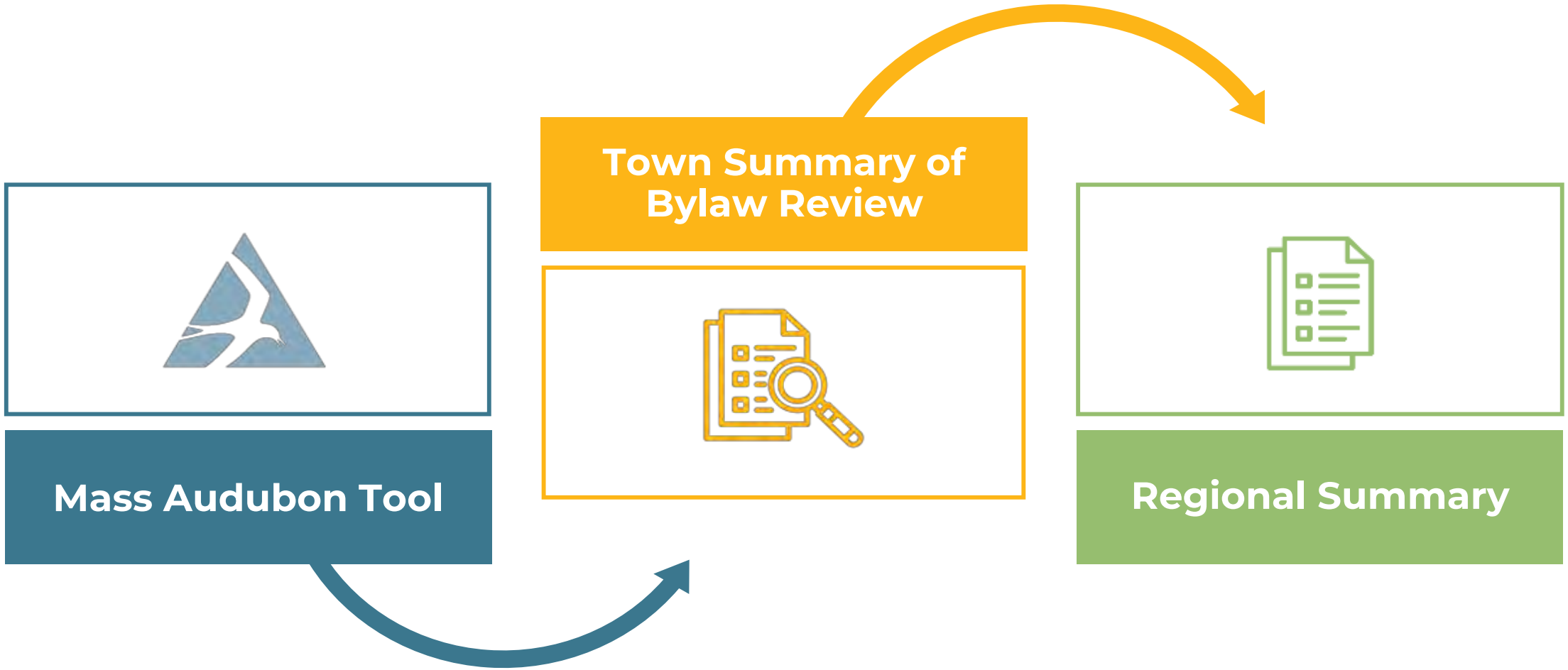
All four PBA towns utilize language promoting LID in some parts of their local regulations

Brewster's Zoning Bylaw	incentivizes the use of stormwater LID components by allowing density bonuses if three or more LID practices are part of the site design.
Harwich's Zoning Bylaw	encourages impervious reductions in OSRD by allowing reductions in roadway standards in exchange for at least 50% open space.
Chatham's Zoning Bylaw	allows for easy siting of LID features in business and industrial districts by allowing drainage in green space.
Orleans' Subdivision Rules and Regulations	requires an analysis of surface versus underground drainage system alternatives for a subdivision.

LOCAL FINDINGS

Factors	Conventional	Better	Best	Zoning Bylaw	Subdivision Rules & Regulations	Wetlands Protection Bylaw & Regulations	Site Plan Review & Staff Review	Illicit Connections and Discharges Bylaw	Board of Health Regs	General Regulations
GOAL 1: PROTECT NATURAL RESOURCES AND OPEN SPACE										
Soils managed for revegetation	Not addressed	Limitations on removal from site, and/or requirements for stabilization and revegetation	Prohibit removal of topsoil from site. Require ~~rototilling and other~~ prep of soils compacted during construction	*(Not applicable)*	No removal of topsoil from site. At least 4" of cover must be provided to cover all areas of subdivision. Stabilize area with seeding and planting (290-24 A). Soil specificications provided (290-15 A-C).	Not addressed	Not addressed	*(Not applicable)*	*(Not applicable)*	Not addressed
Limit clearing, lawn size, require retention or planting of native vegetation/naturalized areas	Not addressed or general qualitative statement not tied to other design standards	Encourage minimization of clearing/ grubbing	Require minimization of clearing/grubbing with specific standards	avoid extensive topo and veg changes (179-36 2&4); Trees and other veg retained (179-66);	Existing trees shall be preserved. Special consideration will be given to layout to ensure that existing trees be preserved during grading lots and roads (290-24 B);	not addressed	Limit clearing and require existing trees and veg be retained, protected and supplemented as much as possible, ≥25% of the front lawn must be vegetated; disturbed areas kept to minimum, temp vegetation and/or mulch (83-8 B.2, 83-9 2). Existing grade shall be changed minimally to meet intent of Ch 272 (83-9 (3))	*(Not applicable)*	*(Not applicable)*	Limit clearing and require existing trees and veg be retained, protected and supplemented as much as possible, ≥25% of the front lawn must be vegetated (83-8 B.2, 83-9 2); Removal of existing vegetated ground cover > 10,000 SF (83-3(4))
Require native vegetation and trees	Require or recommend invasives	Not addressed, or mixture of required plantings of native and nonnative	Require at least 75% native plantings	not addressed	Not addressed	planting compatible with natural vegetative cover (2.03(5)(c))	Not addressed	*(Not applicable)*	*(Not applicable)*	

Workflow


Mass Audubon Tool
Town Summary of Bylaw Review
Regional Summary

KEY REGIONAL FINDINGS



THREE TAKE AWAYS

Concept of higher standards for critical resource areas already exists

Utilize OSRD – improve language / incentives to further encourage LID

Improve consistency of review and enforcement by aligning processes and administration authority with SWMP

CHALLENGES



Accessibility of bylaws and regulations varied widely

Inconsistent language – stormwater vs. storm water vs. runoff vs. drainage

Wastewater is primary focus in Pleasant Bay (stormwater only contributes ~10% of nitrogen load)

Time will tell if towns use recommendations

LESSONS LEARNED

- Stormwater management isn't always in the obvious bylaw(s)
- Word search is useful – however, bylaws need to be in a searchable format
- A wide variety of words used – creating a list of words to search is helpful
- Include a reference for where within the bylaw the standard was located

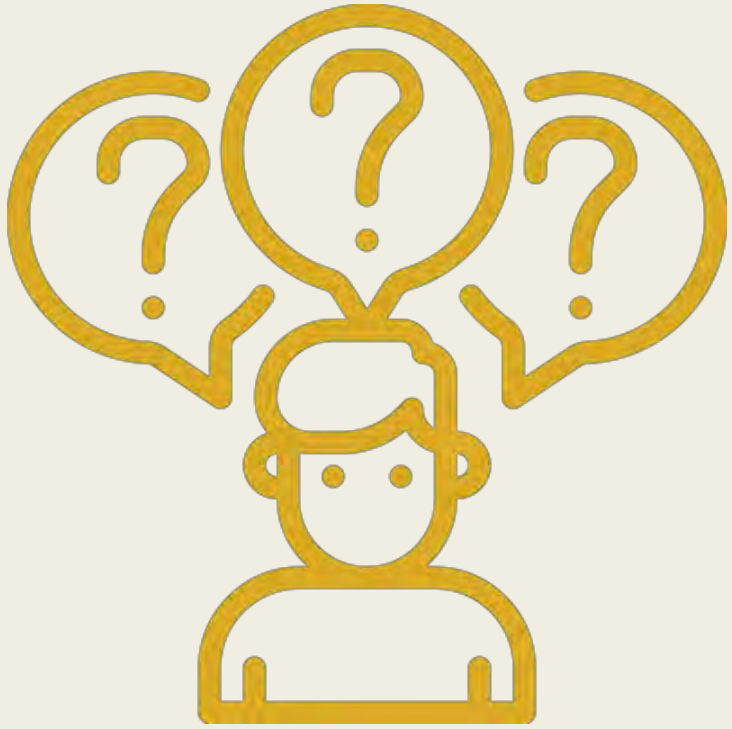


Conclusion

Good effective bylaws already exist – their reach could be expanded

Simple language changes could make a big difference

Consistent review for multiple towns in a region reduces confusion



Questions?

The MS4 and MA Stormwater Handbook on Climate Resilience

Laura Schifman, Ph.D.
Stormwater Program Manager
Massachusetts Department of Environmental Protection





Why Plan with Resilience in Mind?



One tree intercepts ~17 gal/m^2 of tree canopy or ~60% of precipitation[1]

>75% canopy cover in an area with >50% ISA reduces temperatures by 1–1.3 °C in immediate vicinity of the canopy (10m radius)[2]

1. Coville, R.C., Kruegler, J., Selbig, W.R., Hirabayashi, S., Loheide II, S.P., Avery, W., Shuster, W., Haefner, R., Scharenbroch, B.C., Endreny, T.A. and Nowak, D.J., 2022. Loss of Street Trees Causes 6,000 L/Tree Increase in Leaf-on Stormwater Runoff for Great Lakes Urban Sewershed. *Urban Forestry & Urban Greening*, p.127649.
2. Ziter, C.D., Pedersen, E.J., Kucharik, C.J. and Turner, M.G., 2019. Scale-dependent interactions between tree canopy cover and impervious surfaces reduce daytime urban heat during summer. *Proceedings of the National Academy of Sciences*, *116*(15), pp.7575-7580.

Why Plan with Resilience in Mind?



Runoff percent reduction = ISA Mitigated$^{0.756}$

Peak flow percent reduction = ISA Mitigated$^{0.804}$

1. Bell, Colin D., et al. "Stormwater control impacts on runoff volume and peak flow: A meta-analysis of watershed modelling studies." *Hydrological Processes* 34.14 (2020): 3134-3152.

Green Infrastructure in the MS4 permit

Within four (4) years [...]

Assess[ing] existing local regulations to determine the feasibility of [...]:

i. **Green roofs**;

ii. **Infiltration practices** such as rain gardens, curb extensions, planter gardens, porous and pervious pavements, and other designs to manage stormwater using landscaping and structured or augmented soils; and

iii. **Water harvesting devices** such as rain barrels and cisterns, and the use of stormwater for non-potable uses.

[...] and provide a schedule for implementation [...].

Impervious Surface Reduction in the MS4 permit

Within four (4) years [...]

Assess[ing] current street design and parking lot guidelines [...]

that affect the creation of impervious cover [...] to

[...] determine if changes to design standards for streets and parking lots can be made to **support low impact design options**. [...] and

[...] procedures to **minimize impervious cover attributable to parking areas and street designs**. [...]

Massachusetts Stormwater Handbook
(proposed)

Environmentally Sensitive Site Design
- Credit 1: Environmentally Sensitive Site Design
- Credit 2: Environmentally Sensitive Site Design for Solar Arrays

Minimize Impervious Cover
- Credit 6: Reduce Impervious Area at Redevelopment Sites

Natural Drainage Systems
No Disturbance to Wetland Resource Areas

Disconnection to Qualifying Pervious Areas
- Credit 3: Rooftop Runoff Directed to a QPA
- Credit 4: Roadway, Driveway, or Parking Lot Runoff Directed to a QPA

Protect or Enhance Buffer Areas
- Credit 7: Protect or Enhance Buffer Areas

Tree Canopy Implementation for Runoff Reduction
- Credit 5: Tree Canopy Enhancement and Protection

Low Impact Development and ESSD Credits

Environmentally Sensitive Site Design

- Credit 1: Environmentally Sensitive Site Design
- Credit 2: Environmentally Sensitive Site Design for Solar Arrays

Minimize Impervious Cover

- Credit 6: Reduce Impervious Area at Redevelopment Sites

Natural Drainage Systems

No Disturbance to Wetland Resource Areas



Low Impact Development and ESSD Credits

Disconnection to Qualifying Pervious Areas

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- Credit 4: Roadway, Driveway, or Parking Lot Runoff Directed to a QPA

Protect or Enhance Buffer Areas

- Credit 7: Protect or Enhance Buffer Areas

Tree Canopy Implementation for Runoff Reduction

- Credit 5: Tree Canopy Enhancement and Protection

Impervious Area to Pervious Area Ratio	HSG A	HSG B	HSG C
8:1	NC	NC	NC
6:1	NC	NC	NC
4:1	NC	NC	NC
2:1	NC	NC	NC
1:1	✔	✔	NC
1:2	✔	✔	✔
1:4	✔	✔	✔
1:10	✔	✔	✔
1:30	✔	✔	✔
1:50	✔	✔	✔

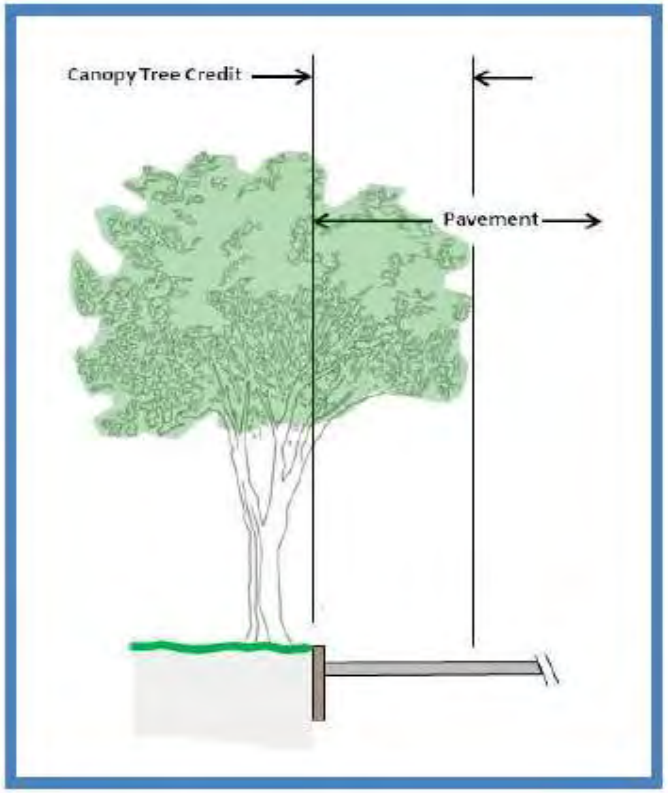
- **Check Mark (✔) =** Credit is provided for 1-inch recharge, 90% TSS removal, and 60% TP removal.
- **NC =** No credit is provided for recharge or pollutant removal.
- Assumes all minimum required criteria are met.

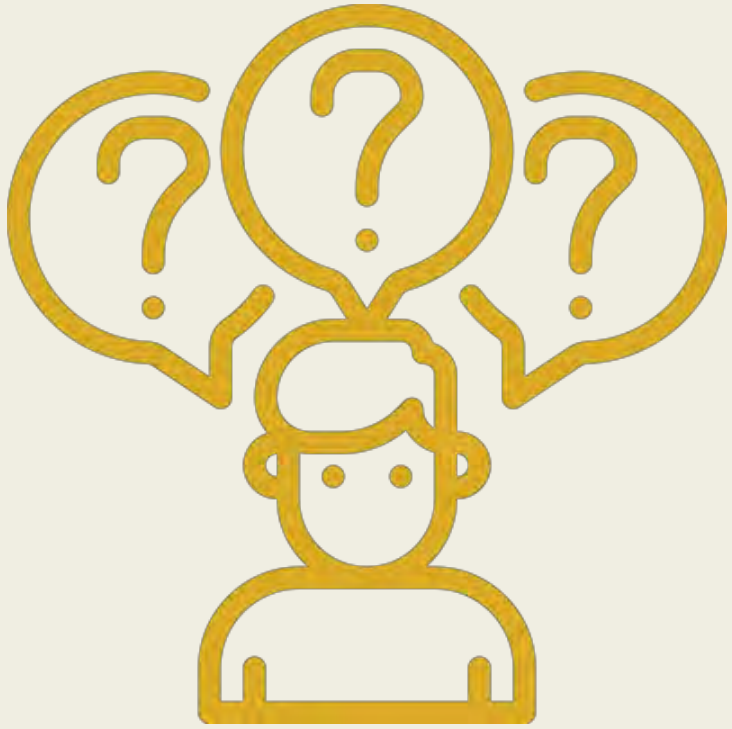
Low Impact Development and ESSD Credits

Tree Canopy Implementation for Runoff Reduction

- Credit 5: Tree Canopy Enhancement and Protection







Questions?

Avoiding Costs and Impacts

Newton Tedder
EPA Region I, Stormwater Section



Sound Future Land Development & Stormwater Management

Are we on the path for Resiliency?



The Challenge

- Nationally 45% to 65% of assessed waters are impaired by nutrients
- Stormwater is a major contributor of Phosphorus and Nitrogen
- Land conversion to impervious cover increases stormwater flow and nutrient delivery
- Changing climate leads to warmer waters and increased stormwater flow – exacerbating the issue

Converting Natural Land to Impervious Cover

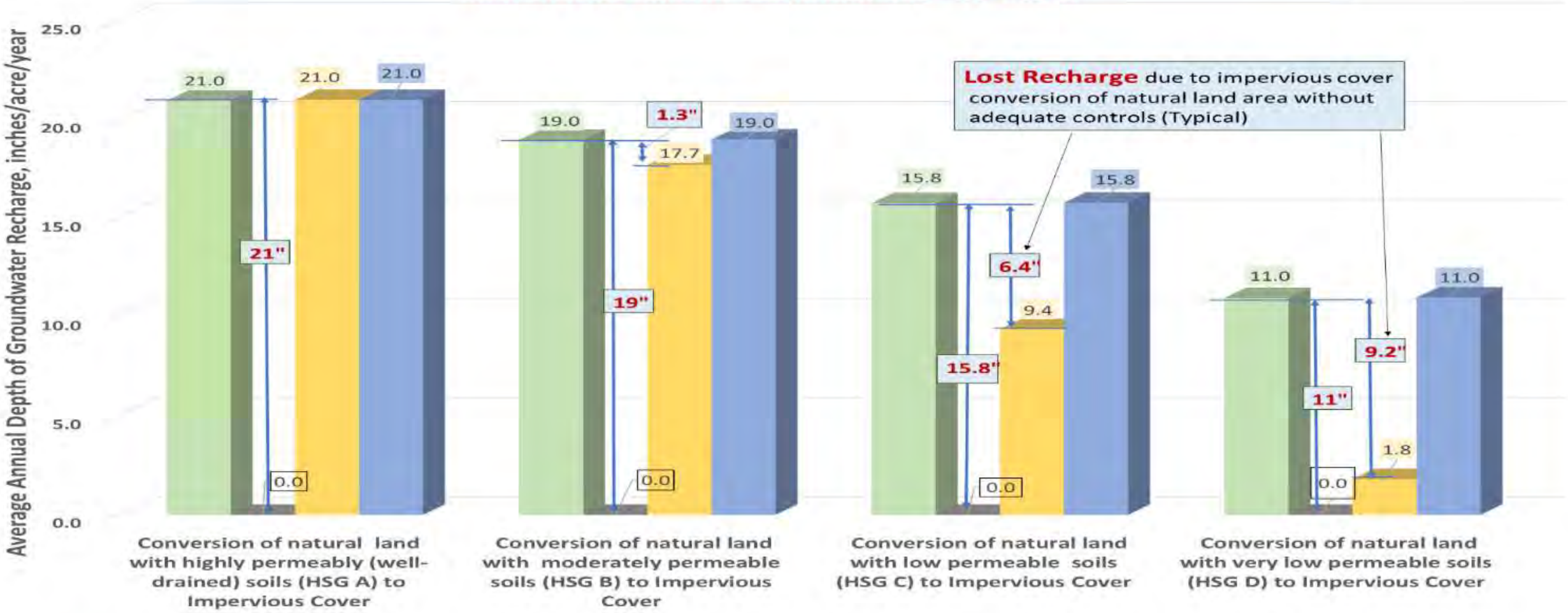
- **Increased** Annual Runoff Volume
  - ~+300% to +10,000% increase (0.5 to 1.1 Million-Gallons/acre/year)
- **Lost** Annual Groundwater Recharge
  - ~0.3 to 0.5 million-gallons/acre/year
- **Increased** Annual SW **Phosphorus** Load
  - ~+400% to +6,500% (1.5 to 1.9 pounds/acre/year)
- **Increased** Annual SW **Nitrogen** Load
  - ~+500% to +13,000% increase (11 to 13 pounds/acre/year)





Average Annual **Groundwater (GW) Recharge** for Conversion of Natural Land to Impervious Cover with & without Management

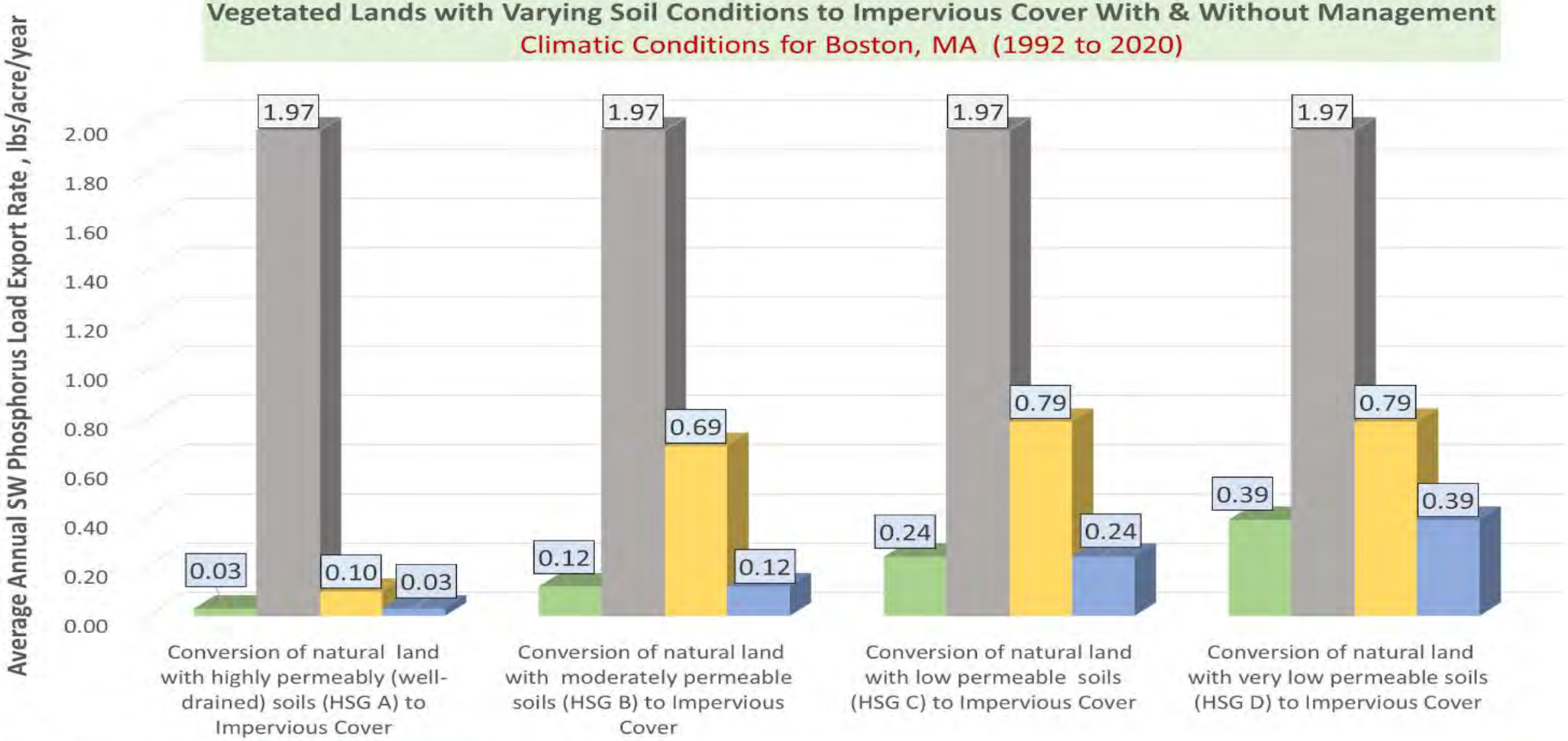
Boston MA Climatic Conditions (1992-2020)



- Pre-Development Naturally Vegetated Conditions
- Conversion to Impervious Cover with No Control
- Conversion to Impervious Cover with Existing MA Recharge Standards (static) or at least 60% P reduction
- Conversion to Impervious Cover with 1 inch Retention Standard - Static Sizing

Average Annual Stormwater Phosphorus Load Export Rate Resulting from Conversion of Natural Vegetated Lands with Varying Soil Conditions to Impervious Cover With & Without Management

Climatic Conditions for Boston, MA (1992 to 2020)



Avoiding Retrofits

- Next generation stormwater permits now require SW load reductions from existing development
- Municipal retrofit programs require substantial investment from the community
- Retrofit stormwater controls can cost up to 4x the equivalent control during new or re-development





Protective Post Construction Stormwater Requirements For New and Re-Development are a MUST

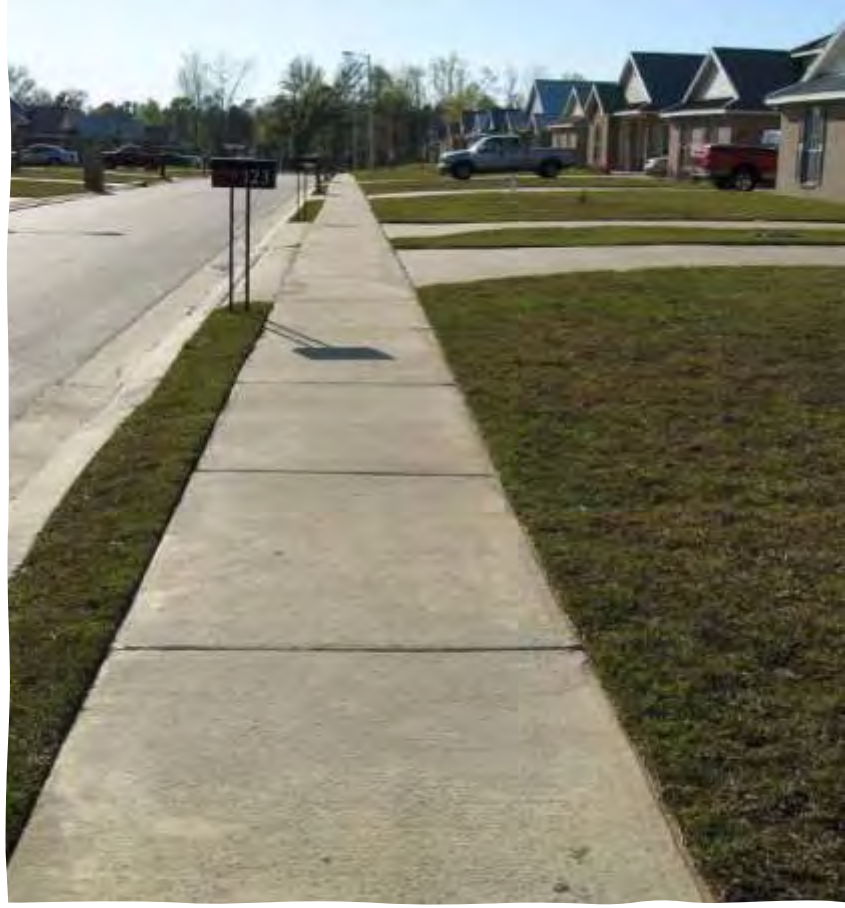
Potential Cost Burden & Opportunity for Cost Avoidance – SW Nutrient Loading Management

Potential Future Stormwater Management Cost Burdens Associated with Converting Natural Vegetated Areas to Impervious Cover (IC Conversion)

Nutrient	Management Scenario	Range of Increase in Average Annual Nutrient Load Export Rate from IC Conversion	Range in Stormwater Retrofit costs (yr 2020)**	Range in Potential Future SW Retrofit Cost Burden to offset increased nutrient loading from IC conversion ($/acre IC)
Phosphorus	No controls***	1.5 to 2.0 lbs/acre/yr	$25,000 to $60,000 per lb Phosphorus Captured	$62,000 to $79,000 per IC acre
	60% P Load reduction at time of development	0.6 to 0.8 lbs/acre/yr		$15,000 to $48,000 per IC acre
	1 Inch Retention standard with Recharge Targets	**0 lbs/acre/yr**	**$0**	**$0**
Nitrogen	No controls***	10.9 to 13.1 lbs/acre/yr	$2,200 to $7,500 per lb Nitrogen Captured	$48,000 to $58,000 per IC acre
	65% N Load reduction at time of development	3.8 to 4.6 lbs/acre/yr		$8,400 to $35,000 per IC acre
	1 Inch Retention Standard with Recharge Targets	**0 lbs/acre/yr**	**$0**	**$0**







Region 1 Tools can Quantify

- Cumulative impacts of future IC
- Benefits of Resilient Site-Development Performance Standards
- Right sizing stormwater controls
- Future Cost Burden and Cost Avoidance Opportunities

Summary & Take Away Information

- Conversion of Natural Vegetated Areas to IC has **serious long-term implications** for future ecological health, economics, & community resilience
- Current land development management frameworks need thorough reevaluations to ensure sustainable water resource **protection & avoidance** of potential future cost burdens
- Application of EPA R1 Tools and information are shedding light on what are appropriate **Resilient Performance Standards at the site scale** to avoid impacts, minimize future cost burdens and increase community resiliency in the face of climate change

Beyond MS4 - Residual Designation

Sarah Bower
Technical Specialist

Huge Victory For Our Rivers!



United States Environmental Protection Agency

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News Releases: Region 01

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EPA Implements Advanced Effort to Protect Water Quality in Three Boston-area River Watersheds

Will Reduce Stormwater Pollution Impairing Charles, Mystic and Neponset Rivers' Water Quality

September 14, 2022

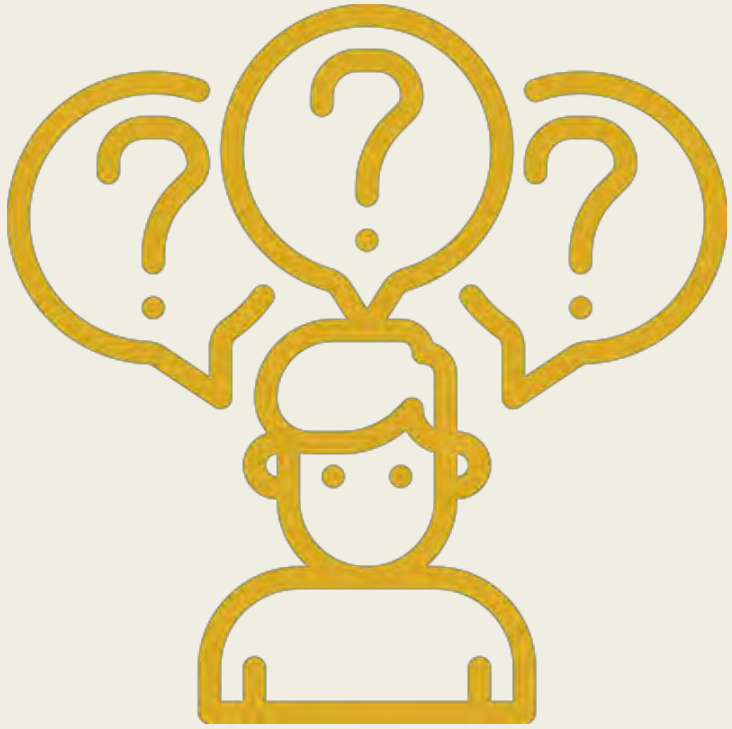
EPA holds large properties accountable for stormwater pollution

- EPA Region 1 utilizing "residual designation authority" for the first time
- Require permits for private properties with one or more acres of impervious cover









Questions?



- Introduction & Overview
- Challenges and Solutions
- Local Bylaws & Review Tool
- Case Studies, Regulations, & Financial Context
- Break
- Let's Go! (Working Session)
- Report-Outs and Discussion
- Next Steps and Resources



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Working Session

- Try out the bylaw review tool using bylaws/regs from a municipality of your choice
- Pick either the OSRD or Subdiv/Site Plan/Stormwater tab on the tool
- Fill in some boxes!
- Don’t expect to finish – this is just practice!
- Prepare to share in discussion next



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Discussion

- What are your goals for bylaw updates?
- What guidance or recommendations are you most interested in?
- Any challenges/concerns regarding LID?
- Any planned updates? Interest?
- Are developers opting for LID practices currently? Examples?



- Introduction & Overview
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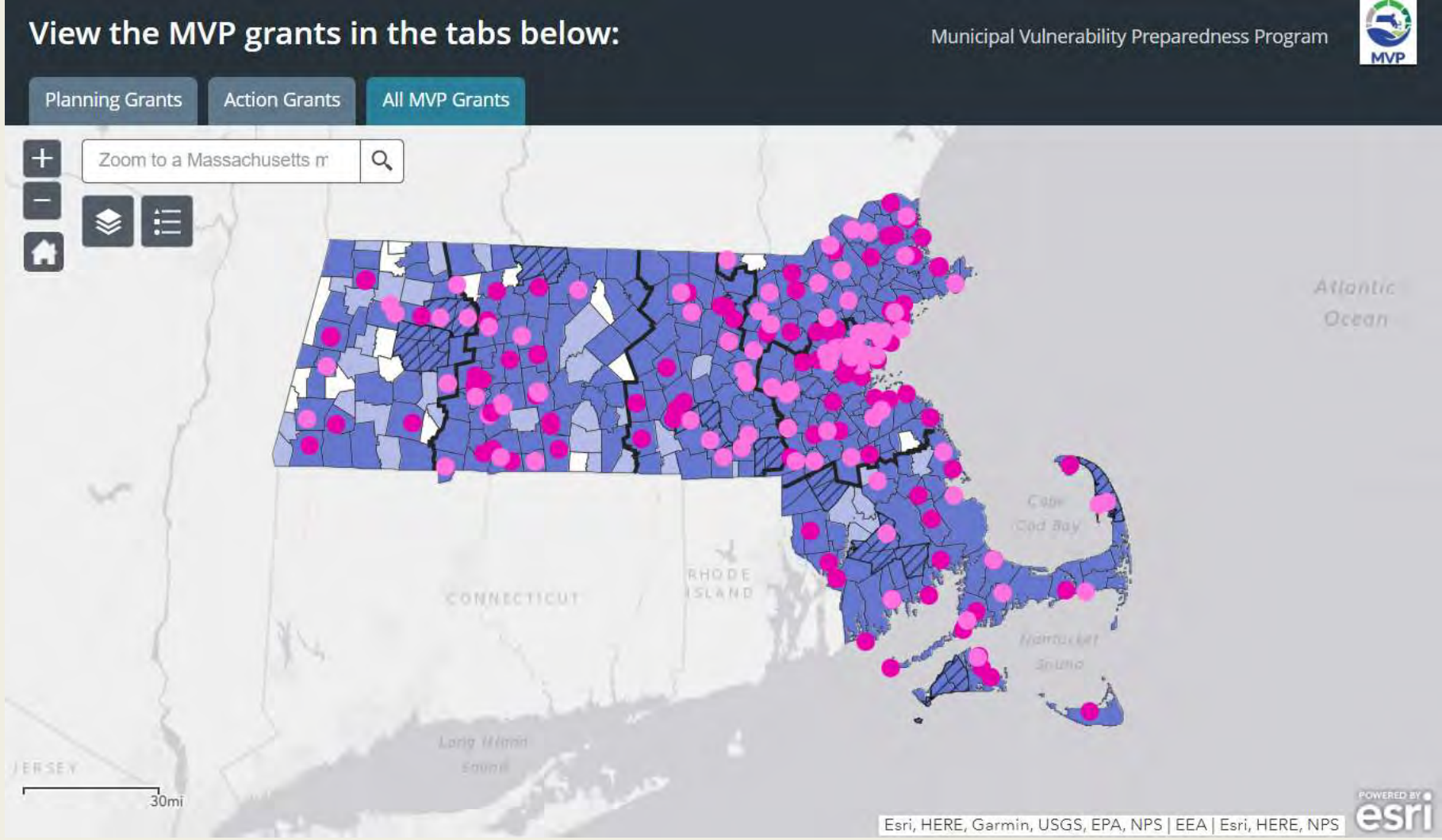
Municipal Vulnerability Preparedness (MVP)



Executive Office of Energy and Environmental Affairs

MVP

State and local partnership to build resiliency to climate change

1. Engage Community
2. Identify CC impacts and hazards
3. Complete assessment of vulnerabilities & strengths
4. Develop and prioritize actions
5. Take Action

The “MVP” of Climate Resilience

The **Municipal Vulnerability Preparedness (MVP) Program** helps communities prepare for the impacts of climate change.

→ Encourages **nature-based solutions**



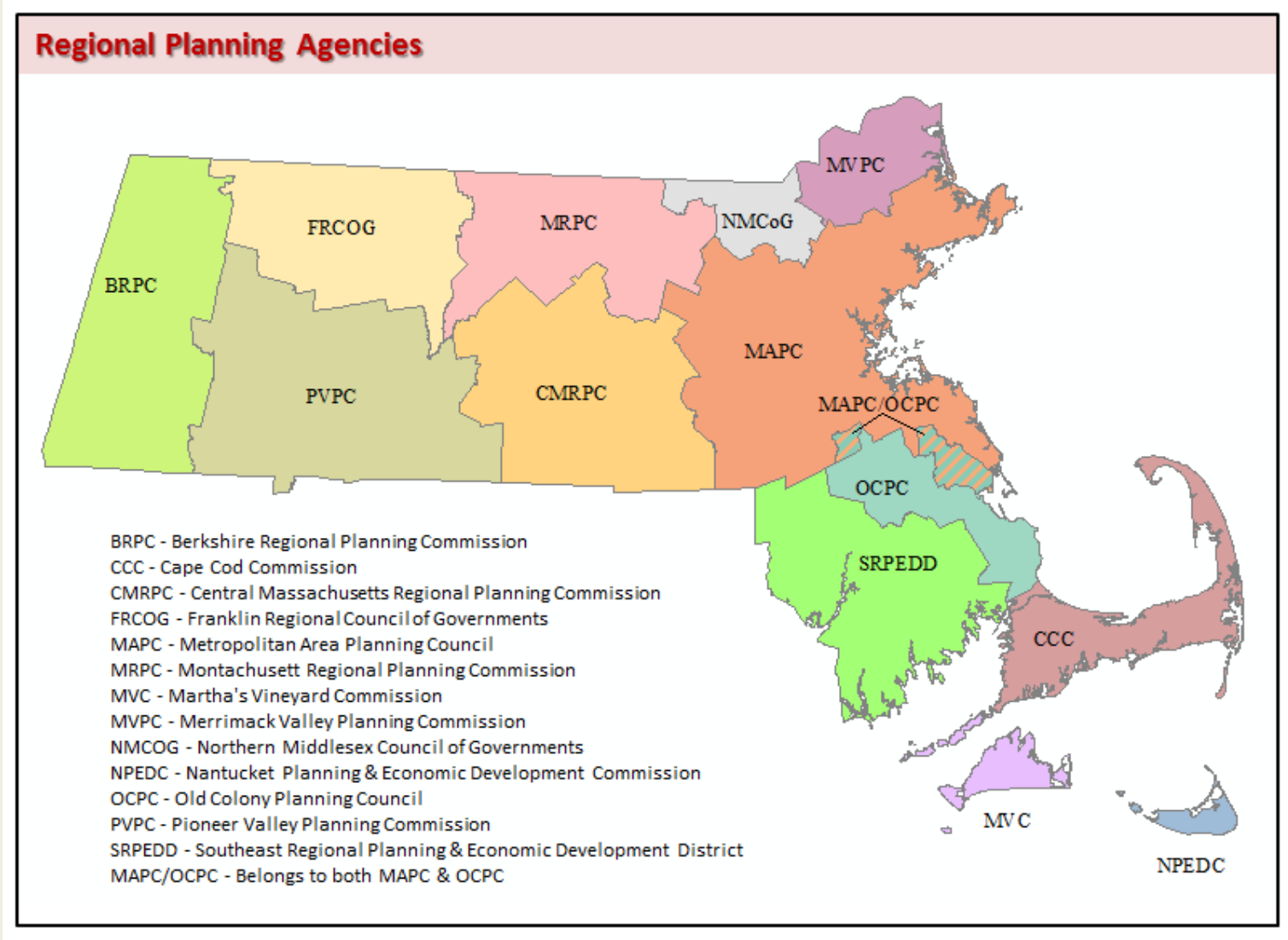
Step 1. **Planning**



The Harvard Gazette

Step 2. **Action!**

Regional Planning Agencies (RPAs)



Massachusetts Executive Office of Energy and Environmental Affairs' (EEA) Smart Growth/Smart Energy Toolkit



Metropolitan Area Planning Council (MAPC) Climate Resilient Land Use Strategies and LID Toolkit

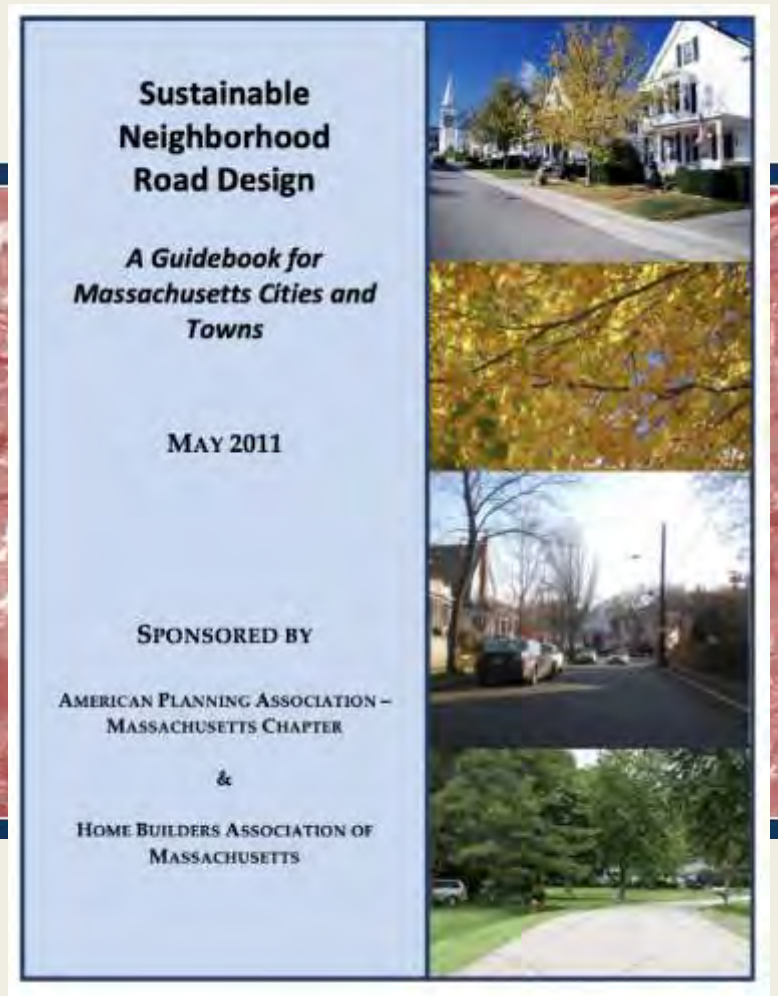




Image source: MAPC , 2020

American Planning Association – Massachusetts Chapter (APA-MA) Neighborhood Road Design Guidebook





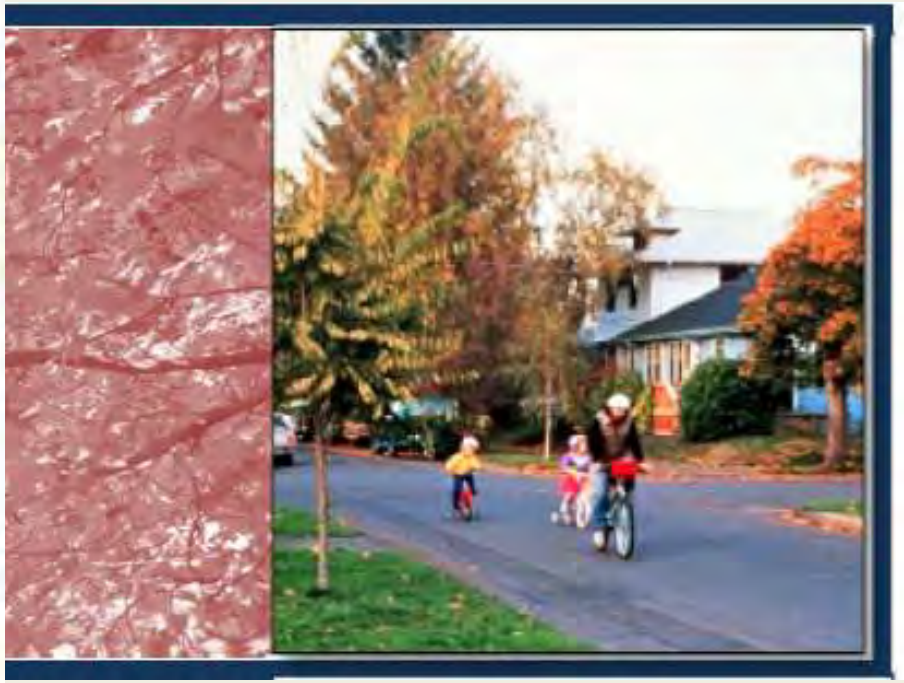
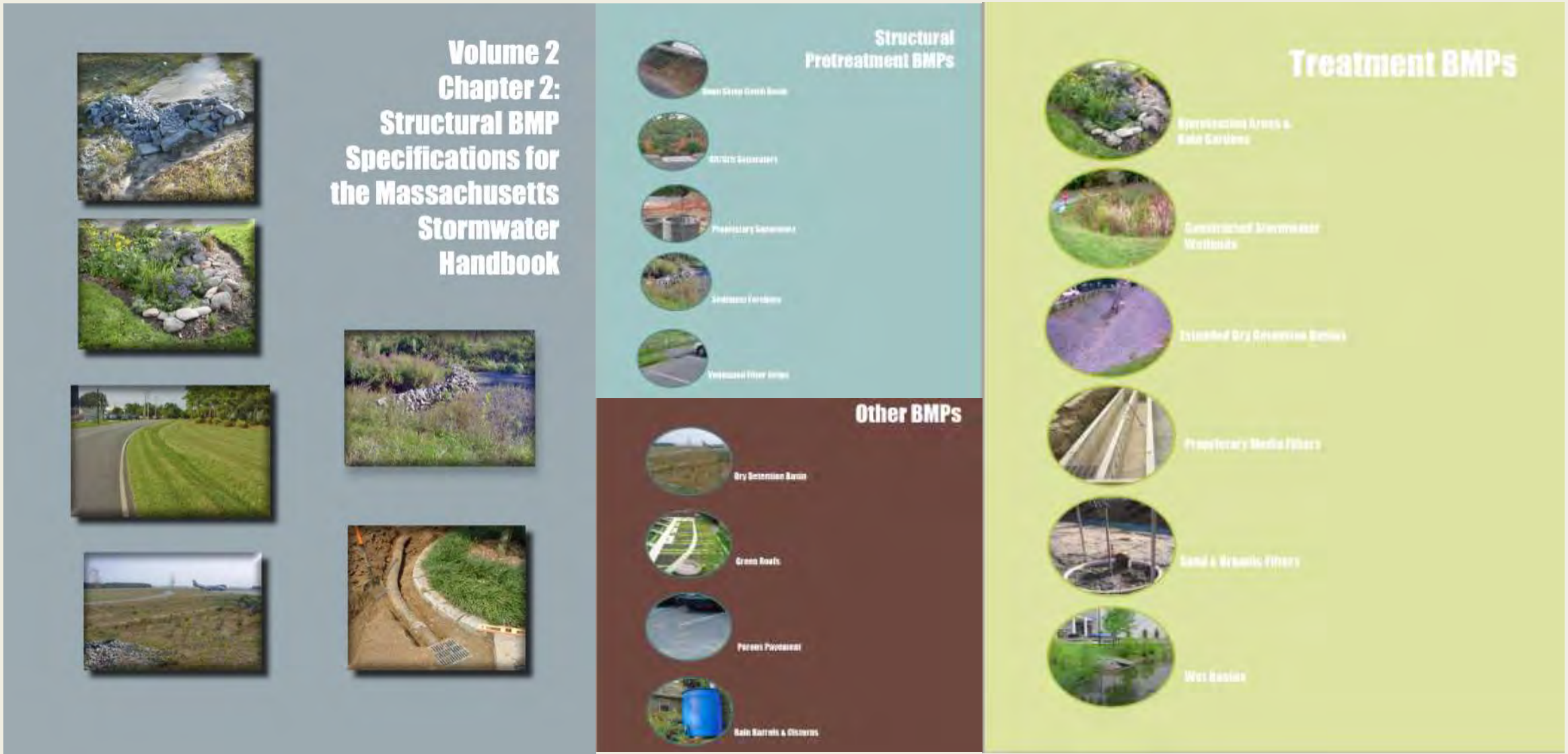


Image source:
APA-MA, 2011

Massachusetts Stormwater Handbook



Funding

There are a variety of funding mechanisms that can facilitate the adoption and implementation of LID in your community. These include:

- Taxes/General funds
- Fees
- Stormwater utility
- Grants
- Bonds
- Loans
- Public-private partnerships



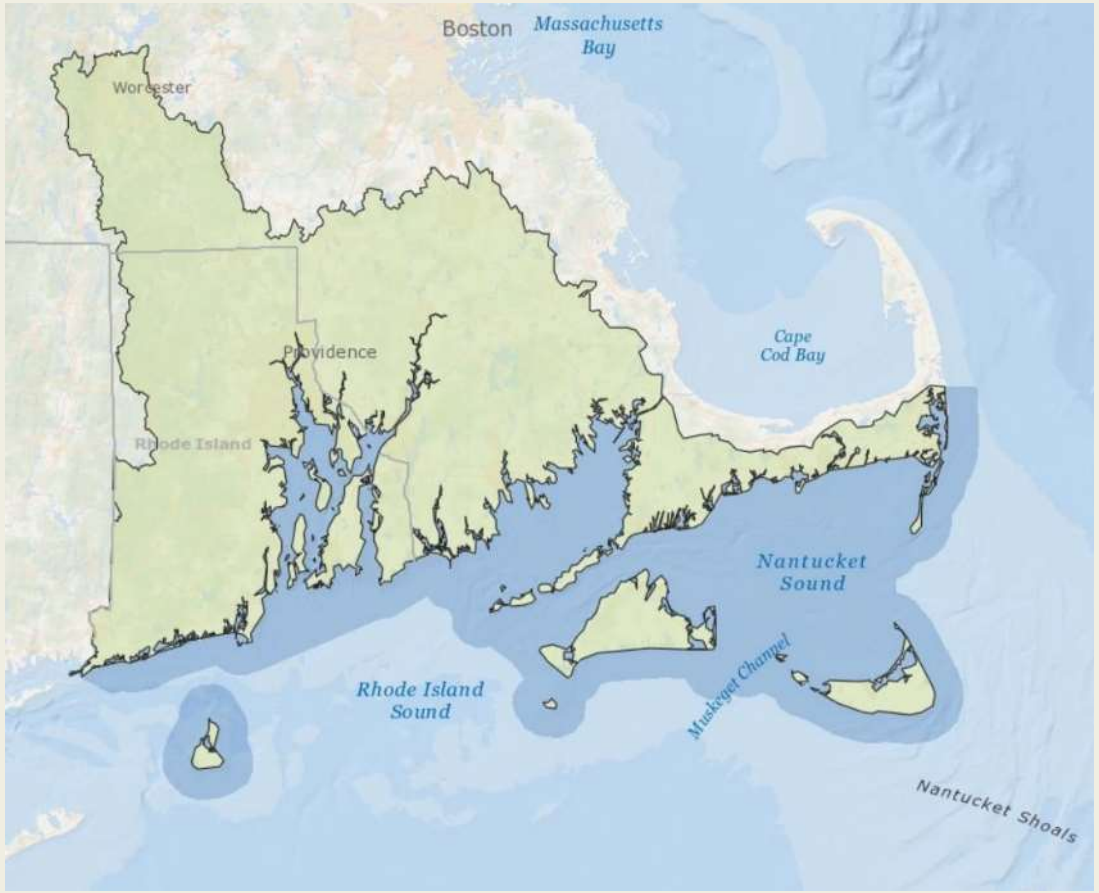
Resources

- Mass Audubon LID fact sheets and bylaw tool massaudubon.org/lidcost, *Losing Ground* and Value of Nature fact sheets www.massaudubon.org/valueofnature
- EEA Smart Growth Toolkit mass.gov/smart-growth-smart-energy-toolkit-information-and-resources
- MAPC's Climate Resilience Toolkit mapc.org/resource-library/climate-resilient-land-use-strategies/
- Citizen Planner Training Collaborative masscptc.org/
- Massachusetts Association of Conservation Commissions Electronic Resource Library maccweb.org/page/ElecResLibrary
- EEA Planning Assistance grants mass.gov/service-details/planning-assistance-grants
- MVP Action Grants mass.gov/service-details/mvp-action-grant
- MA Office of the Attorney General Municipal Law Unit mass.gov/municipal-law-review
- UNH Stormwater Center unh.edu/unhsc/
- URI NEMO Program uri.edu/nemo/
- RI Green Infrastructure Coalition greeninfrastructureri.org
- SNEP Network snepnetwork.org



Find more info in our Resource Guide!

EPA Southeast New England Program (SNEP) and SNEP Network



SNEP

Southeast New England Program

snepnetwork.org

Thank you!

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