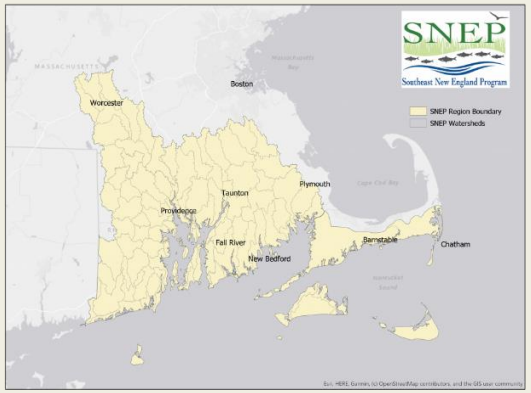
Is Your Community Climate Resilient? Bylaws and Best Practices

February 16, 2022

SNEP NETWORK



Heidi Ricci, Mass Audubon
Stefanie Covino, Blackstone Watershed Collaborative
Danica Belknap, SRPEDD
Mark Voorhees, EPA
Tara Lewis, Cape Cod Commission
Tim Pasakarnis, Cape Cod Commission

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

Mass Audubon
Protecting the nature *of Massachusetts*

Blackstone Watershed Collaborative

CAPE COD COMMISSION

SRPEDD
Southeastern Regional Planning & Economic Development District

Introduction

- **Introduction** – Heidi Ricci, Mass Audubon
- **Challenges and Solutions** – Stefanie Covino, Blackstone Watershed Collaborative
- **Local Bylaws and Review Tool** – Danica Belknap, Southeastern Regional Planning and Economic Development District (SRPEDD)
- **Avoiding Costs and Impacts** – Mark Voorhees, EPA Region I
- **Case Study: Regional Bylaws for Stormwater Management** – Tim Pasakarnis and Tara Lewis, Cape Cod Commission
- **Q&A**
- **Next Steps and Resources** – Heidi Ricci, Mass Audubon

Learning Objectives

Following this presentation participants will:

- Understand links between climate impacts and land use
- Define Nature Based Solutions, Green Infrastructure, Low Impact Development (LID)
- Understand the role of local regulations in reducing costs and impacts
- Have access to the bylaw review tool to prioritize local updates
- Learn about examples 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.

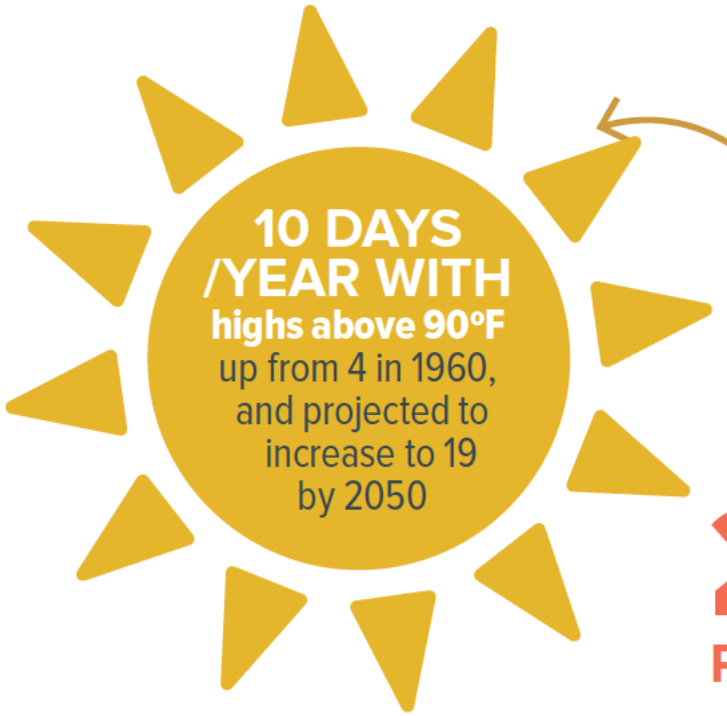
Climate change

Development

Challenges We're Facing

Stefanie Covino,
Blackstone Watershed Collaborative

Blackstone Watershed Collaborative



2.9°F
RISE IN TEMP

11 DAYS
GROWING SEASON

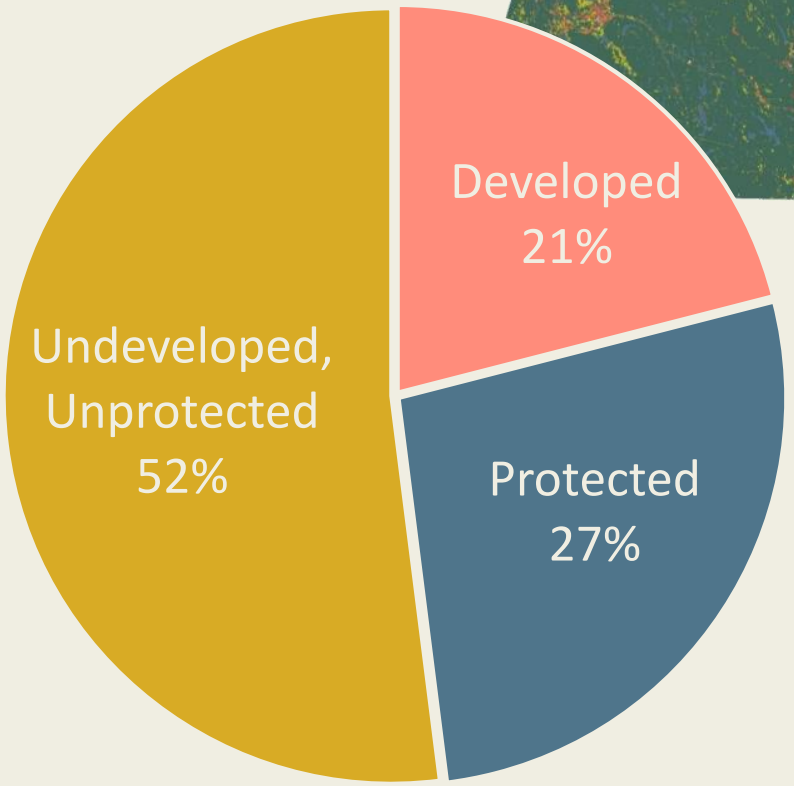
55%
STRONGER
STORMS

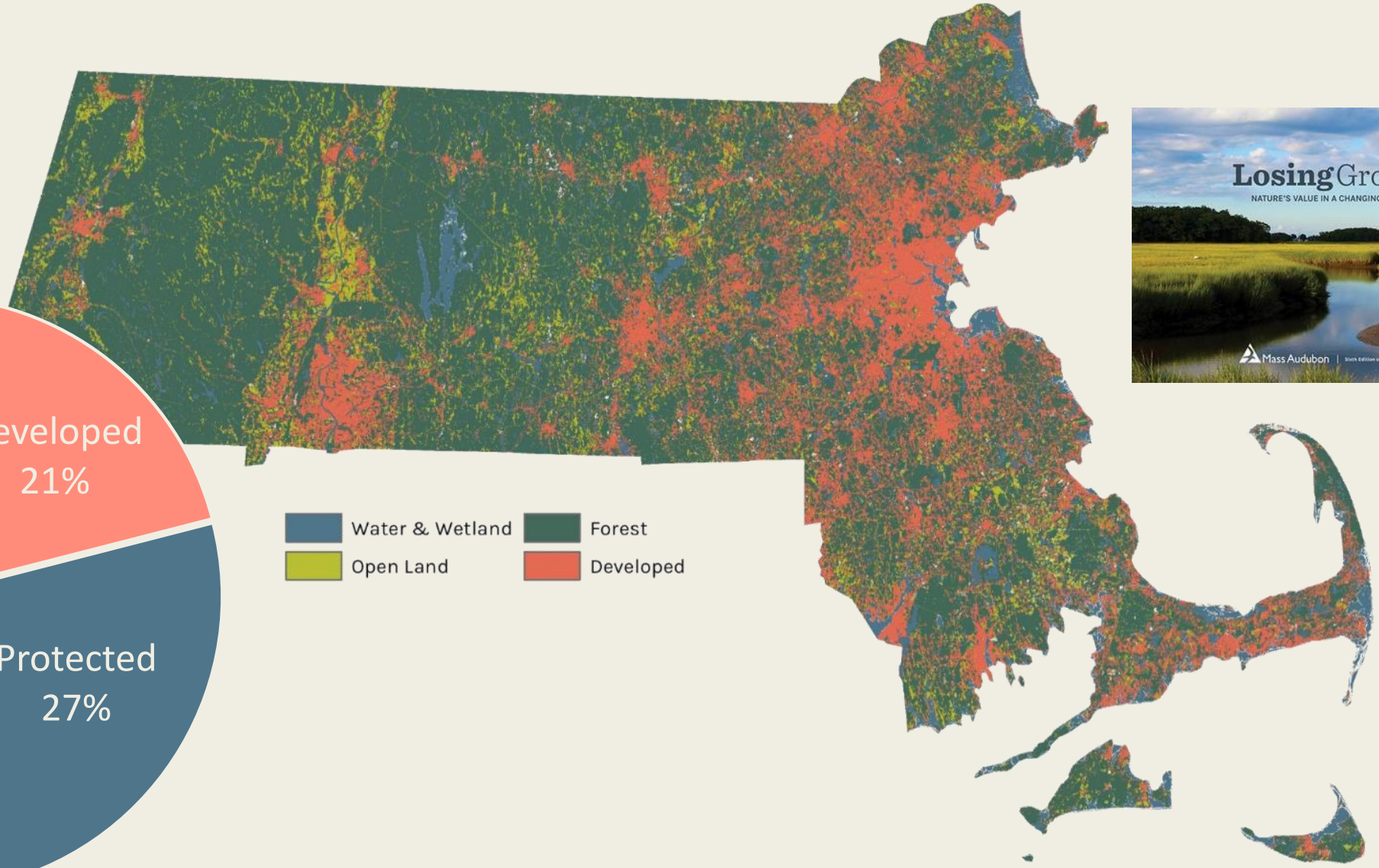
more rain and less snow in winter, and more frequent droughts

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

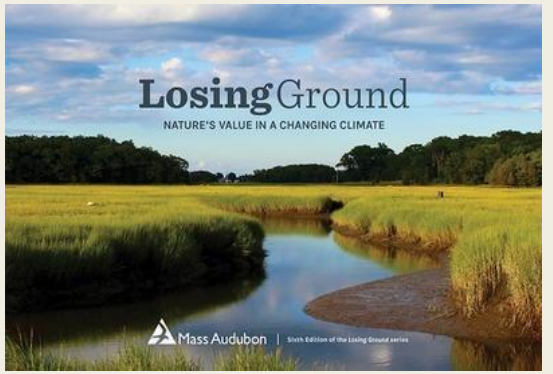
Our climate really is changing...!

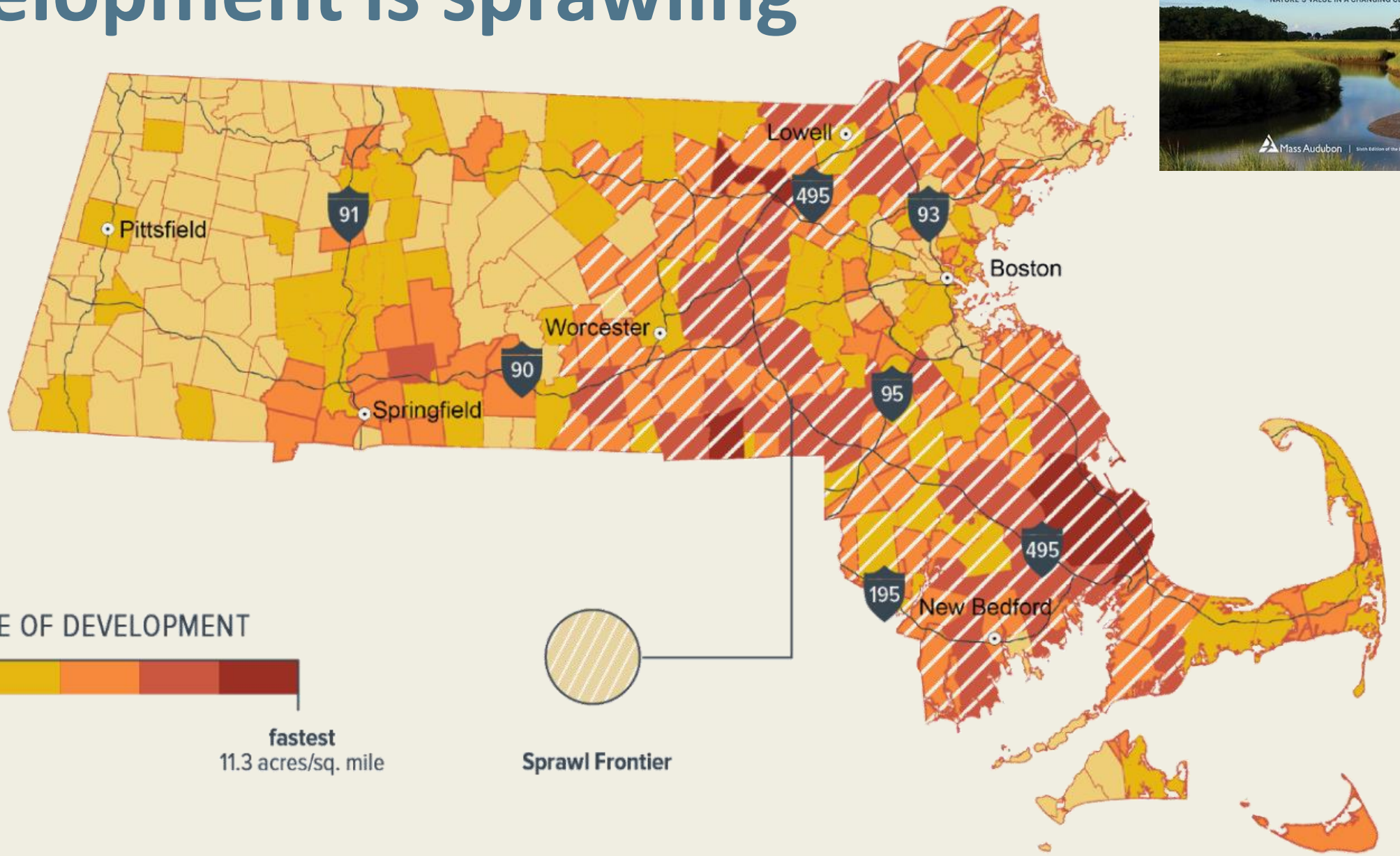
This is exacerbated by our land use patterns





Development is sprawling



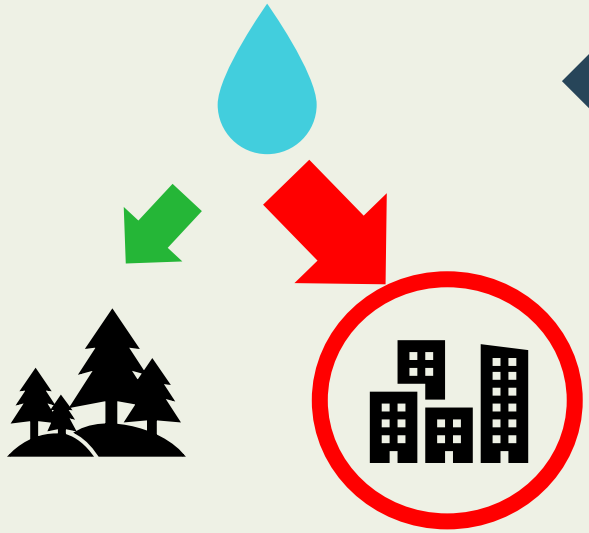


Climate change

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



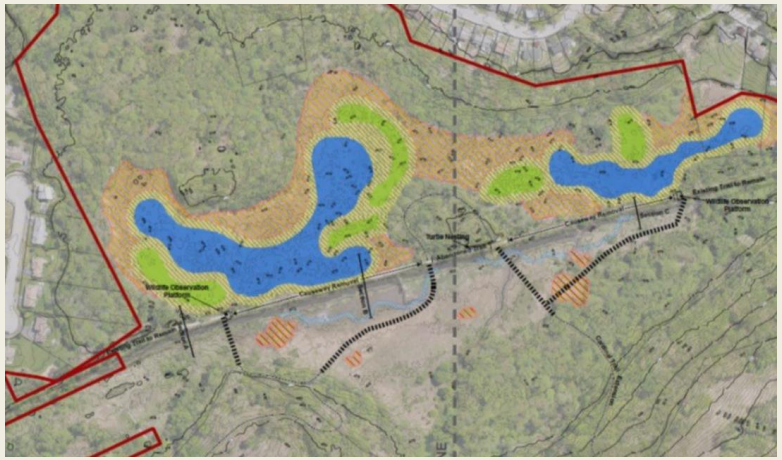
Examples of Nature Based Solutions



Culvert replacement



Street trees



Wetland restoration



Bioswales

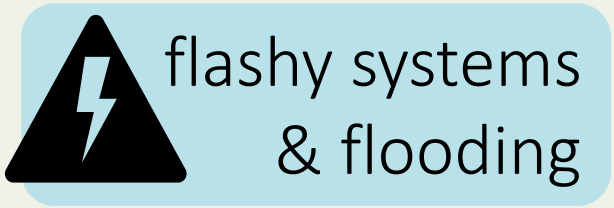


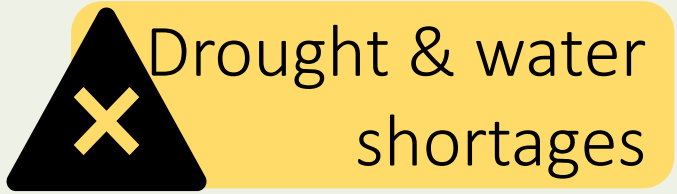
Permeable pavement

NBS address hazards & offer community benefits





















Avoided costs



Enhanced safety



Improved resilience

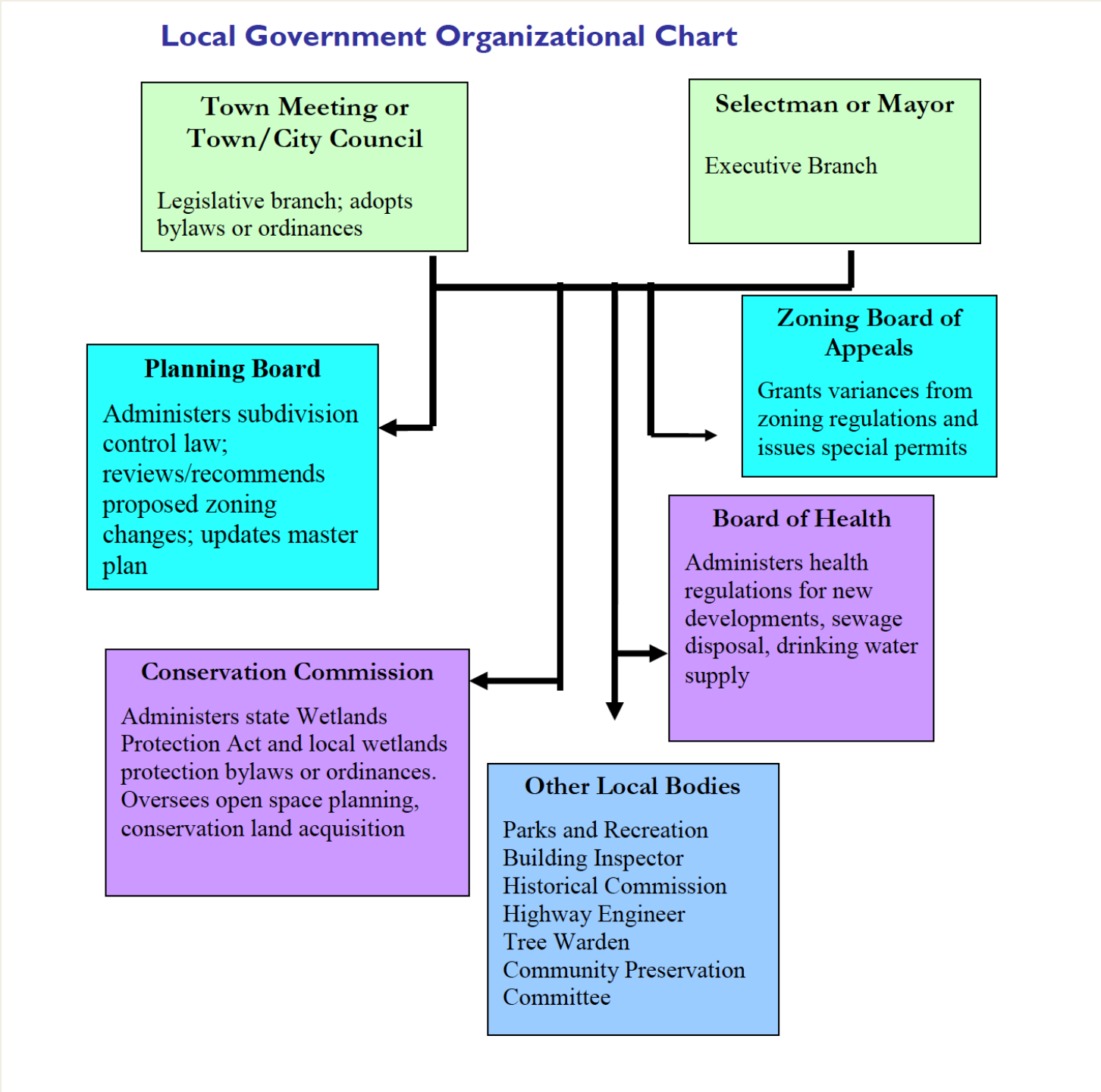
How Can Communities Utilize These Solutions?

Danica Belknap
Senior Environmental Planner

SRPEDD
Southeastern Regional Planning & Economic Development District

Local government and land use

Zoning and Subdivision rules and regulations determine what gets built where



Who regulates stormwater?

Planning Board

- Subdivision regulations, design standards
- Project review & approval

Zoning Board

- Land use
- Lot dimensions & requirements

Conservation Commission

- Wetland permits

Board of Health

- Water supplies & wastewater

Building Commissioner

- Building permits

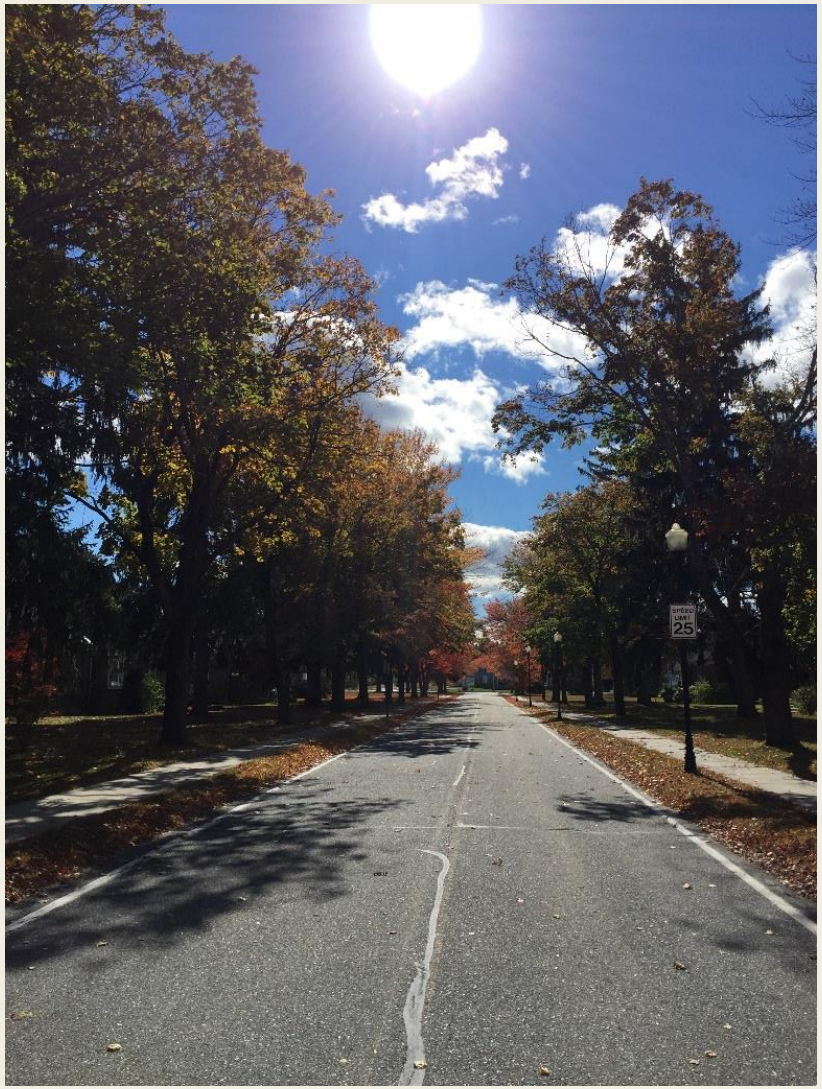
Stormwater Committee (communities with stormwater bylaw/permit)

- Best if includes representatives from all boards & commissions

Why bylaw review? You get what you zone for!

Communities often **unintentionally discourage** nature based solutions by…

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



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

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.

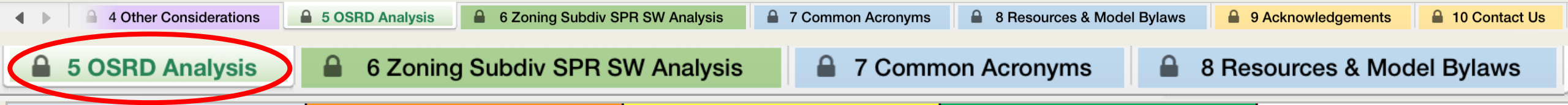
Get more details on LID's many cost-savings and other benefits at: www.massaudubon.org/LIDCost.

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

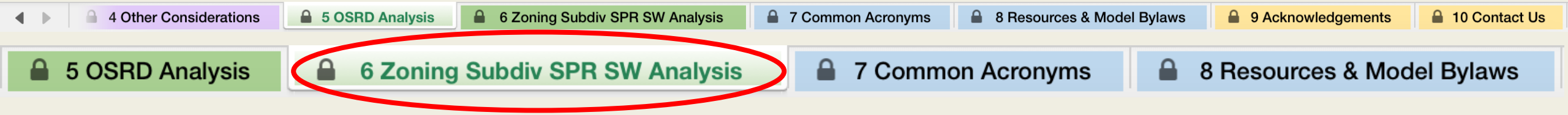
1. **Overall site design**: Open Space Residential Design (OSRD) vs. conventional subdivisions
2. **Project design and layout standards in relation to LID**: road layout and width, curbing, drainage, sidewalks, parking, landscaping
3. **Maintenance and operations, mechanisms for enforcement**: Who is 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 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	

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)*

Avoid impacts through smart zoning and regulations

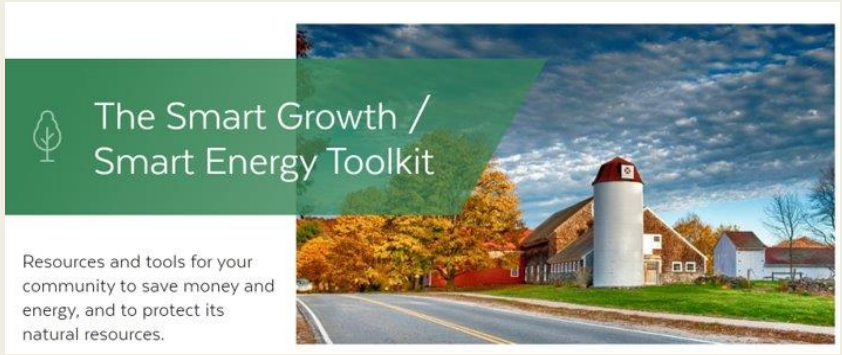
1. Protect natural resources and open space
2. Promote efficient, compact development patterns and infill
3. Smart designs that reduce overall imperviousness
4. Adopt GI Stormwater management provisions (LID)
5. Encourage efficient parking





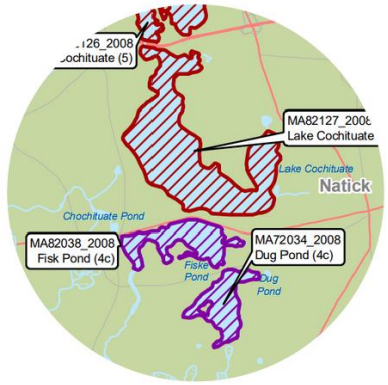
Identify contradictions and prioritize updates

- Identify greatest potential for impact
- Prioritize administrative vs. town meeting changes
- Prioritize what's important to the community
- Don't reinvent the wheel!



Factors	Conventional	Better	Best	Community's Zoning	Community's Subdivision Rules & Regulations	Community's Site Plan Review (Zoning bylaw S 5400, pg 67)	Community's Stormwater/LID Bylaw/Regulations (2008 Stormwater bylaw)
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 specific standards set, only required to minimize area of vegetation disturbed, 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	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	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
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.
GOAL 2: PROMOTE EFFICIENT, COMPACT DEVELOPMENT PATTERNS AND INFILL							
		OSRD/NRPZ preferred		Required minimum lot size of 35,000 sq ft for residential; lots without water or sewer shall			

Adopting LID: Natick



Today

Impaired local water bodies

Minimal protections from stormwater

Regulations at odds with development and MA best practices



Tomorrow

Cleaner, safer water bodies

Reasonable protections from stormwater

Incorporation of nature-based solutions

In line with MS4 permit

Image source:

Jillian Wilson-Martin, Natick Sustainability Coordinator, Presentation to Natick Town Meeting, 2019

Adopting LID: Natick

Minor Permit

- 3,000 - 20,000 sq ft of land disturbance
- (64% of parcels)
- Construction/alteration of drainage
- facility impacting same area
- The addition, on-site redistribution or
- export of 100 - 750 cubic yards of soil

- Approved by Conservation Agent
- Administrative Review

Typical Project:

Construction of new single family home

Major Permit

- >20,000 sq ft of land disturbance
- (30% of parcels)
- Construction/alteration of drainage
- facility impacting same area
- The addition, on-site redistribution or
- export of >750 cubic yards of soil

- Approved by Con Comm
- Public hearing

Typical Project:

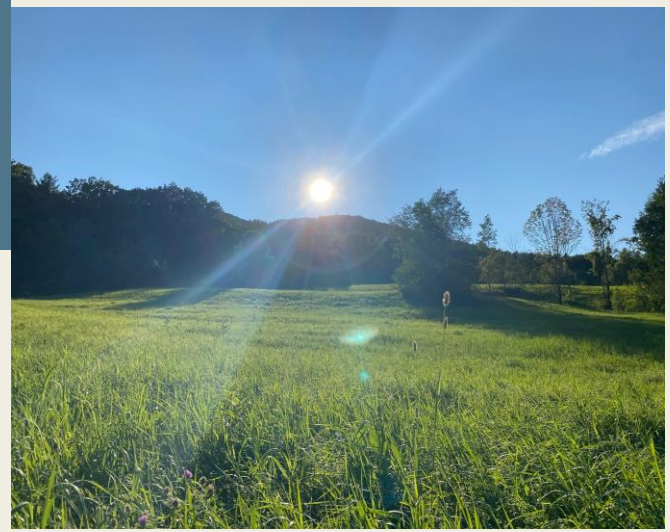
Multi-dwelling or large commercial

Avoiding Costs and Impacts

Mark Voorhees
EPA Region I

Avoiding Costs & Impacts
Conversion of Natural Land to Impervious Cover (IC)

- Introduce new information/methods
- Assessing Cumulative Impacts
  - Long-term Continuous Simulation Hydrologic Modelling & accounting for Groundwater Recharge & Evapotranspiration
  - 29-year climatic data – hourly precipitation and daily temperature
- Homing in on resilient management options for new development activities
  - Long-term Cumulative Performance Estimates of SW control measures sized for different objectives
- Calculating potential Cost Burden &/or Cost avoidance for different management options







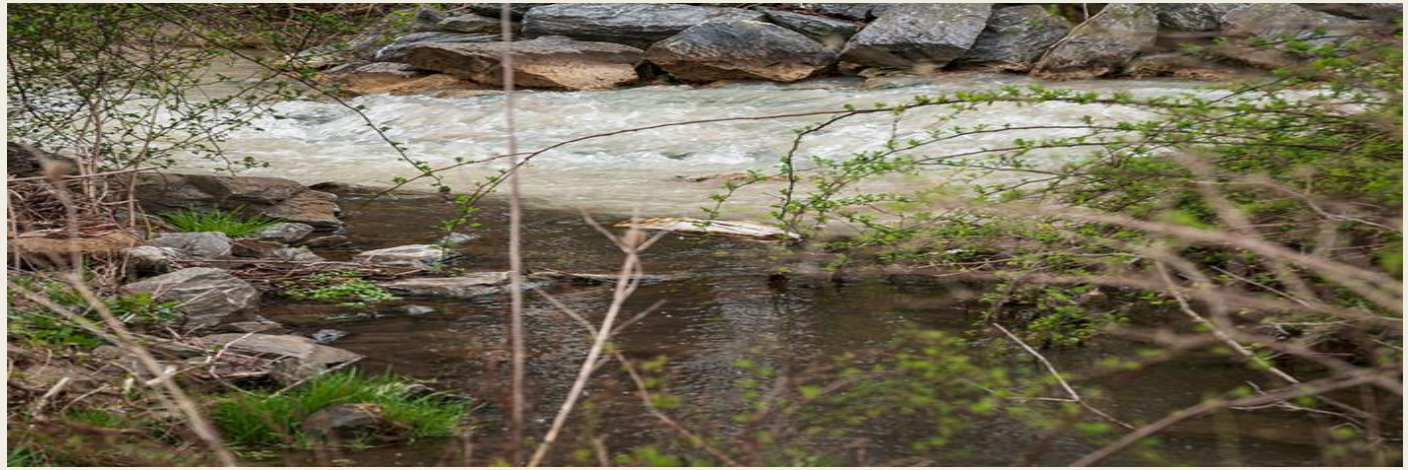
Cumulative Impacts

Conversion of Natural Land to Impervious Cover (IC)

- Hydrologic Impacts
  - Increased Annual Runoff Volume

  ~300% to 10,000% increase (0.5 to 1.1 MG/acre/year)
  - **Lost** Annual Groundwater Recharge

  ~300,000 to 500,000 gallons/acre/year
- Increased Nutrient Export
  - Increased Annual Stormwater **Phosphorus** Load ~300% to 10,000% increase (1.5 to 1.9 lbs/acre/year)
  - Increased Annual Stormwater (SW) **Nitrogen** Load ~500% to 13,000% increase (11 to 13 lbs/acre/year)

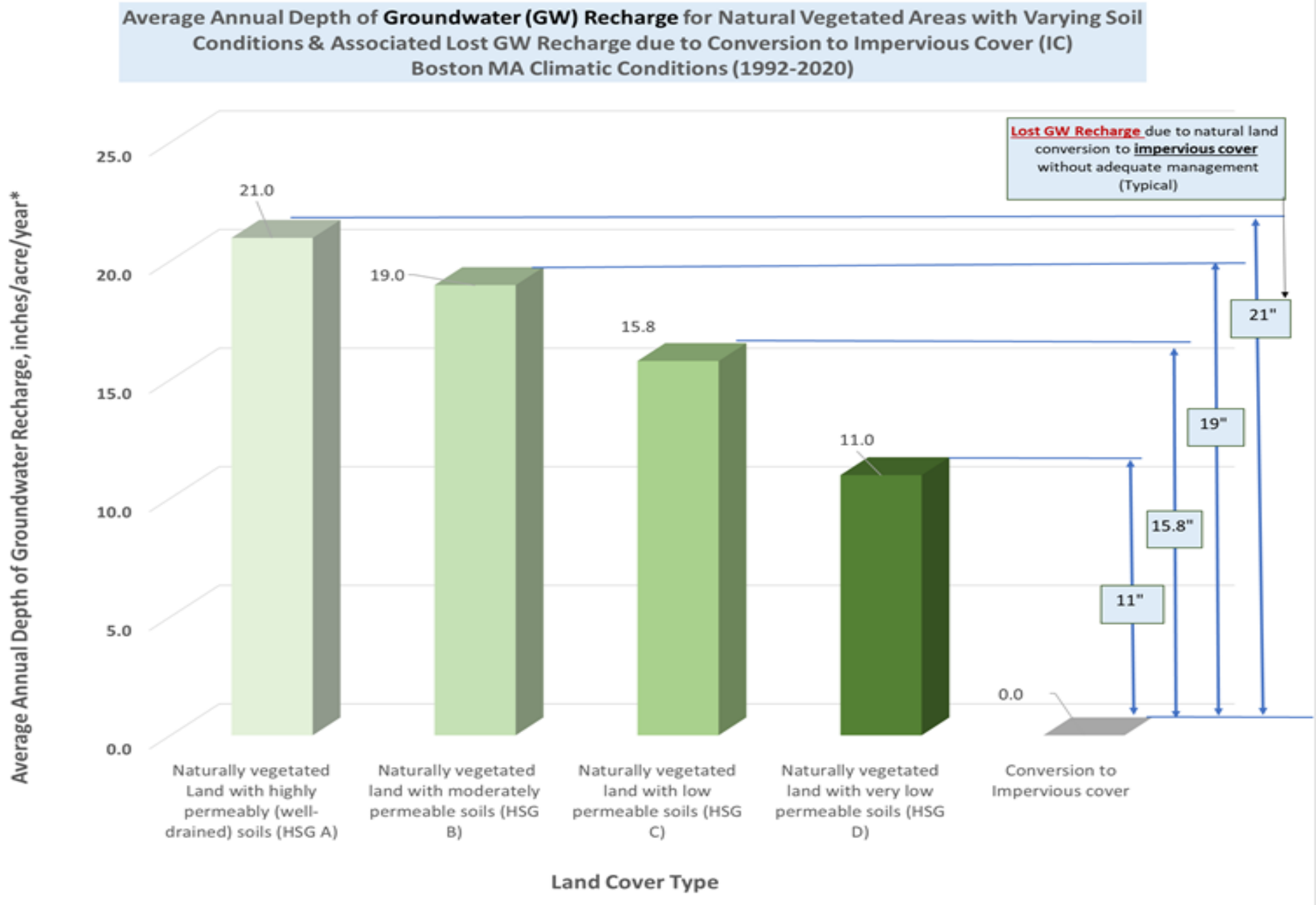




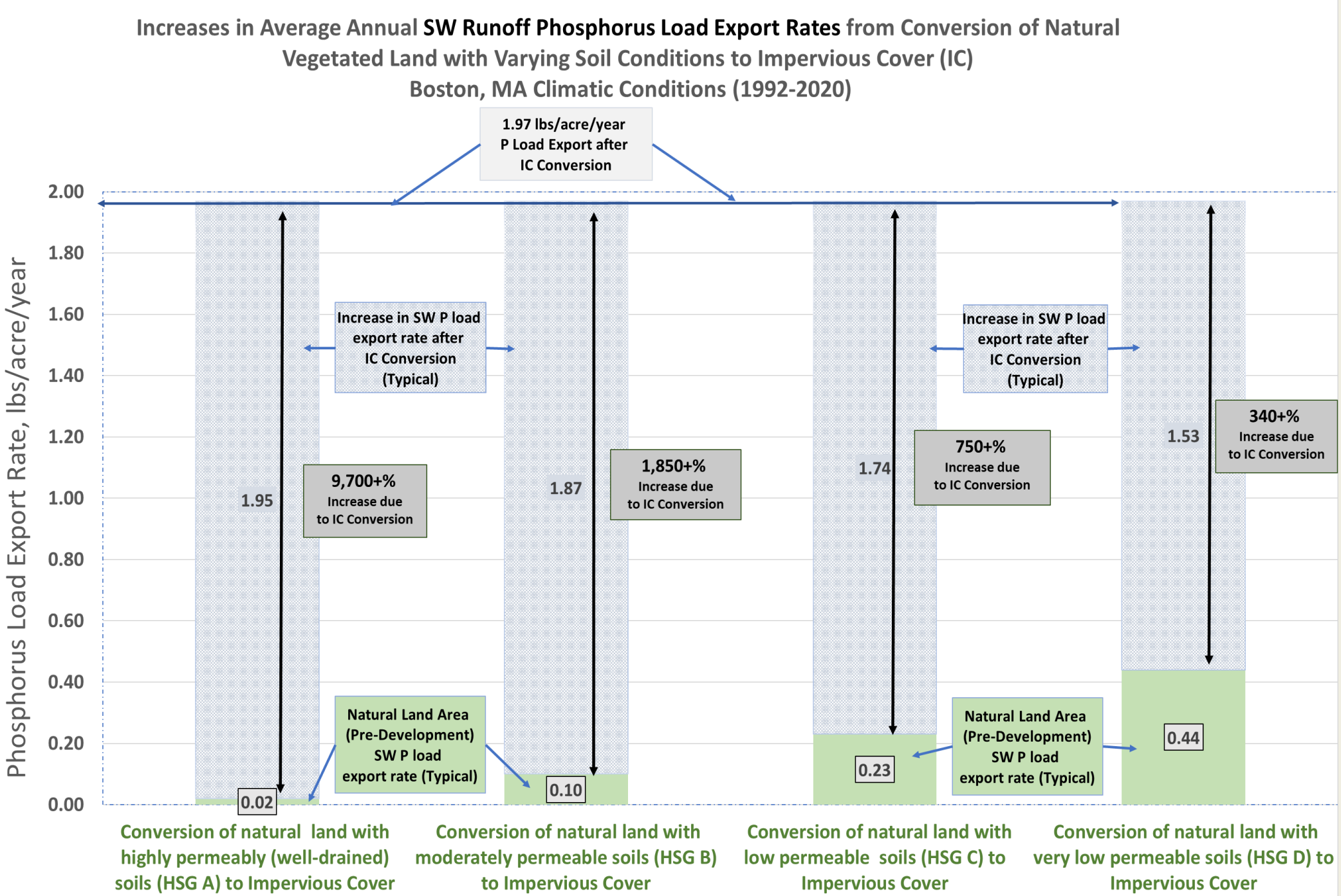




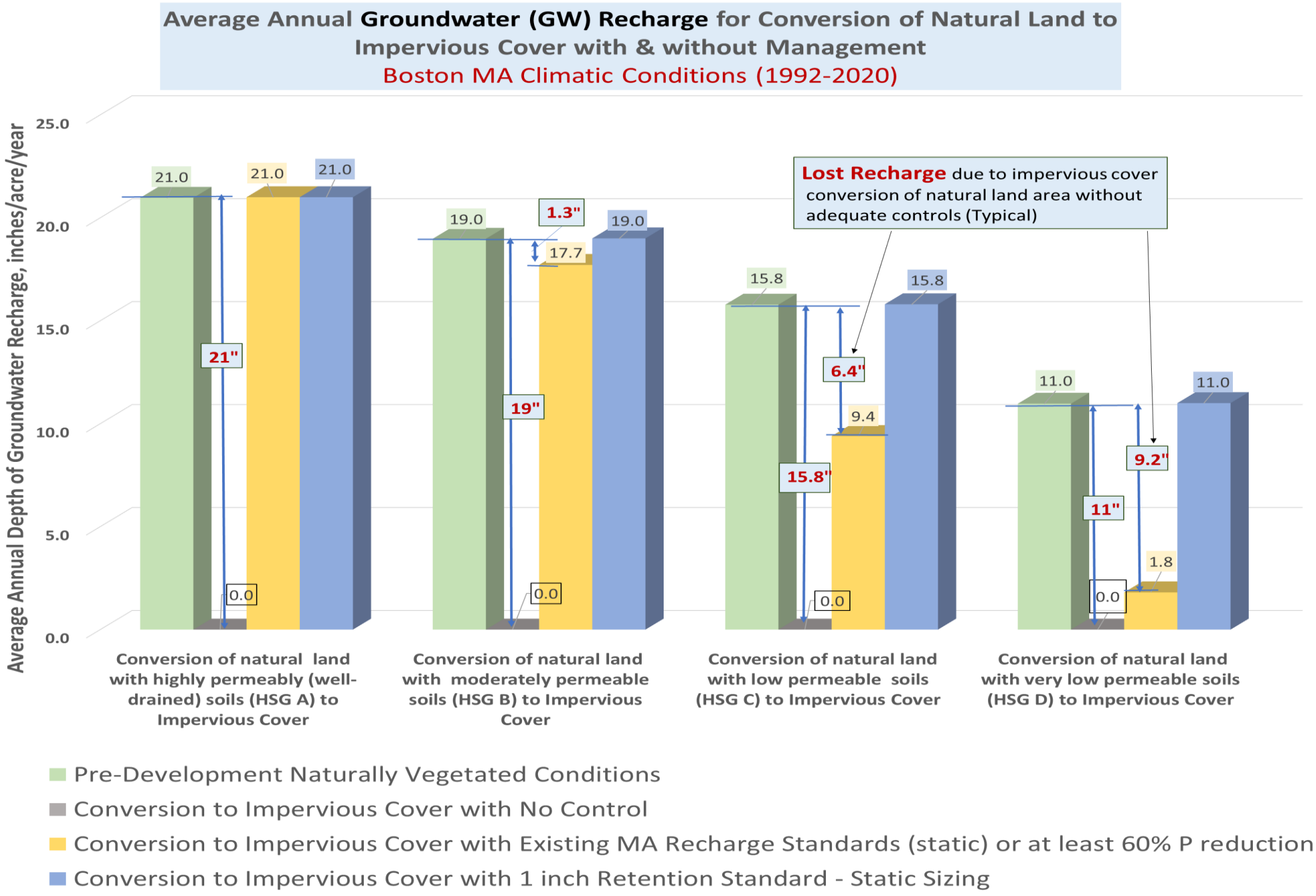
Lost Annual Groundwater Recharge from Conversion of Natural Vegetated Land to Impervious Cover (IC)



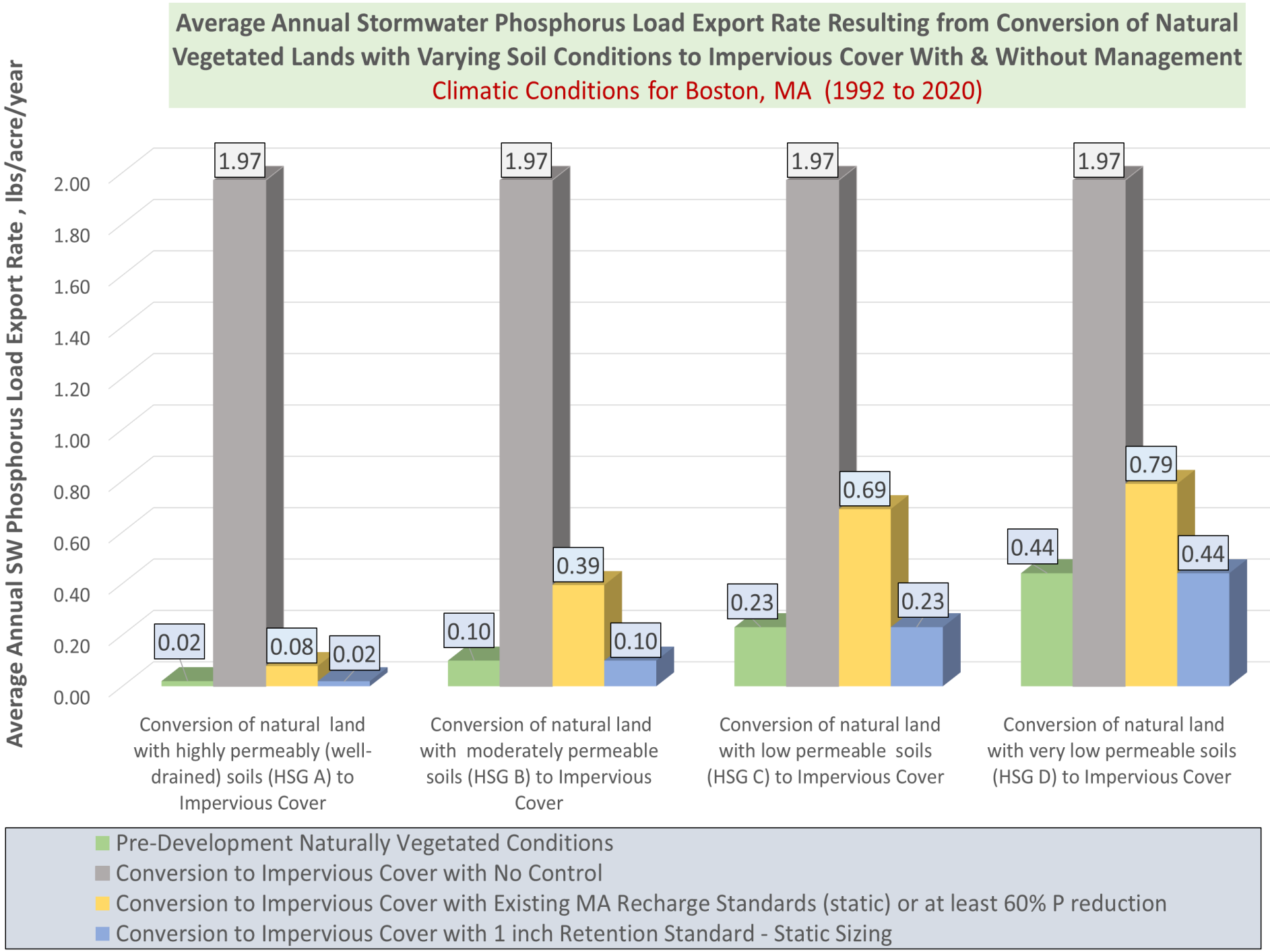
Increases in Annual Phosphorus Load Export from Conversion of Natural Vegetated Land to Impervious Cover



SW Recharge Management for Conversion to Impervious Cover



SW Nutrient Management for Conversion to Impervious Cover



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

- Increased SW Nutrient Loads from IC may contribute to water quality impairments & trigger future SW permitting requirements
- Retrofitting SW control measures(SCMs) into existing development is:
  - Far more costly (2-3 times) than for new development SCMs (not accounting for land costs);
  - More technically challenging due to space constraints from existing infrastructure

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
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

Notes: *Average annual nutrient export rates are derived from long-term continuous simulations of the StormWater Management Model (SWMM) v5.0 using climatic data (hourly precipitation and daily temperature) for Boston, MA (1992-2020) and the nutrient export rates derived for that MA and NH MS4 permits

**Year 2020 Cost per lb P ($/lb-P) and N (lb-N) were calculated using the UNHSC calculator tool v2.2 for SW retrofits assuming the average of equal implementation of infiltration trenches for HSG A, B, and C and enhanced biofiltration with physical storage capacities or DSVs of 0.2in, 0.3in, 0.45in and 0.6 and

*** No SW controls implemented at time of development (e.g., for projects that fall below the regulatory threshold area of disturbance or impervious cover.

Future Cost Burden or Cost Avoidance?
Conversion of Natural Land to Impervious Cover (IC)

Cost Burden? - Inadequate management at time of development possibly creating future burden for community

Increased Nutrient Loads from IC that degrades water quality & triggers future SW permitting requirements.

1) No Management Scenario

- Future $ to offset increased **Phosphorus** load- **~$60,000 to $80,000 per unmanaged acre of IC**
- Future $ to offset increased **Nitrogen** load - **~$50,000 to $60,000 per unmanaged acre of IC**



OR



Cost Avoidance? – Appropriate Management implemented at time of development activity

2) Intermittent Management Scenario (Existing MA recharge standards and 60% P load reduction)

- Future $ to offset increased **Phosphorus** load- **~$15,000 to $50,000 per managed IC acre**
- Future $ to offset increased **Nitrogen** load - **~$8,000 to $35,000 per managed IC acre**

3)Management Scenario of One (1) Inch On-site Retention (meets annual recharge and no increase in Nutrient export

- Future $ to offset increased **Phosphorus** load - **$0 per managed acre of IC**
- Future $ to offset increased **Nitrogen** load- **$0 per managed acre of IC**

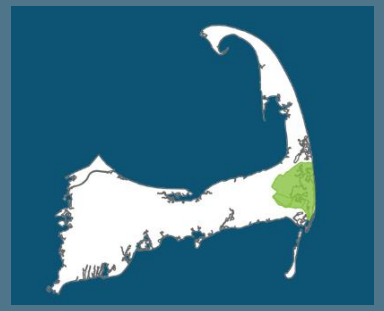
Regional Bylaw Review for Stormwater Management

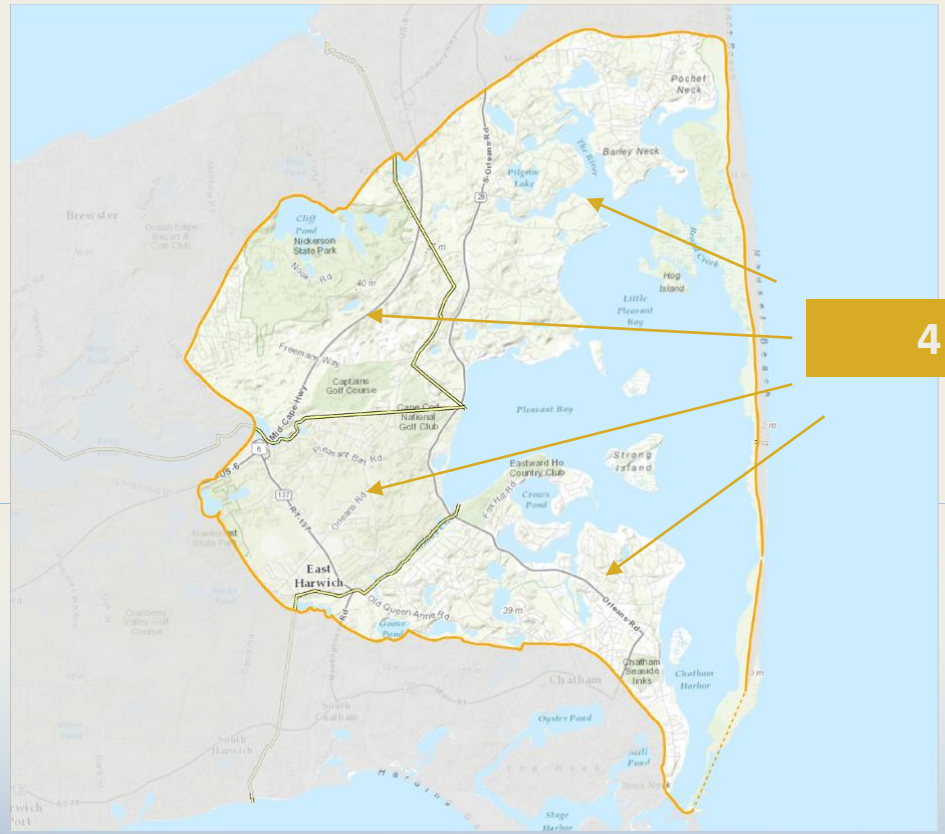
(USING THE MASS AUDUBON BYLAW REVIEW TOOL)

TIM PASAKARNIS & TARA LEWIS
WATER RESOURCES ANALYSTS

CAPE COD COMMISSION

Pleasant Bay





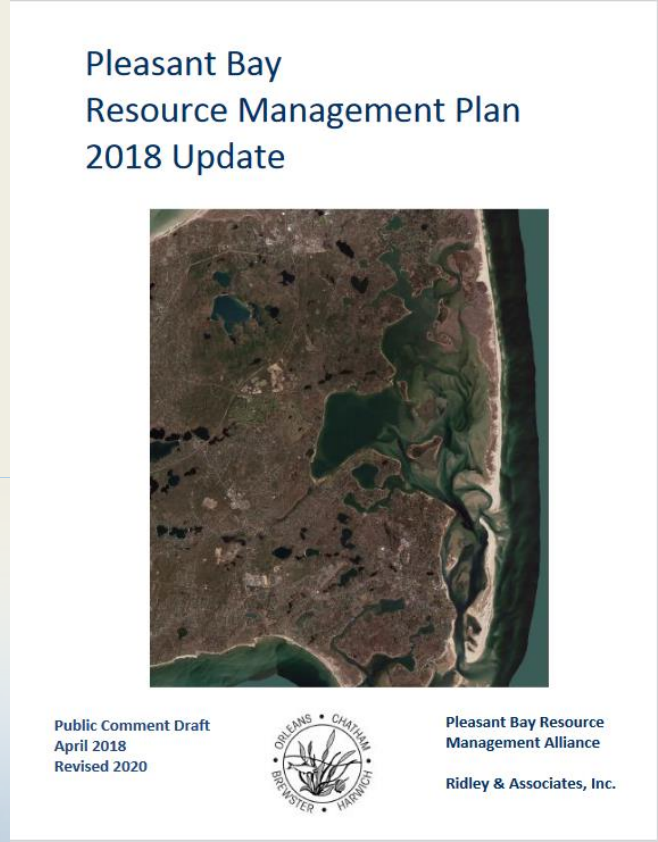
4 Towns

- Pleasant Bay
  - 6,162 acres
  - 13 sub-embayments
- Watershed Area: 11,760 acres
  - ± 8,500 parcels, ± 7,500 developed
  - 89% of developed parcels are residential
  - 42 freshwater ponds, 3 tidal rivers
  - 15 public supply wells

Pleasant Bay Alliance - History

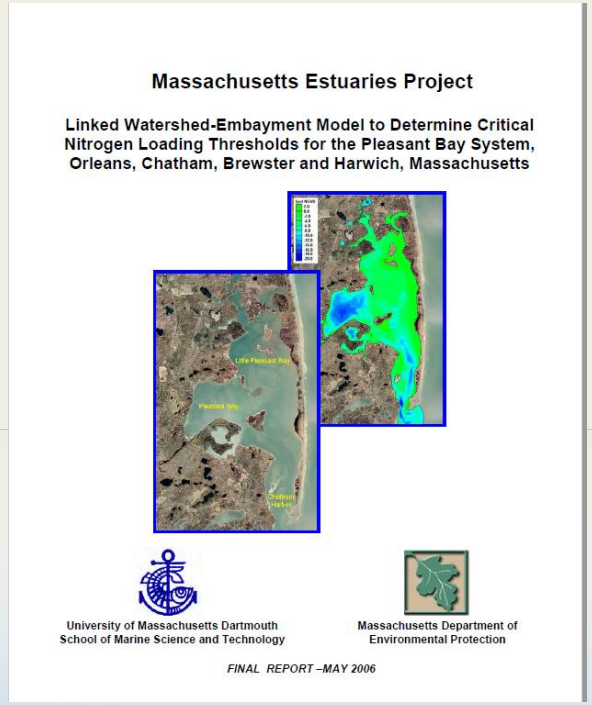
Pleasant Bay Alliance

- Pleasant Bay Resource Management Plan
  - Coastal Processes and Structures
  - No Discharge Area
  - Water Quality Monitoring
  - Watershed Planning
  - Wetlands Protection



Pleasant Bay Alliance - History

- Pleasant Bay Resource Management Plan (1998)
- Pleasant Bay Final MEP Report (2006) & TMDL (2007)



Massachusetts Estuaries Project

Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Pleasant Bay System, Orleans, Chatham, Brewster and Harwich, Massachusetts

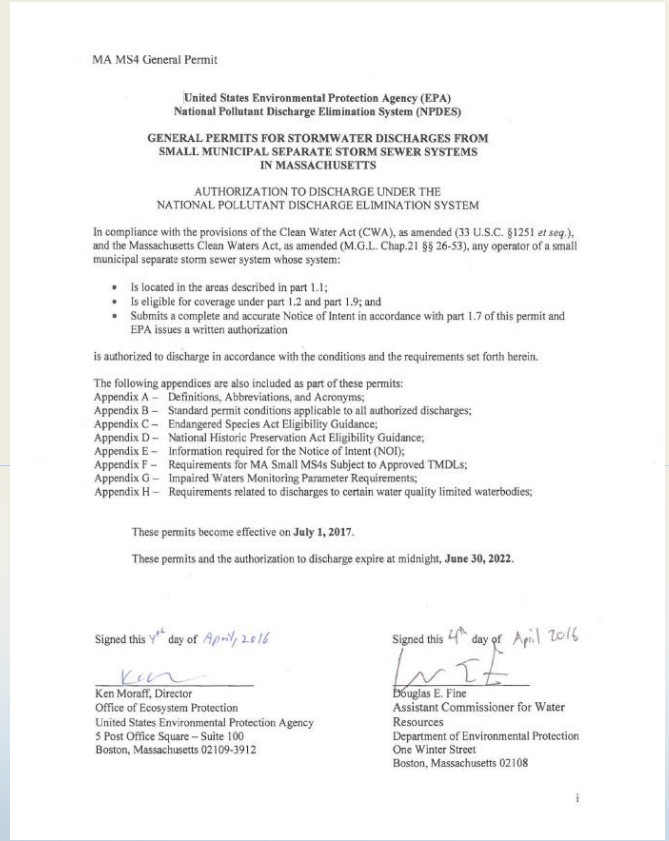
University of Massachusetts Dartmouth
School of Marine Science and Technology

Massachusetts Department of Environmental Protection

FINAL REPORT –MAY 2006

Pleasant Bay Alliance - History

- Pleasant Bay Resource Management Plan (1998)
- Pleasant Bay Final MEP Report (2006) & TMDL (2007)
- Massachusetts Small MS4 General Permit (2016)



MA MS4 General Permit

United States Environmental Protection Agency (EPA)
National Pollutant Discharge Elimination System (NPDES)

GENERAL PERMITS FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS IN MASSACHUSETTS

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. §1251 *et seq.*), and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap.21 §§ 26-53), any operator of a small municipal separate storm sewer system whose system:

- Is located in the areas described in part 1.1;
- Is eligible for coverage under part 1.2 and part 1.9; and
- Submits a complete and accurate Notice of Intent in accordance with part 1.7 of this permit and EPA issues a written authorization

is authorized to discharge in accordance with the conditions and the requirements set forth herein.

The following appendices are also included as part of these permits:
Appendix A – Definitions, Abbreviations, and Acronyms;
Appendix B – Standard permit conditions applicable to all authorized discharges;
Appendix C – Endangered Species Act Eligibility Guidance;
Appendix D – National Historic Preservation Act Eligibility Guidance;
Appendix E – Information required for the Notice of Intent (NOI);
Appendix F – Requirements for MA Small MS4s Subject to Approved TMDLs;
Appendix G – Impaired Waters Monitoring Parameter Requirements;
Appendix H – Requirements related to discharges to certain water quality limited waterbodies;

These permits become effective on **July 1, 2017**.

These permits and the authorization to discharge expire at midnight, **June 30, 2022**.

Signed this 4th day of April 2016

Ken Moraff, Director
Office of Ecosystem Protection
United States Environmental Protection Agency
5 Post Office Square – Suite 100
Boston, Massachusetts 02109-3912

Signed this 4th day of April 2016

Douglas E. Fine
Assistant Commissioner for Water Resources
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Pleasant Bay Alliance - History



- Pleasant Bay Resource Management Plan (1998)
- Pleasant Bay Final MEP Report (2006) & TMDL (2007)
- Massachusetts Small MS4 General Permit (2016)
- Pleasant Bay Targeted Watershed Management Plan & Watershed Permit (2018)



Technical Assistance Objectives

Identify opportunities to strengthen local regulations and create regional consistency

Improve climate resilience

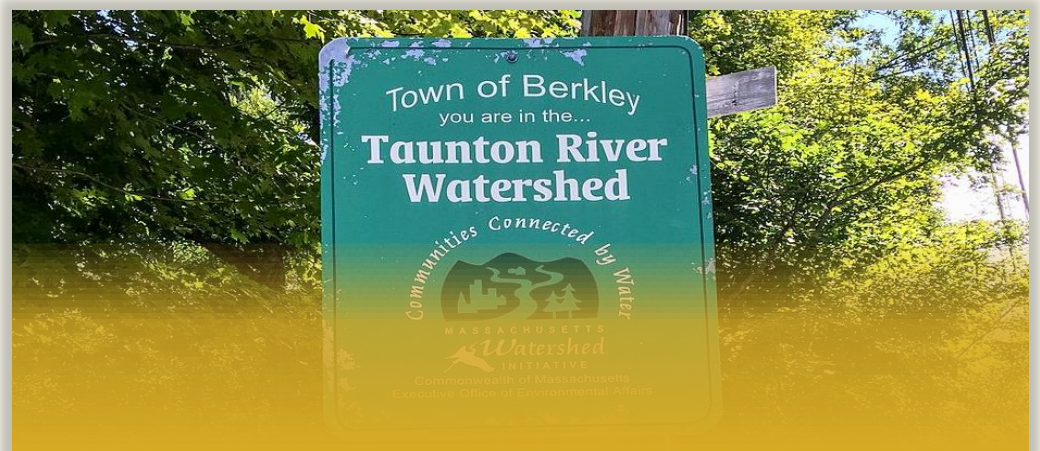
Minimize cost / maximize impact of stormwater planning

Take advantage of overlap between Watershed and MS4 Permits

The Role of Bylaw Review

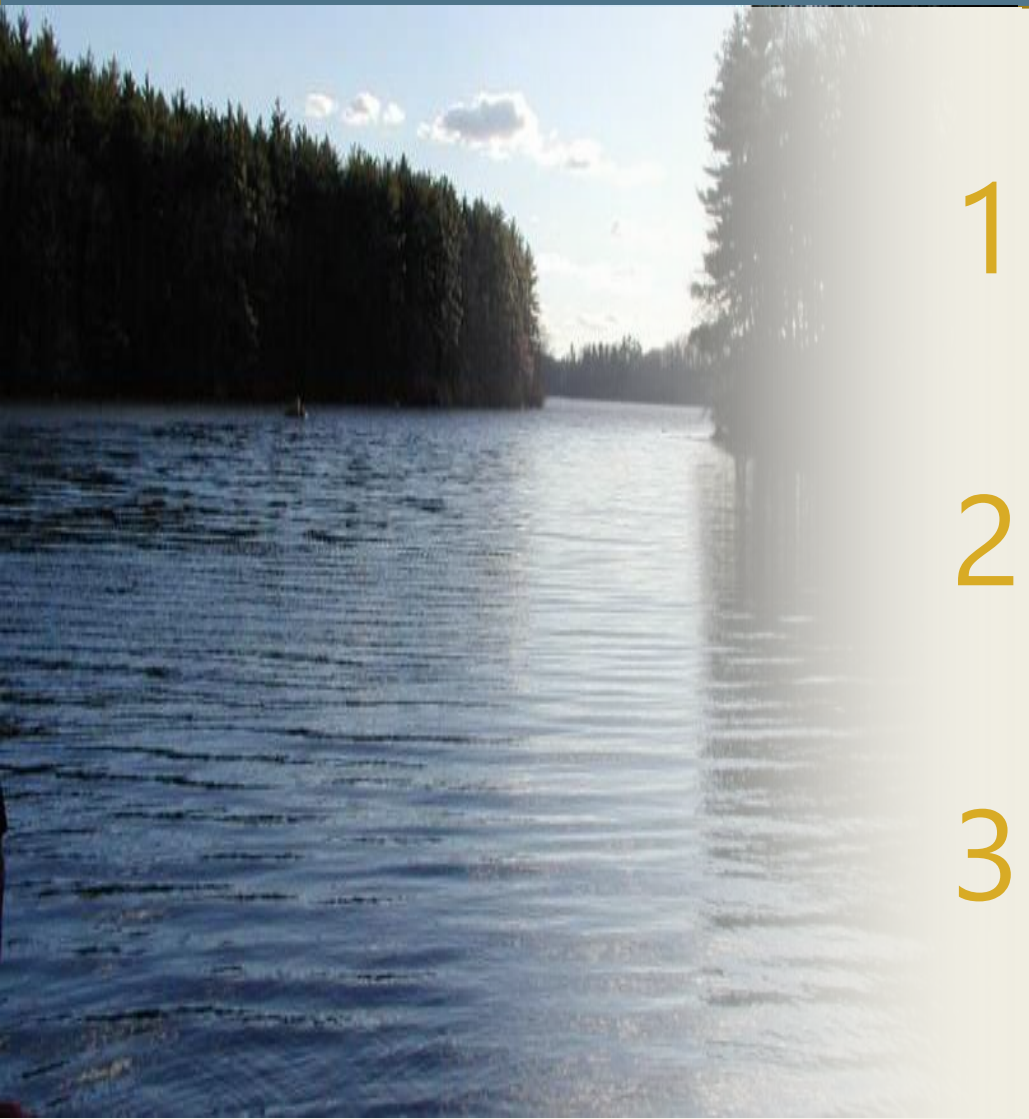
Approximately 40% of impervious cover within Pleasant Bay can be directly influenced by town activities - likely lower than this in many sub-watersheds

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

Regional Bylaw Review Methodology



1. **Mass Audubon's Bylaw Review Tool**
   an Excel-based analysis to compare existing regulations to LID best practices

2. Identify and read local bylaws and regulations

3. Summarize findings for each Town and compile regional recommendations

MS4 PERMIT COMPLIANCE

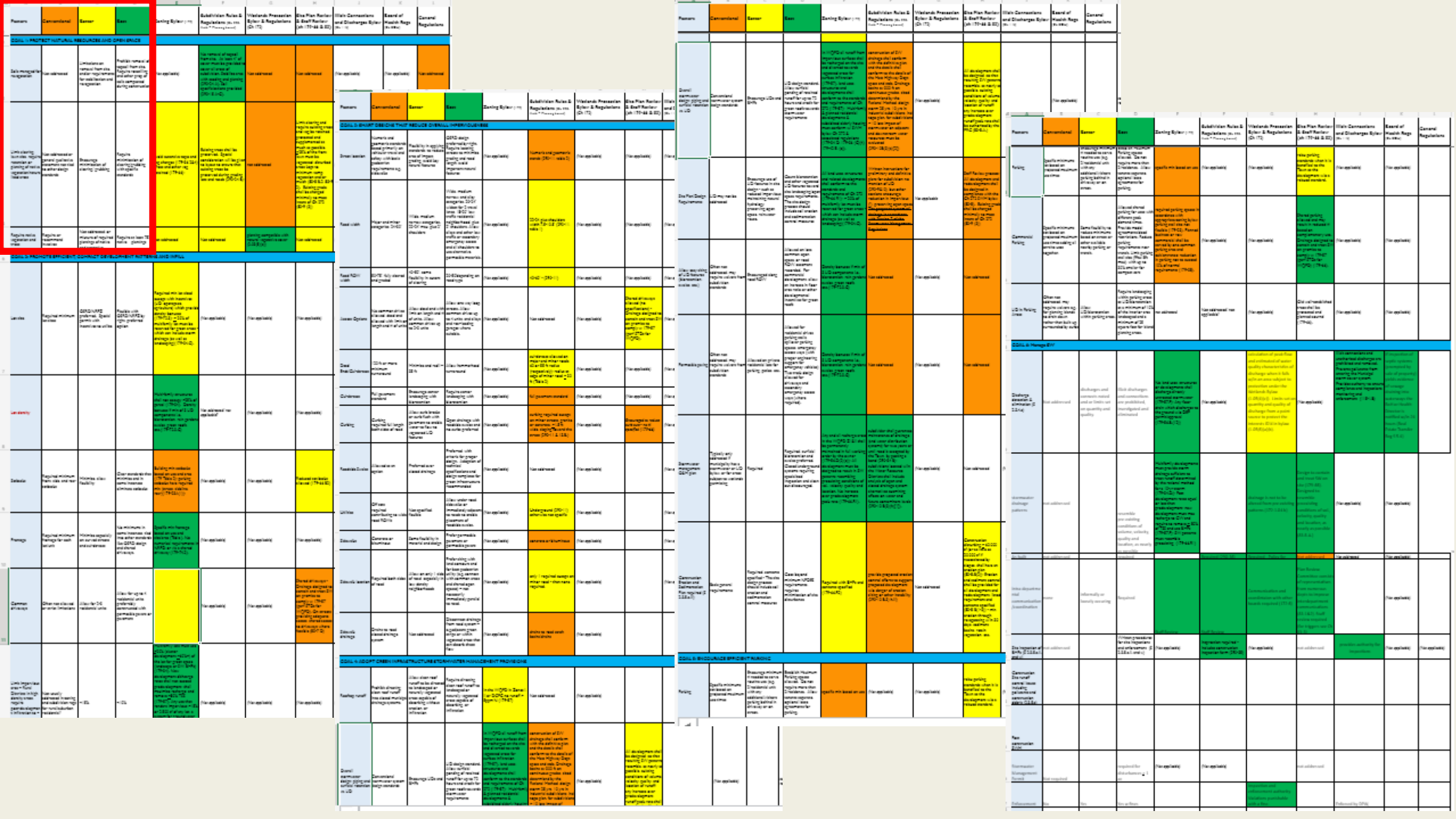


ADDED MS4 GOALS

- 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)

MS4 PERMIT COMPLIANCE

Factors	Conventional	Better	Best	Zoning Bylaw (179)	Subdivision Rules & Regulations (Ch 290, Auth = Planning board)	Wetlands Protection Bylaw & Regulations (Ch 172)	Site Plan Review & Staff Review (ch 179-66 & 83)	Illicit Connections and Discharges Bylaw (Ch 115)	Board of Health Regs (Ch BOH)
GOAL 6: Manage SW									
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	No land uses, structures or developments shall discharge directly untreated stormwater (179-57.F); Any floor drain which discharges to the ground w/o DEP permit/approval (179-56.B.(12))	*(Not applicable)*	calculation of peak flow and estimated of water quality characteristics of discharge when it falls w/in an area subject to protection under the Wetlands Bylaw (1.05(4)(c)). Limits set on quantity and quality of discharge from a point source to protect the interests ID'd in bylaw (1.05(6)(a)(b).	*(Not applicable)*	Illicit connections and unathorized discharges are prohibited and removed. Prevents pollutants from entering the Municipal storm sewer system. Provides authorty to ensure compliance and inspections, monitoring and enforcement (115-1.B)	If inspection of septic systems (prompted by sale of property) yields evidence of sewage draining into waterways the BoH or Health Director is notified w/in 24 hours (Real Estate Transfer
stormwater drainage patterns	not addressed		resemble pre-existing	Multifamily developments must provide storm drainage sufficient to treat runoff determined by the rational method for a 10-yr storm (179-34.D.); Post development rates equal or less than predevelopment; new		drainage is not to be altered from pre-existing patterns (172-1.04 b)	Design to contain and treat SW on site (179-66). Designed to resemble preexisting conditions of vol., velocity,	*(Not applicable)*	*(Not applicable)*



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 / area.
Orleans' Subdivision Rules and Regulations	require an analysis of surface versus underground drainage system alternatives for a subdivision within 300 feet of a wetland resource or if it contains two or more lots of land within the Groundwater Protection District 2.

LOCAL FINDINGS

Some common areas stood out as opportunities for improvement

Authority / responsibility for various aspects of stormwater planning and review is scattered

Inclusion of stormwater design requirements in different areas of municipal code can lead to confusing and inconsistent application

Preferred design types and strategies were not always the easiest permitting option

Low Impact stormwater designs were not always permissible uses for Open Space within OSRD

Mass Audubon Tool

Factors	Conventional	Better	Best	Zoning Bylaw (CH 164)	Subdivision Rules and Regs (CH 192)	Wetland Bylaw (CH 160) & Regulations (CH 196A) revised 2013	Site Plan Review Section 164-33) & Architecture Review (164-
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	Within GWPD 2 ≥ 30% of lot area retained in natural state; ≥ 60% must remain pervious (164-17.D.2.a.1&2); Removal or fill of earth > 2,000 cy shall require ZBoA special permit (164-24.C); For	roads and lots designed with goals of reducing disturbance of veg and # of trees removed (192-9); Preserve natural features (trees, watercourses,	require replacement planting of native vegetation, shrubs, trees (196A-7E.5.(h)); Any activity that denudes ≥50 SF w/in 100 ft of a resource area reequires	Reasonable effort to conserve and protect natural features; Existing trees of 6-in DBH shall be incorporated into

Regional Summary

Pleasant Bay Alliance - Regional Stormwater Management Bylaw Review

EXECUTIVE SUMMARY AND REGIONAL RECOMMENDATIONS

Introduction

In 2019, the US Environmental Protection Agency (EPA) awarded a five-year cooperative agreement to the New England Environmental Finance Center (New England EFC) at the University of Southern Maine to establish a technical assistance network (The Network) consisting of numerous partner organizations that provide training and assistance to municipalities, organizations, and tribes across the region. The purpose of the network is to advance stormwater management, ecological restoration, and climate [illegible] Massachusetts. In response to a request for technical assistance by the Pleasant Bay Alliance and its member towns, Cape Cod Commission staff with the assistance of other network partners developed a process for review of local town regulations and bylaws and conducted reviews for the four municipalities that make up the Pleasant Bay Alliance.

Several guiding principles that direct the Network's efforts include:

1) Conserving resources that already exist to preserve existing function(s),

2) Integrating green infrastructure and Low Impact Development strategies into all development,

3) Working within existing development patterns to restore functions that are lost, including natural hydrology

Town Summary of Bylaw Review

Chatham Bylaw and Regulation Review

Overview

In an effort to understand Chatham's ability to regulate stormwater and promote development that minimizes runoff and maximizes recharge, and to determine compliance with the 2016 EPA Massachusetts Small MS4 General Permit, the Cape Cod Commission reviewed a variety of the Town's regulatory mechanisms, regulations, and guidelines:

- Zoning Bylaws (1993, revised 2019) – includes Site Plan Review
- Wetlands Protection Bylaw (2014) and Regulations (2014)
- Rules and Regulations Governing the Subdivision of Land (adopted under the subdivision control law Section 81- GG Inclusive, Ch 41, GL) (1966, revised 2006?)
- Stormwater Management (Ch 238, 2019)
- Board of Health Regulations – Nitrogen Loading Regulation; Fertilizer Regulation

Key Areas of Analysis

Compliance with MS4 Permit

Protection of existing natural resources and open space

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 all relevant regulations varied widely
- Inconsistent language – stormwater vs. storm water vs. runoff vs. drainage
- Stormwater only contributes ~10% of Pleasant Bay nitrogen load
- Time will tell if towns use recommendations

REMINDERS

- Stormwater management isn't always in the obvious bylaw(s)
- Having the bylaws available on the eCode 360 library (can be) helpful
- Word search is useful – bylaws need to be in a searchable format
- Word choice is important – both for developing and reviewing local regulations
- Bylaw language is nuanced – a simple word search does not suffice



Conclusion

- Established coalitions / relationships are key to regional management
- Look for effective bylaws that already exist and expand their reach
- Simple language changes could make a big difference
- Consistent review for multiple towns in a region reduces confusion – for everyone



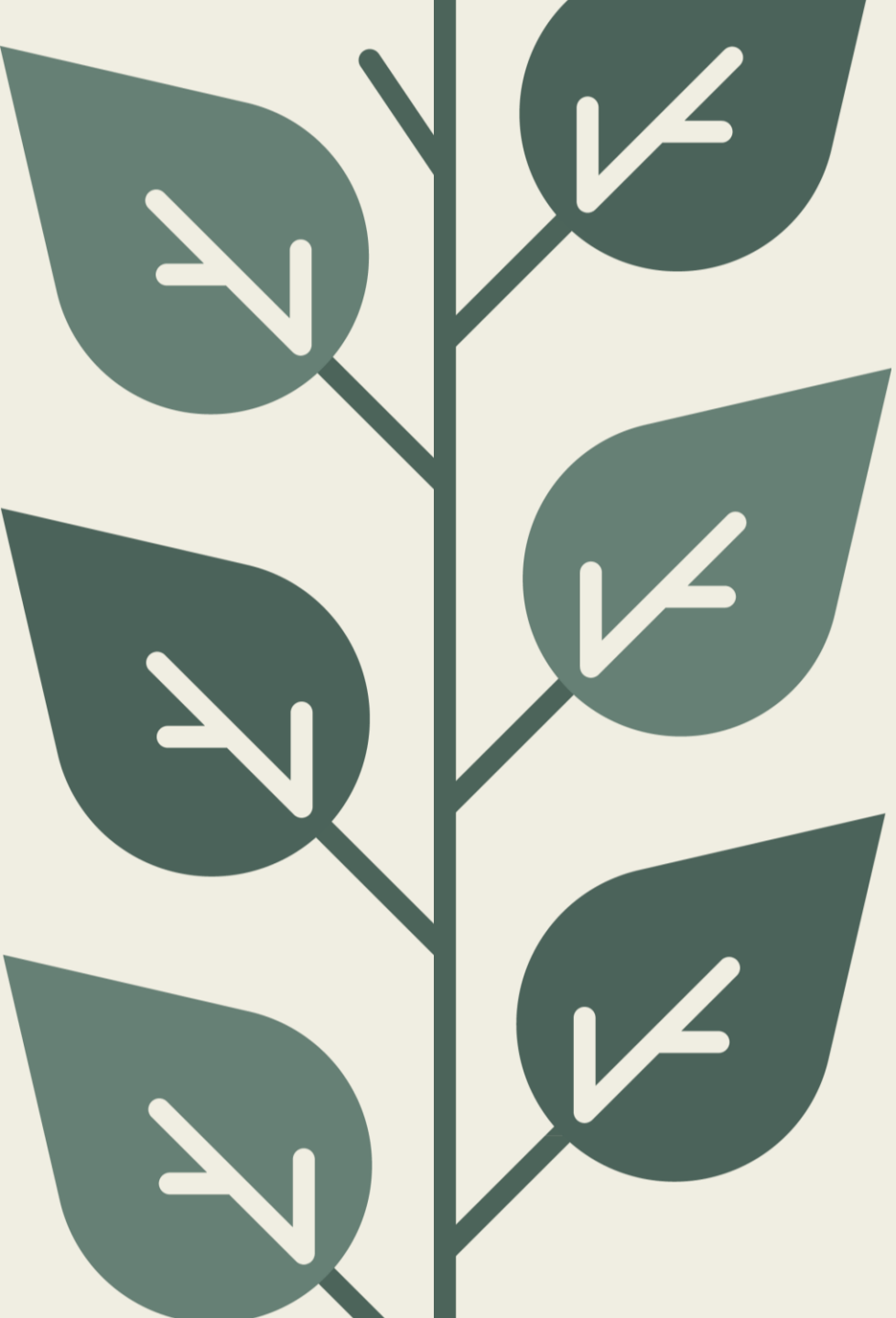
Questions?

Wrap-up and Next Steps

Coming Soon: Bylaw Review Trainings

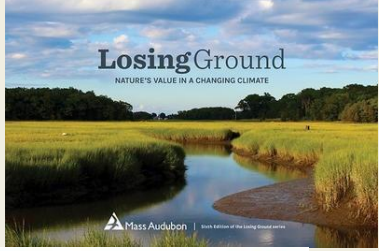
An 8-module training enabling participants to answer questions like:

- Is LID suitable and cost-effective for my community?
- What federal or state regulations should my community be aware of when considering LID?
- What power does my community have to regulate our land use and protect our natural resources?
- How can I build community interest and investment in adopting and implementing LID?
- How do I find the “low-hanging fruit” to make quick fixes?
- And more



- Let Nature Do the Work!
- Low Impact Development (LID) 101
- The Power of a Bylaw, Part 1
- The Power of a Bylaw, Part 2
- Implementing LID
- Bylaw Review
- State and Regional Guides and Resources
- What Next?

Resources





- Mass Audubon LID fact sheets and bylaw tool www.massaudubon.org/lidcost, *Losing Ground* and Value of Nature fact sheets www.massaudubon.org/valueofnature
- EEA Smart Growth Toolkit www.mass.gov/smart-growth-smart-energy-toolkit-information-and-resources
- MAPC's Climate Resilience Toolkit www.mapc.org/resource-library/climate-resilient-land-use-strategies/
- EEA Planning Assistance grants www.mass.gov/service-details/planning-assistance-grants
- MVP Action Grants www.mass.gov/service-details/mvp-action-grant
- UNH Stormwater Center www.unh.edu/unhsc/
- URI NEMO Program www.uri.edu/nemo/
- RI Green Infrastructure Coalition www.greeninfrastructureri.org
- SNEP Network www.snepnetwork.org

MVP
Municipal Vulnerability Preparedness

Rhode Island NEMO

SNEP NETWORK

Thank you!
Reach out if you want to learn more!

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