Low Impact Development and Resilient Bylaw Reform

Winnetuxet Watershed Resilience Portfolio
April 22, 2021

Concord River Walk, from Wicked Local

Massachusetts Watershed Coalition

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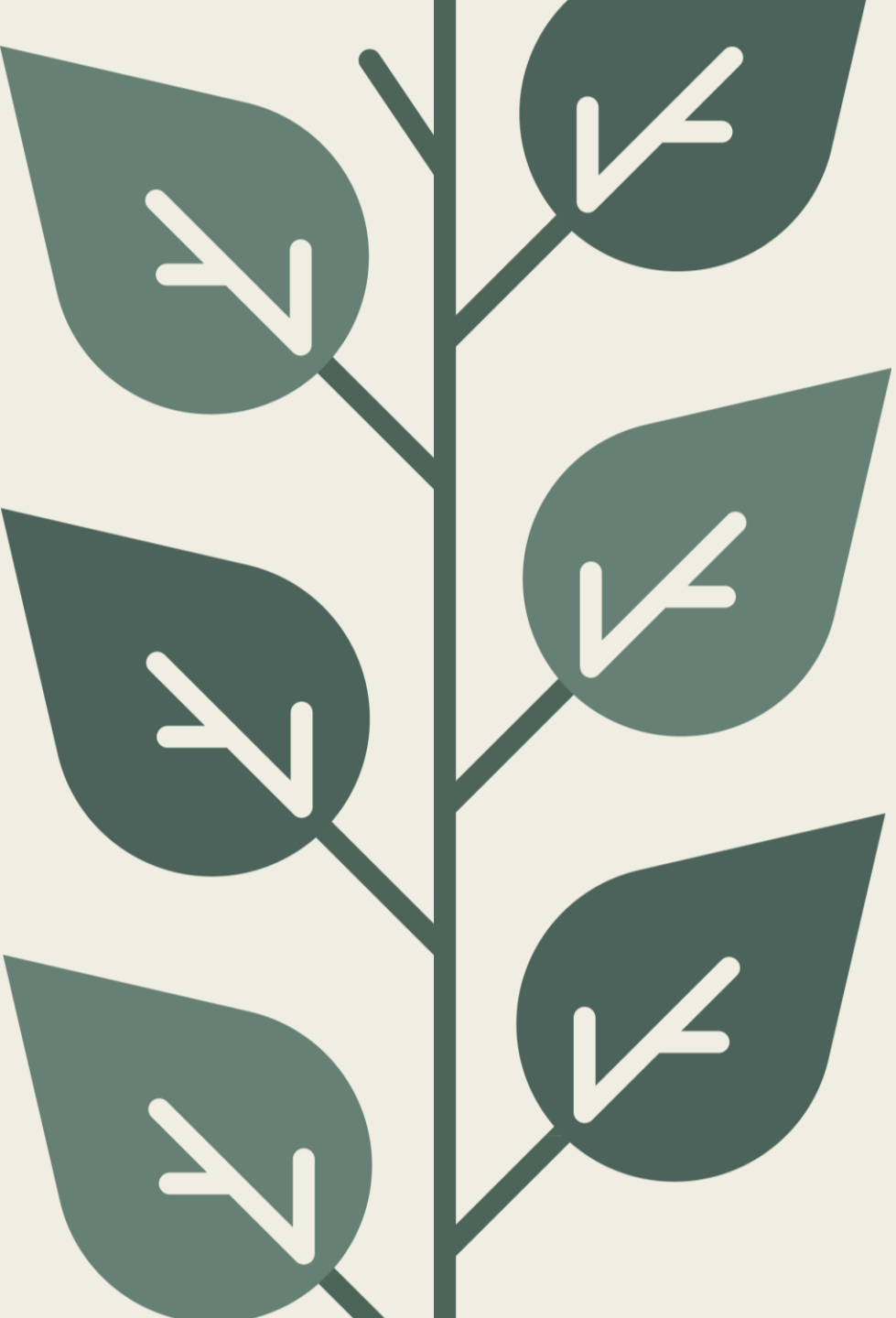
Mass Audubon

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

Shaping Climate Resilient Communities Program

Building more resilient communities across Massachusetts by providing technical assistance and supporting comprehensive community and regional planning

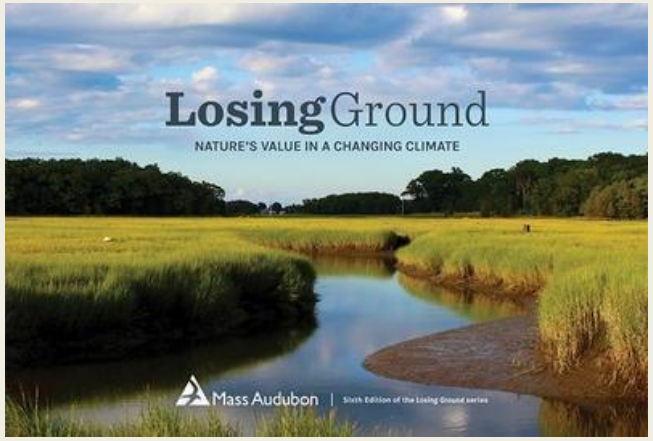
Photo, upper: MMSD
Photo, lower: MAPC



Agenda

- Why low impact development?
- Bylaw review
- Implementing low impact development
  - Strategic land conservation
  - Proactive planning
  - Open space residential design
  - LID examples
- Additional resources

Why low impact development?



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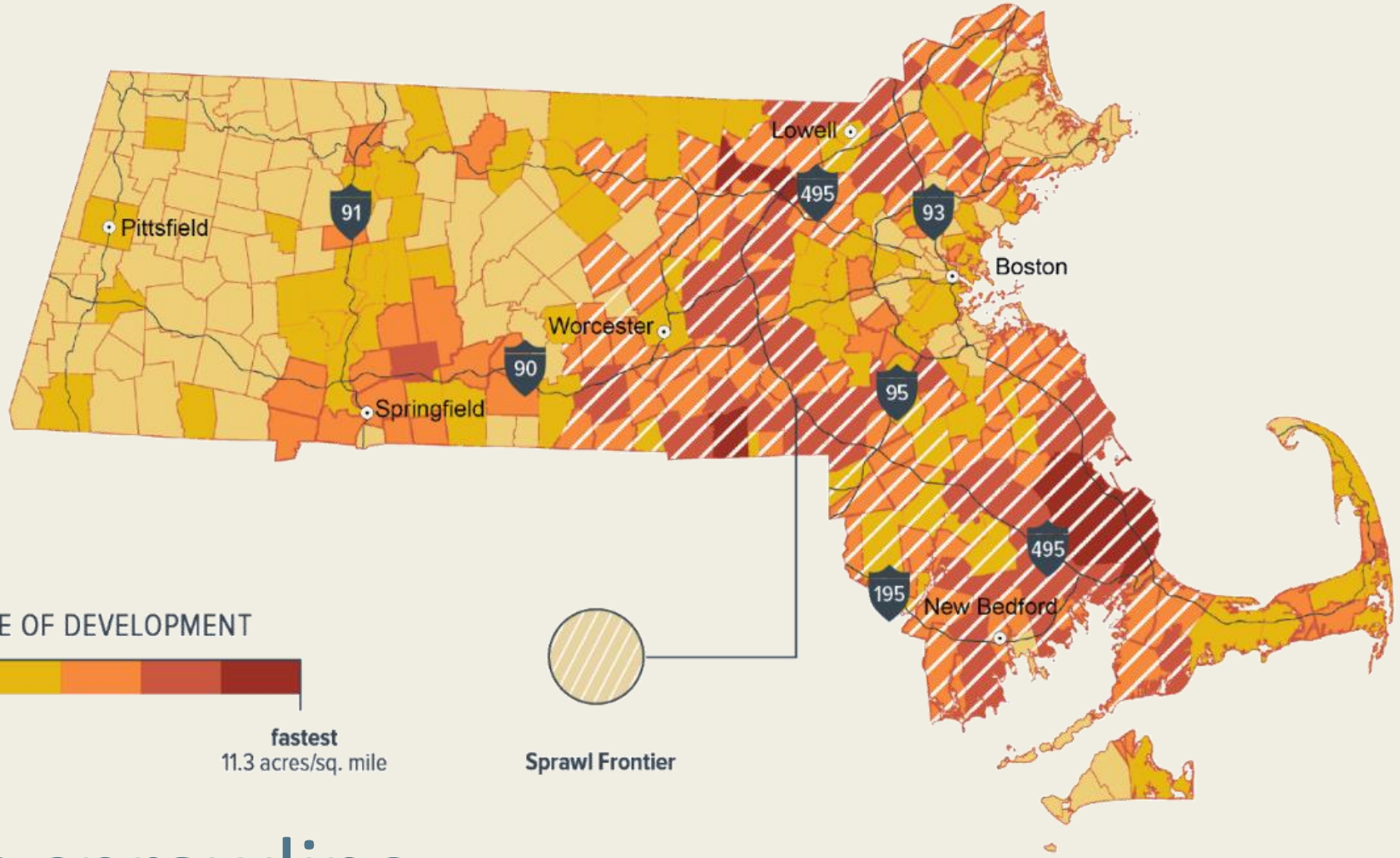

Development is sprawling

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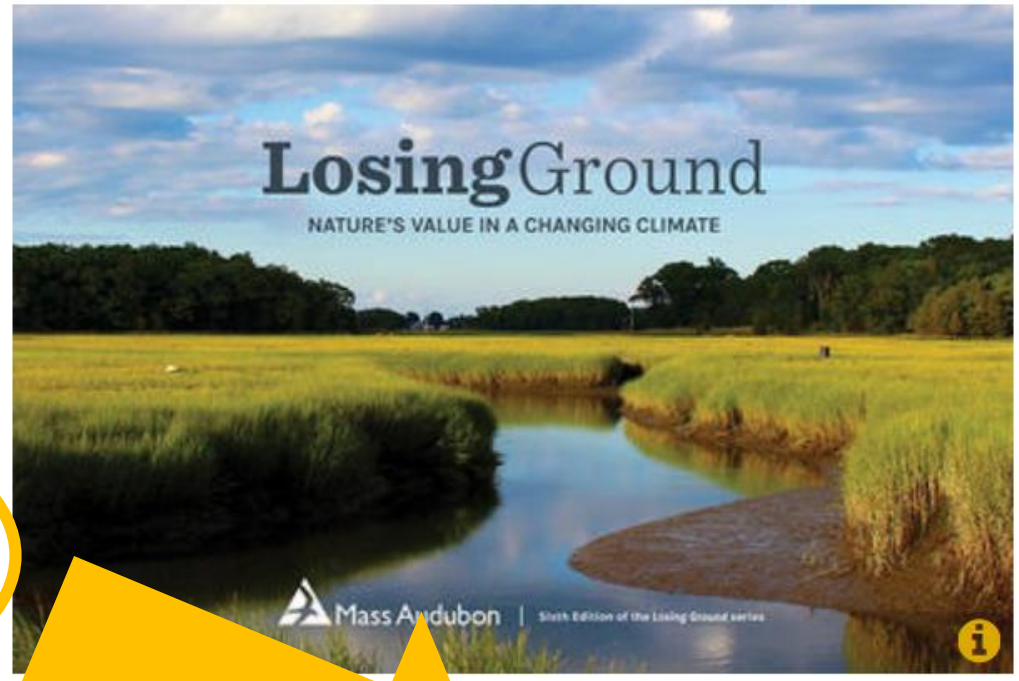
Losing Ground: Nature's Value in a Changing Climate

Sixth Edition | 2020

Explore the Report

- **Key Findings >**
  Important findings and conclusions from the report.
- **At-a-Glance >**
  An overview of the statistics about land use patterns in Massachusetts.
- **Statistics & Maps >**
  Explore land protection statistics and interactive maps by Massachusetts town, county, watershed, or Regional Planning Agency (RPA).
- **Glossary >**
  Information about key terms from the report.



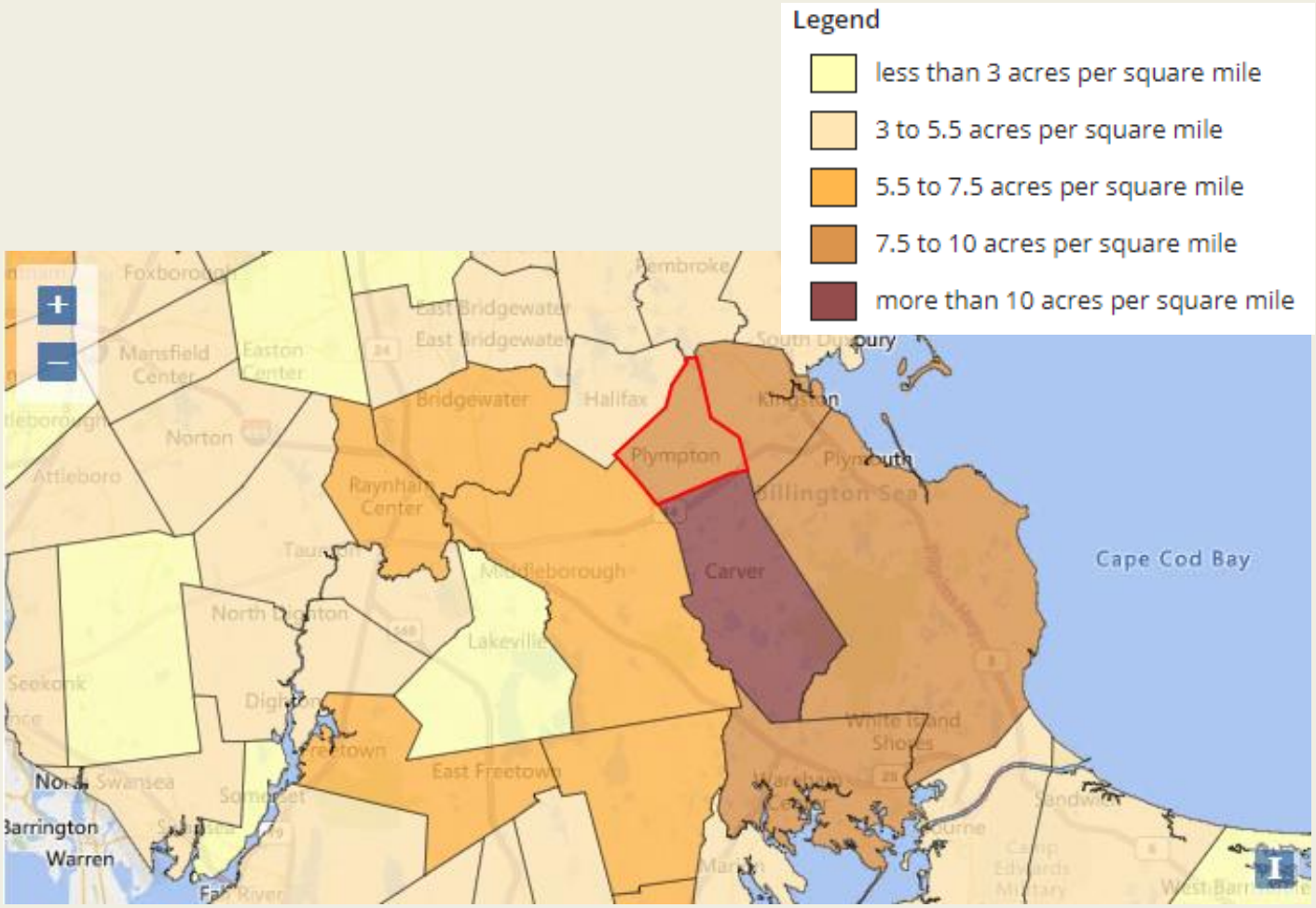
Select Area Type ▼

Select Area Type
Town / City
County
Watershed
Regional Planning Area

Download the Full Report

Losing Ground 2020 Report 6.17 MB

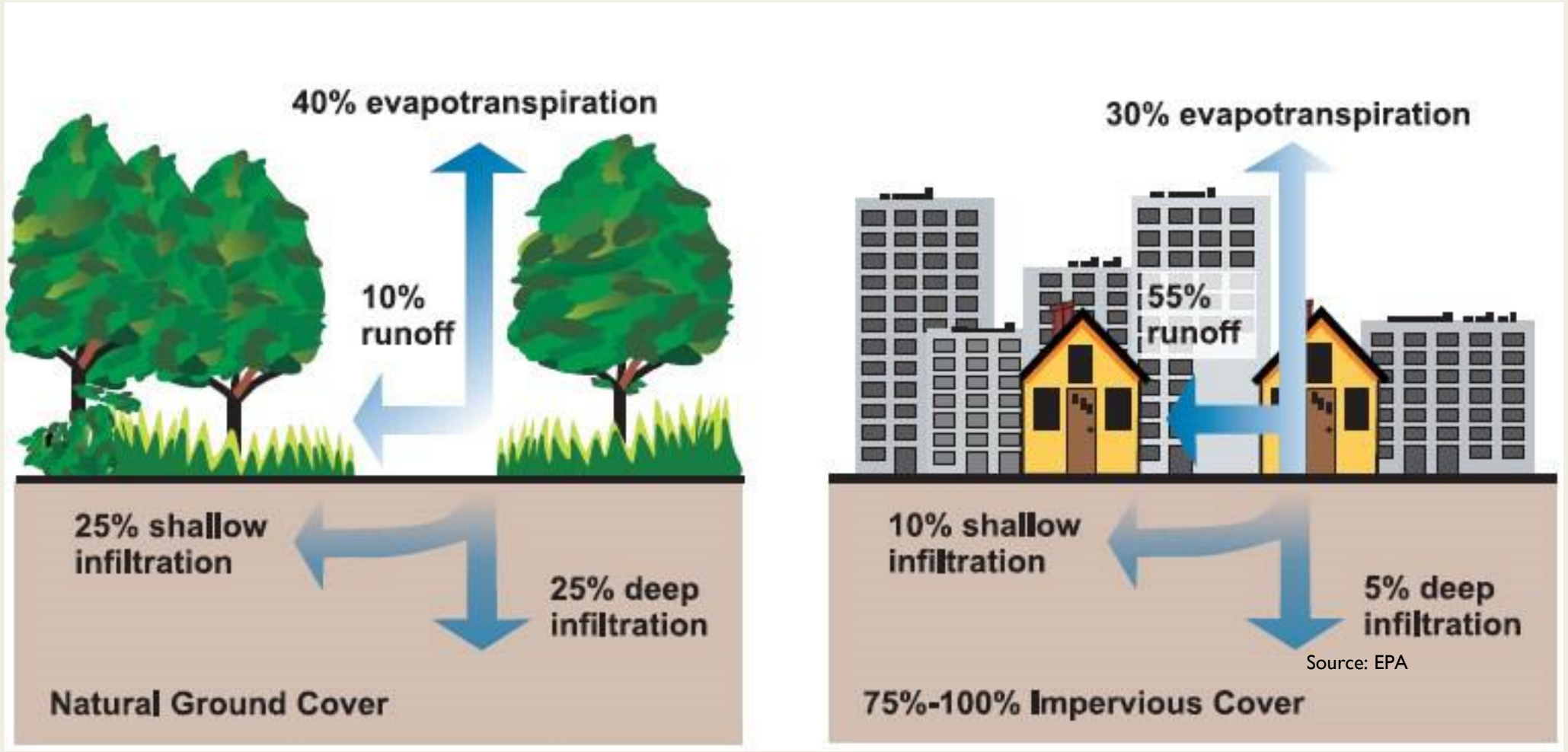
Plympton development trends, 2012 - 2017



Plympton's ranking relative to all 351 MA municipalities

Statistic	Value	Rank in state
Total area of newly developed land from 2012 to 2017 (acres)	134	41
Total area of newly developed land from 2012 to 2017, standardized by town size (acres per square mile)	8.9	5
MAP		
Total area of development (acres)	1,156	257
Total area of natural land (acres)	6,676	220
Total area of open land (acres)	1,544	105
Percent developed land	12 %	234
Percent natural land	68 %	163
Percent open land	16 %	29
Total area of permanently conserved land (acres)	134	346
Overall percent permanently conserved	1 %	351
Total area of newly conserved land from 2012 to 2019 (acres)	113	295
Total area of newly conserved BioMap2 Core Habitat (acres)	23	262
Total area of newly conserved BioMap2 CNL (acres)	74	191
Total area of newly conserved TNC resilient land (acres)	3	262
Total area of newly conserved GIN (acres)	113	295
Size of town in acres	9,664	249
Size of town in square miles	15.1	249

Sprawling development → Impervious surface → Runoff



Source: EPA

Climate change

Sprawling Development

increased precipitation

increased temperature

impervious surfaces

stormwater & WQ issues

flooding & infrastructure damage

heat-related illnesses

stresses to natural environment

Dual Threat - What do we do about it?

A classic New England village look at the Cottages on Green in East Greenwich, RI

Development is going to happen, but we can do it sustainably.

Protect what we have & develop smarter

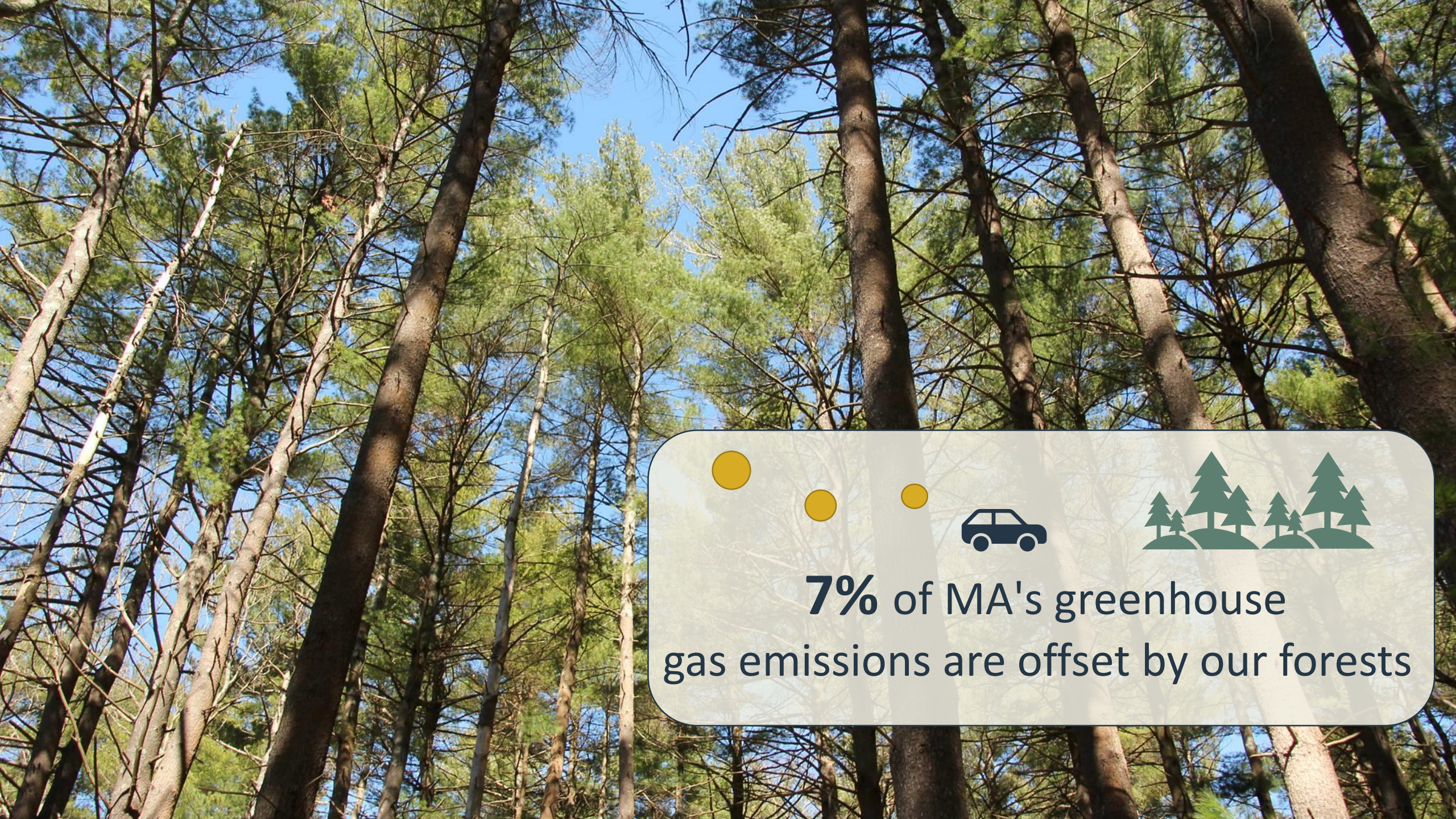
Low Impact Development (LID)

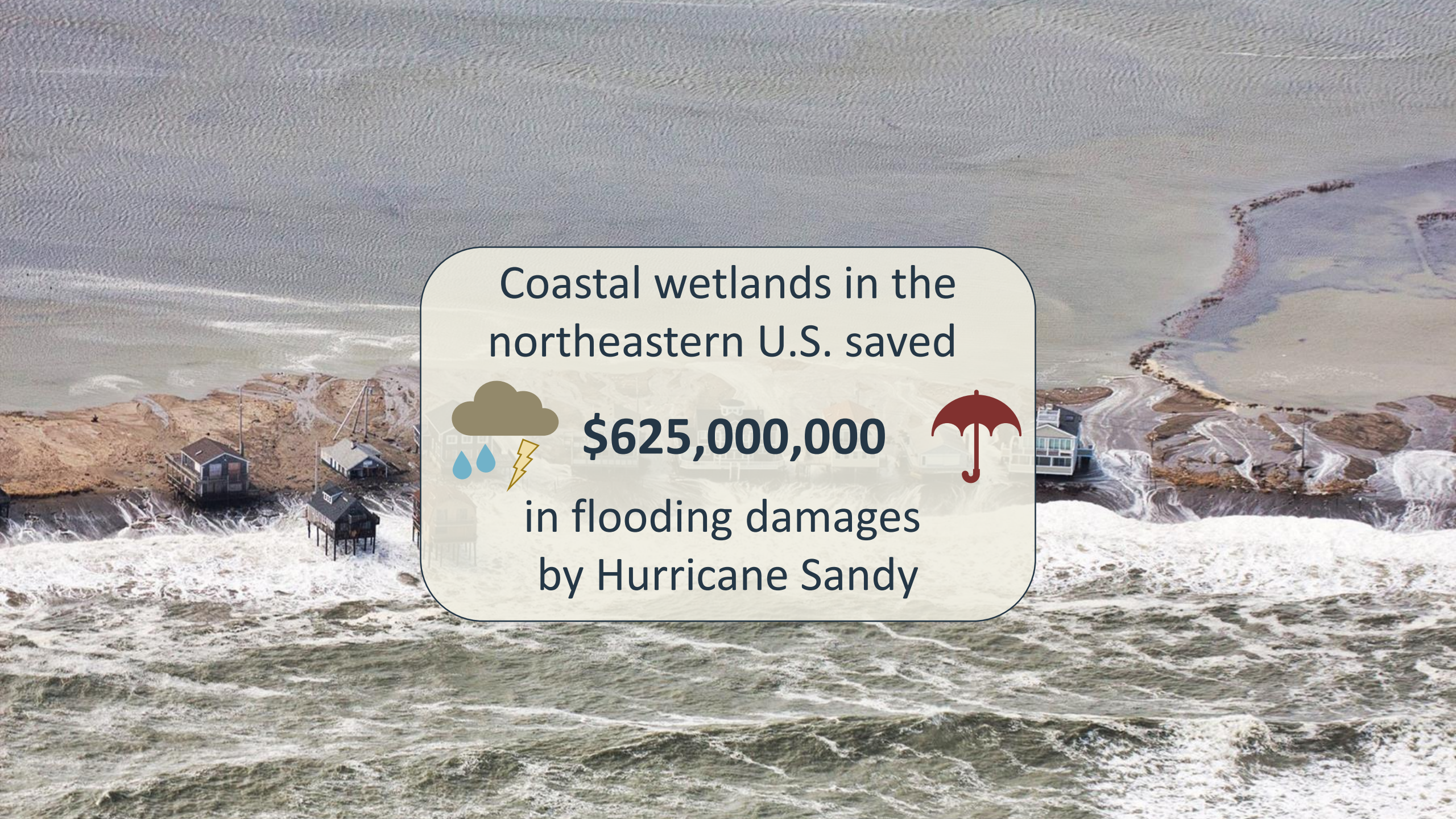
Design that works with nature to manage stormwater and decrease the impact of development on surface and groundwater

- Manages stormwater as **close to its source** as possible
- Treats **water as a resource**, not just a waste product
- **Preserves** natural landscape and recreates natural features

Natural Lands for Resiliency

- Carbon sequestration
- Clean air and water
- Food
- Flood prevention
- Habitat
- Tourism
- Recreation
- Public health
- Property Values
- Quality of Life


7% of MA's greenhouse
gas emissions are offset by our forests


Coastal wetlands in the northeastern U.S. saved
$625,000,000
in flooding damages by Hurricane Sandy


For every
$1
spent on source water protection
$27
saved in water treatment costs

Pollinators contribute

$24 billion

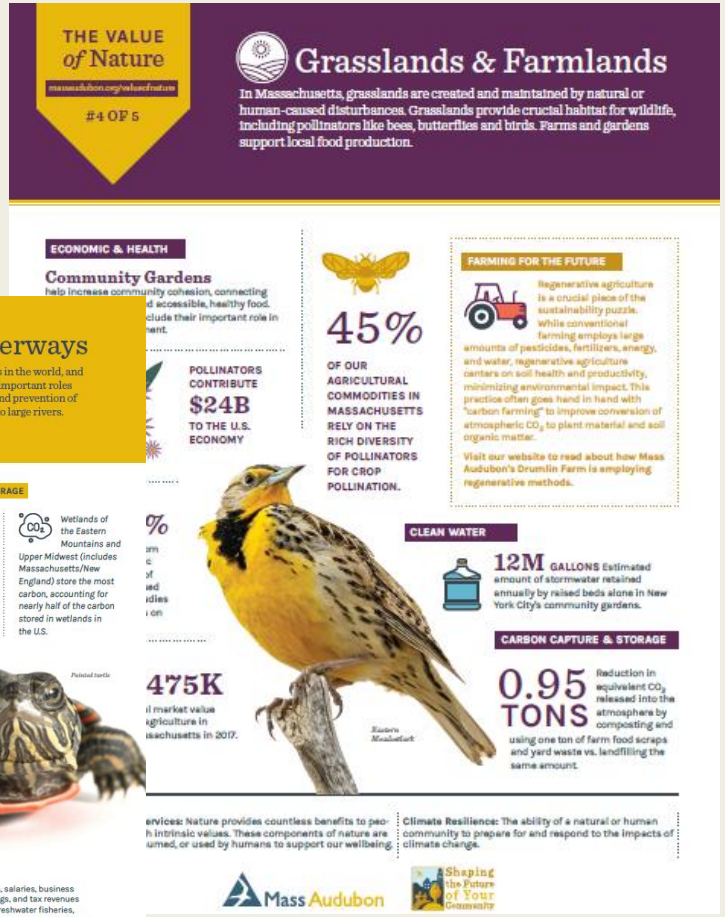
to the U.S. economy

45% of our agricultural goods in Massachusetts rely on the rich diversity of pollinators for crop pollination

Value of Nature fact sheets

Forests | Coastal | Wetlands & Waterways | Grasslands & Farmland | Urban Green Space

- *Climate Resilience*
- *Clean Air and Water*
- *Carbon Capture & Storage*
- *Economic & Health*
- *Recreation & Tourism*



massaudubon.org/valueofnature

Southeast New England Program

Green Infrastructure (GI) refers to natural features (or engineered structures) that perform critical natural processes and provide benefits to nature and people

Nature based solutions (NBS) and **low impact development (LID)** are actions or strategies that protect, restore, and/or manage **GI**

Nature-based Solutions at Every Scale

1. **Conserve** the natural green infrastructure already providing free services
2. **Integrate** LID and green infrastructure design into development
3. **Restore** local resilience through LID in redevelopment

Low Impact Development: Cost Savings & More

1. **Valuing Green Infrastructure**
   - How saving land *saves water and money*
2. **Conservation Design**
   - *Financial benefits* and local examples
3. **LID Techniques**
   - *Costs and benefits* of 5 LID techniques, site design to reduce pavement and costs
4. **LID in Regulations**
   - Review municipal bylaws
5. **Urban Waters**
   - Leominster stormwater case study

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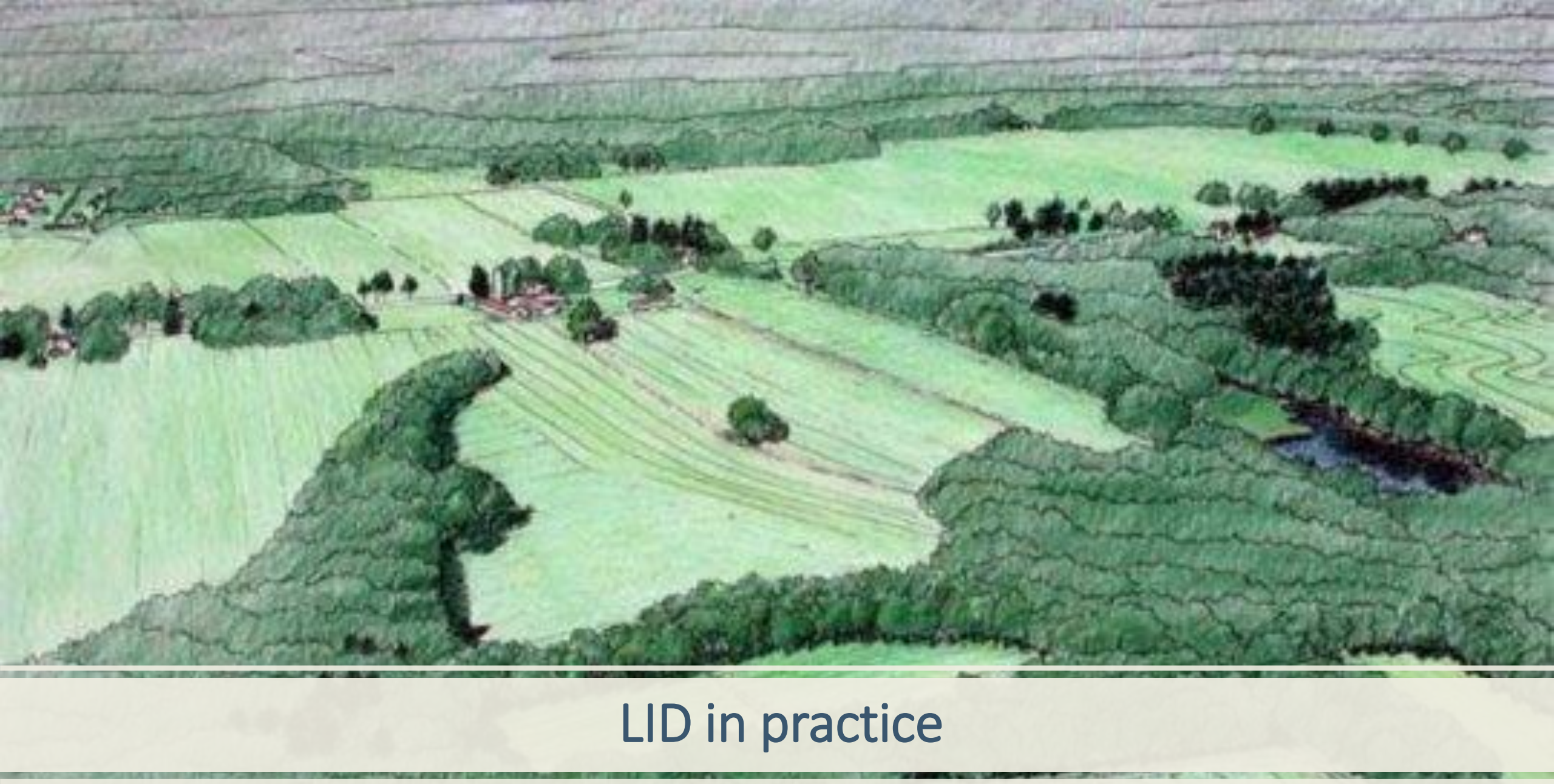
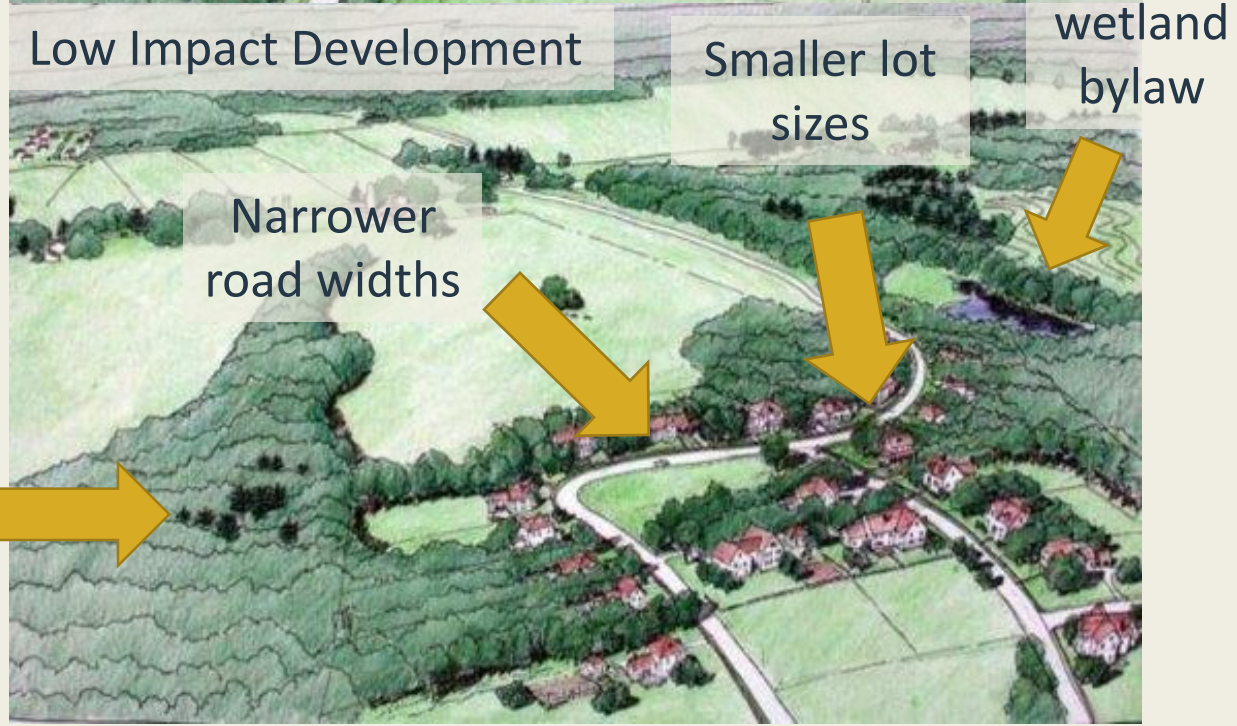


LID in practice

LID in practice

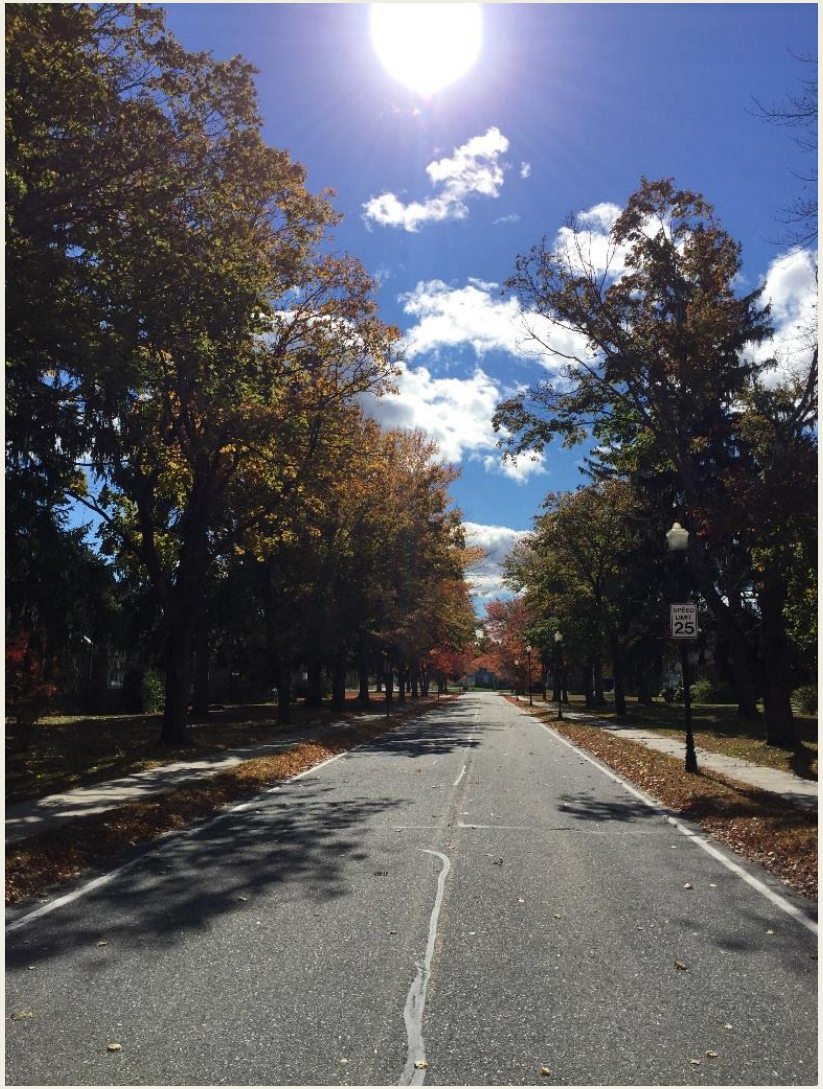
Preservation of existing mature vegetation



Why bylaw review? You get what you zone for.

Communities often **unintentionally discourage** LID by…

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



Bylaw Review Tool

Why?

- Are your resilience goals reflected in your bylaws?
  - If so, how?
  - If not, what might barriers be?

How?

- Review existing bylaws
- ID conventional vs. best practices
- Draft summary and recommendations
- ID administrative vs. town meeting changes

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

Give your community the LID tune-up with Mass Audubon's Bylaw Review Tool

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)*

See how your regulations stack up against best practices

Factors	Conventional	Better	Best	Community's Zoning
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	
Setbacks	Required minimum front, side, and rear setbacks	Minimize, allow flexibility	Clear standards that minimize and in some instances eliminate setbacks	
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.	
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	

Identify contradictions and prioritize updates

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 minmize 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			

Go after the low hanging fruits

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

Factors	Conventional	Better	Best	Community's Zoning
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)*
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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	

Get the tool and the fact sheets at:
massaudubon.org/lidcost

Implementing low impact development

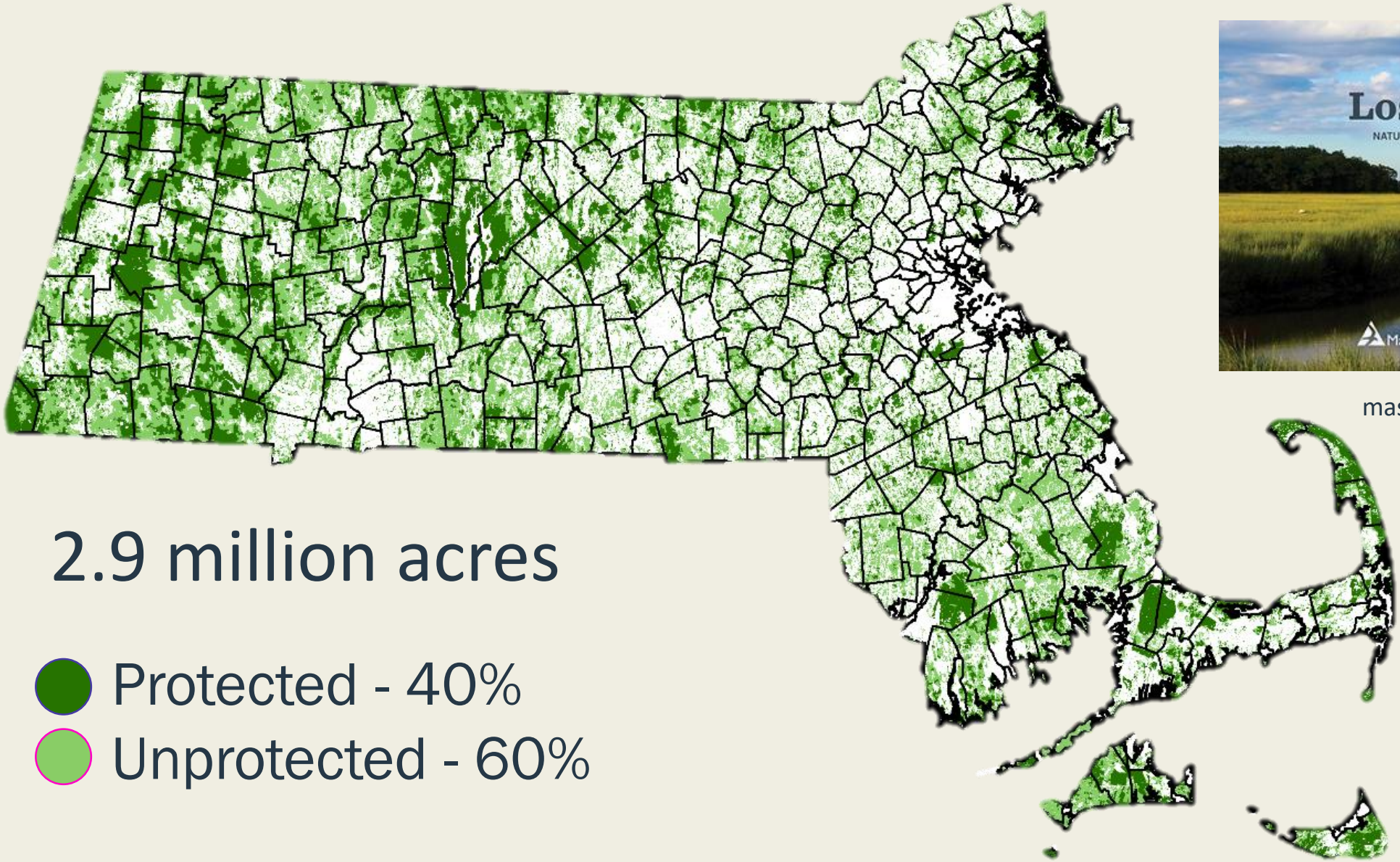
Direct development away from nature

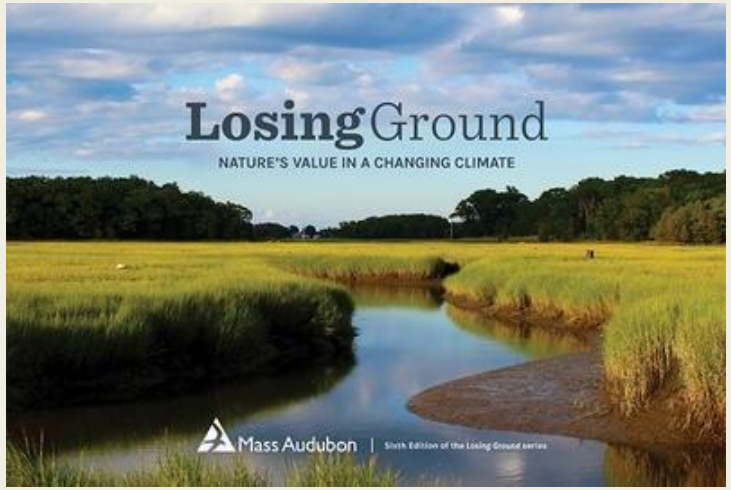
- Priority Development Areas (PDAs)
- Ch 43D expedited permitting
- Low Impact Development (LID)
- Open Space Residential Design (OSRD) by-right

Protect valuable natural areas

- Priority Preservation Areas (PPAs)
- Open Space and Recreation Plan (OSRP)
- Conservation Restriction (CRs)
- Transfer of Development Rights (TDRs)
- Ch 61 tax reductions
- Community Preservation Act (CPA)

Strategic Land Conservation: MA's GI Network





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2.9 million acres

- Protected - 40%
- Unprotected - 60%

Proactive Planning

- Master Plans:
  - Identify your GI Network as an important natural resource
  - Incorporate GIN protection into goals
  - PDAs/PPAs
- Open Space and Recreation Plans (OSRPs)
  - Identify GI Network for protection and management
  - Connect your GI network to the public services it provides your community
- Keep plans up-to-date
- Link land use regulations to these plans

Inclusion of Green Infrastructure in OSRP

- Section 1: Plan Summary: Reference state/regional green infrastructure analysis as part of regional context to be considered in the plan
- Section 3.A: Regional Context: Include a more detailed explanation of the state/regional green infrastructure analysis and the regional green infrastructure map
- Section 4: Environmental Inventory and Analysis: Include discussion of green infrastructure in pertinent sections
- Section 8: Goals and Objectives: Prioritize land conservation to support the local priorities map
- Section 9: Five Year Action Plan: Include local priorities map

SNEP Southeast New England Program

Resilient Taunton Watershed Network (RTWN)

manomet Soaring Solutions. Grounded Science.

50 YEARS

Open Space Design

- Flexible subdivision regulations
- Smaller lot sizes
- Land set aside for conservation
  - Land protection at no cost to town
- By-right is most effective
- Types of OSD:
  - Open Residential Design (OSRD)
  - Natural Resource Protection Zoning (NRPZ)
  - Conservation Subdivision

Open Space Design as the preferred by–right option

Town of Westford adopted a Conservation Subdivision bylaw in 1978

<u>Benefits</u>

- 1,700 Acres of land Protected
- Preserved local habitat and water resources
- Created 13 miles of hiking trails & public recreation
- Town saved millions of dollars

Rail Trail in Westford, MA

Inclusion of Green Infrastructure in OSD, Subdivision Regs

- Require open space dedication to contribute to protection of the local green infrastructure network as depicted in the local priorities map created for the open space plan
- When land being subdivided overlaps the green infrastructure network, require on-site protection
- When land being subdivided does not overlap the green infrastructure network, utilize transfer of development rights to protect the network elsewhere in the locality

SNEP Southeast New England Program

Resilient Taunton Watershed Network (RTWN)

manomet Soaring Solutions. Grounded Science.

50 YEARS

LID Examples

Leominster LID Project - Monoosnoc Brook

- Engaged wide variety of stakeholders
- Numerous LID best management practices (BMPs) installed
- Pollutant loading significantly reduced
- Project significantly less expensive compared to cost of conventional stormwater practices

Find out more: massaudubon.org/lidcost
(LID fact sheet #5)

Natick bylaw updates

- 6 impaired water bodies – stormwater major pollution source
- 90% of Natick's private properties were not subject to stormwater regulations

→ 2016 bylaw review

→ 2019, October - Natick Article 79A Stormwater Management and Erosion Control Bylaw passed at town meeting

Source: US EPA, Waterbody Assessment and TMDL
https://www3.epa.gov/region1/npdes/stormwater/ma/305b303dMaps/Natick_MA.pdf

FOUNDATION FOR METROWEST

Natick bylaw updates: new permit thresholds

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

Broad Meadow Brook Wildlife Sanctuary

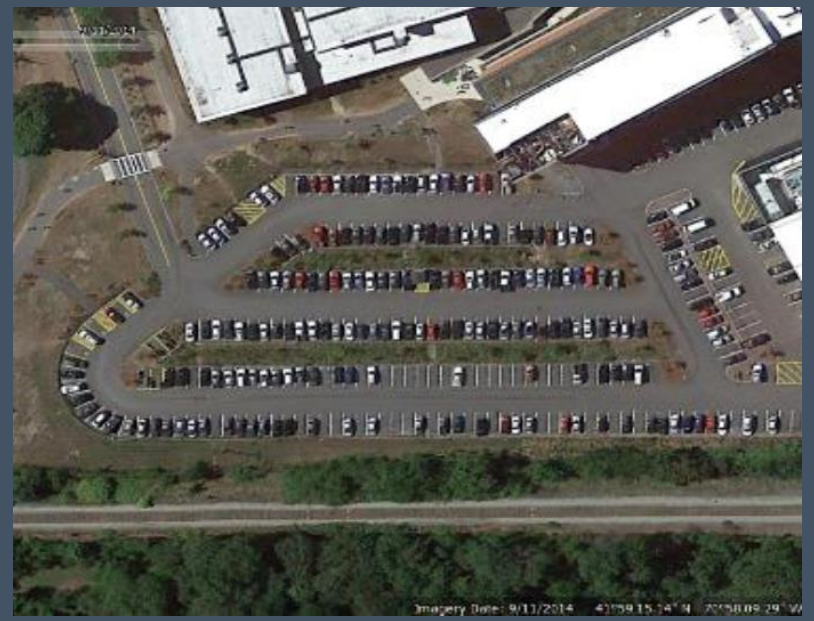
Worcester

- Four rain gardens installed in 2017
- Intentional design
- Native species for pollinators
- Educational features
- Maintenance: sediment removal
- Potential issues: high velocity water, road salt

Find out more: massaudubon.org/get-outdoors/wildlife-sanctuaries/broad-meadow-brook/about/green-features/water-conservation

Bridgewater State University

- LID parking lot built in 2012
- Layout directed all water through natural system, 50 new parking spots
- Bioretention trenches and recharge chambers



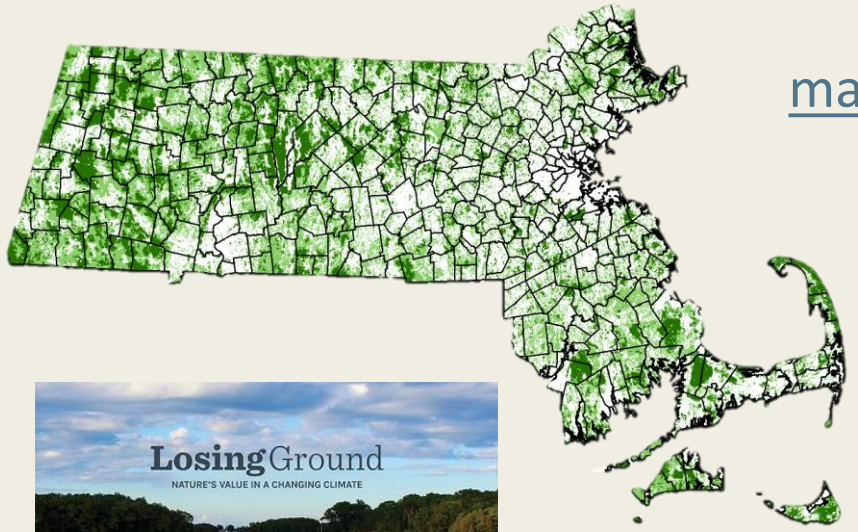
Find out more: https://www.massaudubon.org/content/download/21123/296218/file/HC-Case-Study_BRIDGEWATER.pdf

Provincetown

- Porous Pavement on Commercial Street 2012
- Cleaner water in Provincetown Harbor exhibited by fewer beach closures
- Success with frequent street sweeping

Find out more: https://www.epa.gov/sites/production/files/2016-12/documents/ma_provincetown_508.pdf

Additional resources



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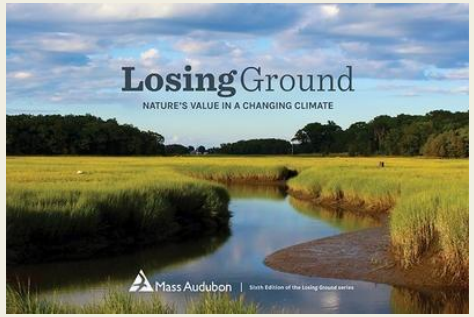

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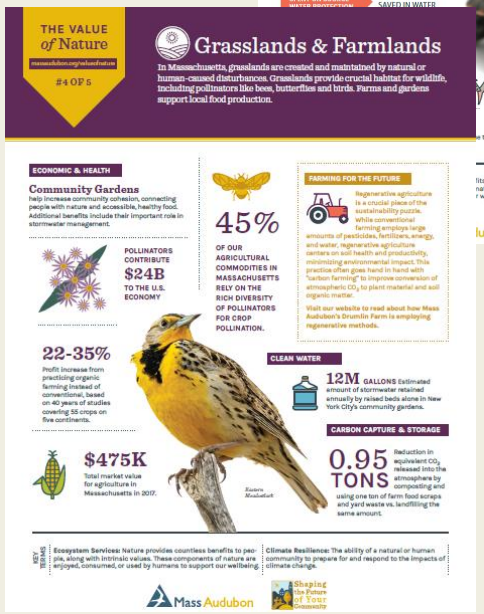
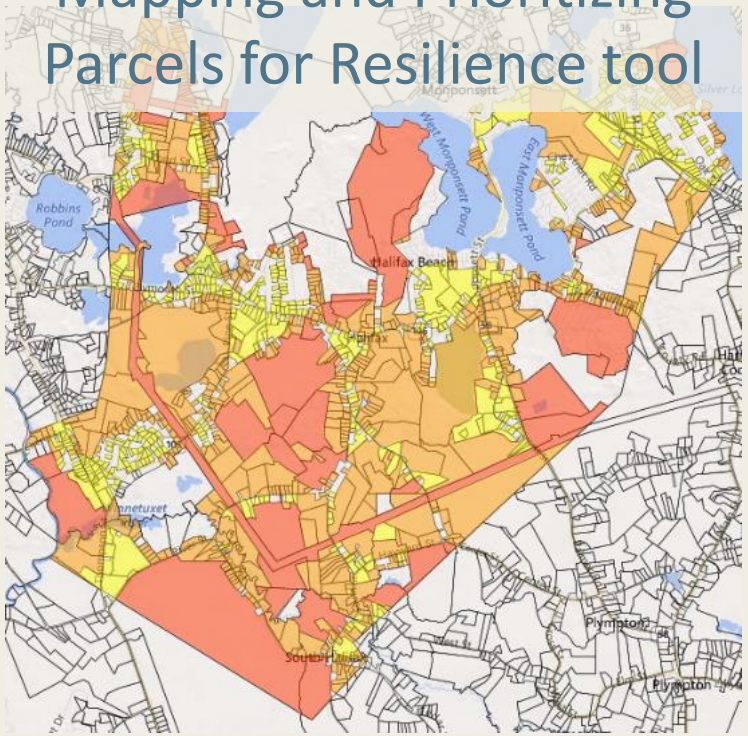


Mapping and Prioritizing Parcels for Resilience tool



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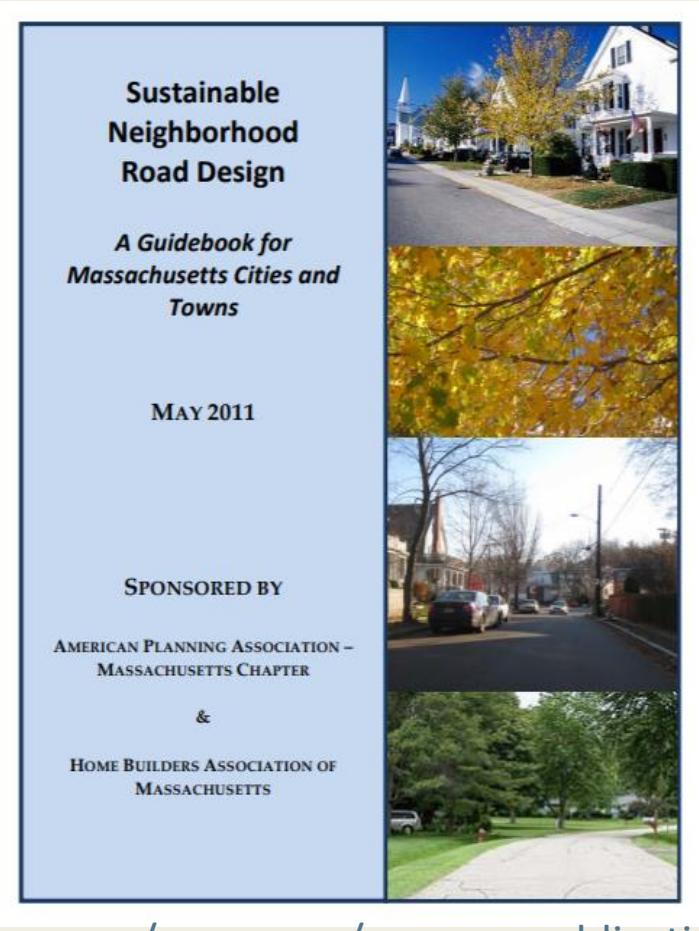
Additional Resources

SNEPNetwork.org

RHODE ISLAND
GREEN INFRASTRUCTURE
COALITION

greeninfrastructureri.org



apa-ma.org/resources/apa-ma-publications

MAPC
METROPOLITAN AREA PLANNING COUNCIL

Low Impact Development Toolkit

MAPC.org

mass.gov/topics/the-smart-growth-smart-energy-toolkit

Thank you!

Contact:
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More information:
massaudubon.org/bylawreview

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