Maximizing Ecosystem Services: Watershed Scale Conservation

Envirothon Fall Training 2017

November 15, 2017

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Mass Audubon

Agenda

1. Who is RTWN?
2. Why work in the Taunton watershed?
3. Climate change & GI analysis
4. Benefits & examples of what you can do

Mass Audubon: Shaping the Future of Your Community

Helping communities chart a more sustainable future

- ✓Customized workshops
- ✓Planning advice
- ✓Technical assistance

SHAPING the Future of YOUR COMMUNITY

massaudubon.org/shapingthefuture

RTWN: Who we are & our goals

Formed in 2104, we're a **collaboration** of local, non-profit, regional organizations, and state and federal government representatives who care about the future health and resilience of the Taunton River Watershed
and believe that ecological and economic resilience go hand in hand.

✓Promote environmental, economic, and social resiliency

✓Provide education and resources to local officials and residents

srpedd.org/rtwn

RTWN Members

Bridgewater State University
Horsley Witten Group
Manomet Inc.
MA Department of Environmental Protection (DEP)
MA Division of Ecological Restoration (DER)
MA Executive Office of Energy and Environmental Affairs (EEA)
Mass Audubon
Metropolitan Area Planning Council (MAPC)
Narragansett Bay Estuary Program
The Nature Conservancy (TNC)
Old Colony Planning Council (OCPC)
Save the Bay
Southeastern Regional Planning and Economic Development District (SRPEDD)
Taunton River Watershed Alliance (TRWA)
Tighe & Bond
US Environmental Protection Agency (EPA)
National Park Service
Wildlands Trust

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Resilient Taunton Watershed Network (RTWN) Project Partners

SRPEDD

manomet
Soaring Solutions. Grounded Science.

The Nature Conservancy
nature.org

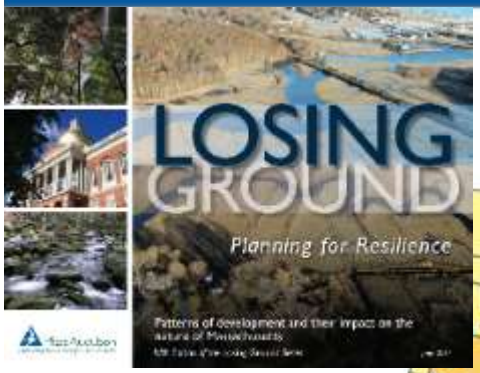
Mass Audubon

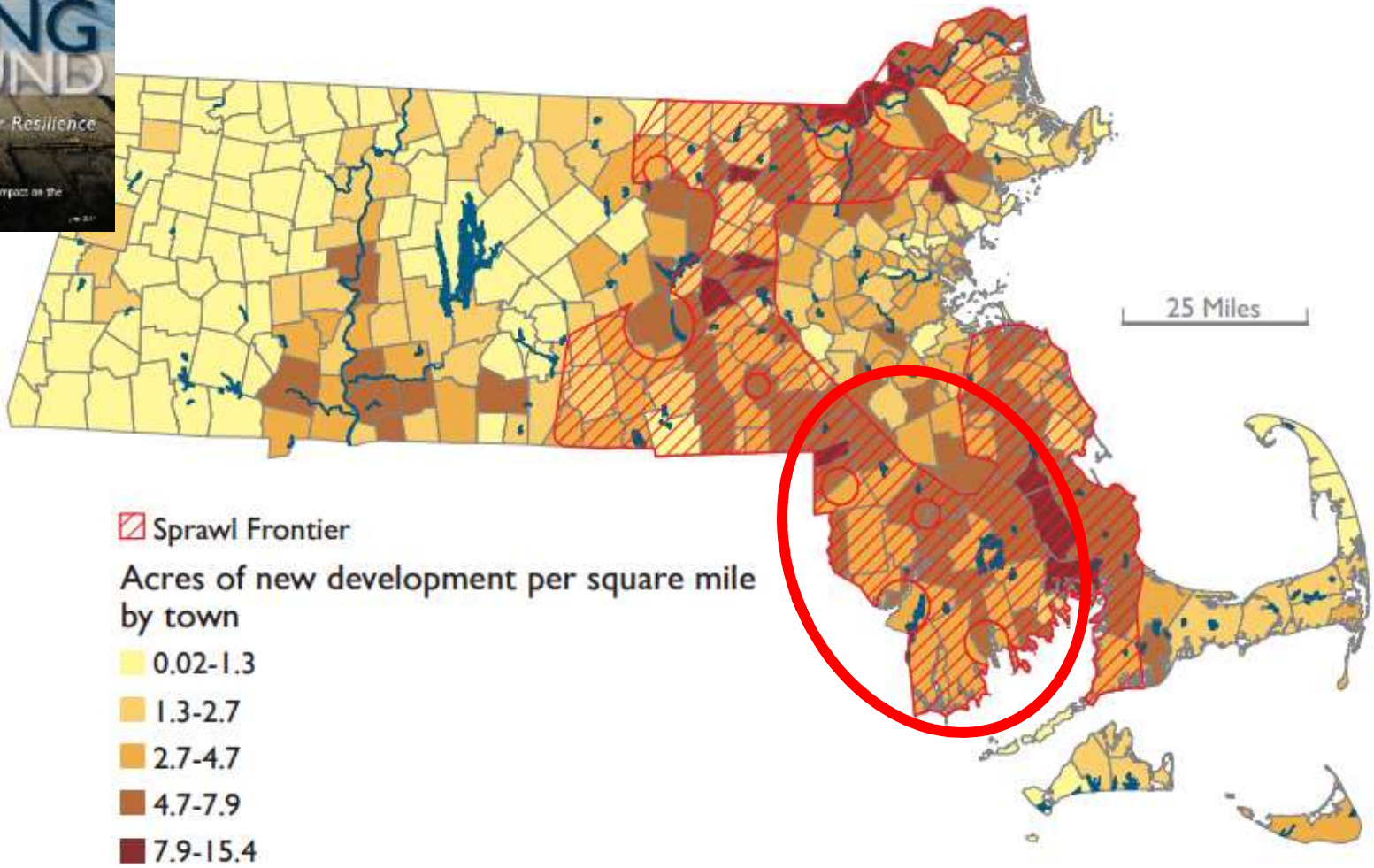
MAPC

SHAPING the Future of YOUR COMMUNITY

Why pilot this in the Taunton Watershed of Massachusetts?

1. The Taunton is the fastest developing watershed in MA





2. It's home to critical natural resources – threatened by climate change

- Taunton Wild and Scenic River is longest undammed coastal river in New England
- One of two largest contributors of fresh water to the Narragansett Bay
- Home to 150 species of birds, 29 native fish, and over 350 plant species
- Low-lying watershed, susceptible to inland flooding
- Existing issues exacerbated by climate change

3. We have an enormous opportunity

There is huge opportunity for improving future resilience

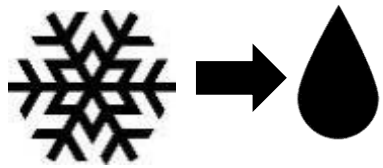
- **60%** of the land is **undeveloped**
- Only **15%** of the land is protected

How we will develop and conserve land in the future?

Key Observed Climate Changes in MA

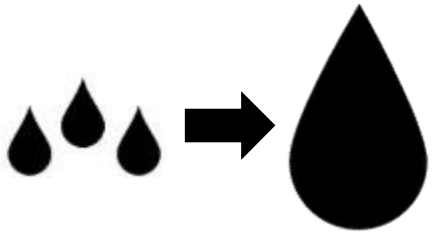
Temperature: **2.8°F** Since 1895

Growing Season: **10 Days** Since 1950



Sea Level Rise: **10 inches** Since 1922

Strong Storms: **71%** Since 1958



Future Expectations

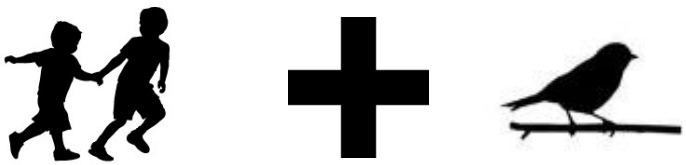
Annual precipitation likely to increase

Extreme precipitation more likely

Outdated assessments do not capture continual change

Sea level rise will drive greater flood risk

Project Goals

- Maximize the benefits provided by intact, healthy ecosystems
  - Climate change resiliency 
  - Control of tax burden and infrastructure costs 
  - Improve health and safet quality of life 

Project Structure

- Regional green infrastructure analysis:
  - Network of lands of highest conservation value due to the multiple ecosystem services that they provide
- Case Studies
- Five workshops throughout watershed on climate change and benefits of GI/LID
  - Work with local land managers to integrate local planning and development decisions with the watershed-scale green infrastructure network

What is Green Infrastructure?

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.

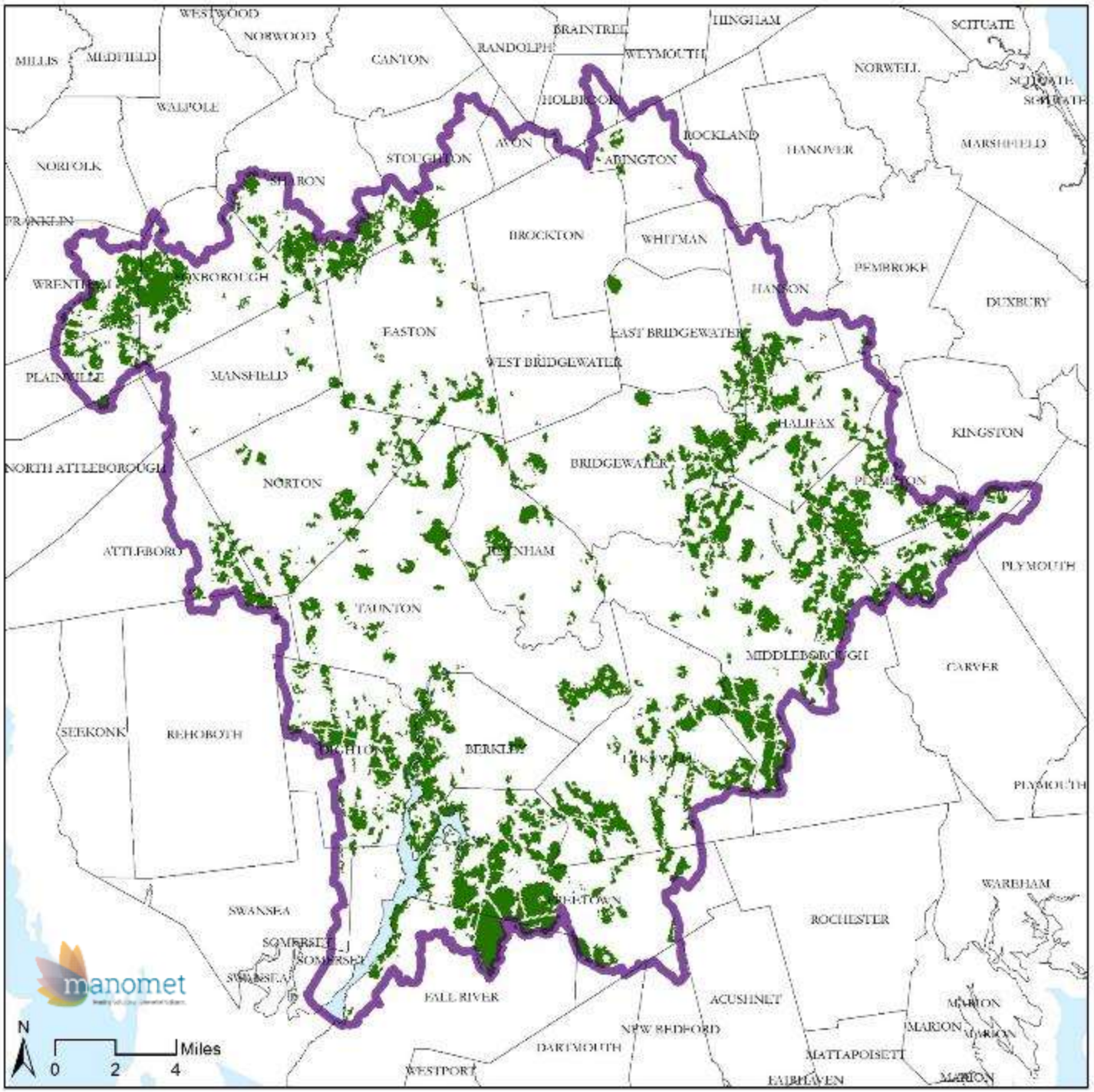
(McDonald, Benedict and O'Conner, 2005)

Low Impact Development

In the context of this project we are using the phrase “low impact development” to refer to local and site specific practices such as green roofs, bio-retention and infiltration, pervious pavement, etc.

Resilient Landscapes
Areas of
Above Average
Resilience

1



Legend

Taunton Watershed Boundary

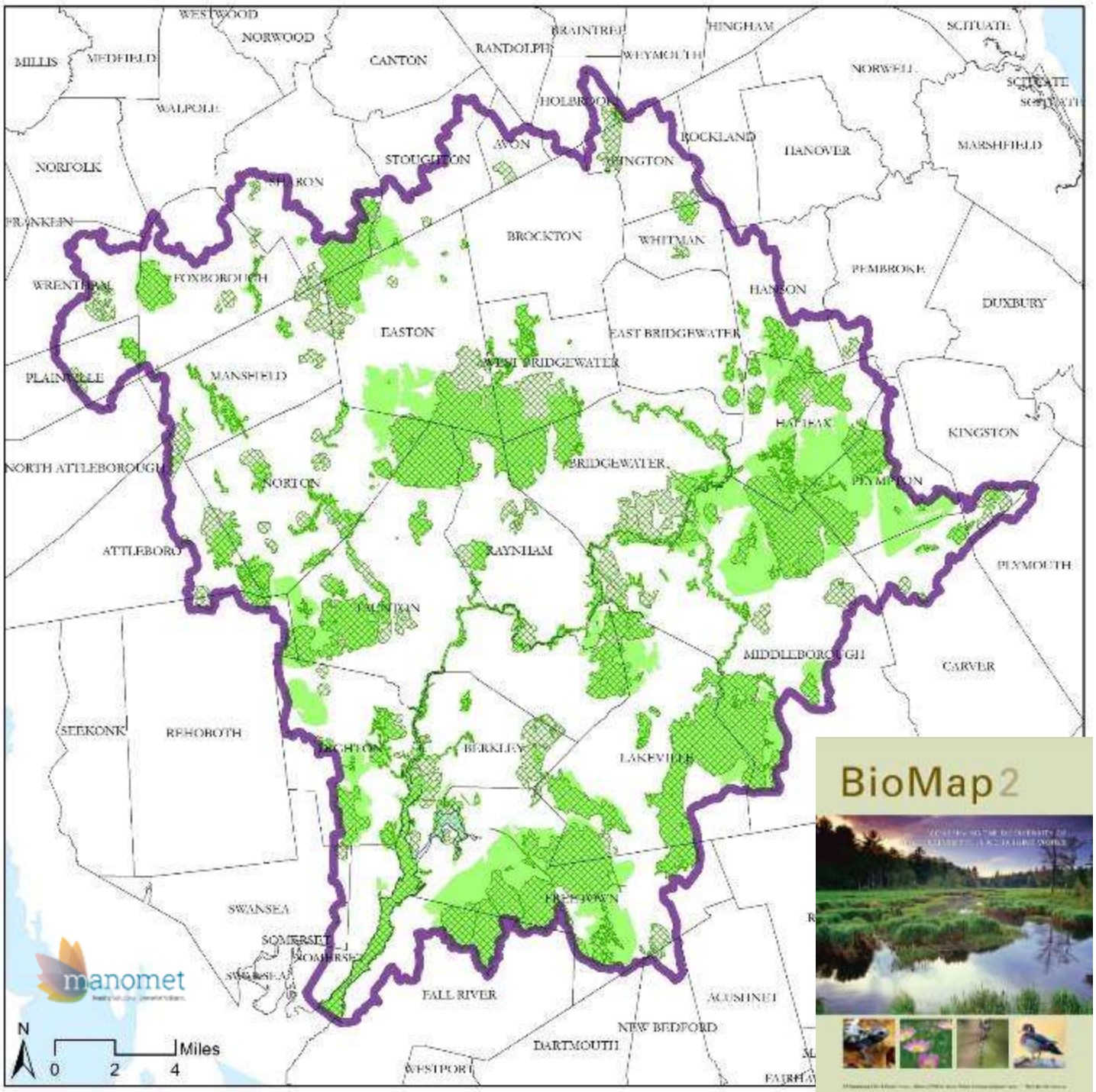
Town Boundaries

Resilience

Areas of Above Average Resilience

BioMap2:
Core & Critical
Natural Landscape

2



Riparian Buffers

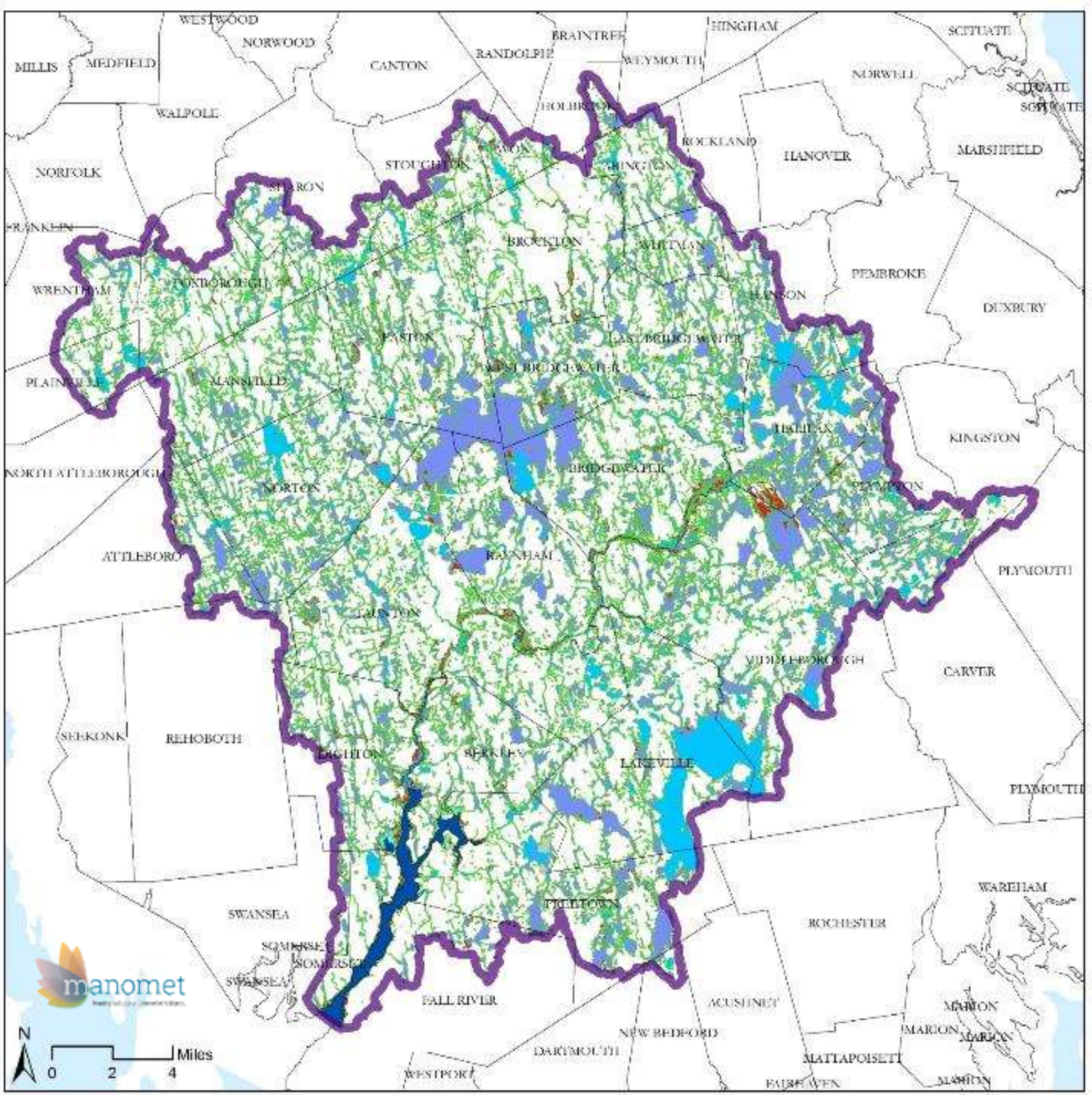
3

Legend

- Taunton Watershed Boundary
- Town Boundaries
- Areas within 100ft of surface waters, wetlands, and flood zones
- 100-yr and High Risk Coastal Flood Areas

Surface Waters & Wetlands

- Freshwater Pond, Lake, or Stream
- Freshwater Wetland
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Other

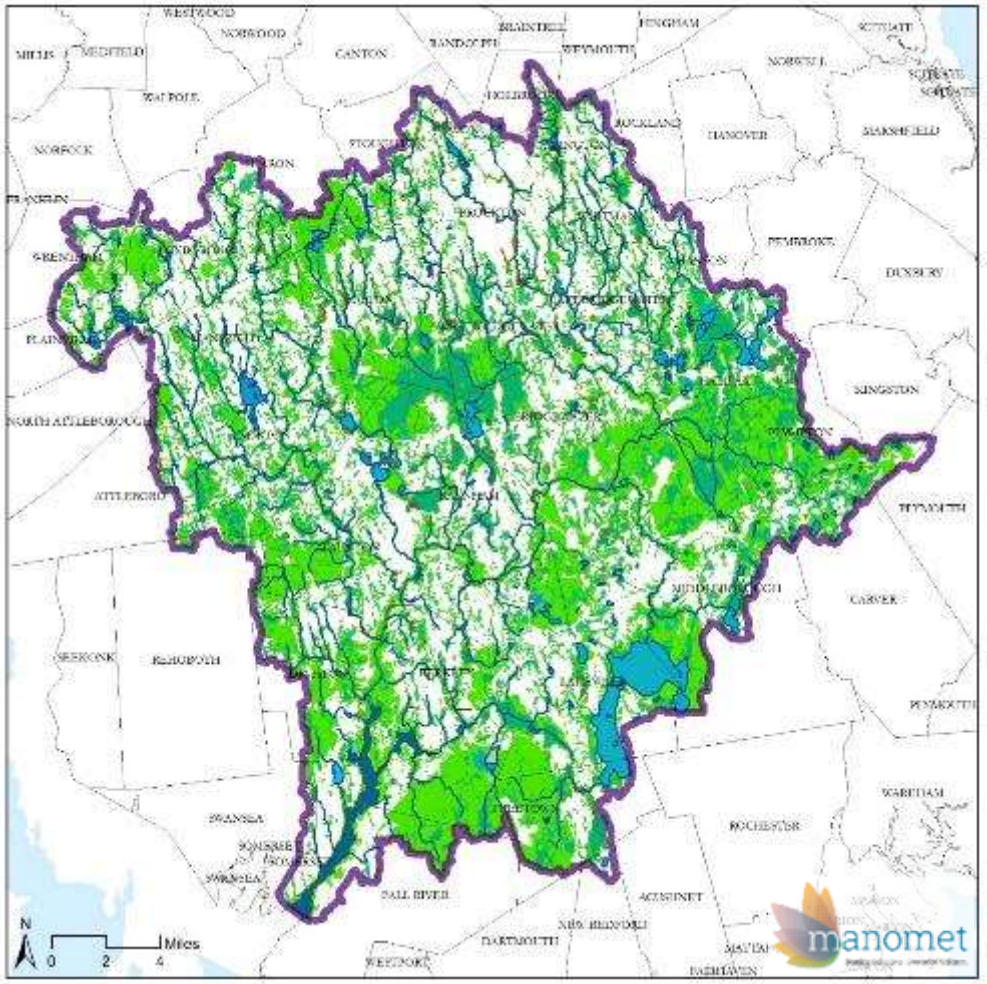


Green Infrastructure Network Components…

Areas of Above Average Resilience

BioMap2 Core & Critical Natural Landscape

Areas within 100ft of Surface Waters, Wetlands, and Flood Zones; Areas </= 4m elevation (vulnerable to sea level rise)



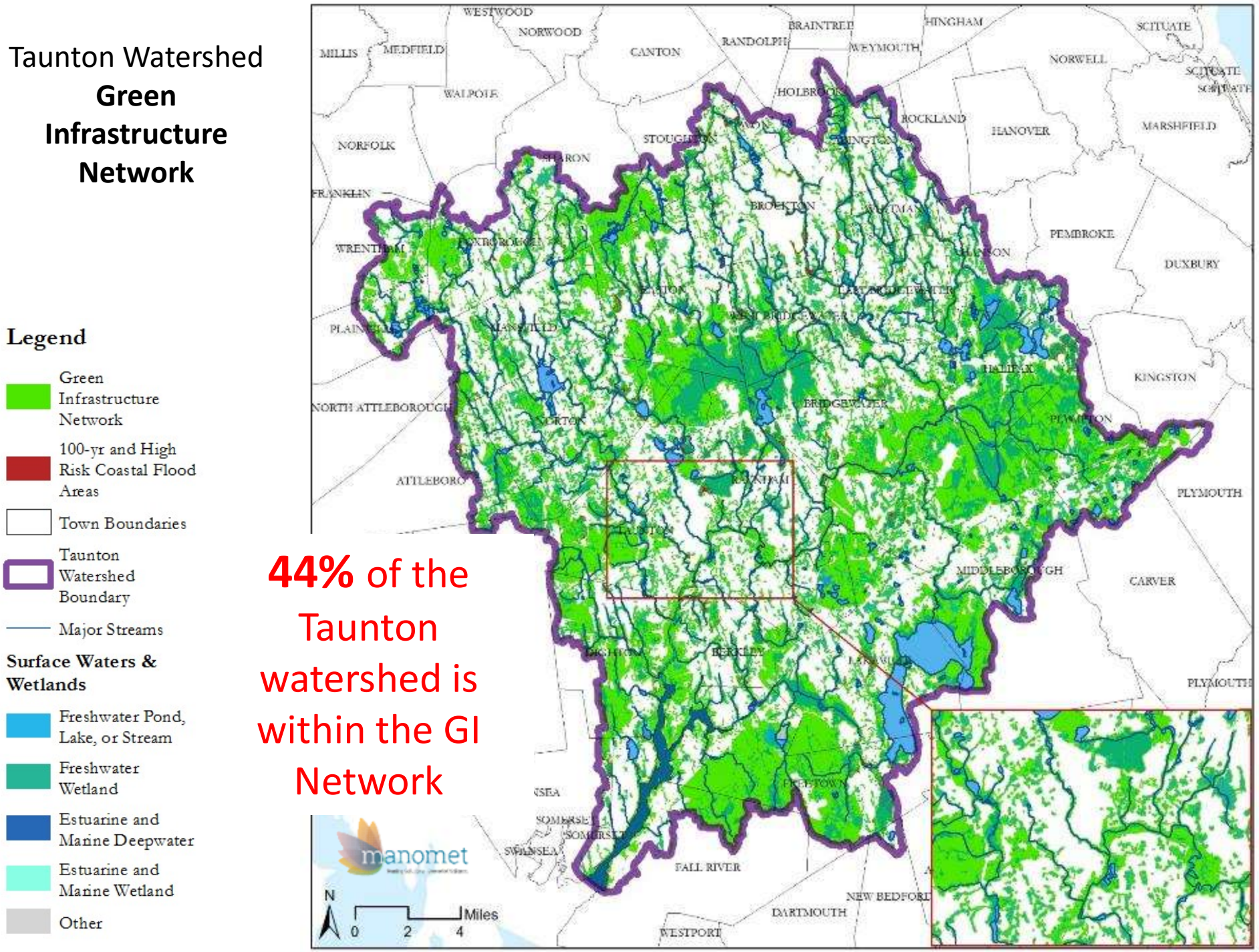
Legend

- Green Infrastructure Network
- 100 yr and High Risk Coastal Flood Areas
- Town Boundaries
- Taunton Watershed Boundary
- Major Streams

Surface Waters & Wetlands

- Freshwater Pond, Lake, or Stream
- Freshwater Wetland
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Other

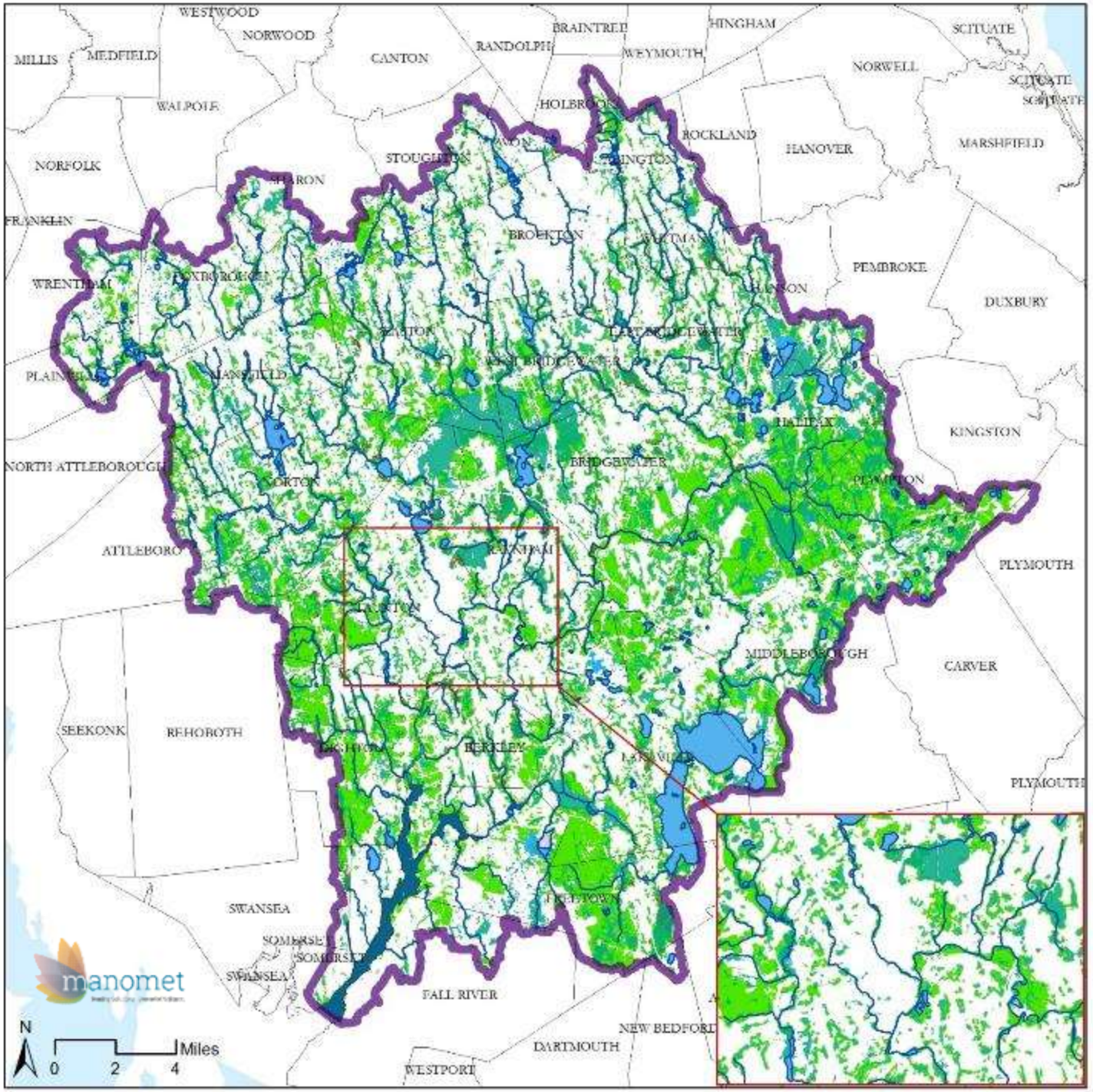
Taunton Watershed **Green Infrastructure Network**



Taunton Watershed
Undeveloped
&
Unprotected
Green
Infrastructure
Network

66% of the GI Network is currently undeveloped and unprotected.

This represents **30%** of the entire watershed area.

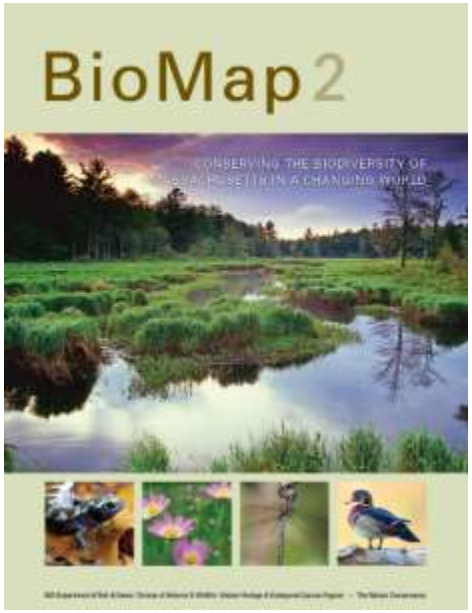


Free ecosystem services:
Free services provided by the natural landscape

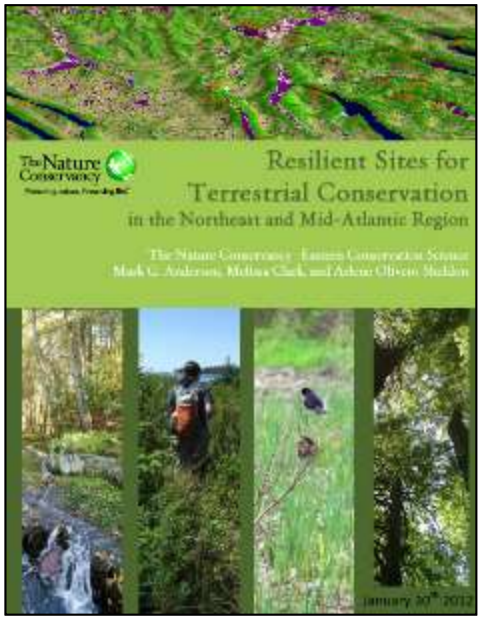
Every $1 invested in land conservation offers a *$4 Return on Investment* in terms of these ecosystem service values

- **Flooding**: Floodplains provide flood protection and reduce infrastructure damage
- **Public Health**: Managing stormwater and reducing retention ponds reduces creation of mosquito habitat
- **Air Quality & Public Health**: Trees reduce the urban heat island effect, reducing smog creation and resulting asthma occurrences as well as reducing nitrogen dioxide and particulate matter
- **Water Quality**: Streamside vegetation filters pollutants and reduces erosion
- **Water Quantity**: Forests and wetlands store water, improve water quality, and recharge groundwater
- **Recreation**: Clean, flowing waters support recreation, including boating, fishing, and swimming while open space provides areas for hiking and biking
- **Quality of Life**: Open space and street trees create a more enjoyable walking environment, benefiting community connection, health, and economic benefit in downtowns and commercial areas
- **Property Value**: Healthy, mature trees add an average of 10-20% to a property's value

MAPPR: Mapping And Prioritizing Parcels for Resilience



BioMap2:
Habitat, Biodiversity



TNC Resilience:
Climate Adaptation

Critical Linkages:
Ecological Connectivity

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MAPPR: 3 Steps

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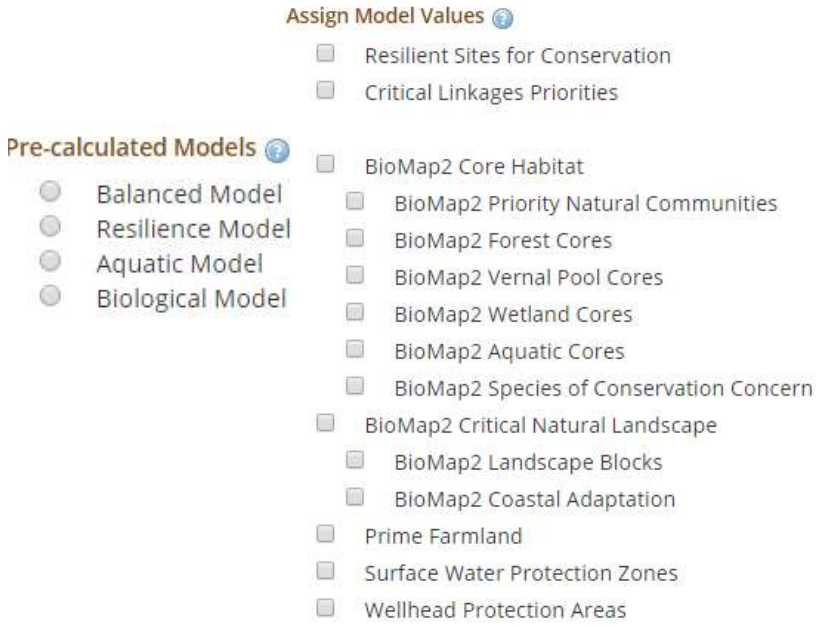
1

Select a study area

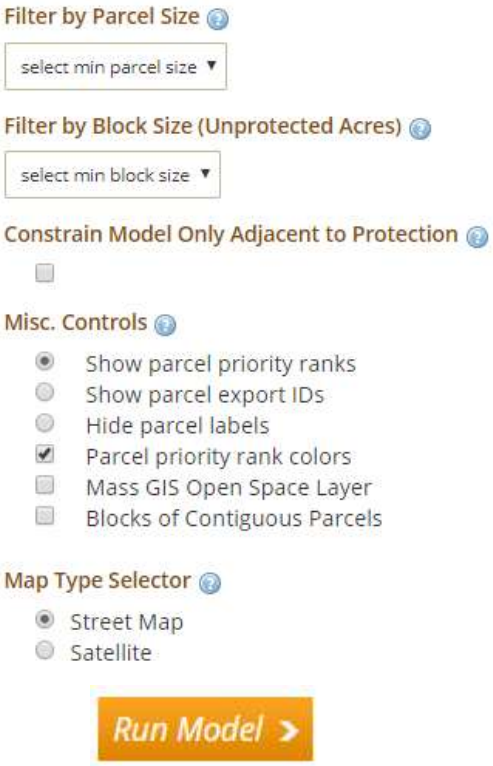
2

Choose model (or choose your own adventure)



3

Run & Review Results



MAPPR in Halifax, MA – Balanced Model

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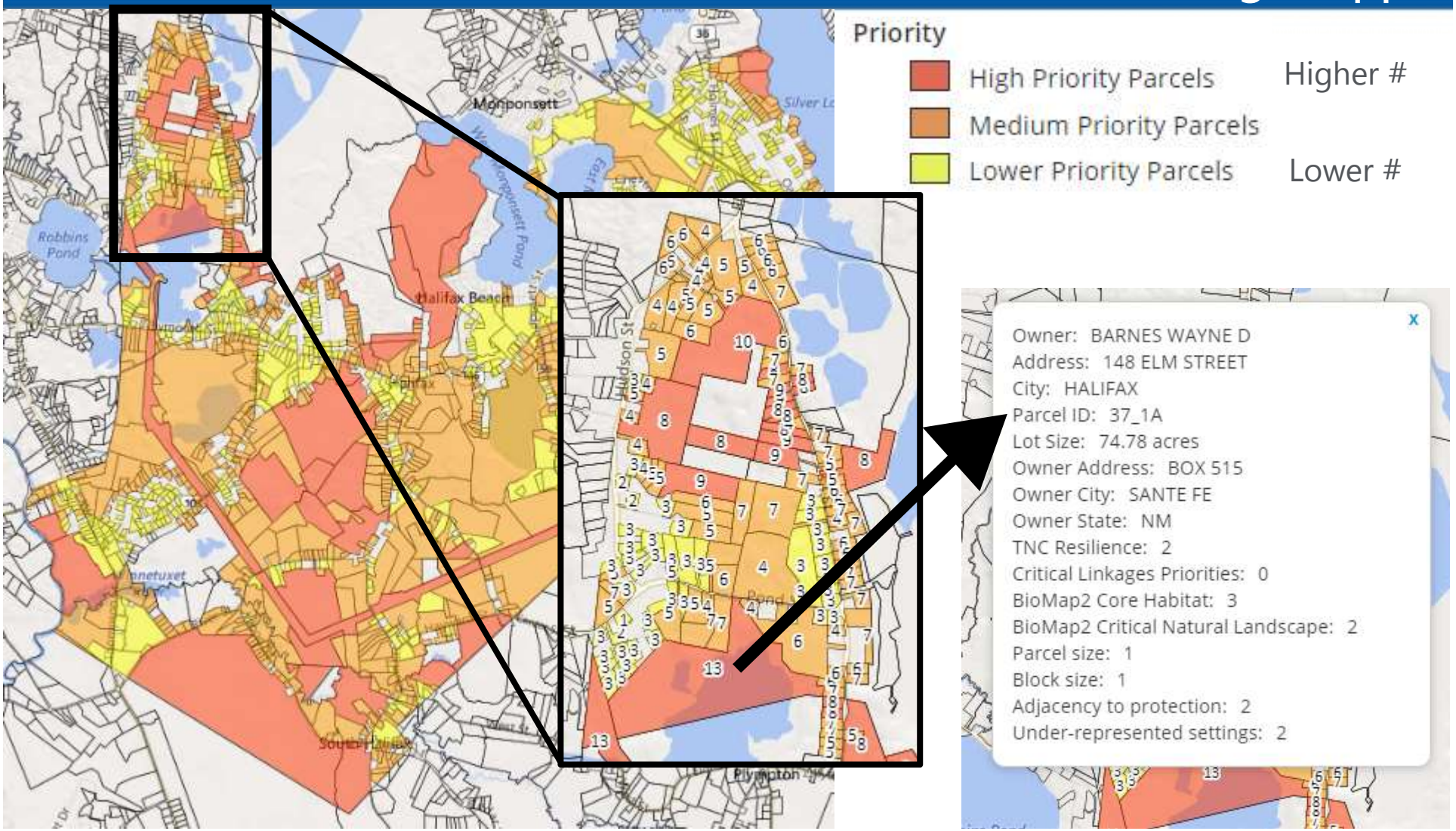
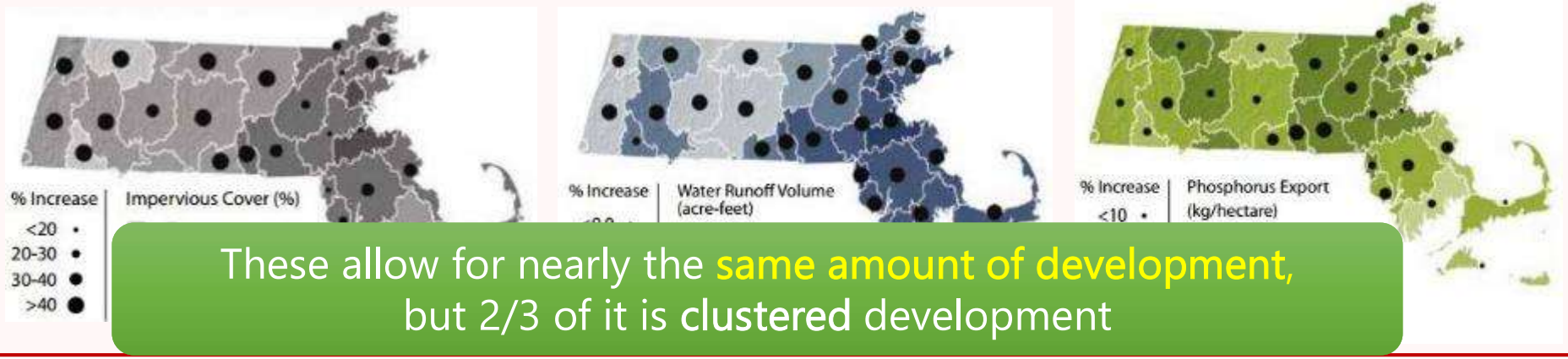


How we develop – local choices in resilience

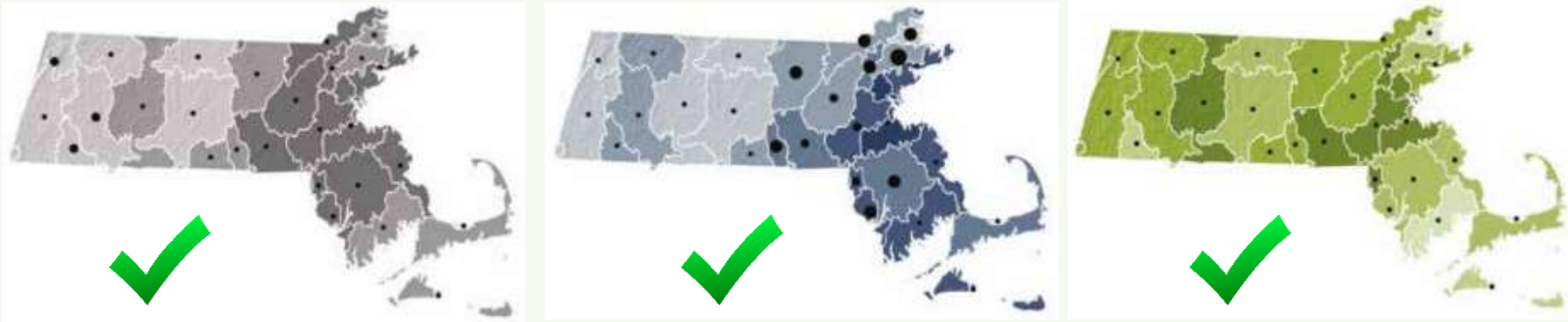
Source: Harvard Forest *Changes to the Land* 201

If we continue to follow opportunistic growth, in 2060:



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

If we value forests as infrastructure, in 2060:



Start here.

Conserve the natural green infrastructure already providing free ecosystem services

Integrate LID and green infrastructure design into development

Restore the resiliency of urban landscapes through LID in redevelopment

Conserve

Conserve the natural green infrastructure already providing free ecosystem services

Integrate LID and green infrastructure designs into current development

Restore elopment

http://www.dem.ri.gov/programs/bpoladm/suswshed/pdfs/condev.pdf

Image credits:
Rhode Island Conservation Development Manual, 2003

Integrate

Conserve the natural green infrastructure already providing free ecosystem services

Integrate LID and green infrastructure designs into current development projects

an landscapes through LID in redevelopment

Restore

Conserve the natural green infrastructure already providing free ecosystem services

Integrate LID and green infrastructure designs into current development

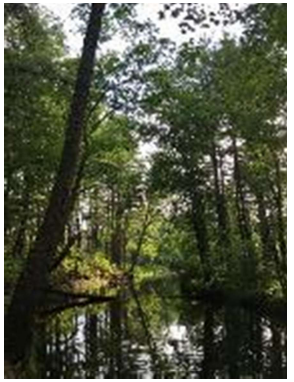
Restore the resiliency through LID in redevelopment

North Street, Pittsfield, MA

Five things you can do now to improve community resilience

1. Take Advantage of Nature
2. Be Smart with Regulations and Bylaws
3. Think Ahead and Plan
4. Be Opportunistic & Work Together
5. Look Around for Easy Fixes



Master plans & Open space plans

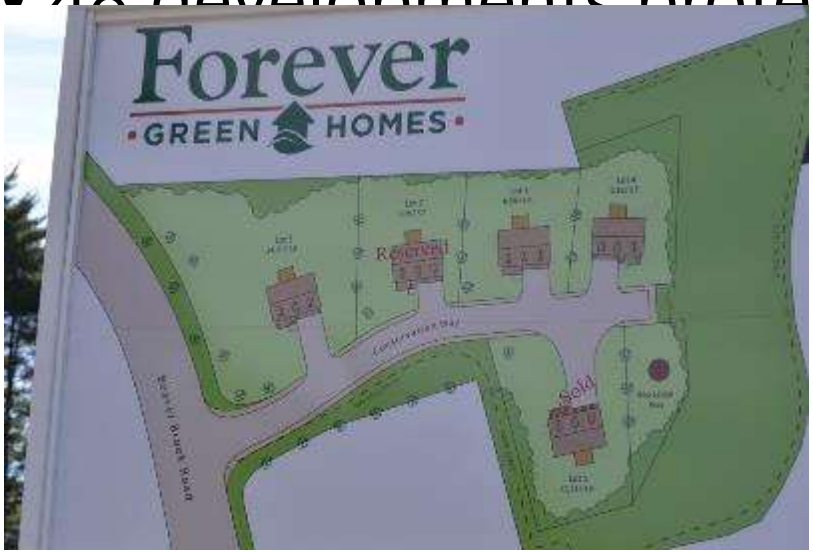
Planning Document	What does it do?	What should I look for?	How do I change it?
Master Plan (MP)	Comprehensive guiding document that sets **community goals**	• **Current**, reflects changing priorities? • Prioritizes **sustainable development?** • Defines specific measures to retain local **community character** & values?	Planning Board often with assistance of a special Master Planning Committee
Open Space and Recreation Plan (OSRP)	Identifies local **natural** resource and recreation priorities and plans for protection and management	• **Current**, reflects current parcel status, priorities? • Allows variety of OS uses: recreation, conservation? • Considers **land and water** resources? • Consider **local context** of existing OS?	Conservation Commission, often with assistance of a special OS Committee. Must meet state guidelines

Supporting LID through local regulations – framework for review

Factors	Conventional	Better	Best		Community's Zoning Bylaws	Community's Subdivision Rules and Regs	Community's Site Plan Review	Community's Stormwater/LID Bylaw/Regs
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			*(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					*(Not applicable)*
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%					
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					*(Not applicable)*

The power of a bylaw: Westford, Massachusetts

- Adopted a Conservation Subdivision bylaw in 1978
- Requires developers to submit both conservation and conventional & Planning Board chooses preferred
- 48 developments protected over1,700 of land



The power of a bylaw: Westford

- Preserved local habitat
- Protected water resources
- Created 13 miles of hiking trails & public recreation
- Town didn't have to purchase the land themselves, saving millions of dollars

Rail Trail in Westford

Weir Village Park – Taunton, Massachusetts

- Redevelopment project demolishing old F.B. Rogers Silver factory in Taunton
- Building new city park and boat ramp to improve access
- Working with TNC to construct rain gardens to

Weir Village Park - Benefits

✓Economic

✓Environmental

✓Community

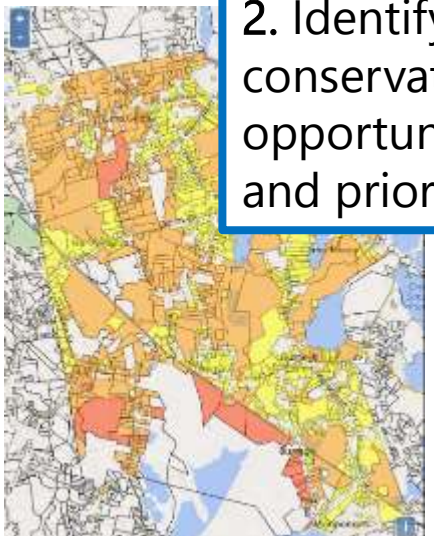
Benefits

Pollutant Reductions	Environmental Benefit	Economic Benefits
90% Removal of Total Suspended Solids	Clearer Water, Clean Riverbed Surfaces	Healthier Fish Communities
30-50% Removal of Total Nitrogen	Nitrogen control helps prevent harmful algal blooms in saltwater habitats	Healthier Shellfish Communities
30-90% Removal of Total Phosphorus	Phosphorus control helps prevent harmful algal blooms in freshwater habitats	Higher levels of oxygen lead to healthier Fish and freshwater shellfish habitat
40-90% Removal of Metals	Metals can be toxic in high concentration	Healthier fish and shellfish communities

So what do we do now?

1. Identify existing and future problems that GI can help alleviate

5. Prioritize and incentivize sustainable development



2. Identify conservation opportunities and priorities

3. Include this information in local planning (OS, Comprehensive plans,

4. Educate the public and local boards to encourage sustainable development

Examples

Municipal Vulnerability Preparedness Program

1. Identify existing and future problems that GI can help alleviate

http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/municipal-vulnerability-preparedness-program.html

2. Identify conservation opportunities and priorities

www.massaudubon.org/mappr

- Wildlife Research & Conservation
- Land Conservation
- Ecological Management
- Education & Community Outreach
  - Sustainable Planning & Development
    - Losing Ground Report
    - Shaping the Future of Your Community Program
    - Preservation & Development Toolkit
    - Guidebook to Involvement in Your Community
    - Cost Effective Low Impact Development (LID)
    - **MAPPR Project**
  - Schools
  - Partners
  - Visitor Experience

Mapping & Prioritizing Parcels for Resilience Project

Mass Audubon, in partnership with The Nature Conservancy and LandVest, developed Mapping and Prioritizing Parcels for Resilience (MAPPR) to allow Massachusetts conservationists to rapidly identify specific parcels that, if protected, could contribute the most to achieving land protection goals.

While land trusts, towns, and agencies have long relied on a wide range of maps and data sets to identify priority areas for land protection to meet their goals, MAPPR takes advantage of newly available digital parcel data to identify specific land protection opportunities. MAPPR also helps land trusts, towns, and agencies to easily define and refine their priorities, discover new opportunities, and extract the data necessary to take the next steps in land protection.

Support for MAPPR

Resources

MAPPR Tool

Resources

Questions

For more information:
MAPPR@massaudubon.org

Project Partners

The Nature Conservancy

LandVest

3. Include this information in local planning (Open Space, Comprehensive plans, zoning, etc.)

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/natu	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)*
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Common	Often not allowed,	Allow for 2-3 residential	Allow for up to 4 residential units, preferrably				*(Not applicable)*

4. Educate the public and local boards to encourage sustainable development

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- Preserved local habitat
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5. Prioritize and incentivize sustainable development

Local Challenges

- Capacity
  - Few full time staff in small towns
  - Comprehensive planning takes time

- Public understanding
- Local champions to stay the course over time
- Need for interdepartmental cooperation and integration – Planning, conservation, public works, fire & safety, etc.

Thank you!
For more information, visit
srpedd.org/rtwn or
massaudubon.org/shapingthefuture

Questions?

Stefanie Covino

Coordinator, Shaping the Future of Your Community Program

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