CAPE-WIDE WASTEWATER PLANNING

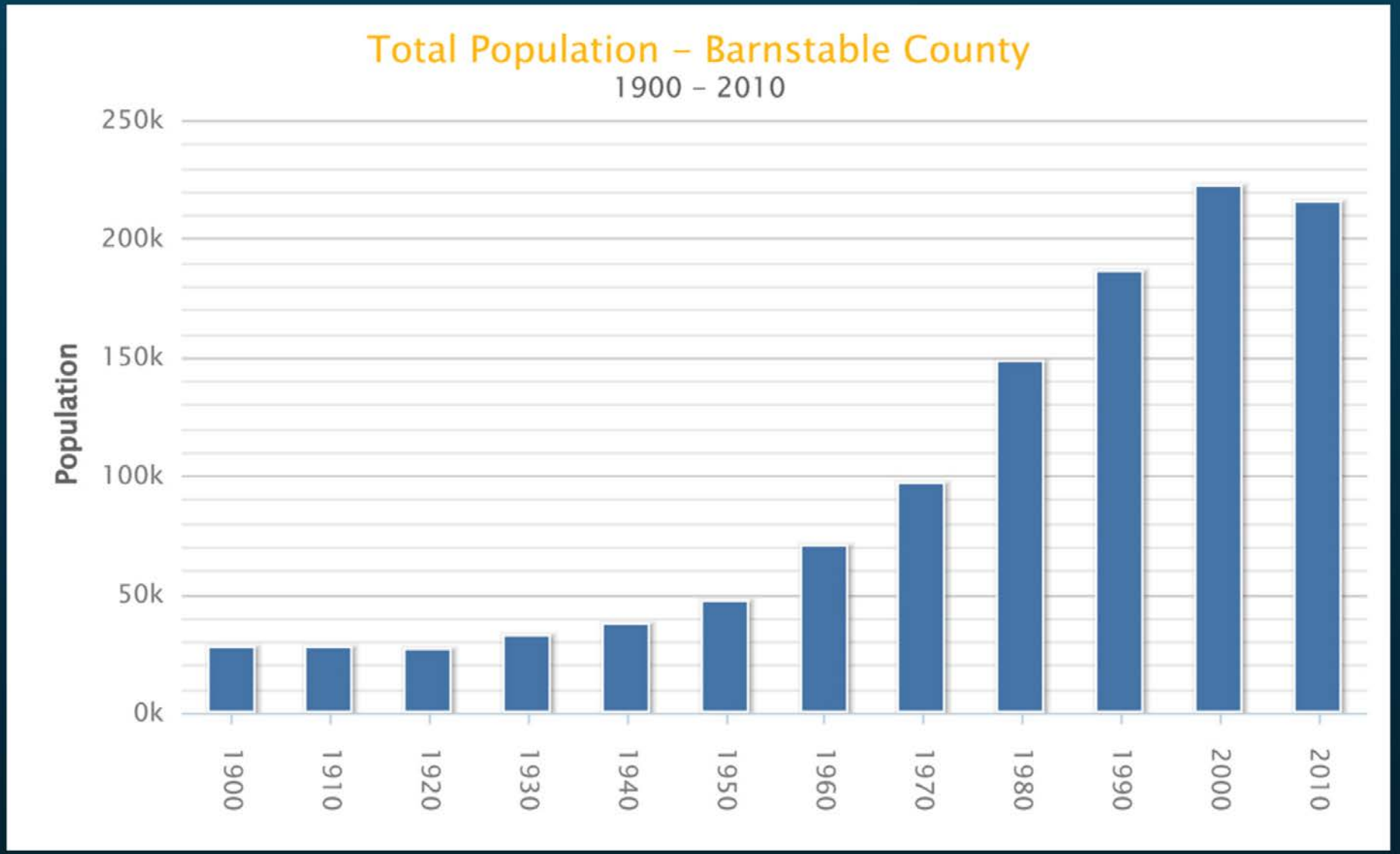
Goals, Strategies, Measures, & a Path Forward

"Going it Together" WBNERR Workshop - 12/12/12

Paul Niedzwiecki, Executive Director, CCC

The Problem

POPULATION GROWTH



The Problem

CHANGES IN DEVELOPMENT

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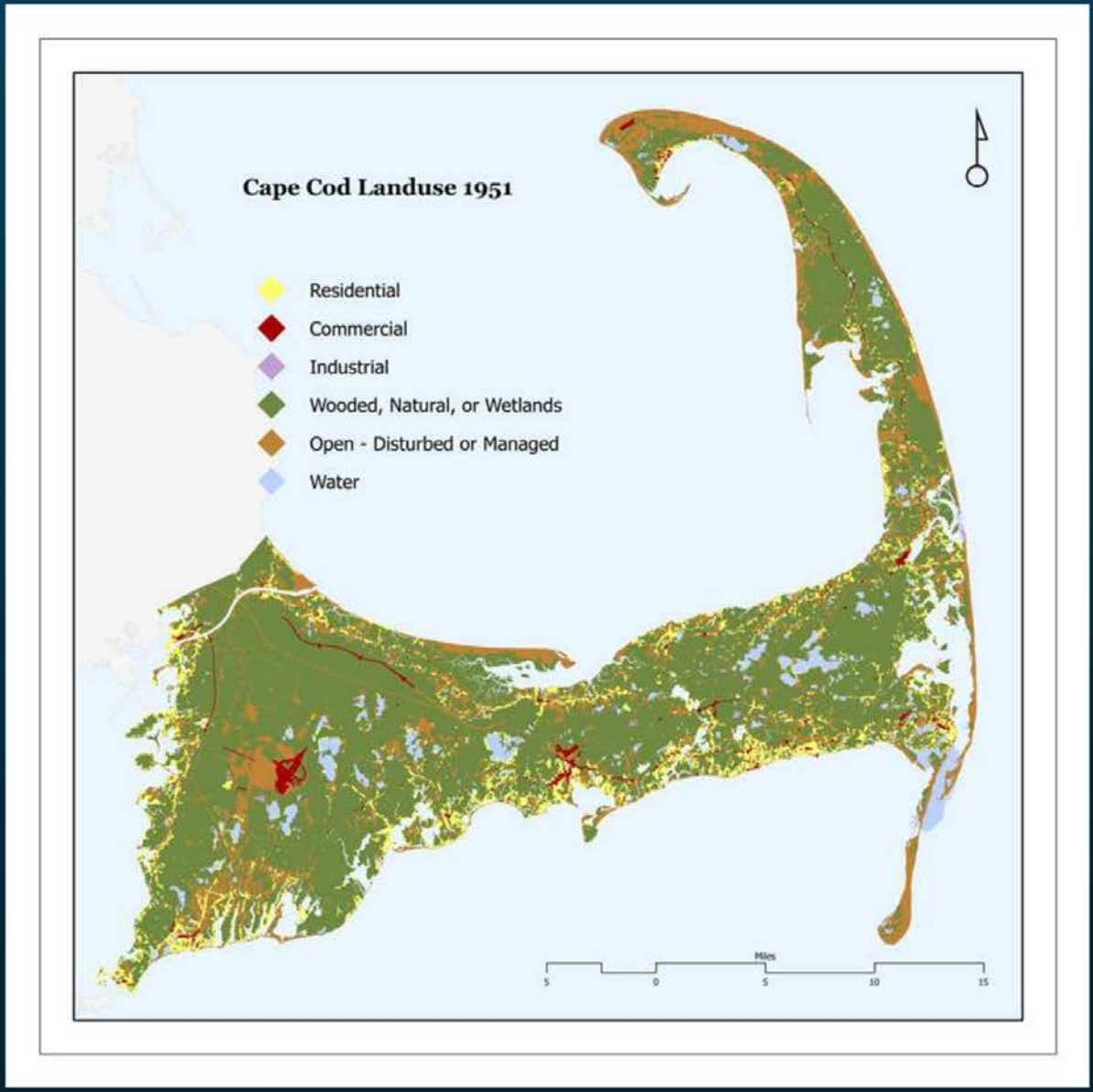

The Problem

CHANGES IN DEVELOPMENT

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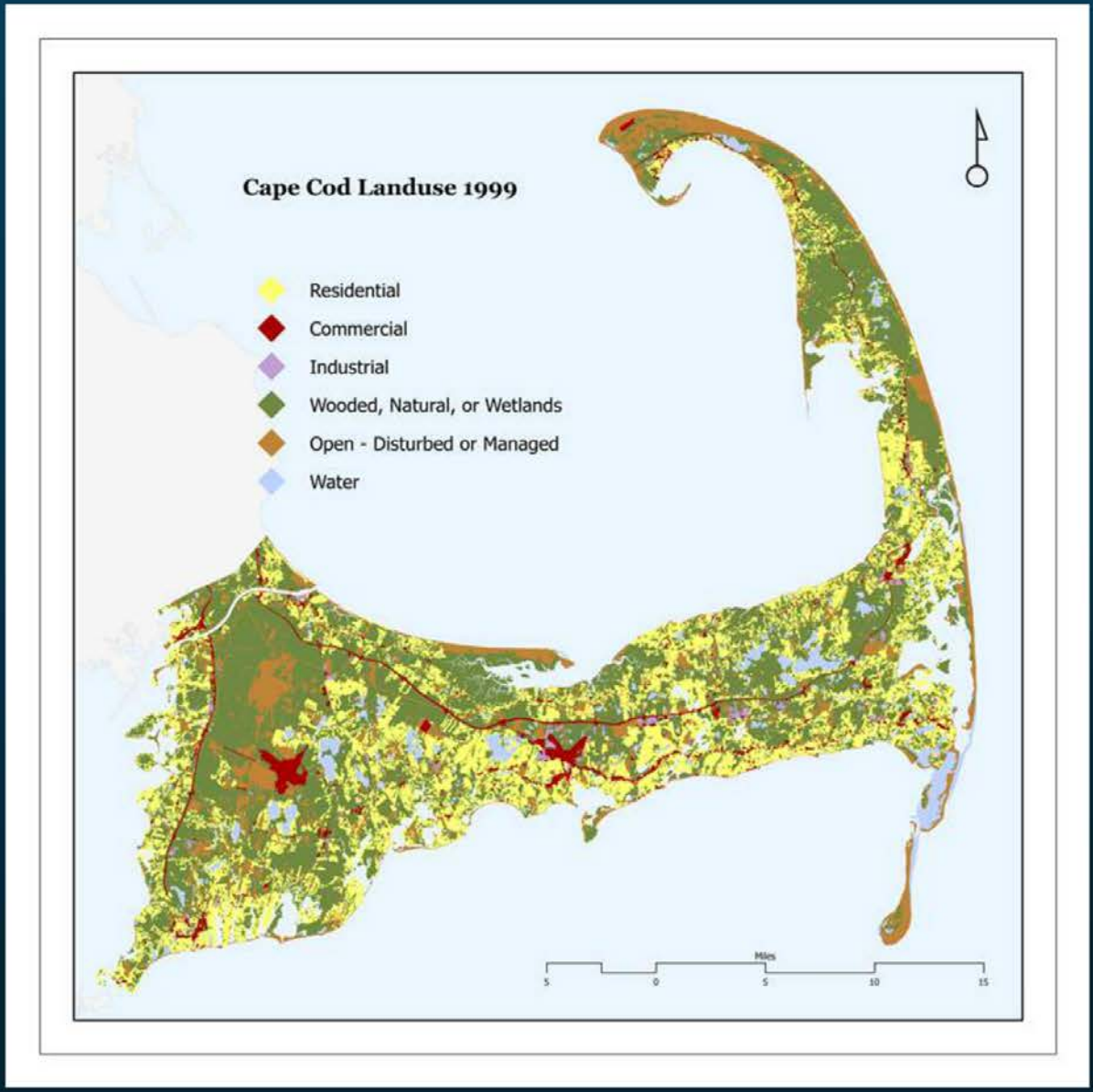


The Problem

NITROGEN IN WASTEWATER

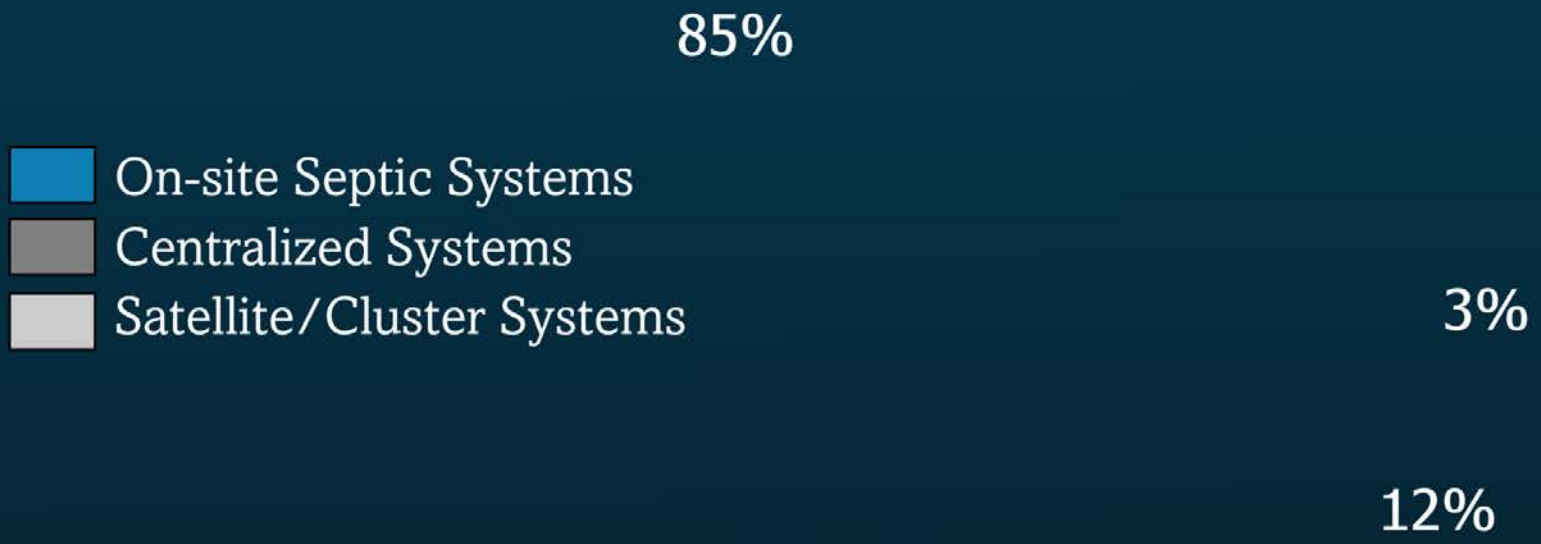
The average 3 bedroom home produces about 8.5 lbs of nitrogen per year.

Most of the nitrogen that enters the groundwater, on average Cape-wide, is from wastewater.

The Problem

On-Site Septic Systems

Title 5 septic systems are not designed to remove nitrogen.

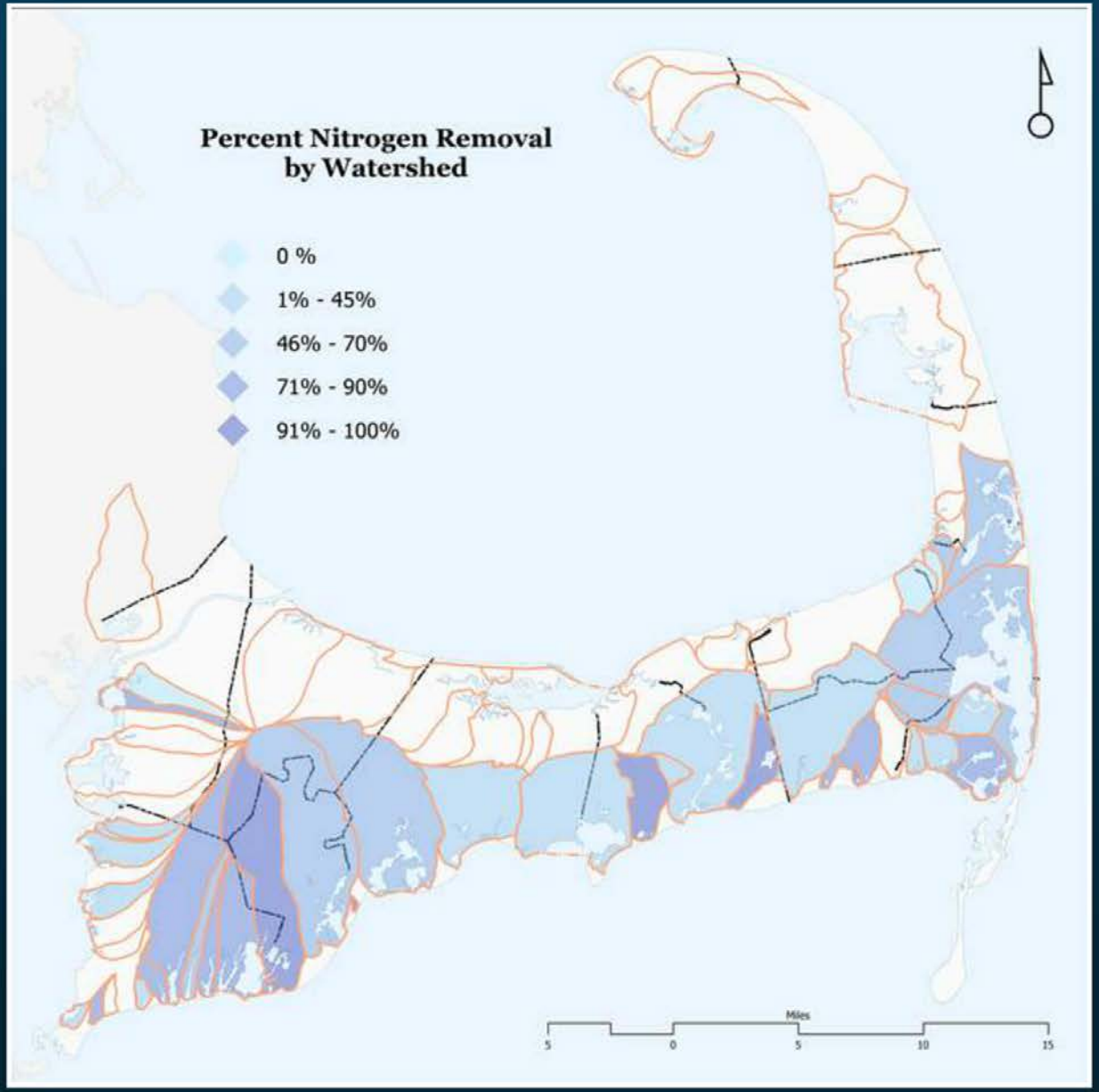


The Problem

NITROGEN REMOVAL REQUIRED

46 watersheds are being studied by MEP

35 embayment watersheds have an established total maximum daily load (TMDL)

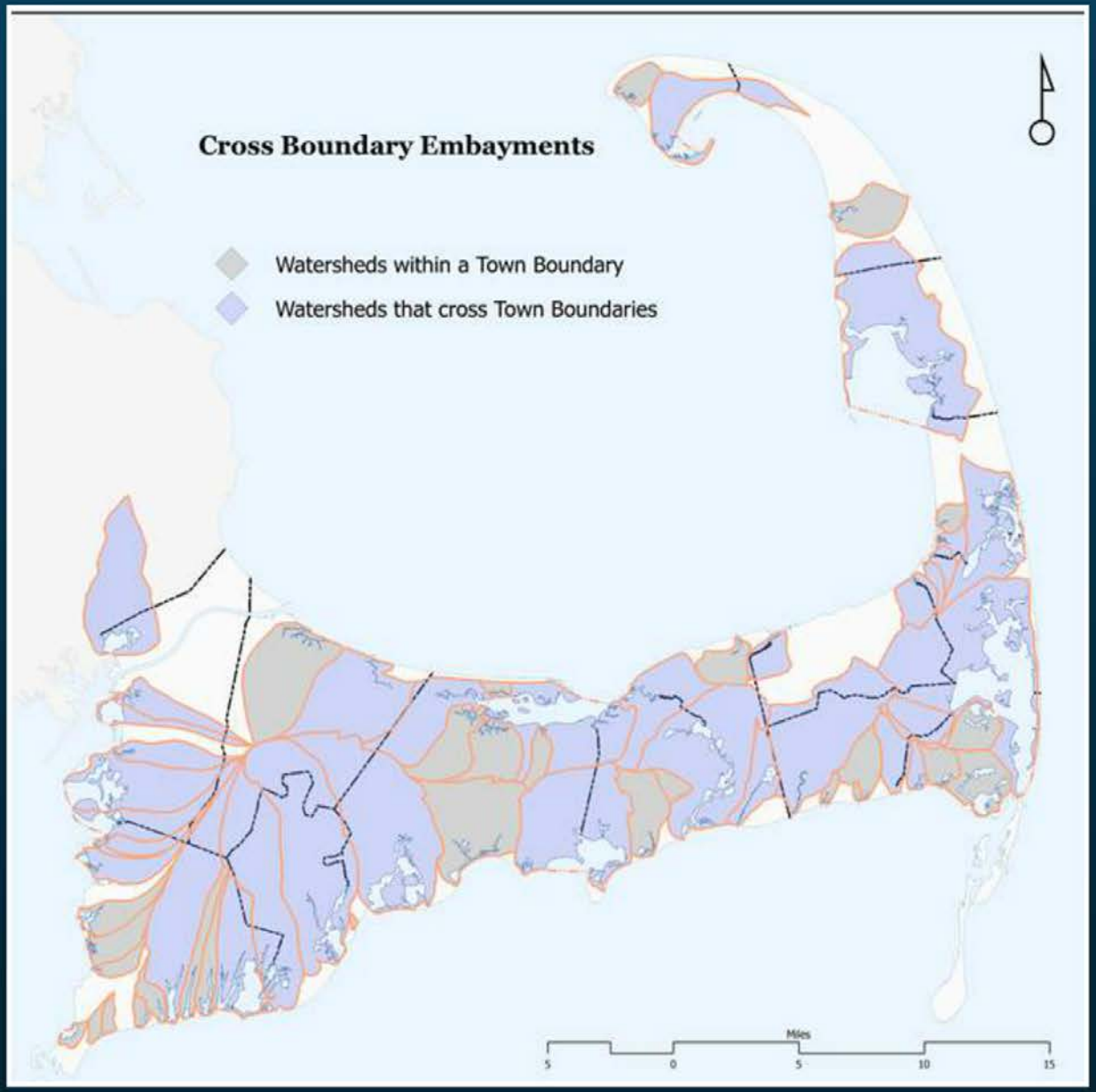


The Problem

SHARED WATERSHEDS

32 of the 57 watersheds to coastal embayments on Cape Cod are shared by two or more towns

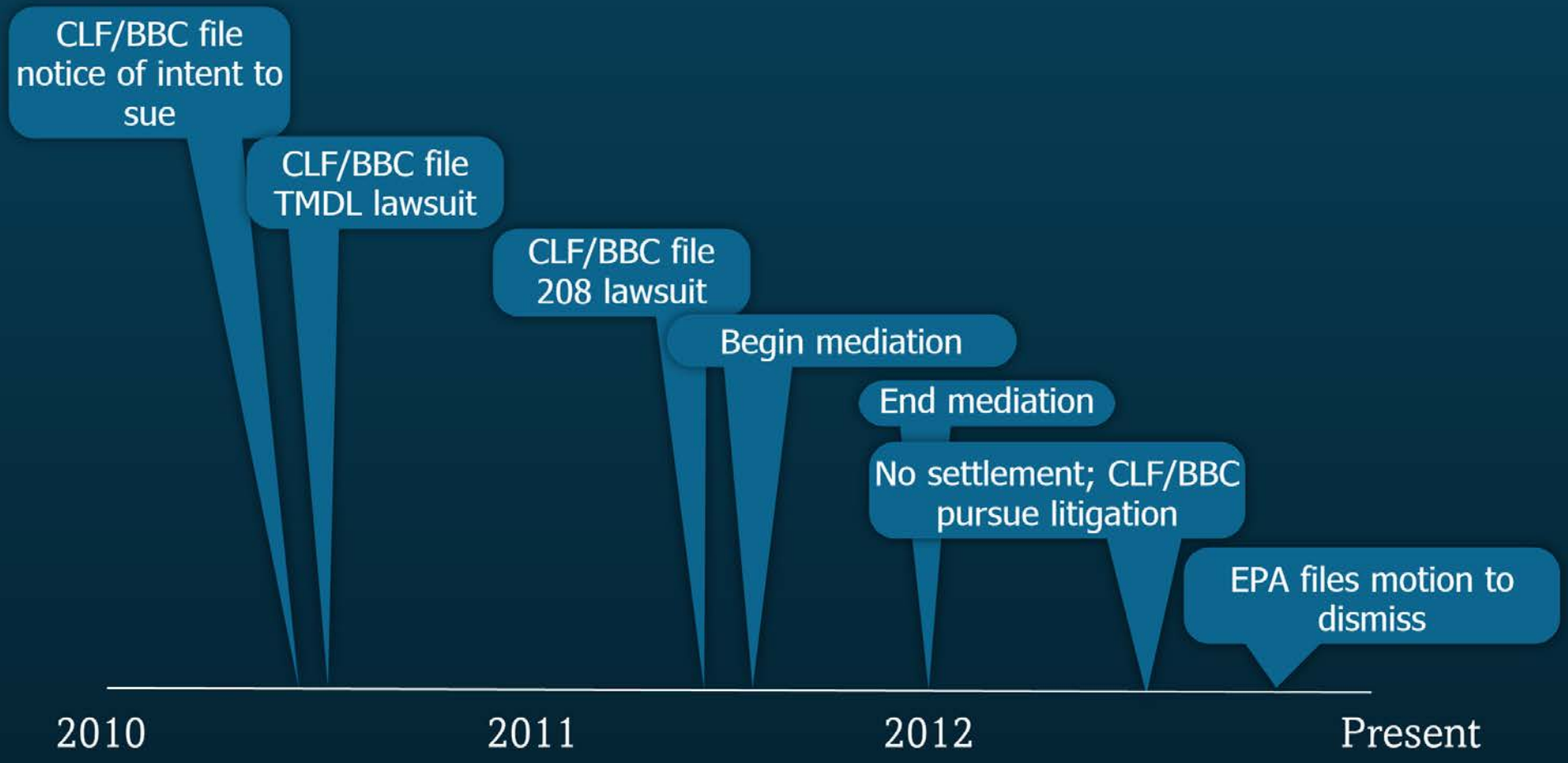
Wastewater planning takes place at the municipal level, without a requirement for collaboration in shared areas



The Problem

LEGAL ACTION

2 lawsuits brought by the Conservation Law Foundation and Buzzards Bay Coalition threaten our ability to solve this problem on our own.



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REGIONAL WASTEWATER MANAGEMENT PLANNING

Restore degraded water bodies through regional nutrient management policy promoting appropriate infrastructure and growth management mechanisms while protecting taxpayers from unnecessary costs.

A series of policies that integrate 4 major goals:

- Environment
- Affordability
- Suitable Infrastructure
- Growth Management

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GOAL: IMPROVE WATER QUALITY

STRATEGIES

Base nutrient management on science

Develop CWMPs that are:

- Are town-wide and based on watersheds
- Integrate land use and wastewater planning
- Demonstrate how TMDLs will be met now and in the future

Incorporate CCC guidance for CWMPs

MEASURES

MEP Technical Reports and TMDLs

Completed CWMPs that:

- Prioritize infrastructure for water quality restoration
- Formally address shared watersheds through IMAs and MOUs
- Include and adaptive management plan

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GOAL: BUILD SUITABLE INFRASTRUCTURE

STRATEGIES

Build watershed-based infrastructure that reduces costs, limits unplanned growth, and utilizes technologies based on density and % removal required

Identify alternative infrastructure techniques and approaches and partner with towns assessing alternatives through pilot projects

Consider impact of climate change

Conduct long-term benefit analysis and product adaptive management plans

MEASURES

Legally enforceable agreements for shared infrastructure
- IMAs, Joint Services Agreements, Management Districts

Wastewater collection and treatment that:
- Is appropriate for development density & TMDL removal requirements
- Is based on watershed lines
- Utilizes existing public and private infrastructure
- Is non-structural in nature, where appropriate

System phasing, technology, and design that prioritizes nitrogen reduction in the watersheds to highly sensitive embayments and is flexible enough to meet future needs

CWMPs with approved monitoring and adaptive management plans

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GOAL: AFFORDABILITY

STRATEGIES

Reduce cost by:

- Utilizing and/or expanding existing wastewater infrastructure
- Promoting shared infrastructre in shared watersheds to reduce costs

Maximize Clean Water State Revolving Fund (SRF) and other funding

Promote equitable financing options for wastewater infrastructure and the use of Cape Cod-based innovation, management, and infrastructure sources

Establish the amount that Cape residents can reasonably be expected to contribute and seek out sources to cover gap in cost

MEASURES

Infrastructure:

- Maximized existing public and private infrastructure
- Establish "host" and "customer" communities that realize financial benefit through shared treatment of proximate, high-density neighborhoods
- A reduction in the need for new infrastructure

Status of towns applying for and obtaining zero-percent interest State Revolving Fund (SRF) loans, other SRF loans, and other loans and grants

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GOAL: GROWTH MANAGEMENT

STRATEGIES

Towns

- Adopt growth management strategies that limit growth to what is allowed under existing Title 5 regulations
    - Exception: Areas specifically designated fro growth to sustain economic development and vitality
- Identify appropriate wastewater infrastructure to service Economic Centers, Village Centers, and Industrial Service and Trade Areas (ISTAs)

A case study assessment of the application of "flow neutral" regulations required for 0% SRF loans

MEASURES

Towns adopting:

- Flow neutral regulations
- Economic Centers, Village Centers, and ISTAs
    - Appropriate wastewater infrastructure
    - Planned disposal capacity
- Other growth management controls for areas outside of identified growth areas

G.L. Chapter 83 "checkerboarding" provisions (collection system limits) adopted, where appropriate

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REGIONAL WASTEWATER MANAGEMENT PLANNING

Providing the tools necessary to promote public discussion and involvement in watershed planning.

The RWMP is the framework for:

Providing technical assistance to communities for watershed planning and implementation

Facilitating dialogue between communities that share a watershed

Educating communities about their options

Advocating for financial resources and regulatory flexibility

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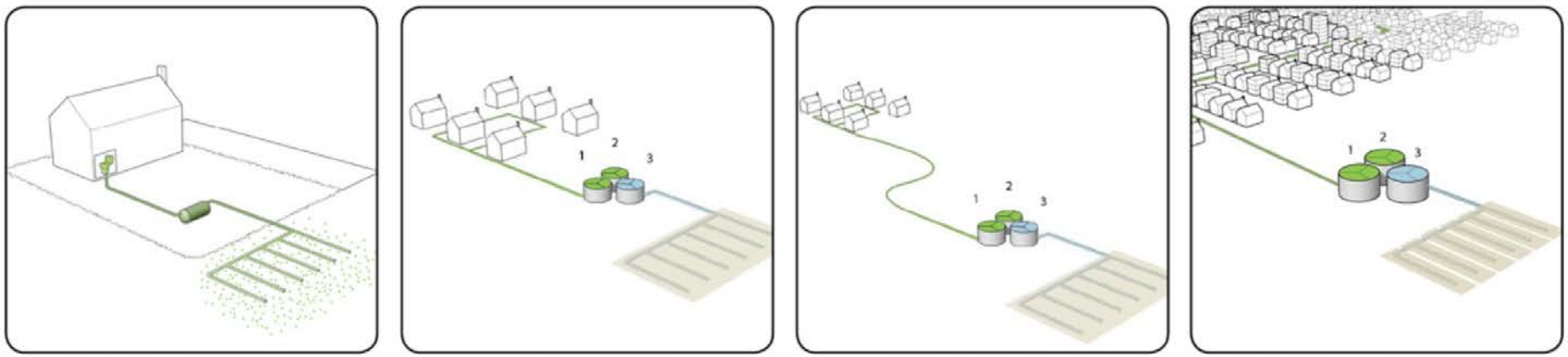
Approaches

Prepared to utilize traditional infrastructure in the most cost effective way...



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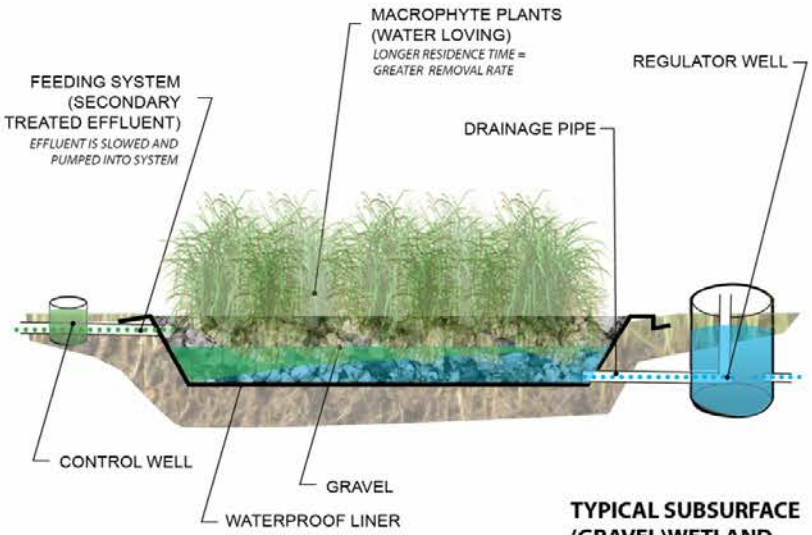
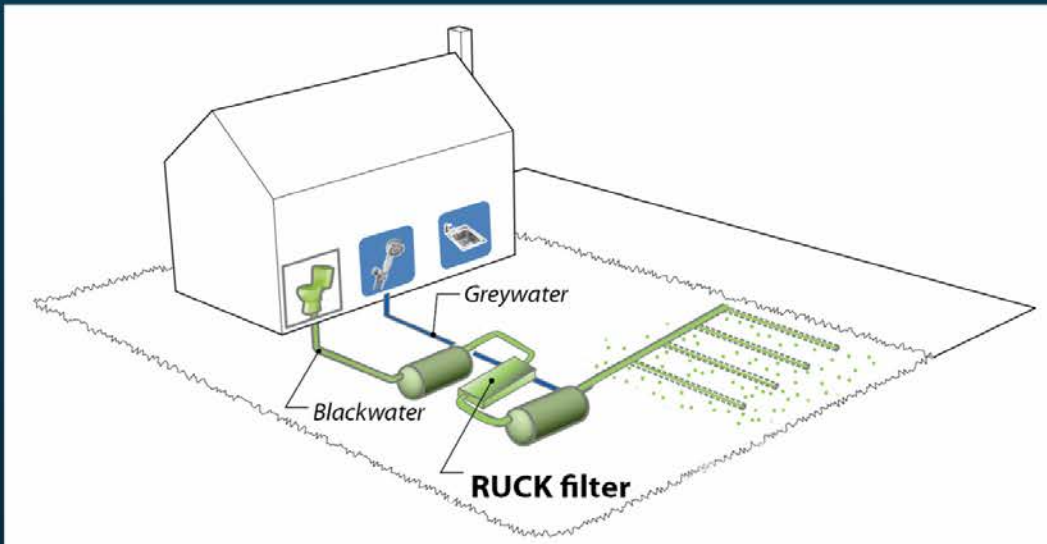
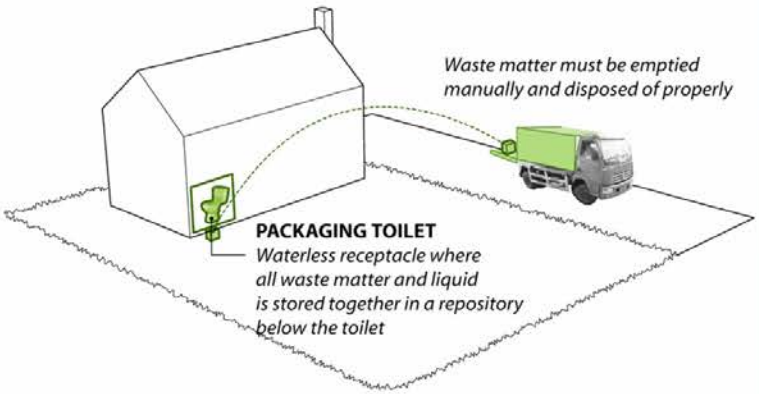
Approaches

But planning for an approach that utilizes traditional technologies and alternative approaches, while maximizing natural attenuation.



TYPICAL SUBSURFACE (GRAVEL)WETLAND
For Wastewater





PACKAGING TOILET
Waterless receptacle where all waste matter and liquid is stored together in a repository below the toilet

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Cost Analysis

Based on traditional infrastructure; providing the information needed to quickly respond to the changing legal environment.

Two scenarios: optimized approach & individual town approach

Assumptions:

Parameter	Optimized Approach	Individual Town Approach
# of central treatment facilities	7	13
% of parcels with on-site denitrification systems (current/future)	3.4%/5.7%	3.4%/5.0%
% of parcels served by cluster/satellite systems (current/future)	4.6%/7.6%	4.6%/6.7%
Density of sewered areas, ft/conn. (current/future)	105/108	115/118
# of disposal sites	10	13
% of effluent disposal in nitrogen-sensitive watersheds (current/future)	15%/25%	20%/30%
% of effluent disposed of in water supply Zone IIs (current/future)	15%/25%	20%/30%
Growth in nitrogen-sensitive watersheds compared with non-nitrogen sensitive watersheds	7.5%/15%/22.5%	15%/30%/45%

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Cost Analysis

Optimized Approach:

Capital: $4.2 billion - $5.1 billion

O&M: $48 million - $53 million

Individual Town Approach:

Capital: $4.6 billion - $6.2 billion

O&M: $57 million - $81 million

FACTORS THAT MOST INFLUENCE COST:

Extent of Infrastructure

Growth

Location of Effluent Disposal Sites

Economies of Scale

The optimized approach assumes 40-45% of the existing developed parcels will remain on Title 5 septic systems. Approximately 20% of the capital costs above are associated with the repair and replacement of these systems.

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APPROACHES

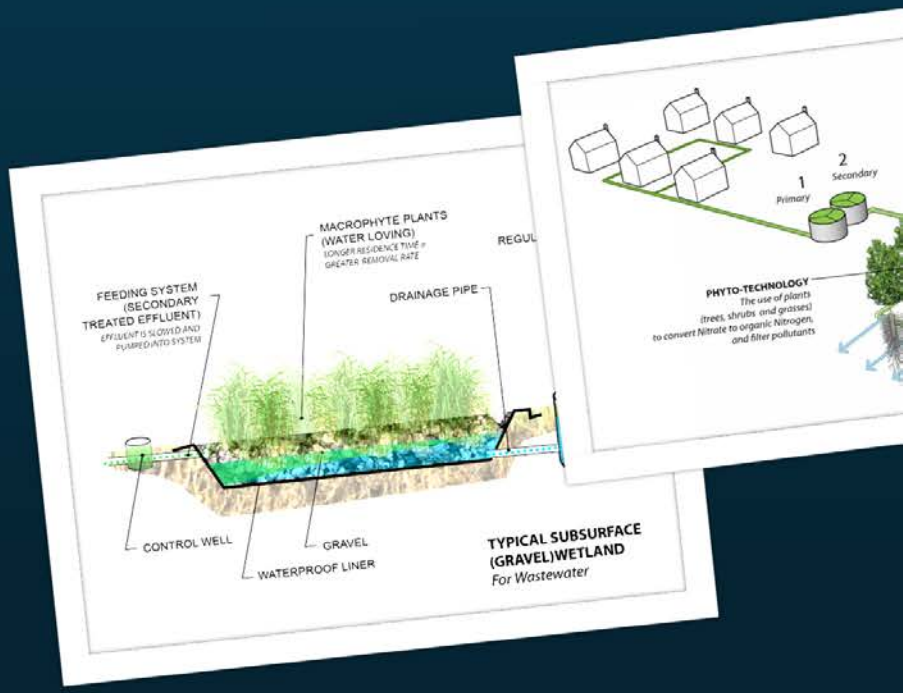
There is no "silver bullet" to fit the multiple needs of the region in a cost effective and efficient way.

A mix of solutions:

Traditional Gray Infrastructure

AND

Green Infrastructure & Alternatives



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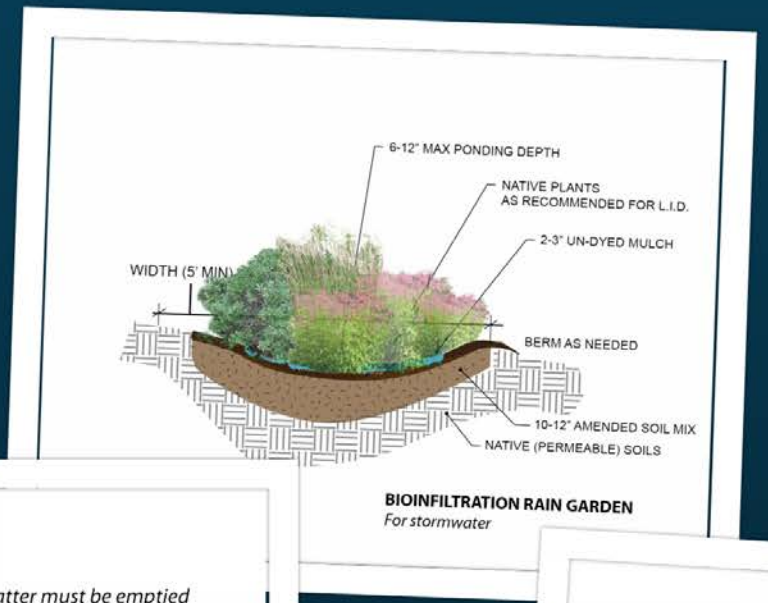
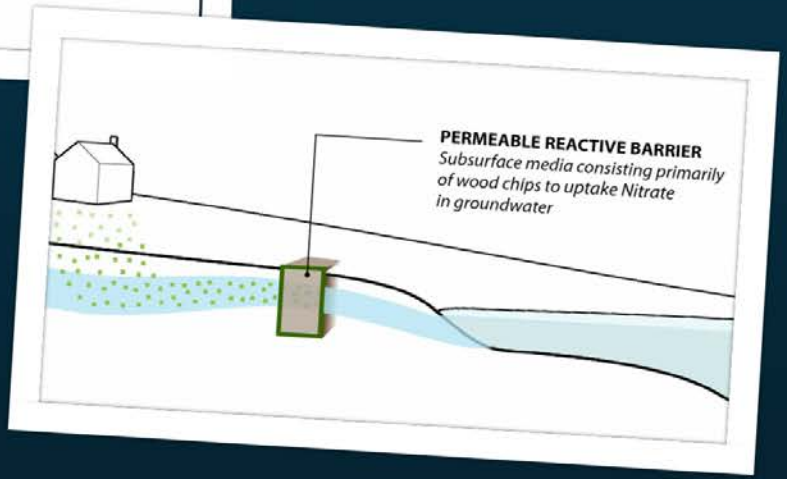
APPROACHES

Including:

- Phytoremediation
- Ecotoilets
- Constructed Wetlands
- Stormwater management
- Permeable Barriers






NITROGEN POLLUTION
WASTE WATER
WATER BODYS
IMPERVIOUS
FERTILIZER
NATURAL
Site
Neighborhood
Watershed
Cape-Wide
Septic System Title 5
Innovative Septic Title 5
Toilets: Urine Diversion
Toilets: Composting
Toilets: Packaging
Eco-Machines
DISCHARGE
Wetlands: Vertical S
Phyto-buffer: S
Permeable React Bar.
Sewers
Satelite Treatment
Cluster Treatment
SECONDARY, TERTIARY & DISCHARGE
Eco-Machines
Wetlands: Surface Flow
Wetlands: Vertical LG
Phyto-irrigation
Sewers
Centralized Treatment
Culvert Widening
Dredging
Phyto-buffer: LG
Permeable React Bar
Shellfish Aquaculture
Seaweed Farming
Septic: Regulation
Toilets: Regulation
Biofiltration Strips
Green Roofs
Wetlands: Surface Flow
Wetlands: Vertical LG
Landscape Guidelines
Fertilizer Policies
Mun. Maintenance Regs

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Tools & Resources

Providing the tools necessary to promote public discussion and involvement in watershed planning.

Watershed MVP - a web-based, scenario planning tool that presents parcel-based data and calculations for land use, water use and build-out, allowing a user to quickly evaluate wastewater treatment options.

Rate Model - a financial model that considers a number of global inputs and assumptions about developed parcels, parcels to be collected, and capital and O&M costs for various treatment options, as well as customer characteristics and financial inputs to generate projected annual costs and projected costs per parcel over a period of time.

Systems Dynamics Model - a computer-aided approach to understanding the dynamics of a natural, built, or social system – that evaluates the impacts of different forms of wastewater treatment on the nutrient loading in the region's estuaries.

Green Infrastructure Siting Criteria - a screening process that utilizes a series of GIS data layers to identify site opportunities for green infrastructure and low impact development (LID) techniques, by assessing both positive siting criteria and potential constraints.

Community PlanIt - a game-based learning tool that provides a flexible platform for presenting local planning ideas while also gathering feedback on plans from the community.

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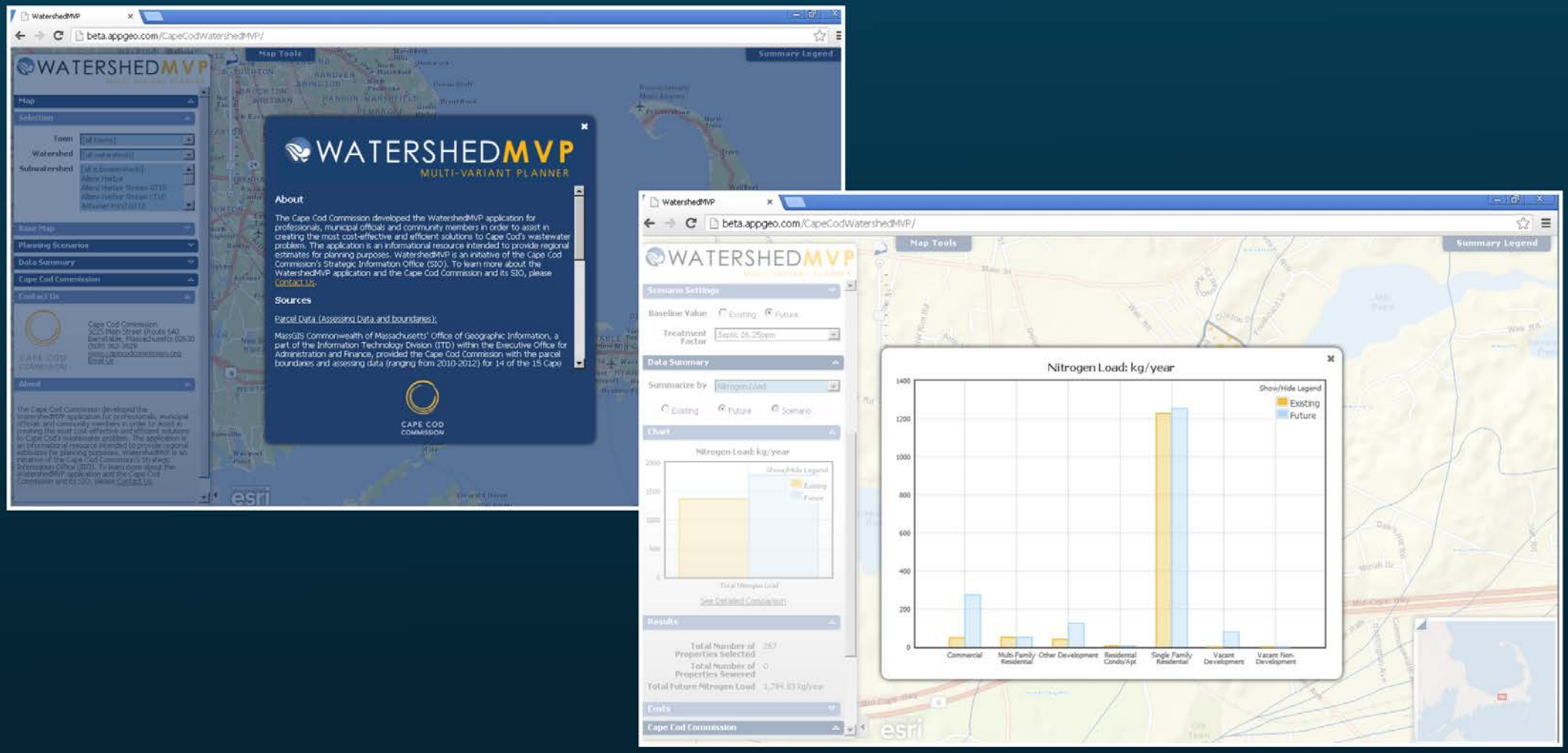

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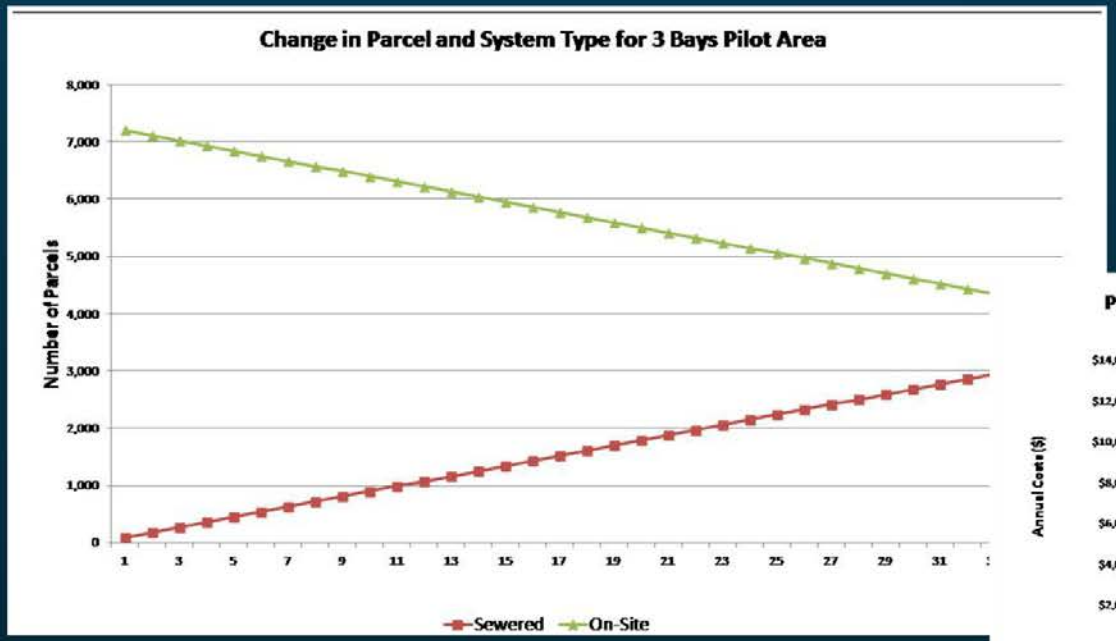

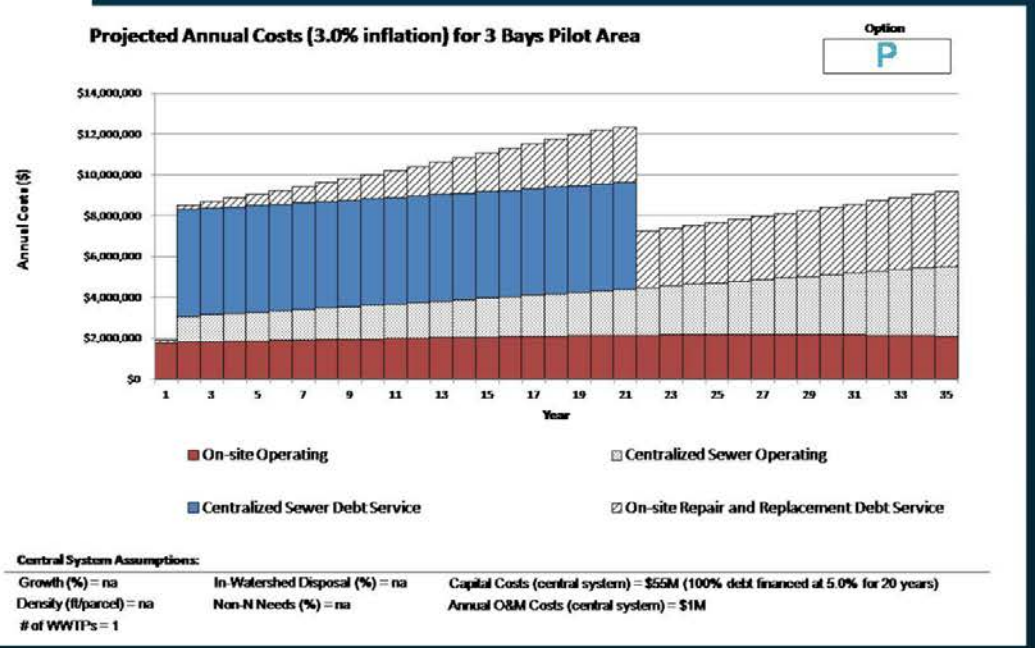

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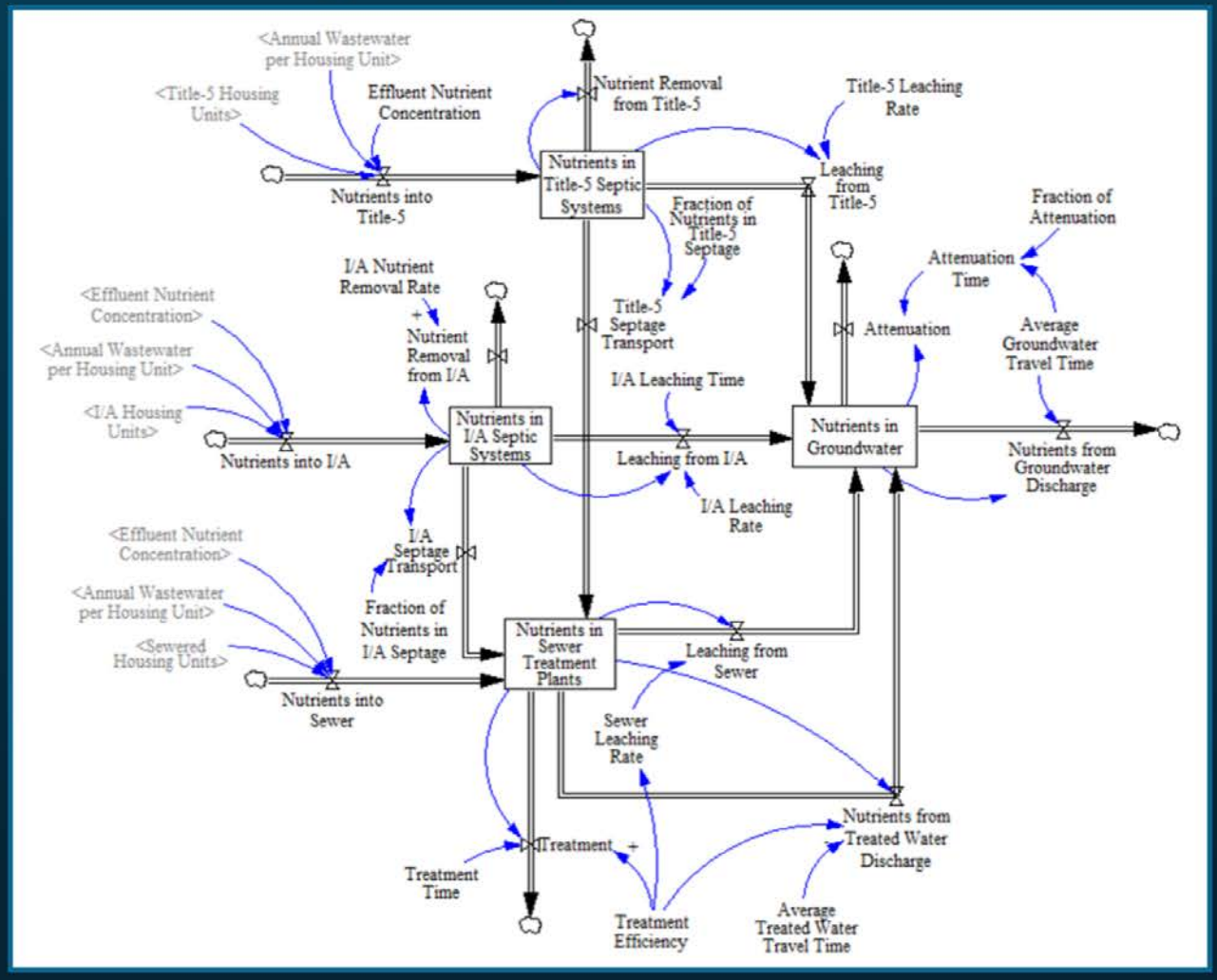

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Tools & Resources

Green Infrastructure Siting Criteria - a screening process that utilizes a series of GIS data layers to identify site opportunities for green infrastructure and low impact development (LID) techniques, by assessing both positive siting criteria and potential constraints.

Siting Criteria	Constructed Wetlands	Permeable Reactive Barriers	Stormwater Treatment Wetlands	Phytoremediation	Biofiltration Strips	Bioretention/Advanced Bioretention	Infiltration	Green roof	Permeable Pavement	Bioswales	Stormwater Disconnection	Gravel Wetland
Soils: disturbed	x	x		x		x						x
Soils: well drained	x	x	x	x	x	x	x		x		x	
Within open space: recreation	x	x	x	x	x							
Within open space: government	x		x	x	x							
Adjacent to open space: recreation			x		x							
Adjacent to open space: government	x		x		x							
Proximity to golf courses, athletic fields	x		x									
Impervious areas	x		x		x	x	x		x	x	x	x

[1] Green roofs have a significantly different set of siting criteria from other stormwater LID techniques

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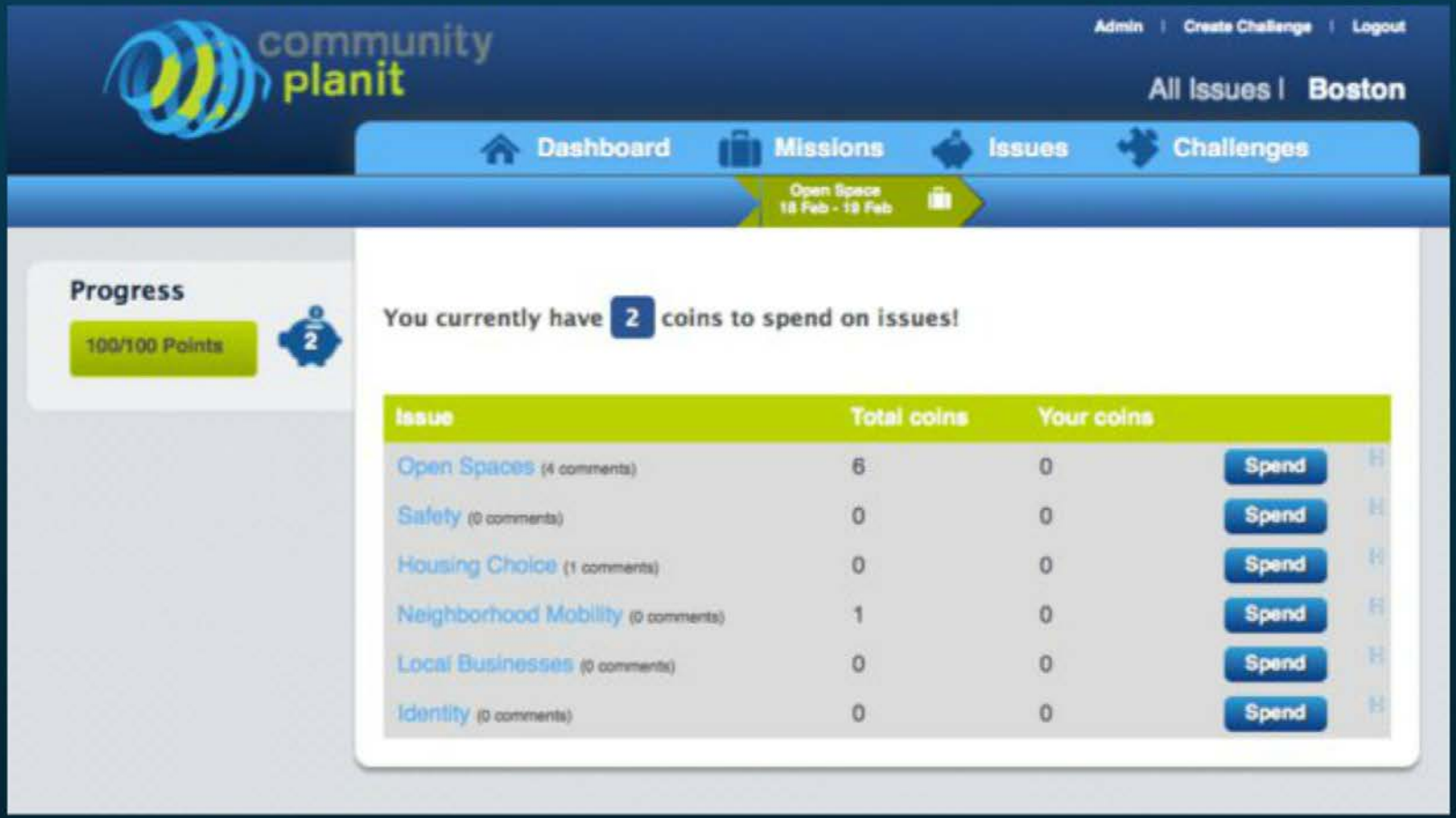
Tools & Resources

Community PlanIt - a game-based learning tool that provides a flexible platform for presenting local planning ideas while also gathering feedback on plans from the community.



Flexible participation: Players can participate from where ever they are when ever they have time.

www.communityplanit.org

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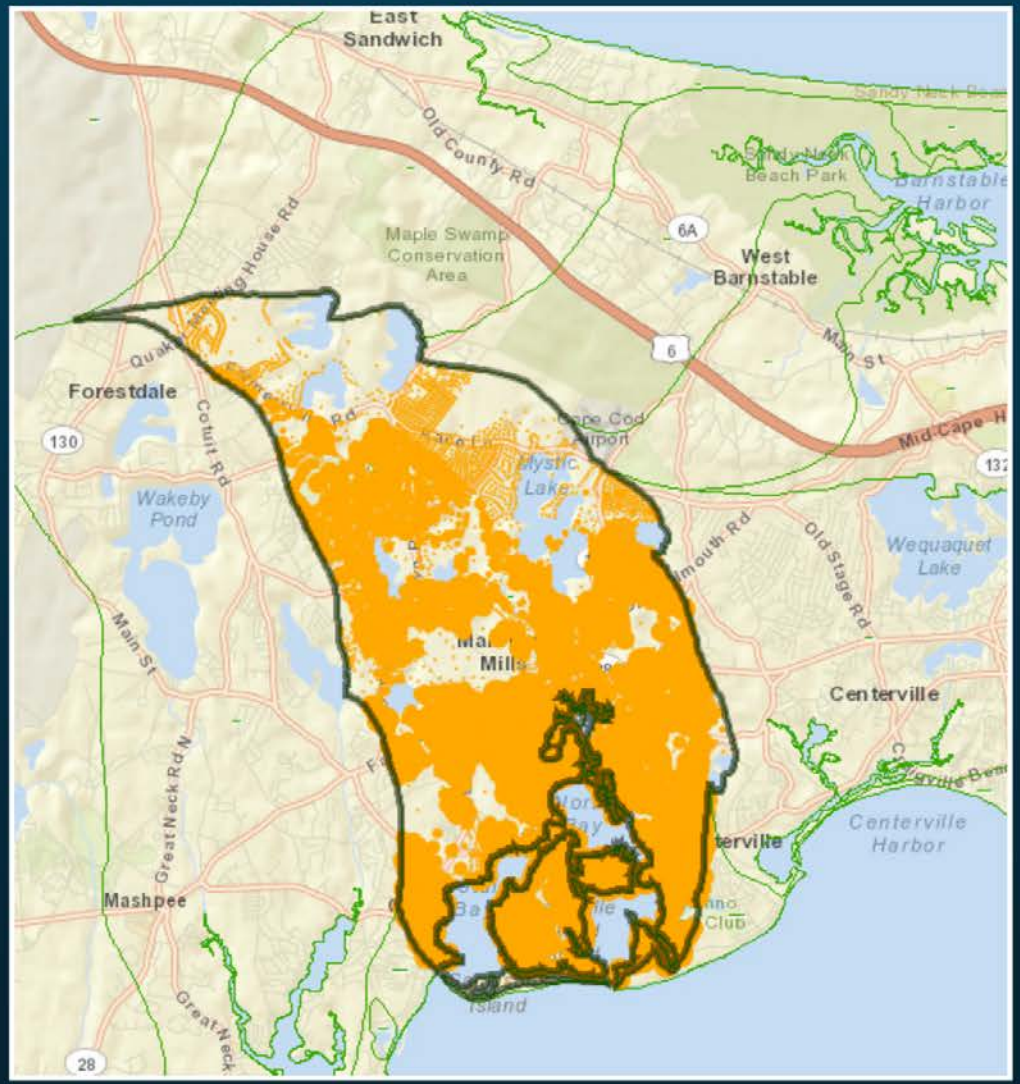
CITIZEN ENGAGEMENT

Developing a watershed-based community participation process



Educating watershed communities about their options

Providing a range of solutions for each watershed: **faster, better, cheaper**

Facilitating local discussions and inter-municipal cooperation in shared watersheds

Providing information, tools and resources to aid watershed communities in identifying the appropriate solution for their impacted embayment

Advocating for future resources to support community participation and appropriate solutions