Cape Cod 208 Area Water Quality Planning
Wellfleet Harbor and Pamet River Watershed Working Group

Meeting Three
Monday, December 2, 2013
1:00 – 5:00 pm
Wellfleet Council on Aging

Meeting Agenda

1:00 pm Welcome, Review 208 goals and Process and the Goals of today's meeting – *Cape Cod Commission Area Manager*

1:15 Introductions, Agenda Overview, Updates and Action Items– *Facilitator and Working Group*

1:30 Presentation of Initial Scenarios for each watershed – *Cape Cod Commission Technical Lead*

- Whole Watershed Conventional Scenarios
- Targeted Conventional Scenarios to meet the TMDLs (or expected TMDLs):
- Whole Watershed 7-Step Scenarios
- Working Group Reactions, Questions and Discussion

3:00 Break

3:15 Adaptive Management – *Cape Cod Commission and Working Group*

- Adaptive Management Sample Scenarios
- Key Adaptive Management Questions
- Defining Adaptive Management

4:00 Preparing for 2014 Jan-June – *Cape Cod Commission and Working Group*

- Triple Bottom Line approach
- Identify Shared Principles and Lessons Learned
- Describe Next Steps

4:45 Public Comments

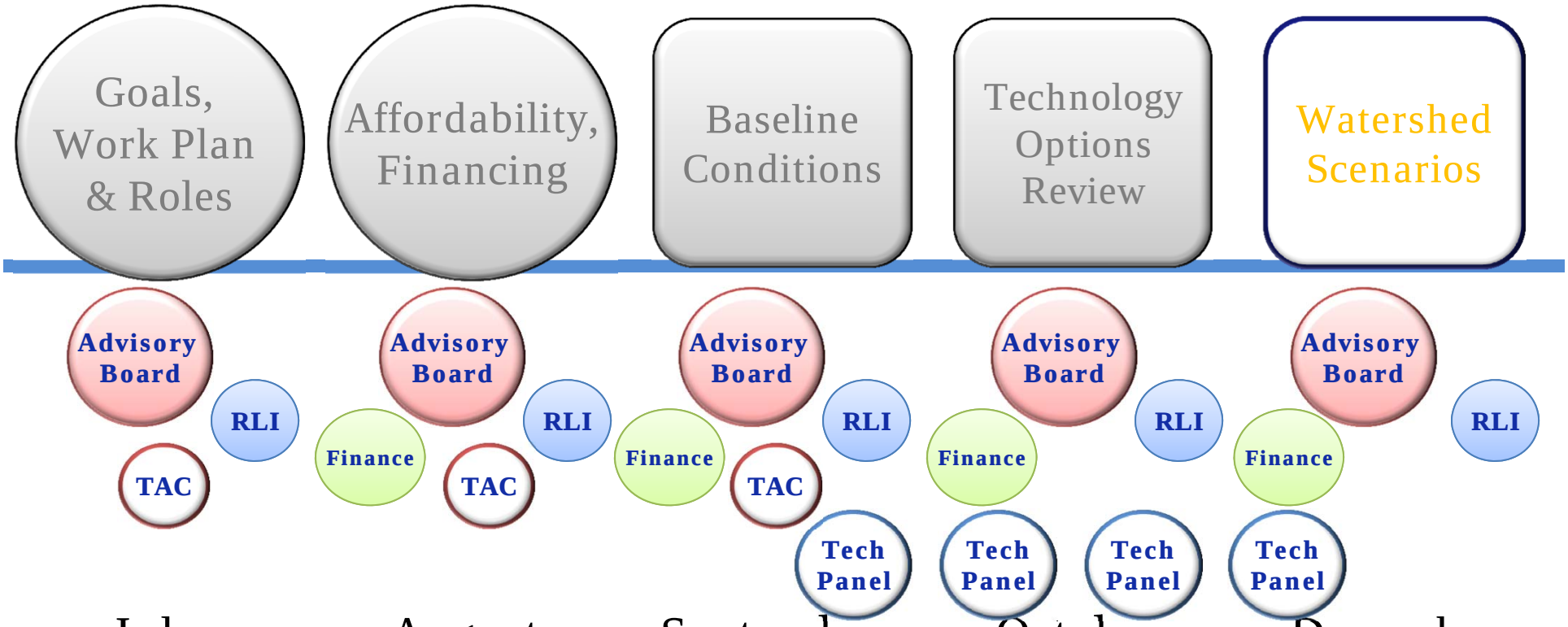
5:00 pm Adjourn

Wellfleet Harbor & Pamet River Group

Watershed Scenarios

Public Meetings

Watershed Working Groups

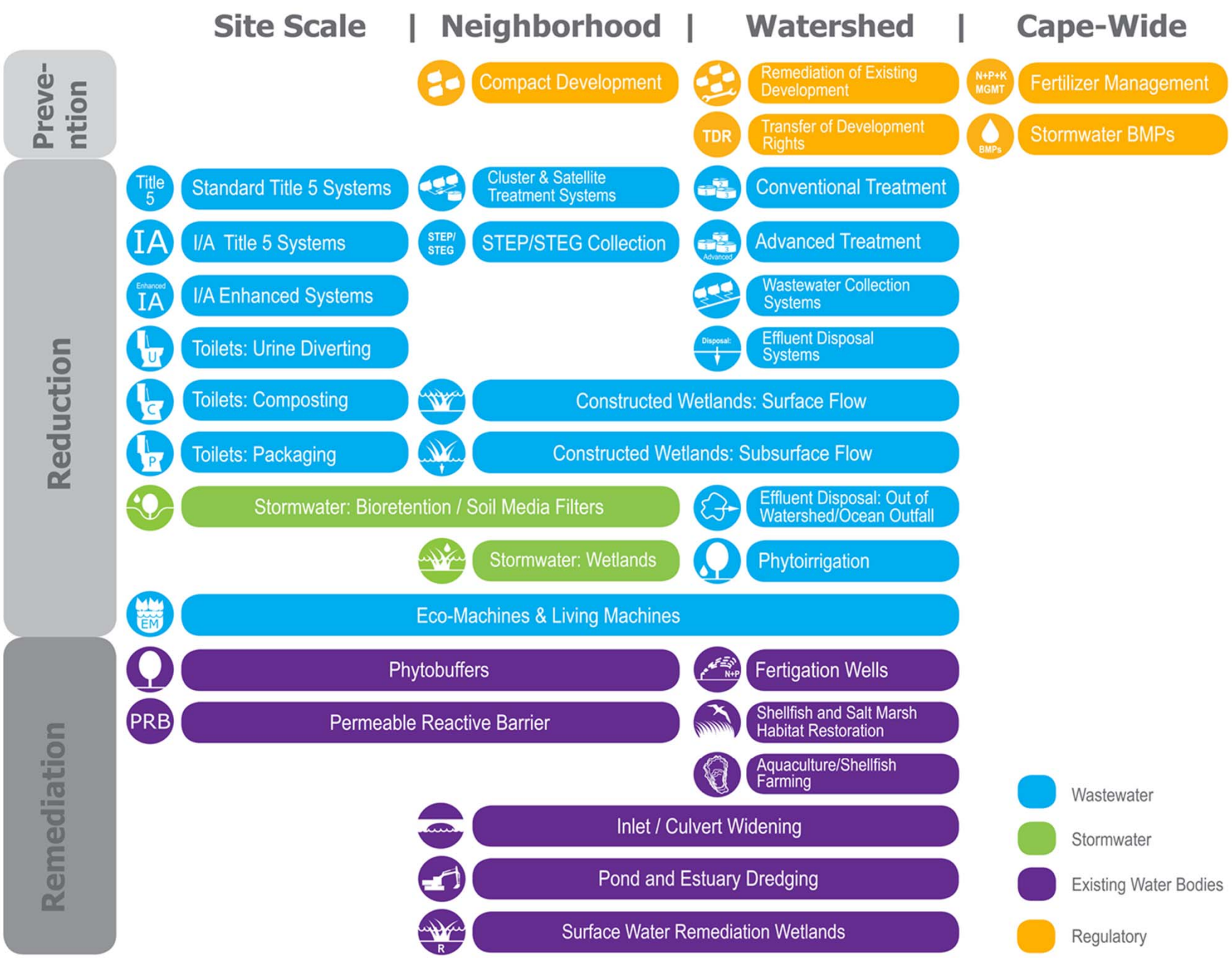


RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process

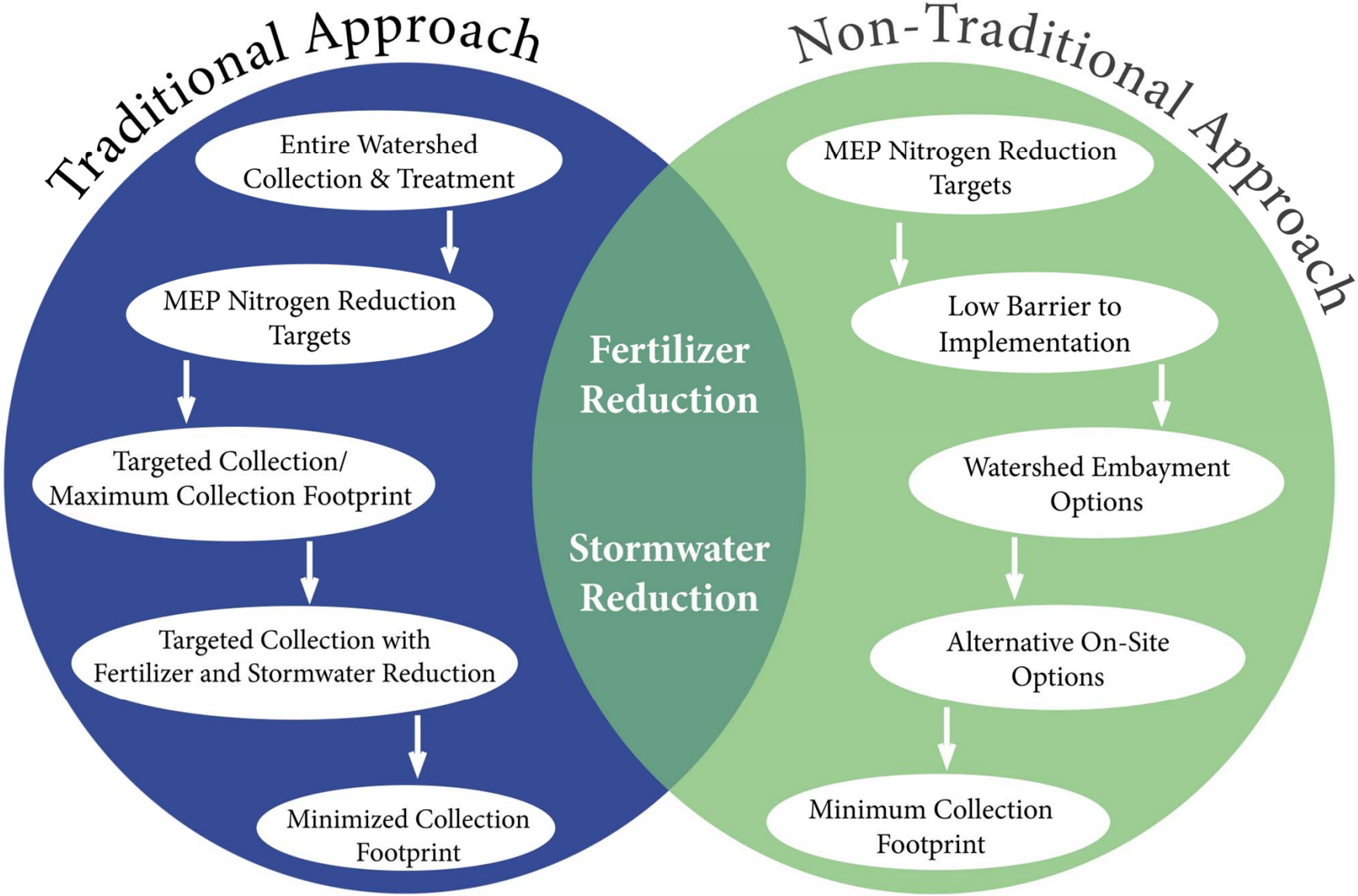
"Watershed Working Group - Wellfleet Harbor/Pemt River - Workshop 3"



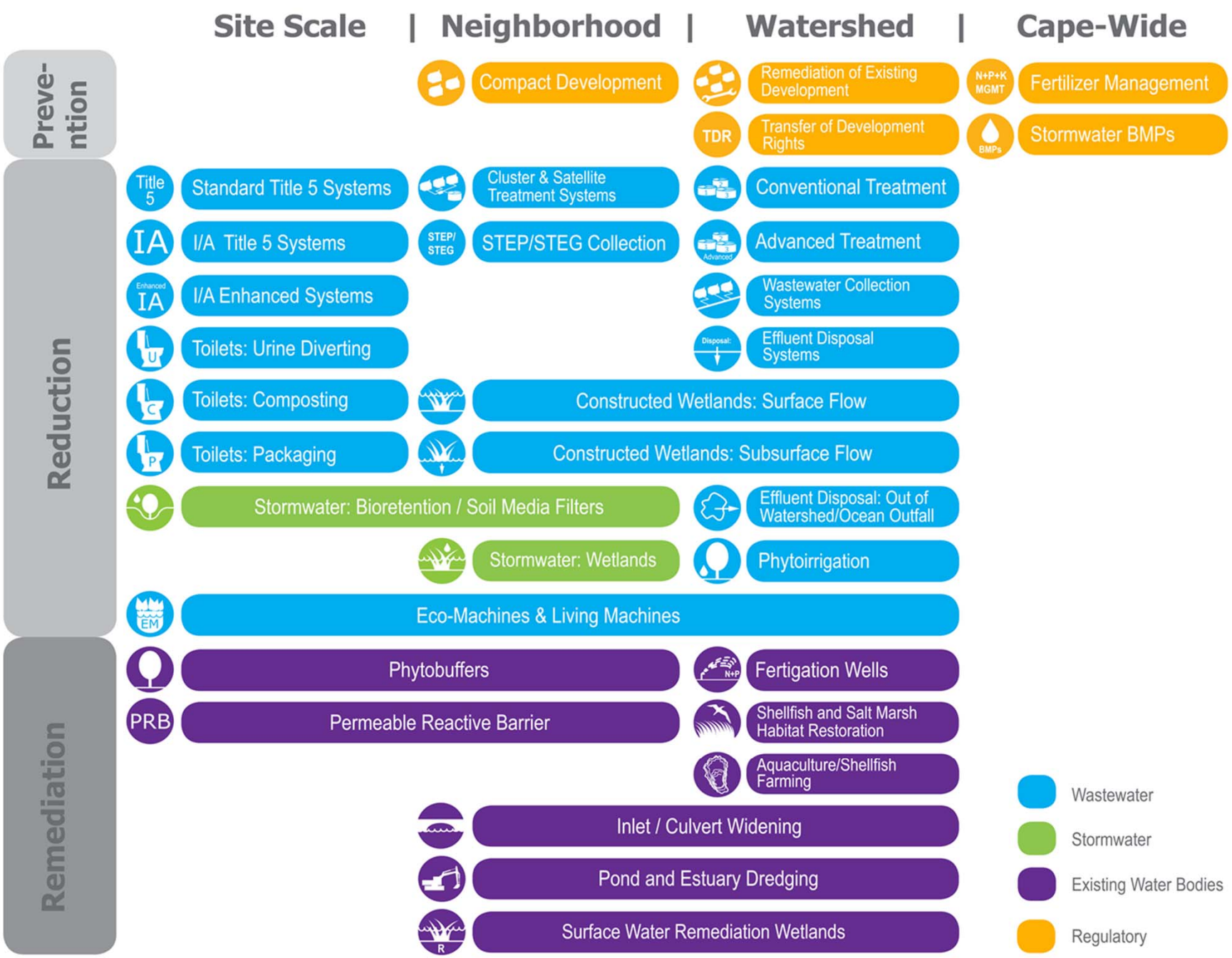
Goal of Today's Meeting:

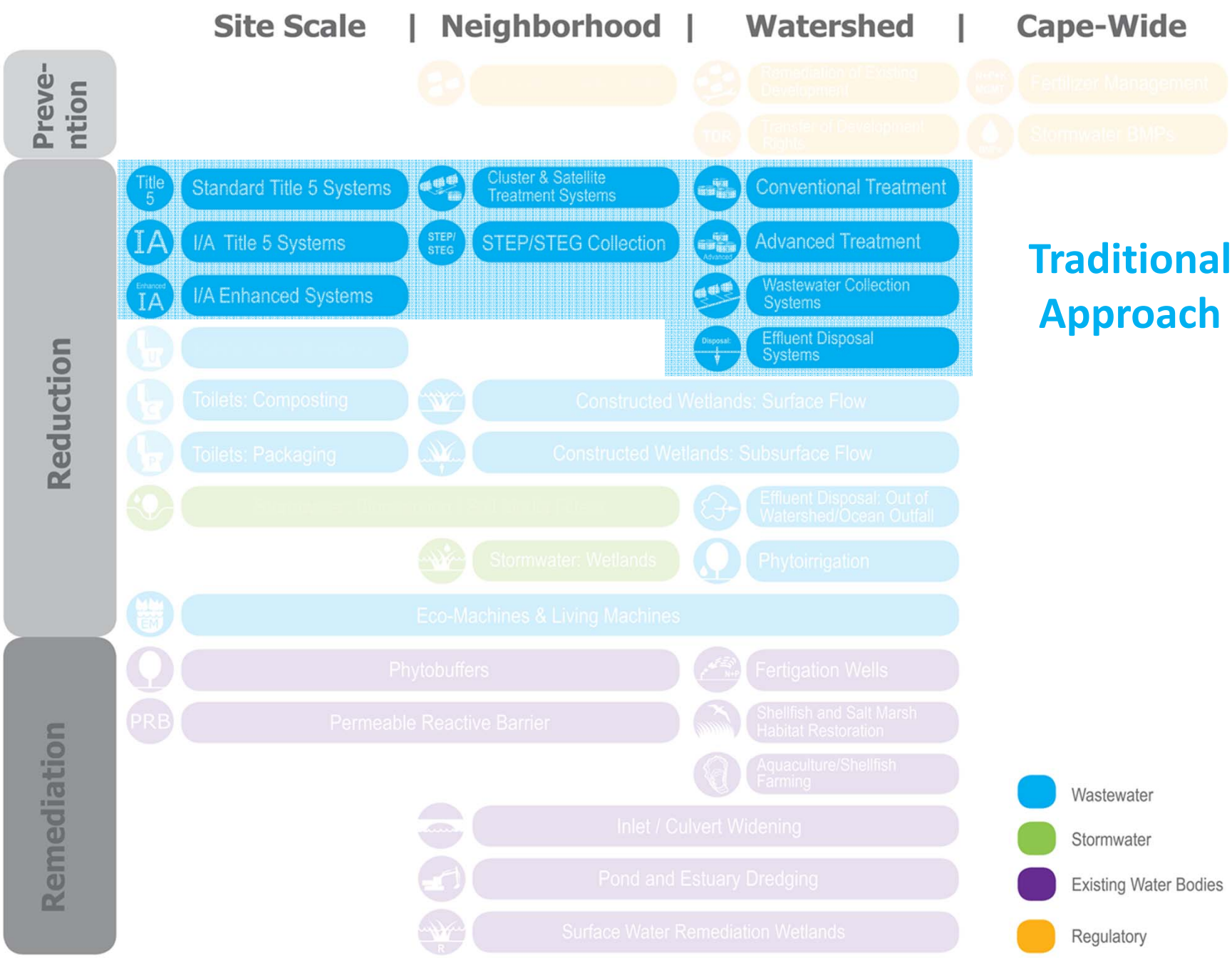
- To discuss the approach for developing watershed scenarios that will remediate water quality impairments in your watersheds.
- To identify preferences, advantages and disadvantages of a set of scenarios of different technologies and approaches, and
- To develop a set of adaptive management principles to guide sub-regional groups in refining scenarios for the 208 Plan.

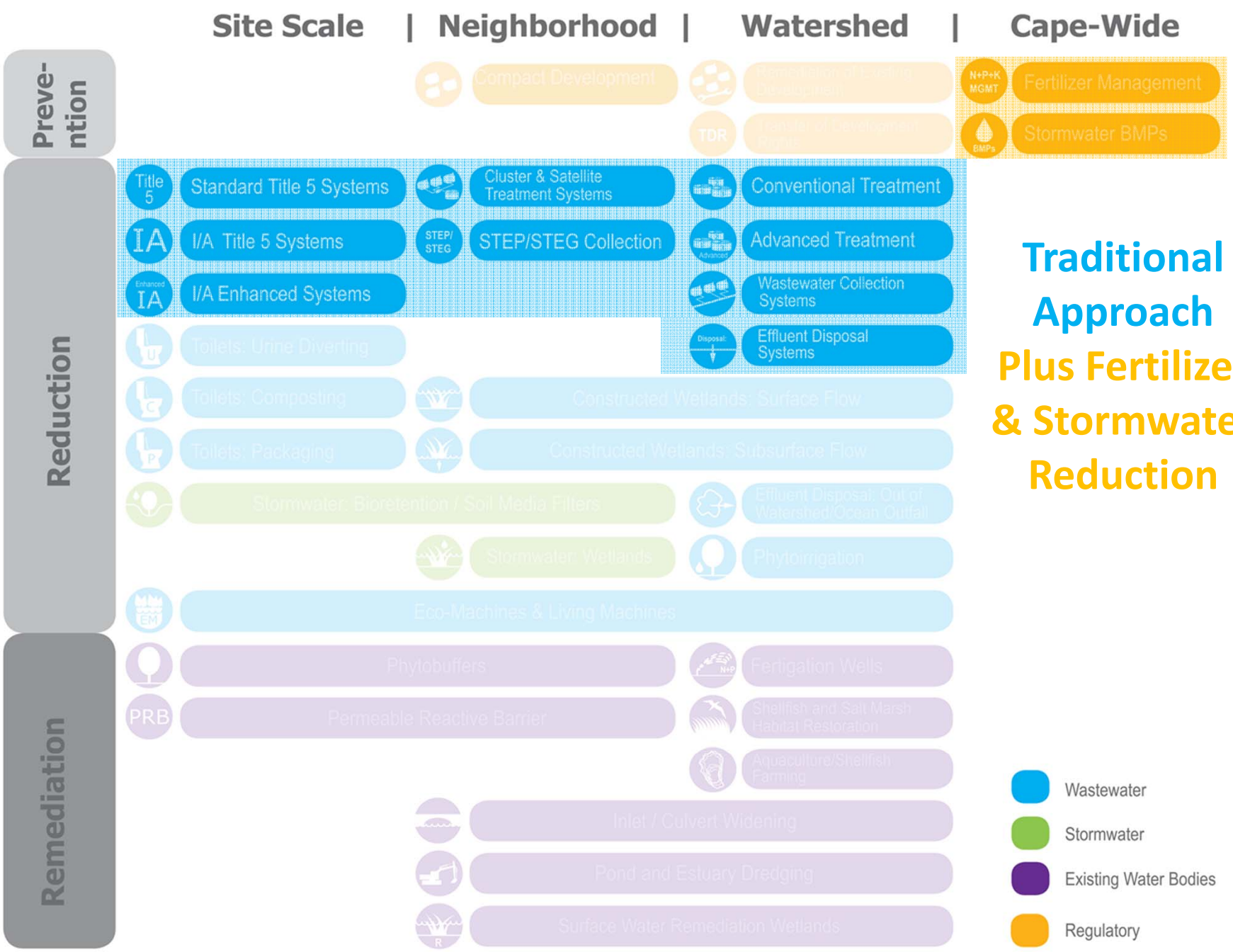
208 Planning Process


Traditional Approach
Entire Watershed Collection & Treatment
MEP Nitrogen Reduction Targets
Targeted Collection/ Maximum Collection Footprint
Targeted Collection with Fertilizer and Stormwater Reduction
Minimized Collection Footprint
Fertilizer Reduction
Stormwater Reduction
Non-Traditional Approach
MEP Nitrogen Reduction Targets
Low Barrier to Implementation
Watershed Embayment Options
Alternative On-Site Options
Minimum Collection Footprint

"Watershed Working Group - Wellfleet Harbor/Pemt River - Workshop 3"




Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Reduction
Remediation
Remediation of Existing Development
Fertilizer Management
TDR
Transfer of Development Rights
Stormwater BMPs
Title 5
Standard Title 5 Systems
Cluster & Satellite Treatment Systems
Conventional Treatment
IA
I/A Title 5 Systems
STEP/ STEG
STEP/STEG Collection
Advanced
Advanced Treatment
Enhanced IA
I/A Enhanced Systems
Wastewater Collection Systems
Disposal:
Effluent Disposal Systems
Traditional Approach
Toilets: Composting
Constructed Wetlands: Surface Flow
Toilets: Packaging
Constructed Wetlands: Subsurface Flow
Effluent Disposal: Out of Watershed/Ocean Outfall
Stormwater: Wetlands
Phytoirrigation
Eco-Machines & Living Machines
Phytobuffers
Fertigation Wells
PRB
Permeable Reactive Barrier
Shellfish and Salt Marsh Habitat Restoration
Aquaculture/Shellfish Farming
Inlet / Culvert Widening
Pond and Estuary Dredging
Surface Water Remediation Wetlands
Wastewater
Stormwater
Existing Water Bodies
Regulatory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Traditional Approach Plus Fertilizer & Stormwater Reduction
Wastewater
Stormwater
Existing Water Bodies
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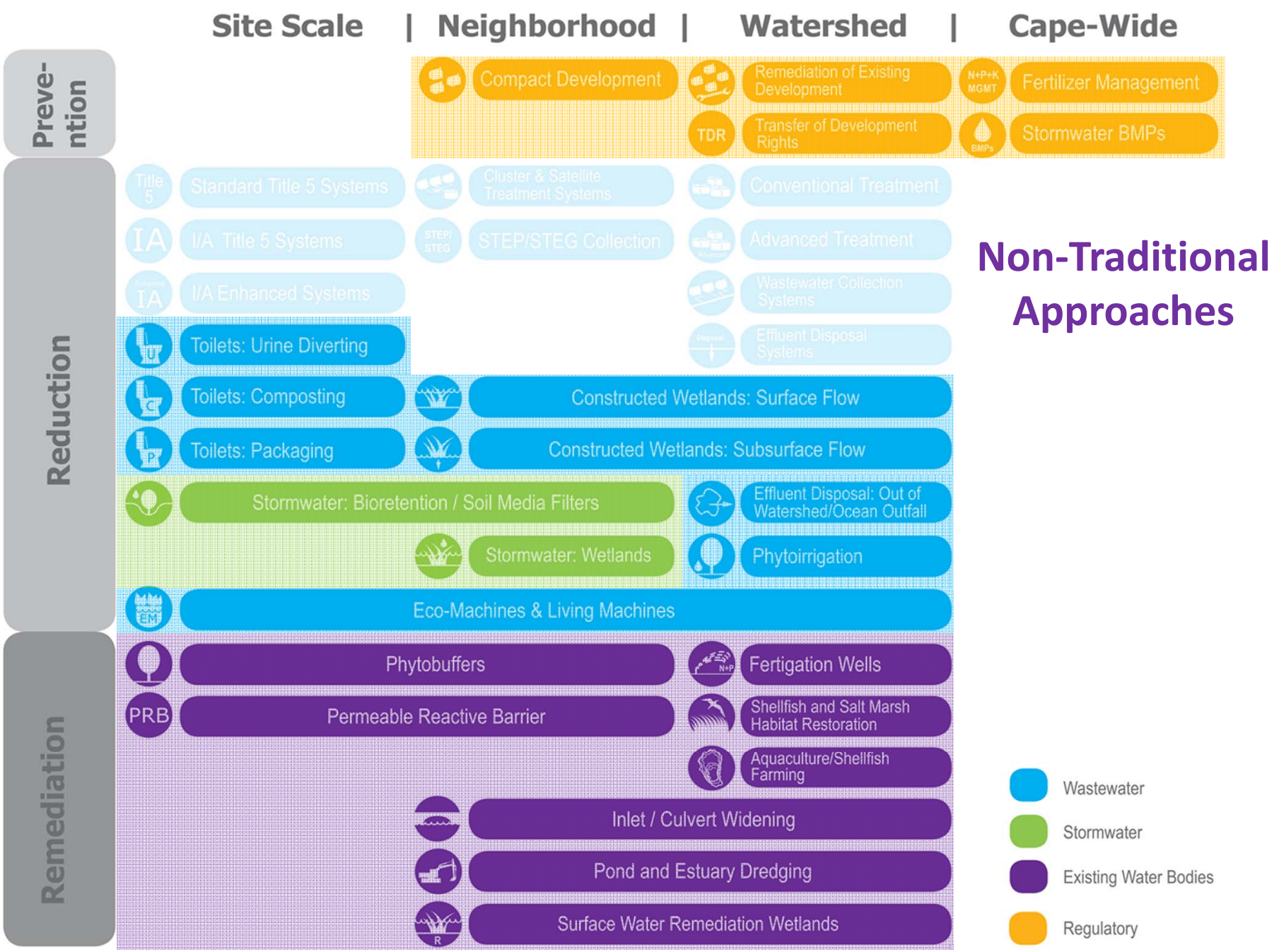
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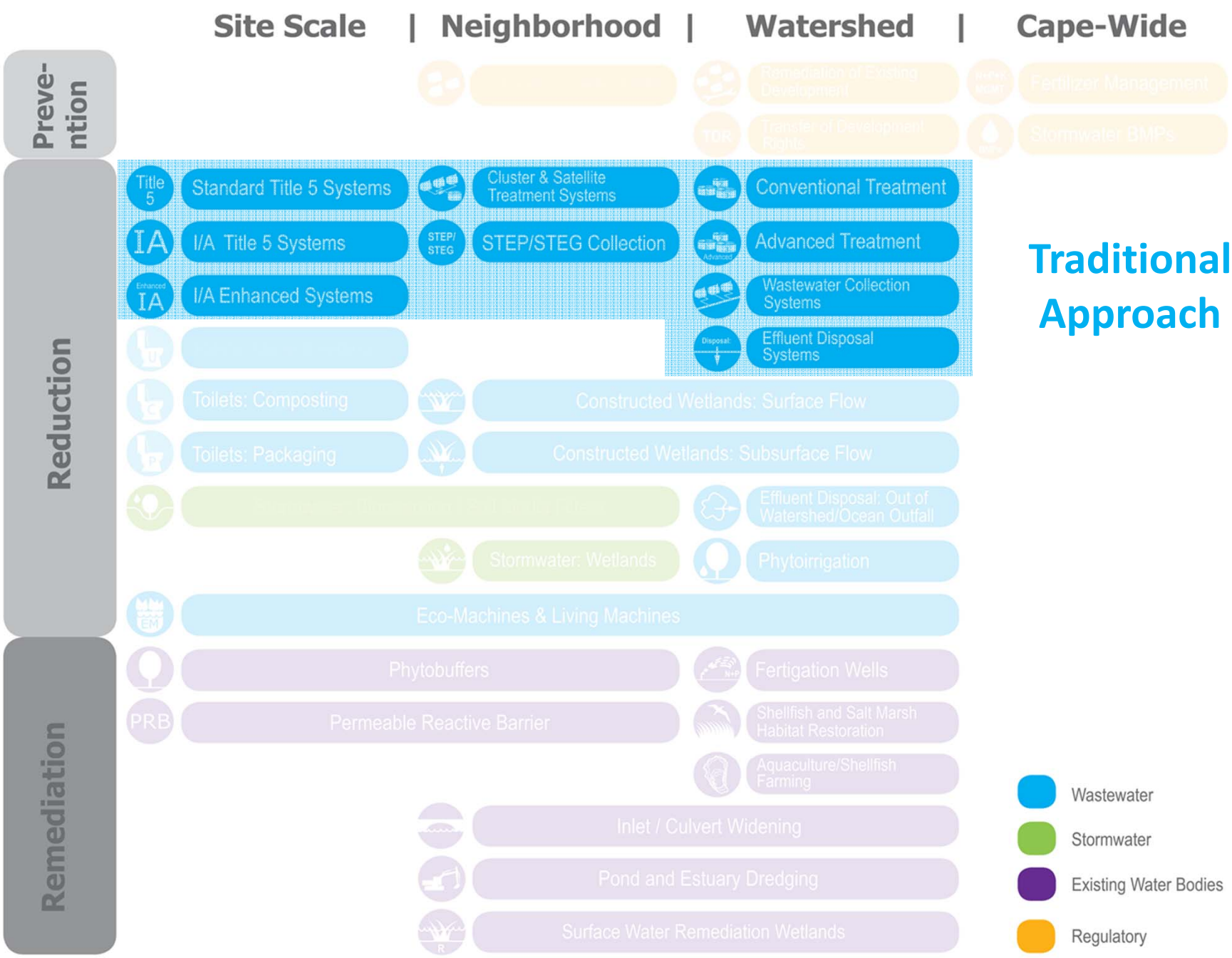
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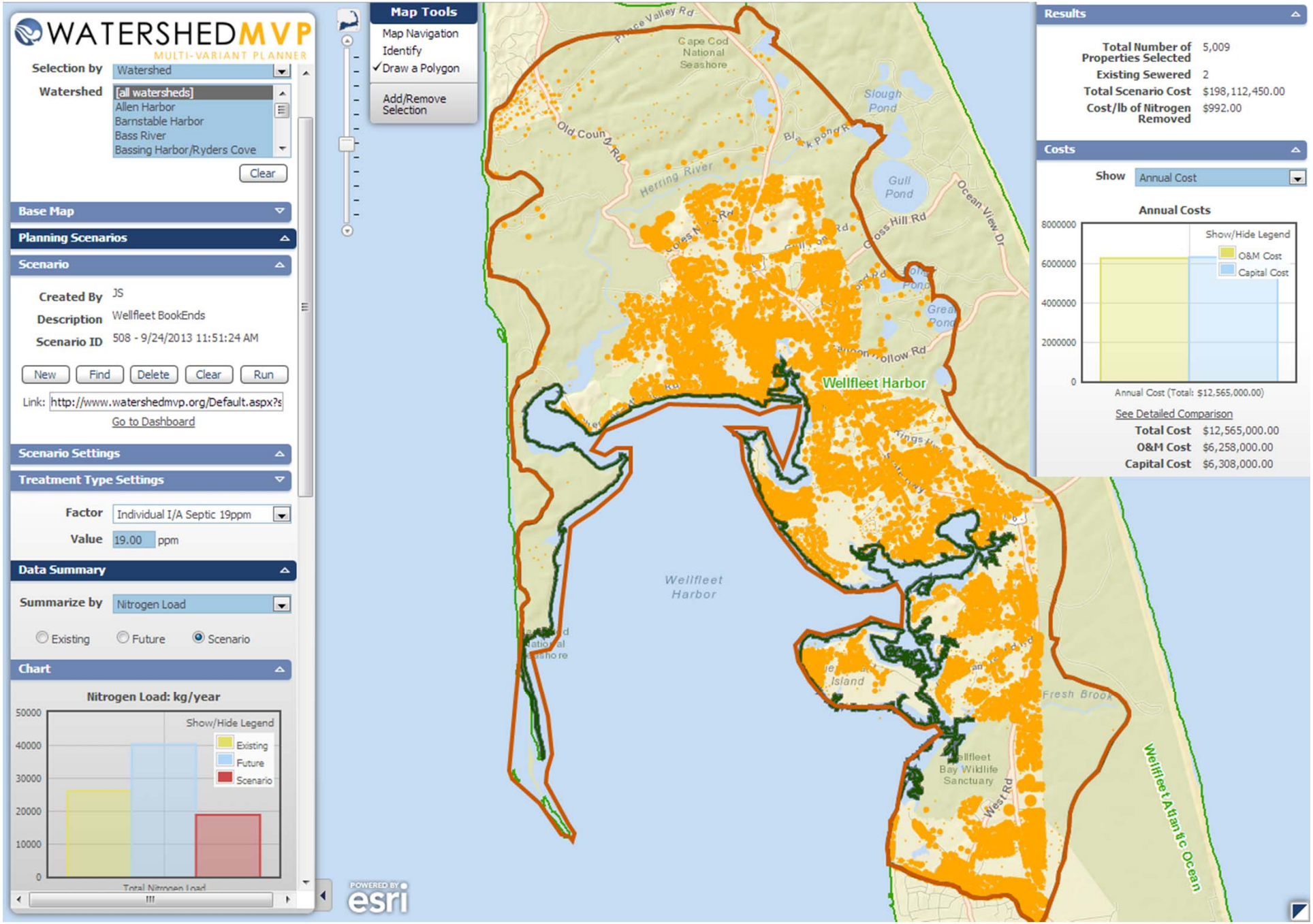
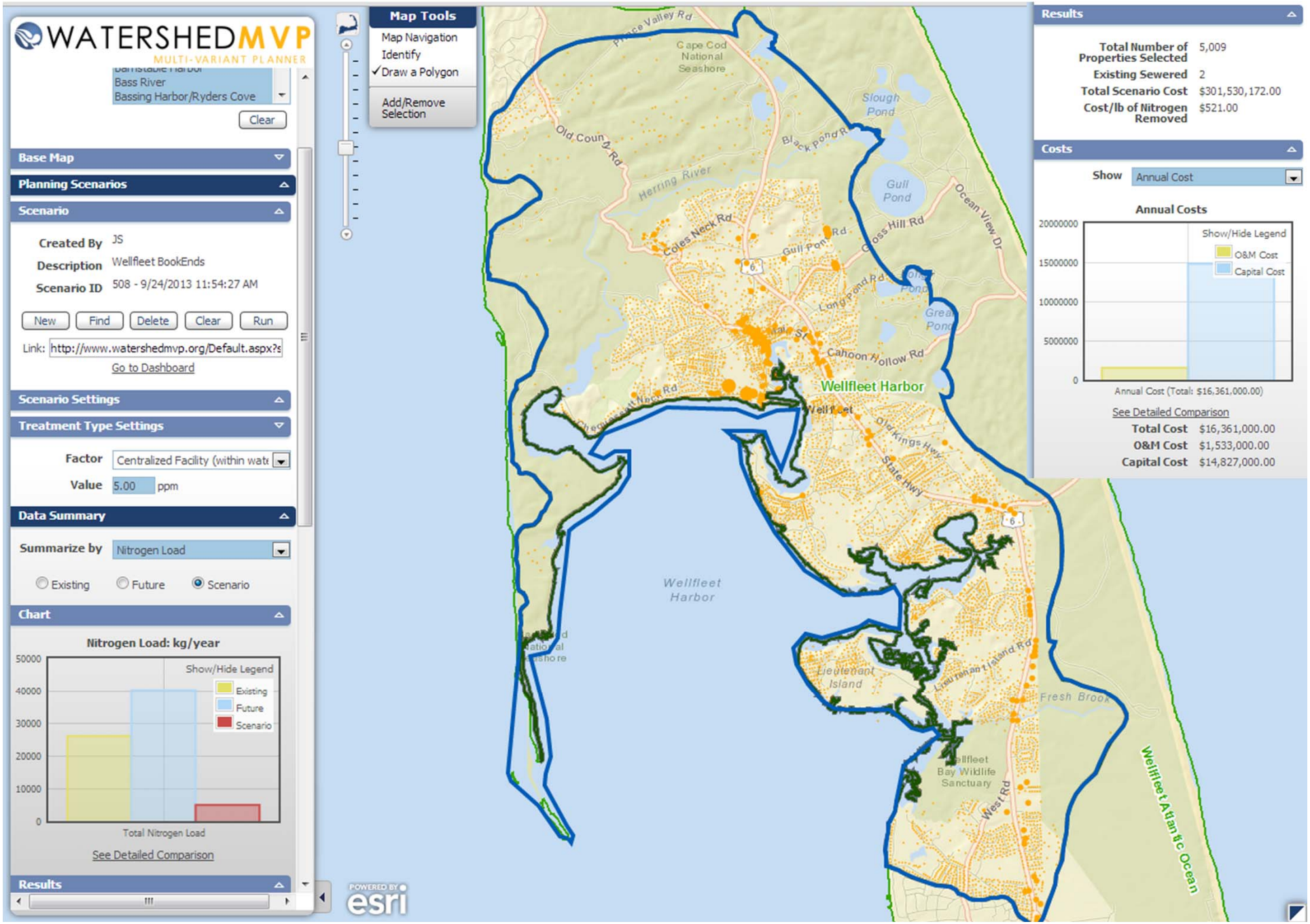
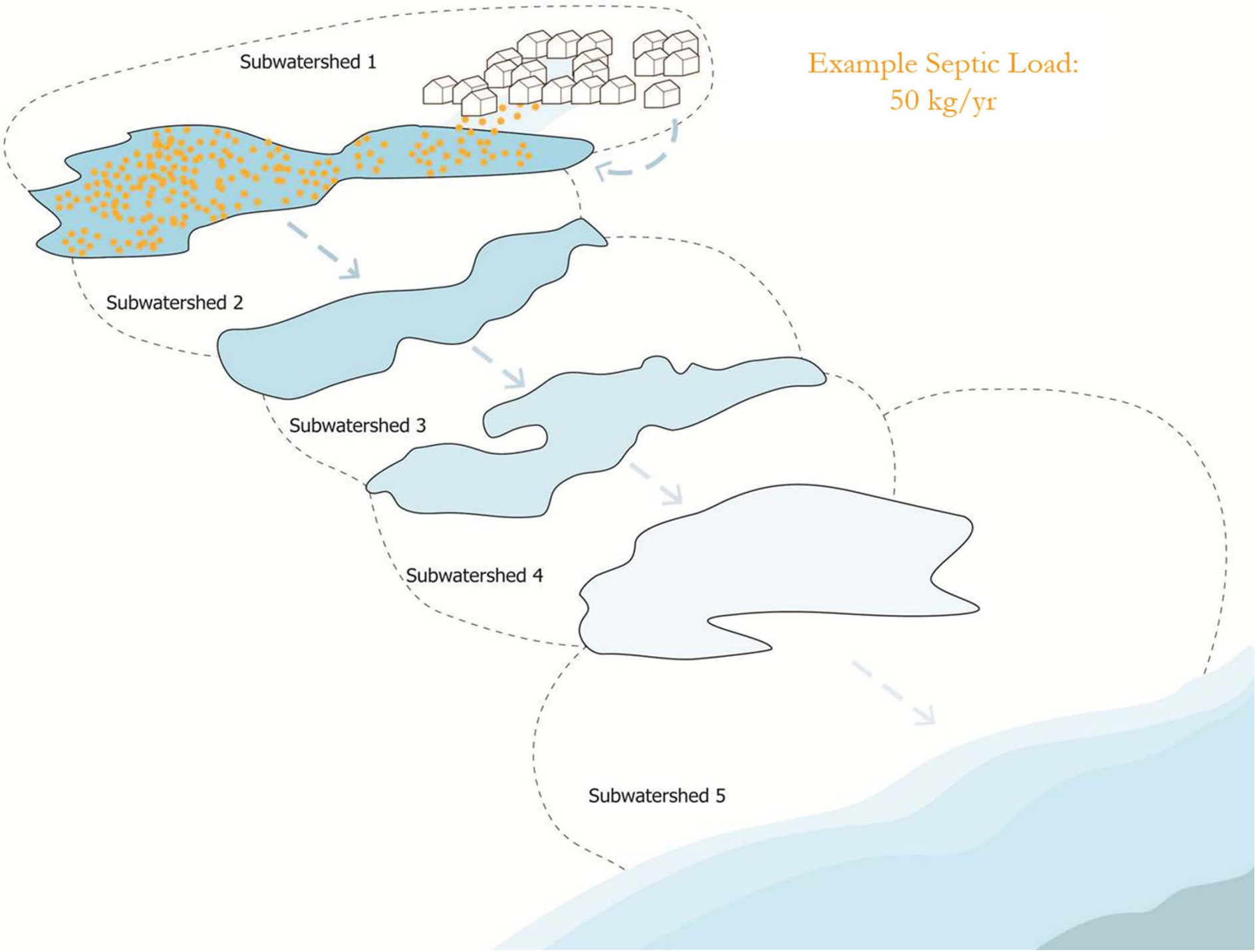
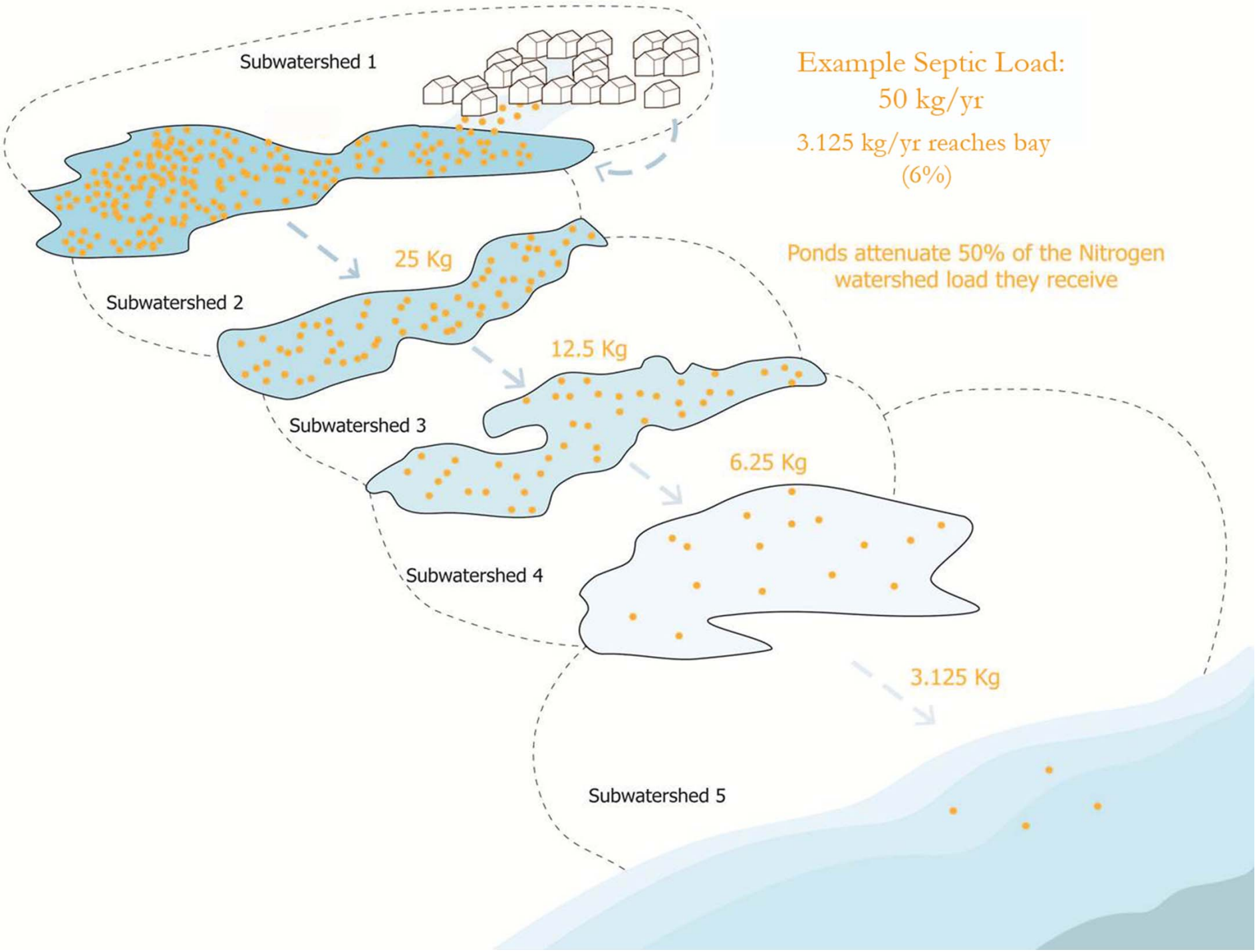
Watershed-Wide Innovative/Alternative (I/A) Onsite Systems

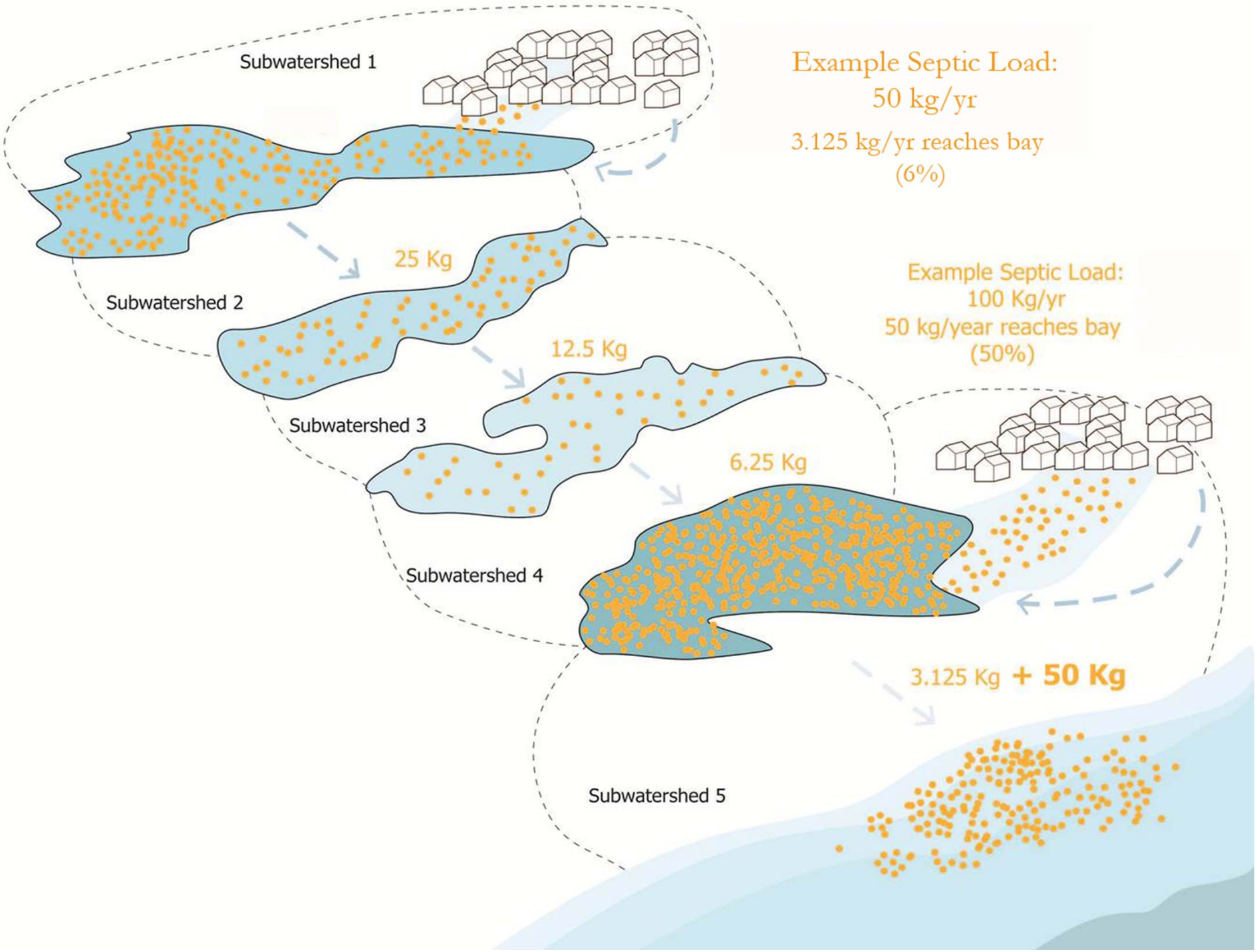


Watershed-Wide Centralized Treatment with Disposal Inside the Watershed




Subwatershed 1
Example Septic Load:
50 kg/yr
Subwatershed 2
Subwatershed 3
Subwatershed 4
Subwatershed 5


Subwatershed 1
Example Septic Load:
50 kg/yr
3.125 kg/yr reaches bay
(6%)
25 Kg
Subwatershed 2
Ponds attenuate 50% of the Nitrogen
watershed load they receive
12.5 Kg
Subwatershed 3
6.25 Kg
Subwatershed 4
3.125 Kg
Subwatershed 5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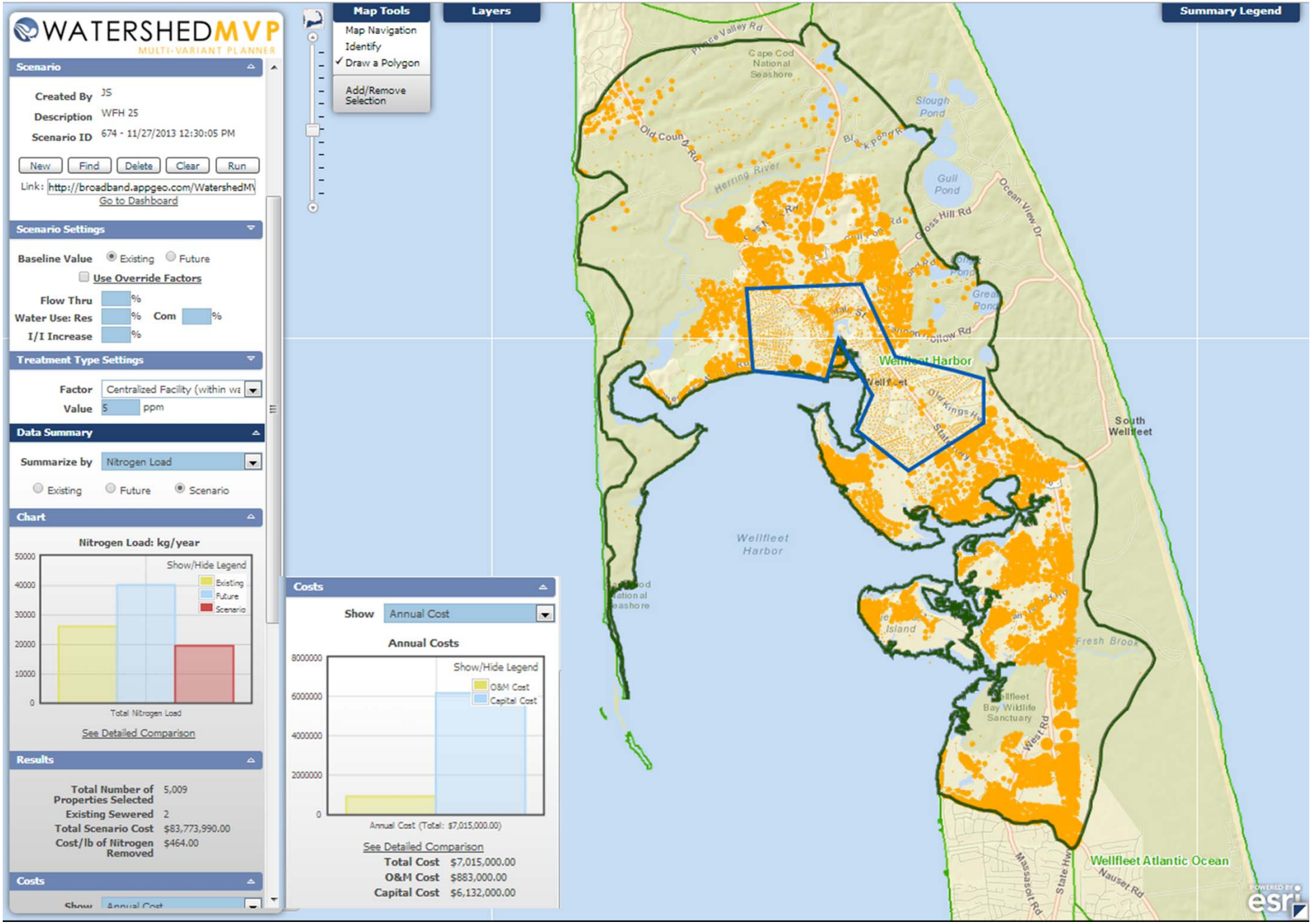
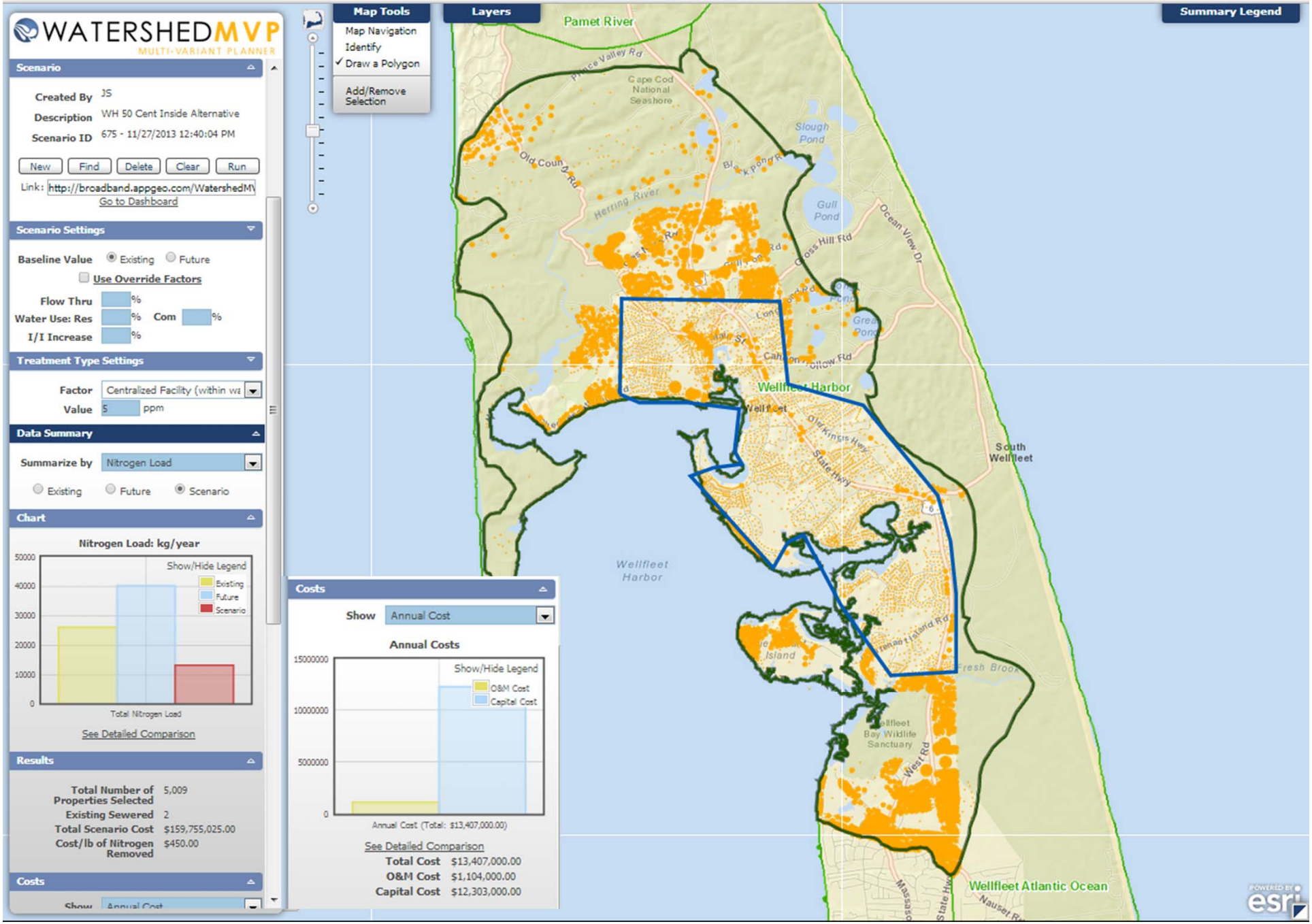
Example Septic Load:
50 kg/yr
3.125 kg/yr reaches bay
(6%)
25 Kg
Subwatershed 2
Example Septic Load:
100 Kg/yr
50 kg/year reaches bay
(50%)
12.5 Kg
Subwatershed 3
6.25 Kg
Subwatershed 4
3.125 Kg + 50 Kg
Subwatershed 5

Targeted Centralized Treatment to achieve a 25% Reduction in Nitrogen

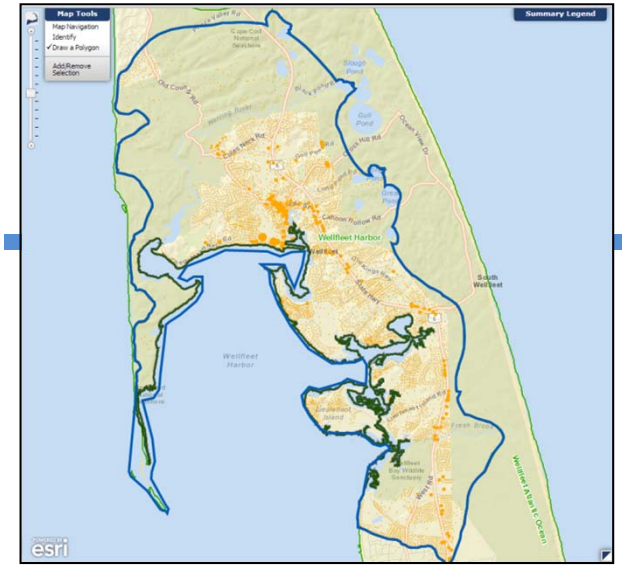


Targeted Centralized Treatment to achieve a 50% Reduction in Nitrogen



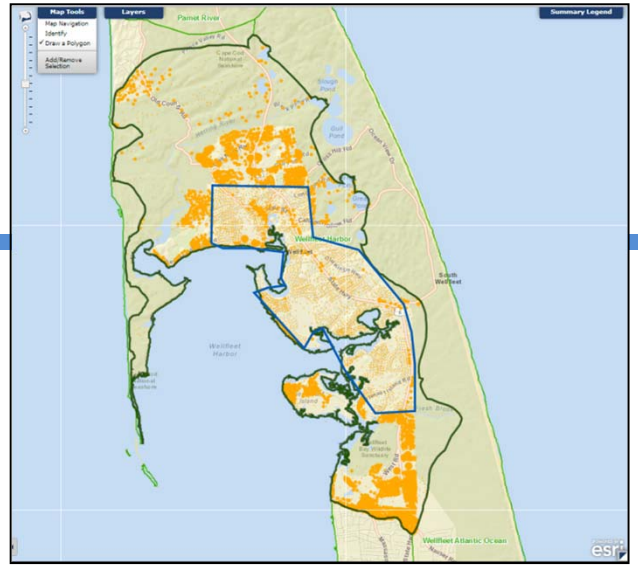
Scenario Comparison

Watershed-wide collection and treatment



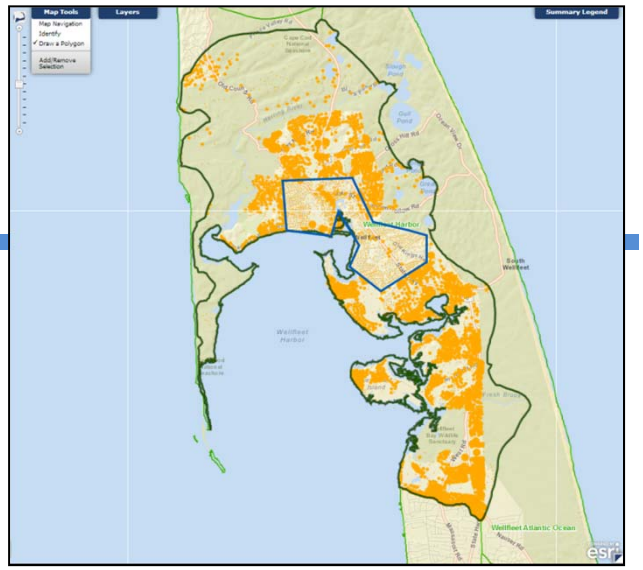
- Total Cost = $302 Million
- Cost/lb N = $521
- Treated Flow = 714,000 gpd

Targeted collection and treatment to achieve a 50% reduction in nitrogen



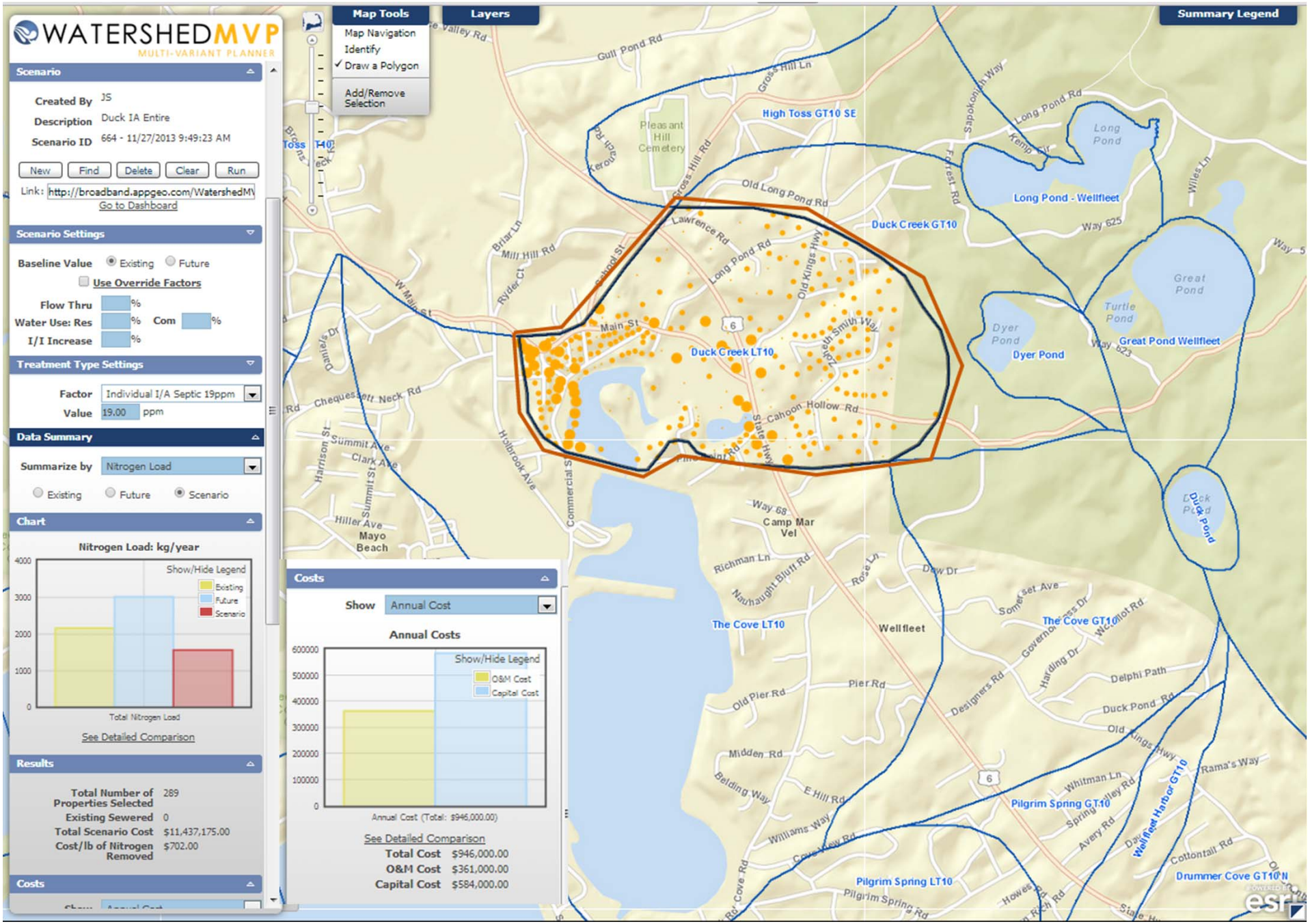
- Total Cost = $160 Million
- Cost/lb N = $450
- Treated Flow = 440,000 gpd

Targeted collection and treatment to achieve a 25% reduction in nitrogen

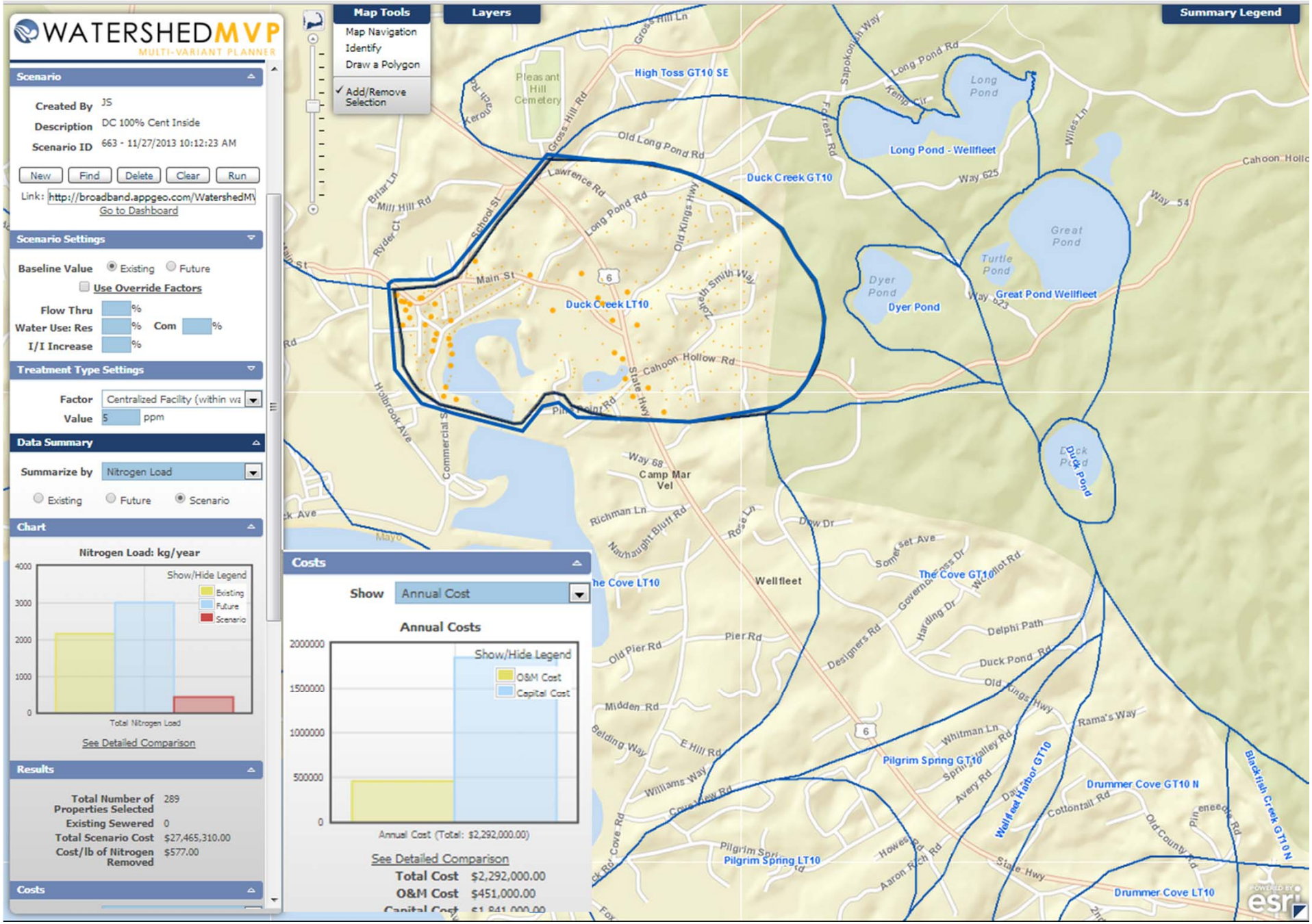


- Total Cost = $84 Million
- Cost/lb N = $464
- Treated Flow = 224,000 gpd

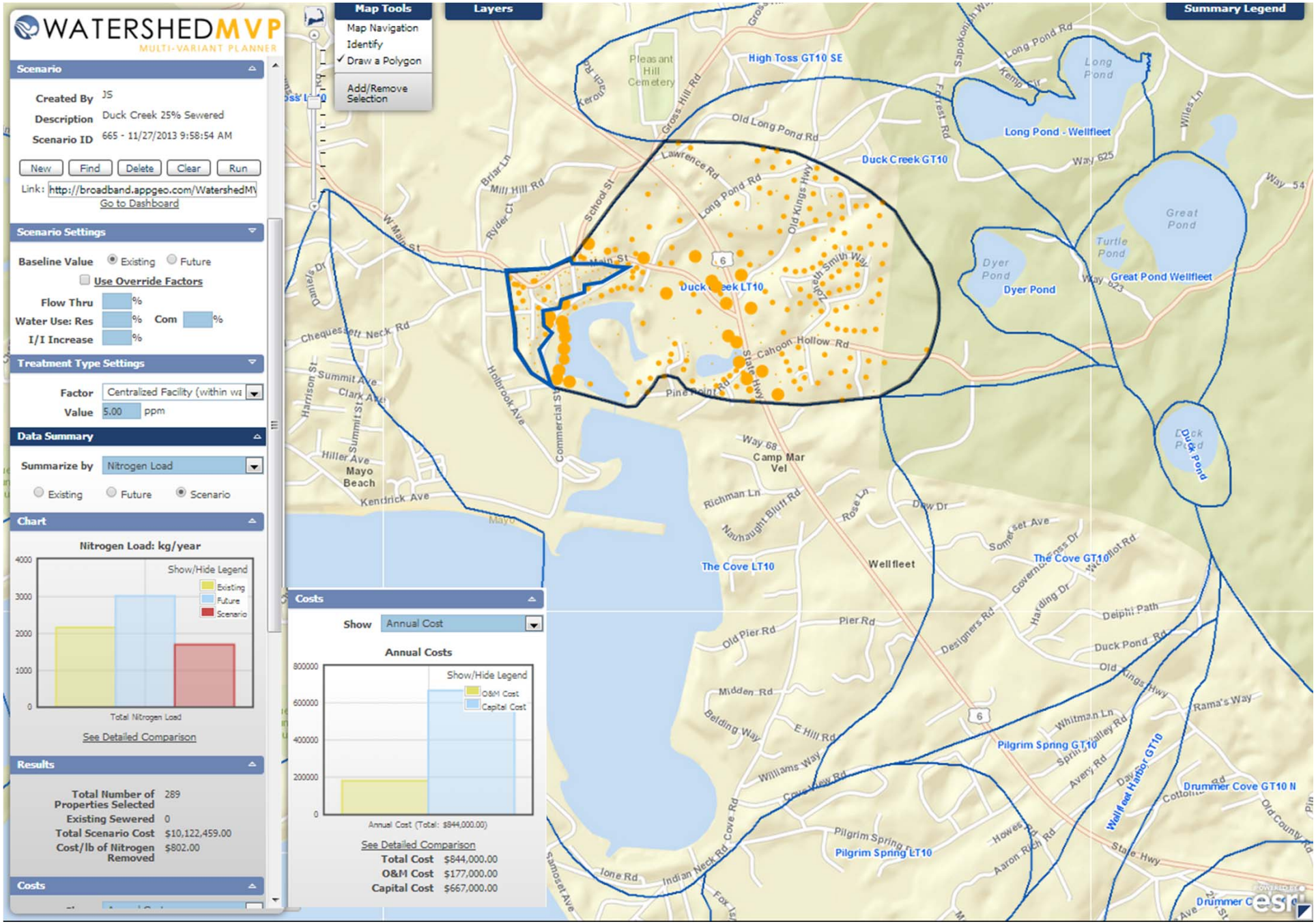
Duck Creek – Applying Innovative/Alternative On-Site Systems to the Entire Subwatershed



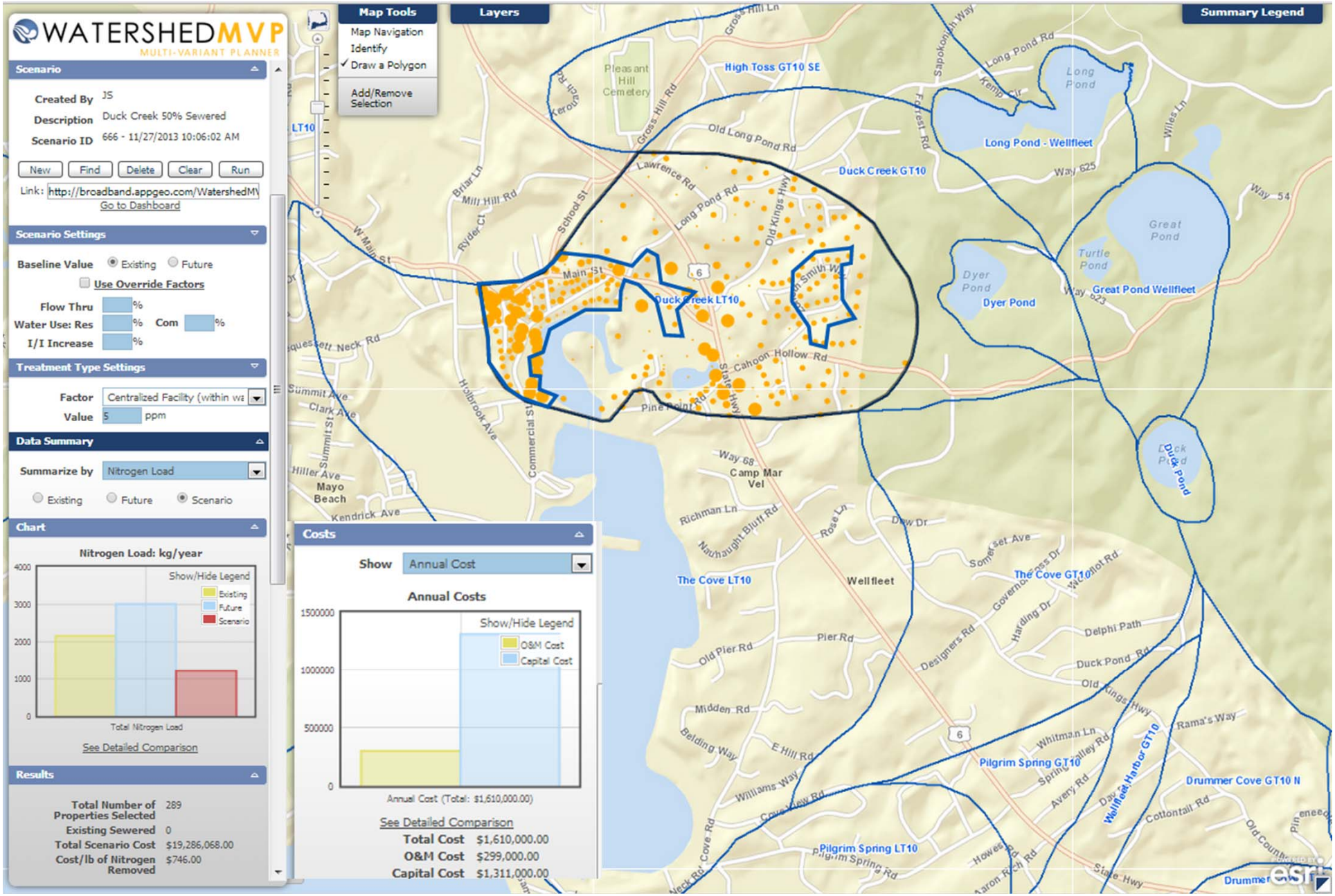
Duck Creek – Applying Centralized Treatment to the Entire Subwatershed



Duck Creek – Targeted Centralized Treatment to achieve a 25% Reduction in Nitrogen

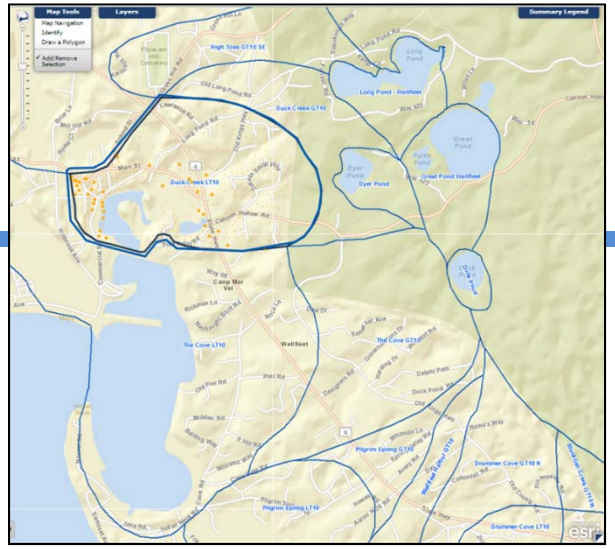


Duck Creek – Targeted Centralized Treatment to achieve a 50% Reduction in Nitrogen



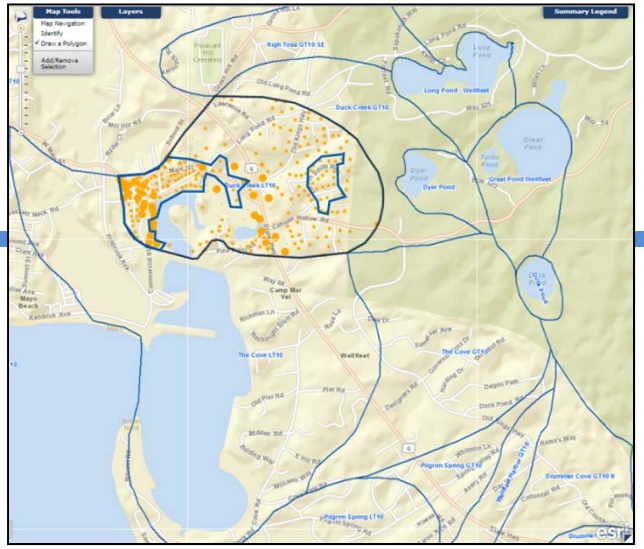
Scenario Comparison

Subwatershed-wide collection and treatment



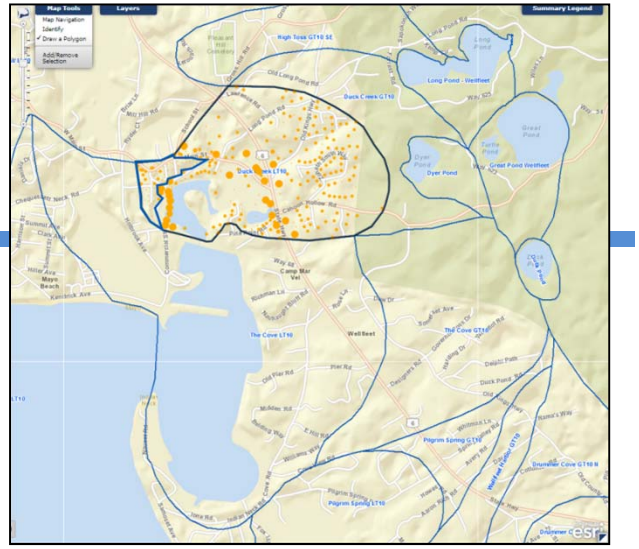
- Total Cost = $27 Million
- Cost/lb N = $577
- Treated Flow = 59,000 gpd

Targeted collection and treatment to achieve a 50% reduction in nitrogen

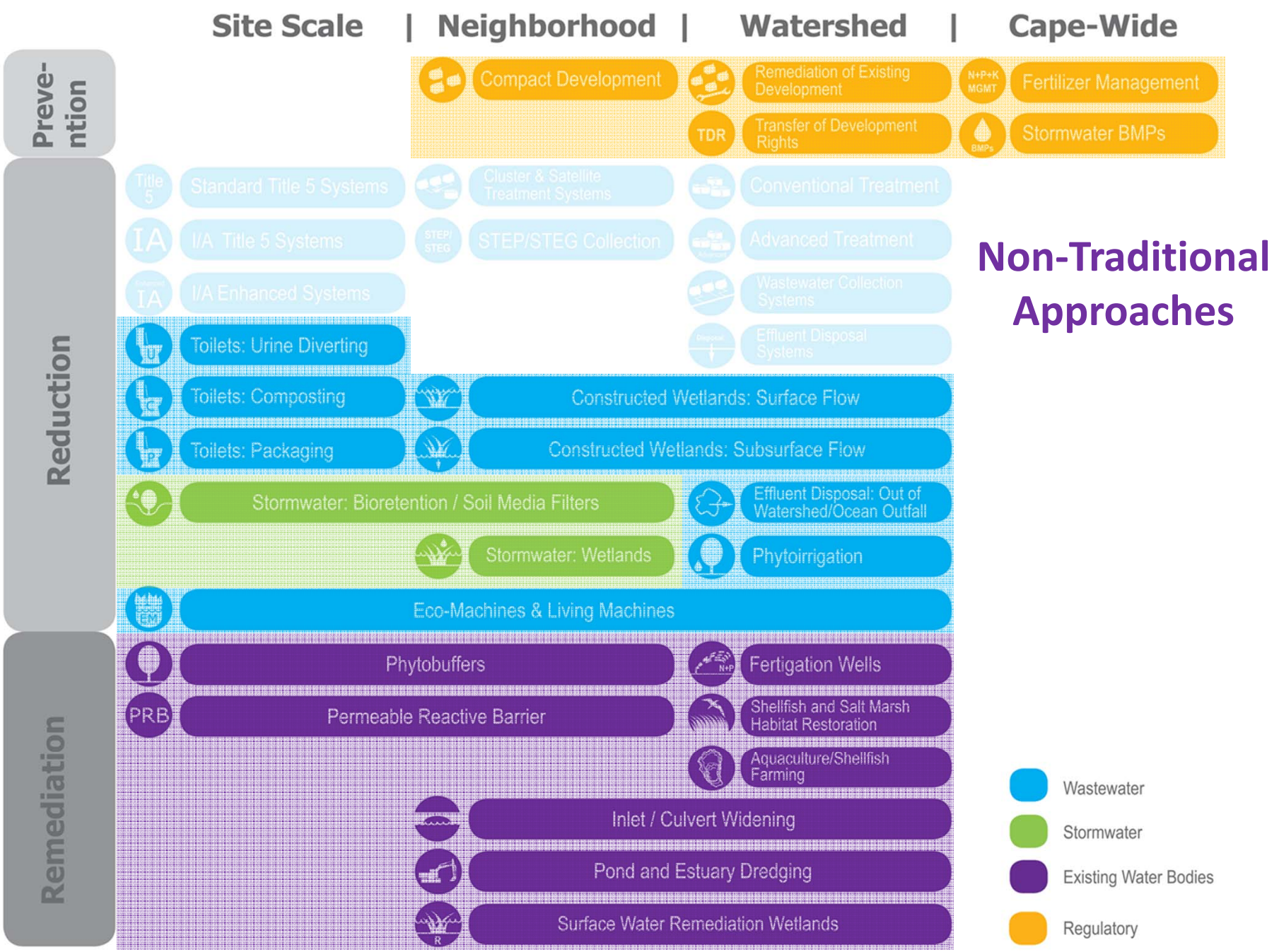


- Total Cost = $19 Million
- Cost/lb N = $746
- Treated Flow = 32,000 gpd

Targeted collection and treatment to achieve a 25% reduction in nitrogen



- Total Cost = $10 Million
- Cost/lb N = $802
- Treated Flow = 16,000 gpd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Pond and Estuary Dredging
Surface Water Remediation Wetlands
Non-Traditional Approaches
Wastewater
Stormwater
Existing Water Bodies
Regulatory


Problem Solving Approach
1
2
3
4
5
6
7
Wastewater
Existing Water Bodies
Regulatory
Targets/Reduction Goals
Present Load: X kg/day
Target: Y kg/day
Reduction Required: N kg/day
Other Wastewater Management Needs
A. Title 5 Problem Areas
B. Pond Recharge Areas
C. Growth Management
Low Barrier to Implementation
A. Fertilizer Management
B. Stormwater Mitigation
N+P+K MGMT
BMPs
Watershed/Embayment Options
A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Aquaculture
PRB
R
Alternative On-Site Options
A. Eco-toilets (UD & Compost)
B. I/A Technologies
C. Enhanced I/A Technologies
D. Shared Systems
Title 5
Enhanced IA
IA
Priority Collection/High-Density Areas
A. Greater Than 1 Dwelling Unit/acre
B. Village Centers
C. Economic Centers
D. Growth Incentive Zones
Advanced
Disposal:
STEP/ STEG
Supplemental Sewering
Advanced

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
wastewater		0	0
fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
wastewater		0	0
fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs	Ponds	Title 5 Problem Areas	Growth Management

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
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fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs	Ponds	Title 5 Problem Areas	Growth Management

Low Barrier to Implementation:	**Reduction by Technology (Kg/yr)**	**Cumulative Total Reduction (Kg/yr)**	**Unit Cost ($/lb N)**	**Total Annual Cost**
A) Fertilizer Management	2,550	2,550		
B) Stormwater Mitigation	2,550	5,100		

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
wastewater		0	0
fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs Ponds Title 5 Problem Areas Growth Management

Low Barrier to Implementation:	**Reduction by Technology (Kg/yr)**	**Cumulative Total Reduction (Kg/yr)**	**Unit Cost ($/lb N)**	**Total Annual Cost**
A) Fertilizer Management	2,550	2,550		
B) Stormwater Mitigation	2,550	5,100		
Watershed/Embayment Options:				
Permeable Reactive Barrier (PRB) 170 Homes	523.6	5,624	$452	$520,668
Permeable Reactive Barrier (PRB) 120 Homes	369.6	5,993	$452	$367,530

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
wastewater		0	0
fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs Ponds Title 5 Problem Areas Growth Management

Low Barrier to Implementation:			**Reduction by Technology (Kg/yr)**	**Cumulative Total Reduction (Kg/yr)**	**Unit Cost ($/lb N)**	**Total Annual Cost**
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B) Stormwater Mitigation			2,550	5,100		
Watershed/Embayment Options:						
Permeable Reactive Barrier (PRB)	170	Homes	523.6	5,624	$452	$520,668
Permeable Reactive Barrier (PRB)	120	Homes	369.6	5,993	$452	$367,530
Fertigation Wells	1	Golf course	136	6,129	$438	$131,050

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
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fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs Ponds Title 5 Problem Areas Growth Management

Low Barrier to Implementation:			**Reduction by Technology (Kg/yr)**	**Cumulative Total Reduction (Kg/yr)**	**Unit Cost ($/lb N)**	**Total Annual Cost**
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Permeable Reactive Barrier (PRB)	120	Homes	369.6	5,993	$452	$367,530
Fertigation Wells	1	Golf course	136	6,129	$438	$131,050
Oyster Beds/Aquaculture	20	Acres	5,000	11,129	$0	$0

Watershed Calculator WELLFLEET HARBOR

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		0	0
wastewater		0	0
fertilizer			5,100
stormwater			5,100
Target Nitrogen Load:		0	
Nitrogen Removal Required:		**0**	
Total Number of Properties:	3000		

Other Wastewater Management Needs Ponds Title 5 Problem Areas Growth Management

Low Barrier to Implementation:			**Reduction by Technology (Kg/yr)**	**Cumulative Total Reduction (Kg/yr)**	**Unit Cost ($/lb N)**	**Total Annual Cost**
A) Fertilizer Management			2,550	2,550		
B) Stormwater Mitigation			2,550	5,100		
Watershed/Embayment Options:						
Permeable Reactive Barrier (PRB)	170	Homes	523.6	5,624	$452	$520,668
Permeable Reactive Barrier (PRB)	120	Homes	369.6	5,993	$452	$367,530
Fertigation Wells	1	Golf course	136	6,129	$438	$131,050
Oyster Beds/Aquaculture	20	Acres	5,000	11,129	$0	$0
Coastal Habitat Restoration	1100	Acres	65,837	76,966	$444	$3,215,479

Watershed Calculator WELLFLEET HARBOR

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Alternative On-Site Options:						
Ecotoilets (UD & Compost)	150	Homes	594.0	76,372	$1,265	$1,653,102
Ecotoilets - Bakers Field	10	Homes	39.6	77,560	$1,265	$110,207

Watershed Calculator WELLFLEET HARBOR

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			Cumulative Total Reduction (Kg/yr):	77,560	$535	$5,998,036

"Watershed Working Group - Wellfleet Harbor/Pemt River - Workshop 3"

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Adaptive Management:

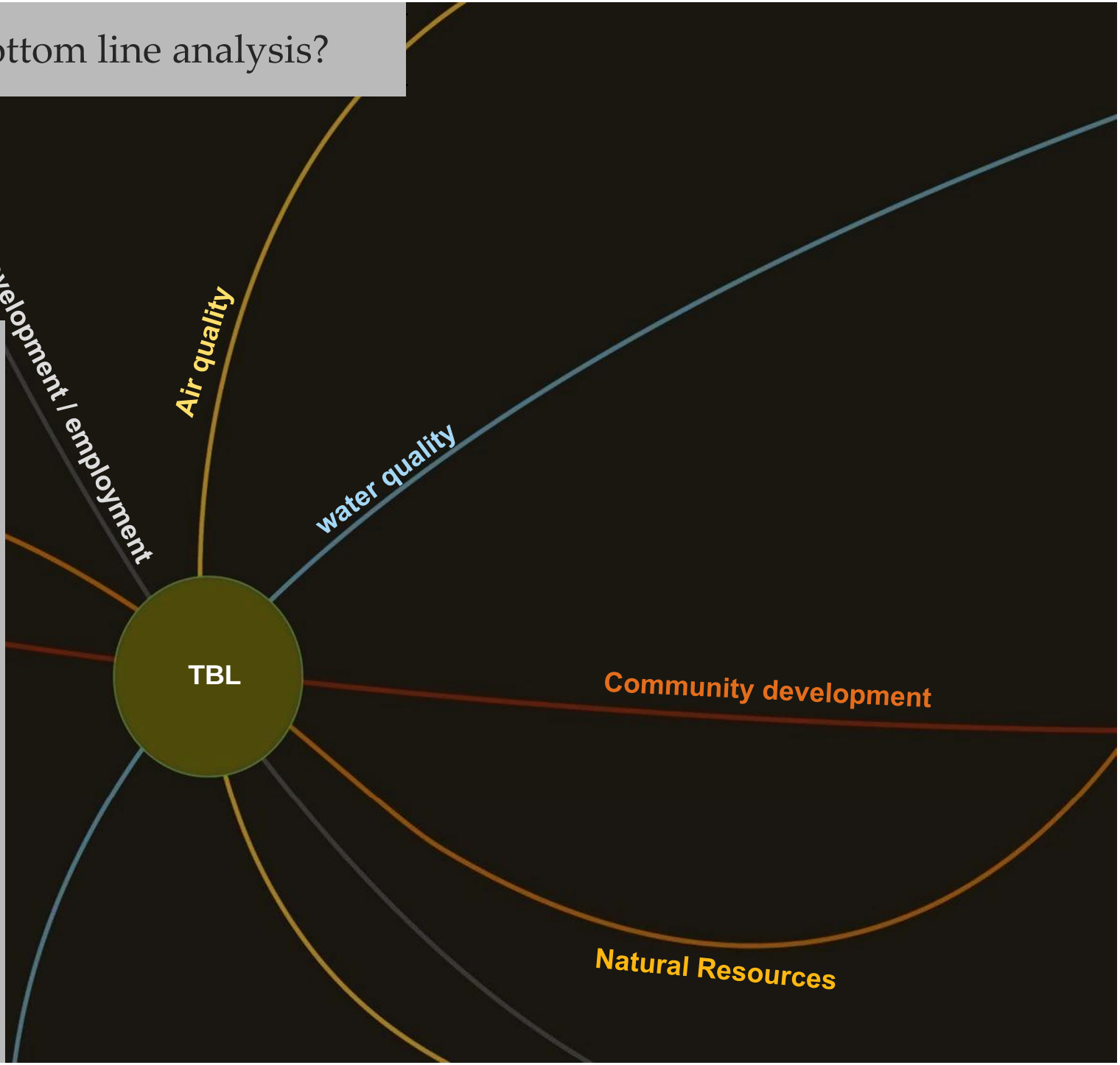
A structured approach for addressing uncertainties by linking science and monitoring to decision-making and adjusting implementation, as necessary, to increase the probability of meeting water quality goals in a cost effective and efficient ways.

Triple Bottom Line (TBL) Introduction

What is triple bottom line analysis?

Triple Bottom Line Analysis
Provides a full accounting of the financial, social, and environmental consequences of investments or policies

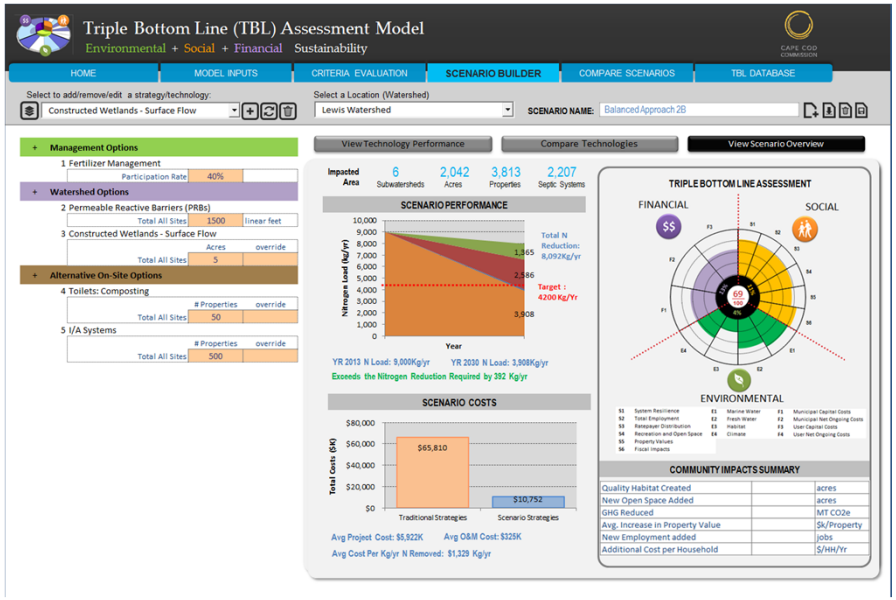
Often "TBL" analysis is used to identify the best alternative and to report to stakeholders on the public outcomes of a given investment.

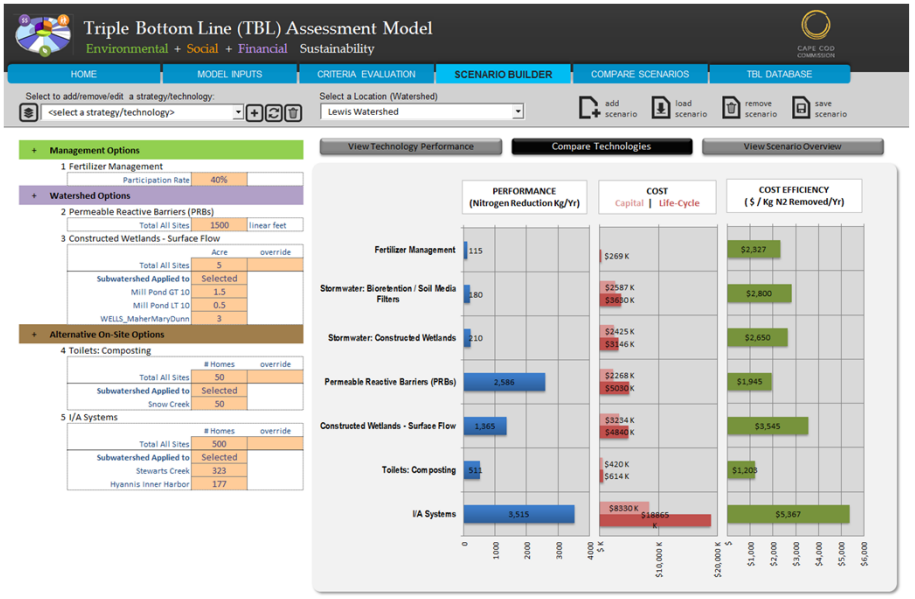


Why develop a TBL model?

- Develop triple bottom line model to consider the financial, environmental, and social consequences of water quality investments and policies in Cape Cod.

- TBL Model evaluates the “ancillary” or downstream consequences of water quality investments not the direct Phosphorous or Nitrogen levels.





Triple Bottom Line (TBL) Assessment Model

Environmental + Social + Financial Sustainability

CAPE COD COMMISSION

HOME | MODEL INPUTS | CRITERIA EVALUATION | SCENARIO BUILDER | COMPARE SCENARIOS | TBL DATABASE

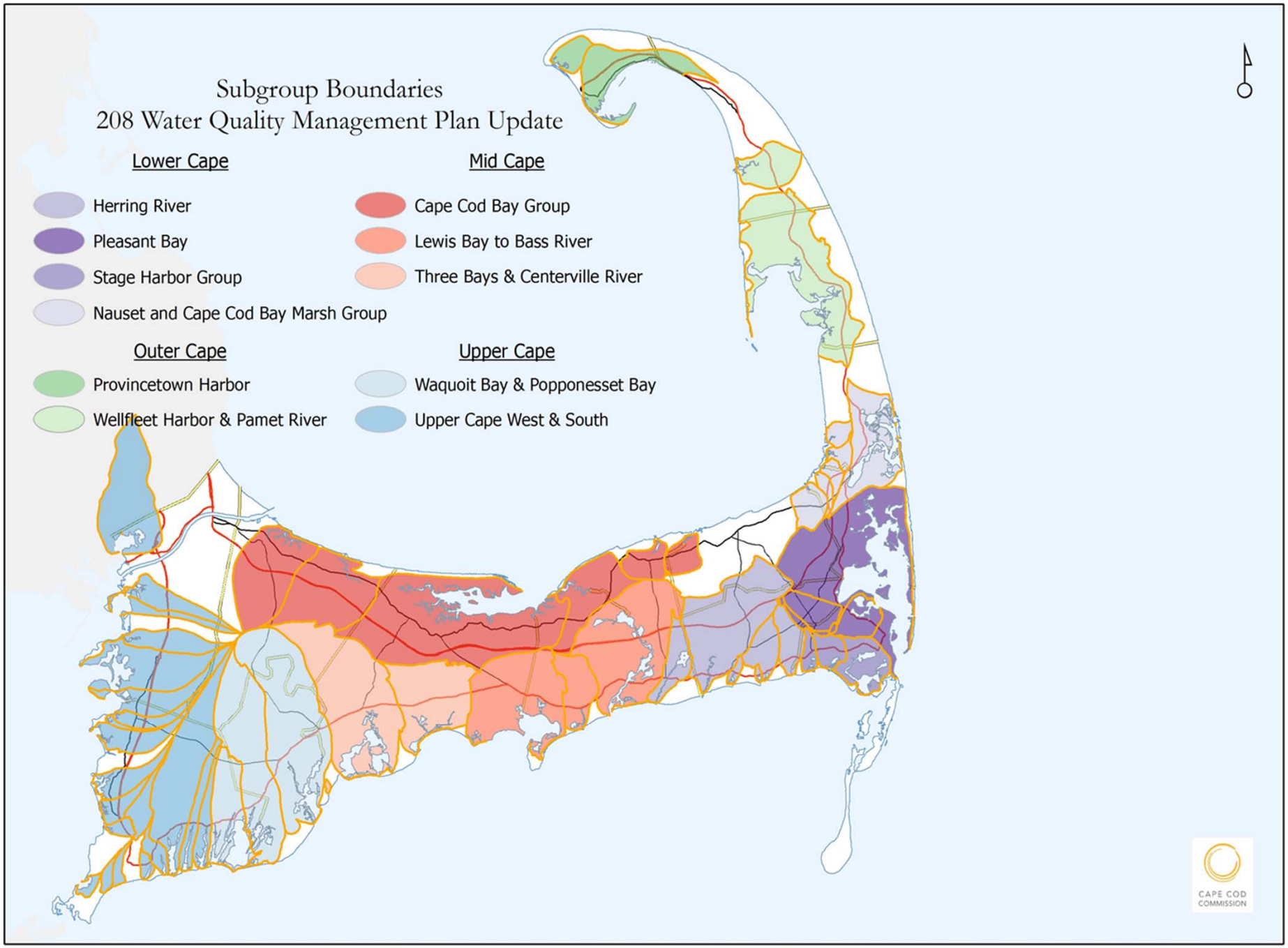
Alternative Definition | Alternative Results | Alternative Scoring Rules

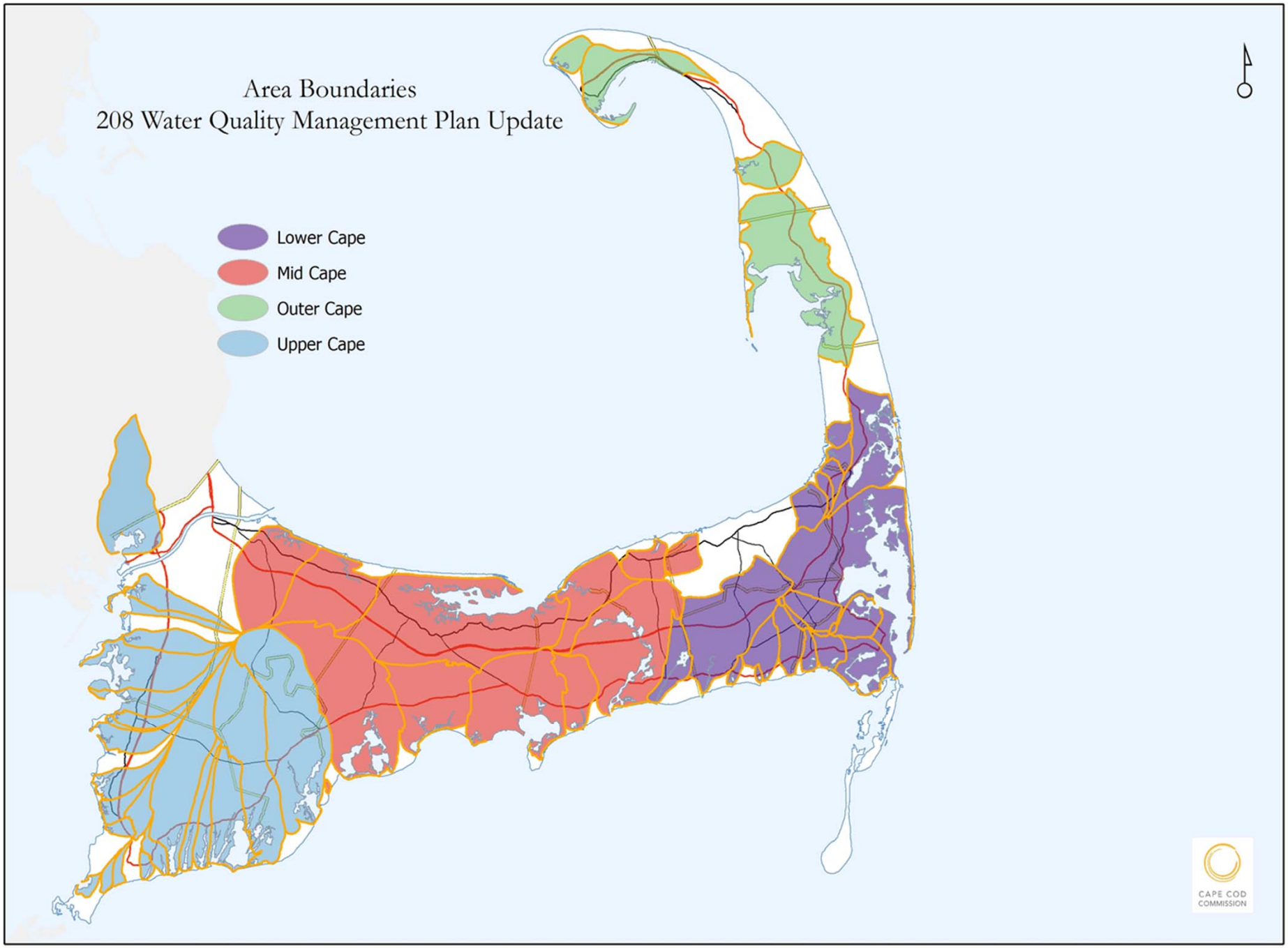
Criterion Scores

SOCIAL	
System Resilience	S1
Employment	S2
Ratepayer Distribution	S3
Recreation and Open Space	S4
Property Values	S5
Fiscal Impacts	S6
ENVIRONMENTAL	
Marine Water	E1
Fresh Water	E2
Habitat	E3
Climate	E4
FINANCIAL	
Municipal Capital Costs	F1
Municipal Other Costs	F2
Property Owner Capital Costs	F3
Property Owner Other Costs	F4

Strategy/Technology Distribution

	Scenario 1	Scenario 2	Scenario 3
	Minimum Cost	Cost Effective	Maximum Performance
Criterion Scores			
Strategy/Technology Distribution			
COST & PERFORMANCE			
Nitrogen Reduction %	30%	52%	61%
Remaining Nitrogen Load (Kg N)	8,400	5,760	4,680
Life Cycle Costs ($K)	$5,922	$7,350	$9,800
Municipal O&M Cost ($K)	$325	$425	$610
Municipal Project Cost ($K)	$1,329	$1,600	$1,800
Property Owner O&M Cost ($K)	$98	$128	$183
Property Owner Project Cost ($K)	$397	$480	$540
COMMUNITY BENEFITS			
Quality Habitat (acres)	0.5	1.8	2.4
New Open Space Added (acres)	1.5	4.6	5.0
GHG Reduced (MT CO2e/yr)	2.1	3.1	3.3
Avg. Increase in Property Value ($/pty)	$200	$1,200	$2,000
New Employment Added (jobs)	152	188	252
Additional Cost per Household ($/HH/yr)	$20	$26	$37


Subgroup Boundaries
208 Water Quality Management Plan Update
Lower Cape
Herring River
Pleasant Bay
Stage Harbor Group
Nauset and Cape Cod Bay Marsh Group
Mid Cape
Cape Cod Bay Group
Lewis Bay to Bass River
Three Bays & Centerville River
Outer Cape
Provincetown Harbor
Wellfleet Harbor & Pamet River
Upper Cape
Waquoit Bay & Popponesset Bay
Upper Cape West & South
CAPE COD COMMISSION


Area Boundaries
208 Water Quality Management Plan Update
Lower Cape
Mid Cape
Outer Cape
Upper Cape
CAPE COD COMMISSION

Cape Cod 208 Area Water Quality Planning
Wellfleet Harbor and Pamet River Watershed Working Group

Meeting Three
Monday, December 2, 2013
1:00 – 5:00 pm
Wellfleet Council on Aging

Revised Meeting Summary Prepared by the Consensus Building Institute

I. ACTION ITEMS

Working Group

- Provide any additional feedback on the meeting summary from Meeting #2 and, when it is circulated, Meeting #3.

Consensus Building Institute

- Circulate a draft meeting summary from Meeting #3 for review by the watershed working group.
- Distribute updated chronologies for water-quality developments.
- Conduct further outreach to working group members regarding the process moving forward and possible ongoing involvement, for example in the area working groups.

Cape Cod Commission

- Examine further the issue of nitrogen removal efficiency and capacity from coastal habitat restoration.
- Update the sample scenarios provided based on working group input.
- Further develop scenarios for different areas within the Wellfleet Harbor and Pamet River Watershed.

II. WELCOME AND OVERVIEW

Scott Horsley, Area Manager and Consultant to the Cape Cod Commission, welcomed participants and offered an overview of the 208 Update stakeholder process.[1] In July, public meetings were held across the Cape to present the 208 Plan Update goals, work plan, and participant roles. Public meetings were also held in August to present information on the affordability and financing of the updated comprehensive 208 Plan. The first meetings of the eleven Watershed Working Groups were held in September and focused on baseline conditions in each of the watersheds. The second meetings of the Watershed Working Groups were held in October and early November and were focused on exploring technology options and

[1] The PowerPoint Presentation made at this meeting is available at: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

approaches. The third meetings of the Watershed Working Groups, held in December, focused on evaluating watershed scenarios. These scenarios are informed by Working Groups' discussions at previous meetings about baseline conditions, priority areas, and technology options/approaches.

Mr. Horsley reviewed the goal of the meeting:

- To discuss the approach for developing watershed scenarios that will remediate water quality impairments in your watersheds.
- To identify preferences, advantages and disadvantages of a set of scenarios of different technologies and approaches, and
- To develop a set of adaptive management principles to guide subregional groups in refining scenarios for the 208 Plan.

Kate Harvey, the facilitator from the Consensus Building Institute, reviewed the agenda and led introductions. A participant list can be found in Appendix A. She explained that the Working Group would be asked to provide input on possible approaches/scenarios for wastewater management in the watershed study area but would not be asked to "vote" on a specific approach. She also reviewed action items, including:

- Erin Perry and other staff at the Cape Cod Commission updated the chronologies for water-quality developments for the jurisdictions in the Wellfleet Harbor and Pamet River Watershed based on input received in Meeting 1.
- Ms. Harvey requested that any Working Group members with input about the meeting summary from Meeting 2 provide that feedback to her during the week of Meeting 3 (from December 2 to December 6).
- Scott Horsley and Tom Cambareri, Cape Cod Commission, met with representatives Wellfleet's Comprehensive Wastewater Planning Committee to discuss the Committee's current thinking about wastewater projects in the community. The Commission has incorporated these ideas into their own scenarios for the watershed.

III. INITIAL SCENARIOS FOR THE WELLFLEET HARBOR AND PAMET RIVER WATERSHED

Scott Horsley explained the Commission's process to develop watershed scenarios. Two teams were formed: one team is exploring "conventional" technologies and approaches (e.g. sewering and I/A systems) and another team is exploring "alternative" technologies and approaches. The teams are both working under the assumption that fertilizer and stormwater reductions will be incorporated into all of the scenarios.

Conventional Scenarios

James Sherrard, Hydrologist in the Water Resources Department at the Cape Cod Commission, led the discussion of "conventional" technologies and approaches. He explained that the scenarios were developed using the Commission's Watershed MVP Tool. This modeling tool allows the Commission to model and illustrate how different conventional technologies and

approaches (such as innovative/alternative (I/A) onsite systems, natural attenuation, and centralized treatment) would be implemented geographically in a given area.[2]

Mr. Sherrard offered the following scenarios for the Wellfleet Harbor and Pamet River Watershed as a whole:

- Innovative/Alternative (I/A) Onsite Systems:
  - Implemented watershed-wide, this would yield only a marginal reduction in nitrogen loads, and was therefore not considered further. The reduction in nitrogen loads would be from 26 parts per million (ppm) to 19 ppm. It would cost approximately $13 million to install I/A systems on every property in the watershed.
- Natural Attenuation:
  - Freshwater ponds can attenuate 50% of the nitrogen watershed load that they receive. Using a series of ponds, a watershed could attenuate the vast majority of its nitrogen outflow before it reaches embayments. This approach would not be very effective in the Wellfleet Harbor and Pamet River Watershed, however, because this watershed has human settlements located very close to the coast, meaning that nitrogen from these septic loads reach the coast without having the opportunity to pass through a series of freshwater watersheds.
- Centralized Treatment with Disposal Inside the Watershed:
  - Watershed-wide collection and treatment would treat a flow of 714,000 gallons per day (gpd) at a total estimated cost of $302 million, or $16 million per year.
  - Targeted collection and treatment to achieve a 50% reduction in nitrogen would treat a flow of 440,000 gallons per day (gpd) at a total estimated cost of $160 million.
  - Targeted collection and treatment to achieve a 25% reduction in nitrogen would treat a flow of 224,000 gallons per day (gpd) at a total estimated cost of $84 million.

Mr. Sherrard also reviewed modeling that the Cape Cod Commission conducted to meet expected total maximum daily loads (TMDLs) reduction targets by focusing efforts in just a portion of the watershed. He offered the following scenarios for the targeted Duck Creek area sub-watershed:

- Innovative/Alternative (I/A) Onsite Systems:
  - Implemented throughout the Duck Creek sub-watershed, this would yield only a marginal reduction in nitrogen loads. It would cost an estimated $11 million to install I/A systems on every property in the Duck Creek sub-watershed.
- Centralized Treatment:
  - Subwatershed-wide collection and treatment would treat a flow of 59,000 gallons per day (gpd) at a total estimated cost of $27 million.

[2] His presentation is available at: http://watersheds.capecodcommission.org/index.php/watersheds/outer-cape/wellfleet-harbor-pamet-river

- Targeted collection and treatment to achieve a 50% reduction in nitrogen would treat a flow of 32,000 gallons per day (gpd) at a total estimated cost of $19 million.
- Targeted collection and treatment to achieve a 25% reduction in nitrogen would treat a flow of 16,000 gallons per day (gpd) at a total estimated cost of $10 million.

Mr. Horsley noted that the reduction targets of 50% and 25% presented for the Wellfleet Harbor and Pamet River Watershed are general, round figures because the Massachusetts Estuaries Project (MEP) has not yet produced nitrogen-reduction targets for this watershed. He added that, despite the seemingly high cost of centralized treatment, some towns nevertheless opt to pursue that option because they believe that sewering can achieve multiple goals.

- *A working group member responded that Chatham has actually opted for a zero-growth plan.* Mr. Horsley answered that some jurisdictions do install centralized treatment for the purpose, at least in part, of promoting economic development.

Working Group members had the following questions and comments about the conventional scenarios *(in italics).*

- *Where would the outfall pipe from the sewer system go?*
  - Mr. Sherrard responded that the MVP system simply models how much nutrient attenuation a given system can achieve and an estimated cost. At present, the Commission has not mapped out and designed a whole system, including where an outfall pipe would be located.
  - Mr. Horsley added that the modeling for the centralized treatment systems show a non-zero quantity of nitrogen on the assumption that a small portion of nitrogen is re-entered into the ground through outflow.
- *As a matter of scale, Wellfleet's annual operating budget is about $15 million per year, whereas the cost of implementing watershed-wide sewering would be $16 million per year.* Mr. Sherrard explained that the intention of showing the modeling results was not to propose that watershed-wide sewering be implemented, but rather to show what the impact would be of installing a given technology, in this case sewering, on every parcel.
- *The "100% nitrogen removal" that the Commission is presenting would actually address only 6% of the total nitrogen load that is in the watershed.* Mr. Sherrard and Mr. Horsley agreed that the Commission's proposals for nitrogen reduction focus only on nitrogen loads from wastewater, not on other sources of nitrogen.
- *How would the planned remediation of Herring River impact these scenarios?* Mr. Sherrard responded that the Herring River remediation would be covered as part of the discussion on alternative technologies and approaches, later in the agenda.
- *Sewering seems very, very expensive for what it provides.*
- *Is it true that Massachusetts requires that drinking water pipes be installed before sewering is installed?* Mr. Sherrard and Mr. Horsley responded that they were not aware of such a condition, if it exists.

- *How would sewering handle other contaminants, including emerging contaminants of concern?*
    - Mr. Sherrard responded that one of the benefits of sewering is to centralize all of the loads into one flow, which would make it much easier to address and treat other contaminants that are identified in the future. He added that, more generally and beyond sewering, an adaptive management strategy would help to address other contaminants that arise in the future.
    - Mr. Horsley said that, while the Commission is considering contaminants other than nitrogen in its planning, the current Section 208 process is driven by nitrogen, which is the only contaminant for which the Commission has sufficient information to set quantitative reduction targets.
- *Currently, technologies do not even exist to treat many contaminants. Generally, the more flexibility that you have in your wastewater management plan, the better off you are in terms of future growth and addressing future concerns.*
- *Without concrete figures from the Massachusetts Estuaries Project for nitrogen loads and reduction targets for the Pamet River Watershed, we do not really know what we are talking about. It seems premature to proceed with any sort of remediation strategy without having more information about what the targets are.* Mr. Horsley responded that, while those numbers are forthcoming, the general concept of adaptive management is not to wait until you have all of the data. There will always be information that decision-makers do not know, and emerging contaminants coming around the corner, but prudent action can be taken despite these limitations.

Alternative Technology and Approaches

Scott Horsley, Area Manger, led the discussion of "alternative" technologies and approaches. He explained that the scenarios were developed for *discussion purposes* and encouraged Working Group members to offer their own modifications and suggestions. The scenarios follow the whole watershed 7-step process which targets fertilizer and stormwater reductions first, then explores watershed/embayment options, and then alternative on-site options.

He offered the following scenario for Wellfleet Harbor:

- *Nitrogen reduction goals:*
    - As noted above, the MEP has not yet released figures regarding current nitrogen loads or removal targets for the Wellfleet Harbor watershed. However, existing nitrogen loads from septic systems and fertilizers was based upon the town's CWMP report.
- *Low barrier options:*
    - Options with low barriers to implementation include fertilizer management, which is projected to reduce 2,550 kilograms of nitrogen per year, and stormwater mitigation, which is projected to reduce another 2,550 kilograms of nitrogen per year.

- *Watershed/embayment options:*
    - The Cape Cod Commission identified two sites in the Wellfleet Harbor area that could be explored for installation of permeable reactive barriers (PRBs). PRBs are deemed reasonable to install where a road passes perpendicular to groundwater flow directions, in areas where the water table is relatively shallow, and at close-proximity to a water body. One of these two PRBs that that Commission identified would filter the flow of wastewater from 170 homes and the other would filter the flow of wastewater from 120 homes. The first PRB would reduce 524 kilograms of nitrogen per year and the second would reduce 370 kilograms of nitrogen per year, both at a unit cost of $452 per pound of nitrogen.
    - A fertigation well on the one golf course in Wellfleet would reduce 136 kilograms of nitrogen per year at a unit cost of $438 per pound of nitrogen.
    - Twenty acres of oyster beds could reduce 5,000 kilograms of nitrogen per year at a unit cost of $0 per pound of nitrogen (assuming that Wellfleet does nothing more than permit the creation of oyster beds and the actual implementation is undertaken by oystermen for their own profit).
    - 1,100 acres of coastal habitat restoration associated with the Herring River project could reduce 66,000 kilograms of nitrogen per year at an estimated unit cost of $444 per pound of nitrogen.
- *Alternative on-site options:*
    - Assuming that, some day, 5% of homes (totaling 150 homes) in Wellfleet adopt either composting toilets or urine diversion toilets, Wellfleet would be able to reduce 594 kilograms of nitrogen per year at an estimated unit cost of $1,265 per pound of nitrogen (assuming that the town provides financial incentives for the adoption of these toilets).
    - Installing eco-toilets at a town-sponsored project at Bakers Field would reduce 40 kilograms of nitrogen per year at an estimated unit cost of $1,265 per pound of nitrogen.
- If Wellfleet were to adopt all of these measures, it would be able to mitigate an estimated 77,600 kilograms of nitrogen per year at an estimated unit cost of $535 per pound of nitrogen and a total estimated cost of $5,998,036.

Working Group members had the following questions and comments about the Wellfleet Harbor scenario.

- *The $0 cost estimate that the Commission has given for installing oyster beds does not seem realistic. My understanding is that the best way to achieve nitrogen-reduction using this method is actually to introduce oyster beds and let the oysters mature without actually harvesting the oysters. If this strategy were followed, there would be no return-revenues from oystering, and so no fishermen would install oyster beds at their own expense. So in that way, there would be a cost for the town. In addition, in New York Harbor, the authorities attempted this strategy of installing oyster beds to reduce contamination but ended up having to put security guards on 24-hour watch to make sure that no one harvested the oysters for human consumption.* Mr. Horsley responded

that, based on the conversations he has had, the return revenues from the installation of oyster beds are significant enough to generate a profit. Regarding the New York example, oysters harvested from Wellfleet Harbor would be safe for human consumption since they would not have the industrial contaminants present in New York Harbor.

- *What is the assumed amortization period used for these calculations?* Mr. Horsley responded that a 20-year amortization is assumed for each of the presented technologies.
- *The 3,000 properties that you have listed for Wellfleet Harbor is a little complicated because the area actually has 4,300 properties, but many of these are seasonally occupied.* Yes, that is how we arrived at the 3,000 figure.
- In response to a comment from a member of the public, Working Group members and Commission representatives discussed the differential in nitrogen removal efficacy between freshwater and saltwater wetlands and how the Commission arrived at its projections for nitrogen removal due to coastal habitat restoration. Mr. Horsley noted that the Commission does not have unequivocal data about the nitrogen-mitigation effects of coastal habitat restoration on the Cape and Commission representatives pledged to examine this issue of nitrogen removal efficiency and capacity further. He also added that the Technologies Advisory Panel has encouraged the Commission to consider oyster beds and coastal habitat restoration, which they believe may be two of the most promising and cost-effectiveness technologies that currently exist.
- *The town should take account of the nitrogen-reduction impacts of other actions that are already being implemented for other reasons. For example, the restoration of Herring River will probably happen, and so the incremental cost of nitrogen mitigation from that project is very small.* Commission representatives agreed.
- *How large or long would the permeable reactive barriers be?* Mr. Horsley responded that the PRBs would be installed underground and so would not really be visible from the surface. A PRB would likely need to be at least 1,000 feet long to make it cost effective to install, but it could easily be longer than that also.
- *What if the figures and assumptions that the Commission used for the nitrogen-reduction effects of oyster beds and coastal habitat restoration are incorrect?* Mr. Horsley responded that an adaptive management plan would be able to address those sorts of issues. Generally, however, the Commission used the most conservative figures from different examples on the Cape for its assumptions.
- *It would be very difficult to win a vote for sewering in Wellfleet when there are other technologies, such as sewering, that already seem to be working. If further nitrogen mitigation is needed, we could install more oyster beds.*
- *What about plans for Truro, Pamet River?* Mr. Horsley explained that analysis would be done for each of the watersheds on Cape Cod and noted that Truro has not been completed yet. He offered some initial suggestions but indicated that these would need to be fleshed out during the next few months, with input from Truro participants.

Kate Harvey, Facilitator, reminded participants of the priorities and concerns that they had raised at past Working Group meetings including: contaminants of emerging concern, prioritizing co-benefits and return revenues, secondary impacts to wildlife, who is responsible for implementing solutions, aesthetics, seasonality, property values, who bears the cost, and public buy-in. She asked if, given these priorities and concerns, working group members had suggestions on additional technologies or approaches that might be appropriate for this watershed. Stakeholders offered the following recommendations for additional projects:

- A stormwater mitigation system on the wharf,
- A stormwater system on the southern part of Commercial Street,
- Harvesting phragmites would potentially reduce up to 16% of nitrogen,
- Implement a restoration project upstream of Duck Creek,
- Add a permeable reactive barrier at the intersection of Main Street and Route 6.

IV. ADAPTIVE MANAGEMENT

Scott Horsley explained the concept of adaptive management as a structured approach for addressing uncertainties by linking science and monitoring to decision-making and adjusting implementation, as necessary, to increase the probability of meeting water quality goals in cost effective and efficient ways. He asked Working Group members to help the Commission to think through what an adaptive management plan for the Wellfleet Harbor and Pamet River Watershed might look like, including:

<u>Time frame for monitoring:</u>

- Working Group members and Commission representatives discussed what sort of timeframe would be appropriate for monitoring the initial implementation of nitrogen-mitigation technologies. Participants noted that, while the Herring River restoration would take at least ten years to move from planning to implementation to testing (at least for the first phase of the project), it may not actually be a good model to use to estimate an appropriate time frame for monitoring because of the complexity of the project.

<u>Additional projects (or Plan B):</u>

- Installation of additional oyster beds
- Widening the channel in Duck Creek to improve flushing
- Permeable reactive barriers
- Herring River restoration
- Improving the bathrooms at the marina
- Mayo Creek project

<u>Suggestions for how to prioritize projects</u>:

- Projects that are already working and that can easily be implemented, such as oyster beds;
- Projects that would be implemented for another reasons, such as improving the

bathrooms at the marina and the Mayo Creek project;
    - Hillary at Environmental Partners has a list of projects that local towns are considering implementing that could also have co-benefits in terms of nitrogen mitigation
- Projects that are relatively low-cost, such as widening the Duck Creek channel.

V. PREPARING FOR 2014 JAN-JUNE

Scott Horsley and Erin Perry shared the Commission's plans for continuing stakeholder engagement into 2014, which includes the following:

Triple Bottom Line (TBL) approach

Mr. Horsley and Ms. Perry explained that triple bottom line analysis provides a full accounting of the financial, social, and environmental consequences of investments or policies. Often, TBL analysis is used to identify the best alternative and to report to stakeholders on the public outcomes of a given investment. A TBL model will consider the financial, environmental, and social consequences of water quality investments and policies in Cape Cod. The TBL Model under development by the Commission will evaluate the "ancillary" or downstream consequences of water quality investments that are not the direct phosphorous or nitrogen levels that are the primary area of concern.

Stakeholder Process: Summit and Working Groups

Ms. Perry explained that stakeholder process for the Section 208 Planning process going forward. She said that the Commission would be convening an optional stakeholder summit with all 11 of the watershed subgroups in January. After this summit, the Commission will be aggregating the subgroups into 4 Area Working groups (representing the areas of: Lower Cape, Mid Cape, Outer Cape, and Upper Cape). These Area Working groups will include local residents and stakeholders, including some members of the watershed subgroups, as well as representatives from MA DEP and EPA. The idea behind convening these Area Working groups is to continue to seek stakeholder participation and guidance without asking all of the members of the eleven watershed subgroups to continue to serve on their committees over the next six months.

In response to Ms. Perry's comments, working group members had the following questions and comments:

- *At the local level, who will be signing off on the plans? Will the Board of Selectmen in each town have a chance to weigh in?* Ms. Perry and Ms. Harvey, the facilitator, responded that the Cape Cod Commission is putting together a plan for the entire Cape that includes a broad range of options that represent a variety of interests and perspectives. The four area working groups will include Selectmen and also various other interests, including business and real estate interests, environmental interests, etc. Ultimately, the plan is under the authority of the Cape Cod Commission and will not require an affirmative vote from local governments, although the Commission is committed to seeking local input and guidance.

- *It is absolutely critical that the Commission review this process and these plans with the Board of Selectmen in each and every town. A lot of good work has been done by the Commission, but all of it is in jeopardy because, if local stakeholders like the Selectmen are left out of the process, there may be a backlash against the plan.*
- *The people in this room have been participating in this process over the past three months and understand the thinking and the evolution of the plans. However, many other people, including the Selectmen and other members of the public, have not been engaged in this process. An education and outreach effort will probably be needed to gain buy-in from this broader constituency.* Ms. Perry responded that such an effort is planned for coming months.

VI. PUBLIC COMMENTS

No public comments were made.

APPENDIX ONE: MEETING PARTICIPANTS

Name	Affiliation
Working Group Members	
Joanna Buffington	Eastham Board of Health
Curt Felix	Comprehensive Wastewater Planning Committee, Wellfleet
Deborah Freeman	Wellfleet Conservation Trust; Friends of Herring River
Charleen Greenhalgh	Town Planner, Truro; Assistant Town Administrator
Charles Harris	Water Management Committee, Eastham
Ned Hitchcock	Wastewater Committee, Wellfleet
Laura Kelley	Littlefield Landscapes, Eastham
Lauren McKean	National Parks Service
John Morrissey	Selectman, Wellfleet
Patricia Pajaron	Health Agent, Truro
Tracey Rose	Real Estate Agent, Thomas D. Brown Real Estate Agency
Harry Turkanian	Town Administrator, Wellfleet
Bill Worthington	Planning Board, Truro
Staff	
Kate Harvey	Consensus Building Institute
Tushar Kansal	Consensus Building Institute
Scott Horsley	Cape Cod Commission
Anne McGuire	Cape Cod Commission
Erin Perry	Cape Cod Commission
James Sherrard	Cape Cod Commission
Observers	
Joseph Buteau	Truro, Energy Committee
Dan Milz	PhD Candidate, University of Chicago
Ed Nash	Golf Course Superintendents Association of Cape Cod