Cape Cod 208 Area Water Quality Planning
Herring River, Harwich Watershed Working Group

Meeting Three
Thursday, December 5, 2013
8:30 am- 12:30 pm
Harwich Community Center 100 Oak Street Harwich, MA

Meeting Agenda

8:30 Welcome, Review 208 goals and Process and the Goals of today's meeting – *Cape Cod Commission Area Manager*

8:45 Introductions, Agenda Overview, Updates and Action Items– *Facilitator and Working Group*

9:00 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

10:30 Break

10:45 Adaptive Management – *Cape Cod Commission and Working Group*

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

11:30 Preparing for 2014 Jan-June – *Cape Cod Commission and Working Group*

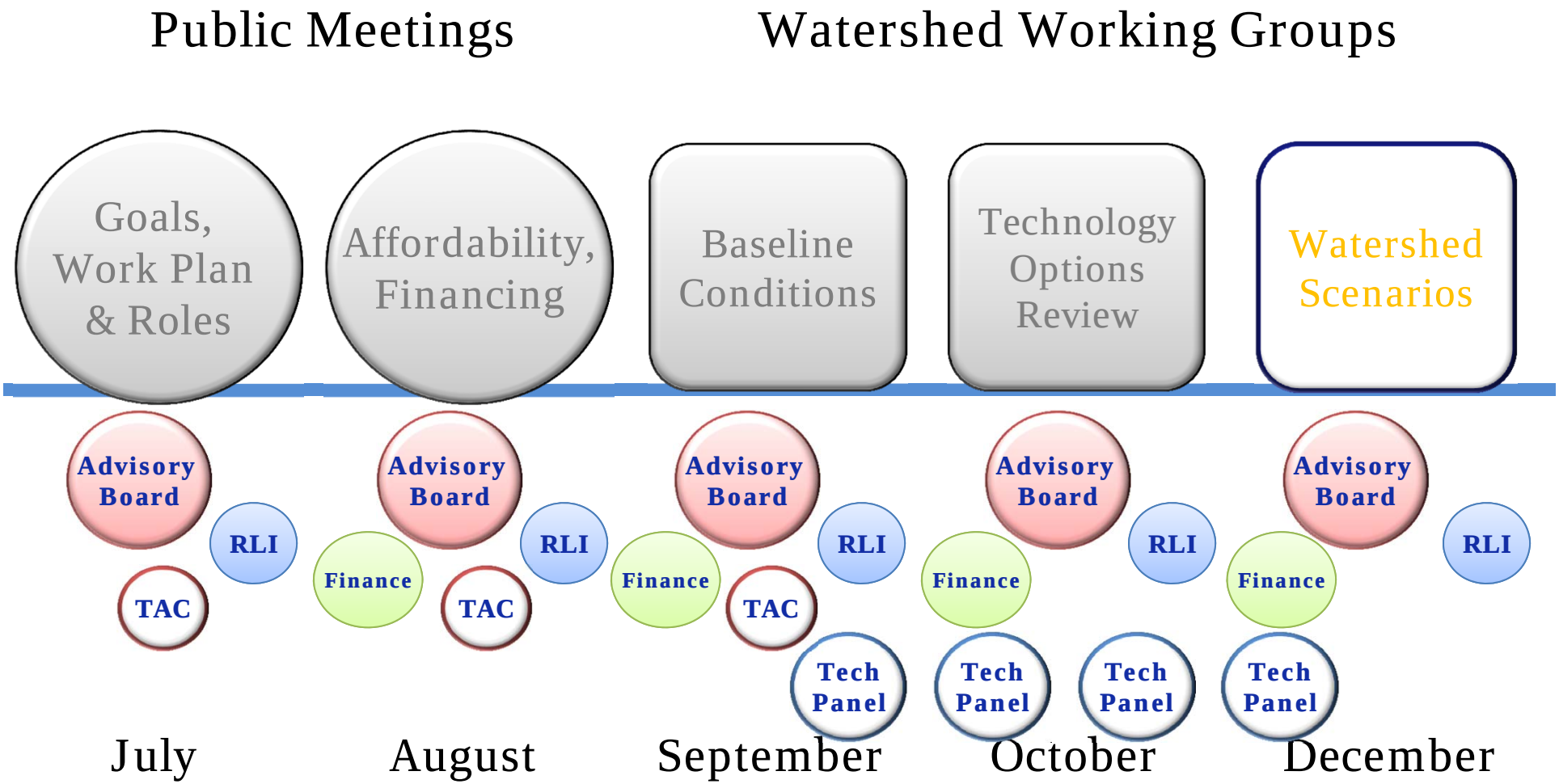
- Triple Bottom Line approach
- Identify Shared Principles and Lessons Learned
- Describe Next Steps

12:15 Public Comments

12:30 Adjourn

Herring River Group

Watershed Scenarios

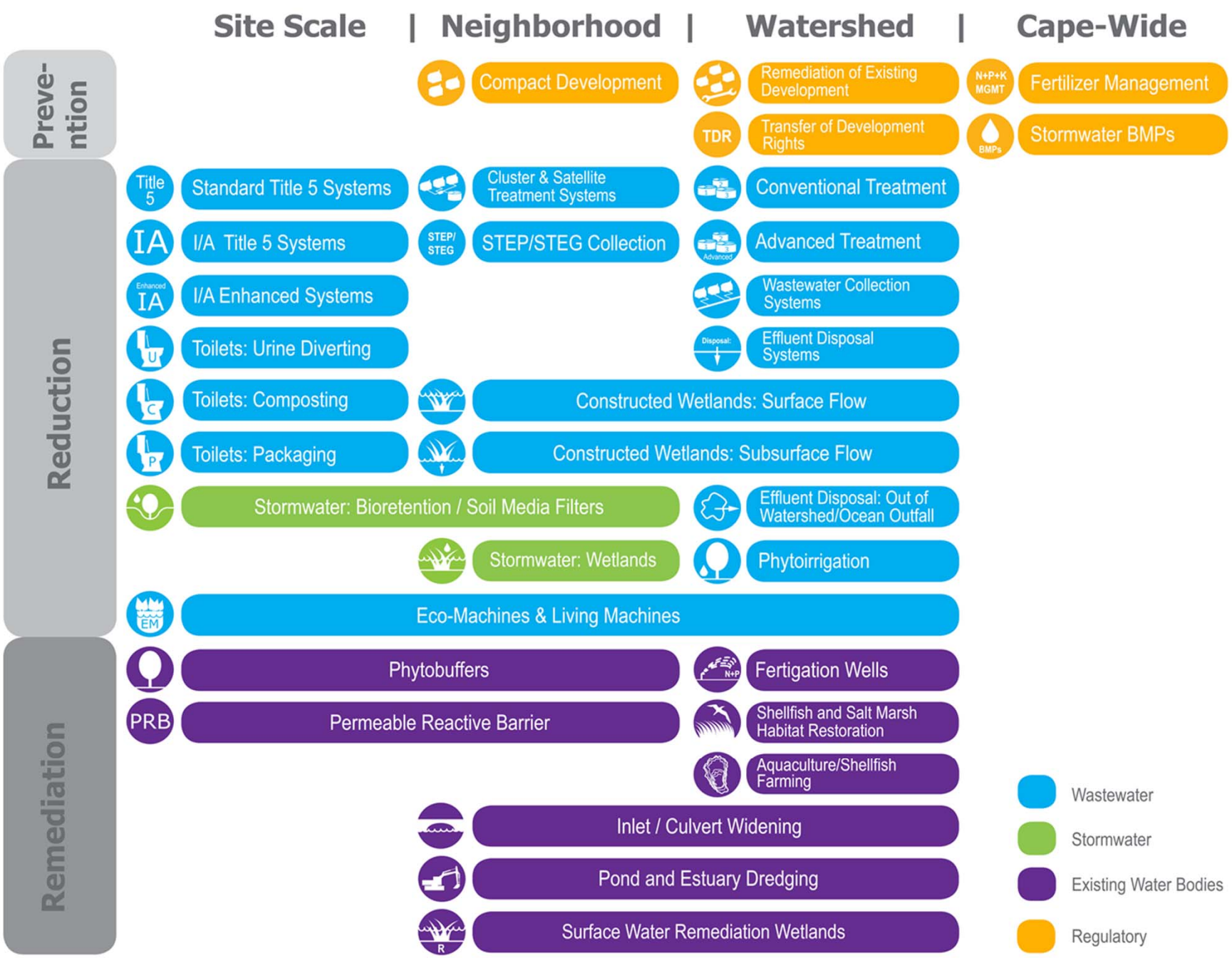


RLI — Regulatory, Legal & Institutional Work Group

TAC — Technical Advisory Committee of Cape Cod Water Protection Collaborative

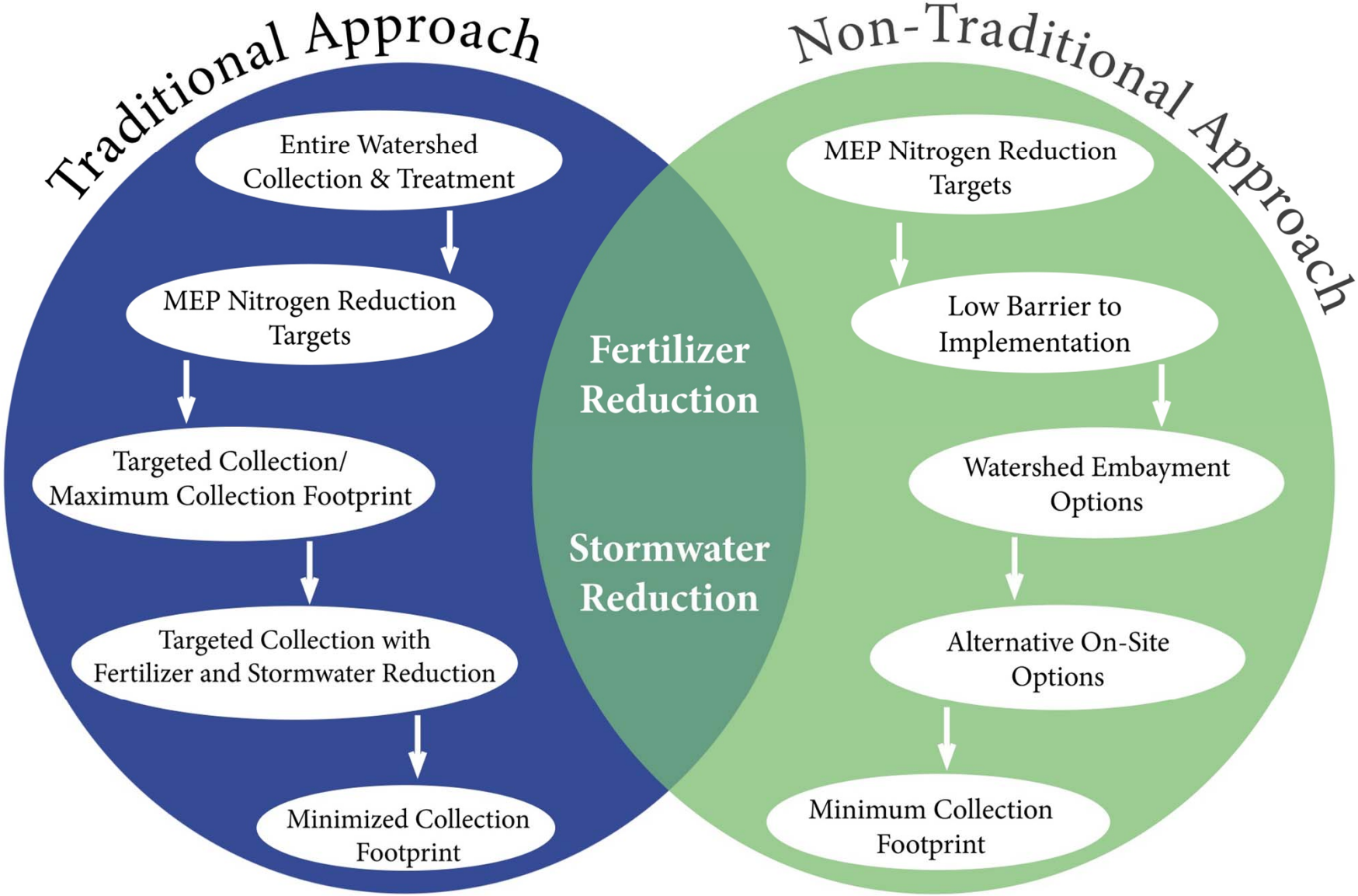
208 Planning Process

"Watershed Working Group - Herring River - Workshop 3"

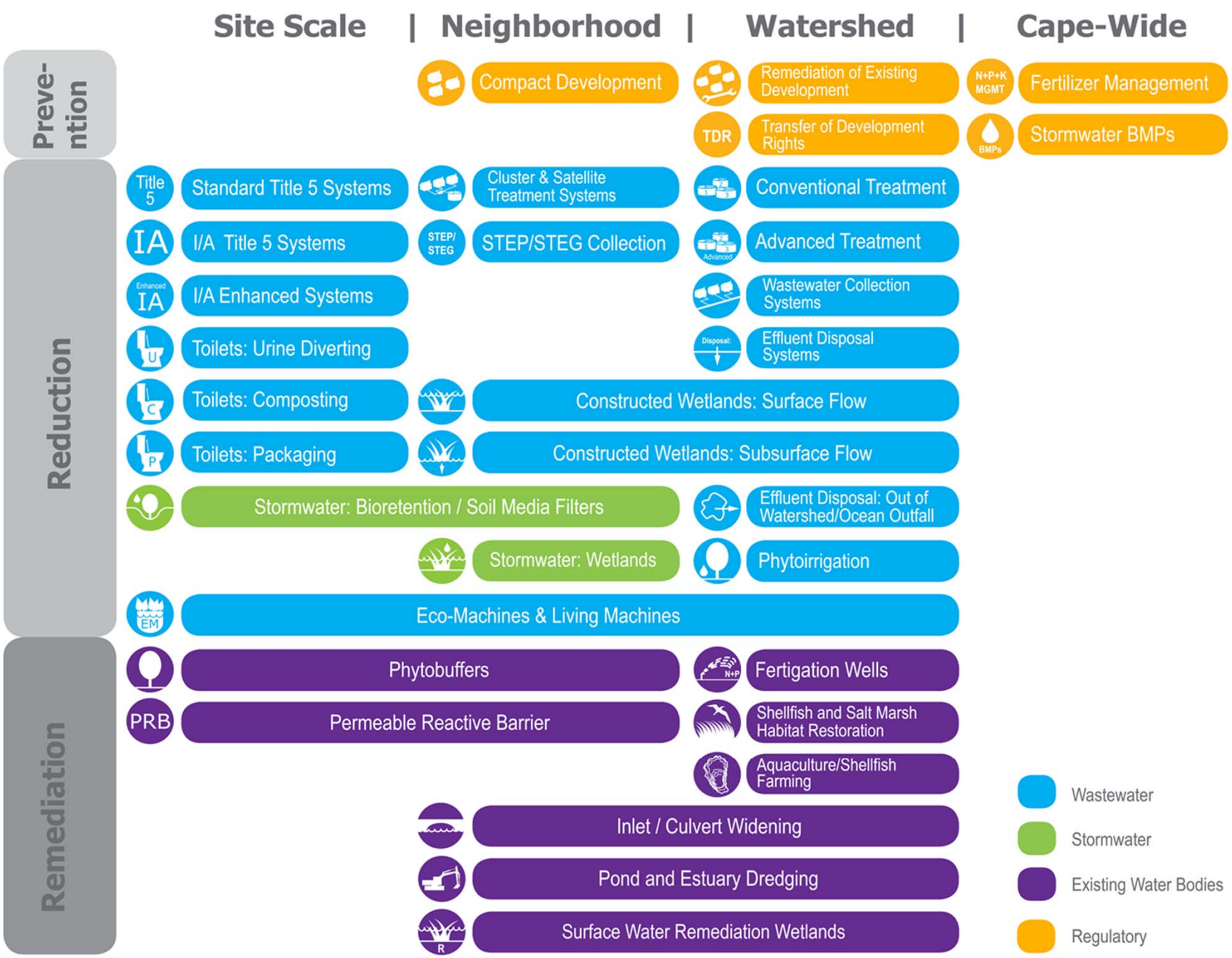


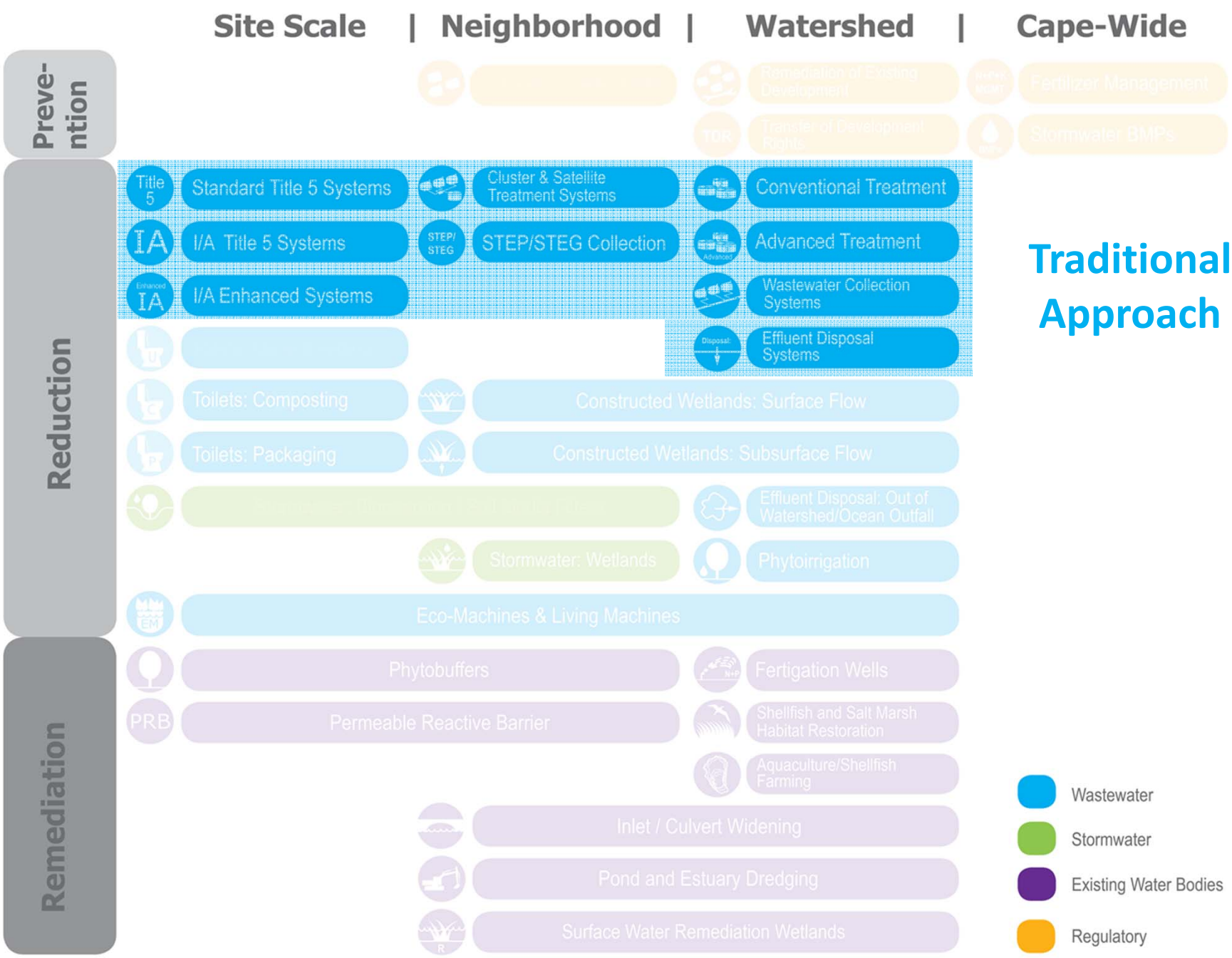
Goal of Today's Meeting:

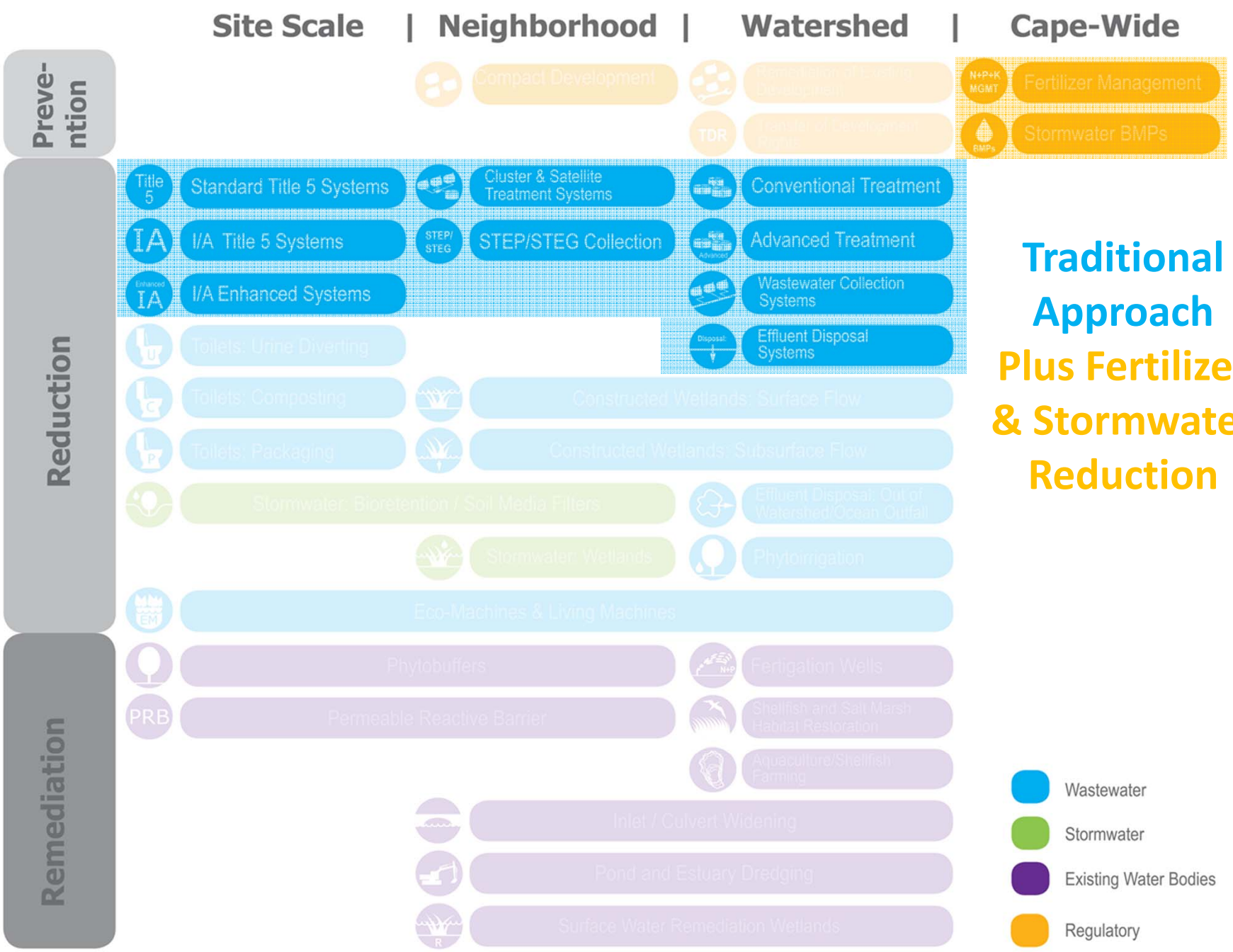
- To discuss the approach for developing watershed scenarios that will remediate water quality impairments in your watersheds.
- To identify preferences, advantages and disadvantages of a set of scenarios of different technologies and approaches, and
- To develop a set of adaptive management principles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


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 - Herring River - Workshop 3"




Site Scale | Neighborhood | Watershed | Cape-Wide
Preve-ntion
Reduction
Remediation
Title 5
Standard Title 5 Systems
Cluster & Satellite Treatment Systems
Conventional Treatment
IA
I/A Title 5 Systems
STEP/STEG
STEP/STEG Collection
Advanced Treatment
Enhanced IA
I/A Enhanced Systems
Wastewater Collection Systems
Disposal
Effluent Disposal Systems
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
Fertilizer Management
Stormwater BMPs
Traditional Approach
Wastewater
Stormwater
Existing Water Bodies
Regulatory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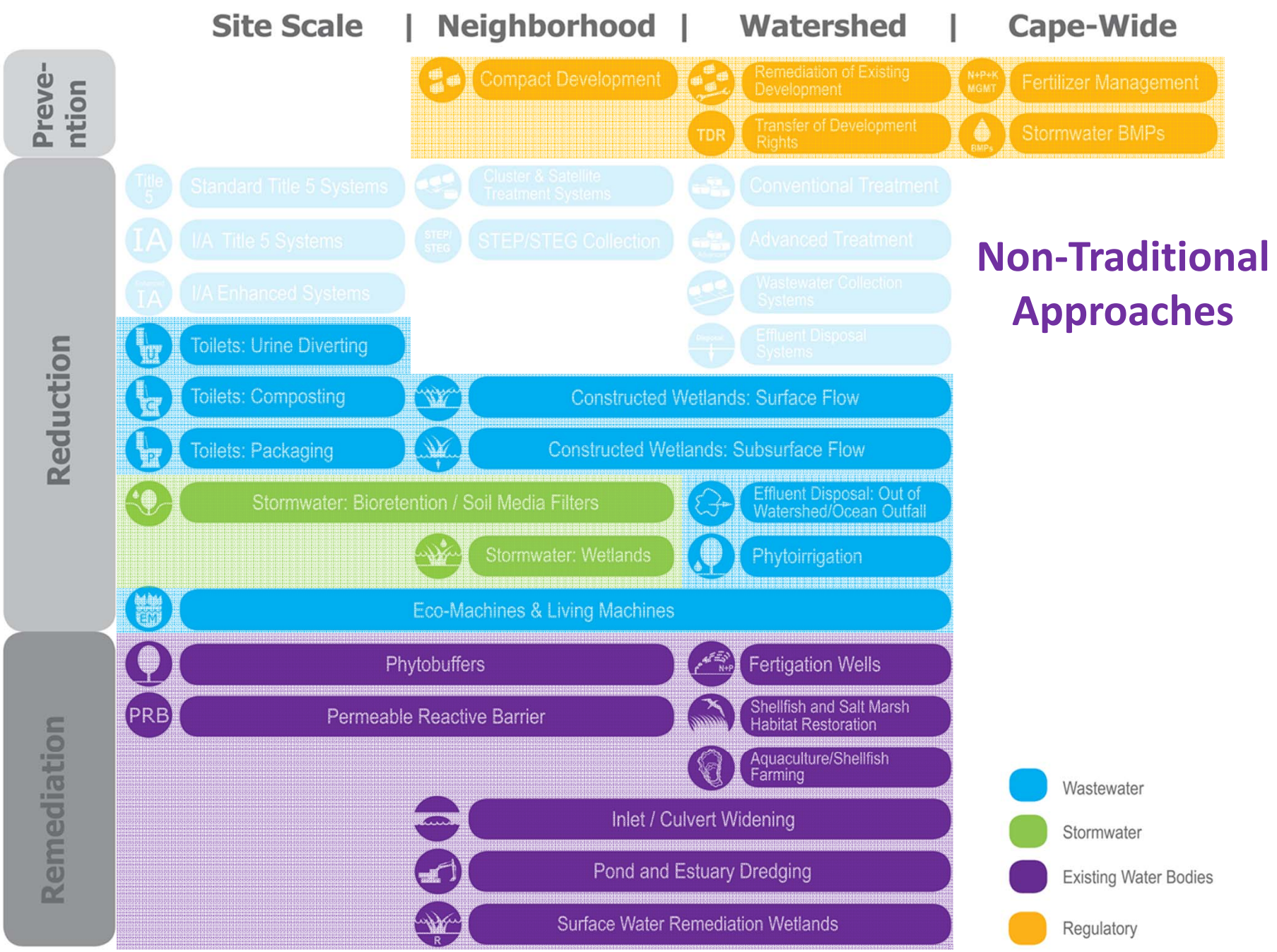
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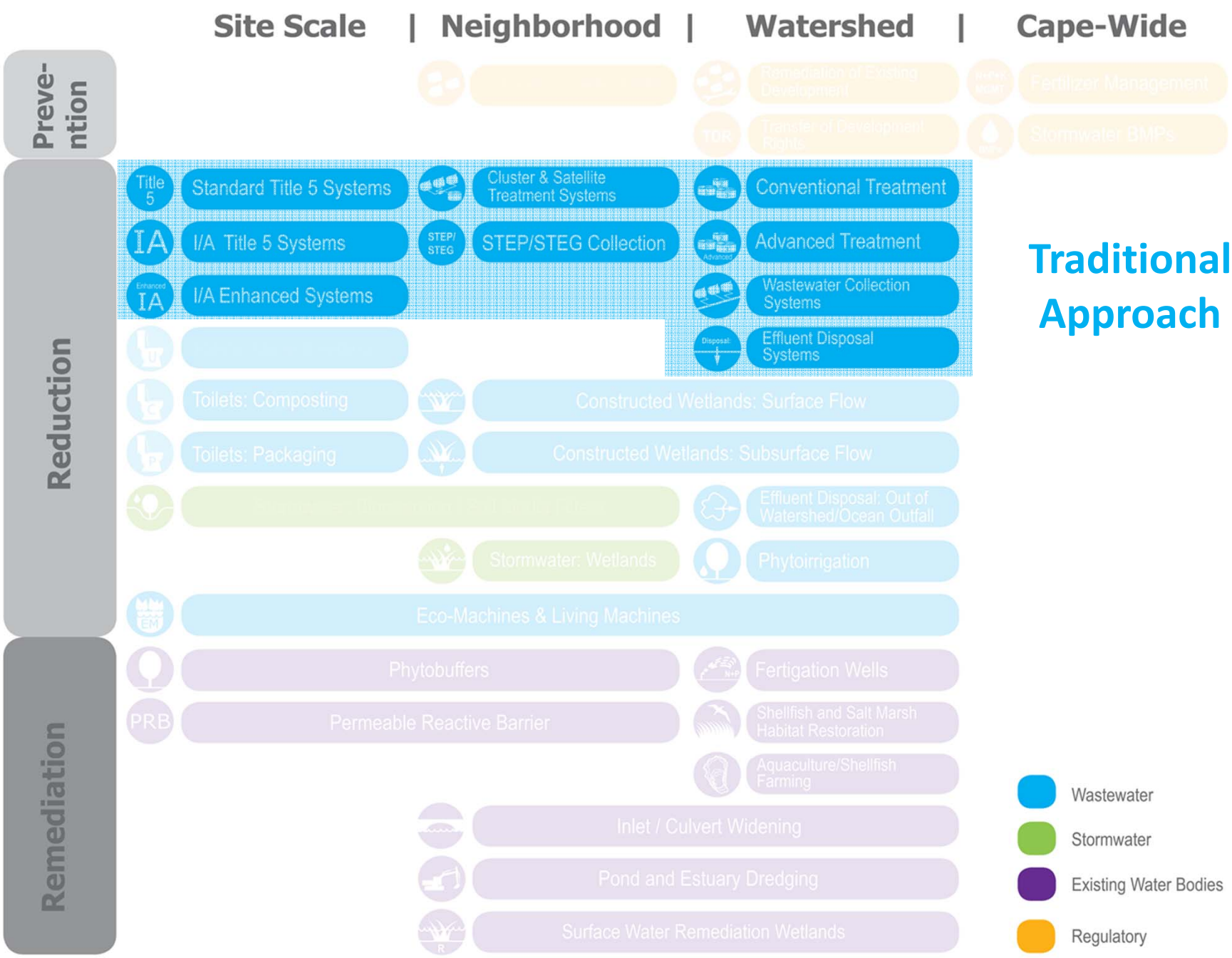
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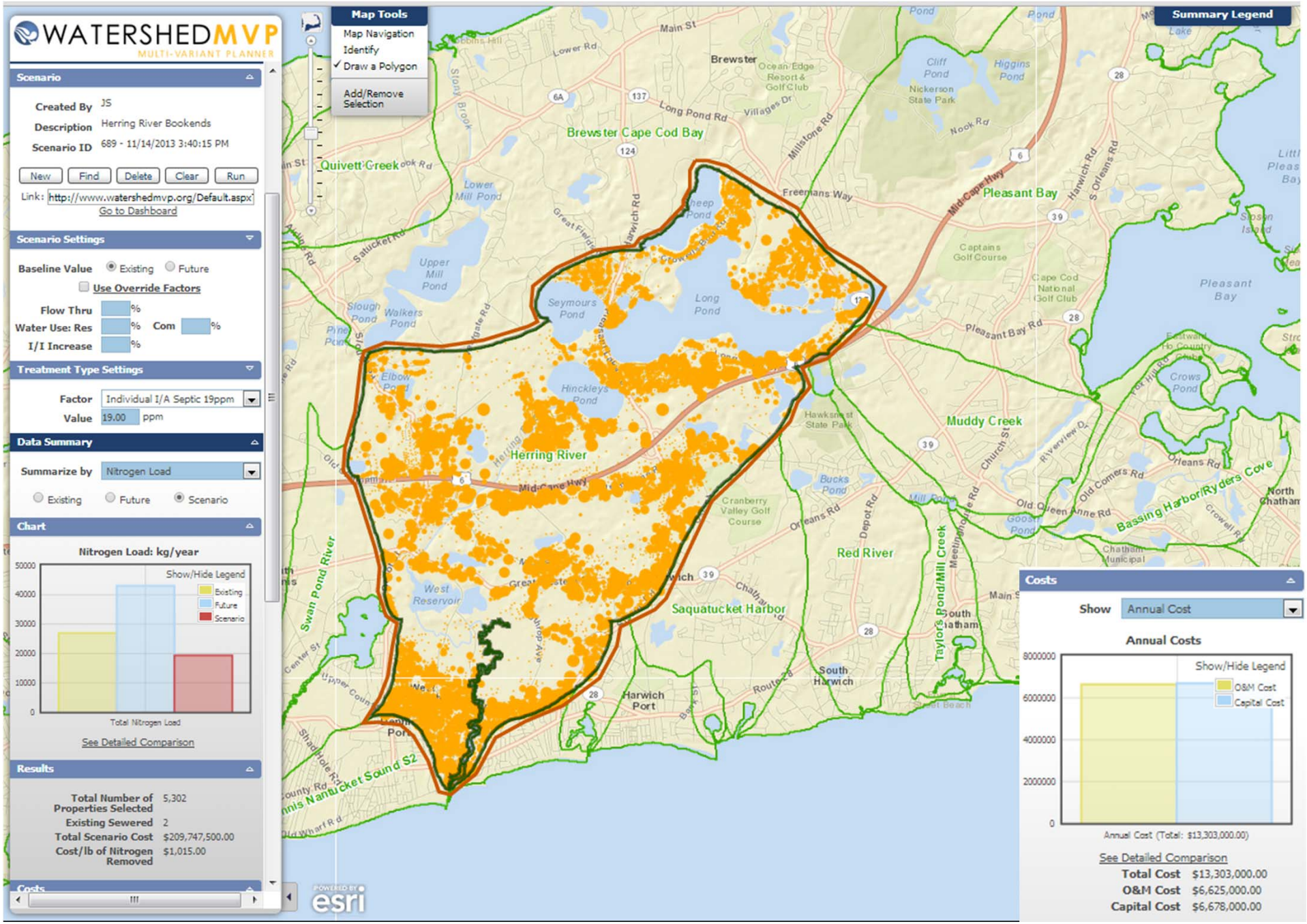
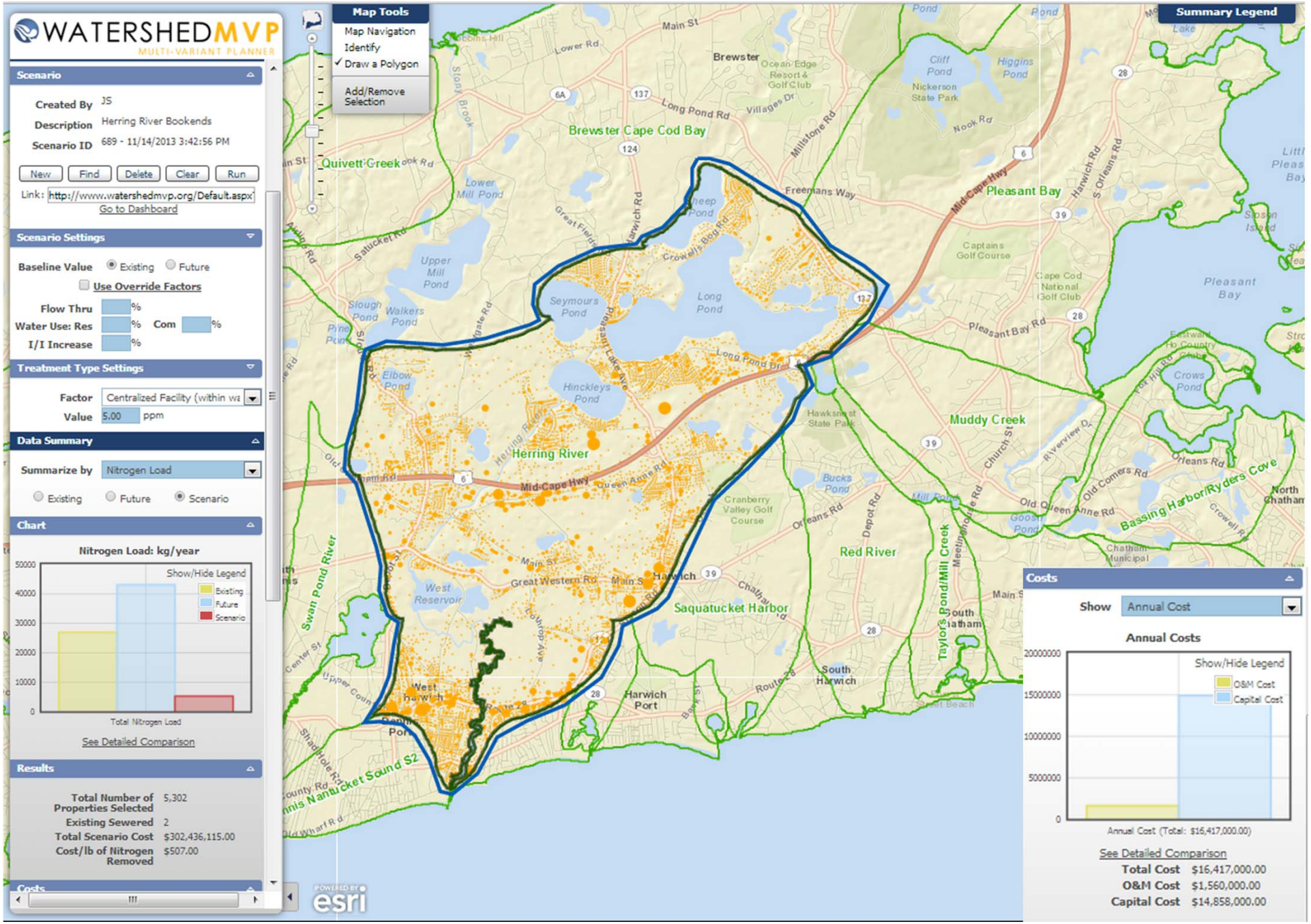
Watershed-Wide Innovative/Alternative (I/A) Onsite Systems



Watershed-Wide Centralized Treatment with Disposal Inside the Watershed



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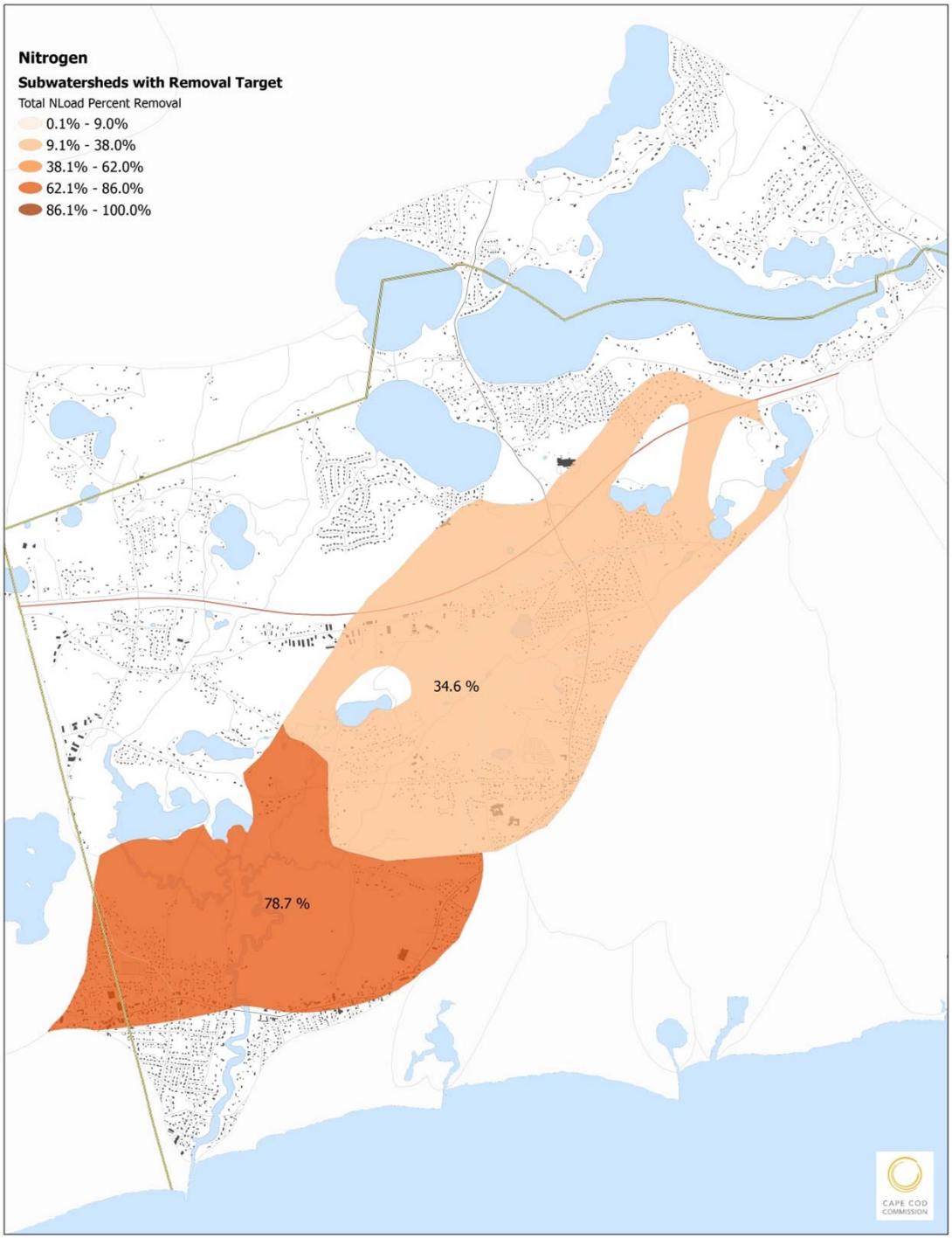
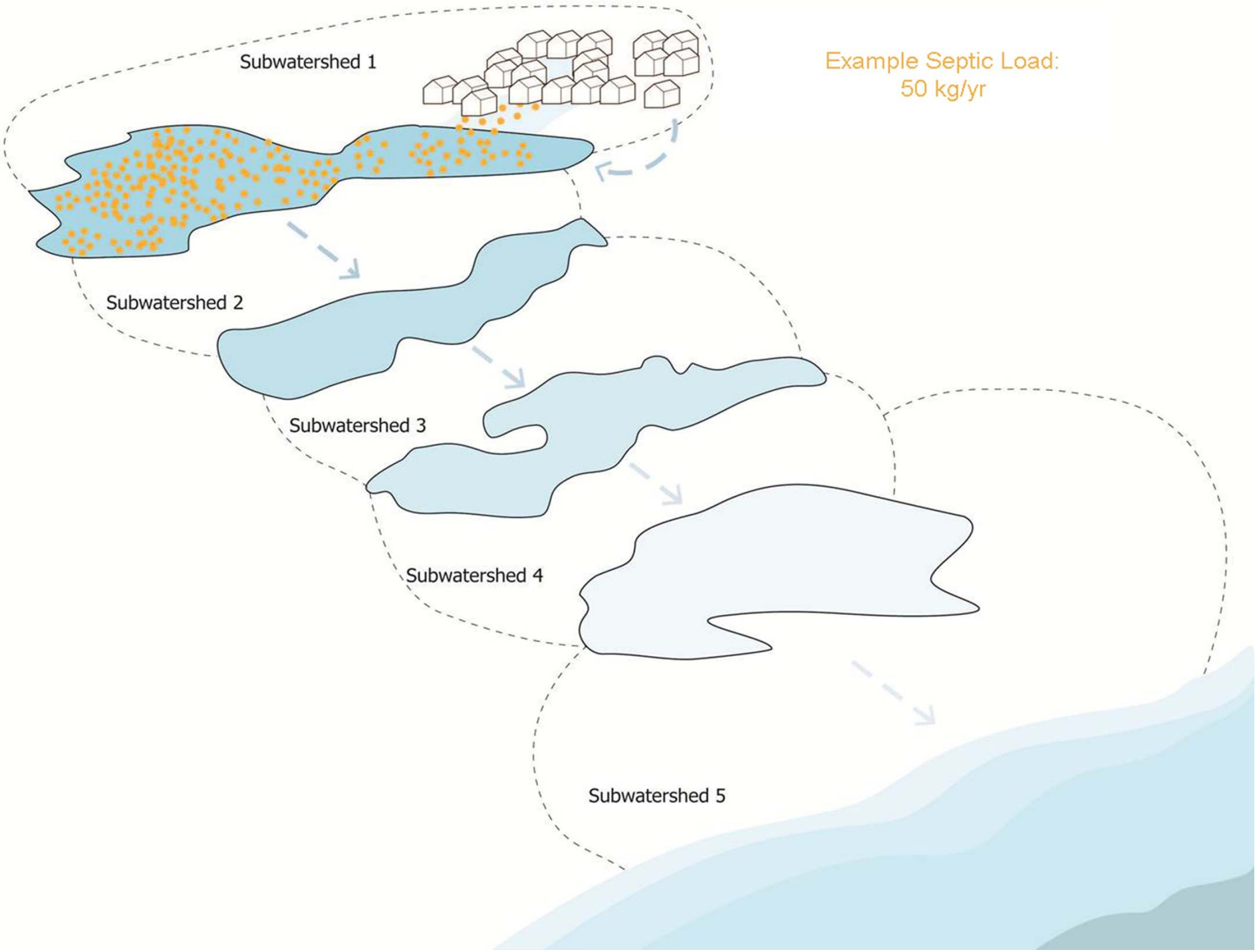
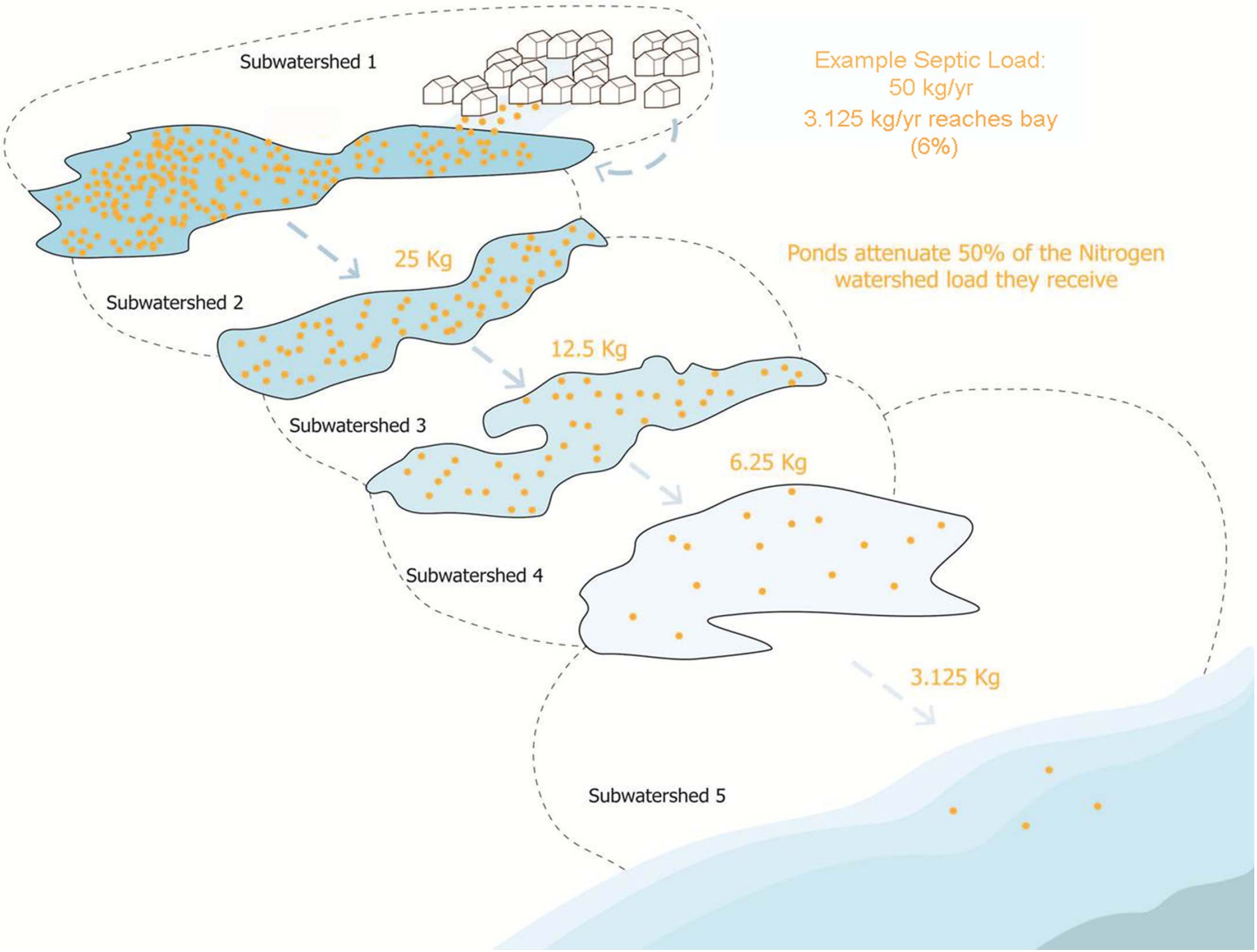
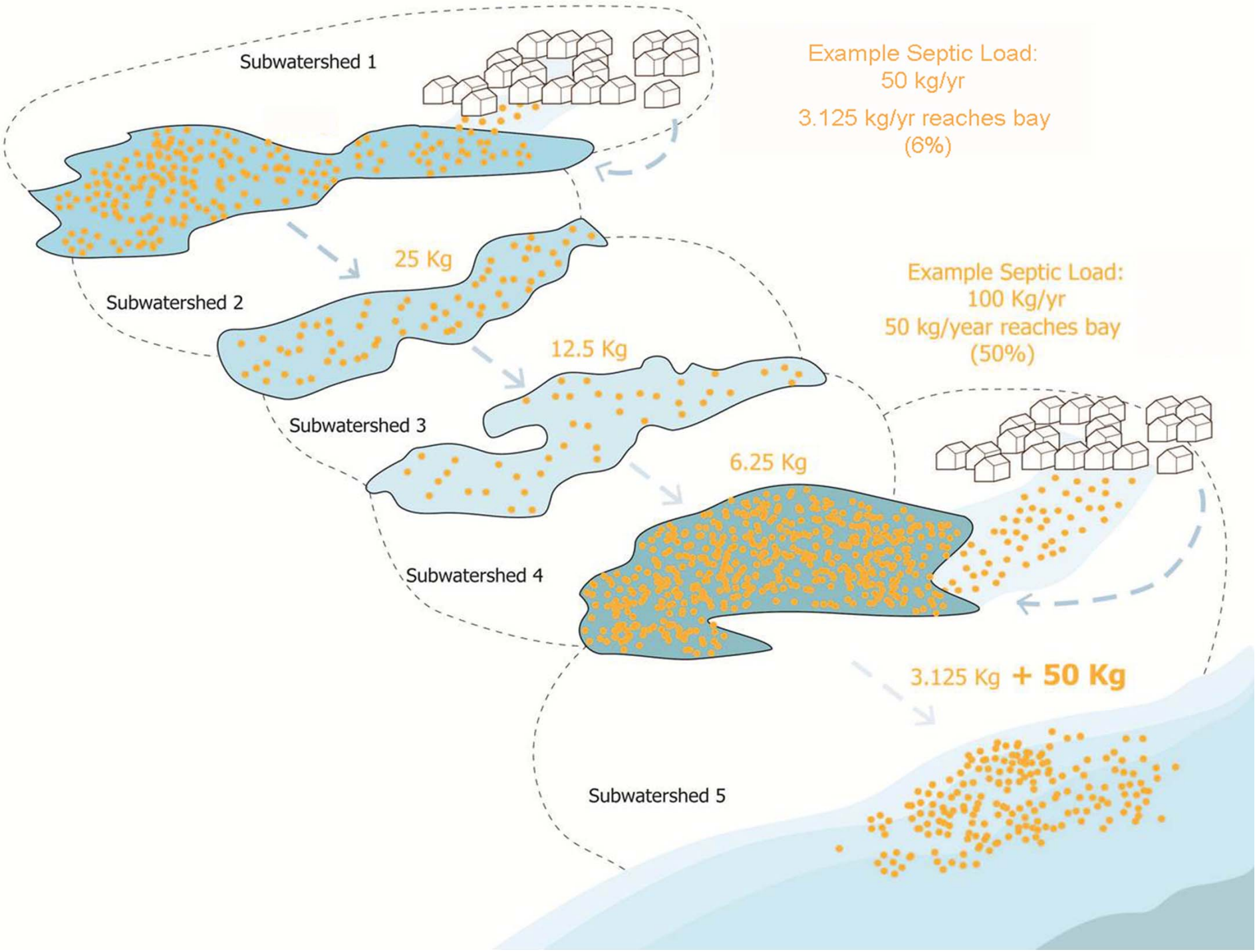



Subwatershed 1
Example Septic Load:
50 kg/yr
Subwatershed 2
Subwatershed 3
Subwatershed 4
Subwatershed 5


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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(50%)
12.5 Kg
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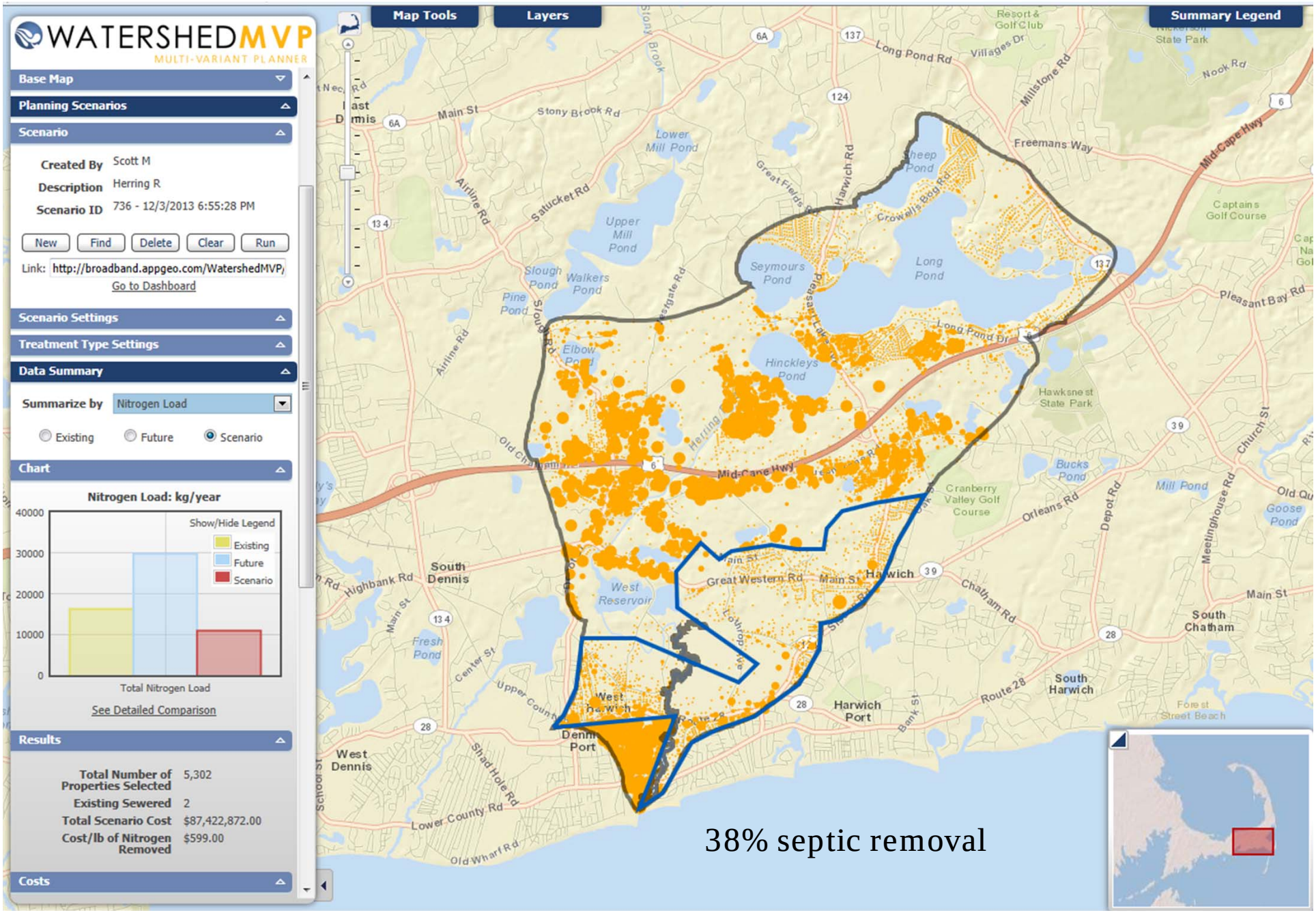
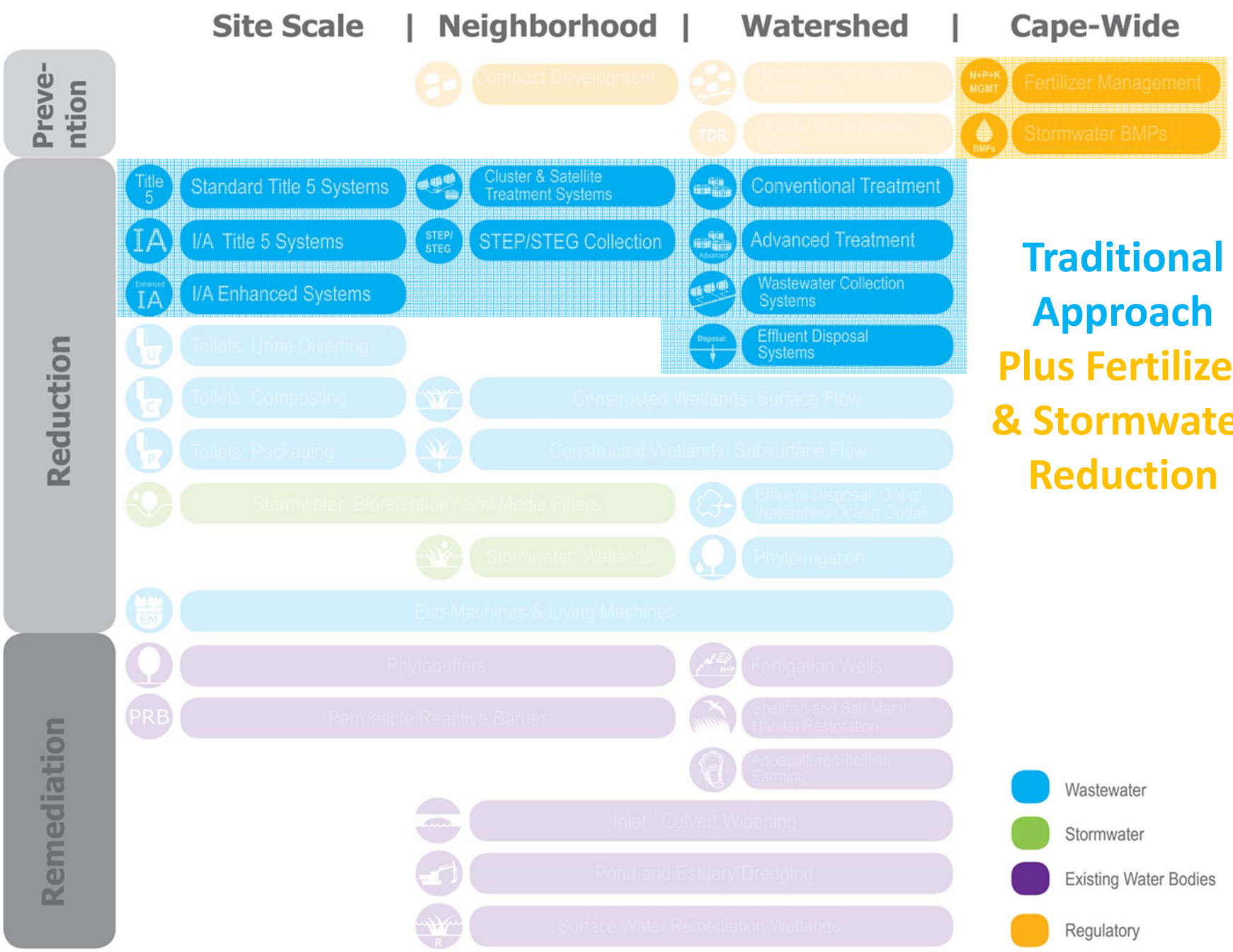
3.125 Kg + 50 Kg
Subwatershed 5

Targeted Centralized Treatment with Disposal Inside the Watershed

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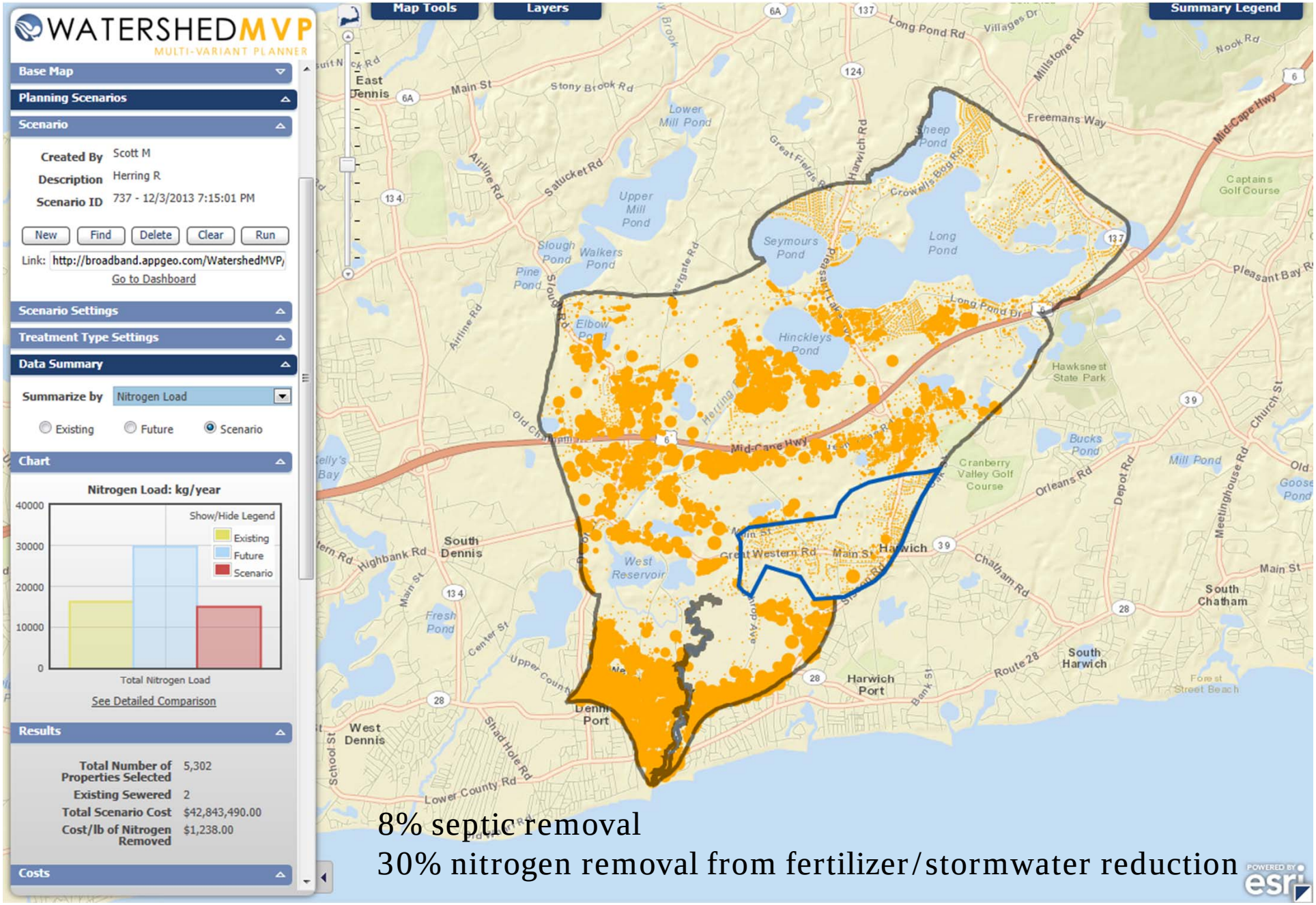
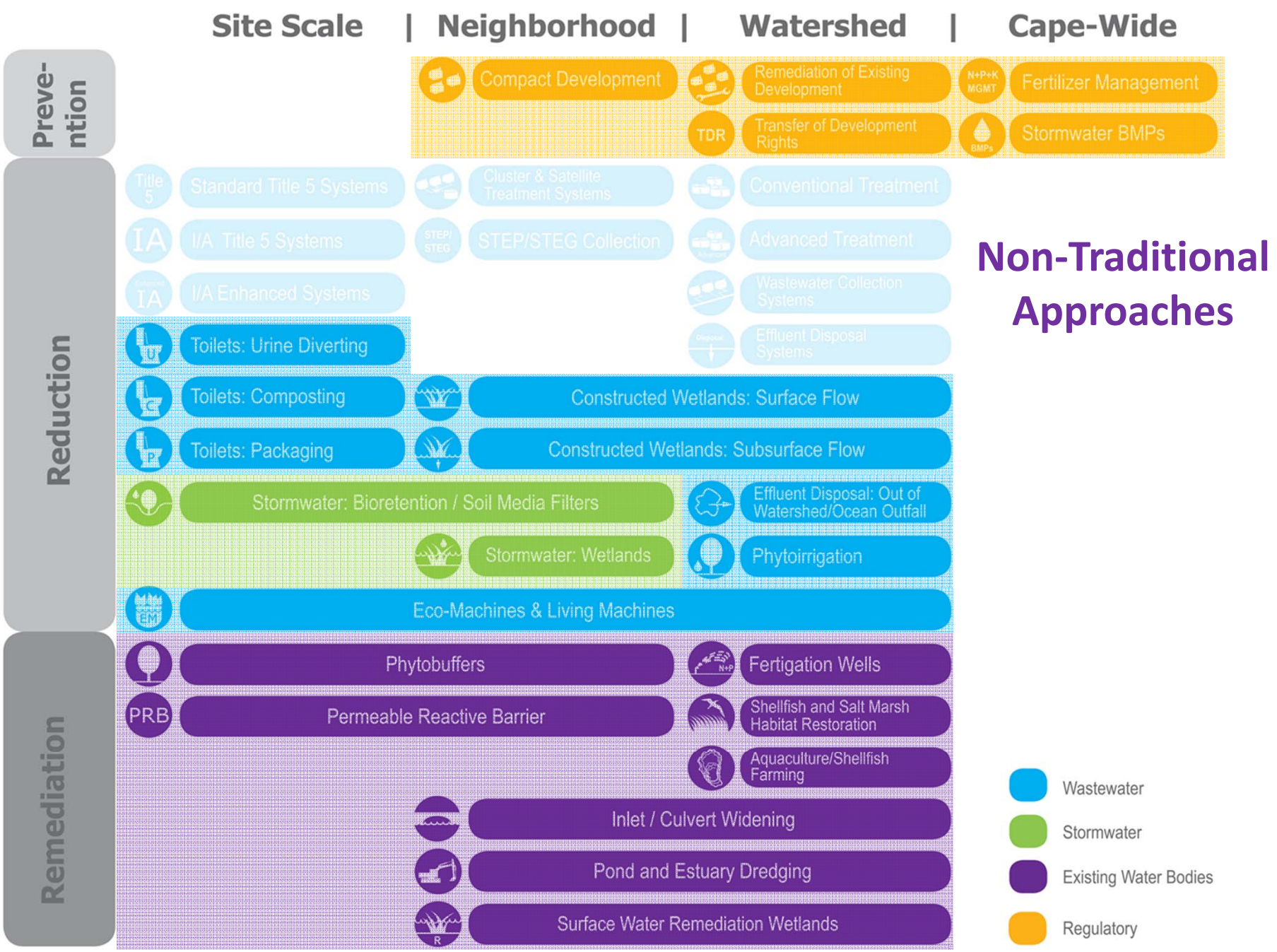
Targeted Centralized Treatment with a 50% Reduction in Fertilizer and Stormwater

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Stormwater
Existing Water Bodies
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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 **Herring River**

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		62.816	22,928
wastewater		38.602	14,090
fertilizer			5,027
stormwater			2,537
Target Nitrogen Load:		47.975	17,511
Nitrogen Removal Required:		**14.841**	**5,417**
Total Number of Properties:	5,302		

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Alternative On-Site Options:					
I&A Technologies	25	homes	58	-45	$1,607

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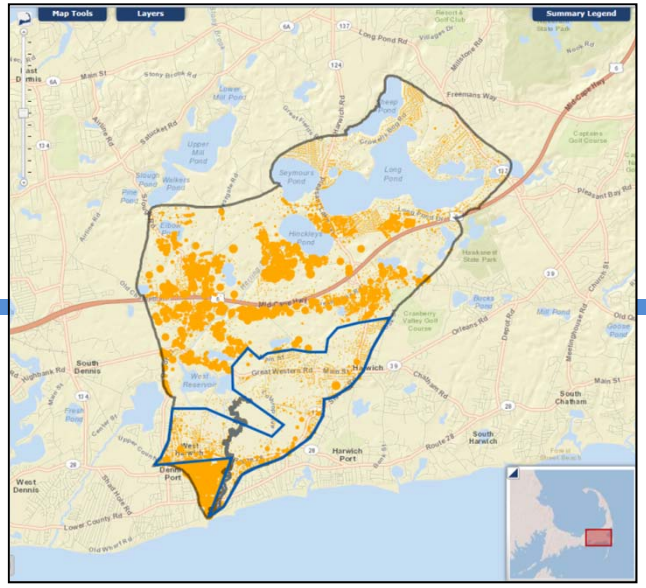
Alternative On-Site Options:					
I&A Technologies	25	homes	58	-45	$1,607
Sewering	-10	homes	-45	0	$1,000

Total To Meet Goal (Kg/yr): 0 $102

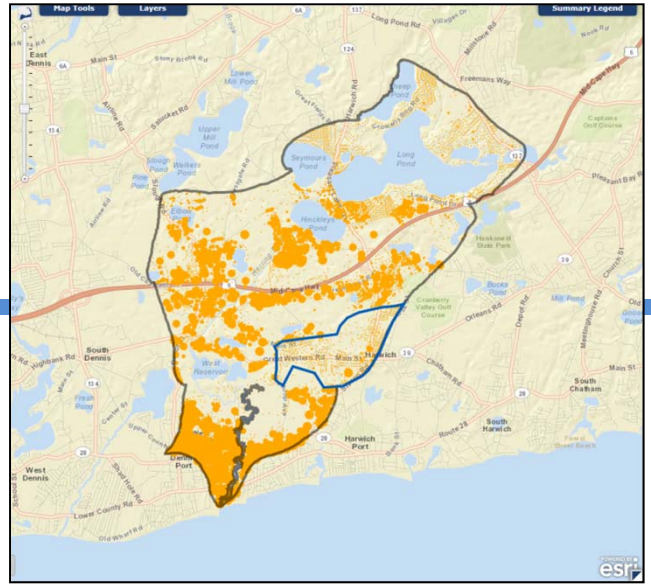
Scenario Comparison

Targeted Collection



- Achieves TMDL[1]
- Cost/lb N = $599
- Treated Flow = 222,000 gpd

Targeted Collection after a 50% reduction in fertilizer and stormwater



- Achieves TMDL[1]
- Cost/lb N = $1,238
- Treated Flow = 83,000 gpd

Collection is unnecessary is each alternative performs as presented in alternatives calculator.

[1] within 5% of goal

"Watershed Working Group - Herring River - Workshop 3"

"Watershed Working Group - Herring River - Workshop 3"

"Watershed Working Group - Herring River - Workshop 3"

Adaptive Management:

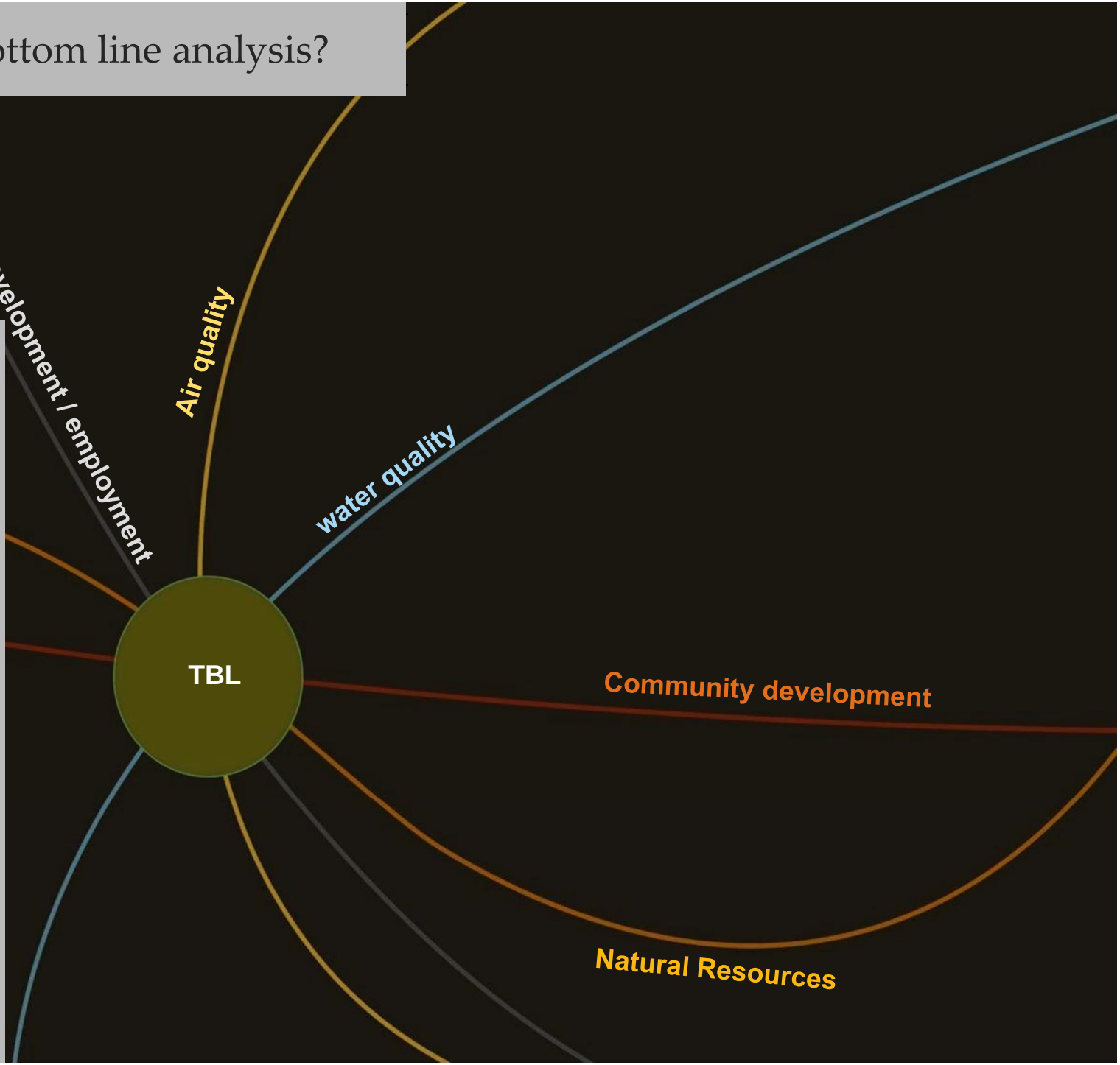
A structured approach for addressing uncertainties by linking science and monitoring to decision-making and adjusting implementation, as necessary, to increase the probability of meeting water quality goals in a cost effective and efficient way.

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

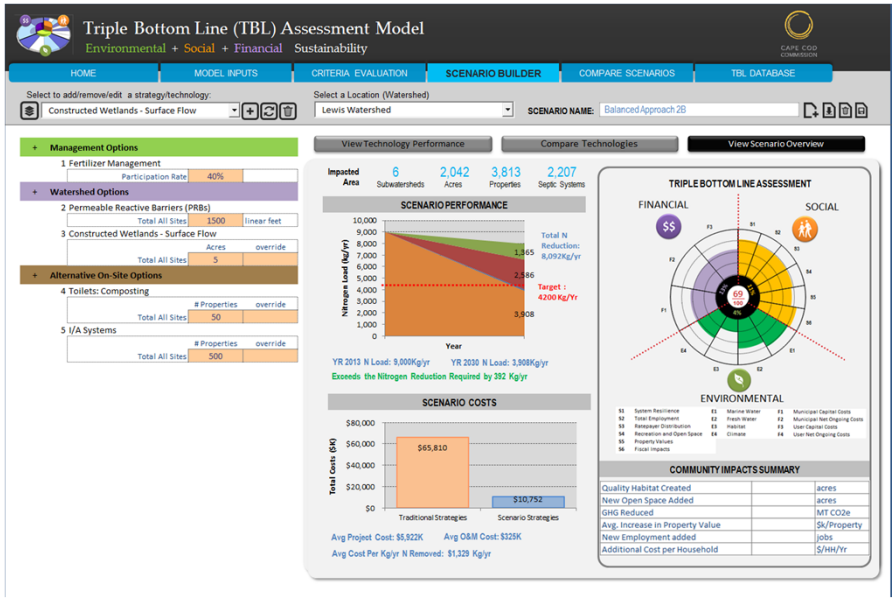
Often "TBL" analysis is used to identify the best alternative and to report to stakeholders on the public outcomes of a given investment.

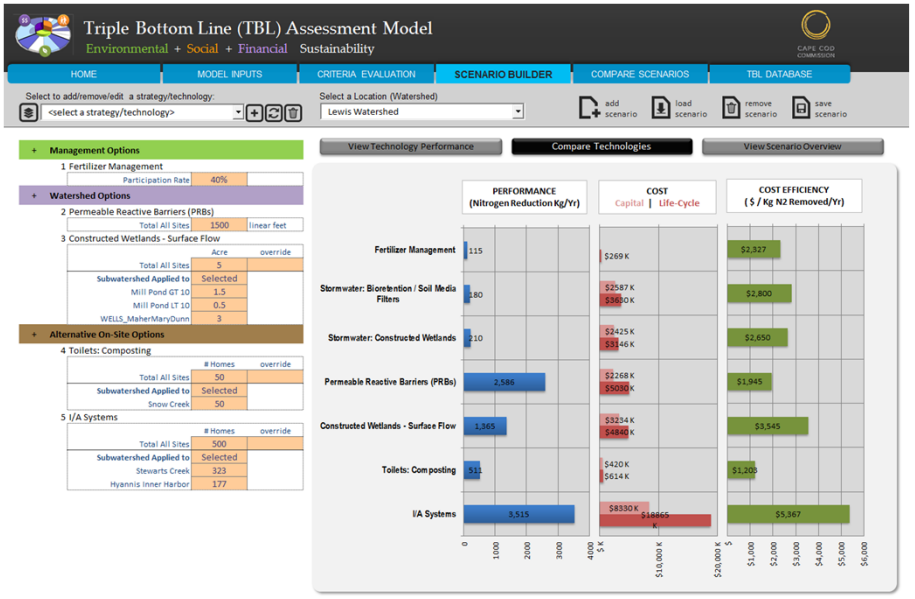


Why develop a TBL model?

- 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

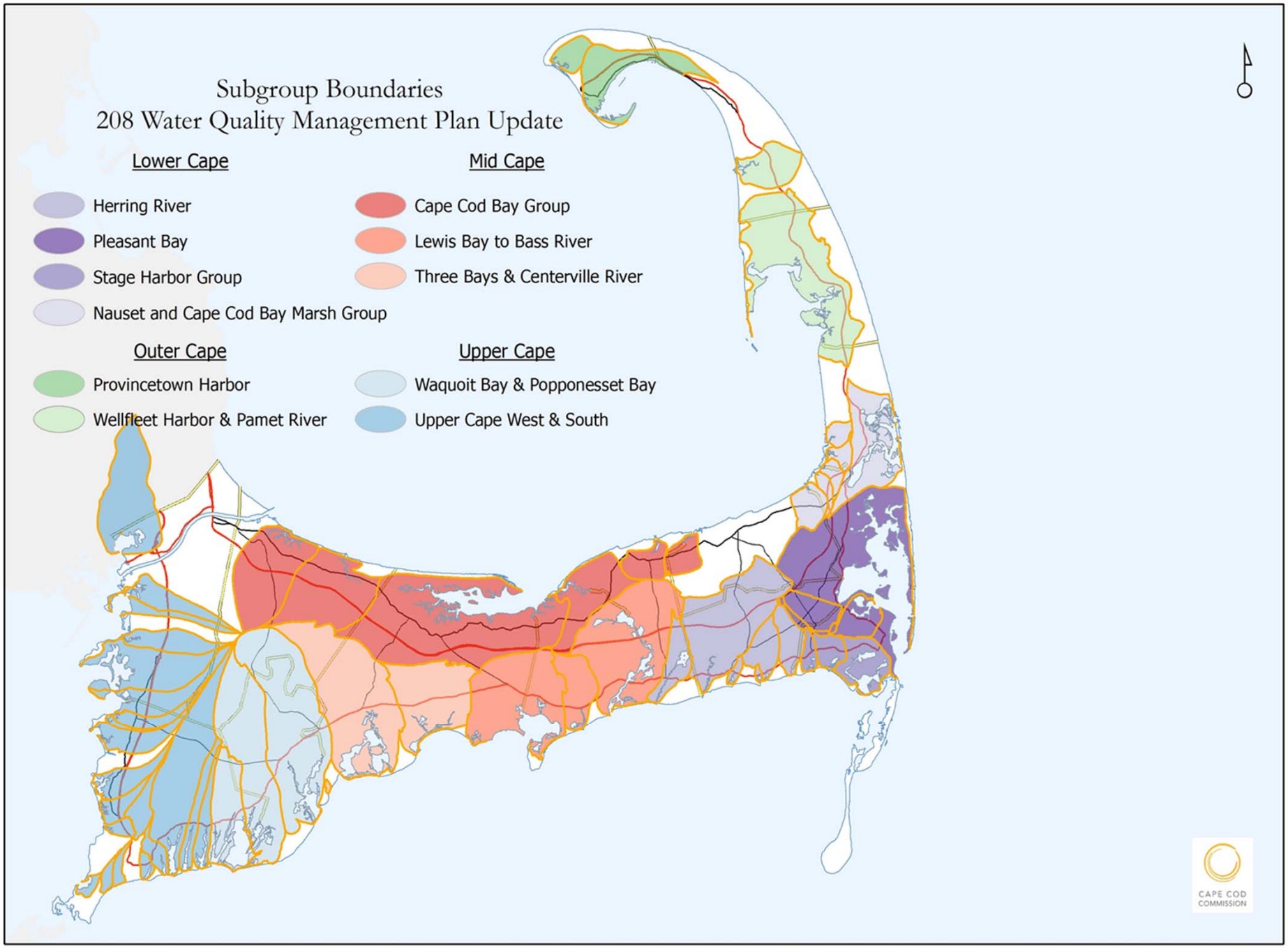
	Scenario 1	Scenario 2	Scenario 3
	Minimum Cost	Cost Effective	Maximum Performance

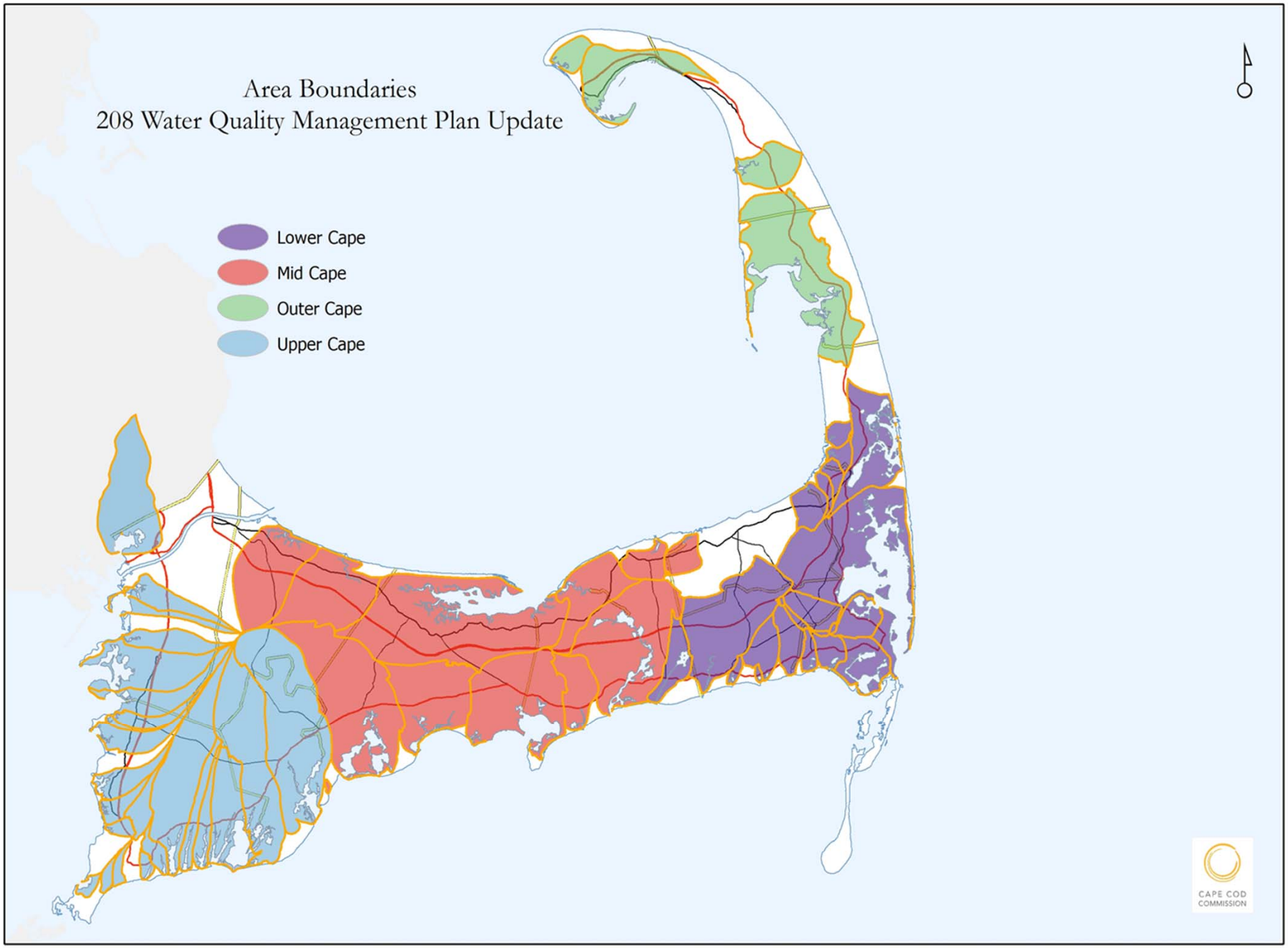
Criterion Scores

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

COST & PERFORMANCE	Scenario 1	Scenario 2	Scenario 3
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
Herring River, Harwich Watershed Working Group

Meeting Three
Thursday, December 5, 2013
8:30 – 12:30 am
Harwich Community Center 100 Oak Street Harwich, MA

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.
- 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

- Update the sample scenarios provided based on working group input.
- Further develop scenarios for different areas within the Herring River study area.
- Give working group members the opportunity to comment on the criteria being used in the Triple Bottom Line analysis tool (at January/February Stakeholder Summit).

II. WELCOME AND OVERVIEW

Patty Daley, Deputy Director and Area Manager, 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 focused on exploring technology options and approaches. These third meetings of the Watershed Working Groups will focus on evaluating watershed scenarios. These scenarios are informed by Working Groups' discussions at previous meetings about baseline conditions, priority areas, and technology options/approaches.

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

Ms. Daley 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;
- 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 (CBI), 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. The scenarios presented today should reflect the input that participants have already given in this process. She also reviewed action items including:

- Kate incorporated the changes submitted to the previous meeting summary and asked participants to submit final comments on that summary as soon as possible.
- The Commission has updated the chronologies.
- Stakeholder representation in the groups: for the next series of stakeholder engagement meetings starting in January, the Commission and CBI will continue to try to bring in broad representation.
- The revised technology fact sheets should be up on the Watershed website next week: http://watersheds.capecodcommission.org/index.php/watersheds/lower-cape/herring-river

III. INITIAL SCENARIOS FOR THE HERRING RIVER WATERSHED

Patty Daley explained the Commission's process to develop watershed scenarios. Two teams were formed: one team is exploring "traditional" technologies and approaches (permitted technologies such as sewering and I/A systems), most of which are already permitted. Another team is exploring "alternative" or "non-traditional" technologies and approaches. The teams are both working under the assumption that fertilizer and stormwater reductions will reduce the footprint required for wastewater infrastructure.

Whole Watershed Conventional Scenarios

Scott Michaud, Hydrologist, Cape Cod Commission, led the discussion of "traditional" technologies and approaches. He explained that the scenarios were developed using the Commission's Watershed Multivariant Planner (MVP) Tool. To meet the Total Maximum Daily Load (TMDL), the Herring River watershed area needs a 38% reduction in wastewater nitrogen. He offered 2 scenarios:

- Watershed-Wide Innovative/Alternative (I/A) Onsite Systems

    - Deploying de-nitrifying septic systems for every property in the watershed results in 27% removal. Estimated cost/pound of N removed: $1,000.
- Watershed-Wide Centralized Treatment with Disposal Inside the Watershed
    - Connecting every property in the watershed to centralized treatment results in 81% removal, at $500/pound of N removed. This scenario over-achieves nitrogen reduction compared to target reduction goals.

With the aid of a GIS image, Scott explained which areas of the watershed are up gradient versus down gradient of local ponds. He also explained natural attenuation of nitrogen and how that relates to overall loads. Fresh water ponds attenuate an estimated 50% of nitrogen. One possible solution is to collect wastewater in areas that are not attenuated naturally and move it to areas that are.

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

- *Who bears the cost?* Mr. Michaud responded that onsite systems are typically the responsibility of the homeowner and a centralized system is typically under town management. However, each town must decide how to allocate costs.
- *These targets are based on existing loads, not including growth*. 100% of future nitrogen load will have to be removed assuming that the targets for existing loads are met.
- *Would a third party manage or inspect the I/A systems?* Ms. Daley responded that there are different ways to manage inspection and maintenance. It could be the responsibility of the individual, the town, or the county. For instance, the town could hire a contractor to service and inspect the systems to make sure they're performing as they should.
- *A stakeholder raised concerns about where the effluent goes when it's disposed inside the watershed, and concerns about having a high concentration of nitrogen in one area.*
- *Participants raised concerns about dealing with phosphorus, and concerns that the Commission is treating phosphorus and nitrogen as mutually exclusive*. Scott responded that phosphorus works very differently than nitrogen, and the 208 Plan update will address both. Phosphorus binds with the soil, so the further you are away from a pond, the less it enters the fresh water body.

Mr. Michaud presented traditional approaches that meet TMDLs, one of which is combined with a 50% reduction in fertilizer and stormwater.

- Targeted centralized treatment that removes wastewater nitrogen loads
    - Collection of approx. 220,000 gallons per day
    - Estimated cost/pound of wastewater nitrogen removed: $600 per pound.
- Targeted centralized treatment with a 50% reduction in fertilizer and stormwater
    - Fertilizer and stormwater make up about 63% of the wastewater nitrogen load in this area. With this approach, the infrastructure footprint size is much smaller than targeted collection without the fertilizer/stormwater reduction.
    - Collection of approx. 83,000 gallons per day

- Estimated cost/pound of wastewater nitrogen removed: $1200 per pound. This Cost is higher than the $600/lb under the previous scenario because collection is focused on Harwich Center, where nitrogen in groundwater is naturally attenuated before it reaches the estuary. Hence, wastewater collection in this area removes less nitrogen otherwise entering the estuary than if wastewater were collected from a portion of the watershed where nitrogen is not naturally attenuated.

Working Group members had the following questions and comments about this scenario:

- *Participants requested that the Commission provide total cost estimates for sewering with and without fertilizer/stormwater removal. Participants understood that it is difficult to estimate this, but they worried it would be misleading to present the numbers in any other way*.
- *Have fertilizer reduction regulations already been passed?* Ms. Daley responded that the Commission has adopted a District of Critical Planning Concern (DCPC) allowing interested towns to adopt fertilizer control through 2014. *Another participant added that adopting the fertilizer bylaw confers a 50% credit from MA Department of Environmental Protection (DEP), which, in this watershed is a very significant amount of money to the town.*
- *Are there any innovative stormwater collection technologies in Harwich?* Other working group members responded that there are a few, with more being implemented each year.
- *Working group members discussed the tradeoffs between development density and designing for innovative stormwater removal. Techniques that allow for both can be found in: the smart growth toolkit, Hyannis's growth incentive zone design guidelines, the UNH Stormwater Center website.*
- *The working group discussed fertilizer management. A participant commented that three-quarters of the fertilizer use in this area comes from home lawns, and it will take a lot of public education in order to reduce this. Most golf courses have already reduced their use by 50%.* Participants raised concerns that if towns pass fertilizer regulations and get the 50% nitrogen reduction credit, their actual use may not reduce by 50%. They suggested that monitoring would be an ongoing challenge.

Whole Watershed 7-Step Scenarios (Alternative Technology and Approaches)

Mark Owen, AECOM, 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. Using the 7-step process, the Commission has developed a watershed calculator which outlines targets and

goals and specifies how much nitrogen needs to be removed to meet the TMDL. The calculator is based on current development, not future development. These scenarios include an assumption of a 50% reduction (credit) from fertilizer and stormwater management. Mr. Owen presented one scenario for the Herring River watershed that includes a combination of alternative technologies and approaches.

Watershed/Embayment Options

- Permeable reactive barriers (PRBs)
    - 250 homes worth of nitrogen, 770 kg/year reduction, estimated cost $452 per pound of nitrogen. This treats nitrogen that enters the groundwater.
- Fertigation wells
    - Could be used on golf courses, but there are other areas that could use it too, e.g. playing fields. 1 golf course, 136 kg/year reduction, estimated cost $438 per pound of nitrogen.
- Phytoremediation
    - 1 acre, 266 kg/year reduction, estimated cost $254 per pound of nitrogen.
- Floating constructed wetlands
    - 1000 cubic feet, 450 kg/year reduction, estimated cost $61 per pound of nitrogen or $25 per cubic feet of wetland constructed.
    - This is a new technology just added to the matrix, hydroponic. You can walk on them, hang oysters, could use seaweed in salt water, and can install solar pumps to circulate water. They require some maintenance: cutting vegetation and harvesting oysters. They can be built with local materials and stocked with local plans. Can be very aesthetically attractive. They are not damaged if the pond freezes. They are very cost effective for the high amount of nitrogen they remove.

Alternative on-site options

- IA technologies
    - 25 homes, 58 kg/year reduction, estimated cost $1607 per pound of nitrogen

The combination of technologies in this scenario would meet the TMDLs with no sewering.

Working group members had the following questions and comments on this scenario *(in italics)*:

- *How deep do the PRBs go?* Mr. Owen responded that depth is site specific. They would mainly be installed in streets so that they don't affect people's property, although you need to consider utilities.
- *Do PRBs need to be maintained?* Mr. Owen replied that the trench PRBs last 20-30 years without much maintenance. The well PRBs that have carbohydrates injected do require some maintenance. The carbohydrate lasts about 20-25 days and could be syrup, vegetable oil, etc. depending on the groundwater quality. However, for the well-style PRBs, the cost of maintenance is often offset by the savings of not having to dig a trench.

- *If a neighborhood association wanted to build a floating constructed wetland, how would they get it permitted?* Ms. Daley responded that if the pond is over 10 acres, would need to go to state for permitting.

Working group members had the following overall comments, questions, and reactions to the three scenarios presented *(in italics)*:

- *How have the non-traditional approaches been perceived by the other working groups?* Ms. Daley responded that there seems to be acceptance and some consensus that we should look into the alternative technologies; many people share the attitude that we should find solutions that confer "the most bang for our buck". Various Herring River working group members commented that it makes sense to start with the least-cost low-hanging fruit before getting into more costly solutions.
- *Has the Commission looked at what solutions have been used in other places, such as the Chesapeake Bay?* Ms. Daley replied that the whole technology matrix is based on external research of solutions from other places, including the Chesapeake Bay. Two of the Technology Panel members advising the Commission in the development of the technologies matrix have a lot of past experience in the Chesapeake Bay.
- *Working group members discussed the timeline of different solutions, and commented that sewering has a very long phase-in period, while many of the alternative solutions could show results very quickly. A working group member added that, if we have a technology that works now and is inexpensive, we are not taking a big risk by trying it out. The plan should implement some solutions right away and some later*.
- *A participant raised a concern about the increase in nitrogen in the embayments from when the MEP studies were completed until the solutions are implemented. It's possible that we have not yet seen the height of the nitrogen concentration already in the groundwater. Some of the TMDLs might still go up.*
- *A participant asked if a given solution fails, is it a disruptive permanent feature or is it unobtrusive? Would it have to be removed?*
- Ms. Daley commented that the Commission would be adding a column on co-benefits, in addition to nitrogen removal, to the technology matrix.
- *Why is it difficult to have technologies pre-approved in a "toolbox" and pick and choose different ones as needed?* The Commission responded that state and federal permitting is what makes this difficult.
- *A working group member made the suggestion that having a traditional/conventional plan in place as a backup might help convince regulators to approve permits for the non-traditional approaches. It would convey the idea that we are serious about cleaning up our water.*
- *Owners' Unknown Land in the watershed should be analyzed to understand potential impact under traditional models and for the potential siting of alternative systems.*
- *There is a critical need to continue monitoring the Herring River Watershed.*

Kate Harvey, Facilitator, reminded participants of the priorities and concerns that they had raised at past Working Group meetings including. She asked if, given these priorities and concerns, they had suggestions on additional technologies or approaches that might be appropriate for this watershed. Stakeholders offered the following comments, questions, and recommendations about additional projects:

- *The plan should be flexible enough to allow for the incorporation of new technologies that do not exist yet.*
- *Do fertigation wells involve a lot of infrastructure?* Mr. Owen responded that it depends. It involves piping the water from an area of groundwater high in nitrogen to wherever you want to use it, and installing an irrigation system. In the future, for instance when building new playing fields, we could consider installing these from the start.
- *What is the byproduct of the microbes in constructed wetlands?* The microbes break down the nitrogen and it is released as a gas. It is a very efficient natural process that does not produce a lot of byproducts.
- Using the calculator, the working group found that if they built five acres of constructed wetlands, they would meet the TMDLs without sewering. Ms. Daley commented that constructed wetlands are very efficient at removing nitrogen, however they need to be sited and designed correctly. There is a range in all of these numbers, which is why adaptive management is so important.
- Mr. Owen remarked that he does not think it likely that any of the technologies implemented will result in zero improvement; they should all provide some benefit. However, it is possible that they may not perform as well as the estimates, and will require some adaptation.
- *A working group member suggested another possible technology: phragmites that grows at the intersection of salt and freshwater, which takes up the nitrogen from the water and can then be harvested and disposed of elsewhere.*

IV. ADAPTIVE MANAGEMENT

Patty Daley explained the concept of adaptive management. The Commission's working definition is: a structured approach for addressing uncertainties by linking science and monitoring to decisions making and adjusting implementation, as necessary, to increase the probability of meeting water quality goals in a cost effective and efficient way.

Ms. Daley asked the working group to share their input about other things that should be included in this definition and in the Commission's approach to adaptive management. Working group members made the following comments and recommendations:

- Add the words "technology" and "social acceptability";
- Address the NIMBY issues and apathy of the population, regardless of the issue. Figure out how to engage the public;
- A course of action that seeks to get consensus through monitoring and feedback, and

then takes adaptive management measures;
- List the goal of the 208 Plan before giving the definition of adaptive management. Ms. Daley summarized the general goals of the 208 Plan: to achieve water quality improvements to meet TMDLs and restore ecological systems. A participant responded that the language of the goal is very technical and suggested that it be stated in more conversational terms.

Ms. Daley asked working group members to help the Commission to think through what an adaptive management Plan for this watershed might look like, including:

Time frame for monitoring:
- *Numerous participants suggested five years*;
- *A working group member commented that the Cape should not be a testing ground for new technologies, suggesting that we should use technologies that have already been proven.* Ms. Daley responded that because many of these technologies are new, they would have to be tested here. One benefit is that if we find something works well in one part of the Cape, it could be useful throughout the Cape;
- Ms. Daley stated that, for each technology, DEP would determine the timeline for which they need monitoring, generally at least 3 years. DEP issues nitrogen credits to the towns. In the next part of the stakeholder engagement process, the Commission will put together a monitoring committee in order to discuss monitoring across town lines and whether there are efficiencies to be gained if towns share monitoring services.

Additional projects (or Plan B if the innovative solutions don't work):
- *Have CWMP as a fall-back plan;*
- *Sewering works; whether it's the best solution in this case is another question. This is the baseline against which you have to evaluate everything else;*
- *When thinking about alternatives, there are a number of other factors to be taken into account, like zoning, etc;*
- *The plan should create space for incorporating new technologies that don't exist yet.*
- *How are the adaptive management plans implemented? Do the towns hire an adaptive management plan manager?* Ms. Daley responded that, yes, many towns do.

Suggestions for how to prioritize projects:
- *Cost effectiveness;*
- *Target projects where there are synergistic opportunities with other towns;*
- *Minimizing risk: if we use many different solutions across the whole watershed and one fails, it's less of a problem than if we use a single solution and it fails.*

V. PREPARING FOR 2014 JAN-JUNE

Erin Perry shared the Commission's plans for continuing stakeholder engagement into 2014

which includes:

Triple Bottom Line approach

The Commission is developing the Triple Bottom Line (TBL) analysis tool to help communities weigh the pros and cons of the various scenarios, including the "no action" alternative. Often TBL analysis is used to identify the best alternative and to report to stakeholders on the public outcomes of a given investment. It is helpful in order to consider the financial, environmental, and social consequences of water quality investment and policies on the Cape. It helps evaluate ancillary or downstream consequences of the scenarios.

- *A working group member asked how the Commission assigned values for the more social/subjective criterion?* Ms. Perry responded that AECOM is making the model based on a number of studies and existing research.
- Jay Detjens, GIS Analyst Cape Cod Commission, clarified that the TBL tool is for comparing scenarios within a single watershed, it is not a tool that is useful for comparing different watersheds' solutions with each other.
- *A working group member asked for a list of the social criteria*. Ms. Perry replied that the criteria are still being finalized, but right now the social criteria include: system resilience, employment, recreation, property values, and fiscal impacts.
- *A working group member stated that they would like to be able to comment on all of the criteria being used in the TBL model.* Ms. Perry responded that there will be opportunities to give input on this during the rest of the stakeholder engagement process in 2014.

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 eleven of the watershed subgroups in January. After this summit, the Commission will be aggregating the eleven subgroups into four 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.

VI. PUBLIC COMMENTS

Jackie Etsten commented that the Commission is basing their assumptions on land use data from a few years ago, which is going to become more and more out of date. She stressed that the Commission should take into account data on buildout. She feels they should overshoot rather than undershoot their estimates because there is a danger of spending a lot of public

money and still not meeting the targets. She also commented that, although this process focuses on water quality in the embayments, in the future they will likely have to address coastal water quality as well. She has seen coastal water quality decline at the beaches she uses, which is a direct discharge area.

APPENDIX ONE: MEETING PARTICIPANTS

Name	Affiliation
Working Group Members	
Larry Ballantine	Harwich Board of Selectman
Peter deBakker	Harwich Water Quality Task Force
Diane Chamberlain	Dennis Board of Health and Comprehensive Water Management Task Force
Joan Kozar	Harwich Planning Board
Jason Klump	Brewster Planning Board
Michael Lach	Harwich Land Trust
Sue Leven	Town of Brewster, Planner
Ed Nash	Golf Course Superintendents Association
Russell Schell	Brewster Comprehensive Water Planning Committee
Steve Swain	Concerned Citizen
Brooke Williams	Harwich Civic Association
Public	
Jackie Etsten	Harwich
Staff and Consultants	
Patty Daley	Cape Cod Commission
Kate Harvey	Consensus Building Institute
Carly Ipken	Consensus Building Institute
Maria McCauley	Cape Cod Commission
Scott Michaud	Cape Cod Commission
Erin Perry	Cape Cod Commission
Mark Owen	AECOM