Cape Cod 208 Area Water Quality Planning
Three Bays & Centerville River Watershed Working Group

Meeting Three
Wednesday, December 4, 2013 | 8:30 am – 12:30 pm
COMM Fire Station 1875 Falmouth Road, Centerville

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*

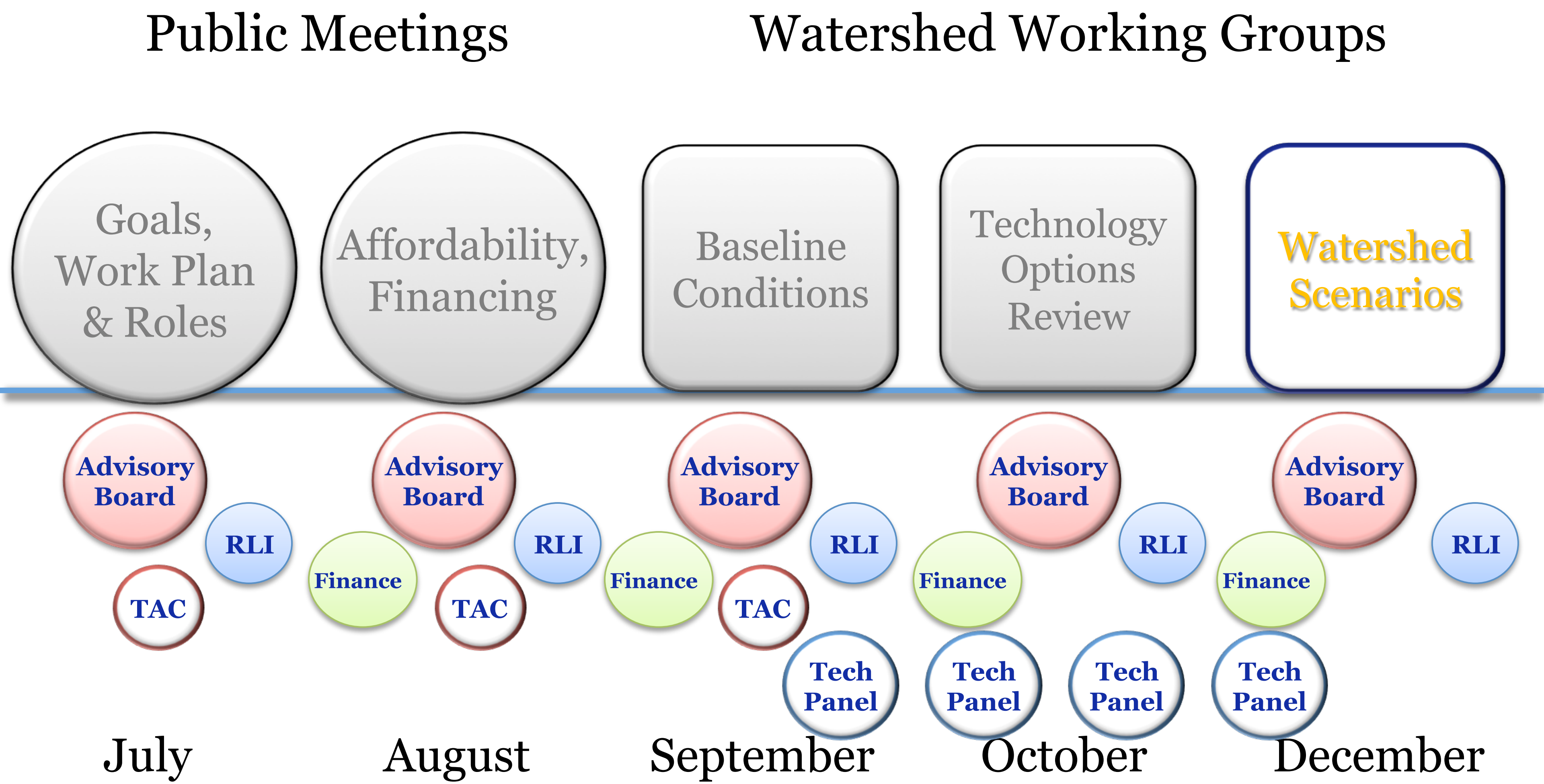
- Triple Bottom Line approach
- Identify Shared Principles and Lessons Learned
- Describe Next Steps

12:15 Public Comments

12:30 Adjourn

Three Bays & Centerville River Group

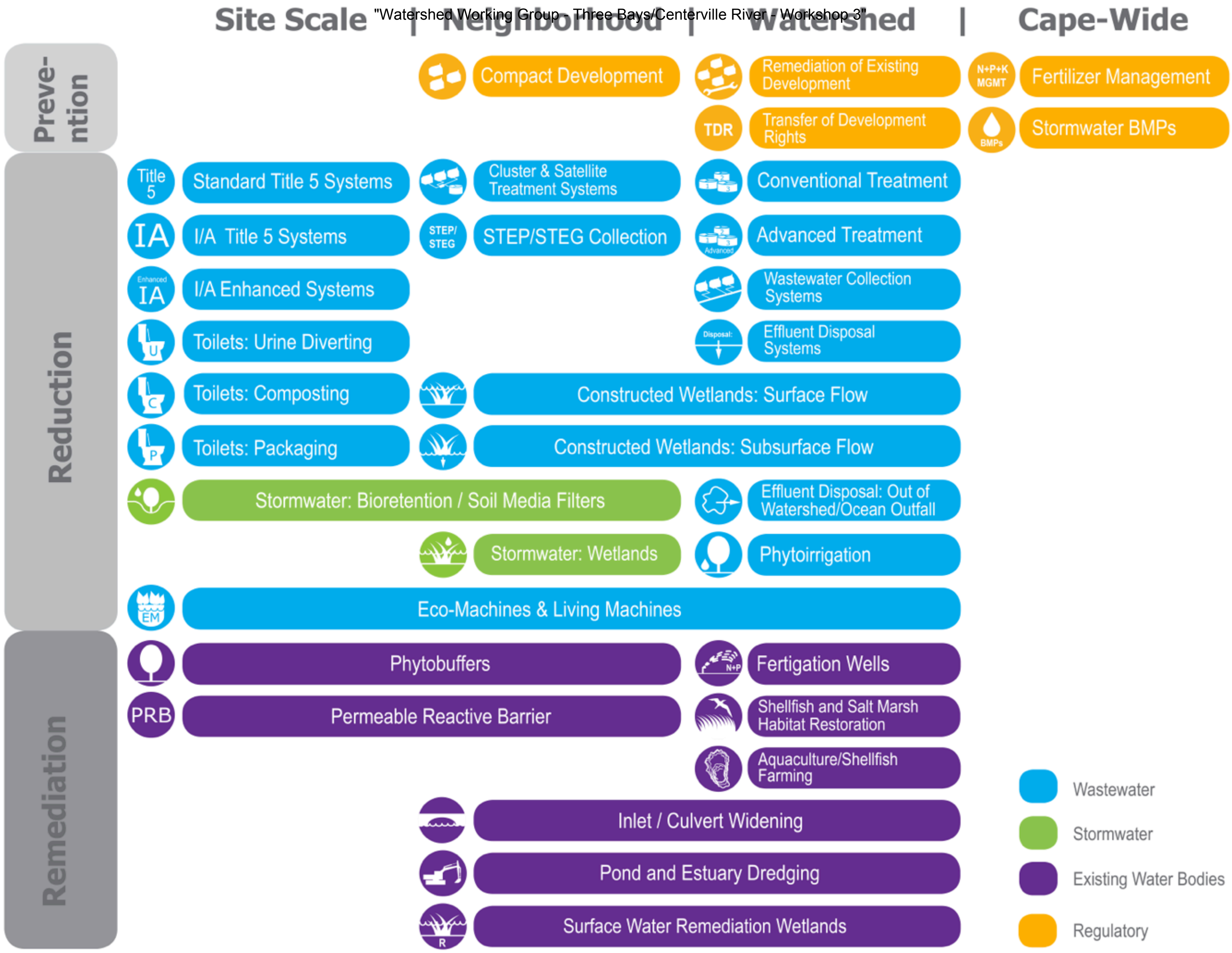
Watershed Scenarios



RLI Regulatory, Legal & Institutional Work Group

TAC Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process


Site Scale | Neighborhood | Watershed | Cape-Wide
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Remediation
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N+P+K MGMT
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TDR
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Toilets: Urine Diverting
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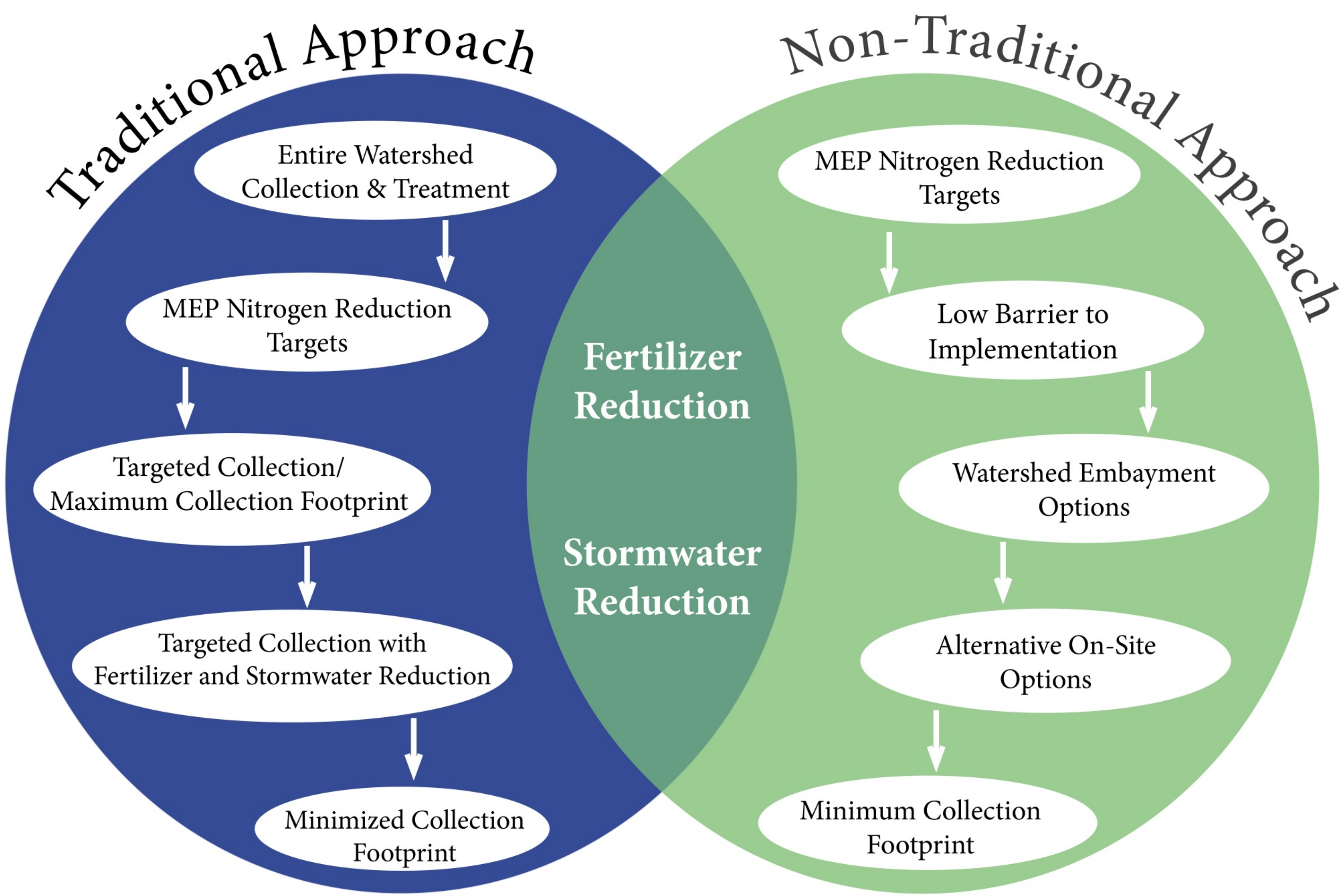
Regulatory

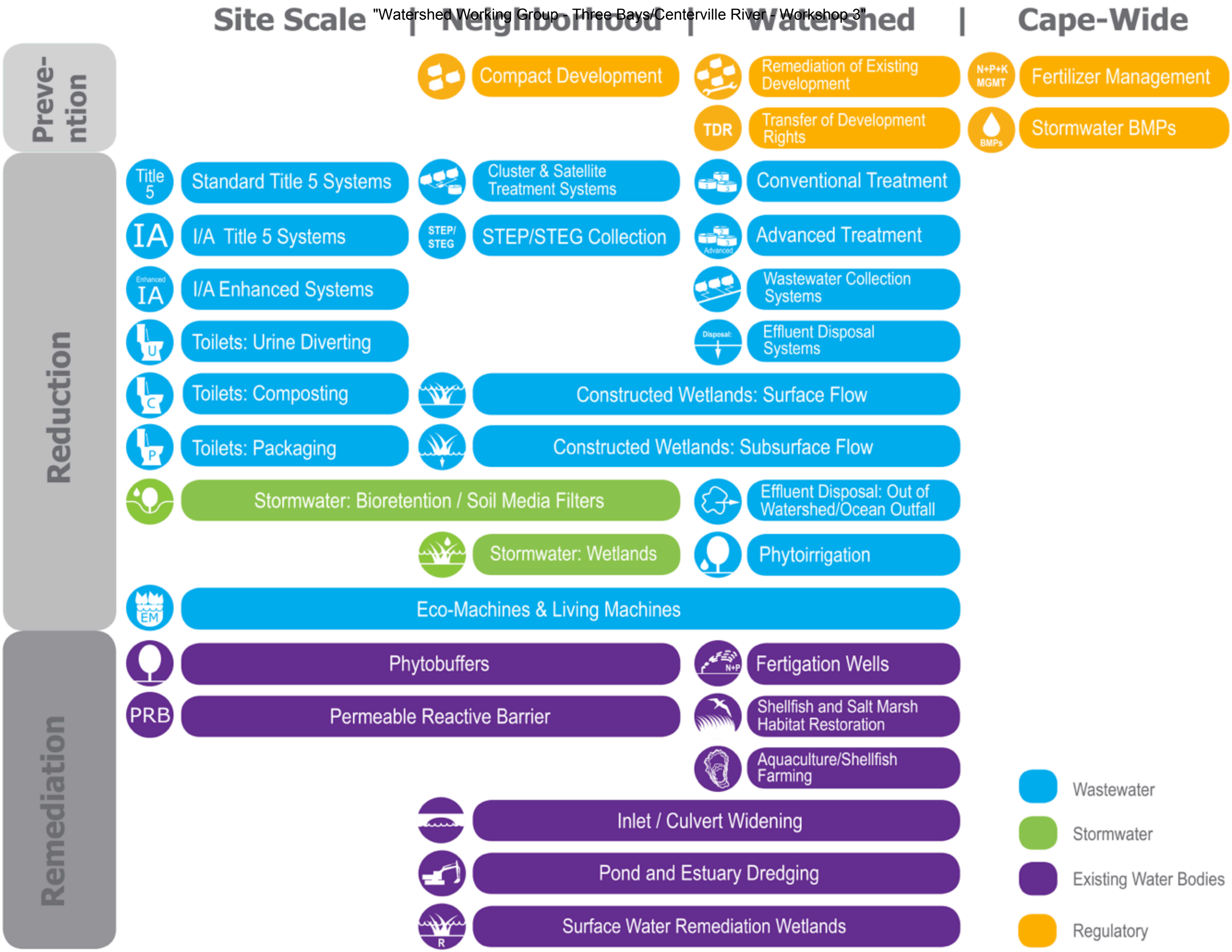
Watershed Scenarios

11 Working Group Meetings: Dec 2-11

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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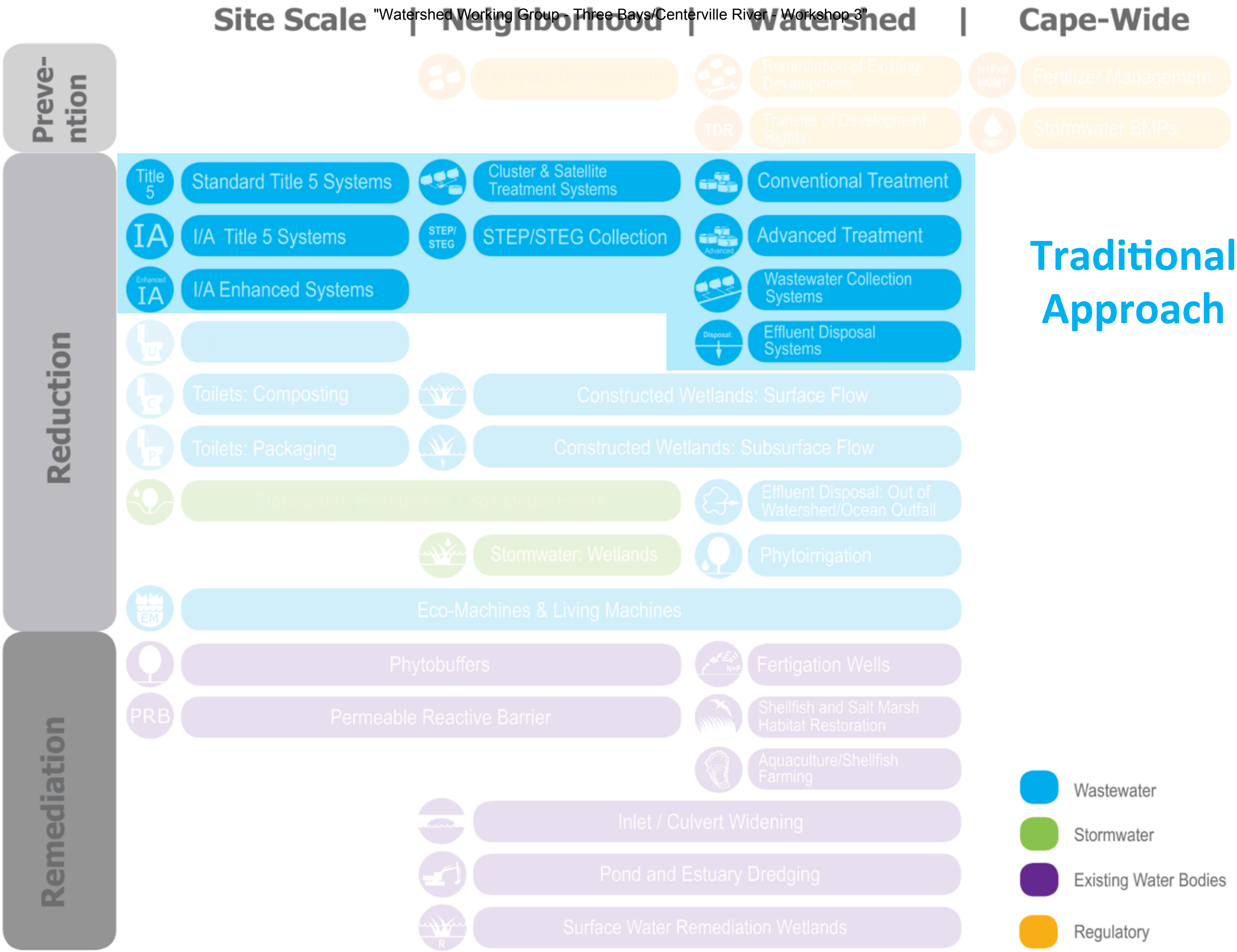

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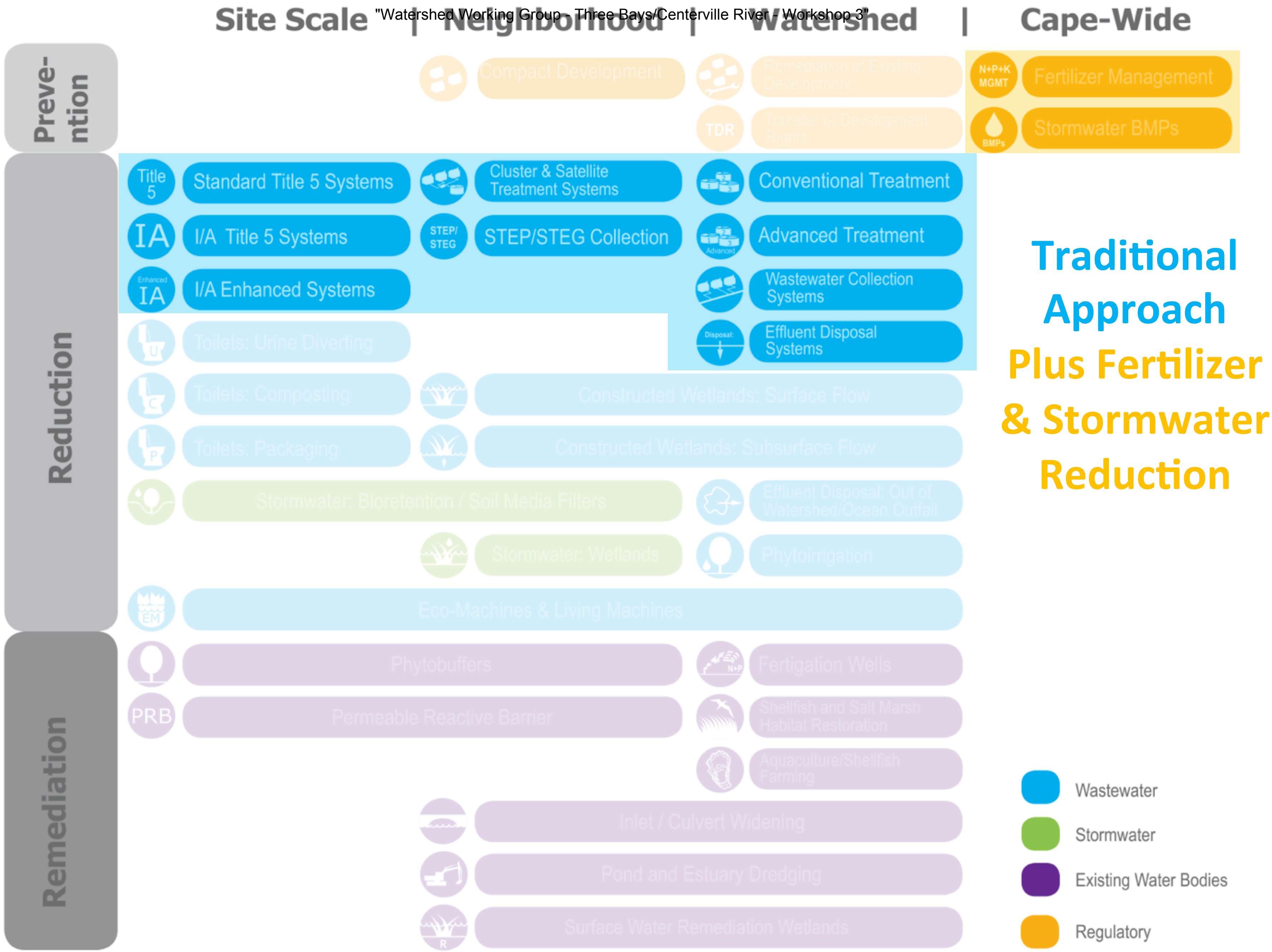
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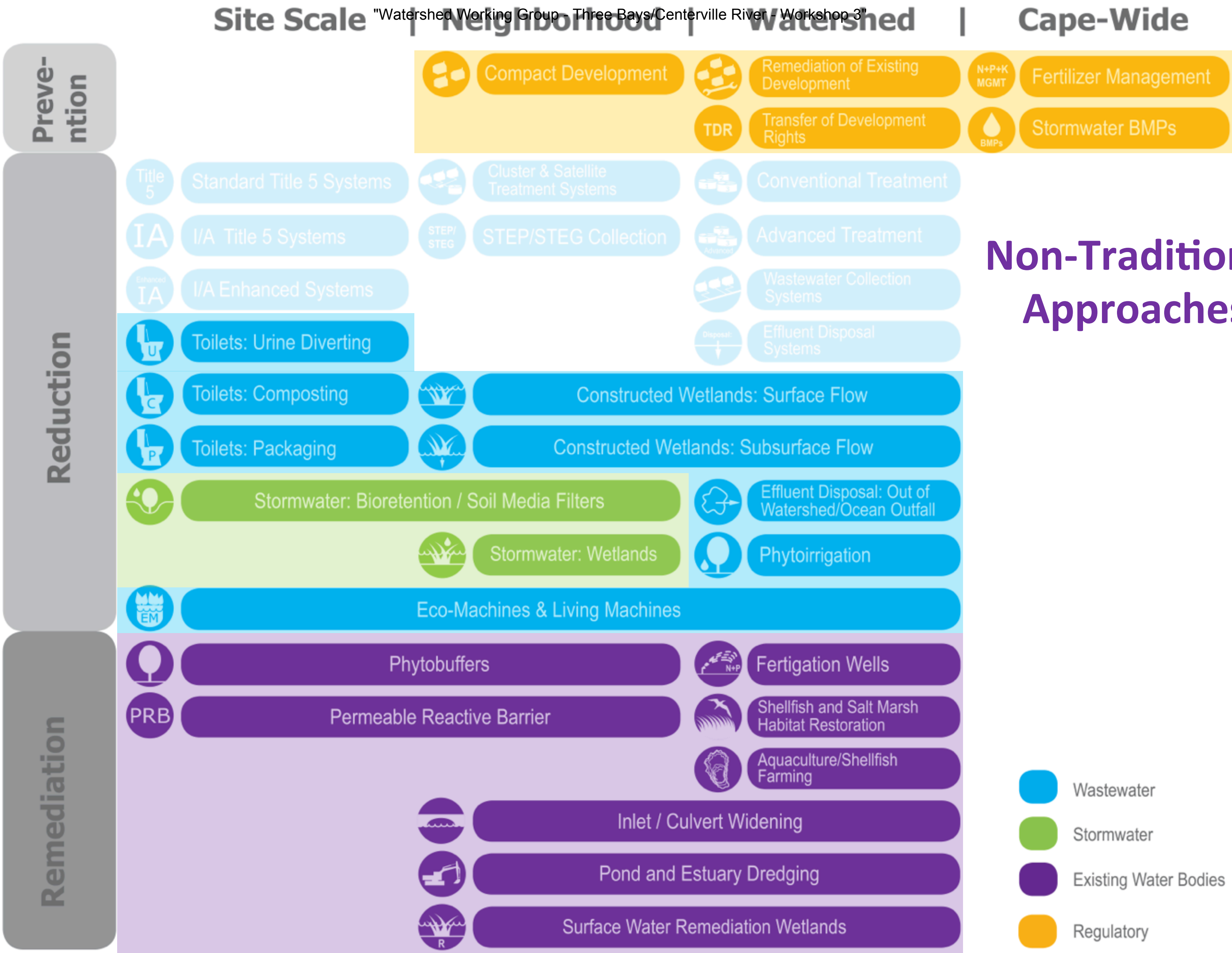
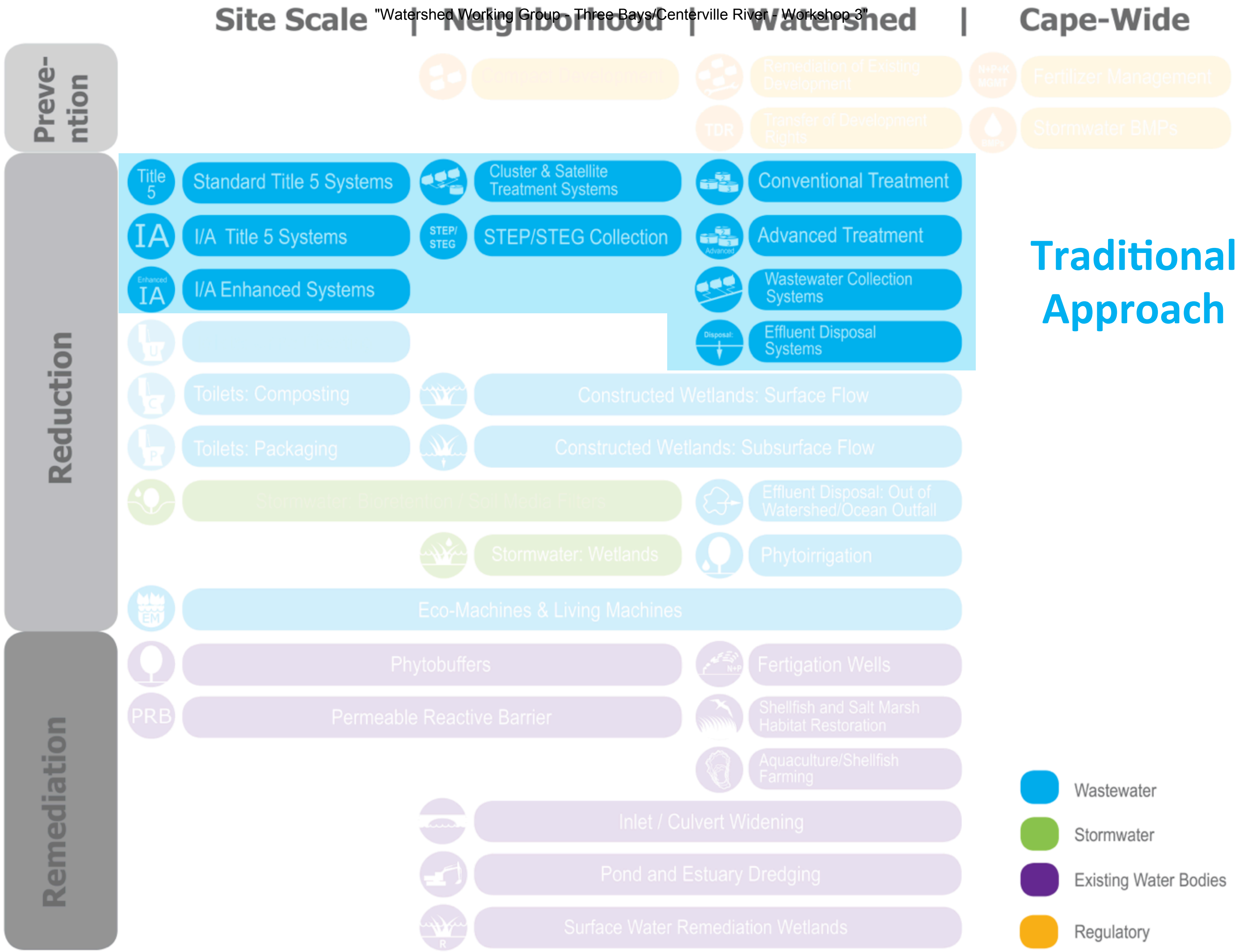
Non-Traditional Approaches

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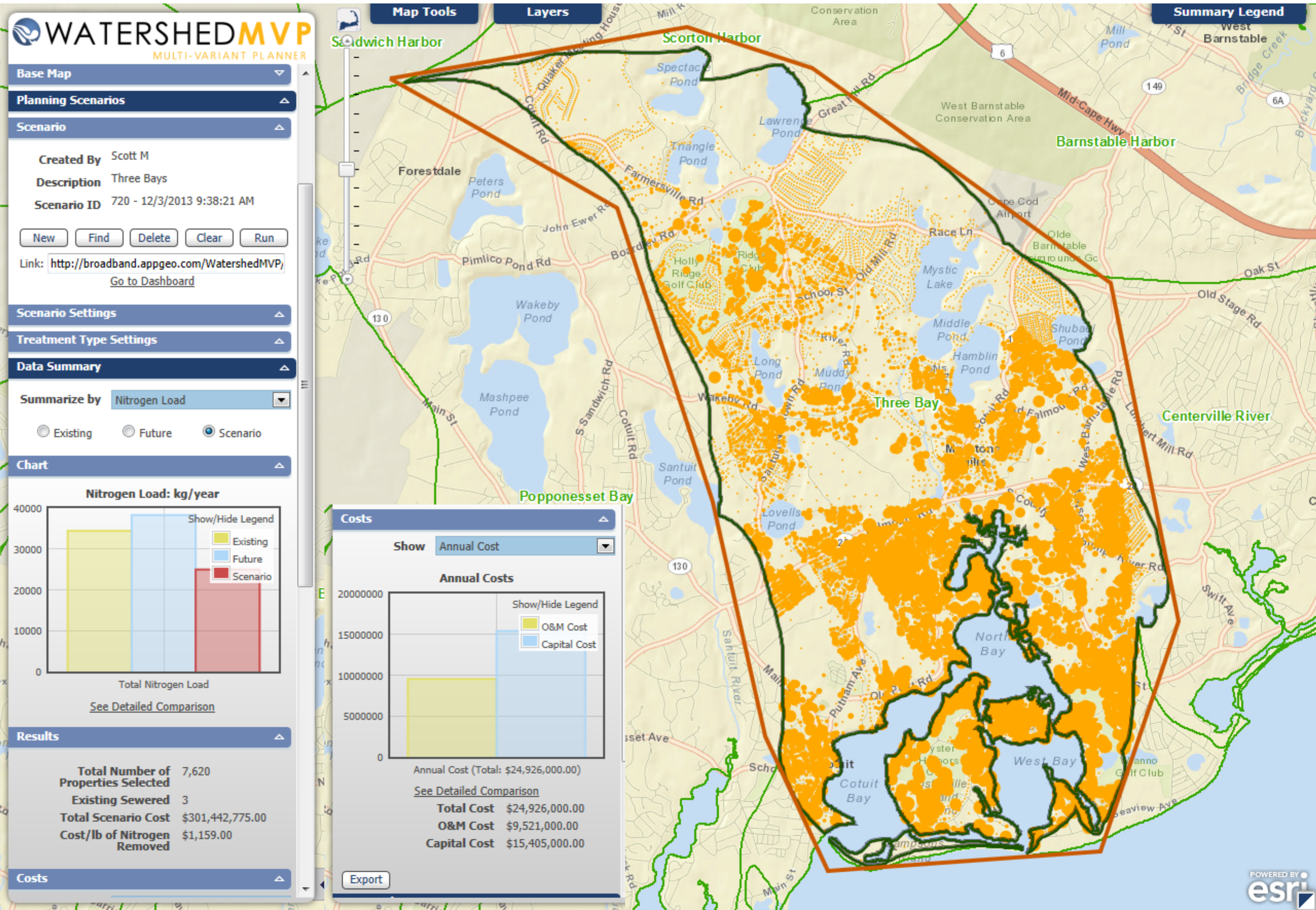
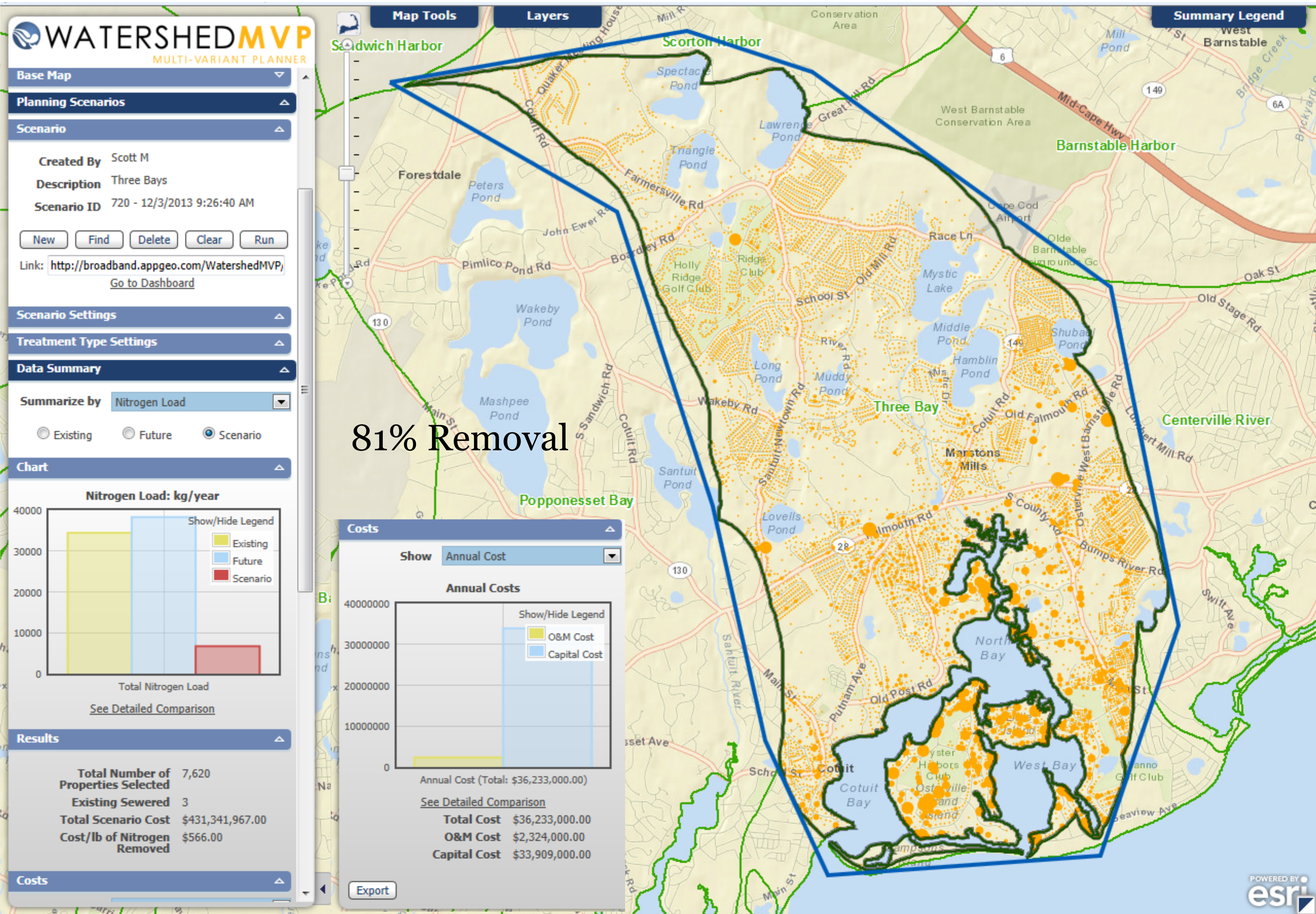
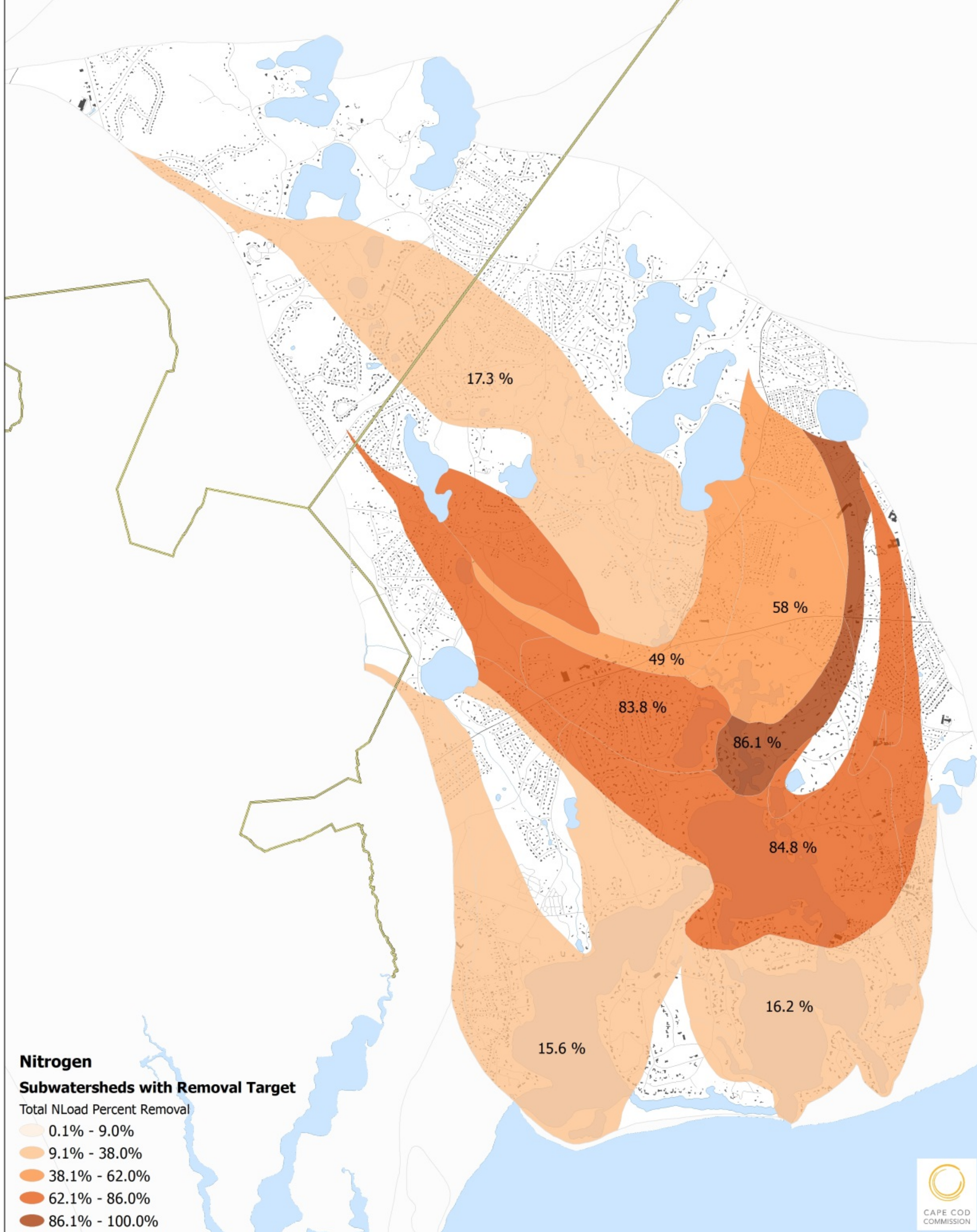
Watershed-Wide Innovative/Alternative (I/A) Onsite Systems

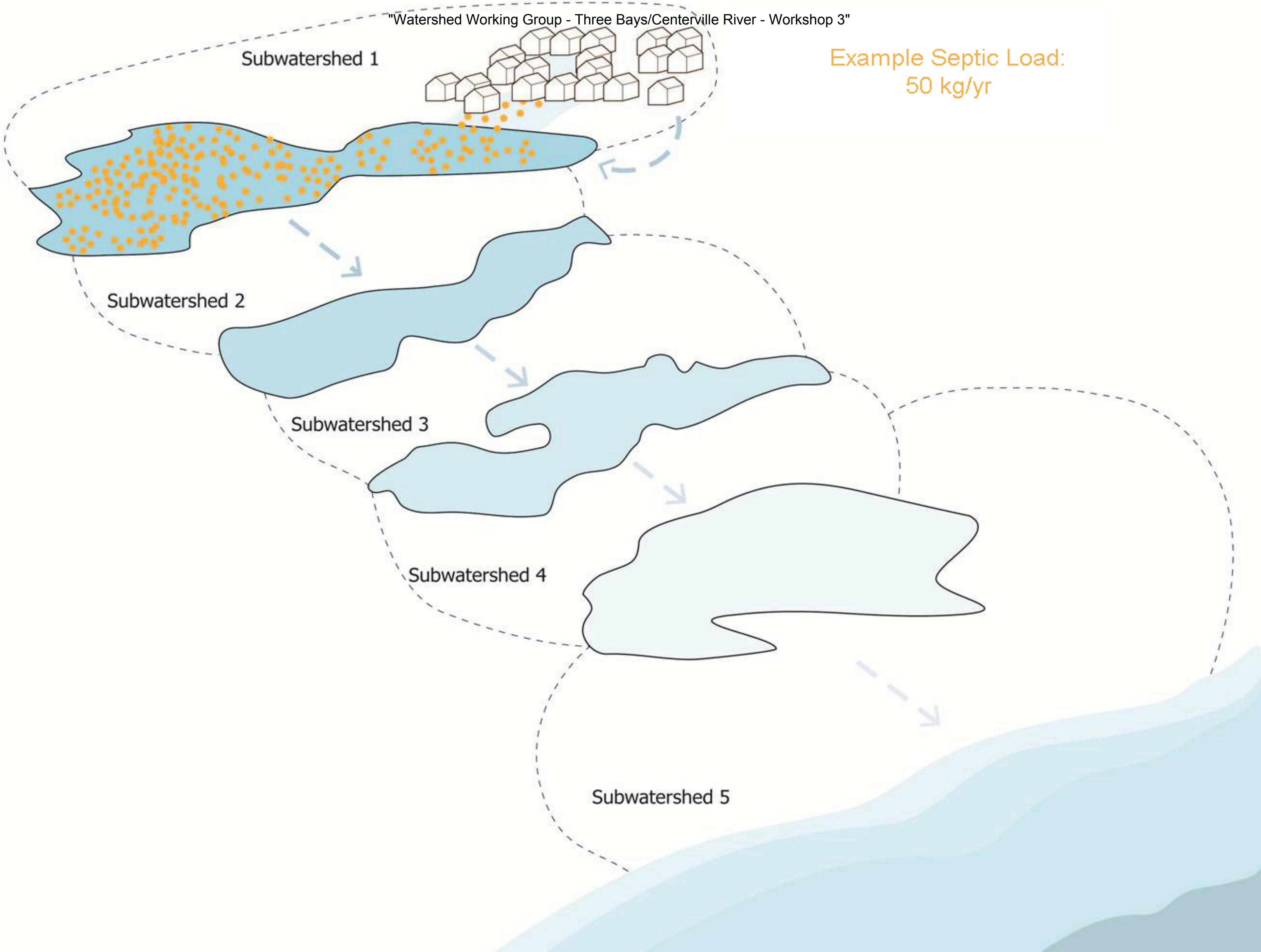


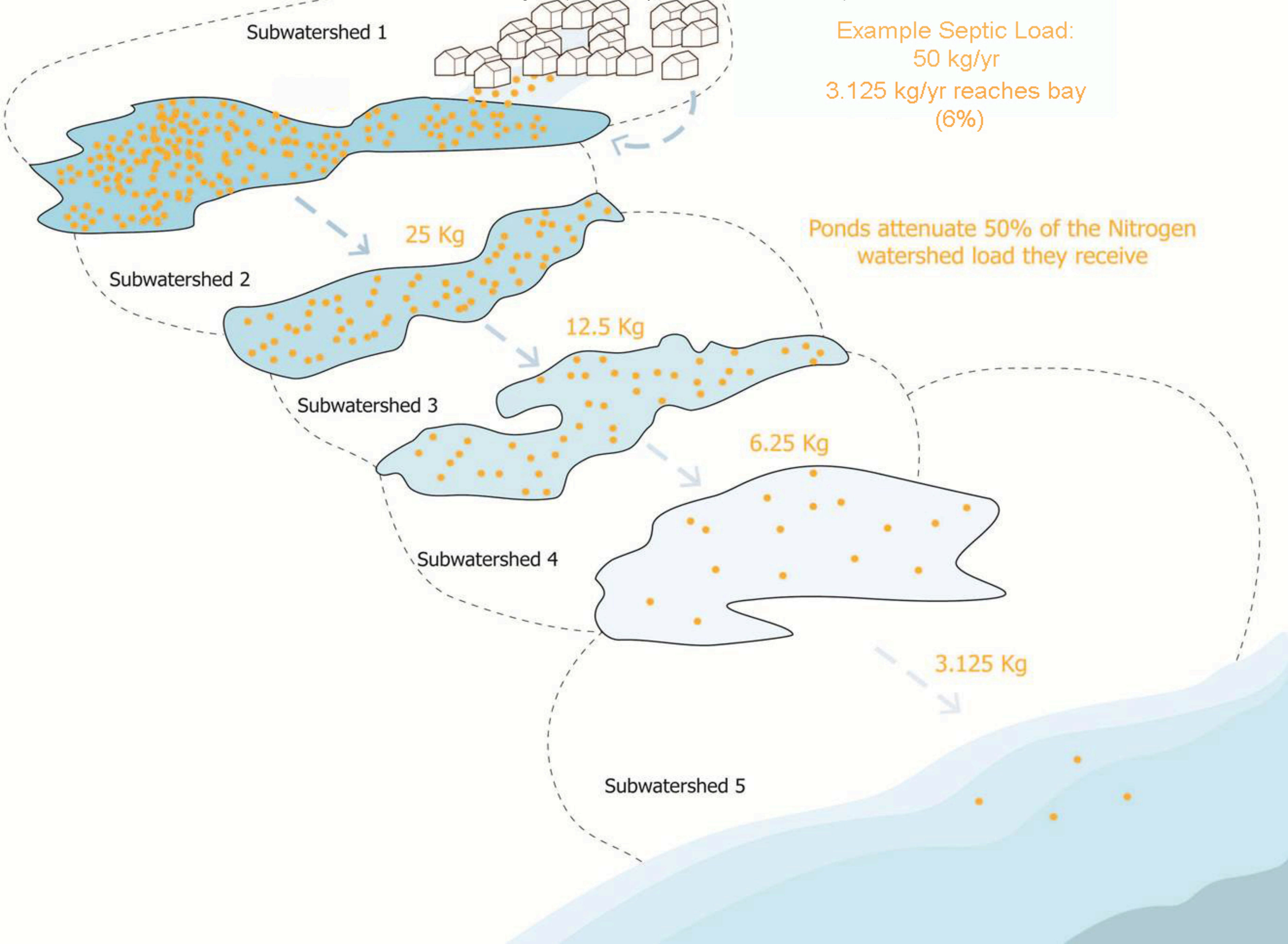
Watershed-Wide Centralized Treatment with Disposal Inside the Watershed

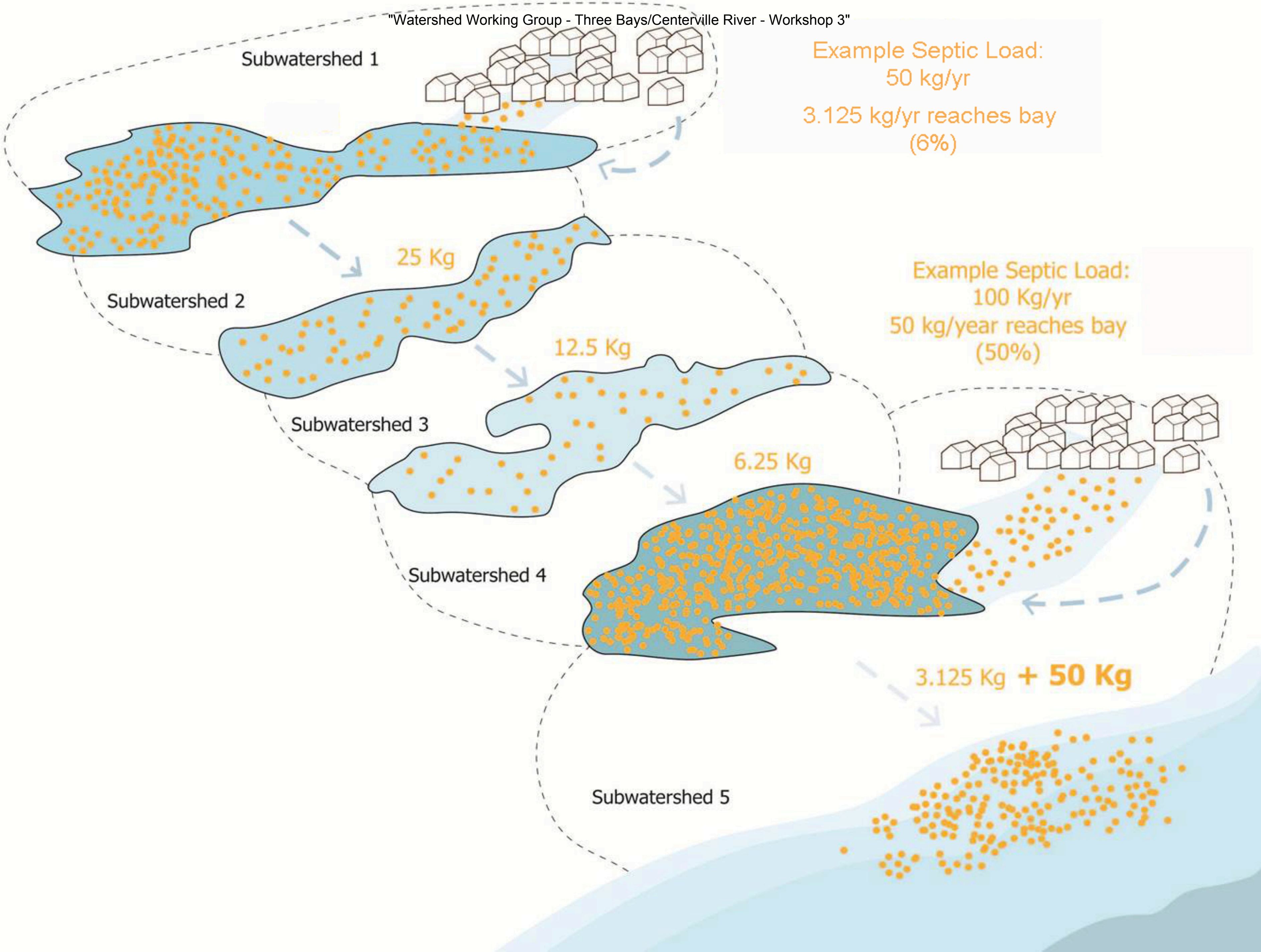


"Watershed Working Group - Three Bays/Centerville River - Workshop 3"




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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12.5 Kg
Subwatershed 3
6.25 Kg
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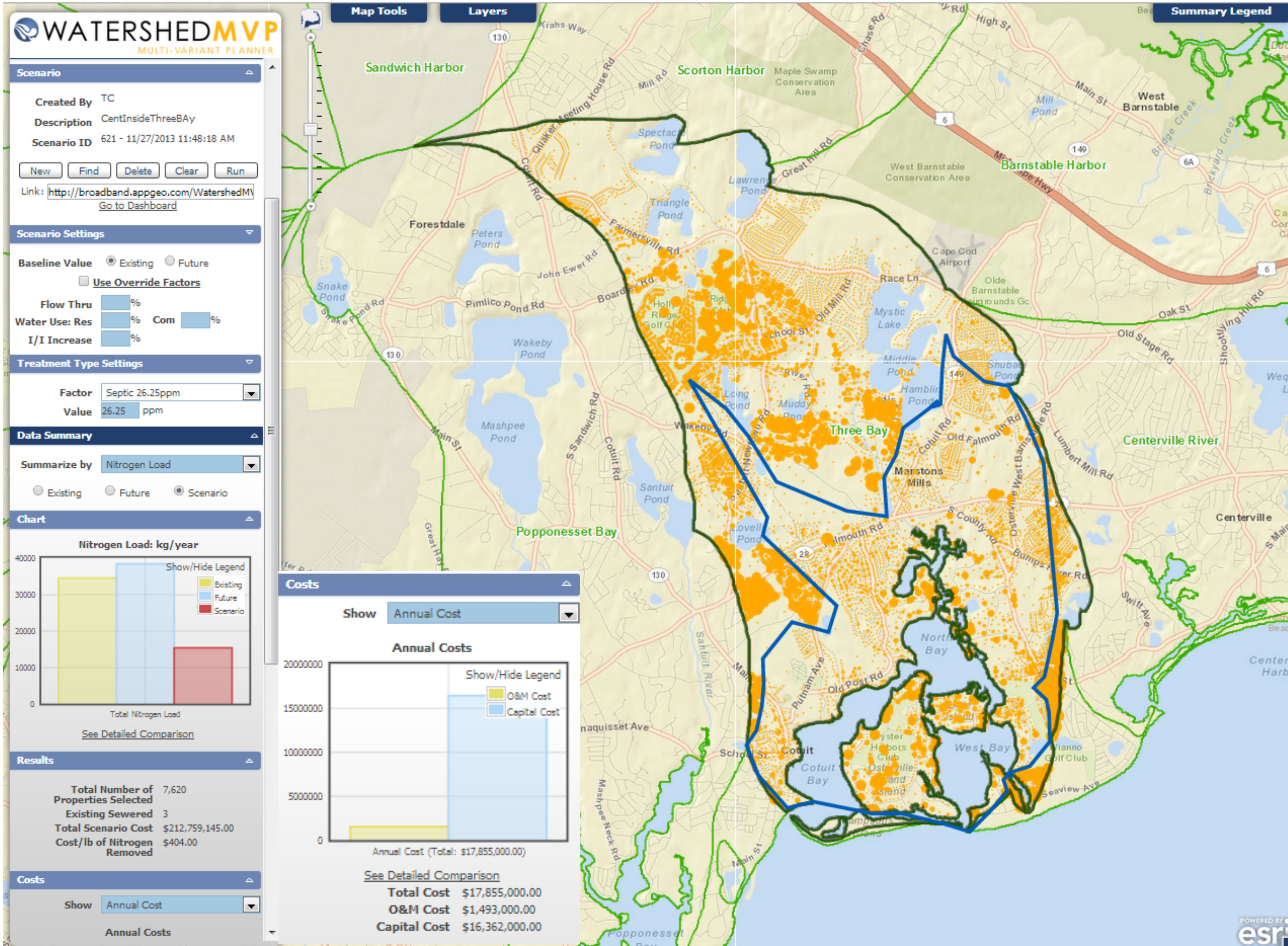
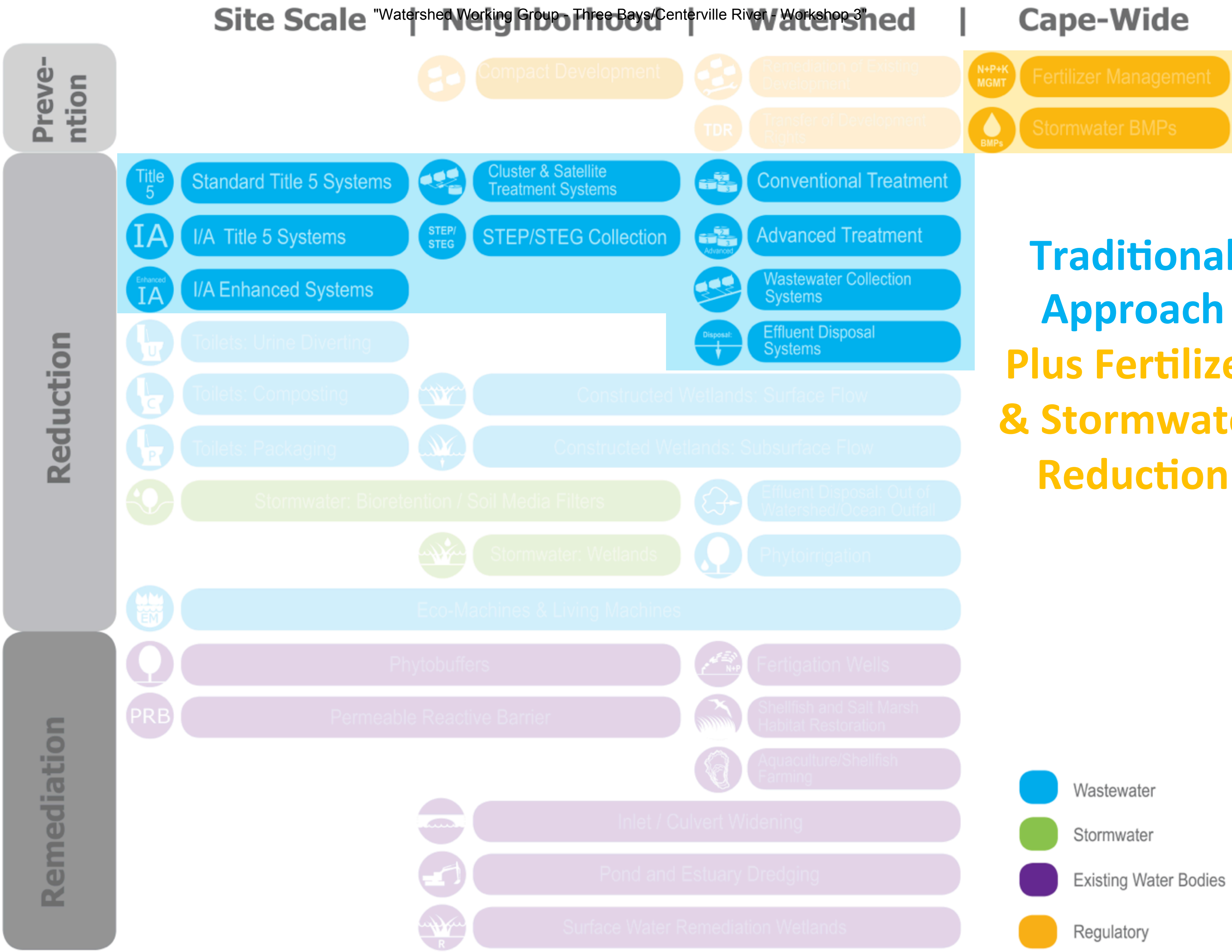
3.125 Kg + 50 Kg
Subwatershed 5

Targeted Centralized Treatment with Disposal Inside the Watershed

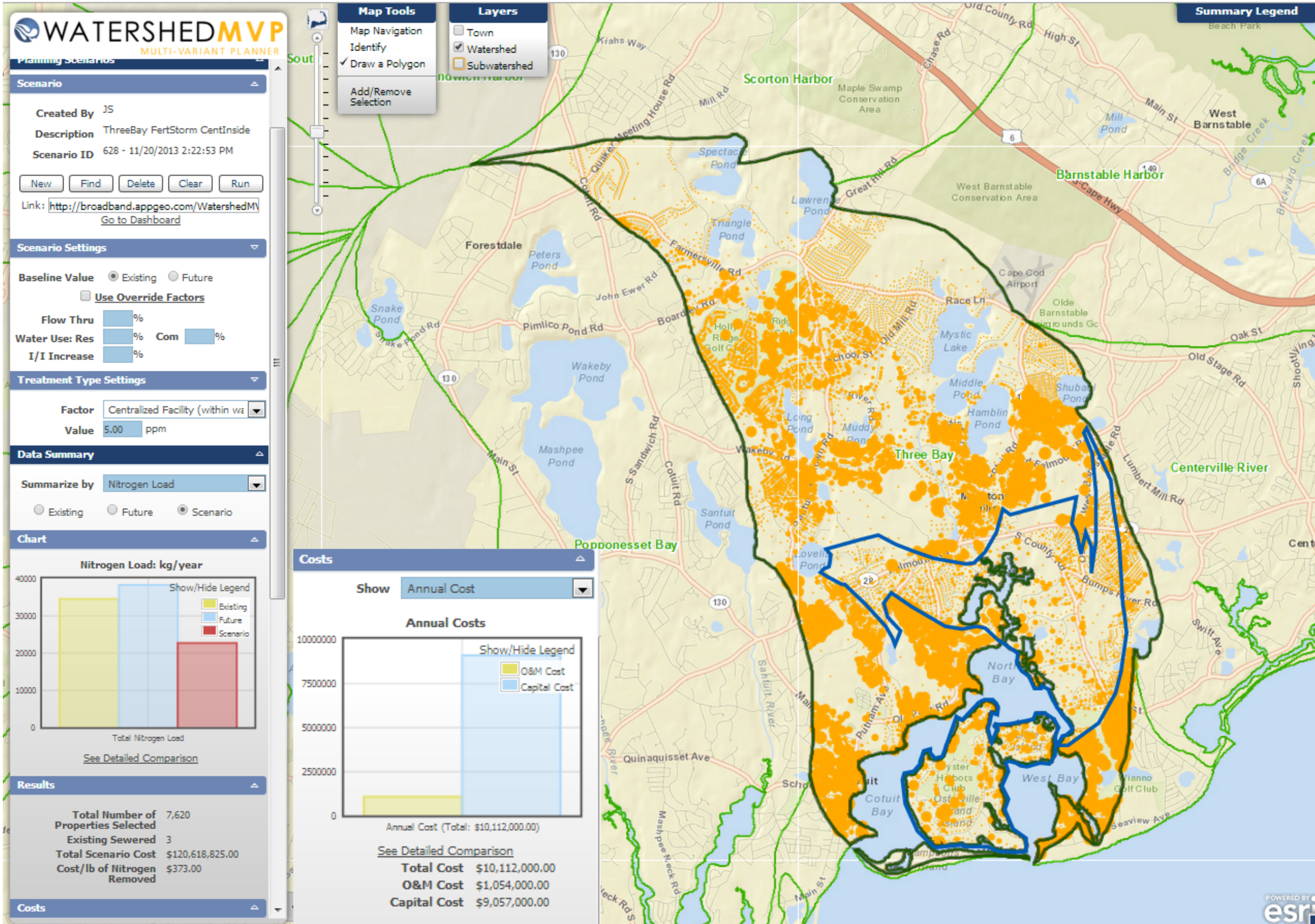


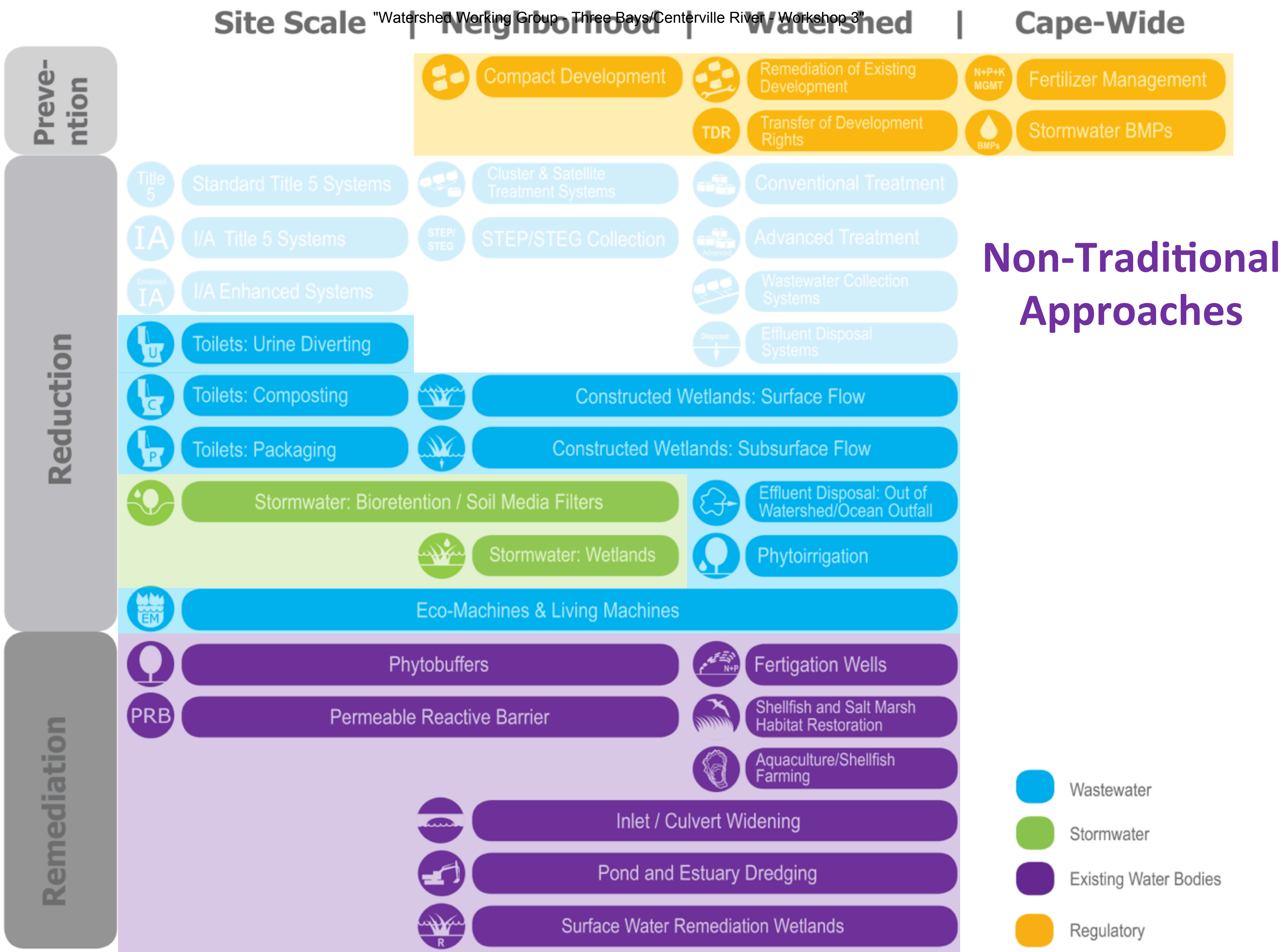


Traditional Approach

Plus Fertilizer & Stormwater Reduction

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

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Wastewater | Existing Water Bodies | Regulatory

Problem Solving Approach

1 Targets/Reduction Goals

Present Load: X kg/day − **Target**: Y kg/day = **Reduction Required**: N kg/day

2 Other Wastewater Management Needs

A. Title 5 Problem Areas
B. Pond Recharge Areas
C. Growth Management

3 Low Barrier to Implementation

A. Fertilizer Management
B. Stormwater Mitigation

N+P+K MGMT
BMPs

4 Watershed/Embayment Options

A. Permeable Reactive Barriers
B. Inlet/Culvert Openings
C. Constructed Wetlands
D. Aquaculture

PRB
R

5 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
C
IA
U
P

6 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

7 Supplemental Sewering

Advanced

MEP Targets and Goals:		**kg/day**	**Nitrogen (kg/yr)**
Present Total Nitrogen Load:		130.7	47,706
wastewater		0	36,573
fertilizer			8,213
stormwater			2,920
Target Nitrogen Load:		0	25,696
Nitrogen Removal Required:		**0**	**22,010**
Total Number of Properties:	9153		

Watershed Calculator THREE BAYS

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Other Wastewater Management Needs	Ponds	Title 5 Problem Areas	Growth Management

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Other Wastewater Management Needs Ponds Title 5 Problem Areas Growth Management

Low Barrier to Implementation:	**Reduction by Technology (Kg/yr)**	**Remaining to Meet Target (Kg/yr)**	**Unit Cost ($/lb N)**
Fertilizer Management	4,107	17,904	
Stormwater Mitigation	1,460	16,444	

Watershed Calculator THREE BAYS "Watershed Working Group - Three Bays/Centerville River - Workshop 3"

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Stormwater Mitigation		1,460	16,444		
Watershed/Embayment Options:					
Permeable Reactive Barrier (PRB)	100 Homes	308.0	16,136	$452	$306,275
Permeable Reactive Barrier (PRB)	140 Homes	431.2	15,704	$452	$428,785

Watershed Calculator THREE BAYS

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Constructed Wetlands	3	Acres	1,698	14,438	$521	$1,946,248
Fertigation Wells	4	Golf course	544	13,894	$438	$524,198

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Dredging	66000	cu. Yard	4,012	9,882	$7	$66,000

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Fertigation Wells	4	Golf course	544	13,894	$438	$524,198
Dredging	66000	cu. Yard	4,012	9,882	$7	$66,000
Oyster Beds/Aquaculture	28	Acres	7,000	2,882	$0	$0

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Constructed Wetlands	3	Acres	1,698	14,438	$521	$1,946,248
Fertigation Wells	4	Golf course	544	13,894	$438	$524,198
Dredging	66000	cu. Yard	4,012	9,882	$7	$66,000
Oyster Beds/Aquaculture	28	Acres	7,000	2,882	$0	$0
Alternative On-Site Options:						
Ecotoilets (UD & Compost)	458	Homes	1,812.3	1,069	$1,265	$5,043,614

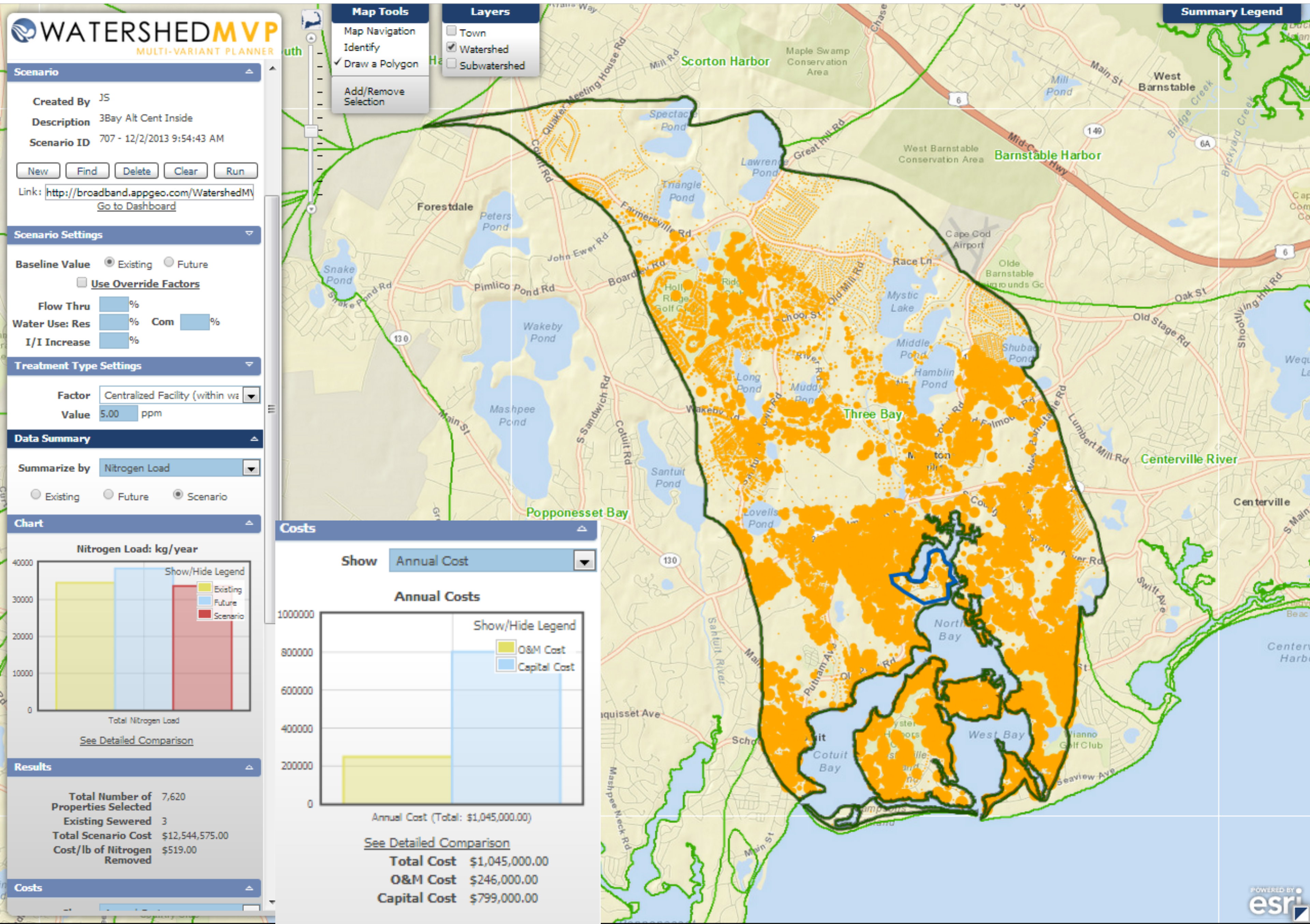
Watershed Calculator THREE BAYS

MEP Targets and Goals:		kg/day	Nitrogen (kg/yr)
Present Total Nitrogen Load:		130.7	47,706
wastewater		0	36,573
fertilizer			8,213
stormwater			2,920
Target Nitrogen Load:		0	25,696
Nitrogen Removal Required:		**0**	**22,010**
Total Number of Properties:	9153		

Other Wastewater Management Needs	Ponds	Title 5 Problem Areas	Growth Management

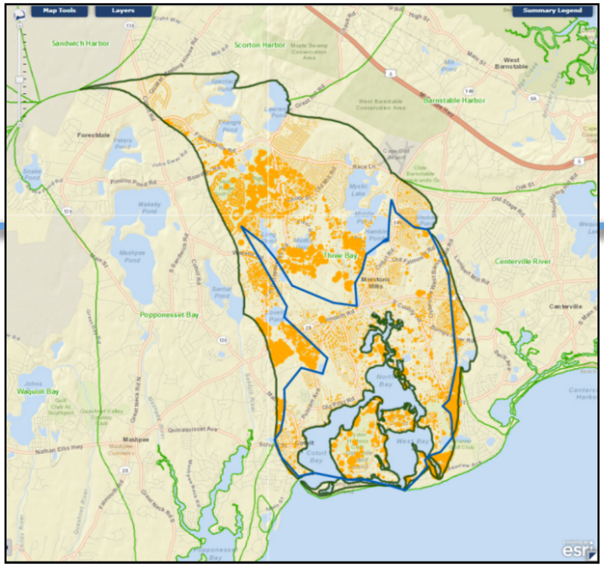
Low Barrier to Implementation:			Reduction by Technology (Kg/yr)	Remaining to Meet Target (Kg/yr)	Unit Cost ($/lb N)	Total Annual Cost
Fertilizer Management			4,107	17,904		
Stormwater Mitigation			1,460	16,444		
Watershed/Embayment Options:						
Permeable Reactive Barrier (PRB)	100	Homes	308.0	16,136	$452	$306,275
Permeable Reactive Barrier (PRB)	140	Homes	431.2	15,704	$452	$428,785
Constructed Wetlands	3	Acres	1,698	14,438	$521	$1,946,248
Fertigation Wells	4	Golf course	544	13,894	$438	$524,198
Dredging	66000	cu. Yard	4,012	9,882	$7	$66,000
Oyster Beds/Aquaculture	28	Acres	7,000	2,882	$0	$0
Alternative On-Site Options:						
Ecotoilets (UD & Compost)	458	Homes	1,812.3	1,069	$1,265	$5,043,614
Sewering	243	Homes	1069	0	$1,000	$2,352,253
		Total To Meet Goal (Kg/yr):		0	$295	$10,667,374
		Comparison to Conventional			$1,000	$48,422,000

Targeted Centralized Treatment after Applying Alternative Strategies (1069 kg N/yr)



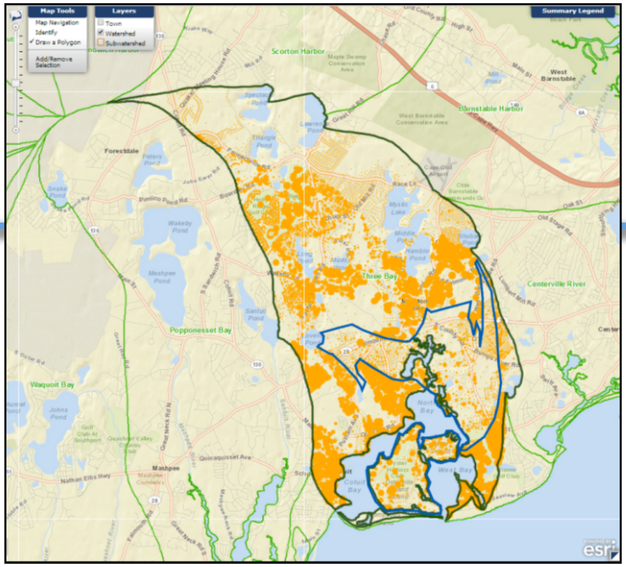
Scenario Comparison

Targeted Collection



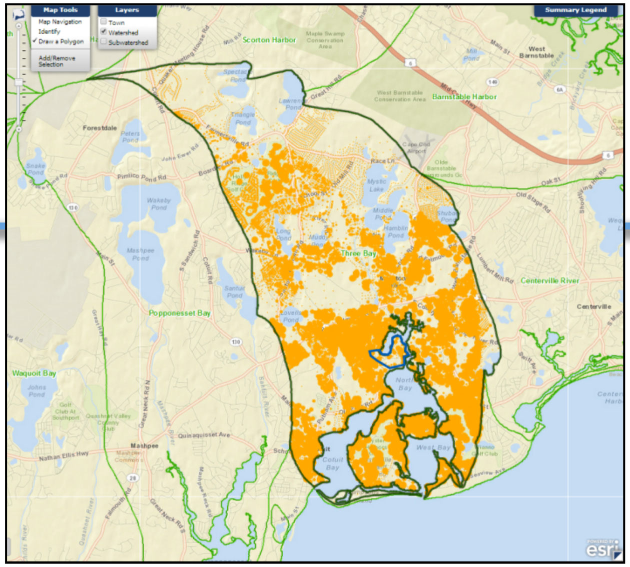
- Achieves TMDL[1]
- Cost/lb N = $405
- Treated Flow = 667,000 gpd

Targeted Collection after a 50% reduction in fertilizer and stormwater



- Achieves TMDL[1]
- Cost/lb N = $373
- Treated Flow = 440,000 gpd

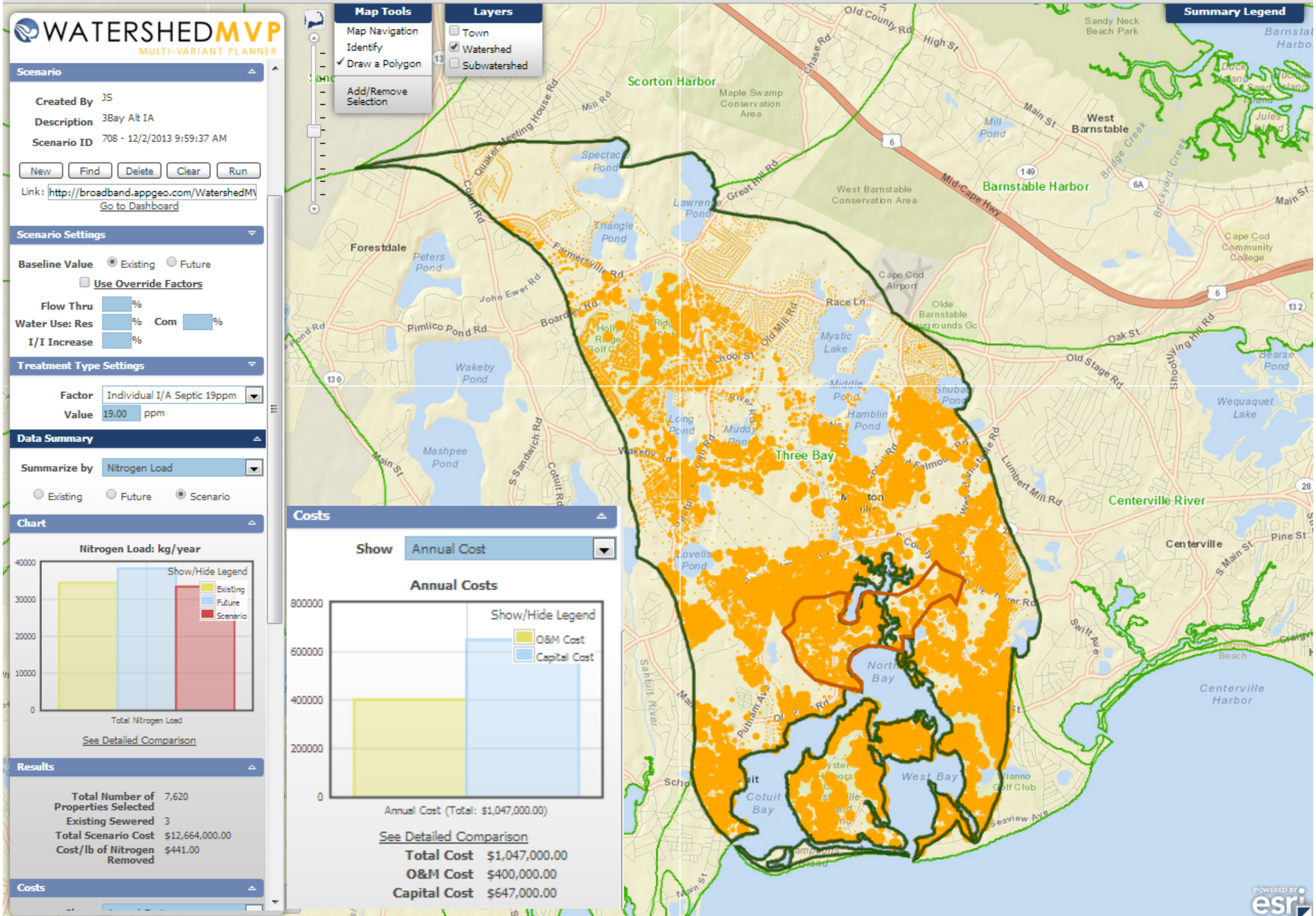
Targeted Collection after a 50% reduction in fertilizer and stormwater & after applying alternative approaches



- Achieves TMDL[1]
- Cost/lb N = $519
- Treated Flow = 24,000 gpd

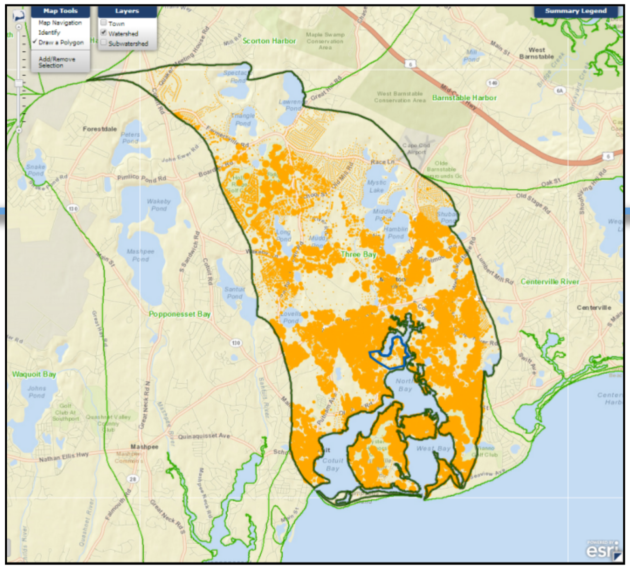
[1] within 5% of goal

Innovative/Alternative On-Site Systems after Applying Alternative Strategies (1069 kg N/yr)



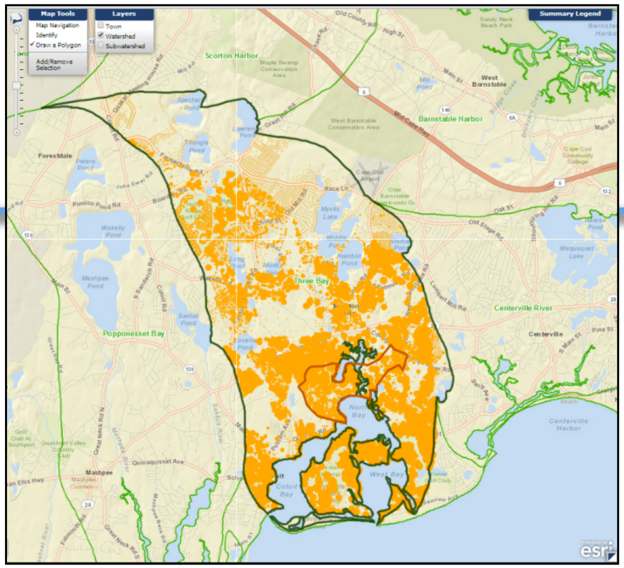
Scenario Comparison

Targeted Collection after a 50% reduction in fertilizer and stormwater & after applying alternative approaches



- Achieves TMDL[1]
- Cost/lb N = $519
- Treated Flow = 24,000 gpd

Innovative/alternative on-site systems after a 50% reduction in fertilizer and stormwater & after applying alternative approaches



- Achieves TMDL[1]
- Cost/lb N = $441
- Treated Flow = 92,000 gpd

[1] within 5% of goal

Adaptive Management:

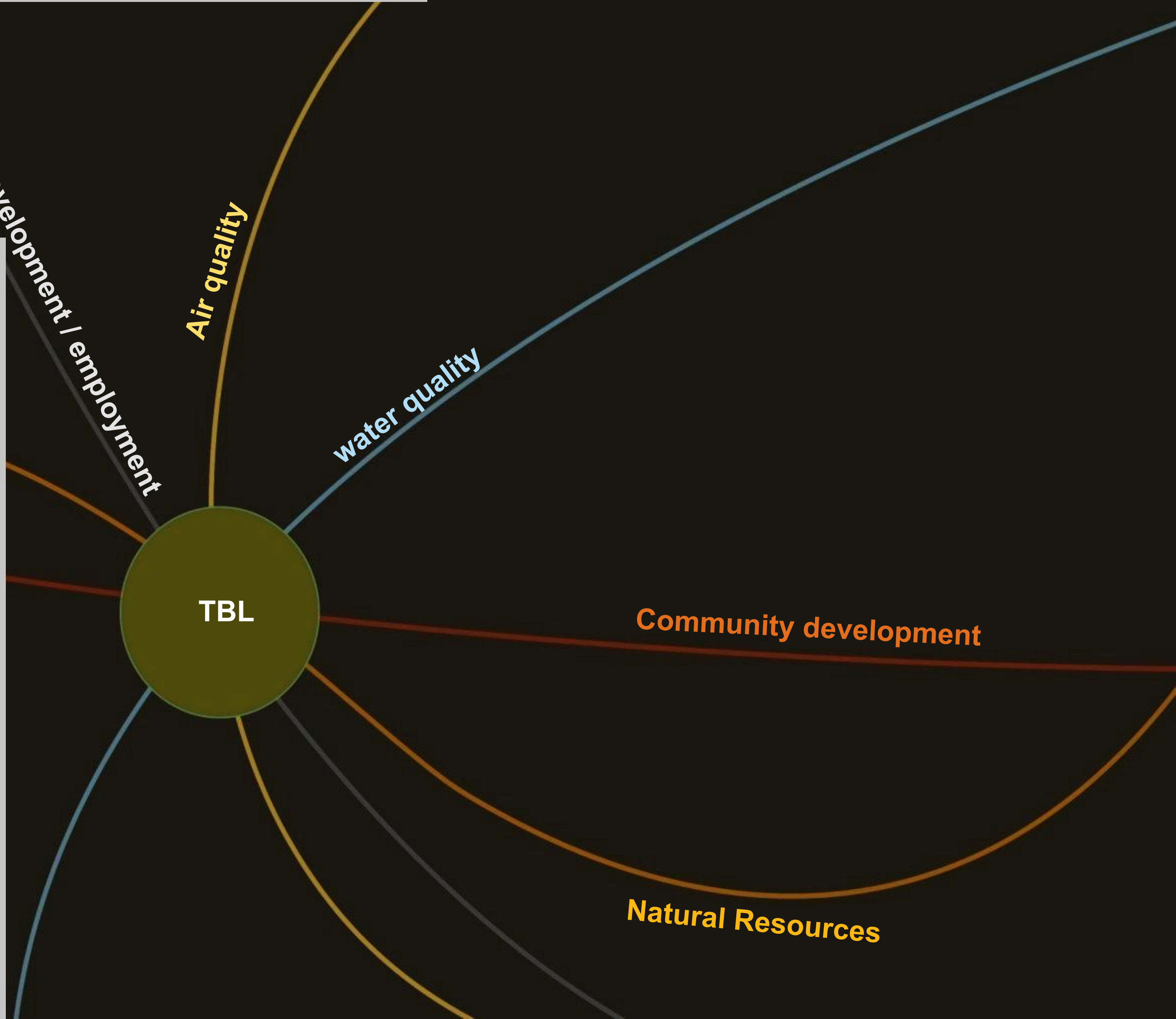
A structured approach for addressing uncertainties by linking science and monitoring to decision-making and adjusting implementation, as necessary, to increase the probability of meeting water quality goals in a cost effective and efficient ways.

Triple Bottom Line (TBL) Introduction

What is triple bottom line analysis?

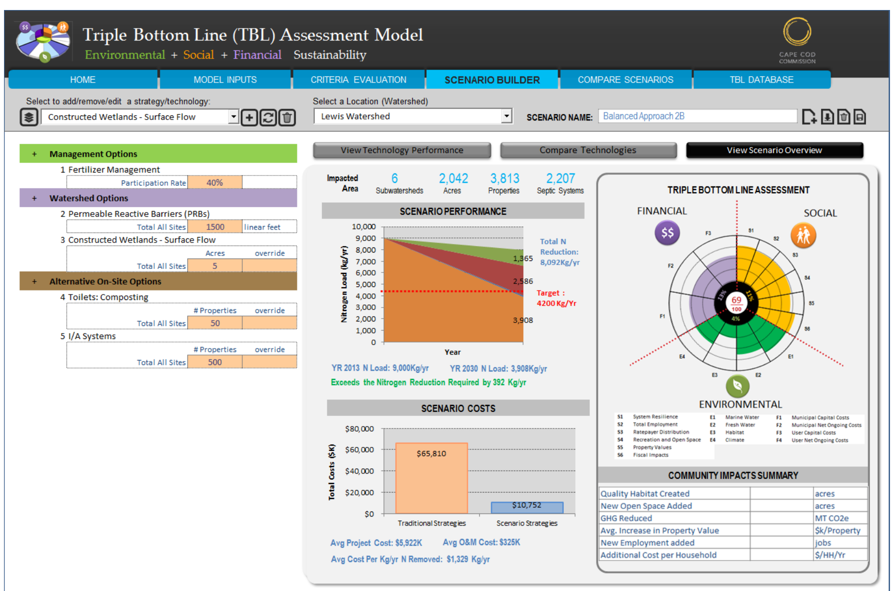
Triple Bottom Line Analysis
Provides a full accounting of the financial, social, and environmental consequences of investments or policies

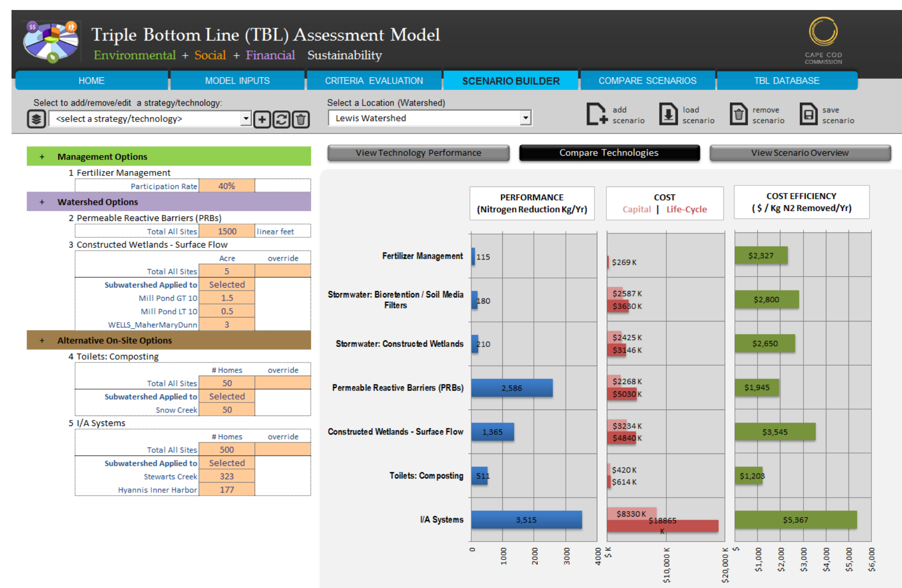
Often "TBL" analysis is used to identify the best alternative and to report to stakeholders on the public outcomes of a given investment.



Why develop a TBL model?

- 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

"Watershed Working Group - Three Bays/Centerville River - Workshop 3"

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

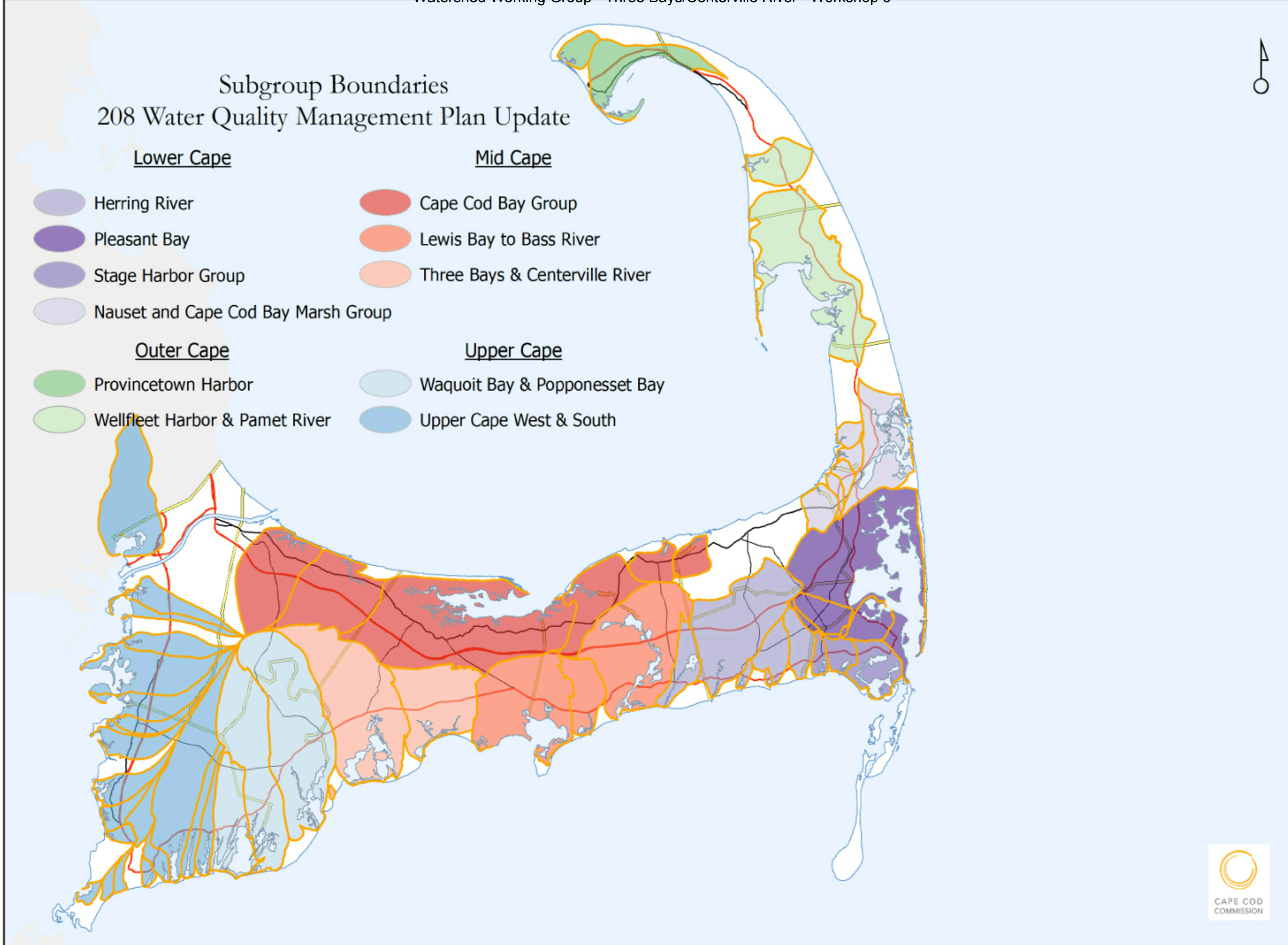
Scenario 1 – Minimum Cost

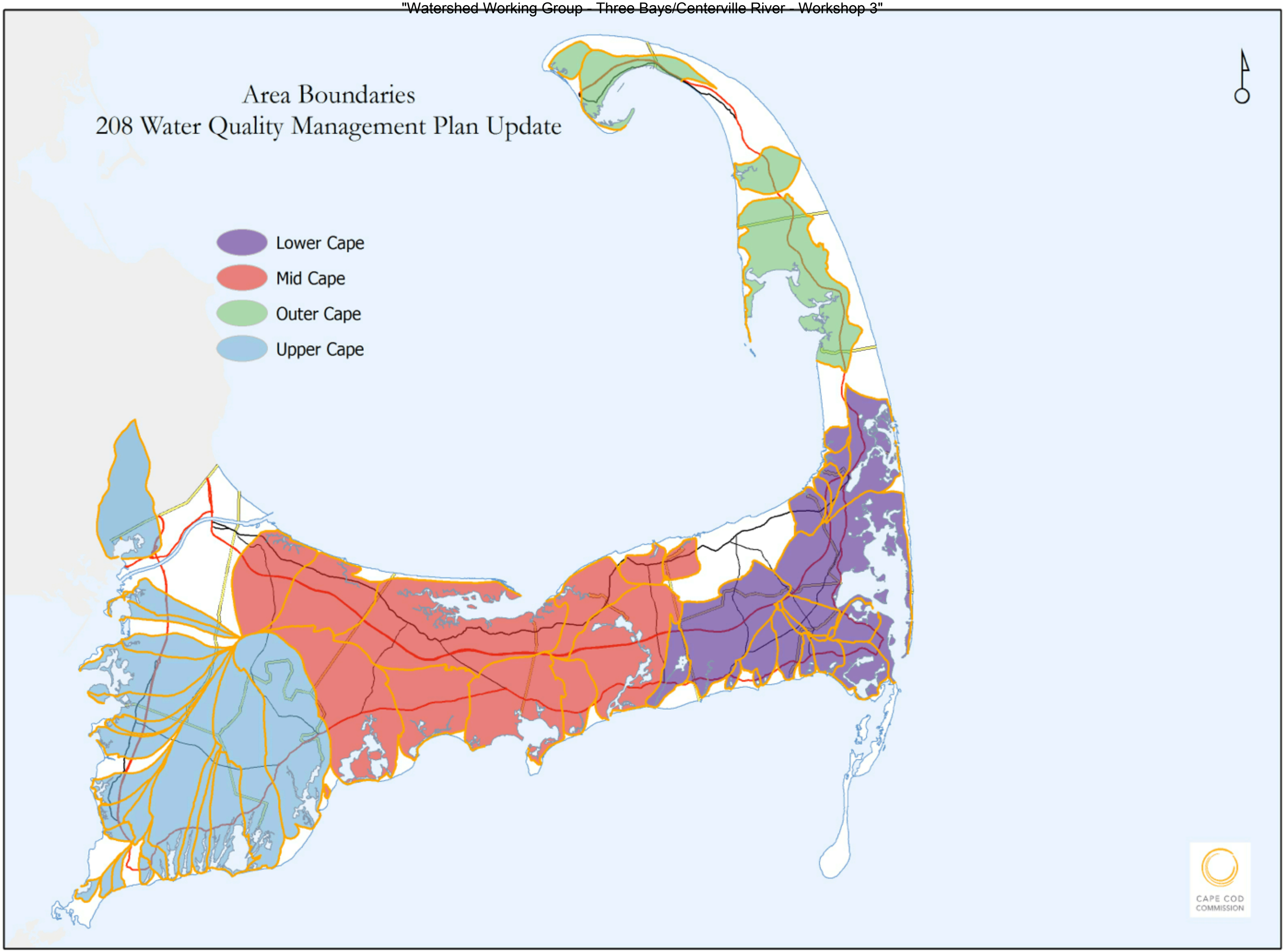
Scenario 2 – Cost Effective

Scenario 3 – Maximum Performance

Strategy/Technology Distribution

	Scenario 1	Scenario 2	Scenario 3
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
Three Bays and Centerville River Working Group

Meeting Three
Wednesday December 4, 2013
8:30 am- 12:30 pm
COMM Fire Station 1875 Falmouth Road, Centerville

MEETING SUMMARY

I. ACTION ITEMS

Working Group

- Provide comments or revisions to the Meeting 2 draft notes to Carri Hulet
- Notify Carri Hulet if you'd like to volunteer or nominate someone else to represent this working group in the larger sub-basin working group meeting over the next several months.

Cape Cod Commission

- Notify the Working Group of the selected date in January for the Stakeholder Summit.
- Share with the Financial Group points raised by this Working Group on interactive cost functions and trade-offs with economies of scale
- Confirm that the activities required to achieve a 50% reduction in fertilizer and stormwater are actually happening or going to happen.
- Add two columns to the technology matrix: 1) time required for implementation (i.e. construction), and 2) time required to observe results
- Account for growth management/development in the final plan
- Add a dredging symbol to the GIS maps, and update oyster/aquaculture layer to include existing oyster plots noted as missing.
- Add dredging of Cotuit inlet and phytobuffers to the analysis for this watershed.
- Account for the impact of any given technology or approach on emerging contaminants in order to discover co-benefits and avoid regulatory barriers.
- Suggest to Technology Matrix developers that ecotoilets be broken into two separate classes (self-contained and 2-year storage systems).

Consensus Building Institute

- Finalize notes from Meeting 2, distribute to the Working Group, and post to the Cape Cod Commission's website.
- Send out draft notes from Meeting 3.

II. WELCOME, REVIEW 208 GOALS AND PROCESS AND THE GOALS OF MEETING

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 focused on exploring technology options and approaches. The third round of 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 and approaches.

Mr. Horsley shared the 208's Plan team's progress since Meeting 2, which includes:

- Meetings with the Advisory Board, the Tech Panel, the Finance Group, the Regulatory-Legal-Institutional Group, and the TAC.
- Further developed and shared the Technology Matrix, showing possible traditional and non-traditional technologies at the site, neighborhood, watershed, and cape-wide scales.

Mr. Horsley then reviewed the goals 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 using 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.

Ms. Carri Hulet, the facilitator from the Consensus Building Institute, led introductions. A participant list is found in Appendix A. Monica Mejia spoke on behalf of Dan Milz, a doctoral student from University of Illinois at Chicago who is filming the working group meetings as part of his dissertation research on regional environmental planning and stakeholder decision-making. She said Mr. Milz would not publish the film or identify anyone by name in any of the documents he will produce. He is available by email or phone for any questions about his research.

[1] This PowerPoint Presentation is available at:
http://watersheds.capecodcommission.org/index.php/watersheds/mid-cape/three-bays-centerville-river

Ms. Hulet reviewed the agenda. She reiterated that one goal of Meeting 3 is to look at how traditional and non-traditional approaches might play out in the Three Bays Watershed, taking into account feedback from this Working Group. Another goal is to determine the group's buy-in for the evaluation process pursued by the Commission because they will use the same methods to evaluate the other water watersheds.

III. INITIAL SCENARIOS FOR THE THREE BAYS WATERSHED

Scott Horsley explained the Commission's process to develop watershed scenarios. Two teams were formed: one team is exploring traditional (or "conventional") technologies and approaches (e.g. sewering and I/A systems) and another team is exploring non-traditional (or "alternative") technologies and approaches. The teams are both working under the assumption that fertilizer and stormwater reductions will be incorporated into all of the final scenarios, but for now, the traditional approach analysis also included two scenarios that do not include fertilizer and stormwater management in order to provide some baseline estimates.

He then introduced the Watershed MVP, a web-based GIS tool that the Commission used to screen potential sites for the technologies based on a variety of factors specific to each watershed. The Commission also used the Watershed Calculator to help evaluate these scenarios, estimating, by technology, the nitrogen load reduction potential (kg/yr), the remaining nitrogen reduction needed to meet the target load (kg/yr), and the unit cost per pound of nitrogen removed ($/lb).

Traditional Approaches

Mr. Scott Michaud, Hydrologist for the Cape Cod Commission, led the discussion of traditional technologies and approaches and how they might be applied in the Three Bays Watershed. He noted that the nitrogen TMDL for the overall watershed can be met if 60% of existing wastewater nitrogen load is removed from the system, as determined by MEP.

Participants' questions and comments about the approaches are included below *(in italics)*.

<u>Watershed-wide sewer:</u> If the entire watershed (7,260 properties) is connected to centralized treatment and no other actions are taken, approximately 81% of the total nitrogen would be reduced, exceeding nitrogen removal targets. The unit cost for this removal approach is approximately $566/lb N, with a total cost of $431 million over 20 years including collection, treatment, and O&M expenditures.

<u>Targeted sewer:</u> Mr. Michaud provided a brief overview of natural nitrogen attenuation dynamics provided by ponds. Each pond with hydrologic connectivity to the water table

reduces (on average) about 50% of nitrogen load through anaerobic processes. As a result of the location of these ponds across any given watershed, the sub-watersheds within it have variable nitrogen loads and thus variable required wastewater reductions. Across the Three Bays sub-watersheds, the range for nitrogen reduction targets is 16% - 86%.

Taking this and the attenuating role of ponds into consideration, it is possible to target sewer infrastructure where greater reductions are needed. For example, a subdivision in the lower reaches of the watershed typically has less opportunity to have its septic load reach one or several ponds, and thus would be a good site to target sewer infrastructure.

If sewer is targeted to high nitrogen areas, rather than sewering everywhere, and no other actions are taken, the required amount of sewer infrastructure decreases significantly. The unit cost becomes approximately $400/lb N, with a total cost of $212 million over 20 years including collection, treatment, and O&M costs.

- *One participant asked about the potential for nitrification and other ecological costs to ponds due to large wastewater transactions.* Mr. Michaud replied that there is the potential for nitrification, and that it is dependent on the distance between the nitrogen load and the water body; the phosphorous in wastewater poses a greater threat to the ecological health of the pond, and is significantly attenuated through the soil. He then noted that the role of freshwater ponds will be discussed further over the next six months.

<u>Targeted sewer with 50% fertilizer reduction and stormwater mitigation:</u> It is anticipated that fertilizer nitrogen loads can be reduced by 4,000 kg/yr, and stormwater nitrogen loads by 1,500 kg/yr, representing a 50% reduction for each. When these 50% reductions are achieved, required sewer decreases significantly and would remove 60% of the total nitrogen load, treating 750,000 gallons per day (gpd) at a unit cost of approximately $373/lb N. The total cost would be approximately $120 million over 20 years including collection, treatment, and O&M expenditures.

- *Ms. Hulet asked if a 50% fertilizer and stormwater reduction is realistic.* Mr. Michaud and Mr. Horsley replied that 50% is a reasonable assumption. They provided an example of a low-cost bio-retention area that was recently constructed in Cotuit near the Town Dock. MA DEP has published a Stormwater Handbook that indicates that bioretention systems can achieve about 50% nitrogen removal. Fertilizer studies and actions within the golf course industries to remove fertilizer-based nitrogen inputs also suggest that 50% is reasonable. The Commission is in discussions with regulatory bodies to determine how to get credit for that reduction.

Non-Traditional (7-Step) Scenario

Mr. Horsley presented a scenario in which, following the 7-step process, a suite of non-traditional alternative technologies is applied within the Three Bays Watershed to reach nitrogen reduction targets. Using the watershed calculator and Watershed MVP, he shared the reduction potential and costs of these various technologies as well as potential locations for their implementation. He noted that the scenario is not a recommendation, but an illustration for what is possible when combining these technologies, and solicited feedback from the group.

Before presenting the scenario, Mr. Horsley discussed further baseline conditions of the Three Bays Watershed. As studied by MEP, the current nitrogen load includes about 48,000 kg/yr from controllable sources. Approximately 37,000 kg/yr is derived from wastewater, 8,000 kg/yr from fertilizer, and 3,000 kg/yr from stormwater. The total nitrogen reduction required is about 22,000 kg/yr to achieve a target load of 25,000 kg/yr. The watershed contains 9153 properties.

<u>Fertilizer Reduction and Stormwater Mitigation:</u> As stated previously, it is anticipated that fertilizer nitrogen loads can be reduced by 4,000 kg/yr, and stormwater mitigation loads by 1,500 kg/yr, representing a 50% reduction for each. These actions require no or minimal additional cost to the community beyond the on-going stormwater mitigation projects that are being sponsored by towns, the Cape Cod Commissions Fertilizer DCPC, or covered by private interests (such as golf courses).

<u>Permeable Reactive Barriers (PRBs):</u> Mr. Horsley shared a map indicating potential areas for PRBs within the Three Bays Watershed, i.e. areas close to water bodies where the water table is 20 feet or less below the surface and where road lengths run perpendicular to groundwater flow. GIS analysis indicates that there are three potential sites across the watershed for PRB installation: in Prince's Cove, near the Eel River in Osterville, and on the east end of Grand Island.

In this scenario, these PRBs could treat the nitrogen load from 140 homes, reducing nitrogen load by 430 kg/yr. The unit cost is $452/lb N. While the Commission is currently using fairly long road lengths in its siting analysis, Mr. Horsley explained that the technology could also be installed on shorter road segments in various locations. He also made the distinction between trenching and injection well PRBs.

- *One participant asked about unit cost comparisons, and noted that this is more expensive per pound of nitrogen reduced than sewer.* Mr. Horsley replied that the unit cost and the nitrogen removal estimates are being updated (the cost calculations for PRBs are based on 2010 data) and need further evaluation. The Technology Matrix assumes conservative estimates for PRB removal rates, and it is likely that the technology can perform better. Results from an intensive study in Falmouth are being integrated as they unfold. Overall, however, the assumption is that PRB will be less expensive than sewer.

- *Another participant asked whether land costs were incorporated into the assumptions.* Mr. Horsley responded that these potential PRB sites are located on public land (i.e. on or along roads with an easement). Land costs may be considered in the future if sites are chosen on privately-held land.
- *Another asked why PRBs need to be located near a road.* Mr. Horsley explained that siting installation at a road makes it easier from an implementation and permitting/regulatory standpoint for several reasons, as studied in Falmouth by CDM Smith. Roads are often dug up, are within the public domain, and require relatively little permitting. Waquoit Bay is considering a PRB installation along a beach, but there is significant permitting required for that location.
- *Another asked if there are septic systems that incorporate the same PRB technology.* Mr. Horsley shared that there are several I/A systems that use similar denitrifying technology. Most rely on a carbon source, e.g. wood chips or injected methane. He noted that the results of these systems are highly variable, however, and that the credit issued from DEP is minimal. *A public member noted that DEP has approved a system called Nitrex, which is better-performing and yields more consistent results. There are only one or two units installed thus far on the Cape in the Mashpee/Falmouth area.*

<u>Constructed wetlands:</u> Under the scenario, three acres of constructed wetlands would reduce approximately 1,700 kg/yr of nitrogen at a unit cost of $521/lb N. Mr. Horsley also presented the results of a GIS analysis screening for constructed wetlands locations. He noted that these wetlands include those that are connected to the water table and those where groundwater is pumped and injected into the area. Mr. Shawn Goulet, GIS Analyst for the Cape Cod Commission, explained the screening criteria:

- Parcel-size over 5 acres
- Outside the 100-year floodplain
- Outside priority rare species protected areas
- Outside protected open space areas.

He noted that the Commission is currently interested in low-technology wetlands that do not treat primary sewage, but rather treat groundwater in high-density areas. Constructed wetlands can perform better (in nitrogen removal) than some natural wetlands, the latter of which MEP is already giving credit.

- *One participant was interested in seeing phytobuffers incorporated into the analysis.* Mr. Horsley agreed to add them, and explained that they can be a low cost option. He also said phytobuffers sometimes run into pushback from the community because they can impact waterviews when tall growing species are utilized.

<u>Fertigation wells:</u> Under the scenario, four golf courses using fertigation wells would result in 544 kg/yr in nitrogen reductions, at a unit cost of $438/lb N. Mr. Horsley explained that four golf courses in the area are already irrigating with fertigation wells,

but that they are not getting credit (or not enough) for the nitrogen removed via this technology. There is still opportunity for fine-tuning and optimization for nitrogen removal, e.g. via pumping schedules and better placement.

Dredging: A dredging project has been proposed for Mill Pond near the intersection of Rte 149 and Rte 28. Under the scenario, removing 66,000 cubic yards of dredged material would reduce nitrogen by 4,000 kg/yr at a unit cost of $7/lb N.

According to the MEP report, Mill Pond is degraded, due to a build-up of sediments and could be dredged to more of a natural condition. It could be possible to take a 50% credit with this dredging project. There would be a significant amount of permitting associated with it, but the costs are low and it could be a good option for significant nitrogen removal. There would need to be a monitoring program to determine actual results.

- *One participant asked about inlet widening in Cotuit. Three Bays Preservation estimates that this would contribute to 5% of the removal target in Cotuit Bay*. Mr. Horsley agreed to add this to the analysis.

Oyster beds / aquaculture: Under the scenario, 28 acres of shellfish are installed. The nitrogen removal rate is 7,000 kg/yr/acre – the highest among non-traditional technologies – with a unit cost of $0/lb nitrogen removed. (These removal rates use the most conservative estimates derived from three studies in Wellfleet, the Mashpee River, and Falmouth, which range from 250-1000 kg/yr per acre. Studies in Chesapeake may suggest even higher removal rates).

Mr. Horsley showed potential 5-acre plot locations, sited in areas with ongoing aquaculture operations. Some shellfish plots have already been established; nitrogen removal data from these plots are currently being recorded. In addition, several partners are conducting research and monitoring benefits of oyster beds, including Wellfleet, NRCS, UMass, and other institutional collaborators.

- *Participants noted oyster plots not displayed on the map.* Mr. Horsley and Mr. Goulet said they would update the map.
- *Particpants also urged the Commission to change verbage from "oyster" to "shellfish" to encompass the farming of other species.*
- *One participant suggested siting oysters in closed shellfishing area – such as Prince's Cove – which would be prohibited from harvesting.*
    - *The group discussed the public's and aquaculture community's response to this idea. Three Bays Preservation received pushback from commercial players on a shellfish reserve area proposed about 3 years ago. Additional floating oyster gear is prohibited due to navigational and aesthetic concerns, but the group agreed that there would be less resistance to*

submerged aquaculture used for restoration. The nitrogen removal benefits of submerged beds may be even greater than floating gear.

- *One participant noted that there are 1700 acres in the Three Bays and that it should be possible to find 28 acres for this purpose within them.*
- *The group also discussed oysters grown on the reef. These do not exist in Three Bays currently. Reef oysters are not profitable because they can't be sold on the half shell market. There are also poaching problems.*

<u>Ecotoilets:</u> Under the scenario, 1,800 kg/yr in nitrogen reduction is achieved with ecotoilets at a unit cost of $1000/lb N. Mr. Horsley mentioned that this number will change dramatically as better information is incorporated into the Technology Matrix. A 5% participation rate among homeowners in the next 10-20 years (i.e. 458 properties) is assumed.

- *One participant felt that a 5% participation rate was low, and cited Australia as a case study where ecotoilets have become a cultural norm. The Falmouth pilot program can be turned to for participation estimates.*
- *The group noted that the cost of composting ecotoilets with installation is often prohibitive for interested homeowners, especially for existing houses with second stories because renovation is required. Costs are less expensive and implementation is easier in new construction.*
- *Urine diversion or composting toilets may be easier and less costly. One participant suggested that $5,000 would pay for the permitting and equipment costs for simpler systems, suggesting that the estimates in the Technology Matrix are inflated by an order of magnitude.*
- *One participant suggested that ecotoilets be considered in two separate classes – self-contained and two-year storage systems. This would greatly affect the costs and likelihood of implementation.* Mr. Horsley agreed to share that comment with the Technology Matrix developers.

<u>Remaining sewer needed:</u> Mr. Horsley noted that using this scenario of non-traditional technologies, a total of 243 homes would still require sewer infrastructure to reduce the final 1000 kg/yr of nitrogen reductions to meet the target load. The unit associated with this sewershed is $300/lb N. He showed the targeted area simulated on a map, and reiterated that this is only one possibility for how these technologies could be paired and implemented – and that a community could decide to rely upon one or all of them.

Scenario Comparison

Mr. Horsley then showed an overall comparison of four scenarios described in the exercise – 1) sewer everything, 2) targeted sewer only, 3) targeted sewer after 50% reductions in fertilizer and stormwater, 4) primarily alternative or non-traditional approaches after 50% reduction in fertilizer and stormwater with targeted sewer if necessary to meet targets. All scenarios are assumed to achieve the TMDL for the watershed. The sewer footprint associated with each was shown on a map, shrinking and expanding depending on the scenario considered. Mr. Horsley noted that by adding additional measures to the non-traditional scenario – e.g. inlet dredging and phytobuffers – the watershed could potentially avoid the need for sewer.

General Discussion of the Scenarios and Methodology

- *One participant asked about the relationship of sewershed footprint size and unit cost.* Mr. Michaud explained that unit cost is dependent on development density. Large distances between parcels will drive costs up.
- *Another participant asked whether build-out is incorporated into the assumptions.* Mr. Horsley explained that the model assumes existing loads, and that the Commission decided to first investigate scenarios using the existing population and measured impact. Growth management and restoration adjustments will be taken into consideration moving forward in later stages of the process. *Another participant added that new growth will change the economics of these options, and stated that a separate model that factors in build-out and captures these dynamics should be developed.*
- The group discussed the relationship between cost and scale in these scenarios. For example, *sewering and I/A could impact the ecotoilet participation rate. Given the option to sewer or install ecotoilets, a community might choose to sewer because it is more familiar, or they may not have the choice because sewering is only cost-effective if nearly everyone connects*. Mr. Horsley noted that homes putting in ecotoilets in Falmouth are being exempted from future sewer costs through a new local bylaw recently adopted. *One participant said this could cause a reaction similar to a phenomenon occurring in Spain, where a mandate to meet a quota for solar energy production has made conventionally-produced energy significantly more expensive for rate payers. Interactive cost functions should be considered in the model, and there should be a comparison of fixed costs versus variable, as well as life cycle costs (i.e. capital or upfront costs vs. maintenance or ongoing costs).* Mr. Horsley stated that he hoped this discussion would take place within the financial group. Their next meeting is December 11 and is open to the public.
- *Another participant shared that EPA has a number of documents on the financial management of wastewater infrastructure.*
- *Another argued that the potential for emerging contaminants and changing regulations should be considered in these scenarios.* Mr. Horsley agreed that it is an important factor to remember, and noted that some approaches, e.g. phytobuffers, constructed wetlands, can address multiple contaminants. Mr. Michaud noted that this is an issue that will be given consideration over the next few months in the next stage of planning.

- Ms. Hulet raised the issue of phased implementation and differing time scales in which nitrogen reduction results are realized. Mr. Horsley noted that EPA has been assisting in the development of a systems dynamics model with time as a central component
  - *One participant noted that it would be helpful to add a column to the analysis representing timing of implementation and results.* Mr. Horsley stated that the Commission will consider adding this to the analysis.
- *The group also discussed the impacts of sea level rise and storm surge. One participant noted that increased storm surge areas should be considered in siting technologies. For example, sewers are not suitable in these areas; rather, self-contained systems (and less costly options) are more appropriate where storm damage is likely.* Mr. Goulet showed a map displaying projected storm surges. Mr. Horsley noted that this map does not take into account the six foot sea level rise that NOAA has projected by the end of the century, and that these need to be incorporated into the plan.[2] Salt marsh and wetland areas will likely be reduced due to both cultural and topographic obstacles as these systems attempt to migrate landward. Additionally, USGS has begun a study of the impacts of sea level rise on groundwater levels on Cape Cod – in nearshore areas, a six-foot sea level rise could result in a six-foot rise in the water table. This will compromise Title 5 systems in low-lying areas which require a minimum 4-foot separation to the underlying water table. Saltwater infiltration to freshwater ponds could also lead to a significant decrease in natural nitrogen attenuation. These effects are critical to the plan, and necessitate an adaptive management approach.
- *One participant noted that a six-foot sea level rise will cover Sampson's Island – which could help greatly with nitrogen flushing.*

IV. ADAPTIVE MANAGEMENT

Scott Horsley explained that an adaptive management approach is critical because of the degree of uncertainty of many of these alternatives and to allow for an integrated approach that involves the most cost-effective strategies over time. The idea behind this concept is to implement and monitor the (lower cost) non-traditional technologies, and if they are not as effective as expected in meeting target nitrogen reduction goals, to implement traditional approaches as necessary to make up the difference.

He provided the Commission's current definition of 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 cost effective and efficient ways."

[2] Sea level projections in 25-year increments are available at the Massachusetts Coastal Zone Management website

He then led the working group through a brainstorming session for a possible adaptive management plan for this watershed, including what non-traditional projects might be implemented first and what monitoring timeframes they would follow. He noted that DEP is receptive to a non-traditional approach, especially given that implementation and results can be achieved quickly relative to the impact timeframe for traditional sewering.

Potential Projects in the Three Bays Watershed

The group suggested that projects should be prioritized if they 1) are cost-effective, 2) have low regulatory barriers, 3) have high public visibility, 4) promise rapid results, and 5) have potential partners for implementation and monitoring.

Given this, the group suggested that non-traditional technologies could be tested by following four pilot projects as the first stage of a Three Bays Watershed adaptive management plan:

1. Oysters and aquaculture in Warren's Cove and other parts of the Three Bays Watershed.

- *Timeframe**:** Implementation: Summer 2014 (e.g.)*
- *Monitoring can be straightforward*
- *One barrier is opposition to floating bags from the town and/or upland land owners, due to aesthetic and navigation reasons*
    - *This might be overcome by careful selection of project sites, in limited use. (Example: Marstons Mills River)*
- *Poaching is an issue – can't have perceived usable shellfish.*
- *Necessitates a public-private partnership between the town and commercial players who can advise or manage implementation. As a starting point, Tamar Haspel can contact Cape Cod Oyster to see if they are willing to share data.*
- *Can generate profit for the town or a commercial partner.*
- *Project should include oysters and quahogs.*
- *The town already has an aquaculture project in Prince's Cove.*

2. PRB installation on Prince Ave

- *Timeframe:*
    - *Implementation: Summer 2015*
    - *Monitoring: Heavy monitoring (e.g. 5 sites) for the first three years. Could reduce to monitoring at two sites after initial monitoring phase.*
- *A co-benefit is that water and sewer lines can be repaired during installation. (One disadvantage, however, is that these lines need to be disconnected during installation)*

- *Falmouth has an example PRB project*

3. Dredging in Mill Pond and/or Cotuit Inlet.

- *Timeframe: This could also be implemented soon in Mill Pond due to studies already completed by Three Bays Preservation (though it should be verified that there have been no emerging contaminants since the last sediment testing).*
- *Monitoring a confined system like Mill Pond will be relatively easy.*
- *This action, by itself, could reduce nitrogen significantly*

4. Ecotoilet public demonstration projects

- *Potential sites include the Prince Cove Marina, the Kettle Ho, and public beaches.*
- *Potential partners include Cape Cod League, Young Professionals Network, the Kettle Ho, the library network, Ropes Beach and the CMYC.* Mr. Horsley noted that a strategic plan could help identify opportunities with partners.
- *Mr. Geyser shared that despite their low cost and ease of implementation, the current plumbing code only allows two-year retention systems to be used in two-story buildings. A change in the plumbing code is needed to address this barrier, or it could be overcome with special permits or variances. The Town of Barnstable is currently unwilling to issue variances, but the chairman is an advocate of ecotoilets and could be educated about the issue.*
- *Falmouth got a variance for a urine diversion system. The working group can look at the process they used.*
- *Cost is a common barrier to ecotoilets. Currently, there is additional funding available for additional systems through the Falmouth Ecotoilet Center's loan program.*

Overall timeframe: *Several participants agreed that a 10-year implementation and monitoring schedule is too long. These four projects could be installed concurrently in 5 years. The group also agreed that decision points should be integrated into the adaptive management plan to guide actions at specific points in time, depending on monitoring results.*

Targeted sewer: *Based on density and other factors, and assuming disposal could be found locally, the group determined that the best sites to initially target sewer infrastructure include:*

- *Cotuit Bay Shores – collected waste could be treated at Stop and Shop, which is already designated for regional use.*
- *Downtown Osterville – already of concern to the Board of Health*
- *Along Craigville Beach Road and the Centerville River – close to the wastewater treatment plant and geometrically linear.*

General Discussion on the Adaptive Management Plan

- *Three Bays Preservation has already developed a series of potential pilot projects with monitoring programs, but these received significant pushback from DEP when proposed several years ago. For example, the Mill Pond dredging project ran into several barriers including 1) concern over an endangered species (bridal shiners); 2) required archaeological surveys; and 3) DEP's inability to ensure credit for the project's estimated 12% nitrogen reduction.*
  - Mr. Horsley responded that DEP is now receptive to giving credit to pilot projects with monitoring schedules in the 208 Plan Update process
  - Ms. Hulet added that it is helpful to the process if the group anticipates the regulatory constraints that DEP is bound to consider (e.g. the Endangered Species Act, cultural preservation, etc.) and addresses those in the project and monitoring proposals.
- *Educating regulatory people, local entities (eg. Town Council, Town of Barnstable, the Board of Health), leaders, and the public is critical. Our most difficult obstacle is the regulatory staff who are accustomed to traditional approaches (e.g. sewer). As an example of ineffective communication on non-traditional alternatives, it was mentioned that proposals for ecotoilets and permeable parking for Sandy Neck were ill-received, and that the site now has a traditional Title V leaching field under the parking lot.*
  - Mr. Horsley noted that regulatory personnel are integrated into the 208 Plan Update process, are being informed of the current science on non-traditional technologies, and are transforming their approach to these alternatives. He also noted that demonstration projects can educate the public and decision-makers. (Examples: Wellfleet community composting toilet, Provincetown Urine Diversion units in public restrooms.) Conversations need to continue, however, and this needs to be a major focus for the Commission moving forward.
- *The plan needs to highlight fertilizer and stormwater reduction as the primary mitigation efforts in eliminating the influx of nitrogen. These can yield very quick results (Example: San Francisco Bay).*
  - Mr. Horsley clarified that the plan clearly states fertilizer and stormwater reductions as primary mitigation efforts.

V. PREPARING FOR 2014 JAN-JUNE

Triple Bottom Line (TBL) Analysis

Erin Perry, Special Projects Coordinator at the Cape Cod Commission, presented on the work that the Commission has done with AECOM to develop a Triple Bottom Line model. First, she defined Triple Bottom Line Analysis as a full accounting of the financial, social, and environmental consequences of investments or policies. She also noted that TBL analysis is often used to 1) evaluate scenario alternatives and rank them against each other; and 2) report to stakeholders on the public outcomes of a given investment. To explain why the Commission has decided to pursue a TBL model, Ms. Perry shared that it will allow the Commission to:

- Consider the financial, environmental, and social consequences of water quality investments and policies in Cape Cod
- Evaluate the "ancillary" or downstream consequences of water quality investments, not just direct phosphorous or nitrogen level reductions.

She also explained that AECOM is working with Commission staff and stakeholders to develop criteria that integrate social, environmental, and financial considerations into the TBL model. These include:

- **Social**: System Resilience (i.e. how communities respond to natural hazards), Employment, Property Values, Ratepayer Distribution, Recreation and Open Space, Fiscal Impacts
- **Environmental**: Marine Water Quality, Fresh Water Quality, Climate, Habitat
- **Financial**: Municipal Capital Costs, Municipal Other Costs, Property Owner Capital Costs, Property Owner Other Costs.

Ms. Perry then showed how three different hypothetical scenarios (minimum cost, cost effective, and maximum performance), when run through the model, rank comparatively, taking into consideration these social, environmental, and financial factors. She explained the model will be finalized by January or February 2013, and that the Commission will be using it over the next six months to assist in scenario evaluations.

- *Several participants expressed some confusion over how the financial dimension was visually depicted.*
- *One participant commented that it would be helpful to have a "no action" scenario run through this model so as to compare the social, environmental, and financial outcomes of doing nothing to the outcomes of other scenarios.*
- *Another participant noted that social criteria should include public health considerations such as days absent from work or school due to poor air or water quality across the community.*

Next Steps in the Stakeholder Process

Ms. Perry explained to the Working Group the next steps of the 208 Plan Update, which include:

January 2014 Assemble all 175 stakeholders across Cape Cod for a one-

	day Stakeholder Summit (tentatively scheduled for Jan 31) to discuss further planning, share the outcomes from stakeholder meetings, and form four sub-groups representing the Upper-, Mid-, Lower-, and Outer-Cape. These groups will likely meet three more times (Feb, March, April) and guide discussions over the next six months. The Commission may also convene an ad-hoc meeting to discuss monitoring protocols for different technologies.
February 2014	Meetings with the four sub-groups to further develop local scenarios and run them through the TBL model.
March 2014	Analysis performed by the Regulatory, Legal, and Institutional Work Group. The scenarios developed by the four sub-groups will be evaluated based on this analysis.
April 2014	Meetings with the four sub-groups to discuss monitoring and financial considerations of implementation.
June 1, 2014	Draft plan submitted to DEP.
June – Dec 2014	Public comment period on the draft plan.
January 2015	Submit final plan to DEP

VI. THE ROLE OF COMMUNITY

Ms. Hulet noted that over the next six months, the Commission will be considering how to best communicate the 208 Update process to the public and to educate the community on the proposed approaches. She invited Mr. Steve Brown, a working group member, to present some thoughts had shared with her previously on the role of community.

Mr. Brown shared a two-page document he developed on this subject (Appendix B). He discussed how to gain trust within the community, and highlighted the importance of language (e.g. using vocabulary such as "transaction" and "transformation" as opposed to "change," which people often resist). He also noted the relationships between data, identity, and relationships in the context of community, and said these are only leveraged effectively when community is engaged.

In response, *one participant suggested that engaging local inspectors and board of health staff is critical to achieving the objectives of the working group. These local staff* *can wield a significant amount of influence in being able to change regulations or approve variances.*

VII. PUBLIC COMMENT

- *One participant suggested the work group look at what Falmouth has included in its comprehensive wastewater plan, which is based on an adaptive management approach. He suggested that the group consider knowledge exchange between the two communities to share their lessons learned.* Ms. Perry replied that this knowledge exchange is already occurring, and that the Commission has been closely following their wastewater plan. Additionally, a Falmouth representative will be in the Upper Cape sub-basin working group with Three Bays & Centerville participants in the next several months, so there will be plenty of opportunity for further knowledge transfer.

Mr. Horsley and Ms. Hulet thanked the group for their participation and adjourned the meeting.

APPENDIX A

Three Bays and Centerville River Workshop Three
December 4, 2013
Participant List

Name	**Affiliation**
Representatives	
Mary Barry	Resident of Barnstable
Jaci Barton	Barnstable Land Trust
Steve Brown	Red Lily Pond Project
Fred Chirigotis	Barnstable
Tom Colombo	Hyannisport Club
Lindsey Counsell	Three Bays Preservation
Beth Ferranti	Citizen
Conrad Geyser	Cotuit Dry Toilet
Tamar Haspel	Indian Ponds Association
Holly Hobart	Indian Ponds Association
Tom Klein	Citizen
Darren Meyer	Sandwich Health Department
Public Attendees	
Rob Adler	U.S. EPA
Fred Dempsey	Barnstable Association of Recreational Shellfishing
John Doriss	Cotuit Civic Association
Monica Mejia	Tufts University
Staff	
Scott Horsley	Area Manager, Cape Cod Commission
Erin Perry	Special Projects Coordinator, Cape Cod Commission
Scott Michaud	Hydrologist, Cape Cod Commission
Shawn Goulet	GIS Analyst, Cape Cod Commission
Carri Hulet	Consensus Building Institute
Lauren Dennis	Consensus Building Institute

APPENDIX B – STEVE BROWN'S THOUGHTS ON COMMUNITY

The Third Aspect of Triple Bottom Line: "Community"

The 208 Planning Process has devoted considerable time and energy to researching, categorizing and discussing technological strategies for addressing wastewater management, as well as projecting the cost and potential return on investment for these strategies.

In order for these positive environmental and economic outcomes to be implemented, I think we need to pay equal attention to the third bottom line, "community."

With this in mind, I'd like to share some insights from my work. Over the last fifteen years, I've consulted with Barnstable County, UMass, and a broad spectrum of organizations in both the public and private sectors, to define and foster community on Cape Cod.

Three perspectives come to mind.

First, how do we define community? In terms of the 208 Planning Process, I think we should discuss defining community. In my work with the "Monitoring the Human Condition" project through Barnstable County Department of Human Services, 2000- 2008, we drew on the work of Robert Putnam (Bowling Alone), and used the following definition of community, developed by Barbara Israel of the University of Michigan:

> "Community is characterized by a sense of identification and emotional connection to other members, common symbol systems, shared values and norms, mutual—though not necessarily equal—influence, common interest, and commitment to meeting shared needs. Communities of identity may be centered on a defined geographic neighborhood or a geographically dispersed ethnic group with a sense of common identity and shared fate."

We balanced this academic definition with a more poetic one, from Starhawk:

> "Community means strength that joins our strength to do the work that needs to be done."

Thinking about wastewater, along this spectrum it seems to me that four process questions should be addressed:

1. Values: What core values do Cape Codders share?
2. Politics: Who decides what will happen to Cape Cod's wastewater, and how will these decisions made?
3. Envisioning Outcomes: Is there an emerging consensus on what citizens want to see on Cape Cod in 50 years in terms of wastewater management?

4. Public involvement: What community-based strategies will be used for publicizing this work and promoting proven best practices?

Existing data: A second area that I think it would be useful to take a look at is local work that's been done on the "triple bottom line" over the last decade. For example, I was involved in the "Cape Cod Sustainability Projects" from 1998- 2006, which hosted many community discussions and produced reports (http://www.capecodedc.org/2020TableofContents.htm). This work contributed to the body of "community data" and may have led to our current work, and contains lots of relevant data which at some point should be explored.

CBO's and FBO's: Third, I think it would be a good idea to discuss a strategy to further engage community- and faith-based organizations such as non-profit agencies, churches, synagogues, schools, and civic associations, where the idea of "community" is discussed and debated. Imagine if all the school superintendents, priests, rabbis, ministers, and imams on Cape Cod embraced effective watershed-based wastewater management as a top priority for 2014? This is not that far-fetched—last weekend I attended the "Bioneers - Connecting for Change" conference in New Bedford, where more than a thousand people participated in three days of keynote presentations and group workshops on many of the issues we're discussing, and applied community-based advocacy strategies to solving real problems (http://www.marioninstitute.org/connecting-for- change).

I think these three areas tackle "community" in depth and could add value to our work and inform our 208 Planning Process. Thanks for the opportunity to share!

--Steve Brown