208 Plan Update

CCWPC
April 9, 2014

Standing Sub Regional Meeting Topics

	Scenario Planning	Regulatory, Legal, Institutional	Implementation
Mtg. 1	One representative watershed	Challenges & opportunities associated with permitting the watershed scenario	Adaptive management plans
Mtg. 2	All shared watersheds & TBL model	Tools to support intermunicipal cooperation	Monitoring
Mtg. 3	Subregional scenarios & TBL model	Structures for permitting	Financing & affordability

Standing Sub Regional Meeting Topics

Scenario Planning

Regulatory, Legal, Institutional

Implementation

Meeting 1 Goals:

- Identify regulatory, legal, and institutional **challenges, constraints, and opportunities** associated with the 208 Plan approach for water quality
- Clarify the definition and components of an **adaptive management plan** that can be permitted

Standing Sub Regional Meeting Topics

Scenario Planning

Regulatory, Legal, Institutional

Implementation

Meeting 2 Goals:

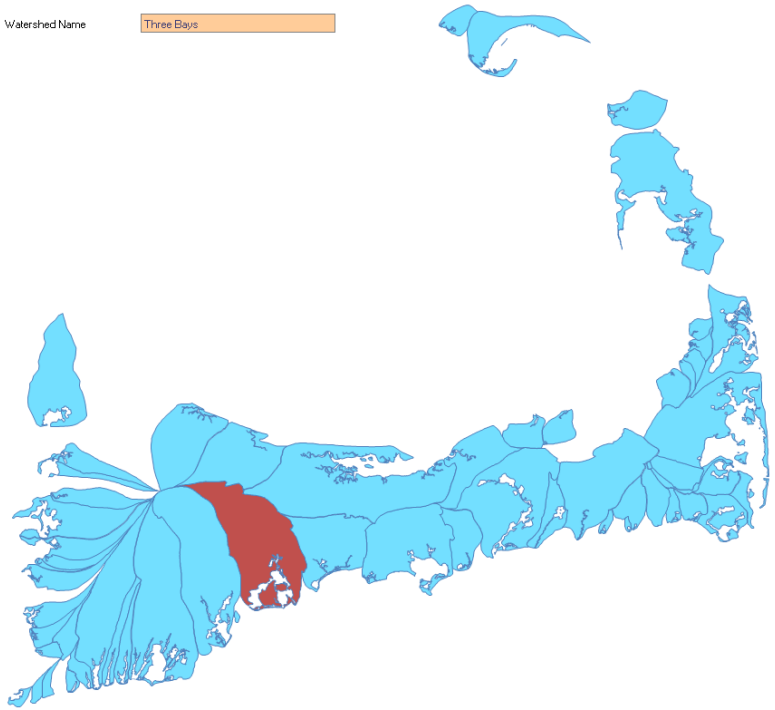
- Introduce the **Triple Bottom Line** analysis tool and its application to scenario planning
- Identify key criteria for **successful collaboration** for shared watersheds and evaluate existing models against the criteria
- Clarify the scope and charge of the **Ad Hoc Monitoring Committee** to meet permitting requirements and water quality goals
- Visualize **monitoring** within an adaptive management approach

Scenario Planning

TRIPLE BOTTOM LINE EVALUATION

THREE BAYS TRIPLE BOTTOM LINE ASSESSMENT

Watershed Name: Three Bays



Key Inputs	Update		
	%	Existing	Future
Present Controllable Load of Nitrogen (Kg/yr)			
Wastewater	90%	34,440	34,440
Fertilizer	6%	2,296	2,296
Stormwater	4%	1,531	1,531
Total	**100%**	**38,267**	**38,267**

Target Setting	
Future Nitrogen Load (Kg/yr)	38,267
TMDL Target	46.3%
Target Nitrogen Load (Kg/yr)	20,560
Nitrogen Reduction Required (Kg/yr)	**17,707**

Community Goals

Please set watershed-wide thresholds for the performance factors below. All scenarios for the watershed will be scored against these thresholds.

1	Development Buildout Timeframe The estimated time when Development in the watershed will reach capacity as planned by current zoning	2033
2	Min. % of TMDL Goal achieved in 20 years The acceptable level of Nitrogen reduction for a viable scenario within a reasonable timeframe	50%
3	Max. % of MHI as 208 Plan Wastewater Management Fee The acceptable burden on households measured as a % of Median Household Income (MHI)	7%
4	Max. average Capital Cost of On-Site Improvement per HH The acceptable burden on households investing in 208 plan related on-site improvements	$14,000
5	Min. % of Properties in Watershed improving in Value The minimum % of properties expected to gain in value due to 208 plan improvements	20%
6	Min. % of High Quality Habitat Created in Watershed The minimum % of high quality habitat being added to the existing habitat areas with the watershed	3%
7	Min. % of GHG Emission Reduction from Wastewater sector The minimum % reduction of GHG comapared to 2002 levels from wastewater sector	4%
8	Min. % New Jobs Created in Watershed The minimum % of new jobs created in the construction, maintenance and rate-payer sectors	2%
9	Min. Concentration Reduction of Phosphorous The minimum amount of phrosphorous concentration reduction in fresh water ponds (Kg/Acre/Yr)	18 Kg/SF
10	Min. % of TMDL Target Achievement 20 Years The minimum extent to which a scenario achieves TMDL target in a specific time frame	50%
11	Min. % Number of Property Gains Property Value The minimum % of number of properties estimated to be increase in property value with the watershed	7%
12	Min. % Value of Property Gain Property Value The minimum % of total property values of properties estimated to be increase in property value with the	6%
13	Min Extent of Development Areas Best Suited For Growth The minimum extent to which a Scenario guides development to areas best suited for growth	90%

SCENARIO 1 : Maximizing Sewer Option

Triple Bottom Line (TBL) Assessment Model

Environmental + Social + Financial Sustainability

CAPE COD COMMISSION

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

Select to add/remove/edit a strategy/technology: S1. Sewering - Sewershed #1

Select a Location (Watershed): Three Bays

SCENARIO NAME: Targeted Sewer

Current Application Stack: 1 Strategies/Technologies

+ **Sewering Options**

S1 **Sewering (Sewershed #1)**

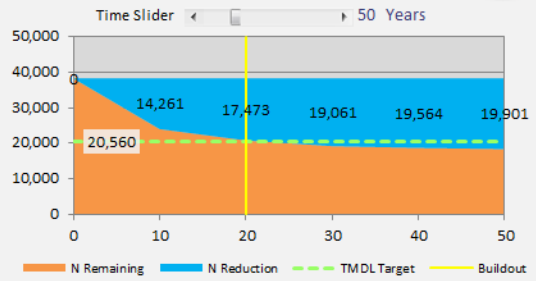
	from Selection	
Total Number of Properties	4035	
Land Area (acres)	5743.2	
Existing Nitrogen Load (Kg/yr)	24794.7	
Future Nitrogen Load (Kg/yr)	24794.7	
Properties Already Sewered	2	
Application Suitability	4,033	
% Selected	100%	
Properties Impacted	4035	
Land Area Impacted	5,743.2	acre
Future Nutrient Load Impacted	24,794.7	Kg/Yr
Collection Systems	**Quantity**	
Main Sewer	421,894	linear feet
Sewer Laterals	201,750	linear feet
Force Main	2	miles
Pump Station	3	Each
On-Site Pump Station		Each
STEG - Collection		Linear Foot
STEP - Collection		
Force Main		Linear Foot
On-Site Pump Station		Each
Interior Plumbing Reconfiguration		Each
Treatment Systems		
Treatment System Included	Yes	
Location (within/outside waatershe	within	
% capacity for sewershed	100%	
Treatment Facility Type	Advanced	
Effluent Disposal	**Quantity**	
Infiltration Basins		Square Foot
Soil Absorption System (SAS)		Square Foot
Injection Well		Each
Wick Well		Each
Ocean Outfall		Linear Foot
Effluent Transport out of Watershed		Linear Foot

Clear Selection

View Scenario Overview | View Technology Performance | Compare Technologies

Impacted Area: 5,743 Acres | 4,035 Properties | 4,033 Septic Systems

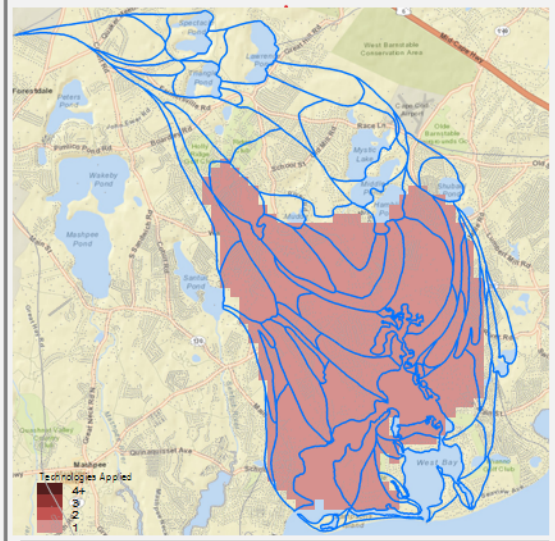
SCENARIO PERFORMANCE



N Load Reduced: 21,219 Kg/yr

N Load Remaining: 17,048Kg/yr

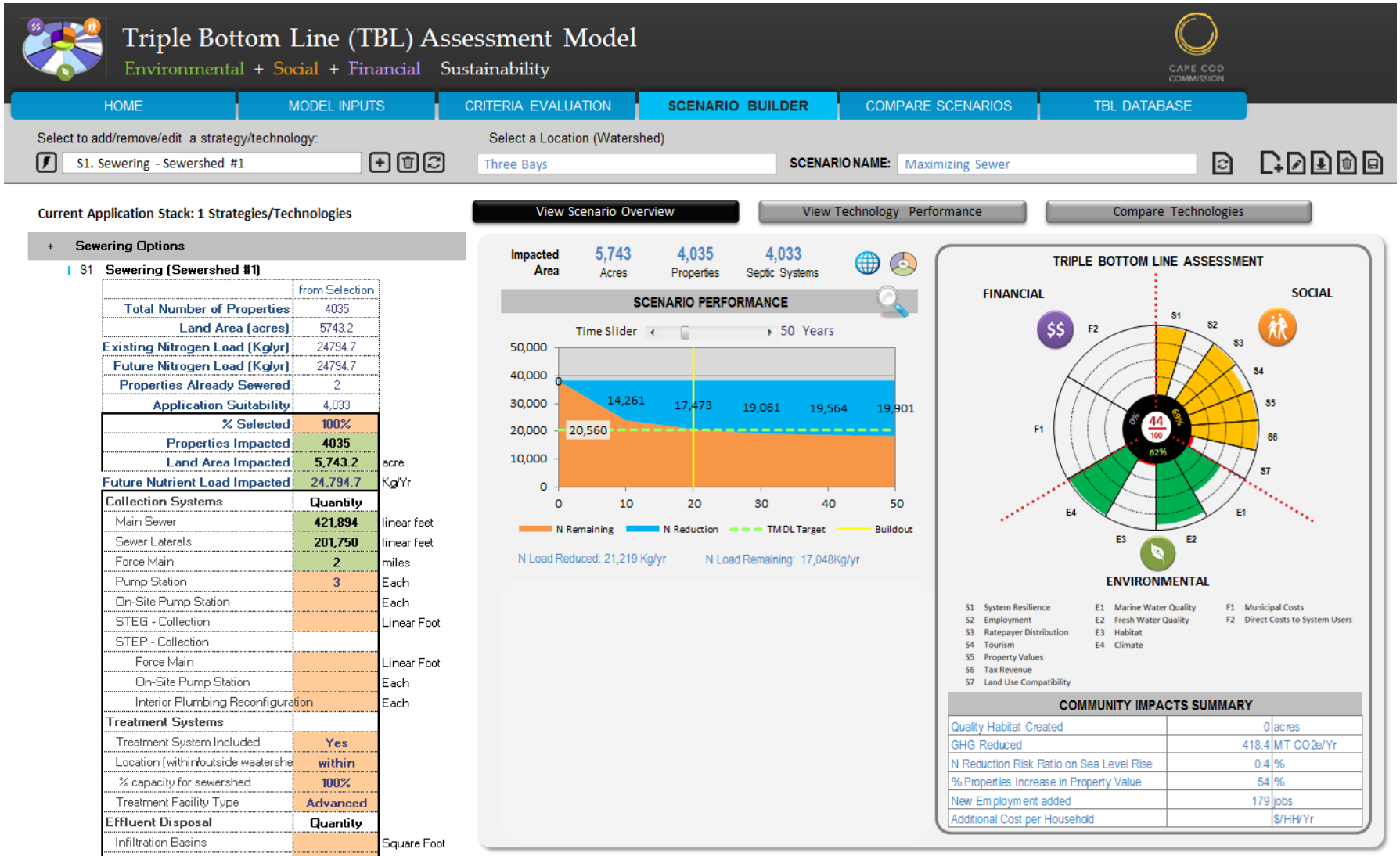
TECHNOLOGY APPLICATION MAP



COMMUNITY IMPACTS SUMMARY

Quality Habitat Created	177.6	acres
GHG Reduced	418.4	MT CO2e/Yr
N Reduction Risk Ratio on Sea Level Rise	0.4	%
% Properties Increase in Property Value	54	%
New Employment added	179	jobs
Additional Cost per Household		$/HH/Yr

SCENARIO 1 : Maximizing Sewer Option



Note: TBL Financial Indicators Not Shown

SCENARIO 2 : Reduced Sewershed

Triple Bottom Line (TBL) Assessment Model

Environmental + Social + Financial Sustainability

CAPE COD COMMISSION

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

Select to add/remove/edit a strategy/technology: S1. Sewering - Sewershed #1

Select a Location (Watershed): Three Bays

SCENARIO NAME: Reduced Sewer

Current Application Stack: 1 Strategies/Technologies

+ **Sewering Options**

S1 **Sewering (Sewershed #1)**

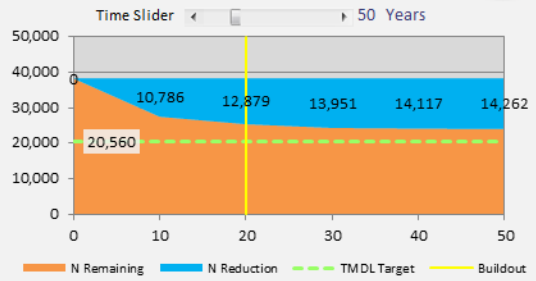
	from Selection	
Total Number of Properties	2774	
Land Area (acres)	3907.7	
Existing Nitrogen Load (Kg/yr)	17431.4	
Future Nitrogen Load (Kg/yr)	17431.4	
Properties Already Sewered	2	
Application Suitability	2,772	
% Selected	100%	
Properties Impacted	2774	
Land Area Impacted	3,907.7	acre
Future Nutrient Load Impacted	17,431.4	Kg/Yr
Collection Systems	**Quantity**	
Main Sewer	316,708	linear feet
Sewer Laterals	138,700	linear feet
Force Main	2	miles
Pump Station	1	Each
On-Site Pump Station		Each
STEG - Collection		Linear Foot
STEP - Collection		
Force Main		Linear Foot
On-Site Pump Station		Each
Interior Plumbing Reconfiguration		Each
Treatment Systems		
Treatment System Included	Yes	
Location (within/outside waatershe	within	
% capacity for sewershed	100%	
Treatment Facility Type	Advanced	
Effluent Disposal	**Quantity**	
Infiltration Basins		Square Foot
Soil Absorption System (SAS)		Square Foot
Injection Well		Each
Wick Well		Each
Ocean Outfall		Linear Foot
Effluent Transport out of Watershed		Linear Foot

Clear Selection

View Scenario Overview | View Technology Performance | Compare Technologies

Impacted Area: 3,908 Acres | 2,774 Properties | 2,772 Septic Systems

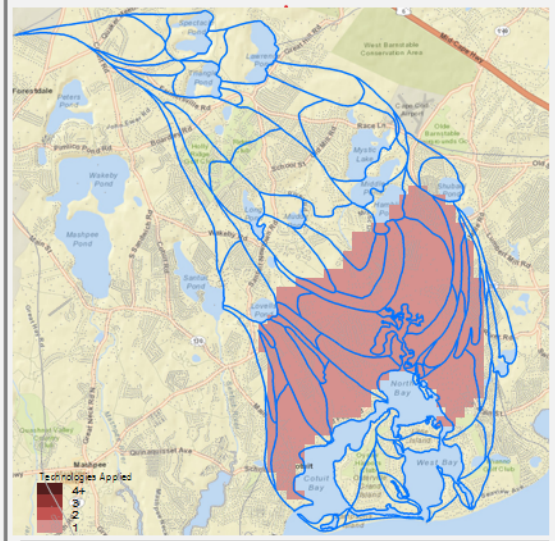
SCENARIO PERFORMANCE



N Load Reduced: 14,887 Kg/yr

N Load Remaining: 23,380Kg/yr

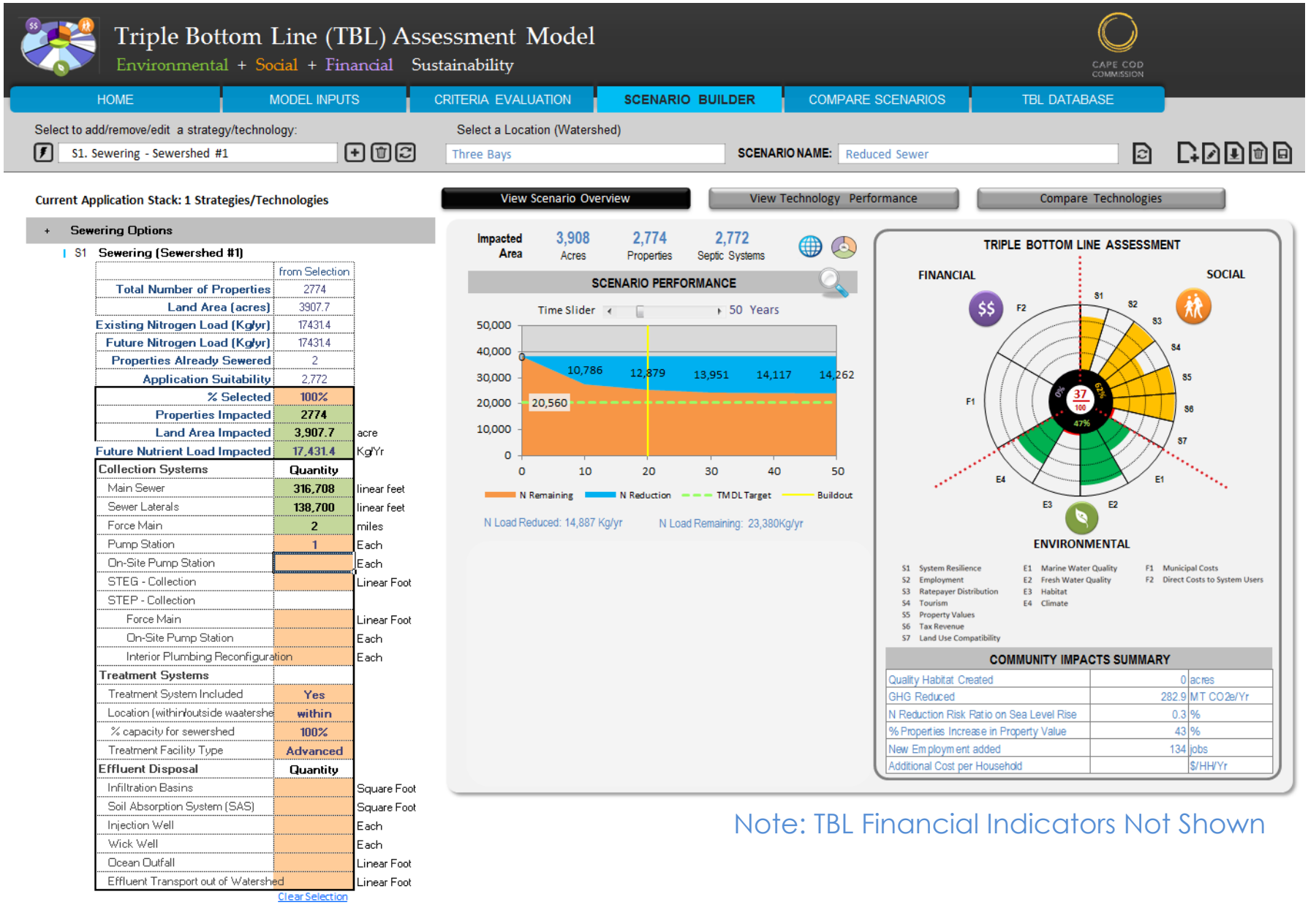
TECHNOLOGY APPLICATION MAP



COMMUNITY IMPACTS SUMMARY

Quality Habitat Created	0	acres
GHG Reduced	282.9	MT CO2e/Yr
N Reduction Risk Ratio on Sea Level Rise	0.3	%
% Properties Increase in Property Value	43	%
New Employment added	134	jobs
Additional Cost per Household		$/HH/Yr

SCENARIO 2 : Reduced Sewershed



Note: TBL Financial Indicators Not Shown

SCENARIO 3 : Alternate Technology

Triple Bottom Line (TBL) Assessment Model

Environmental + Social + Financial Sustainability

CAPE COD COMMISSION

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

Select to add/remove/edit a strategy/technology: A1. Toilets: Composting

Select a Location (Watershed): Three Bays

SCENARIO NAME: Alternative Technologies

Current Application Stack: 6 Strategies/Technologies

- **+ Watershed Options**
  - W1 Permeable Reactive Barriers (PRBs)
  - W2 Constructed Wetlands - Surface Flow
  - W7 Aquaculture/Shellfish
  - W9 Fertigation Wells
  - W13 Pond and Estuary Dredging
- **+ Alternative On-Site Options**
  - A1 **Toilets: Composting**

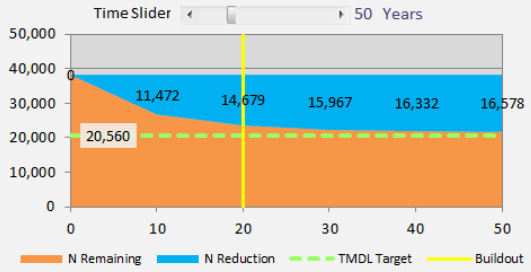
	from Selection
Total Number of Properties	121
Land Area (acres)	110.5
Existing Nitrogen Load (Kg/yr)	869.2
Future Nitrogen Load (Kg/yr)	869.2
Properties Already Sewered	0
Application Suitability	121
% Selected	80%
Properties Impacted	93
Land Area Impacted	86.7
Future Nutrient Load Impacted	792.8 Kg/Yr

Clear Selection

View Scenario Overview | View Technology Performance | Compare Technologies

Impacted: 1,797 Acres; 1,203 Properties; 1,203 Septic Systems

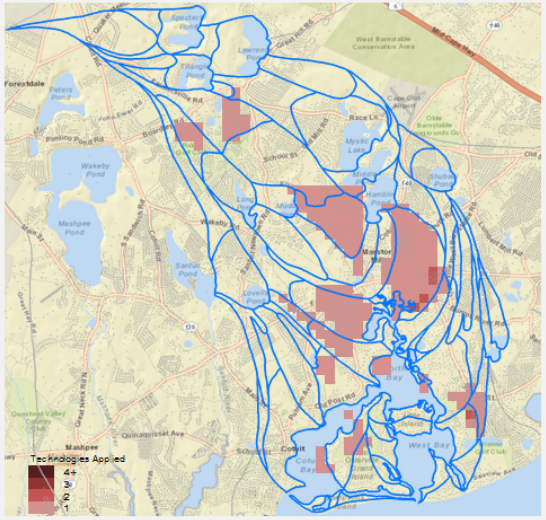
SCENARIO PERFORMANCE



N Load Reduced: 18,556 Kg/yr

N Load Remaining: 19,711Kg/yr

TECHNOLOGY APPLICATION MAP



COMMUNITY IMPACTS SUMMARY

Quality Habitat Created	177.6	acres
GHG Reduced	10.3	MT CO2e/Yr
N Reduction Risk Ratio on Sea Level Rise	0.2	%
% Properties Increase in Property Value	14	%
New Employment added	184	jobs
Additional Cost per Household		$/HH/Yr

SCENARIO 3 : Alternate Technology

Triple Bottom Line (TBL) Assessment Model

Environmental + Social + Financial Sustainability

CAPE COD COMMISSION

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

Select to add/remove/edit a strategy/technology: A1. Toilets: Composting

Select a Location (Watershed): Three Bays

SCENARIO NAME: Alternative Technologies

Current Application Stack: 6 Strategies/Technologies

- **Watershed Options**
  - W1 Permeable Reactive Barriers (PRBs)
  - W2 Constructed Wetlands - Surface Flow
  - W7 Aquaculture/Shellfish
  - W9 Fertigation Wells
  - W13 Pond and Estuary Dredging
- **Alternative On-Site Options**
  - A1 **Toilets: Composting**

	from Selection
Total Number of Properties	121
Land Area (acres)	110.5
Existing Nitrogen Load (Kg/yr)	869.2
Future Nitrogen Load (Kg/yr)	869.2
Properties Already Sewered	0
Application Suitability	121
% Selected	80%
Properties Impacted	93
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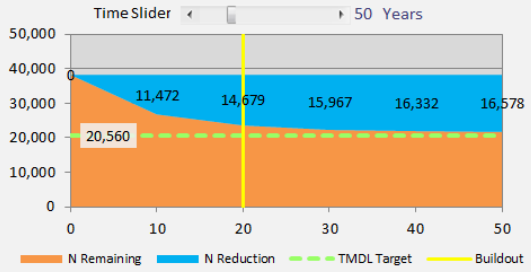
Clear Selection

View Scenario Overview | View Technology Performance | Compare Technologies

Impacted: 1,797 Acres; 1,203 Properties; 1,203 Septic Systems

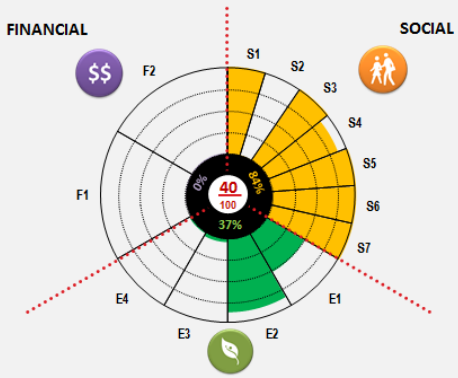
SCENARIO PERFORMANCE



N Load Reduced: 18,556 Kg/yr

N Load Remaining: 19,711Kg/yr

TRIPLE BOTTOM LINE ASSESSMENT



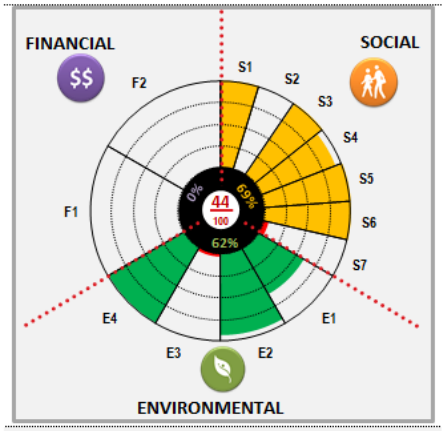
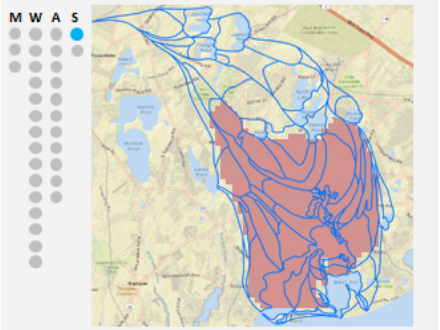
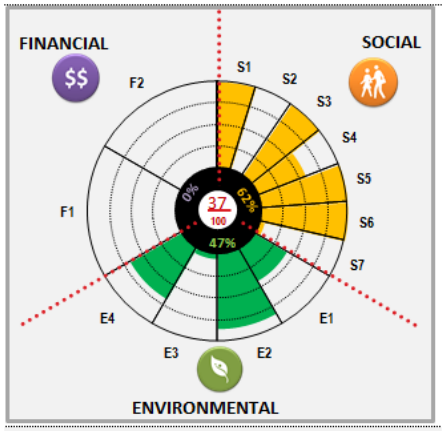
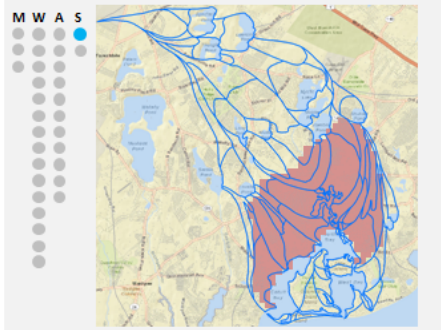
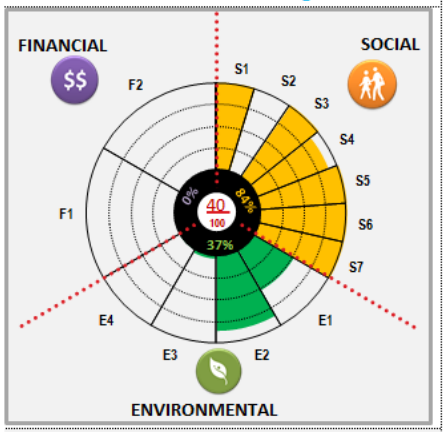
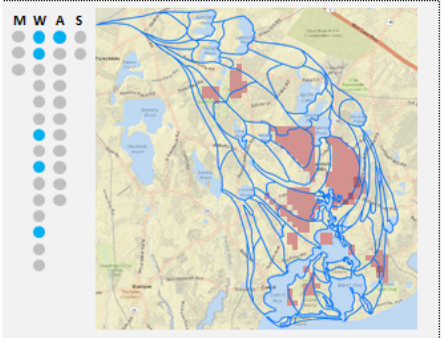
S1	System Resilience	E1	Marine Water Quality	F1	Municipal Costs
S2	Employment	E2	Fresh Water Quality	F2	Direct Costs to System Users
S3	Ratepayer Distribution	E3	Habitat		
S4	Tourism	E4	Climate		
S5	Property Values				
S6	Tax Revenue				
S7	Land Use Compatibility				

COMMUNITY IMPACTS SUMMARY

Quality Habitat Created	177.6	acres
GHG Reduced	10.3	MT CO2e/Yr
N Reduction Risk Ratio on Sea Level Rise	0.2	%
% Properties Increase in Property Value	14	%
New Employment added	184	jobs
Additional Cost per Household		$/HH/Yr

Note: TBL Financial Indicators Not Shown

SCENARIO COMPARISANS

Criterion		Scenario 1	Scenario 2	Scenario 3
		Maximizing Sewer	Reduced Sewer	Alternative Technologies
SOCIAL				
System Resilience	S1			
Employment	S2			
Ratepayer Distribution	S3			
Tourism	S4			
Property Values	S5			
Tax Revenue	S6			
Land Use Compatibility	S7			
ENVIRONMENTAL				
Marine Water Quality	E1			
Fresh Water Quality	E2			
Habitat	E3			
Climate	E4			
FINANCIAL				
Municipal Costs	F1			
Direct Costs to System Users	F2			
Strategy/Technology Distribution		 	 	 
COST & PERFORMANCE				
Nitrogen Reduction %		55%	39%	48%
Time to Reduce (years)		21.9	18.3	27.7
Cost ($M)				
COMMUNITY BENEFITS				
Quality Habitat Created (acres)		0.0	0.0	177.6
GHG Reduced (MT CO2e/Yr)		418.4	282.9	10.3
N Reduction Risk Ratio on Sea Level Rise (%)		0.4	0.3	0.2
Properties Increase in Property Value (%)		54	43	14
New Employment added (Jobs)		179	134	184
Additional Cost per Household ($/HH)		$0	$0	$0

Note: TBL Financial Indicators Not Shown

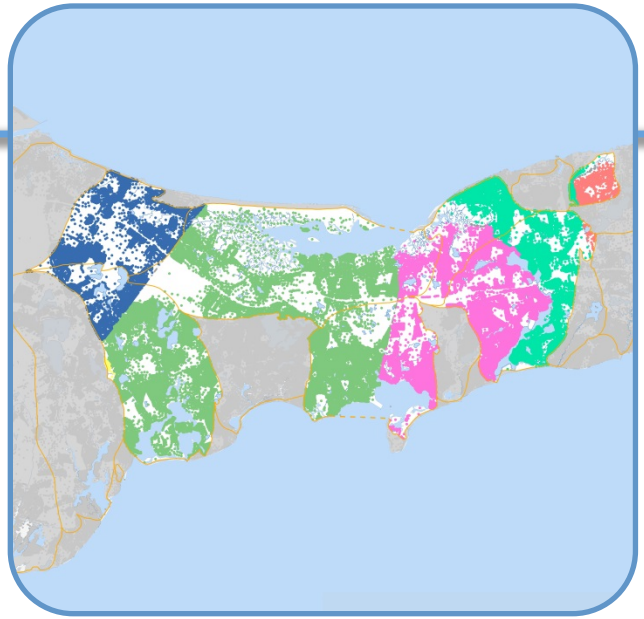
Regulatory, Legal, Institutional

Collaboration

JURISDICTION OF THE PROBLEM

Nitrogen:
- Does not follow town boundaries

Watershed based approach:
- Look across entire watershed
- Identify cost-effective, environmentally effective plan to restore estuary



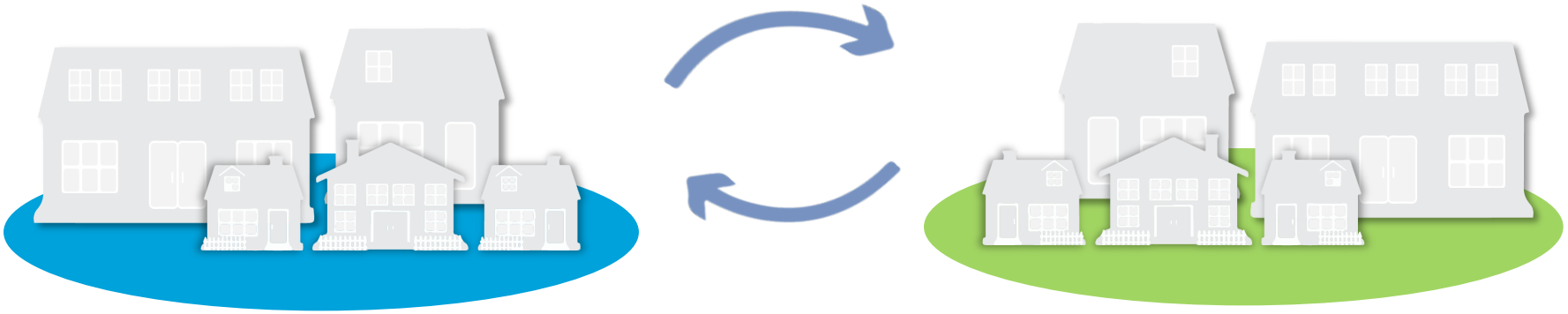
JURISDICTION OF THE SOLUTION

Multi-town collaboration

Shared actions by towns

Collaborative relationships

- Build successful intermunicipal relationships
- Begin with existing watersheds



REQUIREMENTS OF CLEAN WATER ACT / EPA

208 plan requirement:

- State must designate one or more waste management agency (WMA)

WMA must be able to:

- Carry out plan
- Manage waste treatment
- Design & construct new, existing works
- Accept/utilize grants
- Raise revenues
- Incur indebtedness
- Assure each town pays its costs

COLLABORATION CHALLENGES

FROM SUB-REGIONAL MEETING 1

Who decides?

- Which solutions to implement and when and how to re-assess?
- Different levels of planning across towns (including approved CWMPs)
- Different town decision-making processes and publics
- Timeline required for building agreement
- Managing disagreement

Who pays?

- Coordinating multiple town funding approval processes
- Applying for and allocating off-Cape funding opportunities
- Differences in ability & willingness to pay
- Assigning responsibility for: capital funding, operation and maint., monitoring, data mgt., reporting
- Managing disagreement

Who manages?

- Preparing the watershed plan for permitting
- Building, operating, maintaining, monitoring, and reporting
- Ultimate responsibility for water quality outcomes
- Managing disagreement

COLLABORATION MODELS

Intermunicipal Agreements

Federal/Municipal public-public partnerships

Independent Water and Sewer Districts

Water Pollution Abatement Districts

Independent Authority

Regional Health District

AGREEMENT MODEL	LENGTH OF AGREEMENT	ENABLING BODIES	REQUIRES TOWN MEETING
Intermunicipal Agreements	25 years	Boards of Selectmen	No* But agreement can be made subject to vote approval
Federal/Municipal Public-Public	5 years	Boards of Selectmen	No*
Independent Water and Sewer Districts	No limit	Town Meeting	Yes
Water Pollution Abatement Districts	Dissolved by act of Legislature	Boards of Selectmen	No*
Independent Authority	Based on enabling legislation	Requires new legislation	No*
Regional Health District	No limit Unless specified in the agreement	Town Boards of Health and Town Meeting	Yes

* Town Meeting may be required appropriation of funds

Implementation

MONITORING

SECTION 208 AREA WIDE WATER QUALITY MANAGEMENT PLAN

MONITORING SUBCOMMITTEE

Mission:
To provide advice and guidance on appropriate monitoring protocols for technology efficiency and total maximum daily loads, while identifying a process for consolidating all available monitoring data in a central location and format.

SECTION 208 AREA WIDE WATER QUALITY MANAGEMENT PLAN

MONITORING SUBCOMMITTEE

Roles and Responsibilities:

- Establish performance monitoring protocols for technologies that may be a part of watershed permits in the future
- Establish compliance monitoring protocols for meeting total maximum daily loads (TMDLs) in the water body
- Establish process and structure for consolidating and cooperation of existing monitoring programs and data in to a centralized location
- Identify region-wide monitoring needs and develop proposals

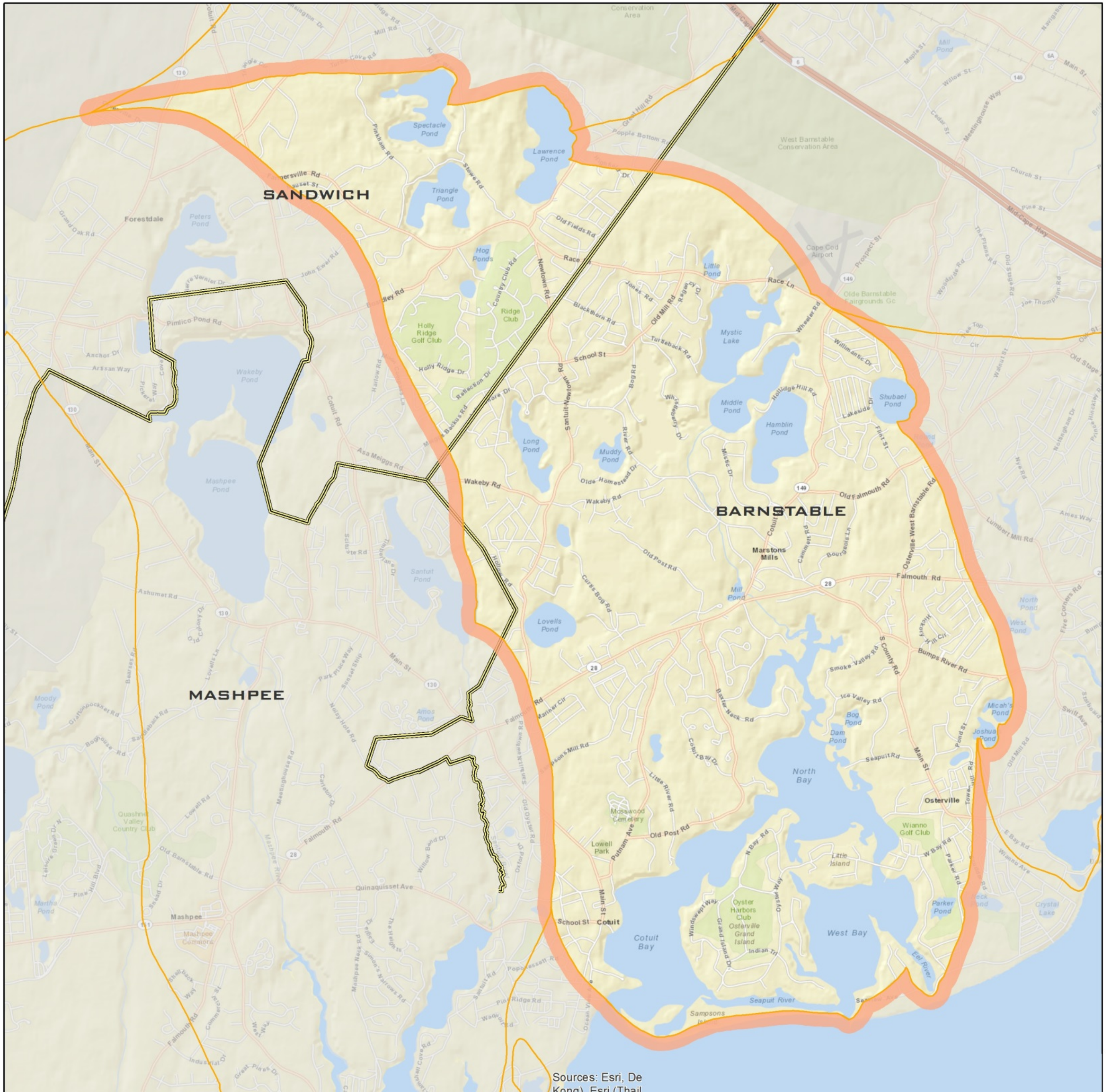
SECTION 208 AREA WIDE WATER QUALITY MANAGEMENT PLAN

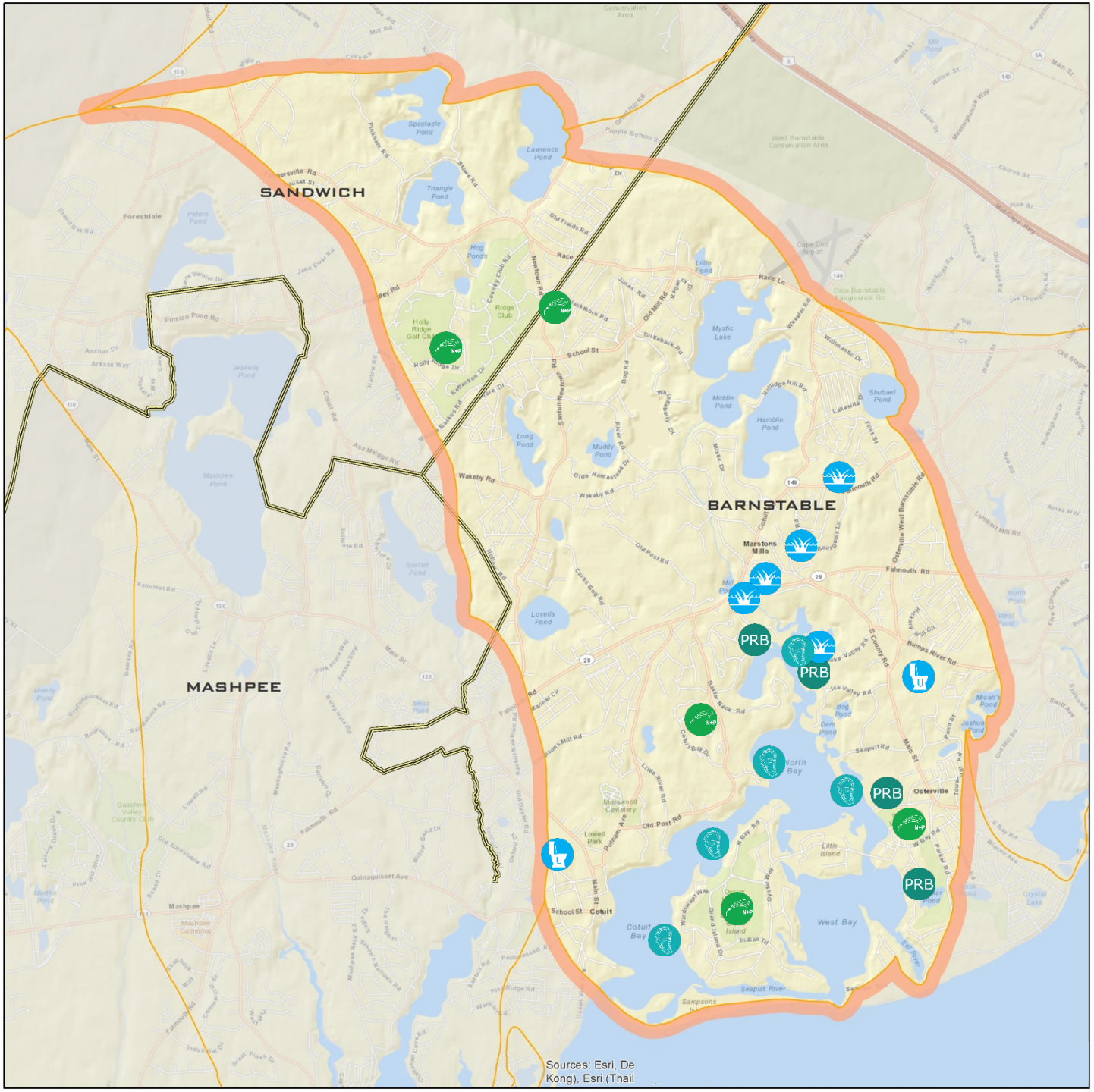
MONITORING SUBCOMMITTEE

Invited Members:
DEP, EPA, Provincetown Center, WBNERR, Town Rep, Academics, SMAST, CCC, Institution/Agency

TRADITIONAL TECHNOLOGY MONITORING FRAMEWORK

Technology	Monitoring	Frequency
 Conventional Treatment	GWDP Influent/ Effluent WQ + quantity	Quarterly - three down & one up gradient
 SatelliteTreatment Systems	GWDP Influent/ Effluent WQ + quantity	Quarterly - three down & one up gradient
 Cluster Treatment Systems	Board of Health performance monitoring similar but less rigorous than GWDP - varries based on conditions, groundwater monitoring may not be required	Varries
IA I/A Title 5 Systems	Influent/ Effluent WQ + quantity	Quarterly


SANDWICH
BARNSTABLE
MASHPEE
Forestdale
Marstons Mills
Osterville
Cotuit
Mashpee
Spectacle Pond
Lawrence Pond
Triangle Pond
Peters Pond
Hog Ponds
Holly Ridge Golf Club
Ridge Club
Wakeby Pond
Mashpee Pond
Santuit Pond
Long Pond
Muddy Pond
Lovells Pond
Little Pond
Mystic Lake
Middle Pond
Hamblin Pond
Shubael Pond
Mill Pond
Bog Pond
Dam Pond
Micah's Pond
Joshua Pond
North Bay
West Bay
Cotuit Bay
Little Island
Oyster Harbors Club
Osterville Grand Island
Wianno Golf Club
Parker Pond
Mosswood Cemetery
Lowell Park
Seapuit River
Eel River
Cape Cod Airport
West Barnstable Conservation Area
Olde Barnstable Fairgrounds Gc
Quashnet Valley Country Club
Mashpee Commons
Moody Pond
Martha Pond
Crystal Lake
Race Ln
Wakeby Rd
Falmouth Rd
Old Post Rd
Old Falmouth Rd
School St
Main St
Quinaquisset Ave
Sources: Esri, De
Kong), Esri (Thail


SANDWICH
MASHPEE
BARNSTABLE
Marstons Mills
Osterville
Cotuit
PRB
PRB
PRB
Sources: Esri, De Kong), Esri (Thail

NON-TRADITIONAL TECHNOLOGY MONITORING FRAMEWORK FOR PILOT PROJECTS (PRELIMINARY)

Technology	Monitoring	Frequency
Constructed Wetlands	WQ samples inlet/outlet (N)	Monthly during growing season
Pond Dredging	WQ samples inlet/outlet of pond (N/P)	Quarterly
Salt Marsh Restoration	Area of restoration, wetland types (GIS and field confirmation)	Annually
Shellfish Bed Restoration	Area of restoration/density of shellfish/landings N content of shellfish Denitrification in benthic (N,DO) WQ samples (N)	Annually Annually - composite 20 animals Annually - three locations Monthly during summer -three locations
Phytobuffer	WQ samples inlet/outlet (N)	Monthly during growing season
Fertigation Wells	Pumping volume/rate WQ samples (N)	Monthly Monthly during summer
Shellfish Aquaculture	Annual landings from each grant N content in shellfish	Annually Annually - composite 20 animals
Perm. React. Barrier	2 upgradient/2 downgradient wells – WQ samples (N, DO) Well in media - WQ samples (N, DO, N gas)	Quarterly Quarterly
Inlet Widening	Salinity measurements to confirm model WQ samples at sentinel station	Two tidal cycles Two tidal cycles
Eco Toilet Systems	Numbers/locations/types of installations WQ samples (N/P) - grey water	Running database Quarterly - three locations per watershed

Adaptive Management