Cape Cod 208 Area Water Quality Planning
Upper Cape West and South Working Group

Meeting One
Tuesday, September 24, 2013
Falmouth Town Hall - 59 Town Hall Square, Falmouth, MA 02540

Meeting Agenda

8:30 am  Welcome – Cape Cod Commission

8:35  Introductions, confirm working group membership and participation – Doug Thompson (Facilitator, Consensus Building Institute) and Working Group

9:00  Review 208 goals and process and the goals of today’s meeting – Cape Cod Commission

9:15  Local Progress to Date: Chronology of what has been done to protect the watersheds in your area – Patty Daley (Area Manager, Cape Cod Commission)

9:30  Review and add to chronology of work to date – Working Group

9:45  Discussion: drawing on past work to move forward – Doug Thompson (Facilitator, Consensus Building Institute) and Working Group

10:00  Baseline Conditions: Understanding Your Watershed and its Water Quality Problem – Patty Daley (Area Manager, Cape Cod Commission)

10:45  Break

11:00  Discussion of Baseline Conditions – Doug Thompson (Facilitator, Consensus Building Institute) and Working Group

11:30  Framework for Moving Forward: Preview Meetings 2 and 3 – Patty Daley (Area Manager, Cape Cod Commission)

11:45  Review/Discuss Process Protocols - Doug Thompson (Facilitator, Consensus Building Institute) and Working Group

12:10 pm  Public Comments

12:30  Adjourn
Upper Cape West & South Group

Baseline Conditions & Needs Assessment
What is the 208 Plan?
Clean Water Act Section 208

The Commission was directed to update the 1978 Plan

The Commonwealth provided $3 million to fund the project
Focus on 21st Century Problems

Nitrogen: Saline Waters

Phosphorus: Fresh Waters

Growth & Title 5 Limitations
Nitrogen Removal Required
**Approach to the 208 Plan Update**

- **Watershed Based**
- **Stakeholder Engagement**
- **Maximize Benefits of Local Planning**
- **No Optimal Solutions**

**Goal:**
To generate a series of approaches in each watershed that will meet water quality standards
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
What is the stakeholder process?
208 Planning Process

Public Meetings

Goals, Work Plan & Roles

Affordability, Financing

Watershed Working Groups

Baseline Conditions

Technology Options Review

Watershed Scenarios

July  August  September  October  December
Public Meetings

Goals, Work Plan & Roles

Goals, Work Plan & Roles

Affordability, Financing

Affordability, Financing

Baseline Conditions

Baseline Conditions

Technology Options Review

Technology Options Review

Watershed Scenarios

Watershed Scenarios

July

August

September

October

December

Advisory Board

Advisory Board

Advisory Board

Advisory Board

Advisory Board

RLI

RLI

RLI

RLI

RLI

TAC

TAC

TAC

Tech Panel

Tech Panel

Tech Panel

Tech Panel

Tech Panel

Regulatory, Legal & Institutional Work Group

Technical Advisory Committee of Cape Cod Water Protection Collaborative

208 Planning Process
Baseline Conditions

11 Working Group Meetings: Sept 18-27

208 Planning Process
208 Planning Process

Baseline Conditions
11 Working Group Meetings: Sept 18-27

Technology Options Review
11 Working Group Meetings: Oct 21-Nov 5
Watershed Working Group - Upper Cape West/South - Workshop 1

208 Planning Process

Baseline Conditions
- 11 Working Group Meetings: Sept 18-27

Technology Options Review
- 11 Working Group Meetings: Oct 21-Nov 5

Watershed Scenarios
- 11 Working Group Meetings: Dec 2-11
Goal of Today’s Meeting:

To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward.
Local Progress to Date

- Buttermilk Bay
- Phinney’s Harbor
- Back River/Eel Pond
- Pocasset River
- Pocasset Harbor
- Megansett Harbor
- Fiddler Cove
- Rands Canal
- Wild Harbor
- Great Sippewissett Creek
- Little Sippewissett Marsh
- Falmouth Inner Harbor
- Quissett Harbor
- Oyster Pond
- Salt Pond
From 1978 Section 208 Plan

The Town of Bourne presents unique geographic difficulties to be overcome in water quality management due to its physical division by the Cape Cod Canal.

The Town of Bourne has a major Category 1 problem area in Buzzards Bay, a densely developed commercial area. On-site system failures in this area have been tied to documented groundwater degradation.

The Wareham treatment plant is planned to serve the area adjacent to Buzzards Bay and has the capacity to accept sewage from Buzzards Bay.

It is likely that watershed protection measures are as important in this area as wastewater management facilities.

It is the general recommendation of this plan that the town should apply for 201 facility planning funds to abate existing problems and construct a septage facility.

The town prefers the district approach and itself must then assume full responsibility for investigating and correcting problems in remaining problem areas.

Should the town be unsuccessful in implementing this approach it should reconsider the possibility of conducting a 201 study.

On-site system management should be implemented throughout the unsewered sections of Bourne, including a maintenance pumping program when adequate septage facilities are available.

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Preliminary Report on Sewerage and Sewage Disposal
Supplemental Report on Sewerage and Sewage Disposal
U.S. Clean Water Act Approved
Wastewater Management Study
CCPEDC Designated Section 208 Planning Agency
Title 5 of State Sanitary Code goes into effect for regulation of on-site wastewater systems.
Section 208 Areawide Plan for Cape Cod Approved
Bourne: 1969-2013

- **1969**: Wastewater Management Study, (Tighe & Bond, 2007)
- **1980**: Draft 201 Facilities Plan
- **1984**: Town of Bourne Sewer Use Regulations
- **1988**: Upper Cape Regional Water Supply Cooperative approved
- **1990**: Start CWMP Process
- **1996**: MEP Report - Phinney's Harbor, Eel Pond, Back River (shared embayment)
- **2000**: Needs Assessment completed in April
- **2003**: Wastewater Management Study, (Tighe & Bond, 2007)
- **2007**: Draft 201 Facilities Plan

Population Change:
- **1980**: 13,874
- **1984**: 16,064
- **1990**: 18,721
- **2007**: 18,721

Population Change: +15.78% to +16.54%
Bourne: 1969-2013

- 2010 Inter Municipal Agreement with Wareham and Bourne for Wastewater
- Wastewater Advisory Committee to the Board of Sewer Commissioners Authorized
- Growth Incentive Zone (GIZ) Application (May 2011)
- Wastewater Management Planning for Downtown Bourne Findings and Recommended Action Plan
- Wastewater Management Options Report completed for Village of Buzzards Bay
- MEP Report - Fidlers Cove/Rands Harbor (shared embayment)
- MEP Report - Wild Harbor (shared embayment)

- State authorizes Checkerboard Sewering for communities with approved CWMPs
- Vision Plan for Bourne’s Downtown
- Action Plan for Bourne’s Downtown
- Bourne Downtown Site Planning
- MEP Report - Wild Harbor (shared embayment)

- Wastewater Flow Projection & Conceptual Costs for Bourne Development Campus
- Wastewater Advisory Committee Report to Board of Sewer Commissioners
- Wastewater Management Conceptual Alternatives Analysis - South of Canal

- Wastewater Management Options Report for Village of Buzzards Bay
- MEP Report - Fidlers Cove/Rands Harbor (shared embayment)

- Bourne: +5.52% between 1969 and 2013

- "Watershed Working Group - Upper Cape West/South - Workshop 1"
Falmouth: 1947-2013

From 1978 Section 208 Plan

Falmouth’s difficulties with sewer system planning and construction have a 30 year history. It is strongly recommended that the town appoint a water quality advisory committee.

A survey of residents and potential sewer users was conducted in the summer of 1978 to determine whether they would be willing to pay for sewers.

The DWPC ordered the town to take immediate action to complete a facility plan for Woods Hole or to begin construction of sewers in downtown Falmouth. Town meeting voted on September 27, 1978 to appropriate additional funds to complete a facility plan for both Woods Hole and Falmouth Village. The plan recommended that DWPC not prosecute the town as long as it is moving in a positive direction towards completion of a comprehensive plan.

The plan also recommended that if town meeting action is not taken expeditiously on the final plan recommendations, the DWPC and DEQE should pursue regulatory actions.

The health agent for the town has stated that there are critical problems with on-site system failures and Title 5 enforcement, both within and outside of, proposed sewer service areas.

A maintenance pumping program should be implemented as part of the facility plan.

The town of Falmouth adopted the first Watershed Protection District bylaw on Cape Cod.
Falmouth: 1947-2013

1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980

15,942 ➤ 23,640

POPULATION CHANGE: (+48.29%)
USEPA required all states to submit strategies for completing TMDLs within 8 to 13 years.
**Falmouth: 1947-2013**

- **Wastewater and Nutrient Management Vision and Strategies**
- **MEP Report - Great (shared embayment), Green and Bournes Ponds**
- **MEP Report - Oyster Pond**
- **MEP Report - Little Pond**
- **MEP Report - West Falmouth Harbor**
- **Wastewater and Nutrient Management Vision and Strategies**

**Upper Cape Regional Water Supply Cooperative approved**

**ENF filed describing CWMP process**

**Wastewater Facilities Plan focused on existing collection systems and area-specific problems.**

**POPULATION CHANGE: (-3.46%)**

- **2000**: 32,660
- **2001**:
- **2002**:
- **2003**:
- **2004**:
- **2005**:
- **2006**:

"Watershed Working Group - Upper Cape West/South - Workshop 1"
Falmouth: 1947-2013

- CWMP Plan of Study - South Coast Estuarine Watersheds
- Completed Needs Assessment, Technology Assessment
- Needs Assessment ENF filed with MEPA & Cape Cod Commission
- Alternatives Screening and Selection of Recommended Plan

2007:
- Completed Needs Assessment, Technology Assessment

2008:
- CWMP Plan of Study - South Coast Estuarine Watersheds
- Needs Assessment ENF filed with MEPA & Cape Cod Commission

2009:
- Alternatives Screening and Selection of Recommended Plan

2010:
- Article 17: Sewer design and alternative demonstration projects approved. $2.7 million

32,660 people

"Watershed Working Group - Upper Cape West/South - Workshop 1"
From 1978 Section 208 Plan

A sewer facilities plan was completed for Sandwich in 1978. The plan calls for a small outfall into the Cape Cod Canal, which now could only be allowed through a special act of the legislature.

Should the town fail to act by 1980, a DEQE investigation of Title 5 violations should be initiated.

A septage treatment facility would not provide a comprehensive solution and could not be considered to be consistent with the 208 plan. Funds should not be made available for the construction of a septage treatment facility.

The town health agent should strictly enforce Title 5 and should seek additional qualified personnel to implement the 208 recommended on-site systems management program.

The town has taken progressive steps to increase lot sizes to at least one acre in most areas of town. The town has indicated willingness to cooperate with the 208 staff in delineating watershed areas and in adopting Watershed Protection Districts.

The problem of the State Fish Hatchery discharging over half a million gallons of fresh water must be addressed by the Department of Fisheries and Wildlife as recommended in the "Water Conservation" section of the final plan.

The town should actively participate in regional solid waste planning to develop a long-range solution to its solid waste management problems.

There has been a serious delay in action on the town’s proposed sewer facility plan and little coordinated participation of town boards in the 208 planning program. The town should immediately form a Water Quality Advisory Committee.

Sandwich: 1960-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Population Change</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>2,082</td>
<td>(+151.63)</td>
</tr>
<tr>
<td>1970</td>
<td>5,239</td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>8,727</td>
<td>(+77.48)</td>
</tr>
<tr>
<td>1980</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>15,489</td>
<td></td>
</tr>
</tbody>
</table>
Sandwich: 1970-2013

- MEP Report - Popponesset (shared embayment)
- MEP Report - Great Pond (Falmouth, shared)
- Start CWMP Process
- County creates Cape Cod Water Protection Collaborative
- MEP Report - Three Bays (shared embayment)
- MEP Report - Phinney's Harbor, Eel Pond, Back River (shared embayment)
- Interim Wastewater Management Solutions for Selected Sandwich, Massachusetts Economic Growth Areas
- MEP Report - Waquoit Bay West (shared embayment)
- MEP Report - Wild Harbor (shared embayment)
- MEP Report - Fiddlers Cove/Rands Harbor (shared embayment)
- Comprehensive Water Resource Management Plan RFP issued
- Comprehensive Water Resources Management Plan Needs Assessment
- Interim Wastewater Management Solutions for Selected Sandwich, Massachusetts Economic Growth Areas
- Scientific Peer Review Panel find MEP data adequate for planning purposes.

POPULATION CHANGE: (+2.68%) 20,675
Did we miss anything?
Your Watersheds

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney’s Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
44.7 square miles
3 Towns
Natural Features

**Base Map**
- Town Lines
- Rivers

**Embayment Boundary**
- On Land
- On Sea

**Major Roads**
- US Highway
- State Highway
- Roads

**Natural Areas**
- Natural Heritage & Endangered Species Program (NHESP) Certified Vernal Pools
- Water Table Contours
- Cranberry Bogs
- Wetlands
- Sea, Lake, & Overland Surges from Hurricanes (SLOSH) Update 2013
- Preliminary FEMA Flood Insurance Rate Map (FIRM) Zones 2013

Sources: MassGIS, MassDOT, ICCOH, FEMA, CCC
Managed Surfaces

Base Map
- Town Lines
- Rivers

Embayment Boundary
- On Land
- On Sea

Major Roads
- US Highway
- State Highway
- Roads

Managed Surfaces
- Approximate Managed Ground Surfaces
- Approximate Residential Managed Lawns
- Approximate Managed Golf Courses
- Approximate Municipal Managed Natural Surfaces

Sources: MassGIS, MassDOT, CCC
Regulatory

**Base Map**
- Town Lines
- Rivers

**Embankment Boundary**
- On Land
- On Sea

**Major Roads**
- US Highway
- State Highway
- Roads
  - Structures
  - Ponds

**Regulatory**
- Areas of Critical Environmental Concern
- DEP Approved Wellhead Protection Areas (Zone IIs)
- Growth Incentive Zone

**OpenSpace: Level of Protection**
- In Perpetuity
- Limited
- None

**Landuse Vision Map**
- Economic Center
- Industrial and Service Trade Area
- Village
- Resource Protection Area
- Other
- Undesignated

Sources: MassGIS, MassDOT, CCC
Land Use Change

Base Map
- Town Lines
- Rivers

Embayment Boundary
- On Land
- On Sea

Major Roads
- US Highway
- State Highway
- Roads

Land Use Change
- Residential
- Commercial
- Industrial
- Wooded, Natural, or Wetlands
- Open - Disturbed or Managed
- Water

Sources: MassGIS, MassDOT
Density

Cape Wide Cost Estimate:
30% growth will increase capital costs by 40%
Buildout

Increase in Dwellings

- Regional Buildout
- LCP
- CWMP

Bar chart showing the percentage increase in dwellings for various towns in the Upper Cape West/South region.
Buildout

Increase in Non-Residential Square Footage

- Regional Buildout
- LCP
- CWMP
Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney’s Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Total Population (2010) = 16,516
7.3% of the Total Cape Cod Population
Median Income (2010)

American Community Survey
Average Assessed Home Value (2010)

Total Assessed Value of Residential Homes = $4,275,621,950

2010 Census
Your Government & Taxes

- Buttermilk Bay
- Eel Pond & Back River
- Falmouth Inner Harbor
- Fiddlers Cove
- Great Sippewisset Creek
- Little Sippewisset Marsh
- Megansett Harbor
- Oyster Pond

- Phinney’s Harbor
- Pocasset Harbor
- Pocasset River
- Quissett Harbor
- Rands Canal
- Salt Pond
- Wild Harbor
Average Single Family Property Tax Bill (2013)

- Bourne
- Falmouth
- Sandwich
- Barnstable County
- Massachusetts

MA Dept of Revenue & Town of Barnstable, 2013
Average Annual Sewer Bill (2012)

- Bourne: $700
- Falmouth: $500
- Barnstable County (Towns of: Barnstable, Bourne, Falmouth, and Chatham): $600
- Massachusetts: $800

Tighe & Bond, MA Sewer Rate Survey, 2012
### The Problem

<table>
<thead>
<tr>
<th>Buttermilk Bay</th>
<th>Phinney's Harbor</th>
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</thead>
<tbody>
<tr>
<td>Eel Pond &amp; Back River</td>
<td>Pocasset Harbor</td>
</tr>
<tr>
<td>Falmouth Inner Harbor</td>
<td>Pocasset River</td>
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<tr>
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<td>Salt Pond</td>
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<tr>
<td>Megansett Harbor</td>
<td>Wild Harbor</td>
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<tr>
<td>Oyster Pond</td>
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</tbody>
</table>
Massachusetts Estuaries Project

- Opportunity for towns to obtain independent analysis of nitrogen loading and its impact on water quality
- Provides water quality, nutrient loading, and hydrodynamic information
- Water quality monitoring – minimum of 3 years of data for each embayment
- Watershed model links water quality data to nitrogen loads
Cape-Wide Controllable Nitrogen Loads

- Septic: 79%
- Lawn Fertilizers: 4%
- Impervious Surfaces: 9%
- Wastewater Treatment Facilities: 8%
- All Other: <1%

Note: Data averaged from existing Massachusetts Estuaries Project Reports
Falmouth Inner Harbor Controllable Nitrogen Loads

- Septic Systems: 77%
- Lawn Fertilizer: 10%
- Impervious Surfaces: 5%
- Wastewater Treatment Facilities: 7%

MEP 2013
Fiddlers Cove
Controllable Nitrogen Loads

- Septic Systems: 78%
- Lawn Fertilizer: 17%
- Impervious Surfaces: 5%

MEP 2013
Oyster Pond Controllable Nitrogen Loads

- Septic Systems: 84%
- Lawn Fertilizer: 4%
- Impervious Surfaces: 7%
- Natural Surfaces: 5%

MEP 2006
Phinney's Harbor
Controllable Nitrogen Loads

- 79% Septic Systems
- 17% Lawn Fertilizer
- 4% Impervious Surfaces

MEP 2006
Rands Canal Controllable Nitrogen Loads

- Septic Systems: 75%
- Lawn Fertilizer: 17%
- Impervious Surfaces: 8%

MEP 2013
Wild Harbor
Controllable Nitrogen Loads

- Septic Systems: 72%
- Lawn Fertilizer: 8%
- Impervious Surfaces: 13%
- Golf Course Fertilizers: 7%

MEP 2013
## Nitrogen Problem

### Base Map
- Town Lines
- Rivers
- Embayment Boundary
  - On Land
  - On Sea
- Major Roads
  - US Highway
  - State Highway
  - Roads
  - Structures
  - Ponds

### Nitrogen

#### Water Quality Stations
- Healthy
- Healthy/Moderately Impacted
- Healthy/Significantly Impacted
- Moderately Impacted
- Moderately Impacted/Significantly Impacted
- Significantly Impacted
- Significantly Impacted/Significantly Degraded

#### Yearly Nitrate Concentration Averages
- 0 - 0.5 mg/l in Public Water Supply Wells
- 0.5 - 1 mg/l
- 1 - 2.5 mg/l
- 2.5 - 5 mg/l

### Embayments with Removal Target

<table>
<thead>
<tr>
<th>Total NLoad Percent Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 %</td>
</tr>
<tr>
<td>1 - 52 %</td>
</tr>
<tr>
<td>53 - 72 %</td>
</tr>
<tr>
<td>73 - 86 %</td>
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<tr>
<td>87 - 100 %</td>
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### Subwatersheds with Removal Target

<table>
<thead>
<tr>
<th>Total NLoad Percent Removal</th>
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<tbody>
<tr>
<td>0.1 % - 9%</td>
</tr>
<tr>
<td>9.1 % - 38 %</td>
</tr>
<tr>
<td>38.1 % - 62 %</td>
</tr>
<tr>
<td>62.1 % - 86 %</td>
</tr>
<tr>
<td>86.1 % - 100%</td>
</tr>
</tbody>
</table>

Sources: MassGIS, MEP, CCC
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Falmouth Harbor estuary system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)
Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Falmouth Harbor estuary system. The approximate location of the sentinel threshold station for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Falmouth Harbor estuary system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Falmouth Harbor estuary system is shown by the black symbol.

(Source: MEP 2013)
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Fiddlers Cove and Rands Harbor estuary systems, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)
Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Fiddlers Cove and Rands Harbor estuary systems. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Fiddlers Cove and Rands Harbor estuary systems, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold stations for Fiddlers Cove and Rands Harbor estuary systems are shown by the black symbols.

(Source: MEP 2013)
Contour plot of modeled total nitrogen concentrations (mg/L) in Oyster Pond, for no anthropogenic loading conditions.

(Source: MEP 2006)

Pre-Colonial Conditions: Oyster Pond
Present Conditions: Oyster Pond

Contour plot of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Oyster Pond.

(Source: MEP 2006)
Contour plot of modeled total nitrogen concentrations (mg/L) in Oyster Pond, for projected build-out loading conditions.

(Source: MEP 2006)
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Phinney’s Harbor estuary system, for no anthropogenic loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Phinney’s Harbor estuary system (PH4) is shown.

(Source: MEP 2006)
Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario and the bathymetry, for Phinney’s Harbor system. The approximate location of the sentinel threshold station for Phinney’s Harbor estuary system (PH4) is shown.

(Source: MEP 2006)

**Present Conditions: Phinney’s Harbor, Back River & Eel Pond**
Contour plots of modeled total nitrogen concentrations (mg/L) in Phinney’s Harbor estuary system, for projected build-out loading conditions, and bathymetry. The approximate location of the sentinel threshold station for Phinney’s Harbor estuary system (PH4) is shown.

(Source: MEP 2006)

Build-out Conditions: Phinney’s Harbor, Back River & Eel Pond
Contour plots of **modeled total nitrogen concentrations (mg/L)** in Quissett Harbor System, for no anthropogenic loading conditions and bathymetry. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

**Pre-Colonial Conditions: Quissett Harbor**
Contour plots of **average total nitrogen concentrations** from results of the present conditions loading scenario, for Quissett Harbor System. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

**Present Conditions: Quissett Harbor**
Contour plots of modeled total nitrogen concentrations (mg/L) in Quissett Harbor System for projected build-out loading conditions, and bathymetry. The approximate location the sentinel threshold station for Quissett Harbor System (QH2) is shown.

(Source: MEP 2013)

Build-out Conditions: Quissett Harbor
Contour plot of modeled total nitrogen concentrations (mg/L) in Wild Harbor, for no anthropogenic loading conditions.

(Source: MEP 2013)

Pre-Colonial Conditions: Wild Harbor
Contour plot of average total nitrogen concentrations from results of the present conditions loading scenario, for the Wild Harbor System.

(Source: MEP 2013)

Present Conditions: Wild Harbor
Contour plot of **modeled total nitrogen concentrations (mg/L)** for results of the projected buildout loading scenario, for the Wild Harbor System.

(Source: MEP 2013)

**Present Conditions: Wild Harbor**
## Nitrogen Problem

### Base Map
- Town Lines
- Rivers

### Embayment Boundary
- On Land
- On Sea

### Major Roads
- US Highway
- State Highway
- Roads
  - Structures
  - Ponds

### Nitrogen

#### Water Quality Stations
- Healthy
- Healthy/Moderately Impacted
- Healthy/Significantly Impacted
- Moderately Impacted
- Moderately Impacted/Significantly Impacted
- Significantly Impacted
- Significantly Impacted/Significantly Degraded
- Significantly Degraded

#### Yearly Nitrate Concentration Averages *in Public Water Supply Wells*
- 0 - 0.5 mg/l
- 0.5 - 1 mg/l
- 1 - 2.5 mg/l
- 2.5 - 5 mg/l

#### Embayments with Removal Target
- Total NLoad Percent Removal
  - 0 %
  - 1 - 52 %
  - 53 - 72 %
  - 73 - 86 %
  - 87 - 100 %

#### Subwatersheds with Removal Target
- Total NLoad Percent Removal
  - 0.1 % - 9%
  - 9.1 % - 38 %
  - 38.1 % - 62 %
  - 62.1 % - 86 %
  - 86.1 % - 100 %

Sources: MassGIS, MEP, CCC
Eelgrass Extent

**Base Map**
- Town Lines
- Rivers

**Embayment Boundary**
- On Land
- On Sea

**Major Roads**
- US Highway
- State Highway
- Roads

**Eelgrass**
- Eelgrass Extent

Sources: MassGIS
Phosphorus Problem

**Base Map**
- Town Lines
- Rivers

**Embayment Boundary**
- On Land
- On Sea

**Major Roads**
- US Highway
- State Highway
- Roads

**Phosphorus Priority Ponds**

<table>
<thead>
<tr>
<th>Trophic Status</th>
<th>Color</th>
<th>Status</th>
</tr>
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<tbody>
<tr>
<td>Eutrophic</td>
<td>Green</td>
<td>Most Impacted</td>
</tr>
<tr>
<td>Mesotrophic</td>
<td>Cyan</td>
<td></td>
</tr>
<tr>
<td>Oligotrophic</td>
<td>Light Blue</td>
<td>Least Impacted</td>
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<tr>
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</table>

**Sources:** MassGIS, MassDOT, CCC
Title 5 Compliance Issues

**Base Map**
- Town Lines
- Rivers

**Embayment Boundary**
- On Land
- On Sea

**Major Roads**
- US Highway
- State Highway
- Roads

**Existing Conditions**
- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC
<table>
<thead>
<tr>
<th>Existing &amp; Proposed Solutions</th>
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<tr>
<td>Buttermilk Bay</td>
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<tr>
<td>Eel Pond &amp; Back River</td>
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<td>Falmouth Inner Harbor</td>
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<td>Fiddlers Cove</td>
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<td>Great Sippewisset Creek</td>
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<td>Wild Harbor</td>
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</tbody>
</table>
## Existing Infrastructure

### Base Map
- Town Lines
- Rivers

### Embayment Boundary
- On Land
- On Sea

### Major Roads
- US Highway
- State Highway
- Roads

### Existing Conditions
- Approx. Locations of Loans Issued for Title 5 Repair
- Potential Title 5 Compliance Issues
- Wastewater Treatment Facility
- Groundwater Discharge Points
- Sewered Parcels

### Enhanced Attenuation Sites
- Pipe
- Stormwater

### Public Supply Wells
- Public Water Supply Well
- Small Volume Wells, Non-Transient
- Proposed Public Water Supply Well
- Surface Water Supply
- Small Volume Wells, Transient

Sources: MassGIS, MassDOT, MassDEP, Barnstable County Community Septic Loan Program, CCC
Proposed Infrastructure

Base Map
- Town Lines
- Rivers

Embayment Boundary
- On Land
- On Sea

Major Roads
- US Highway
- State Highway
- Roads
  - Structures
  - Ponds

Proposed Conditions

Natural Attenuation Sites
- Bridge
- Culvert
- Inlet
- Pipe
- Sewer Alternatives
- Stormwater

CWMP Sewershed Phasing
- No Date Set
- Phase Date
  - 2001 - 2010
  - 2011 - 2020
  - 2021 - 2030
  - 2031 - 2040
  - 2041 - 2050

Sources: MassGIS, MassDOT, CCC
Framework for Addressing Solutions Moving Forward

Buttermilk Bay
Eel Pond & Back River
Falmouth Inner Harbor
Fiddlers Cove
Great Sippewisset Creek
Little Sippewisset Marsh
Megansett Harbor
Oyster Pond

Phinney’s Harbor
Pocasset Harbor
Pocasset River
Quissett Harbor
Rands Canal
Salt Pond
Wild Harbor
Watershed Working Group - Upper Cape West/South - Workshop 1

**Site Scale**
- Compact Development

**Neighborhood**
- Cluster Treatment
  - Cluster Treatment
- Satellite Treatment
  - Satellite Treatment
- STEP/STEG
  - STEP/STEG
- Toilets: Urine Diversion
  - Toilets: Urine Diversion
- Toilets: Composting
  - Toilets: Composting
- Toilets: Packaging
  - Toilets: Packaging
- Stormwater: Bioretention
  - Stormwater: Bioretention
- Eco-Machines & Living Machines
  - Eco-Machines & Living Machines

**Watershed**
- Adv. Central. Treatment
  - Adv. Central. Treatment
- Wastewater Transport
  - Wastewater Transport
- Treated Effluent Disposal
  - Treated Effluent Disposal
- Conventional Treatment
  - Conventional Treatment
- Disposal: Out of Watershed
  - Disposal: Out of Watershed
- Disposal: Ocean
  - Disposal: Ocean

**Cape-Wide**
- Fertilizer Management
  - Fertilizer Management
- Stormwater BMPs
  - Stormwater BMPs
- Regulatory
  - Regulatory

**Prevention**
- Title 5 Replacement
  - Title 5 Replacement
- I/A On-site Denitrifying
  - I/A On-site Denitrifying
- Enhanced I/A Systems
  - Enhanced I/A Systems

**Reduction**
- I/A On-site Denitrifying
  - I/A On-site Denitrifying
- Enhanced I/A Systems
  - Enhanced I/A Systems

**Remediation**
- PRB
  - PRB
- Inlet / Culvert Widening
  - Inlet / Culvert Widening
- Pond / Estuary Dredging
  - Pond / Estuary Dredging
- Surface Water Remediation Wetlands
  - Surface Water Remediation Wetlands
Watershed Working Group - Upper Cape West/South - Workshop 1

**Targets/ Goals**
- **Present Load:** X kg/day
- **Target:** Y kg/day
- **Reduction Required:** N kg/day

**Composite Target Areas**
- A. High Nitrogen Reduction Areas
- B. Pond Recharge Areas
- C. Title 5 Problem Areas

**Low Barrier to Implementation**
- A. Fertilizer Management
- B. Stormwater Mitigation

**Watershed/Embayment Options**
- A. Permeable Reactive Barriers
- B. Inlet/Culvert Openings
- C. Constructed Wetlands
- D. Dredging

**Alternative On-Site Options**
- A. Eco-toilets (UD & Compost)
- B. I/A Technologies
- C. Enhanced I/A Technologies
- D. Shared Systems

**Priority Collection/High-Density Areas**
- A. Greater Than 1 Dwelling Unit/acre
- B. Village Centers
- C. Economic Centers
- D. Growth Incentive Zones

**Supplemental Sewering**
All materials and resources for the Herring River Group will be available on the Cape Cod Commission website:


- Buttermilk Bay
- Eel Pond & Back River
- Falmouth Inner Harbor
- Fiddlers Cove
- Great Sippewisset Creek
- Little Sippewisset Marsh
- Megansett Harbor
- Oyster Pond

- Phinney’s Harbor
- Pocasset Harbor
- Pocasset River
- Quissett Harbor
- Rands Canal
- Salt Pond
- Wild Harbor
Cape Cod 208 Area Water Quality Planning
Upper Cape West and South Working Group

Meeting One
Tuesday, September 24, 2013
Falmouth Town Hall - 59 Town Hall Square, Falmouth, MA 02540

DRAFT SUMMARY NOTES

ACTION ITEMS

The following action items were captured during the meeting:
• Create a distinct chronology for MMR
• Get greater clarity about how to fold MMR into the process
• Address the threshold/“de minimis” issue
• Incorporate the sticky notes that were posted on the chronologies
• Address the seasonal baseline issue
• Check on the potentially incorrect eelgrass data
• When referring to the amount of nitrogen that needs to be removed to achieve TMDL, list the units in absolute kilograms or pounds as well as relative percentages
• Distribute the group members’ email addresses to all members

WELCOME AND INTRODUCTIONS

Ms. Patty Daley of the Cape Cod Commission opened the meeting with a welcome. All of the representatives around the table introduced themselves. Appendix A contains a list of the group members who were in attendance.

REVIEW OF GOALS AND PROCESS

Ms. Patty Daley, Cape Cod Commission (Commission), introduced the goals of the meeting and provided background on the process of updating the 208 plan. The process will focus on 21st century problems such as nitrogen, phosphorus, growth, and Title 5 limitations. Ms. Daley stated that the goal of today’s meeting was: To review and develop shared understanding of the characteristics of these watersheds, the work done to date, existing data and information available, and how to apply all of this to planning for water quality improvements for these watersheds moving forward.

Ms. Daley explained that the Planning Process: will be watershed based, will engage stakeholders, and maximize the benefits of local planning. She stated that the Commission is not searching for an optimal plan for the Cape, but rather seeking to generate a series of approaches in each watershed that meet water quality standards.

Ms. Daley reviewed the 208 Planning Process, including the following basic timeline:
• July – Goals, Work Plan, and Roles

Upper Cape West and South Working Group
Meeting One Draft Summary (9/24/13)
• August – Affordability/Financing
• September (now) – Baseline conditions
• October – Technology Options Review
• December – Watershed Scenarios

Ms. Daley noted the other groups and organizations involved in the process: the Advisory Board; the Regulatory, Legal and Institutional Work Group; the Technical Advisory Committee of the Cape Cod Water Protection Collaborative which will give input on the potential technologies; and, the Technical Panel, comprised of state, national, and international experts who will give high-level review of the potential technologies.

LOCAL PROGRESS TO DATE

Ms. Daley reviewed the chronologies for Falmouth, Sandwich, and Bourne. The chronologies include notation of: regulatory/town meeting actions, appropriations, reports/studies, infrastructure/plan implementation, and negative votes/stopped actions.

Working Group members were given time to examine timelines of water-quality developments for the Upper Cape West and South towns (Falmouth, Sandwich, and Bourne). Mr. Thompson, the facilitator, asked the Working Group to provide input about amendments and additions that should be made to the timelines. Working Group members provided the following input:

• Create a separate chronology for the Massachusetts Military Reservation (MMR); add the Base’s history of sewering.
• Clarify exactly how many square miles of the watershed are covered by MMR.
• Correct the mistake on the Sandwich chronology regarding Fiddler’s Cove.
• Include stormwater in the process.
  • The Commission responded that it will be looking at stormwater, fertilizers, and other issues. They will be covered in more detail later in the meeting.
• Although the Cape Cod Canal watershed is a direct discharge watershed, the Canal needs attention because it could be seen as a watershed to Upper Buzzard’s Bay, which is experiencing higher nutrient levels and plankton blooms.
  • The Commission responded that, while this process focuses on embayment areas, they will be planning holistically to include the direct discharge watersheds as well.
• Change the title of the “Nitrogen removal required” slide in the presentation to reflect the fact that the slide only denotes embayments which have been previously studied; there will be other embayments that will need action and this should be made clearer on the slide.
• Other specific notes and corrections were listed on sticky notes collected by the Commission.
• Address the “de minimis” factor where one small parcel of a watershed nicks into another town. Set a definite limit in order to decide when a town should be involved.

Further comments on MMR
The working group discussed MMR in more detail. The group did not have exact specifications, but MMR might comprise a quarter or a third of the watershed. Group members voiced their appreciation that an MMR representative is part of the Working Group. The working group agreed
that it and the Commission need to get clarity on how they will fold MMR into the 208 update process. Group members also mentioned that the base cemetery should be considered in the planning. Ms. Daley added that there has been a study of the wastewater treatment plant at the Base and discussion of possible municipal use. There may be opportunities for disposal sites and the plant.

**BASELINE CONDITIONS**

Ms. Daley and the Cape Cod Commission presented slides on the water quality challenges the Cape faces, and some of the data the Commission uses for its modeling and analysis. The working group members were asked to identify anything they believed was missing from the data, as well as any differences of opinion they had with the Commissions’ analysis or approach. The Upper Cape West and South towns encompass 44.7 square miles. Ms. Daley noted that the watersheds included in Falmouth’s WWMP were not reflected in these slides.

Mr. Jay Detjens of the Commission covered the natural features slide and GIS layers, including information about the Sagamore Lens Water Table, cranberry bogs, DEP wetlands layer, vernal pools, and the 2013 SLOSH (Sea, Lake and Overland Surges from Hurricanes) update. Ms. Daley and Mr. Detjens introduced the managed surfaces slide and GIS layers and explained that this category includes man-made and natural surfaces including lawns and pavement. Tracking lawns helps them figure out where fertilizer might be in use. The managed ground use layer includes structures, driveways, roads, gravel pits, and other disturbed areas. Ms. Daley described the different layers included in the regulatory maps, including Growth Incentive Zones. There is one growth incentive zone in this watershed, in Bourne. Mr. Detjens discussed the land use change layers that show how much growth has occurred from 1951 to 1971 and to 1999. These data come from UMass Dartmouth. Mr. Detjens walked through the density maps and explained that density is measured in dwelling units per acre in a quarter mile grid. Density is important primarily because it markedly impacts the cost of collecting wastewater for treatment. Collecting from individual units can be up to 70% of the cost of treatment. Density will play into how new growth occurs on the Cape.

Ms. Daley and Mr. Detjens turned next to buildout. Ms. Daley explained every buildout that is done produces very different outcomes depending on the assumptions and parameters used. The Commission has done a Cape-wide buildout for this process because they need to have a standardized measurement for planning across watersheds. The Commission has estimated that 30% growth across the Cape will increase capital costs by 40%. The buildout that they will be using in this process takes into account current zoning about new growth on undeveloped lots and the redevelopment potential of built lots. Ms. Daley noted that the Cape needs growth for its economic health, while also determining how to meet water quality requirements in the future.

A group member asked if the Commission thinks that 30% growth is the most likely number. Ms. Daley responded that between 20%-30% looks likely in most towns. Group members asked if the 40% increase in costs referred to sewering and if it covered operation and maintenance costs. Ms. Daley responded that this number was based on sewering, but the Commission is open to many different solutions; 40% only includes capital costs not operation and maintenance. A working group member commented that buildout will be impacted by what motivations people have to move to the Cape in the future, including employment opportunities, commuter rail, and other factors. Ms. Daley made a
distinction between population and buildout of buildings. Homeowners may decide that the Cape is a desirable place to build a second home, which would not translate into year-round population numbers.

Ms. Daley discussed demographics and stated that this area has a population of 16,516. The data comes from the 2010 census. Ms. Daley stated that, related to demographics, home value will affect what types of wastewater solutions are affordable for Cape Codders and how the issue is framed to the State and Federal government. Mr. Detjens explained that seasonality is one of the main demographic issues. The Commission has been analyzing many different pieces of data over the years to get a sense of seasonality, but given the complexities of measurement, it does not have a completely accurate picture of the issue. A working group member added that seasonality is complicated by the fact that some people who live here in the summer rent their house in the winter, so there is still someone living there year-round. Working group members requested that the Commission clarify whether the 16,516 population number includes the people living on MMR or not. A working group member stated that the population of MMR might change in the future with privatization and with the military encouraging people to live off base.

Ms. Daley described the key challenges facing Cape Cod and the Upper Cape West and South area with regard to wastewater treatment and water quality. She explained that the Massachusetts Estuaries Project (MEP) provides water quality, nutrient loading, and hydrodynamic information. Ms. Daley explained the distinction between non-controllable nitrogen loads that cannot be impacted by the 208 plan versus controllable nitrogen loads available for reduction. A working group member asked whether the working group would be discussing the MEP numbers as part of this process. Ms. Daley responded that some watershed groups will be having a deeper discussion about them. For the purposes of this planning effort, the Commission will be aiming to meet the TMDLs that are based on the MEP work. The MEP was peer reviewed and found accurate for planning purposes. Regulatory law also requires that we meet the TMDLs based upon the MEP.

The working group discussed the seasonal nature of water quality and ecological problems, including source reduction versus seasonal reduction and the need to treat peak flows. A group member noted that the seasonal nature of the problem needs to be understood as part of the baseline data. The group member stated that, for example, Falmouth experiences more serious water quality issues during the summer months, which may mean that a shellfish aquaculture installation may be a good solution, even though it is not active in the winter. Ms. Daley responded that ecological solutions are being discussed in other towns as well and the Commission is interested in alternative options like this.

Mr. Detjens displayed GIS layers that specified the locations of the water quality testing stations used for the MEP studies. Ms. Daley described the change over time in water quality conditions in the Upper Cape West and South area, showing GIS layers for pre-colonial, present, and buildout conditions. In most instances the upper reaches of the embayments have diminishing water quality with current and anticipated development.
Mr. Detjens displayed GIS layers for the estimated extent of eelgrass in 1951, 1995, and 2012. He explained that the presence of eelgrass correlates well with the health of the ecosystem. The 2012 layer showed that there was no eelgrass on the south and west shores. The working group members discussed the extent of eelgrass in these areas and agreed that some eelgrass exists along the south and west shores. They requested that the Commission verify the data for the GIS layer. Ms. Daley explained that phosphorus is the main water quality problem in the Cape’s lakes and ponds. The GIS layer includes information about which ponds are eutrophic (most impacted), mesotrophic, and oligotrophic (least impacted).

Mr. Detjens explained that the Title 5 compliance GIS layer displays locations where homes have applied for a loan or assistance to make system repairs. It also displays places where there has been a potential Title 5 compliance issue. A working group member commented Title 5 currently only takes into account bacteria levels, not nitrogen load although in the future Title 5 may cover the latter as well. Mr. Detjens displayed both the existing and proposed infrastructure GIS layers. He clarified that an attenuated area is an area where they have already installed natural attenuation strategies such as catch basins, leaching chambers, etc. The infrastructure GIS layers are a work in progress so he asked the working group members to share their knowledge of local infrastructure projects with the Commission. A working group member pointed out that many of the infrastructure projects listed do not serve a nitrogen reduction function. Ms. Daley responded that this layer simply tries to capture all water quality projects. Another participant added that it is helpful to be aware of all infrastructure projects because existing infrastructure can sometimes be modified to be nitrogen-reducing. Group members also discussed the issue of affordability, noting that it is important to be aware of the impacts the 208 update will have on lower income homes.

A working group member raised the issue of nutrient recovery, stating that, although the discussion thus far has mainly revolved around removing nutrients, resources recovery should play a bigger part in the working group’s conversation. Working group members also raised concerns about whether the 208 update would take into account water pollution sources such as pharmaceuticals.

**NEXT STEPS**

Ms. Daley reviewed the framework for the upcoming second and third meetings. She discussed the technologies matrix and explained that it will be dealt with more thoroughly in meeting two. The technologies are arranged by scale, including: site/parcel level, neighborhood, watershed, and Cape-wide. The Technical Advisory Committee of the Cape Cod Water Protection Collaborative and the Technical Panel are reviewing the technologies. They will identify the land use characteristics for which each technology is appropriate, what levels of nitrogen removal each might achieve, and the lifecycle costs. Information about each of the technologies will be distributed before the second meeting.

Ms. Daley also walked through the steps through which the group will progress during the three meetings:

1. Discussing target goals so we know the goals we need to reach.
2. Looking at high nitrogen reduction areas, Title 5 problem areas, and pond recharge areas.

Upper Cape West and South Working Group
Meeting One Draft Summary (9/24/13)
3. Examining solutions that are easier to implement, such as fertilizer management and stormwater mitigation. Golf courses are already doing a lot of fertilizer management, and every town on the Cape is engaged in an active stormwater mitigation process.

4. Discussing innovative and lower-cost solutions, such as permeable reactive barriers, inlet/culvert openings, constructed wetlands, and dredging.

5. Looking at alternative on-site options such as eco toilets, I/A technologies and shared systems, among others.

6. Examining priority collection/high-density areas like village centers, economic centers, etc.

7. Considering supplemental sewerage.

She stated that the Commission will attempt to look at all potentially feasible options rather than going straight to sewering. A group member asked where shellfish fit into these numbered steps. Ms. Daley responded that they fall under number four: innovative and lower-cost solutions.

A group member raised the issue of Cape Cod’s aging population and commented that this population may not readily pay increased taxes for something that will primarily affect future generations. Group members commented that affordability will have to be at the forefront of the whole process and, in order to instill altruism throughout the Cape population, the process will have to encourage everyone to work together and take ownership over the issue. For instance, encouraging all citizens to make sure they’re not over-fertilizing will help save everyone money down the line.

A group member asked how energy-use issues would be included in the planning process. Ms. Daley responded that the discussion of lifecycle operation and maintenance will touch on energy issues. Additionally, the Commission is working with the Harvard Graduate School of Design, Zofnass program, to create a framework that will help the working group rank each of the technologies and solutions in terms of their sustainability and energy use. Ms. Daley also added that while the Commission is required by regulation to comply with the TMDLs, the working group has input over how significant a role sustainability will play in the 208 update process. Working group members agreed that, during the process, they should consider the large-scale environmental issues at stake, in addition to local water quality issues. A group member reminded everyone that one of Falmouth’s town goals is to reduce their carbon footprint by 50% over time.

**OPERATING PROTOCOLS**

Mr. Thompson reviewed a draft of the operating protocols and asked the group for their feedback. In addition to the official protocols, Mr. Thompson added a few other guidelines:

- Share the floor and other common courtesies
- First, listen to understand
- Keep “beginner’s mind.” Let expertise inform, not constrain
- Seek opportunities for mutual gain

Mr. Thompson confirmed that working group members could send any comments on the protocols to him and that all of the meeting summaries will be available on the website.

Upper Cape West and South Working Group
Meeting One Draft Summary (9/24/13)
PUBLIC COMMENTS

A participant asked if public comment periods would become more limited as the process progresses. Mr. Thompson replied that meetings two and three would also include a public comment segment at the end. A participant asked what they should do if they feel that there is an interest group who should be at the table but is not present. Mr. Thompson replied that they should inform him and the Commission.

Appendix A
Attendance

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<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tr>
<td>Cynthia Coffin</td>
<td>Bourne Board of Health</td>
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<td>Steve Carr</td>
<td>Pocasset Golf Club</td>
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<tr>
<td>Matt Toomey</td>
<td>Town of Bourne</td>
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<tr>
<td>Hilda Maingay</td>
<td>FEAT</td>
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<tr>
<td>Ron Zweig</td>
<td>WQMC</td>
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<td>Earle Barnhart</td>
<td>[Can’t read]</td>
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<tr>
<td>Karrin Petersen</td>
<td>Buzzard’s Bay Coalition</td>
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<tr>
<td>Virginia Valiela</td>
<td>WQMC</td>
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<tr>
<td>Nathan Jones</td>
<td>Town of Sandwich</td>
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<tr>
<td>Michael Ciaranca</td>
<td>JBCC, CMMRD</td>
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<tr>
<td>Thomas Porece</td>
<td>Decon</td>
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<tr>
<td>Wesley Ewell</td>
<td>Bourne Wastewater Coordinator</td>
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<tr>
<td>Cheryl Holden</td>
<td>F.A.C.E.S.</td>
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<tr>
<td>Gerald Potamis</td>
<td>Falmouth DPW</td>
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<tr>
<td>Sia Karplus</td>
<td>Resident / Science Wares</td>
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<tr>
<td>Charles Passios</td>
<td>Golf</td>
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<tr>
<td>Sallie Riggs</td>
<td>Bourne WW Committee</td>
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<tr>
<td>Mark Rasmussen</td>
<td>BBC</td>
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<tr>
<td>Dan Milz</td>
<td>PhD Candidate, University of Illinois</td>
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<tr>
<td><strong>Staff</strong></td>
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<tr>
<td>Patty Daley</td>
<td>Deputy Director, Cape Cod Commission</td>
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<tr>
<td>Jay Detjens</td>
<td>GIS Analyst, Cape Cod Commission</td>
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<tr>
<td>Doug Thompson</td>
<td>Facilitator, Consensus Building Institute</td>
</tr>
<tr>
<td>Carly Inkpen</td>
<td>Facilitator, Consensus Building Institute</td>
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