CAPE COD COMMISSION
REVIEW
PRINCIPLES FOR ALLOCATION OF NITROGEN RESPONSIBILITY
Allocating Nitrogen Responsibility

Five Principles

1. Assign responsibility at the subembayment level
2. Start with unattenuated load and apply attenuation where available
3. Calculate existing responsibility from existing attenuated nitrogen load
4. Calculate future responsibility from unattenuated potential nitrogen load
5. Data updates every five years with option and process for local modifications
Dennis

- **Swan Pond River**
  - Swan Pond River | 96%
  - Swan Pond River North | 100%
  - Swan Pond River South | 100%

Harwich

- **Swan Pond River**
  - Swan Pond River | 1%

Brewster

- **Swan Pond River**
  - Swan Pond River | 3%
## Orleans: Subembayment Watersheds

### Tar Kiln Stream

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>897</td>
<td>897</td>
<td>1,067</td>
<td>N/A</td>
<td>22%</td>
<td>N/A</td>
<td>Brewster (78%)</td>
</tr>
</tbody>
</table>

### The Horseshoe

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>214</td>
<td>214</td>
<td>233</td>
<td>N/A</td>
<td>100%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### The River Lower

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,217</td>
<td>1,217</td>
<td>899</td>
<td>325</td>
<td>100%</td>
<td>325</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### The River Upper

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,460</td>
<td>1,088</td>
<td>634</td>
<td>454</td>
<td>99%</td>
<td>447</td>
<td>Brewster (17%)</td>
</tr>
</tbody>
</table>

## Rock Harbor

### Cedar Pond

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2,558</td>
<td>2,558</td>
<td>984</td>
<td>2,080</td>
<td>79%</td>
<td>1,256</td>
<td>Eastham (21%)</td>
</tr>
</tbody>
</table>

### Rock Harbor

<table>
<thead>
<tr>
<th>Subembayment</th>
<th>Unattenuated Load (kg)</th>
<th>Attenuated Load (kg)</th>
<th>Threshold (kg)</th>
<th>Reduction Target (kg)</th>
<th>Percent Contribution</th>
<th>Kingston Responsibility</th>
<th>Additional Contributing Towns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>899</td>
<td>315</td>
<td>397</td>
<td>N/A</td>
<td>100%</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
NEXT STEPS
WASTE TREATMENT MANAGEMENT AGENCIES
Next Steps

JUNE 15
Certification of Section 208 Plan Update by The Governor

12 MONTHS
To develop watershed reports
Next Steps

**WATERSHED REPORTS**

Scenarios form outer bounds of adaptive management plan

- **Collection Scenario**
  - Traditional collection and treatment

- **Non-Collection Scenario**
  - Remediation, restoration and on-site reduction approaches
Next Steps

DESIGN LOAD
• Established By WMAs
• Defines Non-nitrogen Needs
• Sets Stormwater and Fertilizer Credits

HYBRID SCENARIO
• Achieves design load reduction
• Uses collection and non-collection approaches
Next Steps

IMPLEMENTATION REPORT

- Post 12 month period
- Will describe WMA action to date
- Prepared by the Commission

DEFAULT WATERSHED REPORT

- If not completed by WMAs
- Based on feedback
- Prepared by the Commission
The Problem

Description of the problem

- MEP TECHNICAL REPORT STATUS: Status
- TMDL STATUS: Status
- TOTAL WASTEWATER FLOW: XX (million gal per year)
- TREATED WW FLOW: XX MGY
- SEPTIC FLOW: XX MGY
- UNATTENUATED TOTAL NITROGEN LOAD (MEP): XX
- ATTENUATED TOTAL NITROGEN LOAD (MEP): XX
- SOURCES OF CONTROLLABLE NITROGEN (MEP):
  - XX% Septic Systems
  - XX% Lawn Fertilizer
  - XX% Stormwater from Impervious Surfaces
  - XX% Wastewater Treatment Facilities

CONTRIBUTING TOWNS

- CONTRIBUTING TOWN1
- CONTRIBUTING TOWN2

THE MEP RESTORATION SCENARIO:

- WATERSHED TOTAL NITROGEN REDUCTION TARGET: XX%
- WATERSHED SEPTIC REDUCTION TARGET: XX%
  (The scenario represents the aggregated sub-

ESTUARY

- EMBAYMENT AREA: XX
- EMBAYMENT VOLUME: XX
- 2012 INTEGRATED LIST STATUS:
  - Status by waterbody
  - Status by waterbody
  - Status by waterbody
  - [www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf]

WATERSHED

- ACRES: XX
- PARCELS: XX
- % DEVELOPED RESIDENTIAL PARCELS: XX%
- PARCEL DENSITY: XX acres per parcel
- WASTEWATER TREATMENT FACILITIES: XX
  - Treatment Facility Name
  - Treatment Facility Name

Freshwater Sources

PONDS

- IDENTIFIED SURFACE WATERS: XX
WATERSHED REPORT: Watershed Name

- NUMBER OF NAMED FRESHWATER PONDS: XX
- PONDS WITH PRELIMINARY TROPHIC CHARACTERIZATION: XX
- 2012 INTEGRATED LIST STATUS: XX
- DISCUSSION:

STREAMS

- SIGNIFICANT FRESHWATER STREAM OUTLETs: 6
  Stream1:
  - Average Flow: XX cubic meters per day (m³/d)
  - Average Nitrate Concentrations: XX milligrams per liter (mg/L)
  Stream2:
  - Average Flow: XX m³/d
  - Average Nitrate Concentrations: XX mg/L
  Stream3:
  - Average Flow: XX m³/d
  - Average Nitrate Concentrations: XX mg/L
- DISCUSSION:

DRINKING WATER SOURCES

- WATER DISTRICTs: XX
  - Water District Name
  - Water District Name
- GRAVEL PACKED WELLS: XX
  - X have nitrate concentrations between 0 and 0.5 mg/L
  - X have nitrate concentrations between 0.5 and 1 mg/L
  - X have nitrate concentrations between 2.5 and 5 mg/L
  - X have no nitrate concentration data
- SMALL VOLUME WELLS: XX
- DISCUSSION:

Degree of Impairment and Areas of Need

Discussion on nitrogen reduction targets.

ECOLOGICAL CHARACTERISTICS AND WATER QUALITY

- OVERALL ECOLOGIC CONDITION: XX
- Waterbody Quality Status
- Waterbody Quality Status
- SENTINEL STATION:
  - Total Nitrogen Concentration Threshold: XX mg/L
  - Total Nitrogen Concentration Existing: XX mg/L
    (As reported at the MEP sentinel water-quality monitoring station)

![Image Placeholder](image1)

Subwatersheds with Total Nitrogen Removal Targets
Figure 4-1 XX

Subwatersheds with Septic Nitrogen Removal Targets

![Image Placeholder](image2)

Subwatersheds with Septic Nitrogen Removal Targets
Figure 4-2 XX
Sub Region

Nitrogen Management Approaches
Description of scenario planning approaches.

TRADITIONAL APPROACH
Description of approach taken in scenario development.

NON-TRADITIONAL APPROACH
Description of approach taken in scenario development.

LOCAL PROGRESS

TOWN1
Description of local efforts.

TOWN2
Description of local efforts.
## Potential Watershed Scenarios

### Credits
- Stormwater
- Fertilizer

### Scenario Details
- Scenario Detail - i.e. number of properties sewered
- Scenario Detail - i.e. flow collected
- Scenario Detail - i.e. acres of aquaculture
- Scenario Detail - i.e. linear feet of PRB
- Scenario Detail - i.e. number of eco-toilets
- Scenario Detail - i.e. cubic feet of constructed wetlands

### Cost
- Collection
- Transport
- Treatment & Disposal
- Operations and Maintenance
- Annual
Targeted Watershed Planning

- Watershed Load
  - Subembayment Nitrogen Limit
  - Watershed Technical Reports

- Credits
  - Stormwater/Fertilizer
  - Nutrient Reduction Policy or Strategy

- Adjusted Load
  - Incorporate Local Plans
  - Economic Development
  - Future Growth
  - Title 5 Failures

Design Load
Targeted Watershed Planning

TECHNOLOGIES

Title 5
IA
Enhanced IA
BMPs
PRB
N+P+K MGMT
TDR
SWR

DESIGN LOAD

COMMUNITY EVALUATION
Targeted Watershed Planning

ADAPTIVE MANAGEMENT PLAN

COMMUNITY EVALUATION

WATERSHED

Non-Collection Strategies

Subembayments

Collection Strategies

Hybrid Watershed Scenario

Community Confidence Cost
Targeted Watershed Planning
WATERSHED TEAM TECHNICAL ASSISTANCE
Goals

- Comply with permitting requirements
- Achieve water quality goals
- Meet essential community needs
- Assist WMAS in designing innovative & cost-effective plans
WATERSHED TEAMS

- Infrastructure Experts
- Water Resources
- Outreach
- GIS
- Legal/Regulatory
- Land Use Planning
- Financial Modeling
- Economic Development
Support

WATERSHED PLANS
Outline, Tasks and Schedule
Support

ANALYTICAL TOOLS
Apply decision support tools created by the Commission

EVALUATION
Recommend appropriate engineering solutions
Evaluate feasibility of hybrid plan components
Support

OPTIONS
Define and evaluate public/private options

COST
Develop comparative cost information
Support

PERMITTING
Assist in the development of permitting strategies

ADAPTIVE MANAGEMENT
Develop targeted monitoring and adaptive management plans
BENEFITS OF COLLABORATION
Simplifying the Process

TECHNICAL ASSISTANCE
Enhancing town expertise to aid local implementation

REGULATORY FLEXIBILITY
Ensuring consistency with Regional Plans

FINANCIAL RESOURCES
Providing access to new sources of revenue
$1 Million in State funds over next four years

New Funds For Monitoring Efforts

$1 Million match from Barnstable County
Cutting Back the Cost

**INITIAL COST**
$6-8 BILLION
Estimate to sewer the entire Cape

**CAPE-WIDE COST**
$4.6-6.2 BILLION
RWMP estimate sewers to meet MEP water quality goals

**208 UPDATE COST**
$2-3.8 BILLION
Estimate to meet water quality standards
208 UPDATE COST SAVING MEASURES

- Considering collection and treatment in areas where it’s most appropriate
- Broadening the use of remediation and restoration technologies
- Cost sharing results in a lower cost for residents and affordable scenarios
Investigation of Non-Proprietary Means of Removing Nitrogen in Onsite Septic Systems
Barnstable County Department of Health and the Environment

Investigation of Non-Proprietary Means of Removing Nitrogen in Onsite Septic Systems
Barnstable County Department of Health and the Environment

This project endeavors to take advantage of findings from three publically-financed projects and a collective of soils-based research efforts to determine the efficacy of non-proprietary soils-based strategies for nitrogen removal. The goal is to determine the simplest most cost-effective modification of a soil absorption system to enhance nitrogen removal in Cape Cod's geological setting. Validating experiments suggest that a sawdust-sand mixture can be integrated into a soil system in such a way as to promote denitrification.
TOWN OF ORLEANS
BENEFITS OF COLLABORATION