Using Alternative Septic Treatment Systems to Protect Pleasant Bay

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All Water Resources are Interconnected

Therefore…
An Integrated Plan!

**Why Integrated?**

Everything is Connected

How you manage your property has a direct impact on water quality.

![Diagram showing connections between different elements related to water management.](image)

- From the kitchen sink... To the septic system... To the groundwater!
- From the oil leak under your car... To the road drainage... To the surface water!
- From your lawn... To groundwater and/or ponds and coastal waters.

Animal waste... Also makes it to surface waters.

From the groundwater... Back to your tap!
The Big Picture…
Protecting the Town’s Waters

- Managing Nitrogen Loads to Coastal Embayments
- Protecting Public and Private Drinking Water Supplies
- Protecting and Restoring Fresh Water Ponds
- Improving Stormwater Management
Integrated Water Planning Timeline

- 2009 Comprehensive Water Planning Committee
- Implementation Phase Under Way.
Managing Nitrogen to Protect Coastal Embayments

- Pleasant Bay
- Work coordinated through the Pleasant Bay Alliance comprised of Brewster, Chatham, Harwich and Orleans
Managing Nitrogen to Protect Coastal Embayments

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Nitrogen Loading to Pleasant Bay

Sources of Nitrogen That Can Be Controlled Locally

- Wastewater (75%)
- Fertilizers (16%)
- Impervious Surfaces (9%)
Open Space Purchases Protect Brewster’s Waters

Pleasant Bay
Town/State-owned, open space, & conservation land
August 3, 2018

RE: PLEASANT BAY – Watershed Permit 001-0

Select Board
2198 Main Street
Brewster, Massachusetts 02631

Board of Selectmen
732 Main Street
Harwich, Massachusetts 02645

Board of Selectmen
549 Main Street
Chatham, Massachusetts 02633

Board of Selectmen
19 School Road
Orleans, Massachusetts 02653

Dear Board Members:
Pleasant Bay Watershed Permit

- First of its kind in Massachusetts
- Regulated Area is the Pleasant Bay Watershed – includes portions of all four watershed towns
- Developed to implement plans to meet the TMDL for Pleasant Bay
- Combination of existing plans for each town
Based on a Targeted Watershed Management Plan
Nitrogen Management Alternatives

- Fertilizer Management
- Onsite Treatment Systems
- Neighborhood Treatment Systems
- Permeable Reactive Barriers
- Regional Opportunities – Nitrogen Trading
Pleasant Bay Watershed Permit

- Brewster is required to remove 2,262 kg N/year.
- The Town has already removed 56%.
  - Mostly through fertilizer management at Captains Golf Course
- This leaves 981 kg/year to be removed using alternative onsite septic systems.
Onsite Program Components

• Selecting onsite technologies and effluent limits.
• Regulatory approach: general bylaw or BoH regulation?
• Town oversight of onsite system O&M required.
• Regular performance monitoring required.
How Many Upgrades Needed?

Factors

- Attenuated vs Non-Attenuated Watersheds
- Extent of Nitrogen Removal Provided by Selected System(s)
- How System Performance is Simulated in the Watershed Model.
Pleasant Bay Subwatersheds
Onsite Alternative Treatment Systems

- Brewster properties located within the Pleasant Bay Watershed: 593

- Properties in unattenuated watersheds available for upgrade: 319

- Future development must be managed to prevent additional nitrogen input to Pleasant Bay
The Magic Number

What is the Modeled Septic System Nitrogen Concentration for Pleasant Bay?
The Magic Number

26.25 mg/L
# Nitrogen Reductions Provided by Onsite System Upgrades

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Reduction KG/Year</th>
<th>TMDL Goal KG/Year</th>
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</thead>
<tbody>
<tr>
<td>19 mg/L</td>
<td>487</td>
<td>979</td>
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<tr>
<td>15 mg/L</td>
<td>752</td>
<td>979</td>
</tr>
<tr>
<td>12 mg/L</td>
<td>960</td>
<td>979</td>
</tr>
<tr>
<td>10 mg/L</td>
<td>1,096</td>
<td>979</td>
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</table>
Regulatory Approach

- General Bylaw – Requires majority approval at Town Meeting
- Board of Health Regulation – Requires majority vote of the Board
- Considering General Bylaw with implementation regulations adopted by the Board of Health
O&M Oversight

- Town is responsible for meeting the nitrogen reduction goals in the Watershed Permit
- Therefore responsible for system performance and O&M oversight
- How?
  - Town staff?
  - Contracted to certified operators(s)?
Performance Monitoring

- Monitoring required based on MassDEP approval of innovative technologies

- Additional monitoring to confirm TMDL compliance – randomly selected performance tests for systems within each subwatershed.
Which Alternative Treatment Systems?
Onsite Alternative Treatment Systems Upgrade Costs

- Approximately 320 Homes
- Cost Range = $15,000-$25,000 per home?
- Overall Cost = $4,800,000-$8,000,000
- Costs for Town oversight, system O&M and water quality monitoring to be determined.
Status of Brewster’s Ponds

Ponds Health Assessment
- 1 - High Quality
- 2 - Meets Most Uses
- 3 - Some Impairment
- 4 - Impaired
- No Data

Wetlands

Map showing the status of various ponds in Brewster’s area, with different colors indicating health assessments.
Septic Management Near Ponds

- Pond
- Groundwater Flow
- Leach Field
- Septic Tank
- House
- Lot Line
- Road

300'
Septic Management Near Ponds

Diagram showing:
- House
- Septic Tank
- Groundwater Flow
- Pond
- Lot Line
- Road
- 300' distance between House and Septic Tank
Draft Health Reg for Ponds

- Reset septic buffer
  - 300 feet upgradient
  - 100 feet downgradient
- Require shallow leachfields to capture phosphorus in iron rich soils
- Pilot testing would be beneficial
How Many Properties Affected?

- Further Research on Individual Properties Needed.
- Estimate 400 Homes Would Require an Upgrade
- Total cost at $15,000-$25,000 per property = $6,000,000 to $10,000,000
Financing – Pleasant Bay and Ponds

- Pleasant Bay Septic Upgrades
  - $4.8 to $8.0 million
- Freshwater Pond Septic Upgrades
  - $6,000,000 - $10,000,000
- Total
  - $10,800,000 - $18,000,000
- Annual Town Oversight, O&M and Monitoring Costs to be Determined.
Financing – Who Pays?

- Town’s Contribution?
- Property Owner’s Contribution?
- Incentive for Early Upgrades?
Potential Financing Options

- State Revolving Fund (SRF) Loans at low or 0% interest
- Cape and Islands Water Protection Fund
- Barnstable County Septic System Loan program
Questions?

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