Barnstable Town Council

Update on Wastewater Efforts In Barnstable

Department of Public Works
January 3, 2019

Agenda

- Problem Review
- Plans
  - The Process
  - Actions to Date
  - The Plans
    - Non-Traditional Actions
    - Traditional Actions
    - Other Ideas
- Discussion
The General Problem

- Wastewater issues
  - Impaired embayments
  - Groundwater quality concerns
  - Pond water quality concerns
  - Failing/expensive septic systems
  - Economic development requirements
  - New flood zones
  - Regulatory requirements

The “208” Problem - Nitrogen

- Impacts marine waters
  - Limiting nutrient
- Origins
  - Septic systems
  - Fertilizer runoff
  - Stormwater disposal
  - Atmospheric deposition
  - Sediment release
Other Issues of Concern

- Phosphorus in freshwater ponds
- Contaminants of Emerging Concern (CECs)
  - Pharmaceuticals
  - Antibiotics
  - Hormones
  - Personal care products
  - Chemicals
- PFOS/PFOA

Regulations

- Massachusetts Estuaries Program (MEP)
  - MA DEP & UMASS-Dartmouth
  - 89 estuaries southeast MA
  - Watershed/estuary model
    - predicts water quality changes resulting from land use decisions
- DEP develops TMDLs
  - Total Maximum Daily Loads
    - Max pollutant a water body can receive and still meet water quality standards
- Eelgrass is the sentinel species
- Cape Divided by watersheds
“5 Needs” Plans Should Address

- Sanitary Needs
  - Poor Soils
  - Variances
  - High groundwater
- Convenience and Aesthetics
  - Excessively Expensive Systems
  - Mounded Systems
    - Impact on Village Aesthetics
- Protecting Groundwater and Water Supplies
  - Nitrogen
  - CECs
- Protecting Surface Waters
  - Nutrients
- Enabling Desired Sustainable Economic Growth
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**What a Wastewater Plan Does**

- **Town-wide** comprehensive plan that:
  - Identifies water quality requirements
  - Identifies solutions
    - Nontraditional - dredging, aquaculture, PRBs, UD toilets, fertilizer plans, etc.
    - Traditional - sewers, etc.
    - Management - zoning, etc.
  - Recommends capital improvements
  - Identifies funding/financing mechanisms

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**“Organic”**

The Plan is Changing
- Needs to meet regulatory requirements
- Flexible
  - In house staff leads consultant
  - Able to adapt to changes in technology
- Adapting to community needs and desires
  - Public feedback from presentations and Political Leaders
The TOB Process

- Collaboration of WRAC Members, Town Staff, and DEP
- A lot-by-lot evaluation of the “5 Needs” using GIS tool
  - Sanitary Conditions/Identified public health issues
    - bad soils/high groundwater
    - effluent surfacing over leaching field
    - Inadequate set-back from private wells/property lines
    - direct discharge of sanitary wastewater to a water body
  - Water Supply Protection
    - Identified “impaired” or endangered wells and neighborhoods likely impacting them
  - Surface Waters - Nutrient Enrichment
    - Marine – SMAST Modeling and CCC 208
    - Freshwater – TOB sampling and study of ponds
  - Convenience and Aesthetic Issues
    - Identified Mounded septic systems, velocity zones, and excessive septage pumping
  - Sustainable Economic Development
    - Met with Planning, and others, to understand where wastewater solutions needed for community chosen economic development

Identified Needs

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**To Date**

- Winter 2015/16 formed the WRAC – Began meeting
- June 2016 – Complete the “208 Bookends”
- Fall 2016 - Completed Gap filling and GIS Mapping Layers
- Winter 2016 through Spring 2017 - Plan Construction
- Summer 2017 - Complete a Draft Plan
- Summer 2017 - Present Draft Plan to Town Council
- Fall/Winter 2017 & Winter/Spring 2018 - Develop the alternatives approach on Marstons Mills River
- Fall/Winter 2017 - Conceptually design, and propose for funding, initial round of Traditional Solution Projects
- Winter 2018 - Evaluation of Marstons Mills School Wastewater Facility
- Winter/Spring 2018 – Meet with DEP on Permitting of Alternatives
- Spring 2018 - Approved Funding for Preliminary Design of initial Traditional Solution Projects
- Spring 2018 - Approved Funding for Evaluation of Wastewater Disposal Alternatives
- Spring 2018 - Began sampling to support permitting for Alternatives
- Spring 2018 – Began modeling WPCF (BIOWIN)
- Summer 2018 – Began Preliminary Design of Initial Traditional Solution Projects
- Summer 2018 – Begin Evaluation of Wastewater Disposal Alternatives
- Summer 2018 – Renewal of WPCF License
- Summer/Fall 2018 – Construction of the Attucks Lane Pump Station
- Summer/Fall 2018 – Begin Public Outreach and Feedback
- Fall/Winter 2018 – Dredging of Sampson’s Island - flushing in Three Bays
- Winter 2018/19 – Understand Financial Options/Opportunities
- Spring 2019 – Present “Final Draft” Plan to Town Council
- Summer 2019 – Submit Final Draft Wastewater Plan to CCC for review
- Fall 2019 - Draft CWMP to DEP

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**The Plan - Phasing**

- Three 20-Year Phases
  - Phase I - Years 0-20
  - Phase 2 – Years 20-40
  - Phase 3 – Years 40 -60
**Current Plan**

**Phase Statistics**

<table>
<thead>
<tr>
<th>Item</th>
<th>Phase 1 (0-20 Years)</th>
<th>Phase 2 (20-40 Years)</th>
<th>Phase 3 (40-60 Years)</th>
<th>Total</th>
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<tbody>
<tr>
<td>WW Captured (GPD)</td>
<td>719,400</td>
<td>697,300</td>
<td>373,800</td>
<td>1,790,500</td>
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<tr>
<td>Load N Removed (kg/year)</td>
<td>24,000</td>
<td>25,000</td>
<td>14,000</td>
<td>63,000</td>
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<tr>
<td>Number of Parcels Affected</td>
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<td>3,707</td>
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<td>9,516</td>
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<tr>
<td>Road Miles</td>
<td>66</td>
<td>70</td>
<td>45</td>
<td>181</td>
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<tr>
<td>% N Removed</td>
<td>40%</td>
<td>39%</td>
<td>21%</td>
<td>100%</td>
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</table>

- **Conservative - No assumed credit for nontraditional solutions**
  - Installed in Phase I
  - Monitored throughout Phase I and II
  - Ideally will enable avoidance of Phase III via Adaptive Management
Existing Facility
- Treatment Capacity = 360,000 gpd (annual average day)
- Disposal Capacity = 840,000 gpd (max day)
- Effective Available Capacity = 75,000 gpd (annual average day)
### Additional Cotuit Expansion

#### Stage Statistics

<table>
<thead>
<tr>
<th>Item</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Total</th>
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<td>22,808</td>
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<td>Load N Removed (kg/year)</td>
<td>1,349</td>
<td>3,063</td>
<td>827</td>
<td>5,239</td>
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<td>Number of Parcels Affected</td>
<td>253</td>
<td>480</td>
<td>155</td>
<td>888</td>
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<td>Road Miles</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>18</td>
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Non-traditional Projects Underway

Focus Area - Three Bays
**Focus Area - Three Bays**

Non-traditional methods.
- Cotuit Bay Inlet Dredging
- Mill Pond dredging
- Abandoned cranberry bogs conversion
- Warren’s Cove - aquaculture
- Alternative septic systems
- Permeable Reactive Barriers (PRBs)
- Stormwater treatment

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**Sampson’s Island Dredging**

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Mill Pond Dredging

• The Issue:
  – Mill Pond is full of silt and debris – 9 feet thick in places
  – In 20 years nitrogen removal capacity has declined from 20% to 10%
  – Healthy ponds = 30% to 50%
  – If 50% restored, estimated remove over 2,200 kg/year of additional nitrogen

• The Solution:
  – Dredge to its original depths (sand layer) and perimeter
  – Estimated 60,000 CYs of material (to be confirmed)
  – Pond depths restored to approximately 8 feet in the deepest areas

Cranberry Bogs

• The Issue:
  – Existing and abandoned bogs - Ideal locations for nontraditional solutions

• The Solutions:
  – Conversion to ponds (~50%)
  – Conversion to wetlands (TBD)
  – Installation of floating wetlands (8-15%)
Warrens Cove

- The Issue:
  - Warrens Cove currently not appropriate for aquaculture due to silt.
  - Potential to be ideal nursery for aquaculture farms
  - The product relocated to established aquaculture farms
- The Solution:
  - Dredging Warrens Cove back to a sandy bottom
  - Establish aquaculture nurseries
    - Variety of species
  - The Cape Cod Commission estimated that aquaculture beds/floating racks can remove 8-15% of the nitrogen they encounter

Other Non-traditional Opportunities

- PRBs
  - EPA Demonstration Project
    - Prince Cove Area
  - Horse Farms?
- Alternative Septic Systems
  - Prince Cove
- Alternative Toilets
  - Cape Cod Academy
Stormwater

• The Issue:
  – Stormwater systems are in various states of repair

• The Solution:
  – A comprehensive survey identifying those that need repair, or replacement.
  – Identify new systems/BMP needed to protect water quality
  – Credit for work already done
    • Cotuit Town Dock, etc.

Three Bays Storm Water Project
Overview

• 3 Year Project
• Total Cost: $692,386
  – $472,574 from U.S. EPA Southeast New England Program
  – $59,014 from MA Office of Coastal Zone Management
  – $160,798 in-kind match from partners
Priority Sites Selected for Design and Permitting

Cotuit
• Ropes Beach (2 BMPs)
• Cordwood Landing

Marstons Mills
• Prince Cove Marina

Results

Short-Term Results
• Treat drainage from 4.8 acres
• Eliminate 70-85% of bacteria and 55% of nitrogen from stormwater runoff at these sites
• Reduce impervious surface by 1,245 square feet
• Restore salt marsh and coastal dunes/beaches
• Remove invasive plant species
• Provide improved public access

Long-Term Goals
• 50% reduction in beach and shellfish closures due to bacteria pollution
• Reduction of algal blooms and fish kills in adjacent embayments
• Improve habitat for fish, shellfish and other wildlife
• Improve water quality
• Support commercial and recreational uses
Traditional Projects Underway (funded)

Attucks Lane Pump Station Area Expansion - Full Design
Long Pond Area Sewer Expansion - Preliminary Design

Phinney’s Lane Sewer Expansion - Preliminary Design
### Effect of the Projects

#### ALL PROJECTS TOTAL

<table>
<thead>
<tr>
<th>Affected MEP Watershed</th>
<th>Watershed Estimated Nitrogen Loading (g/day)</th>
<th>Watershed Nitrogen Removal Target (kg/day)</th>
<th>Total Parcels Affected By Projects</th>
<th>Wastewater Flow Removed By Projects (gal/day)</th>
<th>Nitrogen Removed By Projects (g/day)</th>
<th>% Total Nitrogen Removed</th>
<th>% of Target Nitrogen Removal</th>
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<tr>
<td>Centerville River</td>
<td>128,128</td>
<td>180</td>
<td>1,374</td>
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<td>24,525</td>
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<td>Lewis Bay</td>
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<td>Barnstable Harbor</td>
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<td><strong>240</strong></td>
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<td><strong>265,374</strong></td>
<td><strong>26,340</strong></td>
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#### BY PROJECT

<table>
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<tr>
<th>Project</th>
<th>Affected MEP Watershed</th>
<th>Watershed Estimated Nitrogen Loading (g/day)</th>
<th>Watershed Nitrogen Removal Target (kg/day)</th>
<th>Total Parcels Affected By Project</th>
<th>Wastewater Flow Removed By Project (gal/day)</th>
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<th>% Total Nitrogen Removed</th>
<th>% of Target Nitrogen Removal</th>
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<td>Attucks Lane</td>
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<td>60</td>
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<td>1,094</td>
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<td><strong>PROJECT TOTAL:</strong></td>
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<td><strong>27.3%</strong></td>
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**Town of Barnstable, Department of Public Works**
Effluent Disposal Capacity Study & Design

Effluent Discharge Location Evaluation

Collection
Transport to Treatment
Treatment
Transport to Disposal
Disposal
Other Ideas Being Considered

Marstons Mills WWTF

- Desire to Expand WW collection in the Area
- Existing Plant fully allocated 42,900 gpd.
  - 30,000 gpd schools
  - 12,000 gpd Housing Trust
- Built 1993 – Beyond 20-year design life
- Limited expansion potential
  - Max. = +/- 113,000 gpd
Marstons Mills WWTF

- Expand and Upgrade MMWWTP
  - ~ $16,000,000
    - Includes offsetting sewering for new disposal field
    - Not including costs if required TOC < 3 mg/l
- Convert MMWWTP to a Pump Station
  - ~ $19,000,000
  - Convey flow to Hyannis WPCF
    - Includes gravity sewer along Route 28
    - ~ $15,500,000 if no gravity sewer along Rte 28
Next Steps

• Continuing public outreach and Plan evolution
• Developing the financial plan
• Keep pressing alternatives
  – Permitting, funding, executing, monitoring
• Preliminary design of traditional projects
• Vet possibilities for MMWWTF
• Document the plan for submission to CCC and DEP
• Continue to aggressively get after the issue
Discussion?