Oyster Pond CWMP

Driven by Massachusetts Estuaries Project (MEP) Total Maximum Daily Load (TMDL) Study for Nitrogen

Targeted Comprehensive Wastewater Management Plan (CWMP) to:

- Identify water quality needs
- Identify options/solutions
- Identify funding and schedule
## Oyster Pond CWMP Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tbody>
<tr>
<td>MAR 2013</td>
<td>Kickoff meeting with the Town</td>
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<td>APR 2013</td>
<td>Kickoff meeting with OPET</td>
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<td>OCT 2013</td>
<td>Needs Assessment report</td>
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<td>OCT 2013</td>
<td>WQMC meeting</td>
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<tr>
<td>JUN 2014</td>
<td>Initial Alternatives Analysis report</td>
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<td>JUN 2014</td>
<td>WQMC meeting</td>
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<td>JUL 2014</td>
<td>Neighborhood meeting</td>
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<td>OCT 2017</td>
<td>Updated Alternatives Analysis report</td>
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<td>AUG 2018</td>
<td>Neighborhood meeting</td>
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## Oyster Pond Background Information

### Size
- 63 acres
- 0 to 6 meters deep
- 2 to 7 ppt salinity (typ.)

### History
- 1700’s - Longshore Drifts
- 1800’s - Railroad
- 1900’s - Oysters no longer survive
- 1980’s - New Culvert
- 1998 - Weir to manage salinity
- 2006 - Listed as impaired water by DEP

Source: “A Coastal Pond”, K.O. Emery, Fig 4
Oyster Pond Nitrogen Loads

  - Current Load = 5.2 kg/day, ~4,200 lbs/year
  - Target Load = 1.4 kg/day, ~1,250 lbs/year

Source: MEP Technical Report and TMDL Report

Wright-Pierce
Engineering a Better Environment

Oyster Pond Key Issues

- Development in the Oyster Pond watershed
  - Current: 225 dwelling units (70% built since 1977)
    - Wastewater = 28,900 gpd
  - Future: 233 dwelling units
    - Wastewater = 31,500 gpd

- Water column total nitrogen (TN) in Oyster Pond
  - Relatively high and variable concentration

- Numerous natural system variables
  - Stratification (thermal and salinity/density)
  - Trunk River “sill elevation”
Alternatives Analysis

• Several non-traditional strategies considered and eliminated:
  - Permeable reactive barriers, aquaculture, inlet modifications, phytobuffers, fertigation, alternative water quality criteria, modification to pond compliance elevation

• Six composite plans identified and evaluated:
  1. Sewer to Blacksmith Shop Road WWIF
  2. Sewer to an expanded WHOI WWIF
  3. Sewer to a new local decentralized WWIF
  4. Enhanced I/A system (TN<13mg/l) and pond mixing
  5. Advanced I/A systems (TN<10mg/l)
  6. No Action

Implementation Plan

• Actions by Working Group following 2018 Neighborhood Meeting
  - Assess if additional capacity can/will exist at Blacksmith Shop Road WWIF
  - Continue W. Falmouth Harbor Shoreline Septic System Remediation monitoring
  - Affirm Plan 5 watershed monitoring framework with DEP

• Working Group selected Plan 5 (“non-traditional approach”) with Plan 1 as the “traditional backup plan”

• CWMP was developed in manner that is consistent with the CCC 208 Water Quality Management Plan Update
Watershed Permit and RME

- Watershed Permit for hybrid or non-traditional plan
  - Responsible Management Entity
  - Phased Implementation Schedule
  - Environmental Monitoring
  - Traditional Backup Plan
  - Financial Plan

- Responsible Management Entity (RME)
  - Permitting
  - Procurement provisions
  - Monitoring, operations and maintenance
  - Septic pumping
  - Record keeping
  - Reporting to DEP

Advanced I/A Plan

- Wastewater management: 70% N reduction
  - 168 Advanced I/A systems for 233 dwelling units
  - Advanced I/A systems <10 mg/l eff TN
    - Two phases.
- Fertilizer: 25% N reduction
- Stormwater: 25% N reduction
- Atmospheric sources: 40% N reduction
- Benthic flux changes: as predicted by MEP
- Periodic inspections and maintenance dredging of Trunk River
Implementation Timeline

2019 to 2024
- Obtain approvals from MEPA, DEP and CCC
- Obtain Watershed Permit
- Obtain permits and dredge Trunk River
- Implement RME
- Initiate Phase 0 activities and monitoring
- Confirm Advanced I/A Plan or Traditional Backup Plan
- 2024 Town Meeting

2025 to 2029
- Establish start date
- Design, permit and complete installations
- Remove 80% of TMDL required WW N removals (1820 lbs/yr from a total removal of 2280 lbs/yr)
- Continue monitoring
- Obtain permits and dredge Trunk River at intervals

2029 to 2039
- Continue monitoring
- Obtain permits and dredge Trunk River at intervals
- Evaluate TMDL compliance
- Decide whether to continue with Advanced I/A Plan or modify plan
- Obtain permits and dredge Trunk River at intervals

2039
- Implement Phase 2, as necessary

2040 to 2050
- Environmental Monitoring Program developed to:
  - Assess changes in water column nitrogen concentration
  - Assess changes in benthic habitat
  - Assess Advanced I/A system performance
  - Assess changes in atmospheric nitrogen deposition
  - Monitor changes in technology
**Traditional Backup Plan**

- Low pressure sewer (LPS) system for 189 dwelling units in one phase
- LPS system connecting to Shiverick’s Pond Lift Station with wastewater flow directed to Blacksmith Shop Road WWTF
- Same baseline approach for fertilizer, stormwater, atmospheric deposition and benthic flux loads

**Financing Plan**

**Cost Estimating**
- Cost for Phase 1 only for Advanced I/A Plan and Traditional Backup Plan
- Cost estimates developed consistent with approach used for South Coastal Watershed CWMP and presented in 2026 dollars.
- Estimated capital costs, operations costs as well as costs for the RME.

**Loans**
- Massachusetts DEP SRF Loans (0%, 20 yr and 2%, 20 yr)
- Municipal bonds (4%, 20 yr)
- Private loans or Barnstable County Septic Management Loan Program (5%, 20 yr)
- General taxation

**Grants**
- None anticipated for this project
**Financing Plan**

- **Cost Allocation**
  - **Advanced I/A Plan**
    - Town will contribute the cost of the Advanced I/A System.
    - Property owners will cover all costs for design, installation and landscaping.
    - Municipal debt service will be paid by general taxation.
    - Operating costs will be paid by the property owner.
    - Watershed monitoring costs will be paid by all watershed property owners.
    - Trunk River dredging costs will be paid by general taxation (as per current situation).
  - **Traditional Backup Plan**
    - Town will cover 100% of infrastructure costs that serve multiple watersheds.
    - Town will cover 30% of infrastructure costs that serve the specific neighborhood/watershed.
    - Property owners will cover the rest of the costs, including landscaping and septic system abandonment.
    - Municipal debt service, operating costs and watershed monitoring costs are allocated as noted above.

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**Phase 1 Cost Summary**

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<tr>
<th></th>
<th>Advanced I/A Plan</th>
<th>Traditional Backup Plan</th>
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<tbody>
<tr>
<td><strong>Current Dwelling Units Affected</strong></td>
<td>189</td>
<td>189</td>
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<tr>
<td><strong>Capital Costs</strong></td>
<td>$9.1M</td>
<td>$14.4M</td>
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<tr>
<td><strong>Annual Operating Costs</strong></td>
<td>$536,000</td>
<td>$248,000</td>
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<tr>
<td><strong>Present Worth</strong> (Capital + PW of Operating Costs)</td>
<td>$17.9M</td>
<td>$18.5M</td>
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<tr>
<td><strong>Estimated Annual Cost per Dwelling Unit</strong></td>
<td>$5,200</td>
<td>$4,900</td>
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Costs presented in 2026 dollars.
Plan 5 uses “conservative operations and maintenance assumptions.”
Next Steps

- Obtain and address input from WQMC and Select Board
- Submit for MEPA review, DEP comment and CCC 208 Plan Consistency Review
- Budget for “Phase 0” tasks
  - Proof-of-concept for Advanced I/A system and RME approach
  - Continue to advance efforts to secure additional effluent disposal capacity for BSR WWTF
  - Initiate efforts to secure easements for Advanced I/A and Traditional Backup plans
  - Refine financial plan
  - Prepare for 2024 Annual Town Meeting
- Continue environmental monitoring
- Continue Trunk River inspections and maintenance dredging