Oyster Pond
Comprehensive Wastewater Management Plan

August 1, 2019
Ed Leonard, PE

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

Kickoff meeting with the Town  Kickoff meeting with OPET  Needs Assessment report  WQMC meeting  Initial Alternatives Analysis report  WQMC meeting  Neighborhood meeting  Updated Alternatives Analysis report  Neighborhood meeting

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

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

<table>
<thead>
<tr>
<th>2019 to 2024</th>
<th>2025 to 2029</th>
<th>2029 to 2039</th>
<th>2039</th>
<th>2040 to 2050</th>
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</thead>
<tbody>
<tr>
<td>• Obtain approvals from MEPA, DEP and CCC</td>
<td>• Establish start date</td>
<td>• Continue monitoring</td>
<td>• Evaluate TMDL compliance</td>
<td>• Implement Phase 2, as necessary</td>
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<tr>
<td>• Obtain Watershed Permit</td>
<td>• Design, permit and complete installations</td>
<td>• Obtain permits and dredge Trunk River at intervals</td>
<td>• Decide whether to continue with Advanced I/A Plan or modify plan</td>
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<tr>
<td>• Obtain permits and dredge Trunk River</td>
<td>• Remove 80% of TMDL required WW N removals (1820 lbs/yr from a total removal of 2280 lbs/yr)</td>
<td>• Obtain permits and dredge Trunk River at intervals</td>
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<tr>
<td>• Implement RME</td>
<td>• Continue monitoring</td>
<td>• Implement Phase 2, as necessary</td>
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<tr>
<td>• Initiate Phase 0 activities and monitoring</td>
<td>• Confirm Advanced I/A Plan or Traditional Backup Plan</td>
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<td>• 2024 Town Meeting</td>
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### Environmental Monitoring

**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>Current Dwelling Units Affected</td>
<td>189</td>
<td>189</td>
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<tr>
<td>Capital Costs</td>
<td>$9.1M</td>
<td>$14.4M</td>
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<tr>
<td>Annual Operating Costs</td>
<td>$536,000</td>
<td>$248,000</td>
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<tr>
<td>Present Worth (Capital + PW of Operating Costs)</td>
<td>$17.9M</td>
<td>$18.5M</td>
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<tr>
<td>Estimated Annual Cost per Dwelling Unit</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