

OYSTER POND COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

TECHNICAL BACKGROUND for Responses to questions from the July 30, 2014 watershed meeting

Planning Assumptions

- The seasonal use of some residences has been included in the planning analysis - both the Massachusetts Estuaries Project (MEP) that established the nitrogen limits for Oyster Pond, and the consultant's analysis used actual water use to determine nitrogen loading. Thus, the nitrogen inputs from full-time versus seasonal occupancy are accurately quantified. Seasonal transitioning to year round occupancy was addressed in buildout analysis. We included an allowance of 10% of existing dwelling units being converted from seasonal to year round use. Table 3-7.
- Nitrogen from properties closer to the Pond reaches surface waters more quickly, thus it does not benefit from as much natural ground attenuation as that from more distant properties. Treating the effluent from the closer properties thus has a greater return on investment.
- There is a great level of confidence in the Total Maximum Daily Load (TMDL) prepared by the Massachusetts Estuaries Project (MEP). It was established after extensive field investigation and water quality sampling of Oyster Pond (for details see the MEP Report for Oyster Pond). The TMDL has been approved by Massachusetts Department of Environmental Protection (MA DEP) and the Environmental Protection Agency. There is a safety factor built into the TMDL.
- Upper watershed boundaries have been established by MEP and are based on USGS modeling; boundaries vary slightly due to fluctuating levels of precipitation.
- It has been observed that Oyster Pond is a site that has been disturbed by human activity. However MA DEP has established the TMDL for nitrogen based on extensive ecosystems study, and has classified it as a class SA water body. So, actions to improve water quality are required.
- Once the Conservation Easement for Site C (Table 4-5) is secured, the development allowance included for the subject parcel(s) will be subtracted from the build-out analysis presented in Section 3 of the Needs Assessment report.
- Planning for catastrophic events is not part of the normal CWMP planning process. However, infrastructure will be planned, designed and constructed to meet floodplain issues. The Town is working towards a Coastal Resiliency plan and discusses these issues during Emergency Response Planning sessions.

Specific Options

- The purpose of Task 1 was to identify needs and the purpose of Task 2 was to identify total watershed costs for compliance. Addressing cost equity and fairness will be included in Task 3 (Development of the Recommended Plan). Recently, the Town has passed Special Legislation allowing betterments to be spread over 30 years, in equal payments, with 0% interest. Historically, the Town has assessed

betterments for the cost of the sewer collection system at a split of 70% property owner/30% Town. The betterment cost for the Little Pond Sewer Service Area is projected to be approximately \$18,000. The betterment cost for New Silver Beach was \$27,585. It is expected that the Comprehensive Wastewater Management Plan for Oyster Pond will recommend solutions that would cost a property owner in the range of these historic values. There were some minor corrections to Table 5-8 (revised 10 July 2014) reflected in the current version attached. They do not affect the rank order of cost of the various plans.

- The Town is currently evaluating how much effluent disposal capacity is available at the Blacksmith Shop Road WWTF.
- Innovative/Alternative (I/A) septic systems have been proven to work seasonally. I/A systems that achieve nitrogen reductions to 10 mg/L or less require components that completely nitrify, then denitrify. Title 5 systems are not effective for nitrogen removal. The Town is looking into options for making the installation of Innovative/Alternative septic systems more affordable. For example, the Barnstable County Loan program may be able to offer low or no interest loans. In addition, the Town is exploring ways to require installations in a timeframe compatible with MA DEP timeframes. New technical designs are also being explored.
- The force main connection as proposed in option 1 is on Woods Hole Road and not the Shining Sea Bikeway (which is much closer) because of the flood mapping and velocity zone.
- Discussions with WHOI have indicated they are not interested at present in a Public –Private partnership with the Town

Non-Traditional Alternatives

- The weir was installed in 1998 (MEP Report) to return Oyster Pond to an ecologically stable system such as existed in the 1960's, before significant human alterations. It is clear from the 1997 Conservation Commission Order of Conditions for weir construction, and related Hydrodynamic Study and Weir Report that the Management Plan for Oyster Pond involves meeting the objectives of pond salinity in the range of 2 to 4 parts per thousand, passage for anadromous fish such as herring, and flooding control. Moreover, the TMDL established for Oyster Pond assumes it will continue to function as a brackish pond. Therefore, inlet widening does not seem in keeping with either the Town's intent, or regulatory approvals. Proper maintenance of the Trunk River in accordance with the permit will improve tidal exchange. Although the water level downstream of the weir is higher than it used to be, the system as a whole appears to be working as designed because current data from OPET shows that the salinity is approximately 2.6ppt which is within the target range of 2 to 4ppt.
- Marine Aquaculture in Oyster Pond is not applicable due to the low salinity.
- Permeable Reactive Barriers (PRBs) in the Oyster Pond watershed were carefully evaluated as part of the site selection process for a PRB demonstration (see CDM Smith's Technical Memo #2 for details). Oyster Pond was ruled out due to low density of development, and lack of sites of suitable length to make installation economical.

- Eco-toilets, once the actual nitrogen-removal rates have been established, will be categorized as an innovative/alternative septic system. The Town will be also monitoring how many residents elect to take the eco-toilet option in the Little Pond Sewer Service Area before considering it for any other watersheds.
- The TMDL identifies a specific depth at which to monitor dissolved oxygen (DO) even though the pond exhibits considerable variability in the elevation of the natural occurring stratification layer. The Town's consultants on the Oyster Pond CWMP have suggested that there may be a more practical and affordable approach to monitoring DO that better reflects the dynamic natural system while still being ecologically protective. Adjusting the depth of dissolved oxygen (DO) readings to a variable depth just above stratification would likely show that the minimum observed oxygen concentration is 4 mg/L instead of 2 mg/L. This change in minimum observed DO would indicate that the mass of nitrogen required to achieve TMDL should be lowered. Pond mixing achieves a similar benefit. The current requirement is for 1050 kg of nitrogen/year to be removed from Oyster Pond. **With a DO adjustment, approximately 800 kg/year of nitrogen would still need to be removed to achieve TMDL-compliance.** It is not expected that mixing will mobilize high levels of nitrogen or phosphorus; however, this would need to be assessed as part of a demonstration project. The committee will consider these options in due course.

Next Steps:

- The town must wait for additional technical information as well as availability of capital funds from the retirement of existing debt before substantial work on this project can proceed. Still needed technical information includes data on the capacity of the BSR WWTF, costs and performance of advanced I/A systems.

NOTE: All reports that are mentioned are available on the Water Quality Management Committee Homepage