

## Orleans Water Quality Advisory Panel

### June 2016 Status Report on the 2015 Orleans Water Quality Advisory Panel Consensus Agreement

**Background** – At the meeting of the Orleans Water Quality Advisory Panel (OWQAP or Panel) on April 20, 2016, it was broadly agreed by the panelists that the principles, overall goals and directions of the 2015 Consensus Agreement developed by the Panel remained essentially as defined in 2015, but that we should publish a status report to:

1. Document the progress made over the last year;
2. Outline the more specific goals and further implementation steps and projects that would be undertaken in FY 2017 to resolve remaining uncertainties and implement the elements of the overall Agreement for which there is clear consensus that they are ready to proceed.

This document is the 2016 Status Report on the 2015 Consensus Agreement that accomplishes the above objectives.

#### **Coastal Habitat Restoration (CHR) and Aquaculture:**

Three demonstration projects will be started early in FY2017 including environmental monitoring to prove the efficacy of the projects:

1. Pleasant Bay Oyster Reef Restoration Project - Oyster spat on shell will be used to create an oyster bed near Quanset Pond on suitable bottom material that was identified in the site selection process.
2. Development of an oyster bed in a Pleasant Bay saltwater pond. The oyster bed will be suspended in equipment above the pond bottom.
3. Development of a quahog bed sanctuary area in Town Cove.

Coastal habitat restoration (CHR) and aquaculture projects need to be successful, cost-effective, sustainable and replicable on other sites such that the nitrogen reduction and water quality improvement achieved with these NT technologies can make a major contribution to Plan goals. Both CHR and aquaculture contribute directly to restoring healthy ecosystems and habitats, which is essential to restoring the overall health of our natural water systems. These demonstration projects address four critical objectives identified by the Shellfish working group:

- Establishing successful and sustainable oyster reefs is essential to achieving the scale (number of animals) needed to play a major role in achieving Plan goals and objectives.
- Saltwater ponds in coastal water systems require both water and sediment quality improvement and are in greatest need of remediation.
- It has been reported anecdotally that Town Cove water quality has been declining since the completion of the MEP study and, based on visual observations, more sharply in the last few years. This decline, if confirmed through evaluation of water quality data, could possibly be due to reduced tidal flushing, as well as other potential causes. Quahog propagation has been successful in Town Cove and increasing the quahog population in a sanctuary area was determined to be the best first step in the water quality improvement process. Note that the plan for FY2017 also includes a quahog population survey in the

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Town Cove sanctuary area in preparation for expanded propagation of the quahogs in Town Cove going forward.

- During FY 2017, the Town will continue to work with the shell fishermen to understand how we can work together to expand shellfishing opportunities.

#### **Permeable Reactive Barriers (PRBs):**

The following two demonstration projects will be implemented, including pre- and post-construction environmental monitoring, to prove the efficacy of PRBs and identify critical design and operational issues that must be addressed in full-scale projects:

1. Additional monitoring, analyses, design and permitting of a PRB near the town landfill to intercept nitrogen in groundwater traveling toward Town Cove.
2. Permitting, procurement and installation of a PRB near Eldredge Field.

Both demonstration project locations are well removed from natural surface waters and will be monitored both for efficacy and characteristics (i.e., vegetable oils) in local soils.

#### **Floating Constructed Wetlands (FCW):**

Due to greater than expected capital and operating cost estimates for FCWs and the lack of reliable information about the economics of FCWs in terms of cost per pound of nitrogen removed, Orleans will defer consideration of FCWs until more reliable information is available. In looking at the overall status of this technology, the Panel felt it would be inappropriate for Orleans to be conducting basic research in this area.

In lieu of FCW's, we will investigate other emerging technologies and innovative/alternative treatment systems such as those described in the Meetinghouse Pond Watershed discussion later in this document.

#### **Downtown Wastewater Plan Progress:**

A combination of public and private investment is possible which could take the form of a public-private partnership (P3) in which private investment could offset public funding of certain wastewater infrastructure elements that are of particular benefit to downtown businesses. In addition, there are many options for the process of designing, building, owning and operating the wastewater system. In order to select the best solution for our community, we will consider in greater detail financing, ownership, and technology alternatives that provide an affordable solution that meets the needs of the Town and the downtown property owners.

During the past 12 months, Water Resources Associates and AECOM have completed (1) an evaluation of wastewater collection, treatment and disposal technologies, including implementation costs, (2) a financial model needed to evaluate overall cost impacts and affordability, and (3) a hydrogeological evaluation of potential effluent disposal sites.

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Wastewater Treatment Facility: The required capacity of the downtown wastewater plan has been modified based on more detailed engineering evaluations to include the 349 properties generating a combined, maximum daily wastewater flow of 250,000 gallons per day.

Wastewater Collection System: Taking into account local conditions in the downtown area collection systems to support traditional gravity sewers, alternate solutions such as septic tank effluent sewers, vacuum sewers and low pressure sewers were evaluated on the basis of initial capital costs and 20 year total costs including operation and maintenance. Based on their analysis of cost and reliability, AECOM has recommended a combination of gravity and low pressure sewers.

Treated Effluent Disposal: Hydrogeological evaluations have been used to quantify the treated effluent disposal capacity of the Overland Way Parcel 1/1A and 223 Beach Road (formerly the Hubler property) sites. The Town continues to work on obtaining access to MassDOT property in the Route 6, Exit 12 cloverleaf for evaluation.

Additional potential treated effluent disposal sites have been identified in the downtown area. Multiple effluent disposal sites are needed to demonstrate to MassDEP that the Town can provide backup disposal capacity. They would, in addition, disperse the treated effluent over a wider area in multiple watersheds.

Groundwater recharge of treated effluent will be located at sites such as the following for which more detailed hydrogeological and environmental evaluations are being conducted:

1. The southeast lobe of the Route 6, Exit 12 cloverleaf interchange under agreement with MassDOT, tributary to the Little Namskaket aquifer;
2. At parcels 1/1A, the part of the original CWMP disposal site tributary to the Little Namskaket aquifer at the site of the existing Compost Building, which will be removed. This assessment will include a screening update of the environmental assessment conducted with the CWMP.
3. Additional sites in the downtown area, including one on a proposed development site.
4. The 223 Beach Road site, currently undergoing hydrogeological studies.

#### **Downtown Wastewater Project Work Planned for the Next Year:**

1. Meetings bringing together downtown business interests and their consultants, along with the key Town departments and Town consultants will be conducted to consider technology, location, finance, ownership, Public-Private Partnerships (P3) and Design-Build-Operate alternatives. The objective of this effort is to develop a short list of mutually agreeable options, including project scope, costs, implementation options and schedule. The agreed options will include consideration of septage treatment in terms of capacity (volume of septage to be treated) and an estimated projection of net revenue from septage receiving, treatment and disposal.
2. Based on the advice of the Town's engineering consultants, the Board of Selectmen will make a decision on how to proceed with the downtown wastewater project including a decision on cost

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allocation delineating how the costs would be allocated among residential and commercial users and taxpayers.

3. The Town's engineering consultants will prepare a plan and schedule for downtown wastewater project implementation and begin preliminary engineering design for high priority areas.
4. The Town's engineering consultants will also conduct hydrogeological evaluations of alternative downtown area treated effluent disposal sites to ensure sufficient capacity and backup capacity required by MassDEP.

#### **Meetinghouse Pond Watershed**

The priority for wastewater planning and implementation will be placed on the downtown project. In the interim period, Meetinghouse Pond water quality improvement efforts will continue with a focus on identifying demonstration projects based on available emerging new technologies such as the following:

1. Although the CHR terminal pond oyster bed demonstration project identified for implementation next year will likely not be sited in Meetinghouse Pond, that demonstration project will provide experience that we can employ in a future Meetinghouse Pond CHR project.
2. Other technologies under consideration include aeration methods for accelerating remediation of organic rich, anoxic sediment and the nitrogen recycling from the sediment that contributes to degraded summer water quality.
3. Barnstable County Health Department development of a denitrifying leach field is a promising technology that is being watched closely. While a significant path to full approval by DEP as a permittable technology remains, the denitrifying leach field has been shown in preliminary field studies to reduce nitrogen to levels similar to those of sewage treatment plants. This technology, as well as other emerging innovative and alternative (I/A) approaches will be evaluated as options for on-site or cluster system applications for the 372 parcels in the Meetinghouse Pond watershed.

These technologies and methods will be implemented in other saltwater ponds and embayments as their efficacy and cost-effectiveness are demonstrated.

#### **Adaptive Management Plan (AMP)**

Update of Water Quality Data Bases and Modeling Analyses - The AMP will include continued evaluation by SMAST of the latest data and technical analyses of the hydrodynamic and water quality conditions in Pleasant Bay and Nauset Harbor. This effort will integrate studies by others such as the Center for Coastal Studies, Woods Hole Group, Cadmus, and other entities related to the future characteristics of the Pleasant Bay barrier breach, water quality changes and their impacts on MEP model results, TMDLs and other factors influencing the Orleans Amended CWMP. As part of this evaluation, plans for the recalibration and update of the MEP model for the Nauset and Pleasant Bay systems will be developed.

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Freshwater Pond Water Assessment: The Orleans Comprehensive Wastewater Management Plan included action to conduct further assessments of freshwater ponds with the objective of developing a plan for addressing problems. The process of prioritizing and assessing freshwater ponds will be moved forward in FY2017 with an update of the water quality database, confirmation of water quality impairments and development of plans for remediation of priority freshwater ponds.

Holistic Watershed Management - During various meetings of the OWQAP over the last two years, the topic of holistic watershed management was raised by panel members. Holistic watershed management is a relatively recent term that refers to the need to approach protection and restoration of fresh and estuarine water resources based on monitoring, understanding and addressing appropriate management measures as a result of *simultaneous* consideration of *all* stressors and environmental processes affecting water resources. While the current approach to developing non-traditional measures to address water quality under the state's CWMP program contains elements of holistic watershed management, it has been driven almost exclusively by "top down", regulatory programs promulgated by EPA nationally, in series over the last 40 years, rather than "bottom-up" local programs that developed in parallel and integrated. The holistic approach is also more targeted on specific local conditions and resources than generic federal and state regulatory programs have been in the past.

The approach required to accomplish holistic or integrated watershed management is, in fact, critical to the long-term success of the Orleans hybrid approach. While expressing interest in better understanding and developing integrated watershed management, the panel and the current Amended CWMP planning efforts were not able to develop this need further due to time, scope, and budget limitations. It was suggested that further discussions and presentations of holistic watershed management approaches would help ensure that the chances of long-term success of the current planning recommendations are enhanced by linking them to holistic "bottom-up" watershed management efforts of the environmental coalitions and residents of the town going forward.

#### **Financial Model**

Financial and affordability analysis will be a continuous effort with the goals of lowering costs, identifying revenue from new non-local sources, and gaining access to state, federal and regional grant and debt forgiveness programs, specifically including the advantageous State Revolving Fund loan program.

A major step in the financial and affordability analysis process was the completion of a financial modeling software tool in May 2016. The financial modeling software has the capability of modeling different scenarios (scenario: combination of assumptions) to guide the town in decision making and to allow the town to communicate realistic forecasts of costs to ratepayers (project beneficiaries) and taxpayers. Key assumptions that can be analyzed by the financial modeling software include the following:

1. Current and updated project cost estimates
2. Sources of funds and costs of financing (State Revolving Fund 0%/2% loans, debt forgiveness, and grants, etc.).

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3. Allocation of cost recovery options among ratepayers and taxpayers.

Text refined and finalized on June 15, 2016:

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