General Overview of the Integrated Planning and Permitting Approach Developed for the Town of Durham, NH and the University of New Hampshire

Faced with more stringent nitrogen effluent limits as part of its pending NPDES Discharge Permit renewal for its Wastewater Treatment Facility, the Town and UNH chose to pursue an alternative Integrated Permit approach to reduce its share of nitrogen contributions to the Great Bay through both facility upgrades using the "Sustainable Limits of Technology" and cost-effective storm water and nonpoint source control measures.

Consistent with EPA's recent guidance *"Integrated Municipal Stormwater Permitting and Wastewater Planning Framework"* dated June 5, Durham and UNH recognize the potential value of integrated municipal stormwater and wastewater planning (and presumably permitting), to prioritize and identify the implementation and capital investment goals that will address the most pressing public health and environmental protection needs in a more cost-effective manner.

Durham Project Overview

The Town and UNH share the use of Durham's Wastewater Treatment Facility (WWTF), which has an average annual discharge flow of about 1.0 MGD with two-thirds of the volume coming from UNH. The WWTF discharges to the tidal portion of the Oyster River which is one of seven major tributaries that feed into the Great Bay Estuary. This facility is one of eighteen facilities in the Great Bay watershed in which EPA-Region 1 has proposed more stringent effluent limits on total nitrogen through renewal of NPDES Discharge Permits.

The existing nitrogen concentrations in the WWTF effluent are currently below 8 mg/L on average due to previous facility upgrades completed in the last 10 to 12 years. At times, during the warmer summer months and high biological activity, the effluent concentrations have been measured to be below 5 mg/L. Achieving even lower concentrations, however, will require substantial capital investments and additional, higher operational and maintenance costs. At the average discharge rate of 1.0 MGD, the WWTF is estimated to discharge approximately 11.8 tons of nitrogen per year. The limit of technology for nitrogen removal is considered to be 3 mg/L and this would theoretically decrease the nitrogen output by approximately 7.2 tons per year. New Hampshire Department of Environmental Services (NHDES) and Town of Durham have estimated that the capital investment required to reduce the effluent limit from 8 to 5 mg/L with a design flow of 2.5 MGD would be approximately $12 million and an additional $10 million plus a significant increase in annual operational costs to go from 5 to 3 mg/L[1]. NHDES has also estimated that the annualized cost of removing nitrogen to a limit of 3 mg/l at the Durham WWTF would be over $1,000 per pound.

In addition to relatively high unit costs, the Town and University were deeply concerned that in order to achieve a seasonal average effluent limit of 3 mg/L TN, supplemental chemicals such as methanol or ethanol would be needed to provide a carbon source to enhance the biological treatment process; hence an increase in operational costs. The transport and storage of large volumes of methanol or ethanol also raises major concerns with respect to environmental impacts and public safety. Methanol not only contributes to greenhouse gases, but when stored in a liquid form, it could pose a serious worker safety and water quality threat in the event of a spill or explosion. The reliance on chemical inputs is not considered to be an economically and environmentally sustainable practice and is not consistent with EPA's sustainability concepts espoused by the Integrated Planning Framework.

As part of Integrated Planning approach, the Town and University seek to implement a balanced approach that would involve both facility upgrades to enhance nitrogen removal to a "Sustainable Limit of Technology" without a chemical supplement as well as implementing cost-effective stormwater and nonpoint source control strategies to meet nitrogen reduction goals for both the Town of Durham and the Oyster River estuary. While there is no guarantee that an Integrated Approach will lead to less overall costs to meet the compliance needs or modified timelines, it does enable a prioritization process and an opportunity to combine resources and/or engage other regulated or non-government interests in addressing broad water quality objectives.

[1] NH Department of Environmental Services. (NHDES). 2009. Numeric Nutrient Criteria for the Great Bay Estuary, R-WD-09-12.

The principal goals of this Integrated Planning approach include:

Collaboration: Building on research and monitoring efforts currently being done in the Great Bay region will be a central focus of this effort to make the most efficient use of available resources and technical expertise to achieve nitrogen reductions in a more holistic and watershed-based approach.
Cost- Effectiveness: Identify most cost-effective solutions through a combination or structural and nonstructural measures aimed at stormwater management and nonpoint source control.
Sustainability: Identify measures that will achieve water quality objectives with the least amount of structural modifications, maintenance and additional operational costs using innovative green technology.

One of the first steps involved developing an Integrated Strategy Plan for the Town of Durham and University of New Hampshire (UNH) to identify the key elements and activities that are needed. These elements seek to address the requirements of both the NPDES Wastewater Discharge Permit and those anticipated in the 2013 MS4 Stormwater General Permit, particularly with respect to reducing nitrogen loading to the Oyster River from both nonpoint and point sources within the watershed. The descriptions highlight the major study elements, anticipated timelines and potential collaborating partners for each of the study elements. The early phases of the project are intended to develop the basis for the integrated plan and will focus on collaboration with regulators and watershed stakeholders, and consideration of management options, pollutant loadings, regulatory challenges and opportunities to optimize the integration of each overlapping goal. The major study elements include the following

***Specific Activities that were identified as Key Elements of Integrated Strategy Plan include*:**

1. ***Develop an Oyster River Watershed Management Plan to Identify and Quantity Nonpoint Source Nitrogen Loads***
2. ***Baseline Water Quality Monitoring in the Oyster River***
3. ***Stakeholder Education and Outreach***
4. ***Develop Stormwater System Asset Assessment & Management Program***
5. ***Draft Permit Framework and Language Development***
6. ***Pilot Testing of Various Wastewater Treatment Optimization Measures***
7. ***Develop a Long-term Sustainable Funding Program to Maintain Management and Structural Measures***
8. ***Develop a Nitrogen Reduction Tracking and Accounting System***
9. ***Develop a Long-term Monitoring Program to Measure Nitrogen Load Reductions in the Oyster River Watershed***

The nutrient reduction strategies will be identified through a series of actions focused on nonpoint sources associated with the Town and UNH as part of an Oyster River Watershed Management and Implementation Plan. Completion of the study elements are anticipated to occur during 2013-2014 using a phased approach with implementation of the various control strategies likely to extend over several permitting cycles depending on the results of preliminary tasks which will evaluate cost-effectiveness and community benefit.

Sustainable Long-Term Benefits

Beyond the obvious attraction of avoiding major capital expenditures to achieve the highest level of treatment for one particular source, integrated plans may allow a community to find cost savings in operational efficiency that they might not otherwise be discovered through traditional regulated approaches. As integrated planning requires a broad and thorough examination of a wide range of pollution sources typically managed by a variety of entities even beyond those regulated under the NPDES Program, the potential overlap, redundancies and synergies across departments, communities, and watershed stakeholders should become clear. Integrated planning involves integration of operations and management across political boundaries that currently are separate utilities. Perhaps the greater challenge to initiating an integrated planning approach is the inertia needed to break the barriers for modifying the current regulatory structure and for communities and other regulated entities to embrace the concept that long-term planning, budgeting and sharing of resources on a more regional scale could lead to more cost-effective and sustainable means to meet the ever-increasing and more complex water quality regulations.

For more information: Contact Dave Cedarholm; Durham Town Engineer, 603-868-5578, or dcedarholm@ci.durham.nh.us