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Regional Wastewater Management Plan
Watershed-Based Solutions

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Introduction

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Cape Cod towns are actively engaged in municipal wastewater planning efforts, but are facing a number of common issues, including:

- the cost of conventionally engineered solutions,
- public disapproval of funding requests for municipal wastewater treatment implementation,
- the need for public education,
- a lack of wastewater planning, engineering, and implementation expertise within municipal departments, and
- locating appropriate disposal sites that are outside of nitrogen-sensitive embayments and Zone IIs

The primary issues are related to cost and the consistent use of expensive conventional approaches. Conventional approaches are appropriate, and necessary, in many circumstances. Alternative approaches are often discounted due to the lack of scientific certainty and/or regulatory flexibility. The Cape-wide cost estimate conducted as part of this CCRWMP estimates $4.6 billion-$6.2 billion in capital costs to meet TMDLs Cape-wide. Cost is influenced by the amount of infrastructure required and the location of effluent disposal, in addition to other factors, such as future growth. Under the existing framework for planning and management, the public is voting against expenditures for less expensive, phased portions of municipal infrastructure. These votes come after towns have already spent hundreds of thousands of dollars to developing plans. For voters to best understand the problem and agree upon a solution they need to be more effectively engaged and educated, a process that often requires additional financial resources.

SHARED WATERSHEDS

Many of the issues common to municipal wastewater planning initiatives are further complicated by the fact that 32 of the 57 watersheds to coastal embayments are shared by two or more towns. Watershed lines

are defined by groundwater flow and do not respect traditional municipal lines; however, the existing regulatory framework does not require coordination watersheds shared by two or more towns. Shared watersheds account for about 64% of Cape Cod's total land area and encompass about 68% of the residential parcels and about 63% of the non-residential parcels in the region. The lack of required coordination leaves towns to plan for the area of land within their jurisdiction rather than looking comprehensively across the entire watershed for more cost effective solutions. Figure WS-1 shows Cape Cod's shared watersheds.

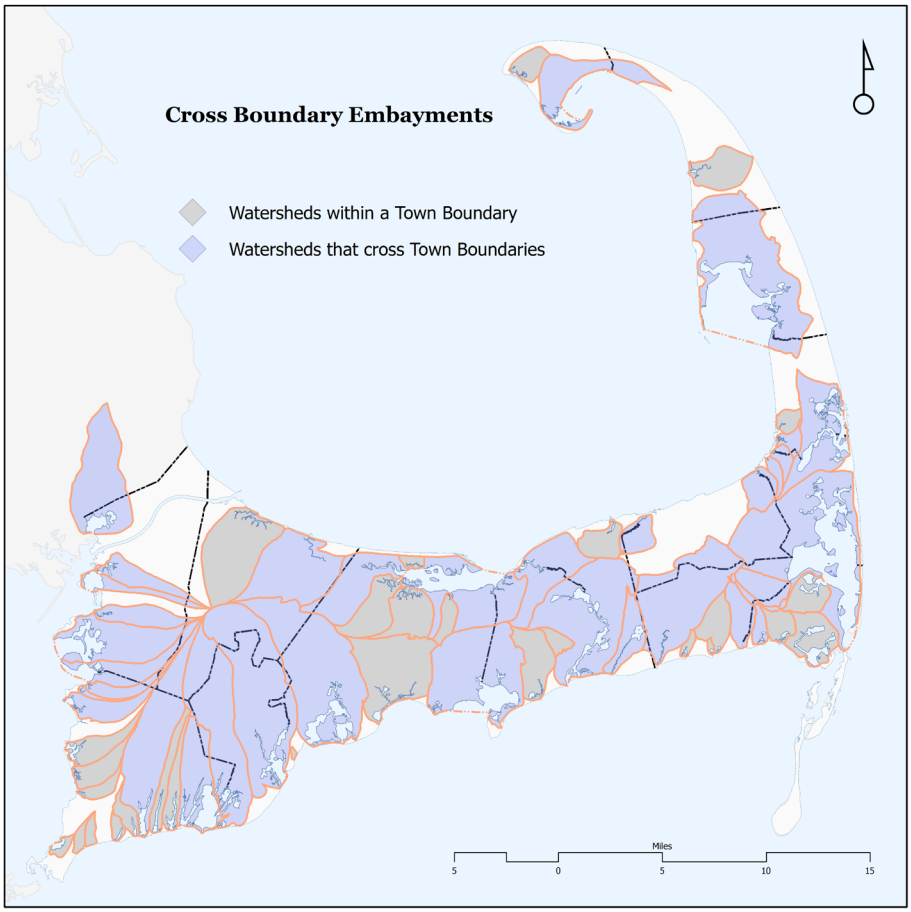

FIGURE WS-1: Cape Cod's shared watersheds. Blue indicates watersheds that cross town boundaries and gray indicates watersheds within a town boundary.

Developing Solutions

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Due to the shared nature of our water resources, the lack of existing wastewater infrastructure, and the cost of constructing significant new infrastructure, the conventional approach is not working for Cape Cod. Moving forward, the region needs a new approach – one that is based on watersheds and not town lines – that effectively engages community members and more closely considers the needs specific to watershed communities. This watershed approach should consider all technology options and approaches, as well as all cost saving strategies.

There are a number of reasons why watershed-based planning and management is an appropriate approach to pursue:

- TMDLs are based on watersheds. Remediating nitrogen in one section of the watershed will not necessarily equate to water quality improvements. A comprehensive look at the entire watershed will ensure that water quality goals can be met utilizing an incremental cost effective strategy, as appropriate.
- Shared conventional infrastructure allows for a single facility to collect a certain percentage of the wastewater flow to meet TMDLs in a shared watershed, rather than two facilities (one in each municipality) to collect the same percentage of total flow – a potential savings in both capital and O&M costs.
    - A treatment facility built in one town may include the capacity to treat wastewater from a nearby town.
    - This may include use of an existing facility, expansion of an existing facility or sharing of a new facility.
    - Where land is scarce it may be feasible to locate a treatment facility in one town and a disposal area in another town.
- Collection can be targeted to the most dense (parcel connections/feet road length) areas of the watershed, regardless of municipal lines, limiting the cost of the collection system, which is typically 60% - 70 % of the capital cost of wastewater infrastructure.
    - Significant savings in the cost of wastewater collection (the sewer pipes) may be realized in areas of

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dense development that are adjacent to each other, but in different municipalities.

The CCRWMP is not a plan that puts forth a single Cape-wide solution or even a specific solution for each of the region's watersheds. It is a framework for providing technical assistance to communities, facilitating dialogue between communities that share a watershed, educating communities about their options, and advocating for financial resources and regulatory flexibility. The CCRWMP provides a process for engaging communities on a watershed level, a library of tools and resources for stakeholders within a watershed to utilize in educating others and identifying solutions, and a series of policies to ensure that, as local solutions are developed, they are appropriately designed to meet water quality goals in a way that limits the impact to Cape Cod taxpayers to the extent feasible.

COMMUNITY ENGAGEMENT

Wastewater management on Cape Cod impacts everyone and requires broad engagement in conjunction with focused working groups. In the coming months the Cape Cod Commission will work with the Consensus Building Institute (CBI) to develop an approach for establishing a watershed-based community engagement process. The process will provide for a facilitated dialogue where local stakeholders can express their thoughts and contribute to the development of a solution. This collaborative approach must be designed and conducted in a way that balances local input with local needs, interests, and capacities under the principles of a coordinated Cape-wide series of policies and principles.

In developing this process the Commission will continue to work closely with stakeholders across the region to cultivate ideas, identify information and education needs, consider cost effective ways to engage third party facilitators, and engage local officials so as to make a connection between citizen collaborators and existing town management. Part of developing this process will include identifying ways to obtain effective representation throughout watershed communities and how to best provide tools and resources to communities engaged in education and planning.

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UTILIZING TOOLS & RESOURCES

The CCRWMP provides a series of tools for communities to utilize as they make choices about technologies and approaches that are appropriate for their watershed. Through technical assistance and education, the Commission will work with communities and a third party facilitator to identify options for communities to consider and provide the tools and resources to promote public discussion around those options. The CCRWMP identifies a broad framework within which a range of potential solutions can be discussed. The Cape Cod Commission will provide technical assistance in identifying solutions that are specific to the individual needs of each watershed and fit within the following framework:

- Faster — approaches that will remediate the necessary nitrogen in the shortest time frame;
- Cheaper — approaches that will remediate nitrogen at the lowest cost to individual taxpayers; and,
- Better — approaches that are most sustainable, both environmentally and financially, over the long term.

Communities need to compare their options to a default scenario that could result from the pending lawsuit between the Conservation Law Foundation and the U.S. EPA, as we have in our Cape-wide cost estimate. The Cape-wide cost estimate uses conventional infrastructure and proven technologies for an off-the-shelf solution that can be implemented quickly under the current regulatory structure.

Throughout this process of engagement and solution identification, a number of tools and resources will be available. The following provides a description of each.

WATERSHED MVP (MULTI-VARIANT PLANNER)

Watershed MVP (multi-variant planner) is an innovative, web-based, scenario planning tool being developed by the Cape Cod Commission that allows technical experts and the general public to compare various wastewater treatment options at scales ranging from the neighborhood, watershed and sub-regional level. Watershed MVP presents parcel-based data and calculations for land use, water use and build-out that allow the user

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to quickly evaluate wastewater treatment options and provide a comparative cost analysis for different approaches. Watershed MVP is an effective decision-making tool making public participation easier and democracy more convenient. It aids in re-engaging the "the majority," driving public discussions toward the lowest cost, most sustainable solutions to the Cape's wastewater problems. See the Watershed MVP primer on the Commission's wastewater initiatives webpage for more details.

SYSTEMS DYNAMICS MODEL

A graduate student from the MIT Engineering School's System Design and Management Program, as part of his master's thesis, looked at the nutrient loading problem currently experienced in the estuaries of Cape Cod. The project entailed the design of a systems model - a computer-aided approach to understanding the dynamics of a natural, built, or social system – that evaluates the impacts of different forms of wastewater treatment on the nutrient loading in the region's estuaries. This model can be used at the watershed, sub-watershed, or regional level. Unlike linear modeling, systems models capture the interdependence and mutual interaction of different variables in the system. The model developed to date focuses on treatment of wastewater using title 5 systems, innovative/alternative systems (denitrifying septic primarily), and sewer systems. With help from EPA, the Commission plans to expand on this model in 2013. An expansion of this model will allow for the visualization of additional impacts on the environment, economy and society.

RATE MODEL

The Cape Cod Commission has worked closely with a consultant to develop a financial model that considers a number of global inputs and assumptions about developed parcels, parcels to be sewered in any given scenario, and capital and O&M costs for various treatment options, as well as customer characteristics and financial inputs such as inflation rate and debt service. These assumptions are being used to generate projected annual costs and projected costs per parcel over a period of time. This model was initially developed for Cape-wide scenario planning, but is being further refined to run scenarios based on geographic areas selected using Watershed MVP.

GREEN INFRASTRUCTURE SITING PROCESS

Working with a consultant, through EPA's 2012 Green Infrastructure Community Partners Project, the Cape Cod Commission developed a screening process to identify site opportunities for green infrastructure (GI) and low impact development (LID) techniques. The screening process began with a desktop investigation of potential sites by utilizing a siting criteria matrix developed by the Commission, assessing both positive siting criteria and potential constraints. The siting criteria matrix consists of multiple GIS-based data layers (termed "siting criteria") and a collection of potential GI and LID technologies. This matrix has been used to identify pilot project sites within the Lewis Bay and Parkers River watersheds with a goal of generating a design for 1 GI and 1 LID project. A number of technologies and approaches are up for consideration based on their high nitrogen removal efficiencies and representative of a range of GI and LID techniques that are applicable in a wide variety of conditions.

GAME-BASED PLANNING TOOLS

The Cape Cod Commission is considering adapting a game-based planning tool - something like Community PlanIt, developed by the Engagement Game Lab at Emerson University - to aid in educating the public, garnering support from communities, and encouraging participation in developing planning scenarios for addressing wastewater Cape-wide. Game-based planning tools are a platform for learning that provides a flexible way for presenting local planning ideas while also gathering feedback on these plans from the community. Using these types of tools, players participate in the planning process whenever they want (within the time frame of the game) from wherever they are, allowing for participation by a wider range of individuals. The Commission expects to use these types of tools as it moves forward in developing a community engagement process to allow for more participation in developing watershed-based wastewater management plans.