

CHAPTER 1

INTRODUCTION

1.1 REPORT BACKGROUND AND PURPOSE

This Draft Comprehensive Wastewater Management Plan and Draft Environmental Impact Report (DCWMP/DEIR) and Notice of Project Change (NPC) Document is the third of four reports to be produced for the Town of Falmouth (Town) Comprehensive Wastewater Management Planning (CWMP) Project. The first of these reports was the Needs Assessment Report dated October 2007, which documented the wastewater and nitrogen-management needs for the planning area and related areas of Falmouth. The second report was the Alternatives Screening Analysis Report dated November 2007, which identified all possible solutions to address the wastewater and nitrogen-management needs and then “screened” these alternative solutions to retain the most feasible ones for cost development and detailed evaluation.

The Needs Assessment Report and the Alternatives Screening Analysis Report were summarized into an Environmental Notification Form (ENF) document to summarize the findings of these two efforts and to initiate environmental review of the project (as part of the Massachusetts Environmental Protection Act or MEPA review process). The ENF provided a scope for the project and the process to be used for the detailed evaluation.

The purpose of this DCWMP/DEIR and NPC is to summarize the detailed evaluation and to present the recommended plan to meet the wastewater and nitrogen-management needs. It also presents the estimated environmental impact (and benefits) of the recommended plan as compared to the consequences of not acting on the wastewater needs (also called the No-Action Alternative). It also includes a Notice of Project Change (NPC) because additional detailed evaluations have been completed and reported in this document that were not originally scoped in the CWMP Environmental Notification Form (ENF) and ENF approval certificate. The NPC is a completed form attached as the last chapter of this document and is submitted to meet the Commonwealth’s environmental review requirements.

There are components of this plan which need further coordination and agreement. The most

significant needed component is an agreement with the Massachusetts Military Reservation (MMR) to allow Falmouth to construct a new Wastewater Treatment Facility (WWTF) on their property near the existing Otis Air Force Base (AFB) WWTF and the Regional Solid Waste Management Facility.

An agreement to site a new WWTF to serve the Planning Area, and possibly the neighboring Towns of Mashpee, Sandwich, and Bourne, as well as the MMR itself, is not yet complete. Significant progress has been made toward an agreement over the past year, but additional discussions, negotiations, and agreement are needed. Discussions are also needed with Massachusetts Department of Environmental Protection (MassDEP) on the innovative treatment, recharge and water-reuse system, and the adaptive management approach proposed as part of the plan.

After MEPA review of this document, comments will be addressed and a Final Comprehensive Wastewater Management Plan and Final Environmental Impact Report (FCWMP/FEIR) will be prepared and presented for final approval.

1.2 PROJECT BACKGROUND AND PLANNING AREA

The CWMP Project is being completed to provide an environmentally and economically sound plan for wastewater treatment and treated-water recharge in the planning area for the next 20 years and with a perspective on the buildout conditions. The Project evaluates the Town's existing wastewater treatment facilities; assesses the wastewater and nitrogen-related needs in the planning area; evaluates appropriate mitigation measures for those needs; and develops a recommended plan for improved wastewater facilities and management structures. The primary focus of the project is to delineate municipal sewer service areas within the planning area and initiate a plan to meet the nitrogen Total Maximum Daily Load (TMDL) limits for the marine waters in this area.

The Town of Falmouth is located in the southwestern portion of Cape Cod as shown in Figure 1-1. This figure also identifies the planning area as the watersheds to Little, Great, Green, Bourne, Eel Ponds and Waquoit Bay. Many of the estuarine waters in the Town are impacted by excessive nitrogen loadings in the watersheds to these waters. The Town of Falmouth is committed to improving the water quality of its estuaries, and in November 2006, prepared its "*Wastewater and Nutrient Management Vision and Strategies*," as contained in Appendix 1-1. The Town's vision statement from this document is:

"Vision - By comprehensively and effectively managing its wastewater and other nutrient sources, Falmouth will improve water quality, protect public health and enhance the

town's economic vitality. Falmouth will offer its residents, visitors and future generations healthy waters in order to sustain the town's property values and vibrant economy."

The Town of Falmouth is faced with several wastewater-related problems in this Planning Area and town-wide as it plans to protect its coastal environment and plans for growth. Nitrogen loadings from the Town's coastal watersheds are causing an overproduction of algae in several coastal estuaries, and these loadings are impacting the water quality and marine resources in the estuaries. Recently completed studies indicate most of the nitrogen originates from wastewater sources. These reports have recommended extensive wastewater nitrogen removal that can only be met with sewers being extended to the watersheds of these marine waters and advanced treatment of the wastewater. These future sewer service areas need to be identified and prioritized.

Several previous projects have developed valuable information that will be referenced and used in this CWMP project. These previous projects are briefly described below.

A. The 1981 Wastewater Facilities Plan. The 1981 Wastewater Facilities Plan by Camp Dresser & McKee, Inc. (CDM) was a result of many years of study and focused on an aging wastewater collection and discharge system in Woods Hole (including an ocean outfall at Woods Hole) and wastewater problems in densely developed portions of Falmouth Center, Falmouth Beach, Falmouth Heights, and the Maravista area. Recommendations of the 1981 Wastewater Facilities Plan were approved by the Town, and the following centralized wastewater facilities were implemented:

1. Construction of the Blacksmith Shop Road wastewater treatment facility (WWTF), located in West Falmouth.
2. Construction of the Jones Palmer lift station to collect wastewater from several areas of Town and pump it to the Falmouth WWTF.
3. Elimination of the Woods Hole ocean outfall, and construction of the Woods Hole lift station to pump the collected wastewater to the Jones Palmer lift station and ultimately to the Falmouth WWTF.
4. Expansion and repairs to the Woods Hole wastewater collection system.

5. Construction of sewers along Main Street, and construction of the Shivericks Pond lift station to collect wastewater and discharge it to Jones Palmer lift station and ultimately to the Falmouth WWTF.
6. Construction of sewers in the Falmouth Beach area, and construction of the Falmouth Beach lift station to collect wastewater and discharge it to Shivericks Pond lift station, and ultimately to the Falmouth WWTF.
7. Construction of sewers along East Main Street and South Davis Straits Road, and construction of the Falmouth Inner Harbor lift station.

The Town's collection system has been slightly extended in past years to collect additional wastewater flow since implementation of these facilities.

The 1981 Wastewater Facilities Plan also recommended that portions of Falmouth Heights and Maravista be sewered approximately 10 years after Falmouth Center was sewered. These areas are often called the "Phase II Areas" and are densely developed, with some of the properties lacking sufficient space for fully compliant Title 5 systems. Portions of these two areas are in the 100-year flood zone and at low elevations where the groundwater is close to the surface. The Maravista area is adjacent to Little Pond and Great Pond. Both of these ponds have water quality problems that have been attributed to wastewater impacts and are in the Planning Area.

The Town experienced problems with the Falmouth WWTF which led to the subsequent construction of additional infiltration beds and modification to the aeration system. Also, the Falmouth Heights and Maravista areas were never sewered due to limitations at the Falmouth WWTF.

B. The 2001 Wastewater Facilities Plan. A Wastewater Facilities Plan was last completed for Falmouth in January 2001 by Stearns & Wheler, LLC which focused on problems with the existing wastewater collection system in Falmouth Center and Woods Hole, the existing WWTF located off Blacksmith Shop Road, and wastewater-related problems in the following areas:

1. West Falmouth Harbor watershed.

2. Falmouth High School property.
3. Areas of town adjacent to the existing wastewater collection system.
4. Areas of town that had been recommended for sewerage in the previous Wastewater Facilities Plan (1981 Wastewater Facilities Plan by CDM, Inc.), including the Falmouth Heights and Maravista areas.

The 2001 Facilities Plan provided the following recommendations for improved wastewater facilities and further study:

1. Upgrade of the Falmouth WWTF to treat a wastewater flow capacity of 1.2 million gallons per day (mgd) and to remove nitrogen in the effluent to 3 mg/L on average. This level of treatment is often called enhanced nitrogen removal (ENR).
2. Connection of the Falmouth High School to the Falmouth WWTF.
3. Sewering of properties along North Davis Straits (north to Maravista Avenue) and Scranton Avenue (south to Clinton Avenue).
4. Sewering of the West Falmouth Harbor watershed west of Route 28.
5. Future evaluation of nitrogen limitations for the Little Pond watershed to determine the needed extent of sewers and other nitrogen mitigation measures for the Maravista and Falmouth Heights areas.

The Town has completed the upgrade of the Falmouth WWTF and the improved facility is now producing treated water with a total nitrogen concentration of 3 mg/L on average. The Town has also connected the High School. The other sewer extensions have not yet been made.

C. Massachusetts Estuaries Project (MEP) Evaluations and Development of Nitrogen TMDLs. The MEP is a collaborative effort between several federal, state, regional, and municipal agencies to develop nitrogen thresholds and limits for a group of approximately 90 estuaries in southeastern Massachusetts. The main agencies involved include:

1. Massachusetts Department of Environmental Protection (MassDEP).
2. University of Massachusetts (UMass) School of Marine Science and Technology (SMAST).
3. United States Geological Survey (USGS).
4. Cape Cod Commission (CCC).
5. Applied Coastal Research and Engineering, Inc. (ACRE).
6. Several municipalities that surround the estuaries.

The nitrogen limits are developed for the estuaries through the following evaluation steps:

1. The watershed of each estuary is delineated by USGS with the use of their regional groundwater flow model.
2. The nitrogen loading to the watershed of each estuary is calculated by CCC for each of the major nitrogen sources.
3. Sediment cores are collected and estimates of nitrogen loadings from the sediments to the estuary waters are calculated.
4. Detailed surveys of each estuary are completed to quantify the condition and extent of several biological parameters, including eel grass coverage, benthic life forms, etc., and to correlate environmental conditions in healthy areas of the estuary with a nitrogen concentration that is associated with these healthy conditions. This step (with other inputs and considerations) identifies the threshold nitrogen concentration for each estuary.
5. A water quality model is developed for each estuary based on tidal mixing and flushing of the estuary and the nitrogen loads from the watersheds and sediments. The model is

calibrated with several parameters, including averages of long-term water quality monitoring data.

6. The model is then run with different watershed loading values to estimate the resulting estuaries' nitrogen concentration for the following scenarios:
 - a. Existing conditions.
 - b. Buildout conditions.
 - c. "No anthropogenic loading" condition, which is the condition of no nitrogen loadings from wastewater, fertilizers, or stormwater sources.
 - d. "Nitrogen threshold" condition which simulates the upper limit of nitrogen loading that can go into the estuary and still have the water quality meet the nitrogen threshold concentration (identified above in Step 4) at one or more key locations (sentinel stations) in the estuary.
 - e. Additional alternative scenarios as requested by the municipality or as needed to evaluate potential tidal flushing modifications.

Once the nitrogen thresholds and limits are developed and presented for each estuary in a technical report produced by the MEP, MassDEP then prepares a draft TMDL report that presents the nitrogen limits as TMDLs for approval by United States Environmental Protection Agency (USEPA). Several of these documents have been produced for the planning area, as listed below:

1. MEP Technical Report for Quashnet River, Hamblin Pond, and Jehu Pond in the Waquoit Bay system (Waquoit-East Watershed); MEP, January 2005.
2. MassDEP TMDL Report for Waquoit-East Watershed; MassDEP, October 2005.
3. MEP Technical Report for Great, Green, and Bournes Ponds; MEP, April 2005.

4. MassDEP TMDL Report for Great, Green, and Bourne Ponds; MassDEP, February 2006.
5. MEP Technical Report for Little Pond; MEP, January 2006.
6. MassDEP TMDL Report for Little Pond; MassDEP, February 2007.

USEPA then reviews the TMDL report and accepts the nitrogen limits as TMDLs which, once accepted, have regulatory status by USEPA and MassDEP.

The main findings of the MEP reports indicate that significant quantities of nitrogen must be removed from the watersheds to restore the water quality and habitat of these estuaries. These reports also indicate that most of the nitrogen comes from individual septic systems in the watersheds. Figure 1-2 illustrates the percentage of existing wastewater nitrogen that needs to be removed from the watershed (and subwatersheds) to meet the TMDLs. It is noted that these percentages represent one of the many possible nitrogen removal scenarios that could be used to meet the nitrogen concentration threshold, but it is the scenario that was suggested by the MEP and used in the TMDL. It is noted that the TMDL has not yet been completed for the Waquoit Bay and Eel Pond Watersheds (expected in 2010 or 2011). In an effort to proceed with the wastewater planning for the total Planning Area, Stearns & Wheeler used the existing wastewater nitrogen removal percentages from the adjacent Bourne Pond watershed as a planning assumption of the removals needed for these two water bodies that we reference as Waquoit West

The wastewater removals shown on Figure 1-2 are for the “existing conditions” in the approximate time period of 2003 to 2004 as documented by the Massachusetts Estuaries Project. Additional land use growth has occurred and is expected in this area, and when the ultimate buildout is projected for this area, the needed wastewater nitrogen removals are even greater. Figure 1-3 illustrates the percentage of future wastewater nitrogen loadings that need to be removed to meet the nitrogen limits. These are very stringent limits and can only be met by sewerage large portions of the Planning Area, advanced wastewater treatment, and careful recharge in selected locations of the Planning Area that can accommodate the return flow and remaining nitrogen estimated at 1 to 3 mg/L total nitrogen.

These wastewater needs are a very large problem for the Town, and solutions to meet these needs

will be a large expense to the Town and its residents.

D. Additional Regional Wastewater Management Efforts. Several regional wastewater management planning efforts are underway to define and implement wastewater and nitrogen mitigation efforts on Cape Cod. These efforts are coordinated with Falmouth's CWMP Project and are identified below.

1. Cape Cod Commission and Barnstable County regional efforts, including:
 - a. Activities of the Cape Cod Water Protection Collaborative.
 - b. Planned development of a regional wastewater management plan.
 - c. Coordination with USGS and Cape Cod towns to provide groundwater modeling services to towns involved with wastewater planning activities. (Falmouth has used this service, and findings of this modeling has been used in this report.)
 - d. Funding assistance and guidance documents for several wastewater guidance and case study reports, and shared watershed evaluations.
 - e. Creation of the Cape Keepers Public Education Program.
2. Association to Preserve Cape Cod (APCC), CCC, and Waquoit Bay National Estuarine Research Reserve (NERR) specialty conferences on wastewater issues.
3. Senator Robert O'Leary's efforts to pass state legislation to assist Cape Cod wastewater-related projects through the 2009 Environmental Bond Act.
4. Barnstable County Department of Health and the Environment (BCDHE) efforts to provide public health technical assistance and to oversee the Alternative On-Site Septic System Test Center to test innovative septic system technologies and management scenarios.

5. On-going wastewater planning projects in the neighboring towns and at MMR.
 - Town of Mashpee Nutrient Management Planning Project to address nitrogen TMDLs for Popponeset Bay and Waquoit Bay (East).
 - Town of Sandwich wastewater planning efforts related to economic development areas as well as nitrogen TMDLs for their portion of the Popponeset Bay watershed. (This planning effort may expand in the near future with a recent grant award received by the Town of Sandwich.
 - Town of Bourne wastewater planning efforts related to economic development areas as well as their watershed area to Phinney's Harbor.
 - MMR wastewater planning efforts related to the existing Otis Air Force Base (AFB) WWTF located at the MMR as well as potential redevelopment of portions of the MMR site.
 - Discussions and planning between the Towns of Falmouth, Mashpee, Sandwich, and Bourne; and the MMR about siting and sharing a new regional WWTF at the MMR to address regional wastewater issues.

1.3 WASTEWATER PLANNING PROJECT SCOPE

The project has been divided into five phases. A brief listing of the tasks associated with each phase of this project follows, and a more detailed Plan of Study for the project as submitted for MassDEP review is included in Appendix 1-2.

A. Phase I – Needs Assessment.

1. Review and summarize Town issues and project background.
2. Initiate identification and evaluation of potential treated water recharge sites.
3. Review and summarize regulatory issues affecting wastewater management planning.
4. Evaluate, summarize, and describe existing conditions in Town, including nitrogen limits.

5. Identify the goals and objectives of the Town related to wastewater management.
6. Evaluate, summarize, and describe future conditions in Town.
7. Identify wastewater areas of concern and prepare CWMP Needs Assessment Report.

B. Phase II - Identification and Screening of Alternative Solutions and Sites.

1. Identify, review and summarize alternative solutions to meet the Town's wastewater management needs.
2. Screen the alternative solutions to identify the most feasible for detailed evaluation.
3. Further identify and screen potential sites for wastewater management facilities.
4. Group feasible solutions and sites into alternative wastewater management scenarios.
5. Prepare the wastewater alternatives screening analysis report by summarizing the tasks of this phase.
6. Prepare the Environmental Notification Form (ENF) to initiate the Massachusetts Environmental Policy Act (MEPA) and CCC Development of Regional Impact (DRI) Joint Environmental Review Process.

C. Phase III – Detailed Evaluation and Development of the CWMP.

1. Continue with subsurface and/or environmental investigations for potential wastewater management sites.
2. Prepare a methodology of the planned detailed evaluations for project and regulatory review.
3. Perform present-worth evaluations of the alternative scenarios.

4. Perform non-monetary evaluations of the alternative scenarios.
5. Perform an environmental impact analysis of the alternative scenarios.
6. Evaluate the present-worth, non-monetary factors, and the potential environmental impacts (and benefits) of the alternative management scenarios to select the most appropriate.
7. Develop and present the recommended Wastewater Management Plan, and prepare the Draft CWMP and Draft Environmental Impact Report (DCWMP/DEIR).
8. Submit the DCWMP/DEIR for regulatory and public reviews.

D. Phase IV - Resolution of Remaining Issues and Project Completion.

1. Resolve remaining issues. (This will involve conducting a limited number of follow-up studies to respond to questions and comments raised during the DCWMP/DEIR review process.)
2. Prepare the Final Comprehensive Wastewater Management Plan and Final Environmental Impact Report (FCWMP/FEIR), and submit it for public and regulatory review.
3. Complete the CCC DRI review process.

E. Phase V – Environmental and Public Review Process. (These tasks occur during Phases I, II, III, and IV).

1. Utilize the Falmouth Nutrient Management Working Group for project reviews and public outreach.
2. Prepare and conduct a public participation program.
3. Submit and coordinate public review of the ENF.
4. Submit and coordinate public review of the DCWMP/DEIR (and NPC).

5. Submit and coordinate public review of the FCWMP/FEIR.
6. Coordinate the needed public meetings and hearings to comply with state and regional regulations as well as meet the informational needs of the community.

1.4 PUBLIC REVIEW AND PUBLIC PARTICIPATION PROGRAM

The Town has conducted an active public participation and outreach program involving the following components and features:

- Formation of a Nutrient Management Working Group comprised of interested citizens, volunteer board members, and Town staff.
- Formation of a Technical Advisory Group (TAG) as a sub-set of the Nutrient Management Working Group for more detailed project reviews.
- Development of a Town web site dedicated to all of the Towns wastewater projects.
- Updates to the Wastewater Department web page.
- Production and dissemination of project newsletters.
- Televised presentations to the Board of Selectmen and other groups.
- Collaboration with FACES, a Falmouth advisory group dedicated to improving the water quality in the coastal waters, to conduct a series of community meetings called “Sewer Socials”.
- Active coordination with the local newspaper to distribute the newsletters and to review public opinion on intermediate stages of the plan.

These components are described and documented in greater detail in Chapter 3.

1.5 ENVIRONMENTAL REVIEW PROCESS

The environmental review process was initiated in December 2007 with the filing of an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA) office of the Executive Office of Energy and Environmental Affairs (EOEEA) as well as with the Cape Cod Commission. The ENF summarized the findings of the Needs Assessment Report and identified the evaluation process for the selected alternatives.

A public hearing was convened to receive comments on the ENF and a bus tour was organized to visit the planning area as well as the alternative treatment and recharge sites identified for evaluation. Several comments were received as attached in Appendix 1-3 with the Certificate from the Secretary of the EOEEA which provides a scope for this DCWMP/DEIR. This DCWMP/DEIR has endeavored to address these comments as completely as possible and a comment-response memorandum is attached in Appendix 1-3. It is recognized that this planning project has a broad scope on a large groundwater and surface water remediation problem, and that some issues will need to be resolved as agreement is found on the larger issues.

As stated in Section 1.1 of this chapter, this document also includes a Notice of Project Change (NPC) because additional detailed evaluations have been completed (and reported in this document) that were not originally scoped in the CWMP Environmental Notification Form (ENF) and ENF approval certificate. The NPC is a completed form attached as the last chapter of this document and is submitted to meet the Commonwealth's environmental review requirements.

The Environmental review process will continue with the MEPA and CCC review of this DCWMP/DEIR and NPC document. A Secretaries certificate will be received at the end of this review and the comments will be addressed in the Final Comprehensive Wastewater Management Plan and Final Environmental Impact Report (FCWMP/FEIR). After a successful review of the FCWMP/FEIR, the CCC will complete their Development of Regional Impact (DRI) review.

1.6 PLANNING PERIOD

The Wastewater Facilities Plan will provide a recommended plan for wastewater facilities in the planning areas for the 20-year planning period of 2015 to 2035. This is an approximate period that would start following newly constructed wastewater treatment facilities resulting from the plan. The plan will also be developed with a planning horizon based on the estimated potential buildout of the planning area and the need to meet the nitrogen TMDLs with the coordination with the other Towns and MMR in the Planning Area and surrounding Falmouth. This larger planning horizon extends from 2035 to 2055.

1.7 ORGANIZATION OF THIS DCWMP/DEIR

The Draft Comprehensive Wastewater Management Plan and Draft Environmental Impact Report (DCWMP/DEIR) is written to summarize Phase 3 of the Project Scope. The report text and tables are contained in Volume 1 of this document. Volume 2 contains the report figures and appendices to make reference to these items as easy as possible.

This Report is divided into nine chapters:

- Chapter 1 presents general introductory information about the CWMP Project.
- Chapter 2 summarizes the main findings of previous documents prepared for the CWMP.
- Chapter 3 identifies the public participation program implemented as part of the CWMP to gain public understanding and support of Project efforts to find the best solution for the Town's wastewater and nitrogen problems.
- Chapter 4 summarizes the wastewater treatment and watershed nitrogen-balance evaluations with the cost estimates for the alternative management plans.
- Chapter 5 presents considerations and recommendations for non-wastewater nitrogen management.
- Chapter 6 presents a summary of the environmental impact and benefit analysis.
- Chapter 7 presents the recommended plan, and identifies the implementation schedule, financial considerations and additional evaluations.
- Chapter 8 presents the "Draft Section 61 Findings for all State Agencies" which is a required format for all environmental impact reports.
- Chapter 9 provides the NPC prepared for the additional detailed evaluations that were completed (and reported in this document) that were not originally scoped in the ENF and ENF approval certificate.