

Draft Comprehensive Wastewater  
Management Plan / Draft  
Environmental Impact Report and  
Notice of Project Change

Town of Chatham, Massachusetts

*Executive Summary*

August, 2007

## **EXECUTIVE SUMMARY**

# **DRAFT COMPREHENSIVE WASTEWATER MANAGEMENT PLAN / DRAFT ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PROJECT CHANGE TOWN OF CHATHAM, MASSACHUSETTS**

### **1.1 BACKGROUND**

The Town of Chatham (Town) is completing this Comprehensive Wastewater Management Planning (CWMP) Project to provide a comprehensive strategy for wastewater management in Chatham, Massachusetts for a 20-year planning period; and with a perspective on the ultimate build-out conditions for the Town. The 20-year period is 2010 to 2030, which is the estimated time period for the recommended Phase 1 facilities to be constructed to meet the immediate wastewater and nitrogen management needs of the Town. Extension of sewers to the remaining portions of Town will take an additional 10 years, estimated for completion in approximately 2040.

This Draft Comprehensive Wastewater Management Plan and Draft Environmental Impact Report (DCWMP/DEIR) documents the many evaluations and reports that were completed for this project. It also documents the recommended plan for Chatham's wastewater management system and the environmental impact analysis completed to demonstrate that there will be minimal impacts and a significant environmental benefit to proceeding with this plan.

This DCWMP/DEIR is also submitted with a Notice of Project Change (NPC) due to the long time that has elapsed (three years) since the last certificate on the environmental review of this project. The NPC is a regulatory form that is attached as the last chapter of this document to meet the Commonwealth's environmental review regulations.

A Final Comprehensive Wastewater Management Plan and Environmental Impact Report (FCWMP/FEIR) will be prepared to address issues and comments that are submitted after public review of this draft document.

## **1.2 SUMMARY OF WASTEWATER PROBLEMS AND NEEDS IN CHATHAM**

The full identification and understanding of the wastewater problems and needs in Chatham has taken many years, and has been a very comprehensive evaluation and public education process.

The “Needs Assessment Report” (Stearns & Wheler, August 1999) was the first summary of wastewater needs and provided a detailed summary of water consumption, wastewater flows, evaluations of the existing wastewater treatment facility (WWTF), nitrogen loadings, and regulatory constraints and requirements. Regulatory comments provided after review of this document indicated that additional evaluations of fresh-water and marine-water quality were needed to completely define the wastewater problems and needs in Chatham and these additional evaluations are provided in this DCWMP/DEIR.

The “Action Plan for the Town of Chatham Ponds” (Stearns & Wheler, November 2003) summarized water quality problems (due to wastewater and other sources of nutrients) of the freshwater ponds, and set an action plan to mitigate nutrient-related problems. The Town is currently (2007) implementing recommendations of this report to remediate water quality problems in Stillwater Pond and Lovers Lake.

Detailed evaluations have been completed by the Massachusetts Estuaries Project (MEP) to identify nutrient loading problems to Chatham’s marine waters. This project was created by the Massachusetts Department of Environmental Protection (MassDEP) and the University of Massachusetts School of Marine Science and Technology (UMass SMAST) to accurately define the nitrogen limits of coastal estuaries in Southeast Massachusetts; and Chatham’s estuaries were the first in Massachusetts to have limits defined. The MEP, UMass SMAST, and MassDEP have produced the following reports and technical memorandum to define wastewater and nitrogen loading problems to the Town’s coastal estuaries.

- The December 2003 Technical Report (MEP, 2003) quantified the nitrogen loadings to the Town's major estuaries (excluding Pleasant Bay/Chatham Harbor) and identified the amount of wastewater nitrogen that needs to be removed from the watersheds of the estuaries to meet the nitrogen limits.
- The November 2004 Total Maximum Daily Load (TMDL) Report (MassDEP, 2004) summarized the nitrogen limits developed in the December 2003 Technical Report and formatted this information to be acceptable to the USEPA to become TMDLs. TMDL is a regulatory term for the pollutant limit of a waterbody.
- The May 2006 Technical Report (MEP, 2006) re-quantified the nitrogen loadings and nitrogen limits to the Town's estuaries in the Pleasant Bay system. This was needed to correct errors made in the December 2003 Technical Report and to develop nitrogen limits for all of Pleasant Bay. This document refined the amounts of wastewater nitrogen that needs to be removed from the Pleasant Bay watershed to meet the nitrogen limits.
- The July 2006 Pleasant Bay TMDL Report (MassDEP, 2006) summarized the nitrogen limits developed in the May 2006 Technical Report and formatted this information to be acceptable to become TMDLs.
- The November 2006 Technical Memorandum on the Cockle Cove Creek Salt Marsh nitrogen threshold (MEP, 2006) developed the nitrogen limit for this salt marsh component of the Sulphur Springs Estuary. The December 2003 Technical Report identified that this area was not overloaded with nitrogen, but did not provide a nitrogen limit. The Technical Memorandum evaluated this area as a salt marsh system (as opposed to an embayment system as done in the December 2003 Technical Report), and found that it is very resilient to nitrogen loadings. In fact, its nitrogen limitation is not based on a loading; it is based on a maximum nitrogen concentration in the upper reaches of the creek. This was an important finding, because the Town's Wastewater Treatment Facility is located in this watershed and the groundwater recharge from the facility will surface in this watershed. The Technical Memorandum found that a total nitrogen concentration of approximately 3 milligrams per liter (mg/L) at the upper portion of the creek (and as a groundwater recharge from the treatment facility) would be protective of the water quality in the creek.
- The February 2007 Technical Report (MEP, 2007) reevaluated the nitrogen loadings to Chatham's southeast estuaries (Stage Harbor system, Sulphur Springs/Bucks

Creek, and Taylor's Pond/Mill Creek) to correct for the errors that occurred in the December 2003 Technical Report, and to incorporate additional water quality data and more recent findings into the nitrogen limit development. This report produced slight modifications to the quantities of nitrogen that need to be removed from the watersheds.

These MEP, SMAST, and MassDEP reports represent a large body of work completed by these groups and the Town of Chatham to accurately identify the nitrogen limitations of the estuaries and needed wastewater management to meet the limits. The nitrogen limitations that they identified were based on detailed measurements of the major sources of nutrient enrichment and the impacts that the nutrient enrichment is causing, including:

- Loss of eel grass in many of the estuarine systems.
- Poor water clarity.
- Low dissolved oxygen in the lower waters.
- Low diversity of the animals living in (and on) the floor of the estuaries.

These findings led to their summary that portions of these estuaries were moderately to significantly impaired and are expected to get worse if no changes are made.

It is noted that the estuaries' nitrogen limits identify a large wastewater nitrogen management problem that tends to overshadow other wastewater needs in the Town. The full wastewater needs resulting from this project are briefly listed below:

- Stage Harbor, Oyster Pond, Oyster Pond River, Frost Fish Creek, Mill Creek, and Muddy Creek lower require 100% wastewater nitrogen removal to remediate impacted estuarine water-quality and habitat conditions.
- Muddy Creek Upper, Sulphur Springs, and Ryders Cove require 60-80% wastewater nitrogen removal to remediate impacted estuarine water-quality and habitat conditions.
- Mill Pond, Little Mill Pond, Mitchell River, and Taylors Pond require 40-50% wastewater nitrogen removal to remediate impacted estuarine water-quality and habitat conditions.

- Two Industrial Parks in Chatham (Commerce Park and Enterprise Drive) require sewerage to protect the groundwater at these areas.
- Eliphamets Lane requires a permanent wastewater solution to address failing septic systems in that area.

This summary of wastewater needs and the areas of Town where the needs apply are illustrated on Figure ES-1.

### **1.3 SUMMARY OF ALTERNATIVE EVALUATIONS TO REMEDIATE THE WASTEWATER PROBLEMS**

Detailed evaluations were completed to investigate the feasible methods to address the wastewater and nitrogen problems, including use of individual nitrogen management septic systems, small treatment facilities to treat and recharge wastewater from neighborhood areas, and upgrade and expansion of the Chatham WWTF to collect and treat wastewater from large areas of Chatham. The evaluations were completed on a watershed by watershed basis to identify the most appropriate wastewater and nitrogen treatment concepts for each watershed to meet the specific nitrogen removal limits for the watershed. The primary findings of these evaluations are summarized below.

- The long-term performance of individual nitrogen management septic system indicates an approximate 50 percent nitrogen removal in these systems compared to a standard septic system. This performance is not sufficient to meet the majority of the nitrogen limits for the Town, as illustrated on Figure ES-1. These systems rely on the individual property owners for operation and monitoring of their systems; and this method of operation and maintenance has much variability. Also, the performance of these systems has been proven to decline for houses with seasonal usage such as Chatham.
- The expected performance of many small treatment and recharge facilities is approximately 75 percent nitrogen removal. This performance is greater than the individualized nitrogen removal septic systems because these systems benefit from professional operations, greater (and consistent) wastewater flows, and more complete performance safeguards. These types of systems could meet the limits for many portions of the estuarine watersheds in Chatham, but not all. However, the



Town lacks available properties that could be used for these types of facilities. Also, the centralized location of the existing treatment facility and its close proximity to areas that could be served by potential small facilities indicates that these areas are best served by the existing facility or a new facility located at that site.

- The expected nitrogen removal performance of an upgraded and expanded Chatham WWTF will be approximately 95 percent, and would remove nitrogen to a level of 3 mg/L in the treated water. This level of treatment can be attained in larger facilities where there is the economy of scale and consistent wastewater flows to facilitate this performance. It is a performance that is called Enhanced Nitrogen Removal (ENR) and it makes use of the best wastewater nitrogen treatment technology available.

Findings of these evaluations were presented at five televised Board of Selectmen meetings for the four major watershed areas in Town, and an overview of the complete Town. Each of these presentations followed presentations to the Town's Wastewater Planning Technical Advisory Group and then to the Town's Wastewater Planning Citizen Advisory Committee (televised meetings) to assist in the public education process.

The general consensus of the meetings (and the votes of the Citizens Advisory Committee and Board of Selectmen) were to proceed with plans to expand the existing wastewater collection system and upgrade the treatment facility.

As the watershed evaluations were proceeding, the Town's Technical Advisory Group was evaluating mechanisms on how a collection system expansion and treatment facility upgrade would be financed in Town. Several presentations were completed by the Town Manager and Town Finance Director to the Board of Selectmen to outline the financial options, and to develop a capital plan that would allow a sewer expansion and treatment facility upgrade to proceed without jeopardizing other capital projects in Town and with a fair (and affordable) distribution of costs to the Towns people.

At the same time, a prominent property-owner group in Chatham (the Summer Residents Advisory Committee), which is comprised of residents that own summer homes in Chatham, but maintain year-round residency outside of Chatham (and therefore cannot vote at Chatham Town Meetings), expressed the view that they would like to see the entire Town served by a modern wastewater collection and treatment system in a period of 8 to 10 years to deal conclusively with

these wastewater and nitrogen problems. Subsequent evaluations by Stearns & Wheler and the Town's Wastewater Planning Technical Advisory Group indicated that the implementation of sewers at this pace would cause major disruptions in Town to traffic, business, etc. during the 8- to 10-year period and could damage the summer-time vacation economy. It would also place a strain on the planning of other capital projects in the Town. After review with the Citizens' Advisory Committee and Board of Selectmen, general consensus indicated that a 20-year implementation was the most practical and feasible for the treatment plant upgrade and sewer expansion to those portions of Town with the critical wastewater nitrogen management needs (i.e., to the areas affected by the nitrogen TMDLs). This 20-year period would be called the Phase 1 implementation and would be followed by a 10-year Phase 2 implementation to further expand the treatment facility and extend the sewers to the remaining portions of Town.

Additional evaluations were completed to be sure that the full volume of treated water could be recharged at the existing treatment plant site or at additional sites around Town. Many potential recharge sites were identified and evaluated. The most favorable (and available) sites were explored with subsurface investigations, groundwater modeling, and hydraulic load testing (large-scale percolation tests). These evaluations led to the following findings:

- The soils at the existing treatment plant are highly permeable and well suited for the infiltration of treated water.
- A design loading rate of 30 gallons per day per square foot (gpd/sf) is appropriate for infiltration bed sizing based on hydraulic load testing and groundwater modeling. This rate is six times greater than the rate that is typically allowed by MassDEP. The higher rate will significantly reduce land area requirements, system construction and system operation costs.
- The majority of the treated water recharged at the treatment plant site will mix with the groundwater and recharge to Cackle Cove Creek. Small percentages of the treated water will also flow to other watersheds. Nitrogen loading evaluations found that the small nitrogen content (3 mg/l on average) in the treated water will not impact these water bodies.
- No adverse impacts will occur due to the increased treated water recharge at the site.

Additional evaluations were completed to determine the best ways to extend the collection system and to upgrade the WWTF. Public meetings with the Board of Selectmen and with the

Citizens' Advisory Committee reviewed the advantages and disadvantages of the various collection system technologies. Most people wanted a gravity collection system that would not rely on a grinder pump system located on individual properties. However, many properties are located at low elevations relative to proposed sewer main depths and will require a pump to convey their wastewater to the system. Otherwise, the majority of the Town will be served by gravity sewers. A preliminary gravity sewer layout was evaluated to make the most efficient use of the topography (to reduce expensive excavations) in Chatham and to identify feasible locations for pumping stations that can be implemented as part of a large sewer master plan.

Evaluation of the potential wastewater flows from the area of Town that cannot meet the TMDLs (Phase 1 flows) represents approximately two-thirds of the total flow from the entire Town (Phase 1 and Phase 2 flows). Detailed cost and non-monetary (implementation, operational, and performance) evaluations indicated that the WWTF should be constructed in a modular approach so that it could be constructed in phases to allow for increased flow over time.

The findings from these evaluations resulted in the Recommended Plan for Wastewater Management in Chatham as summarized in the following section.

Even though there was general consensus for the plan of expanding and upgrading the existing collection and treatment system to meet the wastewater and nitrogen management needs; there were members of the Wastewater Planning Citizens Advisory Committee that wanted a detailed evaluation of the feasibility and costs to pursue additional Wastewater and Nitrogen Management plans. As a result, the following alternative management plans were evaluated in detail:

- No Action Alternative.
- Combination of Sewers and I/A Technology in select watersheds.
- Sewer extensions to meet TMDLs.
- Town-wide sewer.

The detailed evaluations of these alternative management plans are presented in the text of this document. The primary finding of the evaluations is that expansion of the existing collection and treatment system is the most practical and cost-effective long term solution

## 1.4 SUMMARY OF RECOMMENDED PLAN FOR CHATHAM

As mentioned earlier, the recommended plan is a comprehensive strategy for wastewater and nitrogen management in Chatham for a 20-year period; and with a perspective on the ultimate build-out condition for the Town. The 20-year period is 2010 to 2030, which is the estimated time period for implementation of the wastewater facilities to meet the immediate wastewater needs in Town. The recommended plan also includes the strategy to extend wastewater collection and treatment facilities to the rest of the Town within approximately 10 years of the completion of Phase 1 (from 2030 to 2040).

The recommended plan includes the major components as discussed below.

1. **Phased Upgrade and Expansion of the Wastewater Treatment Facility.** This component involves upgrade of the facility to Enhanced Nitrogen Removal (ENR) standards to provide a nitrogen concentration of 3 mg/L total nitrogen in the treated water (on average). This upgrade would include the following technologies and strategies:

- New WWTF headworks for wastewater pretreatment (screenings and grit removal).
- New Orbal® biological nitrogen removal process in an oxidation ditch, post-anoxic tank and settling tank process configuration.
- New tertiary filters.
- Conversion of the existing aeration tanks and the existing sludge management process to improved sludge management facilities to produce dewatered biosolids for disposal or reuse at a regional management facility.
- Expansion of the existing sand infiltration bed system for increased recharge of the treated water at the WWTF site.

This upgrade and expansion would utilize a modular approach to allow the expansion to proceed in two phases.

- Phase 1 to treat approximately 1.3 million gallons (mgd) on average (2.1 mgd for the July and August months) to meet TMDL requirements for the coastal estuaries and meet the wastewater needs in the other areas of concern.

- Phase 2 to expand treatment to a total of 1.9 mgd on average (3.1 for the July and August months) to treat wastewater from all portions of Town.

This phasing will be accomplished by adding another ring to the oxidation ditch process configuration.

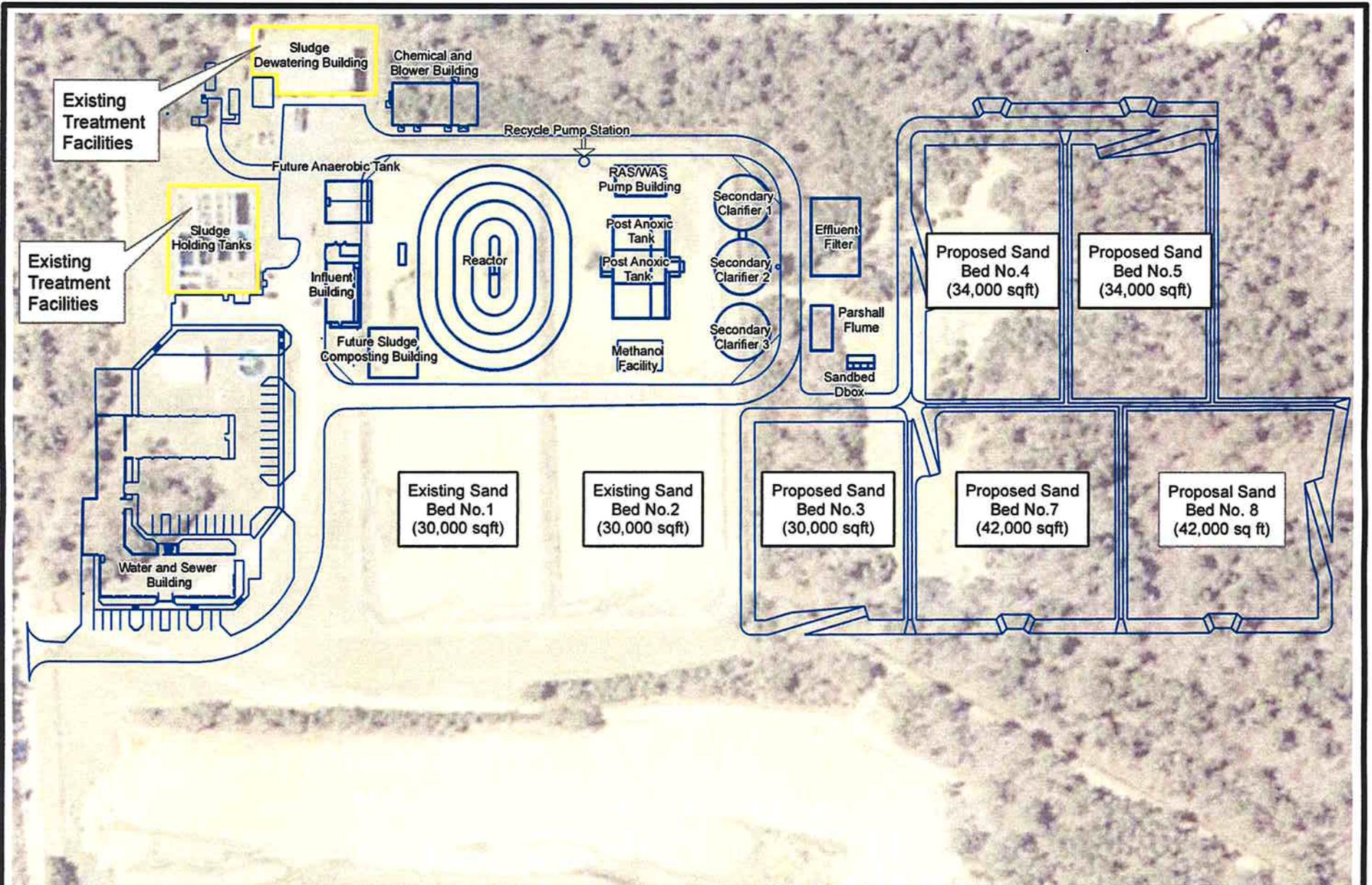
The WWTF upgrade will also include the construction of a new Sewer and Water Department Operation, Maintenance, and Administration Building. These components are illustrated on Figure ES-2.

2. **Multi-Phased Expansion of the Wastewater Collection System.** An expansion to the existing wastewater collection system is recommended in a means that:

- Builds efficiently upon the existing collection system.
- Utilizes gravity sewers as much as possible.
- Allows implementation in a prioritized but flexible manner to minimize construction impacts, and to implement a benefit to Chatham's estuaries as quickly as possible.
- Takes advantage of redevelopment opportunities promoted by developers that want connection to the sewer and are willing to contribute a portion of the shared infrastructure (pump station, gravity collection system, or force main) to allow the redevelopment to proceed.

The proposed collection system is illustrated on Figure ES-3.

3. **Continued Work to Investigate Nitrogen Attenuation in the Muddy Creek Watershed.** This component is the restoration of an old (permitted) dyke in the Muddy Creek drainage basin and watershed to change the habitat of the upper portion of the creek from a brackish water body to a freshwater body. The upper portion of the creek is currently severely impacted due to nitrogen enrichment problems. Restoration of the dyke will convert the upper creek to a freshwater system that would naturally remove a large portion of the nitrogen and help remediate nitrogen enrichment in the lower portion of the creek and in Pleasant Bay as a whole. Several discussions and meetings with the regulatory agencies that would need to approve and permit the dyke restoration have been positive. The meetings have indicated that additional wetland delineation is needed.



 <p><b>Stearns &amp; Wheeler, LLC</b> Environmental Engineers and Scientists</p> <p>HYANNIS, MASSACHUSETTS</p> <p>PHONE: 1-813-251-2800 WWW: www.stearns-wheeler.com</p>	<p>TOWN OF CHATHAM, MA</p>
	<p><b>COMPREHENSIVE WASTEWATER MANAGEMENT PLANNING</b></p>
	<p>Recommended Plan for WWTF Figure ES-2</p>



This dyke restoration would include the construction of a fish ladder to aid in the restoration of the herring run in the creek.

4. **Continued Stormwater Management.** A total of 18 direct stormwater discharges from the road system in Chatham to various ponds and estuaries was documented in the Needs Assessment Report. The primary impact from the direct discharges is not nitrogen; it is road contaminants and sediment that is carried off the road by the stormwater and deposited in these surface waters. Fecal material deposited on the roads by wild and domestic animals will mix with the stormwater and raise the fecal coliform content in the water bodies which in turn will cause closure of shell fishing areas.

Since the Needs Assessment Report, the Town has entered into a stormwater discharge permit agreement with USEPA (Plan II Stormwater Permit) to regulate and improve these types of discharge (this is a country-wide program). Also, since the Needs Assessment Report, the Town has completely remediated 6 of the 18 discharges and is completing design on 2 more.

The Town will continue with the efforts to remediate the 12 remaining discharges in compliance with the USEPA permit and with overall Town goals.

5. **Coastal Education on Proper Fertilizer Application and Management.** The other main nitrogen source to the groundwater system and then to the estuaries is fertilizer use on lawns, gardens, and agricultural areas. Two educational efforts have been launched by the Towns of Dennis and Falmouth to educate the public on the need not to over fertilize, and not to use fertilizers improperly. These programs have been identified as models for a county-wide or for a focused Town of Chatham program. The Town will continue to work with interested Town advocacy groups (water quality, gardening, etc.) and the County Water Protection Collaboration to develop and distribute useful educational materials to prevent improper use of fertilizers.

## 1.5 ESTIMATED COSTS AND FINANCING PLANS

This recommend plan is a large capital investment in the Town’s infrastructure and will be carefully implemented to reduce costs and impacts, as well as to produce the needed nitrogen mitigation in the Town’s estuaries. The first plan will be implemented in the 20-year planning period of this plan (2010 to 2030), and the second plan will occur from 2030 to 2040. The estimated costs for Phase 1 implementation to occur in the 20-year planning period are summarized below:

<b>Phase 1 Cost Summary</b>	
<b>Component</b>	<b>Capital Costs <sup>(1)</sup></b>
WWTF upgrade and expansion	
Construction Costs	\$30,000,000
Contingencies	\$6,000,000
Fiscal, Legal, and Engineering	<u>\$5,600,000</u>
<b>Total</b>	<b>\$42,000,000</b>
Collection System Expansion	
Construction Costs	\$110,000,000
Contingencies	\$28,000,000
Fiscal, Legal, and Engineering	<u>\$28,000,000</u>
<b>Total</b>	<b>\$170,000,000</b>

<sup>(1)</sup> All costs are rounded to two significant digits and are referenced to a date of June 2007.

The Town’s Technical Advisory Group, Town Manager, and Town Financial Director have been actively evaluating mechanisms on how a collection system expansion and treatment facility upgrade would be financed and implemented in Town. Several scenarios were presented to the Board of Selectmen to outline the financial options, and to develop a capital plan that would allow a sewer expansion and treatment facility upgrade to proceed without jeopardizing other capital projects in Town and with a fair distribution of costs to the Town’s people.

The Town will seek funding from both the USDA Rural Development Program and the State Revolving Fund (SRF) to fund part of the WWTF construction project and sewer projects.

The Town has developed several approaches for funding and debt repayment. The current financial plan is aimed at funding the Capital Facilities Plan without adversely increasing the tax rate. This plan includes an infrastructure phase-in schedule of 20 year bond issues (30 years for sewer expansion).

The Wastewater Treatment facility alone is a \$42 million project that will be funded partly through debt drop-off. The remaining funds will come from the tax rate and other sources as identified below.

- Sewer user rates will cover 100% of the WWTF O&M and ultimately 25% of the WWTF debt;
- A proposed real estate transfer tax would cover 25% of the debt; otherwise this portion of the project costs will be borne by the taxpayer;
- Debt drop-off and some combination of betterments and the tax rate would cover the remaining 50% of the debt.

The Town's current sewer user rate is not anticipated to increase.

The Town currently does not have a Debt Service Reserve, but plans on setting up a Short-Lived Asset Reserve, as part of a 5-year capital plan once construction starts. A detailed schedule would be developed following final design when the upgrade and expansion is identified in detail.

## **1.6 CWMP PROJECT COMPLETION AND IMPLEMENTATION TIMING**

As discussed earlier, the Phase 1 facilities will be implemented during a 20-year time period to meet the nitrogen TMDL limits (approximately 2010 to 2030); and the Phase 2 facilities will be implemented in the next 10-year period (approximately 2030 to 2040). The planned milestone dates are listed below:

- October 15, 2007: Submittal of this DCWMP/DEIR to the State and CCC public review process (joint MEPA/DRI review).
- November (to be decided), 2007: Public presentation and formal review process hearing.
- December 15, 2007: Completion of the DCWMP/DEIR review process and development of formal review comments.
- March 2008: Submittal of the Final CWMP and FEIR to the State and CCC public review process.

- April 2008: Public presentation and formal review process hearing.
- May 2008: Expected State approval of plan.
- June 2008: Expected County approval of plan.
- June 2008 through October 2009: Phase I WWTF upgrade and expansion design.
- August 2008: State loan (SRF) initial application submittal.
- October 2009: State loan (SRF) full application submittal (after design).
- May 2009: MassDEP review of Phase I WWTF upgrade design, and bidding to be complete.
- June 2009 through October 2011: Construction and Phase I WWTF upgrade.
- April 2010: Design of Phase 1 collection system starts.
- July 2011: Construction of Phase I collection system starts.

Detailed prioritization and implementation scheduling of the collection system extension is provided in this document.

This schedule indicates the long time period that will be needed to address the nitrogen limits in Chatham.

## **1.7 LONG-TERM EMBAYMENT MONITORING**

The overriding need to extend sewers is to remediate the current nitrogen loading to coastal estuaries as identified by the nitrogen TMDLs. MassDEP will require embayment monitoring of water quality, eel grass coverage, and benthic habitat to verify that the sewer extension and nitrogen remediation efforts are effective.

Working with MassDEP, CCC, and SMAST, the Pleasant Bay Alliance (an inter-municipal organization of Chatham, Harwich, Brewster and Orleans implementing the Pleasant Bay ACEC Resource Management Plan) has taken the lead in defining the scope and content of a long-term embayment monitoring program to meet nitrogen TMDLs. They have recognized the following key items about such a program:

- The ultimate goal is to restore the marine habitat to the levels that are the basis of the TMDLs.

- The attainment of the threshold nitrogen concentrations at the estuary sentinel stations are an indicator of the condition at which habitat can repair itself.
- The implementation of Phase 1 (to remediate watershed nitrogen loadings as the method to meet the TMDLs) will require a period of 20 years. The positive response of the water quality and benthic habitat will require several more years, given the lag in groundwater travel time from the watersheds to the estuaries, and the release and flushing of the stored benthic nitrogen loads.
- Some portions of the habitat such as regrowth of eel grass may not be possible due to other factors such as past deposition of organic solids, on-going boat traffic, etc.
- Once the water quality returns to a level near the threshold concentration, active eel grass restoration efforts may be needed.
- The embayment monitoring will be a long-term effort and will need to be a team effort between the communities within the embayment watersheds and MassDEP.

Working with MassDEP, CCC, and SMAST, the Pleasant Bay Alliance is currently working on a pilot project to develop an embayment monitoring program for that water body, with the expectation that its primary monitoring criteria, parameters, and overall structure can be used by the communities at other embayment watersheds. The Town of Chatham, represented by Dr. Robert Duncanson, is an active member in this group and will continue to work for the development and implementation of the embayment monitoring program for Pleasant Bay; as well as its application to the Stage Harbor, Sulfur Springs/Bucks Creek, and Taylor Pond/Mill Creek systems.

## **1.8 GROUNDWATER MONITORING**

The current groundwater monitoring program for the treated water recharge at the Chatham WWTF is based on agreements between the Town and MassDEP as guided by the Administrative Consent Order on the WWTF. The current program includes the following components:

- Water level is monitored at approximately 50 monitoring wells.
- Water quality is monitored from eight of the wells. Two of the wells are directly downgradient of the treated water recharge to measure any elevated nitrogen or conductivity level, and the remaining six wells are outside of the groundwater

affected by the recharge. The water quality monitoring typically includes field parameters of specific conductance, temperature, and pH; nitrate and nitrite nitrogen; total Kjeldahl nitrogen; and dissolved sodium. In FY 2007, several samples were analyzed for total organic carbon.

This monitoring program is expected to be incorporated into a new groundwater discharge permit after approval of the CWMP. The permit and monitoring program will receive public review at that time.

## **1.9 SUMMARY**

This DCWMP/DEIR is the result of many years of work by the Town's Wastewater Planning Technical Advisory Group (TAG) and Citizen's Advisory Group (CAC) as well as the Town Manager and Board of Selectmen. It has been greatly assisted by the efforts of the Massachusetts Estuaries Project (comprised of MassDEP, SMAST, and the Cape Cod Commission) to develop the nitrogen limits (TMDLs) for the Town's estuaries and to identify the amount of wastewater nitrogen that must be removed to meet the limits.

This plan is developed to remediate the current nitrogen loading problems of the Town estuaries and will take 20 years to implement.

It represents a strong commitment by the Town to maintain a healthy environment in Chatham for regulatory compliance and for the Town's people to enjoy for generations to come.