Chapter 8

Flow and Loading Reduction and Non-Wastewater Nitrogen Mitigation Alternatives

CHAPTER 8

FLOW AND LOADING REDUCTION AND NON-WASTEWATER NITROGEN MITIGATION ALTERNATIVES

8.1 INTRODUCTION

The identification of flow and loading reduction alternatives for centralized water and sewer services is important to minimize the expense of new (or upgraded) facility construction. These alternatives can also conserve water use and minimize impact to natural resources. Reduction of wastewater flows and loadings to on-site septic systems can also reduce the impact of pollutant discharges to groundwater and surface waters downgradient of recharge areas. The objective of this Chapter is to review methods that could be utilized to reduce the wastewater volume and pollutant loadings generated by residential and non-residential sources.

This Chapter also discusses additional options available to reduce nitrogen inputs to the groundwater beyond those associated with improved wastewater treatment. Several additional sources of nitrogen (beyond wastewater nitrogen) were evaluated and used in the MEP model (utilized to calculate nitrogen loading to Chatham's multiple watersheds) as identified in the MEP reports. These sources include road and roof runoff; recharge from natural areas; atmospheric deposition; and lawn fertilizers. This Chapter will discuss the non-wastewater nitrogen management and mitigation methodologies which could be implemented to reduce nitrogen from these sources. These methodologies include management/regulation of fertilizer use; stormwater management and treatment; flushing improvements to embayments; and modification of zoning laws in impacted areas.

8.2 INFILTRATION AND INFLOW (I/I) REDUCTION

The 1999 NAR concluded that the estimated I/I flow to the Chatham WWTF is not excessive based on DEP criteria but it does provide an opportunity to reduce hydraulic loading to the WWTF by removing the I/I flow. The 1992 Sewer System Evaluation Survey recommended periodic monitoring of early morning flow rates at the WWTF to identify occurrences of high infiltration rates. In addition, the Town should inspect the sewers regularly and repair the largest leaks (points of infiltration). Also, the Town should make an effort to notify sewer users that basement sump pumps and roof leaders should not be connected to the sewer. The Town has proceeded with these recommendations and the system continues to exhibit low I/I flows.

8.3 REDUCTION OF HOUSEHOLD WATER CONSUMPTION

A. **Water Conservation Measures.** The Town developed a Water Conservation Plan in November 1990 as part of the Water Management Act. This Water Conservation Plan was discussed and included as part of the 1999 NAR.

The Town Water and Sewer Department has several public education efforts to promote water conservation. Printed newsletters (Chatham Water News) and brochures are sent to all water customers in the spring and fall with water conservation information. Users are notified that water conservation kits are available through the Town, and the Barnstable County Water Utilities Association. The Water and Sewer Department continues to work with the school system to establish curriculum on water conservation, has distributed water conservation pamphlets in the school, and has had a water conservation poster contest.

As part of the 1999 NAR, these water conservation practices were evaluated as requested in the Certificate of the Secretary of Environmental Affairs. Based on a classification system established in the Plymouth Water Conservation Study and the current water conservation practices of the Town, Chatham's Water Conservation Plan is considered moderately aggressive. The Town's current plan includes a public education program and notifies users where to obtain water conservation kits. As part of the public education, the Town includes information to hotels and motels on water conservation; provides conservation information/tips in its semi-annual newsletter; provides free low flow shower heads, hose nozzles, rain gauges for irrigation systems, and low flow toilets. The free shower heads, nozzles and rain gauges are available from

the Town via mail or pickup. Low flow toilets are available from the Town, can be delivered by the Town, and then need to be installed by a qualified contractor.

B. **Plumbing Codes and Water Reduction Devices.** Water use and wastewater flows from households may be reduced through the utilization of household water saving devices. Some of the devices available (and even provided by the Town for free as described above) are water saver toilets, reduced flush toilets, vacuum flush toilet systems, wash water recycling systems for toilet flushing, faucet aerators, flow limiting valves, and pressure reducing valves.

Approximately 70 percent of the total volume of wastewater generated within the average home is derived from the toilet, laundry, and bath. The most substantial water saving and wastewater reductions can be made in these areas. Water-saving toilets, reduced-flush devices, and restricted-flow showerheads are common water saving devices. By use of these devices, a 15 to 20 percent reduction in water may be achieved.

Water saving devices are more expensive than standard fixtures and would probably not be installed by the homeowners without external incentive. However, the use of such devices by individual customers has been encouraged and/or required in new construction or as replacements for improperly functioning devices. State building codes now require the installation of low flow devices during new construction.

8.4 PRICING POLICY FOR WATER AND WASTEWATER SERVICE

As discussed previously in the 1999 NAR, the Town uses an increasing block rate structure for water service fees; and it charges a higher rate for higher water usage. This tends to encourage conservation and encourage cost savings by using lower volumes of water. The Town also uses a seasonal pricing structure to charge a higher rate during the summer when the demand is highest. Summer rates are approximately 40 to 60 percent higher than winter rates depending on the size of the water service.

Similar to water use, the Town also uses an increasing block rate and seasonal pricing structure for sewer usage. Table 8-1 summarizes this rate structure for 2007.

8.5 WASTEWATER REUSE AND RECYCLING

As discussed in detail in Chapter 7, the golf course or Town lands could potentially be watered with reclaimed water to conserve the use of clean water and minimize wastewater flows into the sewer. Currently, reclaimed water use is regulated by MassDEP and the reuse of treated water is allowed for urban reuse (golf course irrigation and landscaping), aquifer recharge (areas within Zone IIs), and toilet flushing.

Golf courses and Town owned properties can be irrigated with reclaimed water if the water is treated properly and proper precautions are taken to avoid human contact with the irrigation water, as regulated by the Reclaimed Water Use Interim Guidelines. This scenario can conserve the clean water which would have been used for this same use. It is noted that this scenario would not minimize the construction of other treated water recharge facilities, because these facilities are still needed when the golf courses and public lands are being actively used by the public or during rainy periods when irrigation is not needed.

8.6 REDUCTION OF WASTEWATER LOADINGS

The opportunities for reducing wastewater pollutant loadings are limited to the non-sanitary components of wastewater. The loadings associated with food wastes are added into wastewater when garbage grinders are installed in kitchen sinks. The wastewater loading associated with food can be significant and that loading could be reduced by disposing of food waste as a solid waste or using a household composting unit. The use of garbage grinders, for homes that have septic systems, contributes additional nitrogen to the groundwater and increases the solids loading to the septic tank, requiring more frequent pumping.

Commercial and industrial businesses may also have opportunities to reduce wastewater loadings to the Chatham WWTF (or their own septic systems) by reprocessing non-sanitary waste byproducts from their operations. Individual businesses need to consider if there are any wastes which could be recycled, reused, or disposed as a solid waste instead of adding it to the wastewater flow.

8.7 WATERLESS TOILETS

Waterless toilets (composting and incinerating toilets) are discussed in Chapter 6. These toilets provide flow and loading reductions because they do not utilize water and they convert sanitary waste to solid waste or to a usable soil conditioner. As discussed in Chapter 6, waterless toilets are not considered a feasible solution on a town wide basis as they are not well suited to handle high seasonal flows and loadings; and poor public acceptance of handling composted or incinerated human waste is expected. A public health threat could occur if the systems were implemented on a large scale without proper operation, management and waste disposal. These systems may be suitable for isolated areas and informed individuals who are willing to take on the significant responsibility of the systems.

8.8 MANAGED/REGULATED USE OF NITROGEN FERTILIZERS

The nitrogen loading analyses for Chatham's coastal embayments were based on several factors as stated in the MEP report. Average fertilizer loadings of 1.05 lbs. of nitrogen per 1,000 ft^2 per year, and an average leaching rate of 20 percent over an average lawn area of 5,000 ft^2 were used (MEP-Chatham, 2003, 2006). Although nitrogen from fertilizer only makes up a small percentage of the overall nitrogen loadings to the embayments, any effort to actively reduce nitrogen inputs will assist in preserving and restoring these waterbodies.

Public participation programs have been initiated in other Cape Cod Towns, most notably Falmouth where the Preserve Falmouth's Bays and Ponds and Falmouth Friendly Lawn (FFL) programs have been initiated. The Preserve Falmouth's Bays and Ponds is a public outreach program designed to educate people on the uses of fertilizers and was developed as part of the Nitrogen Offset Program for Bournes, Green and Great Ponds. The FFL program, approved in July 2003, has created a means of rewarding those organizations and individuals who volunteer to limit their use of fertilizer nitrogen, and signifying specific products considered Falmouth Friendly. Although the program is voluntary, it is focusing attention on managing this nitrogen source. The Town of Chatham and or Barnstable County should consider implementing a similar program.

In Dennis, the Comprehensive Wastewater Management Task Force's Public Outreach Subcommittee, working with the Cape Cod Collaborative Extension, developed a *Clean-Green Lawn Program*, which is patterned after Falmouth's Friendly Lawn program. The purpose of this program is to make the public aware of the potential damage that improper use of lawn fertilizers can do to our estuaries and groundwater. It also provides the public with guidance on soil preparation; proper fertilizer application and lawn maintenance, watering, and weeding. It is designed to help the public have healthier lawns, avoid over fertilization, and reduce nitrogen leaching into our groundwater.

The possible reduction of nitrogen leaching into the ground from fertilized areas is difficult to predict due to the popular desire of growing green lawns with minimal effort. Education on proper fertilizer types, application techniques, and frequency of use can help reduce overfertilization, which is the most common cause of fertilizer leaching into the groundwater system. Over fertilization is a problem that is not limited to just the AOCs discussed in this report, but to all parts of Chatham.

8.9 OTHER NITROGEN REDUCTION OPTIONS

A. **Landscape Design Practices.** Although the majority of the population does not realize it, landscaping practices have a significant impact on water quality. Education to inform homeowners of ways to minimize negative impacts can reduce the effect that landscaping has on water quality. Certain landscape design practices can reduce fertilizer needs, reduce impervious area, and help with runoff control. One program initiated to promote the use of landscape practices that maintain and/or improve water quality is the 2006 Greenscapes program (http://www.nsrwa.org/greenscapes/default.asp). This program is an effort by several non-profit groups and southeastern Massachusetts towns. The program provides workshops and guidebooks to educate consumers on environmentally-conscious landscape designs. Landscape practices recommended in the guidebook include pesticide and fertilizer alternatives, composting, and low maintenance plants. Programs such as this are voluntary and therefore will rely on thorough public education. However, the Town's cost could be as low as a few cents per resident reached. Therefore, public education is important to obtain support for these practices from homeowners and land care providers.

B. **Animal Waste Management.** In addition to being a source of bacterial contamination, nutrients from animal waste can result in eutrophication of lakes and ponds or algal blooms. Several options should be considered to encourage pet owners to control animal waste.

- Ordinances and associated fines can be implemented requiring removal of pet waste from public areas (roads, beaches, parks, etc.) and private property. Reminders of the ordinance in public parks along with supplies for waste removal may improve compliance.
- Dog parks can be created where pets are allowed off the leash. Parks can include reminder signs and waste removal supplies. Dog parks should be designed to minimize stormwater runoff. Additionally, dogs tend to defecate in areas with longer grass. If certain areas are maintained with slightly longer grass, natural disintegration of feces will be promoted.
- Public education programs can be used to educate pet owners on the link between animal waste and water quality, thereby making it more likely that owners will clean up after their animals.

Chatham has had an active "Mutt Mitt" program for over 10 years as part of stormwater management efforts. Upwards of 20,000 Mutt Mitts are dispensed yearly from several locations. Each location includes signage indicating the water quality and public health benefits of pet waste management. Educational flyers about the Mutt Mitt Program have been produced in cooperation with the Pleasant Bay Alliance.

C. **Open Space Acquisition.** Open space can be acquired to serve as an aquatic buffer near waterbodies or wetlands. These buffers serve to reduce the amount of runoff reaching surface waters. Buffers can be natural or engineered. Natural buffers minimize runoff and increase infiltration. Engineered buffers use constructed wetlands or similar designs to provide treatment of stormwater runoff. A distance of 100 feet is typically required for adequate protection of surface water. Acquiring the land needed for buffer areas could help on this issue but could be expensive. Implementation of zoning bylaws restricting activities within buffer zones is an alternative method of obtaining similar benefits at less cost to the Town. An additional consideration when developing buffer zones is the increased property values resulting from aesthetic improvements.

In 2004 the Town Meeting passed amendments to the Wetlands Protection Bylaw imposing a 50 foot "No Disturb" zone abutting wetland areas. This addition will provide for buffer zones with minimal disturbance.

D. **Public Education.** According to the National Environmental Education and Training Foundation, Americans' comprehension of pollution sources and environmental issues is significantly less than believed. The Northeast was the third least-educated region (of four regions) regarding environmental issues. Public education can increase awareness of everyday activities that contribute nitrogen to the watershed. Public education campaigns can target several homeowner activities to reduce nitrogen loads, such as encouraging reuse of grass clippings as fertilizer and promoting use of native, drought-resistant vegetation for landscaping.

The Massachusetts Bays Estuaries Association has initiated the "Think Again. Think Blue." campaign. This campaign provides many homeowner tips to improve water quality. Additionally, they provide posters designed to raise awareness of the effects of lawn fertilizer and pet wastes on local waters. More information on this campaign is available at http://www.thinkagainthinkblue.org/index.html.

On a more local basis, the Cape Keepers program has been developed to educate Cape Cod homeowners about the impacts of septic systems on water quality and to encourage owners to take responsibility for the health of local ponds and estuaries. Posters, educational flyers, education kits, and public service announcements have been developed to aid in informing the local population of the nitrogen loading problems and the part that each individual plays in both the problem and the solution. For more information on the Cape Keepers, visit www.capekeepers.org.

Some important guidelines to keep in mind when developing a public education program are:

- Develop a strong connection between the yard, the storm, and the water resource to emphasize the undesirable effects that can result.
- Consider regional media campaigns to maximize effectiveness and minimize costs.
- Use television wisely – community cable access channels are typically less effective than commercial or public television channels.
- Keep the message simple, direct, and humorous.

- Information packets are most effective if they are attention-grabbing (colorful), small, and durable. Handy references can be posted around the home or workbench – be sure to include contact information for additional detail.
- Consider any unique demographics of a watershed – other languages, church groups, etc.

E. **Recommendation.** These items should be promoted to reduce nitrogen loading to the groundwater and to the estuaries. They may represent a small step toward the goal of restoring the estuaries, but they are all Best Management Practices and should be promoted by the Town, its volunteer boards, and its departmental structure. The Town has several not-for-profit organizations that may be able to incorporate these types of public education reiterations into their programs.

8.10 STORMWATER MANAGEMENT AND TREATMENT

The nitrogen loading associated with road and roof runoff and infiltration used in the nitrogen assessment was also developed as part of the Cape Cod Commission (CCC) Technical Bulletin (TB 91-001) and updated as part of the MEP. Concentrations of nitrogen in precipitation and runoff were examined and average concentrations of 1.5 ppm NO_3-N off paved surfaces and 0.75 ppm NO_3-N off roofs were used in the calculations. The calculations also assume that 90 percent of the storm water is recharged to the aquifer from impervious surfaces. Precipitation on Cape Cod was identified as 44.44 in/yr; and 90 percent of that value equals 40 in/yr of recharge from roads and roofs.

The biggest concern associated with stormwater runoff to waterbodies is the impact of coliform bacteria on shellfish beds, resulting in shellfish closures. The most common treatment method to remove coliform bacteria is to infiltrate the stormwater flow into the soil. At a minimum, this should be performed during the initial flush of stormwater.

Stormwater treatment for nitrogen typically involves using constructed wetland systems to biologically denitrify the oxidized nitrogen in the stormwater. This type of treatment is similar to the constructed wetland treatment technologies described in Chapters 5 and 6, and requires a large land area. In addition, the nitrogen removal performance for constructed wetlands for

treatment of stormwater is highly variable and dependent on several factors including climate, season, vegetation types, and surrounding land use.

As discussed in the 1999 NAR, 18 separate stormwater discharge locations and their impacts have been identified in Chatham. The Town has completed several stormwater projects, and they filed for the USEPA General permit for stormwater discharges. This identified all of the surface discharges in the Town and presented a plan on how the discharges would be remediated in the future. Since that filing, the six discharges have been completely remediated and two additional systems are finishing design.

The Town should continue to seek funding under the Coastal Pollution Remediation (CPR) Program administered by Massachusetts Coastal Zone Management (CZM) for future stormwater mitigation projects.

The best management practices for stormwater include directing stormwater flow to a vegetated area such as a swale, basin or wetland where fine solids will be removed and where plants can take up a portion of the nutrients. The exact nitrogen removal that can be attained with these approaches is difficult to quantify with precision. All the same, there are proven approaches and the Town should continue to implement them.

The amount of nitrogen loading from stormwater is a direct result of the amount of impervious area (roofs, driveways, roads, parking lots, etc.) the recharge area. Reduction of impervious areas will reduce the resulting pollutant loads. Town bylaws can be used to encourage Low Impact Development (LID), to regulate amounts of impervious areas, and to reduce the amount of runoff that flows to paved roads.

As stated above, the most common method of controlling stormwater runoff is infiltration in various types of leaching facilities. Stormwater treatment for nitrogen typically involves using constructed wetland systems to biologically denitrify the oxidized nitrogen in the stormwater. This type of treatment often requires a large land area to construct depending on the volume of stormwater to treat. Several of the technologies used to accomplish this are summarized below.

A. **Dry Extended Detention Basins.** Detention basins are designed to contain stormwater for a minimum of 24 hours in order to allow solids to settle out of the water. Fairly large land areas are needed and nitrogen removal is relatively low (20%-30%), unless the nitrogen is tied up with sediments.

B. **Wet Retention Ponds.** Retention ponds are designed to have a permanent pool of water for a significant portion of the year (the wet season at a minimum). Solids settle out of the water in a forebay; nutrients, including nitrogen, are removed by means of algae and other biological activity in the larger basin. During precipitation events, stormwater is discharged from the permanent pool (minimal decrease in runoff volume is provided). For areas with permeable soils (such as sand), an impermeable layer will need to be included in the design in order to maintain a permanent pool of water. Average total nitrogen removal is around 30%.

C. **Stormwater Wetlands.** Stormwater wetlands are similar to the retention ponds discussed previously. The difference is that wetland plants are included in the design of the pond/wet areas. These plants are tolerant of saturated soil conditions and provide for natural pollutant removal. There are four basic types of stormwater wetlands, varying in the number and size of pools. Nitrogen removal efficiencies vary from 20% to 60% depending on the type of stormwater wetland used.

D. **Water Quality Swales.** Swales are broad, shallow channels with dense vegetation along the sides and bottom. Swales are designed at slopes sufficient to slow down stormwater runoff, allowing sedimentation, filtration, and infiltration. Swales are especially well suited to treat runoff from roadways because of the linear nature of the design. Various estimates of nitrogen removal efficiencies have been reported, ranging from 40% to nearly 100%.

E. **Infiltration Trenches.** Infiltration trenches are shallow excavations filled with stone, providing a storage area for stormwater runoff. The runoff is filtered as it flows through the stone and then into the underlying soils. Infiltration trenches require pretreatment by means of other best management practices in order to function properly. Nitrogen removal efficiencies in excess of 60% have been reported by USEPA.

F. **Infiltration Basins.** Infiltration basins are shallow reservoirs that are designed for stormwater infiltration. The bottoms of the basins need to be completely flat. Soils cannot drain

either too fast or too slow – they should be in the range of 0.5 to 3 inches per hour. The bottoms and sides of infiltration basins are vegetated. These are maintenance-intensive facilities and pretreatment is critical. Properly designed and maintained basins can achieve more than 60% total nitrogen removal.

G. **Bioretention (Rain Gardens).** Rain gardens are landscaping features that provide stormwater treatment. Runoff flows over a sand bed into a shallow depression. The sand bed slows the velocity and evenly distributes flow. Following the sand bed is a ponding area, where woody and herbaceous plants provide evapotranspiration or biological uptake of pollutants. Excess runoff is infiltrated into the soils or flows to an underdrain in areas with less pervious soils. Rain gardens are well-suited for parking lots or residential areas. USEPA reports total nitrogen reduction efficiencies in rain gardens to be approximately 50%.

H. **On-Lot Treatment.** Several practices are considered on-lot treatment, ranging from rain barrels to diverting runoff to pervious areas. Many of the on-lot treatment systems are similar to methods discussed previously; however, they are on a smaller scale and are the responsibility of individual homeowners. The goal of on-lot treatment is to minimize the amount of stormwater runoff that reaches paved roads and enters the drainage system. One of the easiest methods to implement is the rain barrel. A rain barrel collects rooftop runoff and stores it for landscaping use or other use by the homeowner. Rain barrels reduce the gross impervious area of a watershed. In addition, when the stored runoff is used for landscaping, additional nitrogen uptake is provided by the plants being watered.

8.11 IMPROVED TIDAL FLUSHING

Another method of reducing nitrogen impacts to embayments is to increase the flushing that the embayment experiences. This increased flushing means a larger volume of water is entering and exiting the embayment, providing dilution of the groundwater that recharges into the embayment.

Additional linked model evaluations were recently completed by SMAST for the Stage Harbor system and the Bucks Creek/Sulfur Springs/Cockle Cove Creek salt marsh system. These evaluations utilized the modeling of an additional inlet to the system to investigate if an additional inlet could improve water quality to a level that would justify the construction,

permitting, and long-term maintenance of the inlets. The following items are noted from these evaluations:

1. **Stage Harbor System.**

- An additional channel was modeled to be just north of Morris Island where a historic inlet had once existed.
- The volume of the tidal prism (the volume flushed in and out of the estuary during a tidal cycle) did not change for this scenario compared to the single inlet model.
- Slight improvements to the water quality in the upper Stage Harbor/Mitchell River/Mill Pond subembayments were observed, approximately 10% to 13% better than the modeled water quality with the single inlet.

2. **Bucks Creek/Sulphur Springs/Cockle Cove Creek System.**

- An additional channel was modeled to connect Cockle Cove Creek salt marsh directly to Nantucket Sound in an area where the Creek has a historic connection.
- Cockle Cove Creek total nitrogen concentration decreased by 36%.
- Sulphur Springs/Bucks Creek indicated only modest improvement (approximately 3%) in water quality.

The potential improvement to Cockle Cove Creek water quality is significant and should be considered in the future if nitrogen reductions cannot be achieved using traditional watershed management strategies. The potential improvement to the Stage Harbor system is not as significant but could warrant further study if nitrogen reductions in Stage Harbor cannot be achieved with traditional watershed management methods.

8.12 MEP ALTERNATIVES FOR FROST FISH CREEK AND MUDDY CREEK

Frost Fish Creek and Muddy Creek, as discussed in this report and the MEP report, are impacted by poor flushing and high nitrogen loads. Both Creeks are restricted by culverts which run under Route 28. As part of the MEP report, various alternatives were presented for Muddy Creek and Frost Fish Creek to improve water quality.

A. **Muddy Creek.** The MEP report presented four alternatives to addressing the nutrient loadings to the Creek (MEP. 2003).

1. **Alternative 1 – Convert Muddy Creek into a Freshwater System.** This would involve the installation of gates near Pleasant Bay to convert the system over to freshwater, allowing one directional flow. The major drawback to this alternative is the loss of existing salt marsh and shellfish resources closest to Pleasant Bay.

2. **Alternative 2 – Convert Muddy Creek into a Partial Freshwater System.** This would involve the installation of a dike to maintain freshwater upstream and preserve the salt marsh and shellfish resources closest to Pleasant Bay.

3. **Alternative 3 – Increase the Muddy Creek culvert size to 8 feet wide.**

4. **Alternative 4 – Increase the Muddy Creek culvert size to 16 feet wide.**

Alternatives 3 and 4 were modeled and results of the MEP work indicated that no significant water quality improvements would be achieved under these alternatives.

Modeling these alternatives under the various scenarios of existing, build out and no anthropogenic nitrogen load, showed that conversion of the upper reaches of Muddy Creek to a freshwater system would improve the overall water quality of the system. The Towns of Chatham and Harwich are proceeding with this alternative to determine its regulatory feasibility.

B. **Frost Fish Creek.** The MEP report presented two alternatives to addressing the nutrient loadings to the Creek (MEP. 2003).

- Alternative 1 – Increase the Frost Fish Creek culvert size to 5 feet wide with increased height.
- Alternative 2 – Increase the Frost Fish Creek culvert size to 7 feet wide with increased height.

Both of these options reduce the residence time in the Creek and the tidal range, and neither would result in negative impacts from increased saltwater intrusion.

8.13 MODIFIED ZONING

Following sewer installations and depending on the community, growth may be a concern. This growth may be attributed to the removal of the current growth limitations that on-site systems may have provided. Currently, site restrictions associated with Title 5 septic systems often limit the number of bedrooms allowed for a property. Because the Town of Chatham is interested in preserving its existing community essence, the Town has adopted a growth-neutral policy as part of its Rules and Regulations of the Sewer Department. A copy of these regulations is included in Appendix N.

In addition, zoning modification can also be used to limit growth in other areas to prevent future nitrogen discharges into sensitive embayments. These zoning modifications could include increasing the allowable minimum lot sizes, and establishing restrictions on building sizes and uses. The Town is actively reviewing its current zoning bylaws.

The Town is also actively pursuing interim means of controlling growth and limiting nitrogen. The first step in this process has been establishing a "*Nitrogen Loading Regulation*" to address the immediate wastewater needs and public health concerns regarding on-site septic systems in Town, while the CWMP process is still underway. Revisions to this regulation have been ongoing since the late 1980's, with the most current revision being dated May 11, 2006. A copy of this regulation is included in Appendix O.

The adoption of a District of Critical Planning Concern (DCPC), under the CCC Act is another management option. Towns have the ability to create a DCPC for nitrogen sensitive embayments. The DCPC designation allows a town to adopt new regulations to preserve natural features or promote specific development in a particular area. According to the CCC Act, "the Commission may propose the designation of certain areas which are of critical value to Barnstable County as districts of critical planning concern that must be preserved and maintained due to one or more of the following factors:

1. The presence of significant natural, coastal, scientific, cultural, architectural, archaeological, historic, economic or recreational resources or values of regional, state-wide or national significance; or

2. The presence of substantial areas of sensitive ecological conditions which render the area unsuitable for development; or

3. The presence or proposed establishment of a major capital public facility or area of public investment.

Once a DCPC is proposed, it requires the County Assembly of Delegates to hold a public meeting on the proposal and then either approve or return the proposal to the CCC for further study and redrafting. DCPC nominations can be made by the CCC, County Commissioners, Assembly of Delegates, or various Town officials.

The Town should consider these zoning and planning tools to prevent increased growth.

8.14 SUMMARY

The Town of Chatham has policies in place that encourage the conservation of water. Opportunities to reduce wastewater loadings are mainly the reduction of food wastes or other non-sanitary wastes. Infiltration and inflow (I/I) were previously determined not to be excessive by DEP standards and minimization of I/I now and in the future will help reduce hydraulic loading on the Chatham WWTF or any new municipal facility. Periodic sewer inspections are recommended (and on-going by Sewer Department staff) to detect sources of I/I that can be repaired economically. It is recommended that the Town continue with its practices of public education, and enforcement of the building codes to encourage water conservation. In addition, the Town periodically will make adjustments to their current block rate structure, which may encourage increased water conservation.

Tables

TABLE 8-1

TOWN OF CHATHAM
2007 SEWER RATE SCHEDULE

SERVICE CHARGE	WINTER	SUMMER
Billed Quarterly in arrears and includes 1,000 c.f. usage.		
5/8" Meter	$33.75	$67.50
¾" Meter	$33.75	$67.50
1" Meter	$33.75	$67.50
1 ½" Meter	$33.75	$67.50
2" Meter	$33.75	$67.50
4" Meter	$33.75	$67.50
METERED RATES	**WINTER**	**SUMMER**
Usage above the minimum per 100 (hundred) cubic feet		
1st Step: (1,001-3,000 c.f.)	$4.15	$6.70
2nd Step: (3,001-5,000 c.f.)	$4.5	$7.15
3rd Step: (over 5,000 c.f.)	$4.75	$7.35