

***ENHANCING WASTEWATER MANAGEMENT
ON CAPE COD:
PLANNING, ADMINISTRATIVE
AND LEGAL TOOLS***

***Report
To
Barnstable County***

July 2004



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REPORT

TO

BARNSTABLE COUNTY

JULY 2004

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TABLE OF CONTENTS

<u>CHAPTER</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
ES	EXECUTIVE SUMMARY	ES-1
1	INTRODUCTION	1-1
2	DEFINITIONS	2-1
3	EXISTING WASTEWATER FACILITIES AND PROGRAMS	3-1
4	WASTEWATER MANAGEMENT FUNCTIONS AND RESPONSIBILITIES	4-1
5	MANAGEMENT ISSUES AND SOLUTIONS	5-1
	A. Interim Wastewater Management Tools.....	5-1
	B. Municipal Involvement in Private Facilities.....	5-7
	C. Coordination among Town Boards.....	5-11
	D. Multi-town Implementation.....	5-13
	E. Build-out Projections and Reserve Capacity	5-16
	F. Mandatory Sewer Connections and Checkerboard Sewer Systems	5-19
	G. Betterment Assessments for Public Sewerage Projects.....	5-21
	H. Use of Open Space for Wastewater Facilities.....	5-24
	I. Affordable Housing Built under MGL Chapter 40B	5-30
	J. County Oversight of Enhanced Treatment Systems	5-34
	K. Options for District Formation.....	5-37
	L. Management of Wastewater Treatment Residuals	5-43
6	CASE STUDY--ORLEANS.....	6-1
7	CASE STUDY--MASHPEE.....	7-1
8	CASE STUDY--FALMOUTH.....	8-1
9	CASE STUDY--BARNSTABLE.....	9-1
10	CONCLUSIONS AND RECOMMENDATIONS	10-1
 <u>APPENDICES</u>		
A	SUMMARY OF ABBREVIATIONS AND ACRONYMS	
B	EXISTING SATELLITE SYSTEMS ON CAPE COD	
C	FALMOUTH'S NEW SILVER BEACH BYLAW	
D	BCDHE BROCHURE ON MANAGEMENT PROGRAM FOR INNOVATIVE/ALTERNATIVE SEPTIC SYSTEMS	

TABLE OF CONTENTS (CONT.)

LIST OF TABLES

<u>TABLE</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
3-1	ESTIMATED NUMBER OF WASTEWATER TREATMENT SYSTEMS ON CAPE COD	3-1
4-1	FUNCTIONS THAT MUST BE ACCOMPLISHED FOR EFFECTIVE WASTEWATER MANAGEMENT	4-1
4-2	RESPONSIBLE PARTIES FOR KEY FUNCTIONS (CURRENT CONDITIONS).....	4-2
5-1	RESPONSIBLE PARTIES: TYPICAL CURRENT APPROACH (NO DISTRICTS)	5-39
5-2	RESPONSIBLE PARTIES: WATERSHED-BASED DISTRICT SPANNING 3 TOWNS (NO CENTRALIZED FACILITIES).....	5-40
5-3	RESPONSIBLE PARTIES: WATERSHED-BASED DISTRICT SPANNING 3 TOWNS (ONE CENTRALIZED FACILITY)	5-41
6-1	CURRENT ORLEANS WATER USE DATA (RESIDENTIAL)....	6-3
6-2	PROJECTED WATER USE IN ORLEANS: BUILD-OUT SCENARIO B	6-7
6-3	PROJECTED WATER USE IN ORLEANS: SUMMARY OF BUILD-OUT SCENARIOS.....	6-9

TABLE OF CONTENTS (CONT.)

LIST OF FIGURES

<u>FIGURE</u>	<u>DESCRIPTION</u>	<u>PAGE</u>
3-1	LOCATION OF CENTRALIZED AND SATELLITE SYSTEMS..	3-2
3-2	ESTIMATE OF WASTEWATER TREATMENT CAPACITY ON CAPE COD	3-3
5-1	TRADITIONAL TASKS IN DEVELOPING A COMPREHENSIVE WASTEWATER MANAGEMENT PLAN....	5-3
5-2	SAMPLE COVENANT AS DEVELOPED BY CHATHAM BOARD OF HEALTH	5-5
5-3	PROPOSED AMENDMENT TO MGL CHAPTER 83 § 3.....	5-20
5-4	SUGGESTED WORDING FOR CONSERVATION RESTRICTIONS	5-28
5-5	POSSIBLE AMENDMENT TO MGL CHAPTER 40B	5-32
6-1	SEASONAL DISTRIBUTION OF POPULATION IN ORLEANS.	6-5
6-2	STUDY AREA IN VICINITY OF FORD PROPERTY, ORLEANS	6-11
6-3	CONCEPTUAL LAYOUT OF WASTEWATER FACILITIES IN VICINITY OF FORD PROPERTY, ORLEANS	6-12
6-4	CONCEPTUAL LAYOUT OF WASTEWATER DISPOSAL FACILITIES ALONG LOTS HOLLOW ROAD, ORLEANS	6-16
7-1	LOCATION OF MASHPEE COMMONS AND SOUTHPORT DEVELOPMENTS IN MASHPEE	7-2

EXECUTIVE SUMMARY

INTRODUCTION

Cape Cod's rapid development over the past three decades has impacted the Sole Source Aquifer, the region's ponds and its coastal embayments. It is widely agreed that many areas of Cape Cod must begin a transition from traditional septic systems to more sophisticated wastewater infrastructure that provides a higher level of treatment. Cape Cod towns are struggling with the technical and administrative issues associated with that transition.

To begin to address these concerns, Barnstable County has established a regional Wastewater Implementation Committee (WIC) as a forum for sharing information, funding local planning studies, and participating in the development of a regional wastewater strategy. The WIC has set forth the general goals of protecting public health, protecting and restoring surface water quality, protecting private and public water supplies, preserving community character and supporting sustainable economic development. Within that context, the WIC has sponsored this project to address three more specific objectives:

1. Identify ways to enhance the current local, County and state programs in ways that make wastewater management more effective, less expensive and more timely;
2. Suggest near-term actions to address these goals without conflicting with the lengthy wastewater management planning process that is underway in many towns; and
3. Investigate wastewater management districts as means to comprehensively address key issues on a watershed basis.

EXISTING WASTEWATER FACILITIES AND RELATED PROGRAMS

Cape Cod has 5 "centralized" wastewater facilities (the municipal plants in Falmouth, Barnstable, Chatham and Provincetown and the federal facility at MMR), over 40 "satellite" plants (serving schools, nursing homes, commercial developments, condominium projects, etc.), a handful of "cluster" systems, and over 120,000 "individual on-site" systems. "Enhanced treatment", necessary to address nutrient issues, is provided for only a small fraction of the region's wastewater.

Towns use Title 5, the state sanitary code, to address the fundamental sanitary aspects of on-site wastewater disposal. Towns develop comprehensive wastewater management plans to assess needs; identify and evaluate options for collection, treatment and disposal; identify and acquire treatment and disposal sites; and formulate implementation plans. The Massachusetts Estuary Project (MEP) is undertaking comprehensive studies of 89 embayments that will determine their threshold nitrogen loads and serve as the basis for nutrient control programs. The DEP provides low interest loans for eligible public

wastewater facilities through its State Revolving Fund. DEP also licenses facilities with design flows over 10,000 gallons per day through its Groundwater Discharge Permit Program. The Cape Cod Commission assists towns in adapting the standards of the Regional Policy Plan into local comprehensive plans, and regulates wastewater issues at Developments of Regional Impact.

CHALLENGES TO EFFECTIVE WASTEWATER MANAGEMENT

1. Comprehensive wastewater management planning is a lengthy and expensive process. While it is underway, local boards are often uncertain about continuing their usual permitting practices for on-site systems. Often there is a desire to institute interim measures to begin to address perceived problems before planning is complete.
2. Individual enhanced treatment systems have been viewed as a panacea where nitrogen loading problems exist, and are routinely required by local boards, whose members may not be aware of their limitations. These systems generally do not provide the degree of nitrogen removal that is expected, or that collectively may be needed, to protect and restore sensitive embayments.
3. Suitable sites for wastewater facilities are rapidly being developed for residential, commercial and municipal uses. The lack of timely progress in comprehensive planning may be significantly limiting municipal options for siting wastewater facilities.
4. Many of Cape Cod's stressed embayments receive nitrogen loads from more than one town. Coordinated planning efforts among towns are needed to ensure the most cost-effective solutions and their timely implementation.
5. Many of the satellite treatment plants on Cape Cod are privately owned and managed. These facilities are typically developed outside the municipal wastewater planning process, and are potential assets as municipal infrastructure.
6. Affordable housing (Chapter 40B) projects are not subject to locally-imposed wastewater regulations that are more stringent than state requirements. Wastewater disposal from these projects may be contrary to the region's water quality needs.
7. Towns must be careful in predicting wastewater volumes and nitrogen loading at build-out conditions, particularly with respect to seasonal occupancy and how seasonality may change in the future. There is the risk of either "under-building" or "over-building" facilities if build-out projections are not carefully prepared.
8. Towns cannot deny the application of a property owner to connect to a town sewer if that property abuts the street in which the sewer is located. Without special legislation, towns are unable to implement "checkerboard" sewer systems designed to serve selected individual lots, especially those that cannot meet Title 5 requirements.
9. Towns typically recover a portion of the costs for wastewater infrastructure through betterment assessments. Betterments can be assessed only against those properties that are directly connected to the public facilities. Properties not connected to municipal infrastructure, even if they are sources of nitrogen loading in the watershed, cannot be charged betterments.

RECOMMENDED SOLUTIONS

Towns should:

1. Accelerate comprehensive planning for wastewater management.
2. Undertake planning tasks concurrent with MEP studies, to integrate wastewater issues into local comprehensive plans, plan for affordable housing and growth centers, implement interim water quality goals, and set up escrow accounts for the deferral of private infrastructure expenditures.
3. Ensure coordination among town boards in requiring enhanced treatment.
4. Adopt a bylaw or regulation related to cluster systems and satellite plants which will establish design and construction standards, mandate evaluation of cluster systems, incorporate nearby sewer needs in planning, establish a town role in oversight of operations, and allow transfer of ownership to the town where appropriate.
5. Identify prospective sites for wastewater facilities using a hierarchal approach, giving first priority to disturbed sites and joint use, and considering appropriate use of open space only if other possibilities are not feasible.
6. Participate in the WIC, support its evaluation of a County-wide wastewater entity, and consider regional solutions including wastewater management districts
7. Ensure proper handling of wastewater residuals and public education on this need.

Barnstable County should:

8. Continue to support the WIC as a regional forum.
9. Continue to participate in technical and policy aspects of the MEP studies.
10. Continue to provide regional input into DEP's new regulations and policies.
11. Continue to assist the towns in identifying nitrogen sensitive areas, and identifying where watershed-based management districts should be implemented.
12. Take the lead role with the legislative delegation in amending MGL Chapter 83, Section 3 to allow checkerboard sewer systems.
13. Expand the BCDHE program of oversight of enhanced treatment systems, and work with towns to implement a license program with annual fees.

DEP should:

14. Amend its guidance on small treatment plants related to design flows and consideration of local sewer needs.
15. Modify the groundwater discharge permit program to reduce fees and long-term costs for smaller projects, and mandate consideration of local wastewater issues.
16. Allow SRF eligibility for early planning and town acquisition of private facilities.
17. Clarify the policy on site assignment for private facilities.
18. Amend Title 5 to allow nitrogen sensitive areas as determined through local planning.
19. Support the appropriate use of innovative effluent disposal techniques.

Some of these recommendations are illustrated through case studies in Orleans, Mashpee, Falmouth and Barnstable. As this report was being reviewed and finalized, towns, the County and DEP have already taken action on some of these recommendations.

CHAPTER 1

INTRODUCTION

INTRODUCTION

Cape Cod's rapid development over the past three decades has stressed the Sole Source Aquifer, and the region's freshwater ponds and coastal embayments. It is widely agreed that the time has come for many areas of Cape Cod to begin a transition from traditional septic systems to a more sophisticated wastewater infrastructure that provides a higher level of treatment. Many Cape Cod communities are struggling with the technical, legal and financial management issues associated with that transition.

To begin to address these concerns, Barnstable County has established a regional Wastewater Implementation Committee (WIC) as a forum for sharing information and providing input toward the development of a regional wastewater strategy. The WIC is comprised of representatives from each of the Cape's 15 towns, as well as various agencies and environmental groups. In addition, several towns have begun to address these issues through formal wastewater planning studies that are in various stages of implementation. An important component of the regional effort championed by the WIC is the development of planning, legal and administrative guidance to the towns on wastewater issues, including the potential role of wastewater management districts.

Barnstable County, through the WIC, has funded this analysis of planning, administrative and legal tools to improve wastewater management on Cape Cod. This study has been conducted by a Working Group, led by Wright-Pierce and subconsultants Teal Ltd and CLF Ventures, and comprising town, Barnstable County and Cape Cod Commission staff that have advanced the project through several phases. First, an inventory was developed of existing wastewater infrastructure, and current regulatory programs were evaluated. In the second phase, the working group identified those aspects of current programs and policies that are hurdles to more effective management. Next, we identified specific enhancements to existing programs and proposed new programs to supplement them. In the fourth phase, those existing and potential tools were applied to four towns as case studies. Through the case studies, several important tools were fine-tuned and further developed to be available to other towns.

At the outset of this study, it was expected that its principal focus would be the procedures by which Cape Cod towns could establish wastewater management districts, either individually or jointly with neighboring towns sharing common watersheds. As the Working Group identified fundamental issues that districts should address, it became clear that there are many diverse challenges to wastewater management on Cape Cod, and that Cape Cod towns must have new and expanded tools to deal with these challenges, whether they choose to form districts or deal with issues within existing town structure. Thereafter, the development of solutions to these problems became the project's principal focus, with management districts viewed as one of many needed tools.

PROJECT GOALS AND OBJECTIVES

The WIC has set forth the general goals of protecting public health, protecting and restoring surface water quality, protecting private and public water supplies, preserving community character and supporting sustainable economic development. Within those goals, this project has addressed three more specific objectives:

1. Identify ways to add to or enhance the current programs and policies in ways that make wastewater management more effective, less expensive and more timely;
2. Formulate means to make short-term progress on important wastewater issues without conflicting with the lengthy comprehensive wastewater management planning that is underway in many towns; and
3. Investigate wastewater management districts as means to comprehensively address key issues on a watershed basis.

It should be clearly understood that this study is not a substitute for comprehensive wastewater management planning. Instead, it is intended to identify ways to enhance the programs currently in place.

Cape Cod towns are, or will be, formulating plans to build or expand wastewater collection, treatment and disposal facilities. Towns will also be considering non-structural options such as natural wetland systems, improved maintenance of on-site systems, and enhancement of dispersion in coastal waters through dredging. These plans will address failing on-site systems; protection of public water supplies; protection of fresh water ponds against phosphorus enrichment; protection of estuarine and saltwater resources against nitrogen enrichment; and promoting growth centers for commercial development and affordable housing. The tools recommended in this report will be helpful in all of these areas. The report has a particular focus on issues related to nitrogen loading because traditional wastewater management tools are often not fully applicable to this emerging need. Decentralized wastewater management issues are carefully considered in this project, but many of the recommended tools relate as well to centralized facilities.

PROJECT WORKING GROUP

A Project Working Group was formed to guide and actively participate in this study. The Working Group membership includes town, Barnstable County and Cape Cod Commission staff, in addition to the consulting team.

The active public-sector members of the Working Group are:

Cape Cod Commission
Barnstable County Dept. of
Health and Environment
Barnstable County Wastewater
Implementation Committee
Town of Orleans

Tom Cambareri, Ed Eichner, Margo Fenn
George Heufelder, Sue Rask
Gussie McKusick, Frank Sampson
George Meservey

Town of Falmouth
Town of Mashpee
Town of Barnstable
Dept. of Environmental Protection

Amy Lowell
Tom Fudala
Mark Giordano
Brian Dudley

The consultant team consists of:

Wright-Pierce
Teal Ltd
CLF Ventures

Mike Giggey, Heather Merriman
Susan Peterson
Alan Wilson

The study spanned the period of March 2003 to April 2004, and included eight Working Group meetings to identify areas of need, discuss management tools and compile this report. In addition, numerous separate meetings occurred with DEP officials, staff of the case study towns, and other interested parties. In large part, the recommendations of this report reflect a general consensus of the Working Group.

REPORT ORGANIZATION

Following this introduction, Chapter 2 provides the definition of important terms used throughout the report. A summary of existing Cape Cod wastewater infrastructure and current planning, funding and regulatory programs is presented in Chapter 3. Chapter 4 contains an overview of the basic management functions that must be addressed to properly manage wastewater, and a matrix that illustrates how those functions are currently addressed. In Chapter 5, we have identified those aspects of existing programs that should be enhanced or supplemented, in 12 broad areas of need. The tools identified in Chapter 5 have been applied to the specific needs in Orleans, Mashpee, Falmouth and Barnstable through four case studies that are summarized in Chapters 6, 7, 8 and 9, respectively. Chapter 10 presents the overall conclusions and recommendations of the study. Supporting materials are contained in a number of appendices to the report.

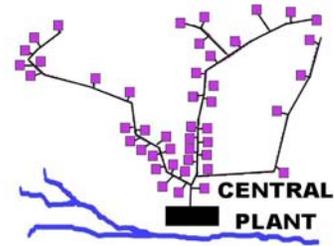
CHAPTER 2

DEFINITIONS OF TERMS

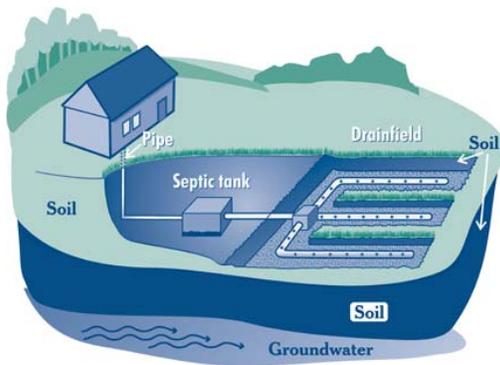
DEFINITIONS

There are a number of terms routinely used in the field of wastewater management, often with connotations that differ by geographic region of the country. For the purposes of this study, the following definitions are used:

Centralized Wastewater System: the provision of public sewerage through a wastewater collection system leading to a publicly-owned wastewater treatment plant with effluent disposal. These systems are typically managed by local sewer commissioners or departments of public works.

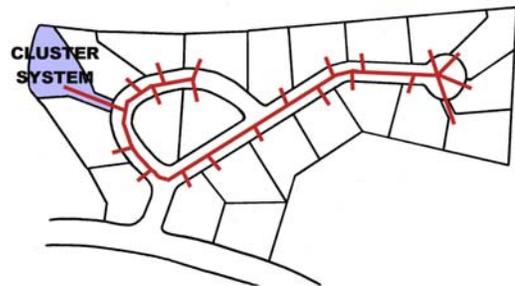


Decentralized Wastewater System: wastewater collection, treatment and disposal methods other than centralized facilities. These systems are further categorized as "individual on-site", "cluster" and "satellite". In general, these systems are permitted by local boards of health and managed by individual property owners or associations of owners.



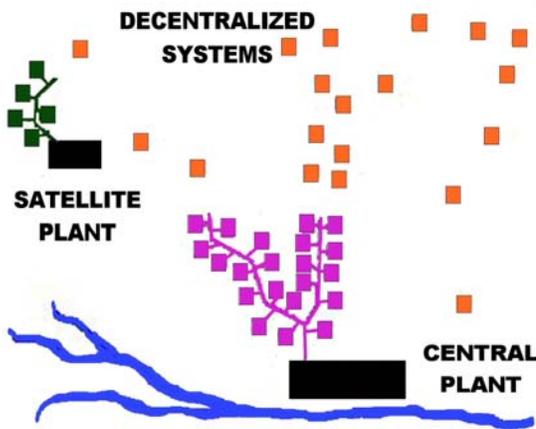
Individual On-site Systems: generally, septic tank and leaching field systems serving a single home or business, and located on the same parcel as the home or business. In Massachusetts, these are typically referred to as Title 5 systems, which imply treatment in a simple septic tank prior to discharge to a subsurface disposal system. Some individual on-site systems involve enhanced treatment, as defined below. These systems are permitted by local boards of health and managed by individual property owners.

Cluster Systems: systems for wastewater collection, treatment and disposal that involve multiple parcels and multiple wastewater generators, served by a single system. Cluster systems typically have capacities between 1,000 and 10,000 gallons per day (gpd). In Title 5 these are also called "shared systems". Cluster systems may be as simple as gravity pipes leading to a shared septic tank and shared disposal field, but may also include grinder pumps, low pressure sewer systems and modular plants providing enhanced treatment. A good example of a



cluster system is the one serving the Red Lily Pond area of Barnstable, which has individual septic tanks that pump to a shared leaching area. These systems are typically permitted by local boards of health and by DEP, and are managed by associations of property owners.

Satellite Systems: for the purposes of this study, those facilities for wastewater collection, treatment and disposal that require a DEP groundwater discharge permit and are intended to serve a closely defined area. (In general, DEP groundwater discharge



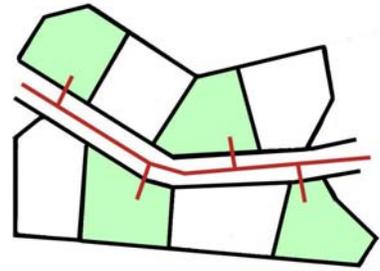
permits are required for facilities that have wastewater flows exceeding 10,000 gpd, which is roughly equivalent to 30 three-bedroom homes.) Many of the satellite systems on Cape Cod have been built by private developers to serve condominium projects, nursing homes, and shopping centers. While many are privately developed, satellite systems can be publicly owned, such as the system at Sandwich High School, or the planned New Silver Beach plant in Falmouth. (This plant is being developed to help alleviate failed

septic systems and is considered to be a "satellite" because it is separate from the Falmouth centralized system.) Private satellite plants are typically managed by the commercial property owner or condominium association; publicly-owned satellite plants are managed by the local public works department, school department or other town entity.

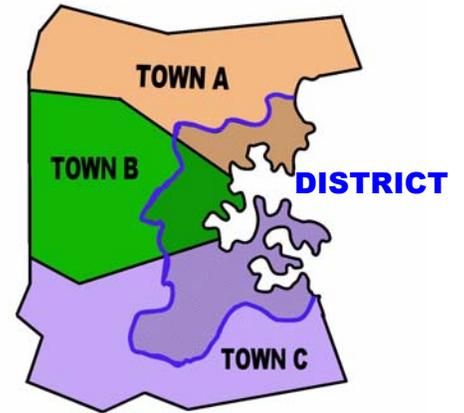
Enhanced Treatment: wastewater treatment technology intended to provide a higher quality effluent than produced by a septic tank and leaching field. There are several technologies approved by DEP for individual and cluster systems treating residential wastewater that remove nitrogen to less than 19 mg/l (compared with the 35 mg/l concentration commonly assumed for the discharge from a septic tank and leaching field system). These technologies are approved for 25 mg/l on non-residential wastes. There are several technologies approved by DEP for satellite and centralized plants where groundwater discharge permits typically require nitrogen concentrations below 10 mg/l. Some newer permits have nitrogen limits of 5 mg/l or below. All of the technologies employed to meet these more-stringent-than-Title-5 limits are termed "enhanced treatment" in this report. Enhanced treatment can also include phosphorus removal. Enhanced treatment systems are also referred to as "innovative/alternative technology" for individual and cluster systems.

Wastewater Infrastructure: wastewater collection, treatment and disposal facilities more extensive and/or providing a higher level of treatment than individual on-site systems. This term includes traditional centralized systems, satellite systems (both public and private) and individual enhanced systems.

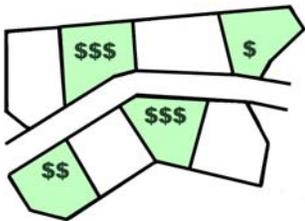
Checkerboard Sewer System: a wastewater collection system configured to serve only selected properties in a neighborhood. Such a system allows a town to restrict sewer service to only those lots in greatest need, and/or to preserve limited capacity for wastewater treatment or disposal.



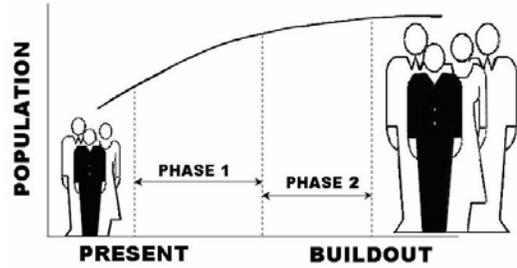
Wastewater Management Districts: in the simplest sense, a wastewater management district may be the specific geographic area within which a town imposes special requirements for wastewater management. In a more comprehensive sense, a wastewater management district may be the governmental entity, complete with staff and legal empowerments, that formulates and enforces the rules, as well as designs, builds and operates the needed infrastructure. Under current programs, DEP-required comprehensive wastewater planning should identify the specific wastewater management goals associated with each Cape Cod watershed, each of which can be viewed as a geographic wastewater management district. In the broader context, two towns could form a wastewater management district to effect the needed infrastructure and operational approach in a watershed that spans both towns, or in a multi-watershed area. The geographic extent of a wastewater management district and its administrative breadth depend largely on its purpose. For instance, a district could encompass only a limited commercial center or could include an entire watershed complete with wastewater planning goals for restoration of water quality in a marine embayment.



Betterment Assessments: an apportionment of the costs of a public sewerage project to individual property owners. The town must adopt a uniform apportionment approach, typically based on the square footage of the parcel that is served or the length of its roadway frontage. The payment of betterment assessments is secured by a lien on the property. Barnstable County's Community Septic Management Program uses betterment assessments for repayment of funds loaned to property owners for upgrading of individual systems.



Build-Out Conditions: the future condition in which all the vacant lots in a town have been developed, and redevelopment of existing properties has occurred, both to the maximum extent allowed under the zoning bylaw.



The terms defined above are used throughout this report. Chapter 3 discusses the planning, funding and regulatory programs that govern wastewater management and further define and provide context for these terms. Appendix A contains a summary of the abbreviations and acronyms used in this report.

CHAPTER 3

EXISTING WASTEWATER FACILITIES AND PROGRAMS

EXISTING WASTEWATER FACILITIES ON CAPE COD

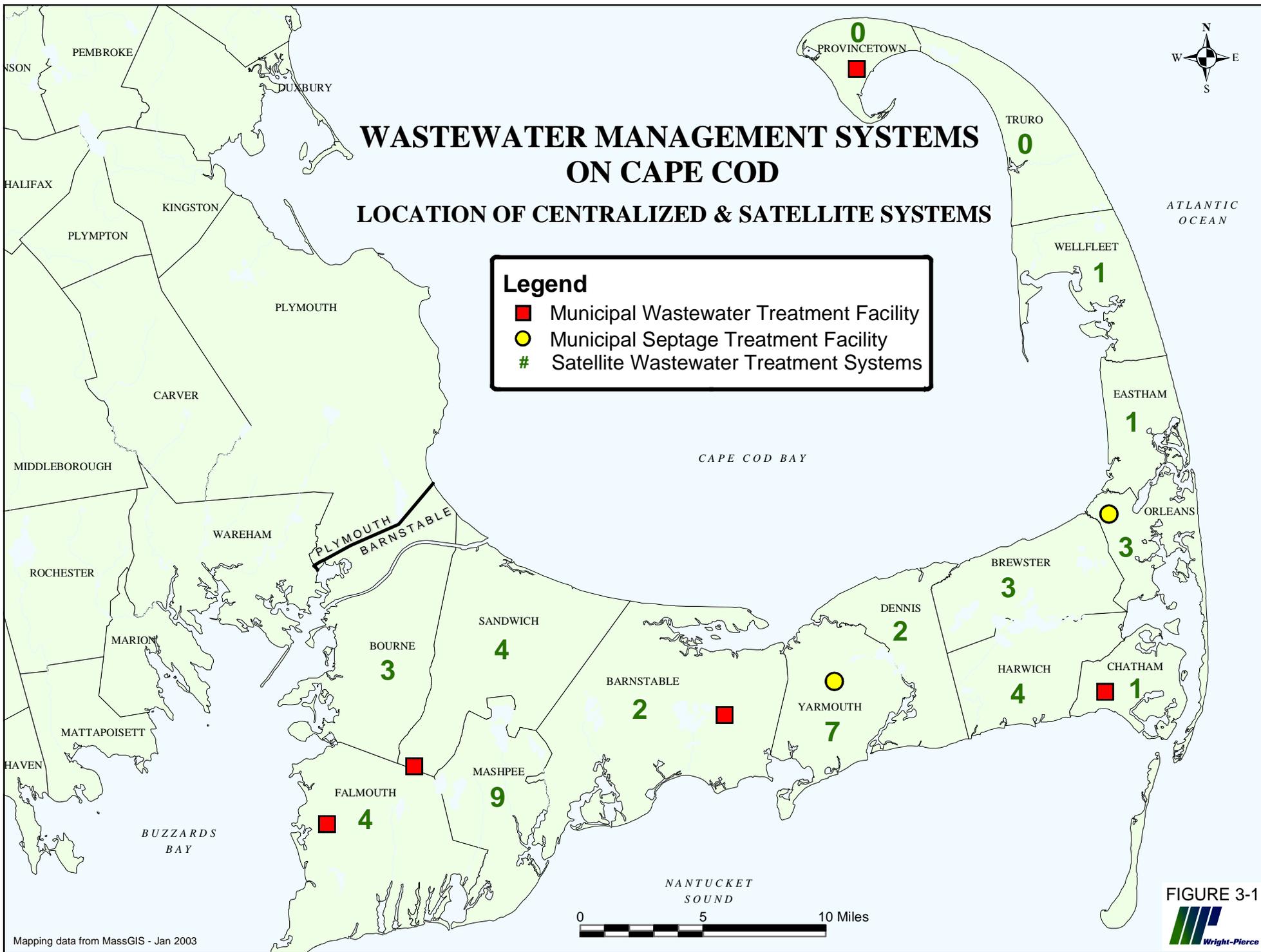
Table 3-1 summarizes the best available information on the number of wastewater facilities on Cape Cod in the categories of individual on-site, cluster, satellite and centralized, as defined in Chapter 2. The locations of the centralized systems are shown in Figure 3-1.

**TABLE 3-1
ESTIMATED NUMBER OF WASTEWATER TREATMENT SYSTEMS ON CAPE COD**

Town	Individual On-Site		Cluster Systems		Satellite Plants	Centralized Systems
	All Systems	Enhanced Treatment	All Systems	Enhanced Treatment		
Barnstable	19,600	29	Note 1	Note 1	2	4.2 mgd
Bourne	8,100	58	Note 1	Note 1	3	
Brewster	5,700	9	1	0	3	
Chatham	4,900	49	4	2	1	0.44 mgd
Dennis	12,600	43	0	0	2	
Eastham	5,400	55	0	0	1	
Falmouth	18,500	66	7	3	4	0.81 mgd
Harwich	8,100	21	0	0	4	
Mashpee	6,700	158	0	0	9	
Orleans	4,500	14	0	0	3	0.045 mgd (septage)
Provincetown	1,400	16	Note 1	Note 1	0	0.50 mgd
Sandwich	8,100	16	1	1	4	0.80 mgd (MMR)
Truro	1,900	4	0	0	0	
Wellfleet	3,300	60	0	0	1	
Yarmouth	13,900	51	0	0	7	0.11 mgd (septage)
Total	122,700	649	13	6	44	5 wastewater 2 septage

Note 1: Data on cluster systems is not available for all towns.

The DEP database on groundwater discharge permits lists 51 entries for the 15 Cape Cod towns. These include the 5 centralized wastewater facilities (in Barnstable, Chatham, Falmouth, Provincetown and the MMR facility at Otis) and the two stand-alone septage facilities (Yarmouth and Tri-Town). (It should be noted that all of the centralized wastewater facilities

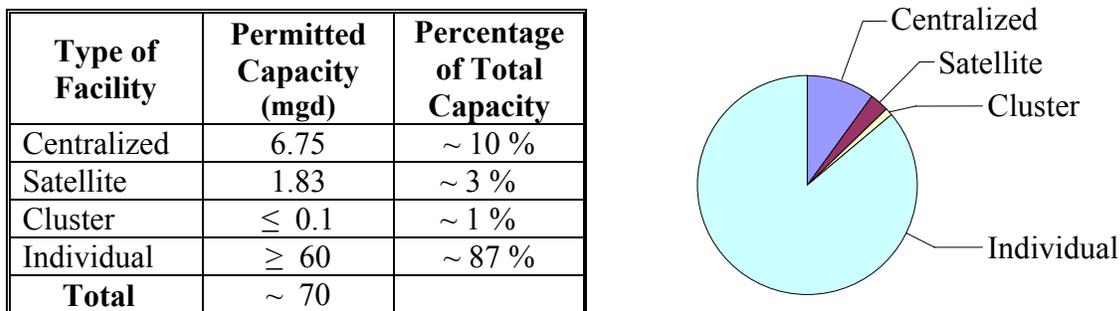


also receive and treat septage.) The remaining 44 groundwater discharge permits are associated with satellite plants, as defined in this report, and are enumerated in Appendix B. Of these, the DEP database lists three as not yet in operation. Nine of the satellite plants are located at laundries, three of which have design flows less than 10,000 gpd. (All of these laundry facilities are included in the "satellite" category because they hold DEP groundwater discharge permits.)

The estimated number of individual on-site systems shown in Table 3-1 is derived from Cape Cod Commission estimates of the number of households in each town, with an allowance for commercial establishments. These figures are approximate. The numbers of enhanced on-site systems are derived from the records of the Barnstable County Department of Health and Environment and information made available from local health departments, and is current as of early 2004.

Information in Tables 3-1 and Appendix B allows an estimate of the total capacity of wastewater facilities on Cape Cod. The five centralized plants have a current capacity of 6.75 million gallons per day (mgd). There is another 1.83 mgd of capacity at the 44 satellite plants. While complete information on the number and size of cluster systems is not available, their aggregate capacity is expected to be well below 1 mgd, and perhaps below 0.1 mgd. No definitive data exist on the capacity of individual on-site systems, but a rough estimate places that capacity at over 60 mgd. Figure 3-2 summarizes these estimates of capacity.

**FIGURE 3-2
ESTIMATE OF WASTEWATER TREATMENT CAPACITY ON CAPE COD**



These data indicate the predominance of on-site systems on Cape Cod; they provide more than 85% of the existing capacity for wastewater treatment and disposal.

All of the centralized and satellite treatment plants are governed by groundwater discharge permits that require enhanced treatment. Given the relatively small percentage of individual systems with enhanced treatment, it can be concluded that less than 15% of the wastewater generated on Cape Cod is now subject to enhanced treatment. Even if new or expanded centralized facilities were to double or triple the treatment capacity in these categories, approximately one half of the wastewater on Cape Cod would still be treated through on-site systems. It is these facts that provide part of the impetus for this current study.

It is interesting to note that the actual wastewater flow treated at certain centralized and satellite plants is well below their permitted capacity, due to limitations on discharge capacity or because of reserve capacity set aside for future growth.

The Cape Cod Commission has estimated that residences and businesses generate about 12 billion gallons of wastewater annually on Cape Cod; see the Comprehensive Cape Cod Regional Wastewater Management Strategy Development Project Report. On an annualized basis, this is approximately 32 mgd. That report also estimates that the seasonal water use is about 53 mgd.

CURRENT WASTEWATER-RELATED PROGRAMS

Description of Existing Programs

Wastewater management is strongly influenced by several existing programs, as follows:

Title 5 is the state sanitary code that governs on-site wastewater management for all facilities except those that function under a groundwater or surface water discharge permit. Title 5 underwent significant changes in the 1990's to make it more comprehensive. While Title 5, properly enforced, is designed to provide for the "sanitary" aspects of wastewater disposal (that is, avoidance of surfacing effluent, prevention of back-ups into the home or business, or protecting an on-site well), it does not adequately address the protection of offsite water resources from nutrient enrichment www.mass.gov/dep/brp/wwm/t5pubs.htm.

The DEP **Groundwater Discharge Permit Program** controls the level of treatment and means of effluent disposal for wastewater flows greater than 10,000 gpd with discharge to the land. In the case of centralized facilities, this program is closely tied to the comprehensive wastewater management planning process and, in those cases, the permit is an effective water quality management tool with limits and terms that are customized to the specific project. However, for satellite plants, the permits are less apt to be tailored to the specific environmental issues and more apt to be of a standard form. This program no longer includes a thorough technical review by DEP of the design of all treatment facilities that will be governed by discharge permits; due to budget constraints, DEP limits its review to the basic design criteria of the treatment facility and plan review of the disposal system.

The DEP has a formal program of **Comprehensive Wastewater Management Planning** that involves a thorough evaluation of needs, identification of alternatives, assessment of impacts, public participation, and development of an implementation plan. This process applies to municipalities that are planning centralized and decentralized facilities. It does not apply to privately-developed satellite plants (although the required level of treatment for private plants ought to be established through the municipal planning process).

The recently initiated **Massachusetts Estuaries Project (MEP)** is an effort by DEP to determine a site-specific set of standards for protection of coastal embayments. Because these are complicated natural systems, expensive and time-consuming studies are needed. The results will provide very valuable input to comprehensive wastewater managements plans; most comprehensive planning is being delayed until these important estuary studies are complete

www.smast.umassd.edu/Coastal/research/estuaries/estuaries.html, www.mass.gov/dep/smerp/smerp.html.

The DEP has a **State Revolving Fund (SRF)** that provides low-interest loans for qualified public wastewater projects www.mass.gov/dep/brp/mf/cwsrf.htm. The facilities funded under this program are subject to technical review by DEP staff. This technical review has traditionally been more comprehensive than the review of private, non-SRF projects. (Recent staffing reductions at DEP may result in reduced oversight of both SRF-funded and non-SRF projects.) SRF projects are generally reviewed under the procedures of the Cape Cod Commission and the Massachusetts Environmental Policy Act.

The Cape Cod Commission's **Regional Policy Plan** establishes a regional water quality management strategy, as well as setting minimum performance standards for the regulatory review of Development of Regional Impact (DRI). The Water Resources Section contains minimum performance standards for a number of activities including wastewater treatment and disposal. The Plan sets a maximum nitrogen loading of 5 mg/1 for all new development and redevelopment, and a 1 mg/1 limit in potential public water supply areas. (This nitrogen loading is the average recharge nitrogen concentration from a project, taking into account all nitrogen sources and all recharge sources.) The Plan prohibits new effluent disposal systems within 300 feet of freshwater ponds. In watersheds to coastal embayments, projects must conform to watershed-specific critical nitrogen loads. Where existing nitrogen loads exceed critical loads, or where there is demonstrated water quality impairment, the Plan requires no net nitrogen increase at DRIs www.capecodcommission.org/RPP/.

How Existing Programs Fit Together

How do these regulatory programs fit together into a comprehensive approach? A town prepares a comprehensive wastewater management plan that determines the most cost effective, environmentally sound and publicly acceptable program for that town. The plan may include both centralized and decentralized facilities, and it should determine where enhanced treatment is needed and where Title 5 systems will suffice. The plan would then serve as a guide to the development of public and private wastewater facilities over 20 to 30 years. The town would apply for and obtain SRF loans to help finance the infrastructure recommended in the plan. The local health department would use Title 5 to govern the individual on-site systems that are built, expanded or repaired in the decentralized areas, and require enhanced treatment where determined necessary by the plan. Groundwater discharge permits would be issued by DEP for the centralized and satellite plants. The town would implement, or facilitate the implementation of, cluster systems where this option provides better or more cost-effective treatment, all in accordance with the plan. The plan would include provisions for ensuring the proper operation of private facilities.

In some cases, a town with undersized or dated wastewater infrastructure enters into a comprehensive wastewater management plan with the objective to both extend and update its existing infrastructure. Often that pragmatic focus precludes a comprehensive assessment of all wastewater needs and alternatives. This may result in partial solutions that often are not phased efficiently. These incremental solutions could be enhanced by the implementation of the interim planning tools that are discussed and recommended in Chapter 5 of this report.

CHAPTER 4

WASTEWATER MANAGEMENT FUNCTIONS AND RESPONSIBILITIES

WASTEWATER MANAGEMENT FUNCTIONS

For the purposes of this report, the following functions have been identified for effective long-term wastewater management: planning, land acquisition, permitting, design, construction, operation, monitoring, enforcement, and funding.

Each function is described in Table 4-1. Table 4-2 shows how these functions are currently accomplished on Cape Cod, for each of the four categories of facilities defined in Chapter 2.

**TABLE 4-1
FUNCTIONS THAT MUST BE ACCOMPLISHED FOR EFFECTIVE
WASTEWATER MANAGEMENT**

Function	Description
Planning	Identifying sewer or nutrient management needs; estimating wastewater flows and loads; determining necessary levels of treatment; evaluating options; identifying sites; obtaining public input; etc.
Land Acquisition	Obtaining fee simple interest or easement rights for land for collection, treatment and disposal sites.
Permitting	Obtaining disposal system construction permit, groundwater discharge permit, local site approval, MEPA approval, site assignment, Cape Cod Commission approval for DRI's, etc.
Design	Contracting with engineers to prepare plans and specifications for wastewater infrastructure.
Construction	Bidding and letting contracts for the building of wastewater infrastructure and overseeing the construction work.
Operation	Providing routine and emergency operation and maintenance of wastewater infrastructure.
Monitoring	Collecting samples and conducting laboratory analyses to determine compliance with effluent or groundwater standards, and to assess off-site impacts.
Enforcement	Taking action to ensure compliance with permits and approvals.
Funding	Appropriating or otherwise arranging for funds to pay capital and operational expenses, including the securing of grants and loans.

RESPONSIBLE PARTIES FOR WASTEWATER MANAGEMENT

Table 4-2 is intended to illustrate the typical responsible parties for the broad range of wastewater management functions. The same format is used in Chapter 5 to illustrate how these functions could be accomplished differently through wastewater management districts.

For individual on-site systems, most of the responsibilities fall to the property owner, except in planning, where the town or Barnstable County may interpret Title 5 or impose other requirements, such as enhanced treatment. On the other end of the spectrum, most of these functions for the existing centralized wastewater facilities are the responsibility of a town (or the federal government in the case of the Otis facility). The two centralized septage facilities are the responsibility of either the host town (Yarmouth) or a management district (the Orleans Brewster Eastham Groundwater Protection District).

**TABLE 4-2
RESPONSIBLE PARTIES FOR KEY FUNCTIONS (CURRENT CONDITIONS)**

Function	Individual On-Site Systems	Cluster Systems	Satellite Plants	Centralized Systems
Planning	Property Owner, Town, County	Property Owner, Town, County	Property Owner, Town, County	Town, County
Land Acquisition	Property Owner	Property Owner, Town	Property Owner, Town	Town
Permitting	Property Owner	Property Owner, Town	Property Owner, Town	Town
Design	Property Owner	Property Owner, Town	Property Owner, Town	Town
Construction	Property Owner	Property Owner, Town	Property Owner, Town	Town
Operation	Property Owner	Property Owner, Town	Property Owner, Town	Town
Monitoring	Property Owner, County	Property Owner, Town, County	Property Owner, Town	Town
Enforcement	Town, County, State	Town, County, State	Town, County, State	State
Funding	Property Owner, County	Property Owner, Town	Property Owner, Town	Town
Typical Flows, gpd	less than 1,000	1,000 to 10,000	10,000 to 250,000	greater than 250,000

The responsibilities for cluster systems and satellite plants are less straight-forward. A town-owned satellite plant, such as at a school, may be managed no differently than the centralized plant in that town. However the approach in managing a school's wastewater system may be different in a town with no centralized facilities or the associated staff, where the operations would likely be contracted out. Many private satellite facilities are developed with little or no town input, and are designed, built and operated by the developer. The developer may only

focus on the immediate problem and may be constrained from considering the broader community needs due to budget and the lack of articulated planning goals and management structure by the local government.

In Developments of Regional Impact (DRIs), Barnstable County has a role in enforcement through the Cape Cod Commission's enabling legislation and the requirements of the Regional Policy Plan. (The definition of DRIs encompasses projects large enough to have satellite plants and some larger cluster and individual systems.) Although the developer is the responsible party for properly planning the wastewater aspects of the project and obtaining permits, the County has a role in both of these functions for DRIs. Further, the County has a funding role for those individual systems that are upgraded through the Community Septic Management Program it administers.

It should be noted that Table 4-2, and related tables in Chapter 5, designate the parties typically responsible for accomplishing the noted functions. For example, the property owner is responsible for obtaining permits for an individual on-site system, even though the local board of health and DEP are responsible for implementing Title 5.

CHAPTER 5

WASTEWATER MANAGEMENT ISSUES AND SOLUTIONS

INTRODUCTION

The Working Group identified many aspects of current wastewater planning and development practices that could be improved. This chapter addresses 12 specific areas of need:

- A. Interim tools that can be used while comprehensive wastewater management planning is underway;
- B. Municipal control over the planning, construction and operation of private wastewater facilities;
- C. Coordination among town boards, departments and commissions with respect to enhanced wastewater treatment;
- D. Multi-town planning and implementation issues;
- E. Build-out projections and reserve capacity;
- F. Mandatory sewer connections and checkerboard sewer systems;
- G. Betterments assessments for wastewater infrastructure;
- H. Use of open space for wastewater treatment and disposal facilities;
- I. Managing wastewater aspects of affordable housing projects;
- J. County oversight of enhanced treatment systems;
- K. Management districts for better wastewater and nutrient management; and
- L. Providing for proper disposal of residuals from wastewater treatment.

For each topic, we present a summary of the problem, a range of possible solutions and a list of discussion points.

A. INTERIM WASTEWATER MANAGEMENT TOOLS



INTERIM TOOLS

Statement of Problem

Comprehensive wastewater management planning is a lengthy process. On Cape Cod, that process is entwined with the Massachusetts Estuaries Project (MEP), which will determine critical nitrogen loads to embayments. Since the MEP studies require several years of data acquisition, modeling and reporting, most towns will not complete their wastewater planning in the next five years.

In the interim, local boards and commissions must deal day-to-day with applications for new projects and for septic system upgrading. With the general knowledge that many of the Cape's estuaries are over-burdened by nitrogen loading, there is a tendency for local boards to require enhanced wastewater treatment. On one hand, there may be a reluctance to require the applicant to make a substantial capital investment, given the lack of an approved town-wide wastewater management plan and the possibility that future studies may show that enhanced treatment is not



needed. On the other hand, there is reluctance to approve a conventional Title 5 system and miss the opportunity to effect some nitrogen removal.

The financial issues are significant to the property owner. An applicant might be asked to spend \$5,000 to \$20,000 for enhanced treatment, only to find, as a result of later comprehensive planning, that a simple Title 5 upgrade would have sufficed. Worse, an applicant might spend a large amount for an enhanced individual system and neglect its maintenance, effecting no appreciable nitrogen removal. Worse still, an applicant might spend a large amount on enhanced treatment and five years later be required to abandon that system, connect to a centralized system and pay a substantial betterment assessment. In the last case, the applicant may oppose the long-term plan to avoid the "double" financial impact.

The dwindling availability of wastewater treatment and disposal sites is also an important concern. If comprehensive wastewater planning requires an additional 5 to 10 years to complete, for example, how many sites for pump stations, treatment facilities and effluent disposal system will have been developed for other uses during that period, thus making the available solutions more complicated and more expensive?

Recommended Solutions

There are several steps that towns can take to help address the problems noted above, as follows:

1. Towns can begin the comprehensive wastewater management process prior to completion of the MEP work, focusing on tasks that are not dependent on the results of the MEP studies. Figure 5-1 is a generalized listing of typical wastewater planning tasks. For each task we have noted the potential (high potential vs. moderate potential vs. low potential) for productive early planning; the items designated as "high potential" could be undertaken now in advance of or concurrent with MEP studies. The Orleans Wastewater Management Steering Committee has taken this approach and has made good progress while the MEP data acquisition phase is underway. Demographic studies and water use analysis are important tasks that can provide locally-grounded information for MEP modeling.

2. As part of the early planning recommended in Item 1 above, towns should identify potential sites for wastewater facilities. Simple screening criteria can be developed that allow the identification of sites that might be suitable for wastewater treatment plants (cluster, satellite and centralized), effluent disposal facilities, and pump stations. The identification of prospective sites allows town officials to plan for their acquisition and to monitor and react to private development proposals, conservation land set-asides, new school or municipal building projects, and other activities that may impact future site availability.

Interim Wastewater Management Tools

- ◆ *Start early planning tasks concurrent with MEP studies*
- ◆ *Begin to identify sites for wastewater facilities*
- ◆ *Identify N-sensitive watersheds*
- ◆ *Establish program for escrow accounts*
- ◆ *Require developers to set aside land*
- ◆ *Use covenants to acknowledge interim solutions*



**FIGURE 5-1
TRADITIONAL TASKS IN DEVELOPING A COMPREHENSIVE WASTEWATER
MANAGEMENT PLAN**

	<i>Potential for Early Progress*</i>
1. Assess conditions of existing wastewater and septage facilities	<i>High</i>
2. Document demographics <ul style="list-style-type: none"> • Current population and projected future populations • Zoning issues and build-out • Water use 	<i>High</i>
3. Estimate wastewater flows and contaminant loads, including septage	<i>High</i>
4. Assess needs <ul style="list-style-type: none"> • Nutrient enrichment of ponds • Nutrient enrichment of embayments • Growth centers and areas of high cost for replacement of on-lot systems • Corrections of public health problems 	<i>High</i> <i>Low</i> <i>High</i> <i>High</i>
5. Identify statutory and regulatory constraints	<i>Moderate</i>
6. Identify and evaluate wastewater management options <ul style="list-style-type: none"> • Centralized, decentralized and on-lot • Wastewater collection, treatment and disposal • Management of residuals (septage and biosolids) • Non-structural options 	<i>Low</i>
7. Identify and evaluate sites <ul style="list-style-type: none"> • Pumping stations • Treatment plants • Effluent disposal 	<i>Identify: High</i> <i>Evaluate: Low</i>
8. Conduct a public participation program	<i>Moderate</i>
9. Prepare an environmental assessment	<i>Low</i>
10. Conduct a financial analysis <ul style="list-style-type: none"> • Capital cost estimates • Estimates of annual operation and maintenance costs • Financing and user fees 	<i>Low</i>
11. Prepare an implementation plan for the recommended wastewater facilities.	<i>Low</i>

* "Early Progress": could be undertaken in advance of or concurrent with MEP studies.

3. The Cape Cod Commission has identified many watersheds where its "No Net Nitrogen Increase" policy applies to Developments of Regional Impact. The Commission should apply its criteria to all Cape Cod coastal embayments. This work will provide a valuable tool to



INTERIM TOOLS

local boards of health in focusing their attention on the areas of greatest need. This exercise could be viewed as part of a regional needs assessment and should be consistent with the approach used in the Massachusetts Estuaries Project.

4. The local board or commission responsible for wastewater management should be given the authority to require, where appropriate, that applicants place funds in escrow as a substitute for implementing enhanced treatment in the absence of a fully-documented need. The amount of money set aside would equal the cost the applicant would have incurred if enhanced treatment were put in place. The escrow account would bear interest that would remain in the account to offset inflation. Once the long-term wastewater plan is implemented, the escrow account would be closed and the funds used to offset the applicant's share of costs of that plan. The escrow account would be tied to the property so as to remain available should the property change hands. The escrow agreement would have a fixed term (5 years perhaps), so as to allow new information to be considered, and would be renewable at the discretion of the local responsible board. The recent experiences in Provincetown may serve as a good model for this concept.
5. For residential subdivisions or multi-lot commercial development (or redevelopment), the local responsible board should have the authority to mandate some degree of planning to accommodate future wastewater needs. This could include the setting aside of a parcel within the project for a future cluster system, the installation of a "dry sewer", or the use of individual septic tanks that could become part of a STEP (septic tank effluent pump) system in the future if indicated by comprehensive wastewater planning. Escrow accounts could be used, as in Item 4, to set aside funds that otherwise would have been used for wastewater collection and treatment facilities.
6. Town can promote public knowledge of issues associated with wastewater planning by requiring applicants to sign and record covenants wherein they document their understanding of the ongoing nature of the planning process and the possibility that currently approved facilities may be abandoned in the future. Figure 5-2 is covenant wording developed by the Chatham Board of Health for this purpose.

Discussion Points

When town officials and the Cape Cod Commission staff review these recommendations, the following should be considered:

1. If the Commission were to provide the technical basis for identifying nitrogen-sensitive watersheds, these watersheds could be so designated through a modification to Title 5 as proposed below under Section 5I (Affordable Housing). The towns then would need to decide what standards would apply in those watersheds. They could consider a "best available treatment" criterion or use the "no net nitrogen increase" approach that the Commission uses for Developments of Regional Impact.



INTERIM TOOLS

**FIGURE 5-2
SAMPLE COVENANT AS DEVELOPED BY CHATHAM BOARD OF HEALTH**

COVENANT

At such time as the Town of Chatham, through its Board of Health or Board of Water and Sewer Commissioners, directs the connection from the land herein described to a municipal sewer, construction of alternative wastewater treatment system, connection to a shared septic system or to any other wastewater management option for the removal of nitrogen, Applicant, for itself, its heirs, Grantees and assigns, covenant and agree to comply with such a directive. The Board of Health and/or the Board of Water and Sewer Commissioners shall determine the schedule for compliance.

This Covenant shall run with the land, until released or until a Certificate of Compliance from the Board of Health of the Town of Chatham is recorded.

Applicant

2. Many factors must be considered by the local responsible board in deferring enhanced treatment and in establishing an escrow account. These include the following questions: a) What is the likelihood that nitrogen removal will be required as part of the long-term plan? b) Will the long-term plan involve individual enhanced treatment systems or an off-lot solution? c) If enhanced treatment is deferred, when will the long-term plan be in place, and how significant is the higher nitrogen load that would occur in the interim? and d) What degree of upgrading is required, even without enhanced treatment, to comply with Title 5?
3. If escrow accounts are to be used widely, the town should establish a simplified standard procedure to set up the accounts and provide for routine reporting of fund status town-wide. Such an accounting system would allow the commingling of escrow funds to simplify the banking arrangements.
4. Costs for interim wastewater management planning can be kept to moderate levels by use of town staff where possible. Orleans has positive experience in this regard. Early discussion with DEP indicate that such costs, if appropriate to the long-term plan and approved by DEP in advance, might be eligible for funding under the SRF program.
5. The Town of Yarmouth is working with DEP on potential deferral of upgrading of wastewater systems for large commercial establishments on Route 28, to allow progress on the Town's wastewater planning. Other towns should benefit from any administrative programs that derive from that work.



INTERIM TOOLS

6. The comprehensive wastewater management plan will identify the best means to ensure the connection of identified properties in the long-term solution, regardless of prior covenants. The principal benefit of the covenants that have been used by local boards is that of public awareness of the planning process and the possibility of future changes.
7. A DEP Sewer Extension Permit may be required for a "dry sewer" at the time of installation, not at the time it is put into actual service.
8. Towns that embark on the early planning steps noted in Table 5-1 should coordinate their efforts with the MEP, particularly Items 2 and 3, and should recognize that watershed boundaries could change as part of later MEP work.

Chapter 6 of this report illustrates how several recommendations of this Section 5A can be applied in Orleans.

B. MUNICIPAL INVOLVEMENT IN PRIVATE SATELLITE AND CLUSTER SYSTEMS

Statement of Problem

There are more than 40 satellite wastewater treatment plants on Cape Cod, many built and operated by private developers in towns, or areas of towns, without municipal sewerage systems. These plants are mandated under the terms of the DEP Groundwater Discharge Permit program for design flows over 10,000 gallons per day. Plant sizing is in part governed by the DEP guidance on small wastewater treatment plants, which was published in 1988. The 1988 guidance document requires the use of Title 5 flow estimates, which often leads to over design and unused capacity. In that these facilities are usually privately owned, that reserve capacity is typically unavailable to a municipality. Generally, the design of the satellite plant is based solely on the needs of the proposed development, without regard to sewer needs on nearby properties.



Cluster systems represent a potential tool in decentralized wastewater management not now widely used on Cape Cod. A developer of a residential subdivision who is required to provide nitrogen reduction technology for wastewater treatment is more likely to install individual enhanced treatment systems, lot-by-lot, than build a cluster system. For redevelopment, or for upgrading and repair of existing individual systems, there is no impetus for individual property owners to participate in a cluster system, absent a municipal program that anticipates the need, sets aside sites and intervenes in the decision-making process.

Improved and/or expanded use of satellite plants and cluster systems can result in more cost-effective decentralized wastewater.

Recommended Solutions

A consensus emerged among the Working Group that the planning for wastewater infrastructure is a public function, and that mechanisms should be put in place that allow private facilities (other than individual Title 5 systems) to be owned eventually by a town, a district or a regional entity. With that view in mind, we have identified the following steps to use satellite plants and cluster systems more effectively, centered on a local bylaw or regulation:

1. All towns should adopt a local bylaw or regulation that mandates, for all projects with wastewater flow greater than 2,000 gallons per day, that the project proponent conduct an evaluation to compare cluster systems with individual on-site systems. That evaluation should cover general capital and operational costs, public health issues, effectiveness of nutrient removal, and long-term operational issues. The regulation or bylaw should allow the responsible town board to require the use of a cluster system if that evaluation determines that more effective wastewater treatment (especially nutrient removal) will occur.
2. Rather than relying on Title 5 flow calculations, the design of cluster and satellite systems should be based on conventional sanitary engineering practices. The design basis should include expected water use, peaking factors appropriate to the project, allowances for infiltration and inflow, and reserve capacity for future phases of the project. These



requirements should be built into the local bylaw or regulation; such provisions have been incorporated into the 2004 update of DEP's design guidelines for small wastewater treatment plants. This recommendation may be particularly important for schools where wastewater treatment plants often encounter operational difficulties due in part to wide fluctuations in flow that are not accounted for in Title 5 calculations.

3. The local bylaw or regulation should mandate that the project developer coordinate with the town on sewer needs in the area of the project, and incorporate provisions in the design for treatment and disposal of flows from neighboring areas, if appropriate. DEP's design guidance should strongly suggest this coordination.
4. Each town should proactively identify growth or redevelopment areas where local sewer needs might be accommodated in satellite or cluster systems. That effort should include the identification of potential treatment and disposal sites and their purchase if appropriate, as well as estimates of wastewater flows. Public/private partnerships could be used to leverage public funds and facilitate timely implementation.
5. The local bylaw or regulation should mandate discussions between the developer and the town concerning ownership of the proposed facilities, and give the town the authority to assume ownership if conditions warrant. Those discussions should lead to the decision on how the plant will be owned and operated, with the following possibilities: 1) construction, ownership and operation by the town; 2) construction by the developer and turn-over to the town at time of start-up or at some other agreed-upon time; 3) construction, ownership and operation by the developer or the homeowners/condo association; and 4) construction and ownership by the developer (or homeowner/condo association) and operation by the town, district or regional entity. These discussions should lead to the negotiation of a price for Town takeover, in the event of purchase, or of the terms and conditions of town management, if appropriate. Discussions between the town and developer should address potential public-private partnership to leverage local resources.
6. DEP should clarify or modify its rules for eligibility under the SRF program to allow funding for municipal purchase of privately developed wastewater infrastructure, provided that the purchase is cost-effective compared to municipal development and part of a town-wide plan.
7. DEP should modify the terms of its Groundwater Discharge Permit program to require the applicant to coordinate with the town on these issues, and require a written sign-off from the town that such coordination has occurred. Even while this recommendation is being

Municipal Involvement in Private Facilities

- ◆ *Mandate cluster system evaluation*
- ◆ *Require consistent engineering design basis*
- ◆ *Consider addressing nearby sewer needs*
- ◆ *Identify growth and redevelopment areas*
- ◆ *Consider transfer of ownership to town*
- ◆ *Expand SRF eligibility for town purchase*
- ◆ *Modify DEP Groundwater Discharge Permit program to reduce cost and promote coordination*
- ◆ *Establish design & construction standards*
- ◆ *Oversee operations*
- ◆ *Modify site assignment policy*



considered, DEP should be more aggressive in ensuring that towns are notified of permit issuance and renewal.

8. DEP should streamline its requirements under the Groundwater Discharge Permit program to expedite the review process, reduce the permit fee, and reduce the long-term operational costs for compliance (with particular attention to labor and testing of effluent and groundwater). Developers will be less apt to modify their projects to avoid a groundwater discharge permit if the permitting-related time and expense are reduced for smaller projects.
9. Either as part of the local bylaw or regulation mentioned above, or by separate bylaw/regulation or policy, each town should put into place design and construction standards related to privately-built wastewater infrastructure. Compliance with these standards should be a condition of town approval of all new facilities, even those intended to remain in private hands. These standards should require accurate and complete record drawings ("as-builts") as an aid in documenting the facilities that may later be turned over to the town. DEP has recently modified its groundwater discharge permit application form to require the applicant to provide a copy of any approval under any local regulation governing construction of wastewater treatment plants.
10. Towns should take an active role in the oversight of existing satellite plants and cluster systems. That oversight should include an assessment of the plant's condition, useful life and upgrading needs, as well as a determination of any unused capacity. The program in place in Yarmouth should be considered as a starting point, wherein an independent engineer inspects each private plant annually, reviews operational data and recommends improvements. The costs of the annual review could be funded by a fee paid by the developer.
11. The local bylaw or regulation should authorize town purchase of existing cluster systems and satellite plants, if consistent with the comprehensive wastewater management plan and if cost-effective.
12. The DEP site assignment process (MGL Chapter 83, Section 6) should be considered in the permitting of a private plant when municipal take-over is contemplated, to avoid later problems.

Discussion Points

When these recommendations are considered by the towns and by DEP, the following points should be considered:

1. The program recommended above is quite comprehensive and it requires effective planning and management by a town or district. It may be more easily accomplished by professional engineering staff in those towns that already have wastewater facilities. Where no existing capability exists, a town may choose to designate the Board of Health or the Public Works Department, or to establish a wastewater management district.



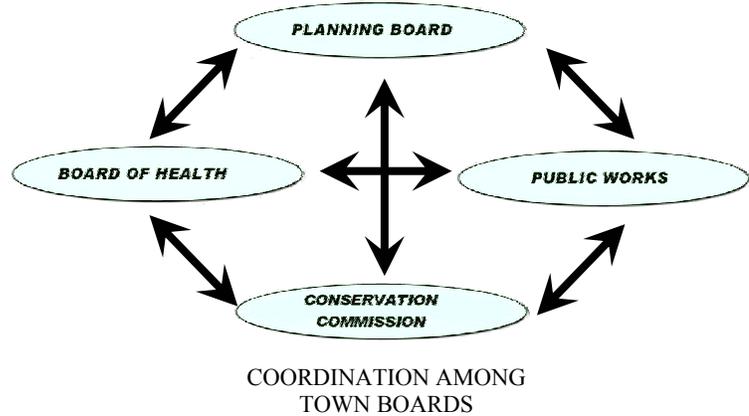
2. To be effective, the recommended program requires good municipal planning with respect to the identification of areas of sewer needs, projection of future wastewater flows, and location of potential treatment and disposal sites. This work should be part of the comprehensive wastewater management plan, but towns should not wait for the formal planning process to start; see the discussion on interim planning steps in Section A (Interim Wastewater Management Tools) of this chapter.
3. Initial discussions with DEP on these issues have been generally positive. DEP issued revisions to its guidance document on small treatment plants in April 2004, and changes in the groundwater discharge permitting program are also expected in 2004. DEP staff has also indicated flexibility in the SRF program to accommodate public purchase of private facilities. Thus, the proposed modifications in DEP programs could be accomplished in the relatively near future.
4. DEP requires developers to set up escrow accounts for the repair and replacement costs for cluster systems and satellite plants. DEP does not require these escrow accounts for municipal plants. Therefore municipal takeover at the time of start-up could avoid this expense and paperwork. Conversely, the developer is able to depreciate the satellite plant or cluster system, and may wish to retain ownership for the first few years of operation. If transfer of ownership to the town were to occur at that time, the escrow account could perhaps be rolled over into a municipal enterprise account.
5. The absence of town funding for wastewater facilities should not preclude the program recommended above. Through permitting fees, towns can lay the groundwork for later acquisition of privately developed infrastructure.

Many of the recommendations of this Section 5B are illustrated in Chapter 7 for two existing private satellite plants in Mashpee.

C. COORDINATION AMONG TOWN BOARDS

Statement of Problem

Wastewater management touches on a wide range of issues, from basic public health to environmental protection to density of development. A number of town boards have interest in one or more of these issues, including boards of health, planning boards, zoning boards of appeals and conservation commissions. Each of these boards or commissions must consider wastewater management issues, in



one form or another, and each may adopt regulations, bylaws or policies accordingly. In many towns, the wastewater-related "rules" are not fully consistent, nor is their application uniform.

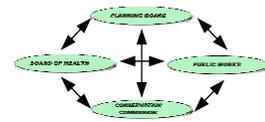
Local decision-making is needed across the full spectrum of wastewater management, from planning through design to construction and operation. One board may have the primary input on planning issues (e.g., the planning board with respect to density of development), while another board may be best suited to oversee the construction and operation of the resulting facilities (perhaps the public works department).

Comprehensive wastewater management planning is intended to identify the most cost-effective and environmentally sound solution for a town's wastewater-related needs. A critical part of the plan is the implementation strategy that identifies the entity that should manage the program. That entity could be an existing town board or department, a new town entity, or an independent wastewater management district. The implementation strategy should also identify the local regulations and bylaws needed to support the plan, as well as a schedule for their development and adoption. The most effective implementation strategy is one that builds on the town's existing regulations, bylaws and policies and considers the areas of synergy or conflict that may exist among current boards. Towns should place high priority on the development of an effective implementation strategy as part of their comprehensive wastewater management planning. In the absence of the technical details of the recommended wastewater management plan, however, it is difficult to predict in advance what the best strategy will be.

Recommended Solutions

There are steps that should be taken to address this issue, as follows:

1. Regardless of the organizational approach that is adopted (either as an interim measure or as part of the long-term program), coordination among boards and departments is critical. Written policies are important to ensure clear communication, close coordination and consistent results.



2. Given the long time required to complete comprehensive wastewater management planning, and the critical need for appropriate short-term actions, the board of selectmen in each town should assess the programs now in place by the various boards and organize a concerted strategy. An effective approach may require only an enhancement in the communication and coordination among boards. It may also be necessary to shift responsibilities from one board to another.

Coordination among Town Boards

- ◆ *Develop clear long-term responsibilities in CWMP*
- ◆ *Fine tune interim coordination*
- ◆ *Establish written policies*

Discussion Points

The towns should consider the following points when addressing these recommendations:

1. A wastewater management district may be an important part of a town's implementation strategy. Defining the jurisdictional boundaries between the district and existing town boards and departments will be critical to success.
2. Wastewater management requires both proper organization and qualified personnel. Each town should identify the optimal municipal structure to deal with its specific wastewater management needs, but the town must also consider the capabilities of current staff. The ideal structure may not be effective if the strengths and weaknesses of the staff are not consistent with the demands of the key positions.
3. Some towns rely heavily on the outsourcing of services. The best organizational structure may be different in a town that expects to rely on contract services, compared with one that relies on its own staff and equipment.

Chapter 8 summarizes specific experiences in Falmouth with regard to coordinating the authorities and policies for enhanced treatment among several boards.

D. MULTI-TOWN IMPLEMENTATION

Statement of Problem

For most major estuaries, the land-based nitrogen load originates in two or more towns. Any effective nitrogen control program will require action by all of the towns in the watershed. One town may aggressively manage nitrogen load, while a neighboring town in the same watershed may fail to take the necessary actions, or may consciously delay important management steps, due perhaps to budgetary problems. Cooperation and coordination are essential to achieve cost-effective and timely solutions. A combination of incentives and administrative actions may be warranted to optimize the multi-town efforts.



Recommended Solutions

A number of tools exist to induce or require budget-strapped or otherwise reluctant towns to participate in wastewater planning, as follows:

1. Education of citizens and public officials is a key component of regional planning. If the public knows the sources and extent of contamination problems, is knowledgeable of the options to control them, and is aware of the importance of timely action, then town government will be more apt to deal with the problems promptly and in concert with neighboring towns. The towns and the County should continue to support the County's Wastewater Implementation Committee as an important forum for education and information sharing across town boundaries. Public education and involvement should be part of all wastewater planning efforts at any level.
2. As a way to begin discussions on district formation, two or more towns could establish a working group to identify and address common interests and areas of concern. Memoranda of Understanding (MOUs) can be used to formalize points of agreement and can serve as useful building blocks toward eventual district formation, if appropriate. Such MOUs would be particularly important for towns engaged in coordinated wastewater planning activities across town boundaries.
3. The Massachusetts Estuary Project will determine the critical nitrogen loads for embayments on Cape Cod. These critical loads will be used to establish Total Maximum Daily Loads (TMDLs) under the federal Clean Water Act. Both EPA and DEP have statutory authority to mandate compliance with the TMDLs under the Clean Water Act. DEP is in the process of evaluating appropriate regulatory strategies. In its regulatory approach, DEP should establish the ability to compel towns to participate in wastewater management planning and infrastructure development. Town and County support is warranted for this science-based program.
4. The DEP can issue an administrative consent order to force a reluctant town to undertake comprehensive wastewater management planning, or to move forward more quickly with the actions recommended in a comprehensive plan.



5. Under the Massachusetts Clean Waters Act, DEP has the ability to unilaterally establish a wastewater management district (MGL Chapter 21, Sections 28, 29, 30, 32, 35 and 36), and could use this authority to implement solutions on a watershed basis more quickly than might occur with the individual towns left to their own priorities.
6. Sections 10 and 11 of the Cape Cod Commission Act provide for the establishment of Districts of Critical Planning Concern (DCPCs), which may offer benefits in multi-town wastewater planning. A DCPC is a recognized area of critical value which must be preserved due to the presence of significant resources or substantial areas with sensitive ecological conditions, or the proposed establishment of an area of public investment. Thus a watershed-wide effort to protect water quality in freshwater ponds or coastal embayments clearly fits within the intent of the Cape Cod Commission Act in setting up DCPCs. One or more towns could nominate a multi-town watershed for consideration as a DCPC. The nomination would be reviewed by the Cape Cod Commission, and if appropriate would be approved by the Assembly of Delegates. The DCPC designation allows towns to adopt special rules and regulations to govern development within the DCPC. The Cape Cod Commission is empowered to adopt such rules and regulations if one or more of the towns fail to do so. The DCPC approach may be appropriate to synchronize and coordinate the efforts of towns that may not be on the same schedule or view water quality as a different priority. However, it is not a substitute for a wastewater management district.
7. The most comprehensive tool would be a wastewater management district based on watershed boundaries. All the towns in the watershed would participate, either with equal representation or with representation proportional to the town's impact on the embayment. The sole focus of the district would be the protection of the embayment, and the district would not be distracted by other municipal functions. Properly established, the district could receive grants, impose and collect fees, undertake planning studies, and build and operate wastewater infrastructure. The Cape Cod Commission should take a lead role in identifying those multi-town watersheds where wastewater management districts may be most beneficial.
8. The Business Roundtable and the Association for the Preservation of Cape Cod have investigated options for regional management and funding of wastewater infrastructure. A county-level entity has been proposed to collect revenues, establish regional priorities and fund studies and the

Multi-town Implementation

- ◆ *Support WIC's regional focus and public education*
- ◆ *Develop MOUs between towns sharing common watersheds*
- ◆ *Support the Mass. Estuaries Project*
- ◆ *Include regional plans in TMDLs*
- ◆ *Consider DEP's regulatory authority to exert pressure on tardy towns*
- ◆ *Educate public on regional impacts*
- ◆ *Consider management districts based on Commission's identification of best opportunities*
- ◆ *Consider DCPC designations*
- ◆ *Support Blue Ribbon Panel's evaluation of County-wide entity*



recommended infrastructure. Such an entity could play an important role in inducing the timely participation of all towns in a watershed through the selective release of funding for studies or implementation. The County's Blue Ribbon panel should continue to evaluate this opportunity for regional solutions, supported by the towns.

Discussion Points

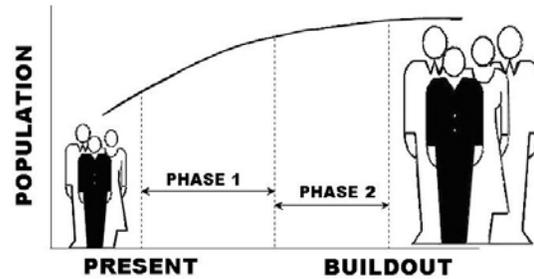
When these options are reviewed by the towns, Barnstable County and DEP, the following points should be considered:

1. The best solutions are those that have the full cooperation of the affected towns. That cooperation is most likely to result from grass-roots understanding of the problem and broad support for solutions. Solutions imposed from above, such as administrative consent orders, are likely to be less effective or timely.
2. The formation of a wastewater management district allows a more focused approach to nutrient loading issues. However, the affected towns must consent to the formation of the district (unless it is imposed unilaterally by DEP) and must help fund its functions. Therefore a wastewater management district may not be an effective tool for unwilling participants. Further, land use and zoning are central to many nutrient loading issues, and these powers would remain with the towns and not be within the purview of a special-purpose district. A DCPC could address these land use issues.
3. DEP policy on implementing watershed-based solutions is just evolving, and specific programs are not currently available. Nonetheless, Cape Cod towns and Barnstable County are in a position to help formulate these programs, and they should continue to be actively involved.
4. A regional wastewater entity, with appropriate funding, could be ideally suited to ensure the coordination among towns, set watershed-by watershed priorities, and induce participation by reluctant towns.

E. BUILD-OUT PROJECTIONS AND RESERVE CAPACITY

Statement of Problem

Publicly-owned wastewater facilities traditionally are designed with reserve capacity, often based on projected population growth over a 20-year period. The facilities are designed to handle more flow or higher pollutant loads than are expected in the initial years of operation. Reserve capacity at a wastewater treatment plant or effluent disposal site allows growth and redevelopment within areas initially served, permits future geographic expansion of the service area, and provides a safety factor for inaccuracies in determining initial flows or nutrient loads.



BUILD-OUT PROJECTIONS

The process of planning, designing and constructing wastewater facilities typically requires many years of effort and large amounts of capital. It would be imprudent to ignore the need for reserve capacity or to under-estimate it, only to have to repeat the entire process to expand a facility or to build a new one. Failure to plan for future effluent disposal requirements could result in the loss of available sites and serious constraints in dealing with future needs.

Conversely, if a town builds excess reserve capacity, it has tied up capital that could be used for other municipal projects. Without adequate controls, as discussed later in this chapter (see Section 5F--Mandatory Sewer Connections and Checkerboard Systems), available sewer capacity often leads to unwanted development that may surpass the town's ability to deal with the associated traffic, school population, water supply demands, etc. Therefore, an important step in wastewater planning is to determine the amount of reserve capacity that balances the disadvantages of both "under-designing" and "over-designing".

Recommended Solutions

A number of methods are available to towns to estimate future population and commercial activity and to determine the amount of reserve capacity that fits their needs. These include the following measures:

1. Because wastewater facilities are an integral part of municipal infrastructure, with important growth implications, planning boards and their staff must participate in the planning process. Estimates of population and commercial activity at build-out

Build-out Projections and Reserve Capacity

- ◆ *Integrate CWMP with Local Comprehensive Plan*
- ◆ *Consider project phasing*
- ◆ *Use water use data to judge seasonality*
- ◆ *Adopt systematic approach to build-out*

must be consistent with the town's local comprehensive plan and reflect the degree of growth the community has decided is appropriate, given all factors. Ideally, a comprehensive wastewater management plan is "growth-neutral", neither restricting

growth nor promoting more growth than would occur in the absence of the wastewater facilities.

2. A phased wastewater plan can accommodate the risk associated with estimating build-out population or commercial activity. A town could select a planning horizon that is well short of build-out, and construct modular facilities that are readily expanded. For example "Phase 1" could provide for the current sewer needs plus a small growth allowance, while "Phase 2" could address full build-out. The town would monitor growth during the operation of Phase 1 facilities and implement Phase 2 only when necessary. At that time, a better estimate of build-out conditions would be possible.
3. Towns should take a methodical approach to estimating build-out population, wastewater quantities and nitrogen load. One possible approach includes the following steps for residential development:
 - a. analyze current conditions in terms of number of homes (year-round and seasonal), the number of bedrooms per home, and water use (both town-wide and by watershed);
 - b. estimate the number and size of new homes that could be built under current zoning;
 - c. predict how many new homes are likely to be seasonally occupied and how many will be year-round;
 - d. predict how many currently seasonal homes will be converted to year-round use;
 - e. estimate the number of new bedrooms that will be added to existing homes;
 - f. project future water use based on per-lot or per-bedroom figures developed from Step "a"; and
 - g. use the predicted water use figures to estimate wastewater quantities and nitrogen loads.

It should be noted that simple application of Title 5 flows to projected bedroom counts is excessively conservative and results in too much reserve capacity.

4. Seasonality is a key factor in both current nitrogen loads and in build-out determinations. Over one-half the housing units in some Cape Cod towns are occupied seasonally. To predict current nitrogen loading (which will be a major determinant of sewer needs), one must judge the degree to which seasonal homes are occupied. Equally important is the potential conversion of seasonal to year-round use (or an increase in the number of months the house is occupied). Water use information is the best available indicator to estimate the degree of use of seasonal dwellings.

Discussion Points

As wastewater planners implement these recommendations, a number of important points must be considered:

1. External factors may dictate the planning horizon or the amount of reserve capacity in wastewater facilities. Limitations on effluent disposal sites may dictate the total

wastewater flow that can be collected, treated and disposed of. Municipal budgetary constraints may dictate an overall project cost that limits reserve capacity, forcing a shorter planning horizon than might otherwise be the case. The State Revolving Fund may require a certain planning period.

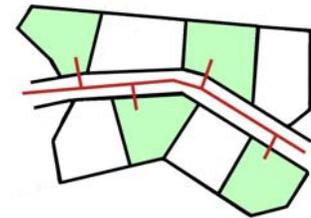
2. Build-out projections are integral to sizing wastewater facilities, but they also impact the expected nitrogen loads on estuaries from unsewered development. Realistic build-out estimates are needed as inputs to the modeling work conducted under the Massachusetts Estuaries Project.
3. Planners must be prepared to justify build-out projections in light of the cost of reserve capacity. It should be expected that a town meeting voter will ask a question of the sort: "How much of this capital appropriation is for capacity we do not need at present?"
4. Predicting future commercial wastewater flows and nitrogen loading is more difficult than projecting residential quantities due to the diversity of commercial activities and their associated water use. One approach is to determine current water use per square foot of commercial area for various types of development, and let that information form the basis for future projections. Consideration must be given to the creation or expansion of growth centers.
5. Towns must be prepared to use available tools to control growth within the constraints of public wastewater facilities. Tools for managing private wastewater infrastructure are discussed earlier in Section 5B of this chapter. The checkerboard sewer system concept is discussed in Section 5F.
6. If wastewater infrastructure is to be developed by a wastewater management district, the district must be prepared to work with the planners in all participating towns to achieve accurate and consistent build-out projections. Both current and future projected flows and pollutant loadings will be key determinants of each town's share of project costs incurred by a multi-town district.

The multi-step process outlined above has been applied in Orleans and the results are summarized in Chapter 6.

F. MANDATORY SEWER CONNECTIONS AND "CHECKERBOARD" SEWER SYSTEMS

Statement of Problem

Chapter 83, Section 3 of the General Laws of Massachusetts allows a board of health to mandate a sewer connection on a property abutting a road in which public sewer is located. This section also requires the town to connect a property abutting such a road if the landowner requests service. In cases where treatment and/or disposal capacity is limited, the town needs the ability to deny sewer access to properties that can make use of Title 5 with reasonable variances, and thus create a so-called "checkerboard" system. When this situation has occurred in the past, towns have dealt with it through special legislations. It is likely that many towns will be faced with this problem, and it would be helpful if Chapter 83, Section 3 could accommodate the "checkerboard" approach to avoid special legislation.



CHECKERBOARD
SEWER SYSTEMS

Recommended Solution

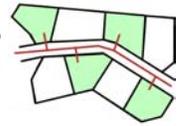
We have developed a proposed amendment to Chapter 83 Section 3 that would allow towns to implement "checkerboard" sewer systems. Section 3 is repeated in Figure 5-3, along with the proposed change shown in italics.

Discussion Points

When Barnstable County, the towns and the legislative delegation review this recommendation, the following points should be considered:

1. If a town develops a wastewater management plan that creates reserve treatment capacity for an area needing sewers, it could use this amended Chapter 83 Section 3 to reject applications from properties abutting the sewer system to preserve that reserve capacity for the purposes stated in the plan. If the Town does not move forward with the planned sewer system expansion in a timely fashion, say due to budgetary limitations, the town must be prepared to deal with the applications for service that were rejected, particularly if the lots in question are otherwise prime for development.
- Mandatory Sewer Connections and "Checkerboard" Sewer Systems**

 - ◆ *Amend MGL 83 § 3 to allow checkerboard systems without town-by-town special legislation*
2. Amending Chapter 83, Section 3 would allow a town to reject an applicant's request for sewer service, but it does not address the potential need to restrict the flow from existing services, such as through "redevelopment". The wording adopted by the Town of Falmouth for New Silver Beach Sewer Service Area is an example of how increases in flow could be handled; see excerpts presented in Appendix C.



**FIGURE 5-3
PROPOSED AMENDMENT TO MGL CHAPTER 83 § 3**

CHAPTER 83. SEWERS, DRAINS AND SIDEWALKS.

Chapter 83: Section 3. Sewer connections.

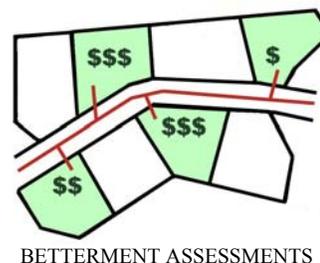
Section 3. The board or officers of a city or town having charge of the repair and maintenance of sewers may, upon request of the owner of land and payment by him of the actual cost thereof, construct a particular sewer from the street line to a house or building. A town may appropriate money for connecting estates within its limits with common sewers, and no estate shall, in any year in which such an appropriation is made, be connected with a common sewer except in the manner hereinafter provided. If bonds or notes are issued to pay the cost of making such connections, the assessments provided for in section twenty four shall be applied to the payment of such bonds or notes. If the board of health of a town making such appropriation shall order land abutting upon a public or private way in which a common sewer has been laid to be connected with such sewer, or if the owner of such land shall make to the board or officer having charge of the maintenance and repair of sewers application to connect his land with a common sewer, such board or officer shall make such connection. ***Except as provided in the following sentence: Said board or officers shall deny such application if the city or town has adopted a wastewater management plan that provides for only certain estates to be served by common sewers and if such land is not included among the estates to be served. In a city or town which has adopted such a wastewater management plan, betterments shall be assessed only upon estates actually served or designated to be served by the common sewer system.***

3. It is not possible to precisely predict the wastewater flow from an area of need, nor is it possible to definitively determine which existing houses or businesses can rely on Title 5 systems indefinitely. Towns will need a mechanism to revise the wastewater management plan and the extent of "checkerboard" systems as conditions warrant.

G. BETTERMENT ASSESSMENTS FOR PUBLIC SEWERAGE PROJECTS

Statement of Problem

The protection of a given embayment from nutrient enrichment may require that nitrogen be removed from various sources within the embayment's watershed. If, for example, 40% of the nitrogen load originating from septic systems needed to be removed, it would be much cheaper to remove 80% of the nitrogen generated at 50% of the houses than to remove 40% of the nitrogen at all houses. The houses to be connected to a wastewater treatment system would be selected based on ease of connection or other criteria, such as proximity to valued water resources. Should the costs of the public system be borne by only those who own houses that are connected?

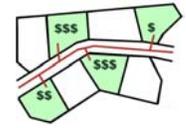


Chapter 83, Section 14 of the General Laws requires a person who connects his drain to the common sewer, or who “by more remote means receives benefit thereby for draining his land or buildings,” to pay the proportional costs of a common sewer system. (Whether or not an owner “receives benefit . . . for draining his land or buildings” by “more remote means” when there is no direct sewer connection is a factual question to be determined case-by-case.) Chapter 83, Section 15 of the General Laws provides for the assessment of these costs using two different methods: a “fixed uniform rate” or a “uniform unit.” The proportional costs of sewer facilities may be assessed against all properties abutting a sewer street, provided that no assessment may be made against any land, which by reason of its grade, level or any other cause, cannot be drained into the sewer system. We have examined whether amendment of these statutes to allocate costs to owners not served, either directly or remotely, by the sewer system would be permissible.

Massachusetts courts have consistently held that assessments for betterments, including sewer systems, may be made only against properties receiving “special and peculiar benefits” from the improvements as distinguished from the general benefit shared by the public; such assessments have been deemed unconstitutional if the assessment exceeded the “special and peculiar benefits.” Betterments therefore may not be assessed against owners of property who are not served, either directly or remotely, by the sewer system, and any amendment to the statutes attempting to permit such an assessment would be unconstitutional.

Recommended Solution

For each project, or segment of a project, the town's comprehensive wastewater management plan should develop a fair and rational allocation of costs between betterments paid by direct project users and general property taxation. It is not unusual for a town to pay for one third or more of the capital costs through general property taxation and the remainder through betterment assessments. The rationale for all property owners to pay a portion of the costs is the town-wide benefit of improved water quality. In some towns, where complete sewerage is planned, residents of unsewered neighborhoods are assured that town-wide taxes will also help support future extensions of the sewer system, and that they too will eventually benefit to the same extent as those served by the current project. The rationale for the betterment assessment is that the



served property is indeed "bettered", by having the town take care of wastewater treatment and disposal, and eliminating the need for pumping, maintenance and replacement of the individual septic system or cesspool. When a portion of a town is sewerred, sewerred lots are typically assessed at higher values, and sell at higher prices, than comparable unsewerred lots.

Betterment Assessments for Public Sewerage Projects

- ◆ *Mix betterment assessments and property taxes to balance direct and indirect benefits*
- ◆ *Educate public on income tax issues*
- ◆ *Consider wastewater management districts and special taxes*

In developing implementation plans as part of comprehensive wastewater planning, towns should seriously consider one of the benefits of wastewater management districts. Properly formulated, a district is able to impose special property taxes to accomplish its authorized

activities. That tax could be imposed on all properties in a watershed to help pay for the infrastructure needed to control nitrogen loading watershed-wide, and would be a very useful tool to supplement other funding mechanisms.

Discussion Points

As towns prepare their wastewater implementation plans, the following points deserve attention:

1. The City of Chicopee has established a stormwater management utility that reportedly has levied fees on all properties in a watershed, even those without direct piped connection to storm sewers, to pay the capital and operating costs of stormwater facilities. Each single-family house pays \$10 per quarter. Multi-family houses and commercial and industrial establishments pay \$0.30 per year per 1000 square feet of gross lot area, with an annual cap of \$400 per property. The fee is based on the average impervious surface area of each class of property. The fees thus bear some reasonable relationship to the benefit derived from the stormwater facilities.
2. Local property taxes are deductible on state and federal income tax returns for those that itemize deductions. Betterments are not deductible. Thus, other factors being equal, the property served by the public sewerage project has a lower after-tax cost associated with expenditures paid by property taxes than with expenditures paid from betterment assessments. The further (and more significant) benefit with property taxation is the spreading of the cost over a broader base than the new users.
3. Massachusetts tax law allows a tax credit equal to 40% of the cost of design and construction of the repair or replacement of a failed septic system, for total expenses up to \$15,000. The credit, up to \$6,000, may be taken at a rate of no more than \$1,500 per year over 4 years. There is an amendment pending to Chapter 62, Section 6 that would extend the eligible period to 7 years. (This tax credit may also be claimed by property owners who connect to a municipal system as a result of a federal court order or federal consent decree.)
4. Many people on Cape Cod associate "betterments" with the Community Septic Management Program administered by the BCDHE. That program provides loans for replacement of



failed septic systems, at 5% over 20 years. The loan is secured by a lien against the property, and the loan must be paid in full at the time of sale. Only residential properties are eligible, and there are income limitations.

5. In many public sewerage projects involving nutrient removal, the per-property cost for the public project is higher than the cost for individual septic systems. Without a property tax component to the project funding, the property owner who relies on a Title 5 system is typically faced with lower life-cycle costs than the property served by the public system, even without the benefits of the Community Septic Management Program and the state tax credit. By considering all of these factors, a town can document, as part of the comprehensive wastewater management plan, the degree of property taxation that provide a degree of fairness between sewered and unsewered properties, particularly when nutrient removal is the driving force.
6. Wastewater management districts have been formed in other parts of the country in which the district takes responsibility for certain functions associated with on-site wastewater disposal, ranging from inspection, to pumping, to repair and replacement. In this setting, where unsewered properties also benefit from the public program, betterments could be assessed against all properties.
7. As part of a public education program, towns may wish to develop materials supporting the general public benefits associated with improved wastewater treatment and disposal, as well as the financial incentives from loan and tax credit programs, as arguments for funding a greater proportion of system costs through property taxation rather than betterment assessments.

H. USE OF OPEN SPACE FOR WASTEWATER FACILITIES

Statement of Problem

Identifying land area for wastewater treatment and disposal is a thankless task performed by public works boards, wastewater committees, consultants and/or municipal staff. The Barnstable County WIC is currently developing decision criteria for a Cape-wide effort to identify appropriate parcels. Possibly the most contentious locations are those lands set aside for agriculture, conservation, recreation and open space. Utility lines criss-cross all Cape towns and represent potential effluent disposal sites provided that some very important utility priorities are respected.



*Effluent disposal beds under Ocean Park
Oak Bluffs, Martha's Vineyard*

Under certain circumstances, and perhaps only as a last resort, wastewater facilities could be sited on land previously set aside for agriculture, conservation or open space by a town, the state, a land trust, or other entity legally established to hold land for conservation. (Both wastewater treatment plants and disposal facilities for treated effluent might be sited on such land. The most compatible use, i.e. the one that would allow forests, orchards, trails, ball fields, etc. to remain, would be for the subsurface disposal of effluent, and for modular decentralized treatment systems that can be located below grade.) While the preservation of open space is a very important issue on Cape Cod, some local officials have realized the paucity of wastewater sites and have advocated balancing land use and water quality protection goals. This report attempts to address that problem, and parallels work by the Cape Cod Commission in its study of the potential for public well fields on municipally-owned land previously acquired for other purposes (see: The Compact of Cape Cod Conservation Trusts, Inc., June 2000, "The Creation of Public Wellfields through Conversion of Lands owned by Municipalities in Massachusetts").

Methods of Open Space Protection

Where a protected open space property is identified as a potential site for wastewater treatment and/or disposal, understanding the processes by which the land is protected, and how that protective mechanism may be altered to allow the wastewater use, will be important factors in weighing one site against another.

Land may be “permanently” protected for aquifer protection, agricultural, conservation, and recreational and/or general municipal use if the landowner gives or sells the land to a municipality. Covenants may be put on the land by the seller or donor that restrict the use of the land for specific purposes. In some situations, another layer of land protection may be added to municipally-owned land if the town grants a conservation restriction to a land trust. Under MGL Chapter 40, Section 8C, land can be donated to conservation commissions directly without town meeting action.



OPEN SPACE

If a town is to purchase a piece of land, or acquire it by eminent domain, it must have town meeting authority to do so, and that town meeting action typically stipulates the purpose for the acquisition or taking. If the stated purpose is for general municipal uses, then the town should be able to use that land for wastewater treatment and disposal without subsequent town meeting action. If the change involves a transfer of control from one town board to another, for example from the board of selectmen to the water and sewer commissioners, a two-thirds vote by town meeting would be required. Moreover, if the original town meeting vote to acquire the parcel stipulates that the land is to be used for conservation purposes or for aquifer protection, for example, then a two-thirds vote of town meeting is required to use the property for something other than the stated purpose. Conservation commission approval is also needed. If the town has granted a conservation restriction to a local, regional or national land trust, that trust must also vote to agree to allow use of the property for other than the stated purpose. If the original authorization stipulated that the land was acquired for conservation purposes, then a second step is required: the state legislature must also approve the change in use by a two-thirds majority.

Land can be temporarily protected under MGL Chapter 61. The property owner may designate that his or her land will be used for agriculture, forestry or recreational purposes and apply to a town's board of assessors for a reduced property tax rate. A change from one of the Chapter 61 uses, or sale for development, precipitates rollback taxes for 5 years. Subsurface wastewater disposal might not necessarily be a change in use but rather might be an additional use. Examples include using treated effluent for irrigation in orchards, disposing of treated wastewater on upland associated with cranberry bogs, and effluent disposal in a Christmas tree farm, provided that public health issues are properly addressed.

Land may also be protected as agricultural or conservation land if the landowner donates or sells the land to a land trust, which holds the land and manages it under guidelines provided by the donor and/or by the trust's board of directors. Land trusts are incorporated entities (MGL Chapter 156B, Sections 11, 12 13 and Chapter 180, section 4 as amended) and registered with the IRS as 501c3 organizations. Land trusts may sell land, trade land or use the land for a range of purposes following the guidelines (usually the articles of incorporation) of the organization and/or the land donor. Land held in fee by land trusts for conservation purposes could be available for wastewater treatment and disposal sites, without town meeting action or legislative vote, providing that: 1) the land trust's board of directors agreed that the proposed use did not diminish identified conservation values; and 2) the landowner had not specified a restriction on the use of the land prior to the conveyance. However, land trusts are likely to be less inclined to offer quasi-municipal services than a municipality that might be trying to balance conservation goals with wastewater treatment and disposal needs.

Land trusts, towns and other entities may also hold conservation or agricultural restrictions or easements (under MGL Chapter 184, Sections 31 to 33). The land itself remains in private ownership. The protections are similar to those on lands held in fee by a conservation organization. A two-thirds vote by the town and state legislature are required to change uses allowed on a town property protected through conservation restriction.

The process by which land was transferred to a land trust or municipality, or by which conservation restrictions were put in place, will determine the steps necessary to use previously



OPEN SPACE

set-aside land for wastewater purposes. Further, knowledge of these processes is important if it is appropriate to condition future land transfers to leave open the possibility of later use for wastewater facilities.

Extent of Power Line Rights of Way

Staff of the Cape Cod Commission has analyzed its Geographic Information System to determine that there are about 116 miles of major power line rights of way on Cape Cod. Based on the available information, it appears that 63 miles of these rights of way are over wetlands, conservation land or water supply zones of contribution. If only 10% of the remaining 53 miles were appropriately located and not otherwise encumbered, a significant amount of effluent disposal capacity might exist. There are a large number of site-specific issues that must be addressed, but this table-top evaluation indicates the potential for selective applications.

Concerns of Utilities

Power line rights-of-way are controlled to varying degrees by NStar. NStar owns only about 15% the land on which its facilities are located on Cape Cod. In the remaining 85%, NStar holds an easement and the land itself is owned by someone else. In some cases NStar holds an exclusive easement, in which the property owner has agreed that no other easements can be granted on the land occupied by NStar. In very few cases is the easement explicitly not exclusive; that is, where the property owner has reserved the right to allow other uses. When the easement is silent with respect to exclusivity, NStar believes that the courts would hold that exclusivity is implied by the inherent safety issues associated with power transmission.

There are several important issues to NStar. First, NStar must have unimpeded area to replace poles. Second, any vegetation must be kept to a low height. (In this case, the owner or operator of the wastewater facilities would maintain a grassed leaching field, and NStar would benefit by reduced need for clearing and trimming.) Third, NStar is concerned about off-road vehicles. (Here, the owner/operator of the wastewater facilities would have a similar concern and would undoubtedly provide fencing that would help NStar.) Fourth, NStar may need to keep certain key areas open for future underground power facilities.

Recommendations

We recommend the following:

1. In identifying and evaluating sites for wastewater facilities, towns should consider the sites in the following priority:
 - a. Already disturbed but unoccupied sites, such as at a gravel pit, or under existing parking lots.
 - b. Joint use in conjunction with currently developed or proposed future open space uses such as ballfields, utility rights of way, town parks, highway rights of way, or golf courses.
 - c. Vacant undisturbed land where appropriate effluent disposal could be accommodated.
 - d. Land already set aside for open space purposes.



OPEN SPACE

If undisturbed land is proposed for siting a wastewater treatment or disposal facility, consideration should be given to setting aside other land for open space or conservation purposes. This is desirable for sites not now set aside for conservation, and may be critical to the successful conversion of previously set-aside land.

2. If land is being considered for set-aside for conservation or other open-space purposes, which could also accommodate wastewater facilities, it would be prudent to incorporate appropriate wording in the town meeting article or conservation restriction language. Two possibilities are:

- Specify only "general municipal use".
- If the land is to be acquired for specific open space or conservation purposes, specify that wastewater treatment or disposal are allowed ancillary uses, with appropriate caveats with respect to effluent quality, extent of above-grade structures, etc.

Use of Open Space for Wastewater Facilities

- ◆ *Develop priority ranking of sites considering disturbed sites first*
- ◆ *Incorporate flexible wording on future land set-asides*
- ◆ *Pursue selective use of power line easements and road rights of way*
- ◆ *Promote innovative effluent disposal options*

When a town acquires land for conservation or recreation, the warrant article should include language that explicitly allows for subsurface disposal of treated effluent, but the source of funding (Land Bank, Community Preservation Act, etc.) must be considered, and may preclude the proposed wastewater use. Similarly, language in a deed or other

instrument donating land should contain language allowing subsurface disposal, with appropriate conditions to safeguard the conservation interest. One possible vehicle would be a donation of the fee interest to a land trust with a reserved easement donated to the town to provide for subsurface disposal under prescribed circumstances and conditions. Provided that both donees are qualified organizations, the tax deductibility of the donation should not be affected.

When conservation restrictions are conveyed to a town or private entity, wording could be incorporated to allow subsurface disposal of treated wastewater. A sample is shown in Figure 5-4, based on a conservation restriction recently negotiated in Rochester for a cellular tower within a forested parcel.

3. From our discussions with NStar, it appears that there may be opportunities for joint use of its land or easements, provided that strict attention is paid to its concerns. The simplest case would involve town-owned land over which NStar holds a non-exclusive easement, and there is adequate right-of-way width to keep the wastewater facilities sufficiently remote from poles. The town would negotiate with NStar to find a mutually acceptable solution. If the land were privately owned and subject to a non-exclusive easement, the town would bring NStar into the discussions with the land owner about town purchase to determine if an appropriate arrangement could be reached.



OPEN SPACE

**FIGURE 5-4
SUGGESTED WORDING FOR CONSERVATION RESTRICTIONS**

I. Purpose

II. Prohibited Acts and Uses, and Reserved Rights.

A. Prohibited Acts or Uses.

B. Reserved Rights. Grantor reserves all rights for use of the Premises not expressly prohibited under Paragraph A, of this Grant of Conservation Restriction. The following acts and uses otherwise prohibited in Section A are permitted, but only if such acts and uses do not materially impair the purpose of this Conservation Restriction or other significant conservation interests:

(1) Building Envelope ...

(2) Driveway/lane...

(3) Utilities. The installation, maintenance, repair and replacement of utilities, including water and, wastewater pipes, and power lines, poles, or antennas (including without limitation electricity and telephone, cable, fiber-optic, satellite, or other electronic commerce) underground or above ground, to service the structure permitted in Paragraph B (1), above and B (4) below.

(4) Treated wastewater disposal site. Within the Premises an area no greater than _____ sq. ft. shall be identified as a Treated Wastewater Disposal Site.
 Water quality requirements: treated wastewater disposed of at the site shall be domestic wastewater and shall meet the following quality standards:
 BOD5 _____, TSS _____, Total N _____, Total P _____, etc.
 [This is likely to be site-specific based upon soils, local and regional environmental conditions, etc., or may be obviated by permit requirements listed below]
 Permit requirements: [list appropriate permits from MA DEP and/or BOH].
 Liability: The site lease shall require that all liability for impacts to ground and surface water down gradient of the site shall be with the lessee. Insurance may be required.
 Site modification: Lessee shall be required to use technology that maintains the site in its natural condition as forest, meadow, or agricultural field.
 Grantor will notify Grantee of Grantor’s intention to lease the Site and provide Grantee with copies of all federal, state and local permits.

(5) Recreation....

(6) Trails....



OPEN SPACE

4. Highway rights of way, town parks and bike trails all may offer opportunities for effluent disposal. The Town of Provincetown was successful in acquiring rights to use a portion of the Route 6 right of way for effluent disposal from its municipal treatment plant. Facilities in the right of way are all below ground.
5. DEP should be encouraged to allow innovative effluent disposal techniques that are compatible with open-space land uses. These include drip irrigation, wicks, and deep well injection. DEP has issued guidelines for use of reclaimed water that permit spray irrigation on ballfields and golf courses under controlled circumstances.

Discussion Points

In implementing these recommendations, the following points should be considered:

1. There is a good example on Buzzards Bay of the appropriate use of land previously set aside for open space or recreation for subsurface disposal of treated wastewater. Interested towns should become familiar with the process by which the Town of Fairhaven installed effluent wicks on the state-owned West Island Reservation.
2. There are property tax consequences associated with conversion of Chapter 61 land to other uses. These financial issues should be addressed in evaluating sites for wastewater facilities.
3. It is not clear if Land Bank funds can be used to purchase land with rights reserved for wastewater facilities.
4. Under pending state legislation, the acreage of land "converted" from a protected use to some other use must be replaced elsewhere in the same town with land of equal or greater conservation value.
5. The level of protection afforded a particular property may be an indicator of the property's significance to the town's open space or natural resource protection plan.
6. A model conservation restriction is available at the website for the Massachusetts Division of Conservation Services www.state.ma.us/envir/des/restrictions/default.htm.
7. This section of this report should be reviewed with the Division of Conservation Services at EOEA, with DEP, with the Compact of Cape Cod Conservation Trusts, and with NStar officials.

Chapter 6 illustrates how effluent disposal could be accommodated within a conservation land set-aside in a residential subdivision and within a roadway relocation project in Orleans.

I. AFFORDABLE HOUSING BUILT UNDER MGL CHAPTER 40B

Statement of Problem

Chapter 40B was passed in 1969 to increase the supply and improve the regional distribution of low- and moderate-income housing by allowing a limited suspension of existing local regulations that are inconsistent with construction of such housing. A developer files an application with a town's zoning board of appeals, which then may seek recommendations from other boards, including the planning board, board of health, conservation commission, historical commission, water, sewer or other commission or district, fire, police, traffic or other department, building inspector or similar official or board.



AFFORDABLE HOUSING

The zoning board of appeals holds a public hearing to ensure that local concerns are properly addressed. Local concerns include health, safety, environmental, design, open space, and other concerns raised by town officials or residents. In making its decision, the board acts on behalf of all other town boards and officials, but only with regard to matters where local restrictions are more stringent than state requirements. The board can issue a single comprehensive permit, which subsumes all local permits and approvals normally issued by local boards. Alternatively, it can issue a comprehensive permit with conditions or it can deny the permit. If a comprehensive permit is granted, the applicant, prior to construction, must normally present final, detailed construction plans to the building inspector or similar officials to ensure that the plans are consistent with the comprehensive permit and state requirements.

If a permit is denied, or granted with conditions the applicant claims are uneconomic, the applicant may appeal the board's decision to the state Housing Appeals Committee. The general principle governing hearings before the local board and the Housing Appeals Committee is that all local restrictions, as applied to the proposed affordable housing, be "consistent with local needs." Section 20 of Chapter 40B defines consistency with local needs as being reasonable in view of the need for low and moderate income housing balanced against health, safety, environmental, design, open space, and other local concerns. If less than ten percent of municipality's total housing units are subsidized low and moderate income housing units, there is a rebuttal presumption that there is a substantial housing need that outweighs local concerns. (See 760 CMR 31.07(1)(e); Board of Appeals of Hanover v. H.A.C., 363 Mass. 339, 367, 294 N.E.2d 393, 413 (1973) source: www.state.ma.us/dhcd).

In general, 40B projects are not subject to local bylaws or regulations more stringent than state requirements. As a specific example, a local bylaw or regulation requiring a higher level of nitrogen removal than Title 5 would not necessarily apply to a 40B project. In this context, wastewater disposal at Chapter 40B projects may be inconsistent with nutrient management plans.

Cape Cod is unique in that it has an active County government, and development is, in part, regulated by the Cape Cod Commission. The Commission has been able to effect significant nitrogen removal at Developments of Regional Impact to protect coastal waters. However, in its enabling legislation, the Commission is designated as a "local entity" with respect to 40B



projects, so its requirements are fundamentally no different than regulations or bylaws adopted by towns. Therefore, the Commission's programs do not offer a solution to the problem noted above.

Recommended Solutions

Given the expedited review process for 40B projects, and the narrow focus of allowable town issues, actions on a number of fronts are warranted to reconcile the goals of affordable housing with the water quality protection goals on Cape Cod. The following actions should be considered:

1. Towns should plan for 40B projects and the infrastructure necessary to accommodate them. Affordable housing projects should be directed to growth centers where towns have provided, or plan to provide, wastewater collection, treatment and disposal facilities necessary to support high density development. This planning could include the setting aside of reserve capacity at existing centralized wastewater facilities. Where such capacity does not exist, towns could forge public-private partnerships with developers to jointly build satellite plants to serve both the affordable housing project and nearby development. Properly planned, joint facilities could provide economical wastewater service to the affordable housing project, thus encouraging this important program, while addressing other municipal sewer needs. It should be noted that a proposed amendment to Chapter 40B has been filed (H4240) that would require a town to adopt an affordable housing plan. This recommendation is consistent with that concept.
2. Towns should develop and adopt comprehensive wastewater management plans that set forth standards for nutrient control sufficient to accomplish water quality goals. Should a 40B project apply for a groundwater discharge permit from DEP, DEP would set discharge limits consistent with the comprehensive plan. The groundwater discharge permit program is already structured to consider site-specific conditions that warrant more stringent limits than DEP's standard 10 mg/l limit for nitrogen.

Affordable Housing Built under MGL Chapter 40B

 - ◆ *Actively plan to accommodate 40B projects*
 - ◆ *Ensure that DEP groundwater discharge permits reflect locally-based limits*
 - ◆ *Establish scientific basis for stringent limits*
 - ◆ *Modify Title 5 to expand N-sensitive areas*
3. DEP could designate all appropriate Cape Cod watersheds as "nitrogen sensitive areas" as defined in Title 5 (310 CMR 15.215). This state designation should result in the higher levels of nitrogen control warranted by local conditions and management plans, even for 40B projects.
4. Title 5 (310 CMR 15.215) could be amended to expand the definition of nitrogen sensitive areas to include those areas determined in a DEP-approved comprehensive wastewater management plan.



5. Since the presumption that the need for affordable housing outweighs local concerns is rebuttable, towns and Barnstable County should accelerate efforts to develop scientific data on the significant adverse impact caused by excessive nitrogen loading to sensitive coastal embayments. Having these data readily available when faced by the statute's tight time schedule would help boards of appeals or the County to make the case that compelling evidence exists that local concerns do, in fact, outweigh the need for housing in appropriate circumstances.
6. Chapter 40B, Section 23 could be amended to elevate the comprehensive wastewater management plan to a higher level of importance in the granting of comprehensive permits or the resolution of appeals to the Housing Appeals Committee. Figure 5-5 shows prospective wording. Except for the reference to "comprehensive wastewater management plan", this proposed wording is contained in amendments to Chapter 40B that have already been proposed and are under consideration.

**FIGURE 5-5
POSSIBLE AMENDMENT TO MGL CHAPTER 40B**

Section 23. The hearing by the housing appeals committee in the department of housing and community development shall be limited to the issue of whether, in the case of the denial of an application, the decision of the board of appeals was reasonable and consistent with local needs and, in the case of an approval of an application with conditions and requirements imposed, whether such conditions and requirements make the construction or operation of such housing uneconomic and whether they are consistent with local needs. ***The committee shall receive evidence of and shall consider the following matters: (1) a city or town's master plan, comprehensive plan, comprehensive wastewater management plan, or community development plan, and (2) the results of the city or town's efforts to implement such plans.***

Discussion Points

When these recommendations are considered, the following points should be noted:

1. It will take several years for comprehensive wastewater management plans to be put in place in most Cape Cod towns. In the interim, DEP may have insufficient basis for more stringent effluent limits in groundwater discharge permits.
2. Even with a comprehensive wastewater management plan in place, DEP generally does not issue groundwater discharge permits for projects with flows below 10,000 gpd. Thus small projects may "fall below the radar". The designation of nitrogen sensitive areas may close this gap.
3. We know of no example where DEP has designated a nitrogen sensitive area based on protection of coastal waters. The designation process may be lengthy and cumbersome, and DEP may not be willing to make that designation prior to the completion of MEP studies. A strict reading of Title 5 would suggest that even with that designation, nitrogen loading could



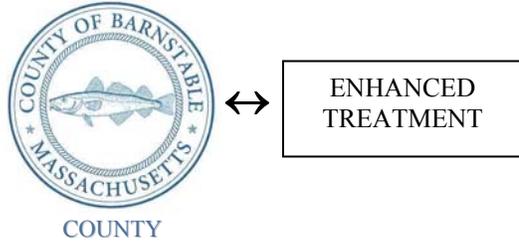
AFFORDABLE HOUSING

only be restricted to the equivalent of 440 gpd/acre. More stringent standards may not be possible without modifying this section of Title 5. Discussions with DEP on this matter are warranted.

4. If towns adopt standards for design and construction of private cluster systems or satellite plants, 40B projects will not be governed by those standards if they are more stringent than what DEP guidelines suggest. Support for comprehensive updating of DEP's design guidelines is warranted to "raise the bar" at the state level.

Chapter 9 summarizes the Town of Barnstable's success in providing wastewater treatment capacity for a future affordable housing project as part of the upgrading of the treatment plant serving the Horace Mann Charter School in Marstons Mills.

J. COUNTY OVERSIGHT OF ENHANCED TREATMENT SYSTEMS



Statement of Problem

Various town boards may require the installation of enhanced treatment systems at individual homes or businesses at the time of construction or for remediation of failed systems. Whether required by the board of health or another town board, it is the board of health that issues the local permit for such systems. DEP requires the owner of an enhanced system to contract with a DEP-approved operator, and to file an annual report covering maintenance activities and the results of the sampling and analysis of effluent and/or groundwater quality. Town boards may require more extensive oversight or reporting. There appears to be considerable variability from town to town as to who evaluates the reports or identifies corrective actions if needed.

The Barnstable County Department of Health and the Environment (BCDHE) has been actively involved in the development, testing and oversight of individual enhanced treatment systems. The Department helps manage the Massachusetts Alternative Septic System Test Center at the Massachusetts Military Reservation where new wastewater treatment technologies are demonstrated. Department staff compiles and analyzes data from installations in many Cape Cod towns and reports back to the boards of health in those towns. This is an informal program funded from the BCDHE operating budget. The BCDHE is interested in expanding this data collection and analysis program to include all Cape Cod towns and to provide more intensive oversight; however, its funds are limited and it must rely on the boards of health, property owners and operators to forward monitoring data.

A more comprehensive approach to the oversight of individual enhanced systems is needed if the potential of these systems is to be realized.

Recommended Solutions

There are several steps that could be taken to help address the problems noted above. Our recommendations are as follows:

1. Each town must develop and implement a system of regulations and bylaws, and provide for their implementation and enforcement, as part of the comprehensive wastewater management planning process. Such management programs may include town or district oversight of individual enhanced systems, or, alternatively, planners may conclude that Barnstable County assistance is preferred. Prior to the completion of that comprehensive planning, an expanded BCDHE program would be a cost-effective way to track performance of these systems. We recommend that towns support the development of a broader BCDHE program and participate in it, at least as in interim measure. (The BCDHE has already been successful in providing a County-wide service in the form of the Community Septic Management Program. That program coordinates the financing of septic system repairs, whether they involve conventional Title 5 or enhanced treatment systems. This is a good example of how the County can cost-effectively reduce the administrative burden for the towns.)



ENHANCED TREATMENT

2. The BCDHE's existing program related to enhanced systems could be expanded in two ways. First, all Cape towns should obtain County assistance in compiling and analyzing monitoring data. Second, the services provided by the County could be expanded to include inspection, sampling, testing and oversight of operators. Since these enhanced treatment systems are permitted by local boards of health, enforcement responsibility would continue to reside with the boards of health. However, the County could provide valuable input to the boards of health on the need for enforcement action and the range of actions available to correct problems.

3. A County-wide program to monitor and assess the effectiveness of enhanced systems could be funded in either of two ways. First, the operating budget of the BCDHE could be increased, and the costs automatically passed on to the towns through a slight increase in annual County assessment. Second, the board of health could require the applicant to obtain a town license, and renew it annually, as a condition of approval for the enhanced treatment system. The license would involve a small fee, which the BCDHE estimates would be in the range of \$25 to \$50. The town would contract with the County for monitoring services and pay over most or all of the license fees to the County as payment for those services. This system would be most effective if all towns adopted a uniform approach as was done for the Community Septic Management Program. With a well-operated County system, DEP and local monitoring requirements might be relaxed, with cost savings to the property owner that would significantly

County Oversight of Enhanced Treatment Systems

- ◆ Provide County service to all towns
- ◆ Expand program to include inspection, monitoring, etc.
- ◆ Implement County budget increase or local license program with fee

exceed the license fee. This system should also be considered for County inspection of the installation of enhanced treatment systems.

4. Boards of health could implement a new regulation, or amend an existing related regulation, that requires the applicant to obtain a license for an enhanced treatment system. A standard agreement could be developed between the County and each town to formalize the following arrangement: a) the County provides inspection and monitoring of enhanced treatment systems as a service to the town; and b) the town pays the County for that service with funds raised by collecting a fee paid by the property owner. The standard agreement could be analogous to that which each of the 15 Cape Cod towns has signed to enable the County to administer the Community Septic Management Program.



ENHANCED
TREATMENT

Discussion Points

There are several issues that should be considered as these recommendations are considered by the towns and Barnstable County:

1. The underlying authority for approval of enhanced treatment systems would continue to be with the local board of health (or in some cases DEP). The County can provide valuable technical assistance in tracking the performance of these systems, but the local board of health must still be responsible for enforcement action under the program that is recommended.
2. If the County program is to be expanded to include other aspects of managing these systems (such as sampling, analysis, and oversight of operators), towns, through their boards of health, should have input into how the program is expanded. As comprehensive wastewater planning is underway, the County can provide a cost-effective service to the towns in this emerging area of technology, but preferably in an advisory role consistent with each town's individual approach to local permitting, siting and design issues.
3. While our recommendations focus on individual enhanced treatment systems, the recommendations apply as well to cluster systems (both conventional Title 5 systems and those with enhanced treatment).

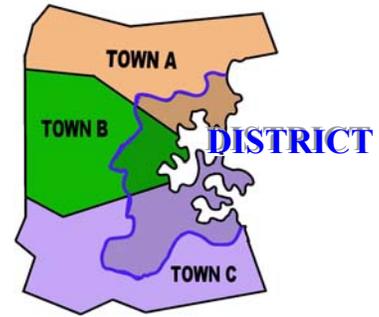
The BCDHE has taken steps toward implementing these recommendations. Appendix D contains a brochure developed by BCDHE to promote this program.



*Enhanced Treatment
Cluster System Installation -- Chatham*

K. OPTIONS FOR DISTRICT FORMATION

Wastewater management districts are one tool (among the many that are presented in this chapter) that may provide improved wastewater management on Cape Cod. This section of Chapter 5 summarizes the advantages and disadvantages of districts, documents how districts can be formed, and illustrates their possible role in a variety of Cape Cod settings.



Definition

Chapter 2 discusses how a "wastewater management district" can range from a simple geographic area where certain wastewater rules apply (such as an overlay district), to a complex multi-town governmental entity, complete with staff and legal authority, that formulates and enforces those wastewater rules, as it designs, builds and operates wastewater infrastructure to protect a specific watershed. In this section, we deal with the latter case where a district is a governmental entity.

Options for District Formation

- ◆ Consider benefits in single- and multi-town settings
- ◆ Choose from several mechanisms for district formation
- ◆ Coordinate planning efforts watershed-wide

Several issues must be addressed to form a wastewater management district:

1. For what wastewater management functions will the district be responsible (for example, planning versus design versus operation)?
2. What will be the geographic area of the district?
3. For what types of wastewater facilities will the district be responsible (for example, individual systems versus satellite plants)?
4. How will the district fund its activities?
5. How will the district's functions be coordinated with town functions?

Table 4-1 lists and defines the functions that a district may assume.

Advantages and Disadvantages

Advantages of wastewater management districts include:

1. The district's principal or sole function would be wastewater and/or nutrient management, and decision makers would not be distracted by other municipal functions.
2. A multi-town district may be better able to obtain state funding for infrastructure projects than individual towns; DEP gives extra priority points to regional projects in its SRF program.
3. DEP is moving toward watershed-based permitting, and a district could be formulated to deal most effectively with the local implementation of such permits.
4. A district can attract staff with special expertise in wastewater issues.
5. In a multi-town watershed, the towns could benefit from the economies-of-scale that a district can provide.



6. A district may be able to raise money through a special property tax, making it easier to fairly allocate nitrogen control costs across a watershed.
7. A district would not be subject to the limitations of Proposition 2½.

Disadvantages of a wastewater management district (compared with town management of wastewater and nutrient issues through its public works department or board of health) include:

1. The district would be an added level of government, perhaps with attendant extra costs. For example, the district might have office expenses, clerical costs, equipment costs, etc. that might be, at least in part, duplicative with respect to existing town functions.
2. Zoning issues would still be handled by local planning and zoning boards, and Title 5 compliance would still be the responsibility of the board of health, so close coordination would be needed between the district and these local boards. (This same issue exists with a public works department in a single town; however, all town functions fall within the same overall municipal structure.)
3. The financial strength of a multi-town district could be compromised by the failure of one of the member towns to appropriate its share of costs.

Mechanisms for District Formation

Districts can be formed in the following ways:

1. By special legislation, such as was used to form the Orleans Brewster Eastham Groundwater Protection District.
2. Under MGL Chapter 40N, the state statute related to water and sewer commissions. This statute allows for regional water and sewer district commissions under Section 25. Many Massachusetts towns have formed water and sewer commissions under this statute. If a single town has established a commission, it may provide services to other towns through inter-municipal agreements.
3. By amending MGL Chapter 165, Water and Aqueduct Companies, to allow water districts to undertake wastewater functions. Water districts are well-established entities with experience in infrastructure development and operation that may have the administrative capabilities to provide wastewater services.
4. By amending MGL Chapter 48, Fires, Fire Departments and Fire Districts, to allow fire districts to undertake wastewater functions.
5. Under the Barnstable County Charter. A County-wide district could be established within which the County takes on responsibilities of the towns that are most cost-effectively accomplished regionally, if the towns agree.
6. By or through DEP under the Massachusetts Clean Waters Act, MGL Chapter 21 (Sections 28, 29, 30, 32, 35 and 36). DEP can propose or mandate a water pollution abatement district with all the powers needed to plan, design, build and operate needed infrastructure. Revenues would be raised by proportional assessment of member towns.
7. By establishing a regional health district under MGL Chapter 111, Section 27B. The district's authority would generally be limited to the authority of the individual boards of health.

In addition to these options, towns can establish geographic districts by bylaw or regulation. For example, the Town of Falmouth has established a Coastal Ponds Overlay District and a Water



Resources Protection District in which specific water-quality-related standards apply. Such districts are limited to that town's boundaries.

Illustrative Models

Table 5-1 shows the parties typically responsible for various wastewater functions for the four basic types of wastewater facilities. The geographic focus today is typically town-wide, as discussed in Chapter 4.

There are a large number of possible district arrangements that would be applicable to Cape Cod. Table 5-2 illustrates the functions that might be assigned to a district whose boundaries are a watershed that spans three towns where there are no centralized wastewater facilities. In this example, we have assumed that the district would be responsible for planning and operating enhanced individual treatment systems in the watershed. The boards of health in the three illustrative towns would continue to be responsible for Title 5 systems, as well as any enhanced systems outside the district.

Table 5-3 illustrates a scenario similar to Table 5-2, but with a centralized sewerage system in one of the three towns. The district would be responsible for the decentralized components of the wastewater plan in all three towns, except for the normal Title 5 responsibilities of the three boards of health. The DPW in Town A could operate and monitor the satellite and cluster systems in all three towns, given its capabilities and staff.

**TABLE 5-1
RESPONSIBLE PARTIES: TYPICAL CURRENT APPROACH (NO DISTRICTS)**

Function	Individual On-Site Systems	Cluster Systems	Satellite Plants	Centralized Systems
Planning	Property Owner, Town	Property Owner, Town	Property Owner, Town	Town, County
Land Acquisition	Property Owner	Property Owner, Town	Property Owner, Town	Town
Permitting	Property Owner	Property Owner, Town	Property Owner, Town	Town
Design	Property Owner	Property Owner, Town	Property Owner, Town	Town
Construction	Property Owner	Property Owner, Town	Property Owner, Town	Town
Operation	Property Owner	Property Owner, Town	Property Owner, Town	Town
Monitoring	Property Owner, County	Property Owner, Town, County	Property Owner, Town	Town
Enforcement	Town, County, State	Town, County, State	Town, County, State	State
Funding	Property Owner, County	Property Owner, Town	Property Owner, Town	Town

Note: Responsible party may hire one or more service providers to carry out given function (e.g., town could hire County to monitor cluster system performance).



Wastewater management districts may evolve when a private developer builds a project with wastewater infrastructure. That facility and the properties it serves become an informal private wastewater district. If the town were to assume ownership of the facility, the "district" would be absorbed into the town.

**TABLE 5-2
RESPONSIBLE PARTIES: WATERSHED-BASED DISTRICT SPANNING 3 TOWNS
(NO CENTRALIZED FACILITIES)**

Function	Individual On-Site Systems		Cluster Systems	Satellite Plants	Centralized Systems
	Title 5	Enhanced			
Planning	BOH, County, Property Owner	BOH, District, County, Property Owner	District	District	Not Applicable
Land Acquisition	Property Owner	District, Property Owner	District	District	Not Applicable
Permitting	Property Owner	District, Property Owner	District	District	Not Applicable
Design	Property Owner	District, Property Owner	District	District	Not Applicable
Construction	Property Owner	District	District	District	Not Applicable
Operation	Property Owner	District	District	District	Not Applicable
Monitoring	BOH, County, Property Owner	District	District	District	Not Applicable
Enforcement	Town, County, State	District	District	State	Not Applicable
Funding	Property Owner, County	District	District	District	Not Applicable

Note: Responsible party may hire one or more service providers to carry out given function (e.g., District could hire County to monitor performance of enhanced treatment systems).

There is a wide range of options available to Cape Cod towns to manage wastewater and nutrients through district concepts. The best choice for a given town or watershed will depend on the nature and extent of existing wastewater infrastructure, the degree to which multi-town solutions are needed, and the nature of towns' existing organizational structure. Tables 4-1, 5-1 5-2 and 5-3 illustrate the use of a systematic approach to assign responsibilities for functions across the spectrum of likely infrastructure. This systematic approach should be applied to the specific situation in each town or watershed.



**TABLE 5-3
RESPONSIBLE PARTIES: WATERSHED-BASED DISTRICT SPANNING 3 TOWNS
(ONE CENTRALIZED FACILITY)**

Function	Individual On-Site Systems		Cluster Systems	Satellite Plants	Centralized Systems
	Title 5	Enhanced			
Planning	BOH, County, Property Owner	BOH, District, County, Property Owner	District	District	Town A DPW
Land Acquisition	Property Owner	District, Property Owner	District	District	Town A DPW
Permitting	Property Owner	District, Property Owner	District	District	Town A DPW
Design	Property Owner	District, Property Owner	District	District	Town A DPW
Construction	Property Owner	District	District	District	Town A DPW
Operation	Property Owner	District	Town A DPW	Town A DPW	Town A DPW
Monitoring	BOH, County, Property Owner	District	Town A DPW	Town A DPW	Town A DPW
Enforcement	Town, County, State	District	District	State	State
Funding	Property Owner, County	District	District	District	Town A DPW

Note: Responsible party may hire one or more service providers to carry out given function (e.g. District could hire County to monitor performance of enhanced treatment systems).

Implementation Steps

What steps would towns take to begin planning for a multi-town wastewater management district? The following outline portrays one possible approach for a hypothetical two-town watershed:

1. The boards of selectmen set up an inter-town working group during the planning stage of the project to begin to identify and address common interests and possible areas of conflict. Points of concurrence are formalized in memoranda of agreement.
2. Steps are taken by DEP and the County to synchronize and coordinate the planning processes for the towns.
3. Both towns have access to and participation in the studies conducted by the Massachusetts Estuaries Project.
4. During the comprehensive wastewater planning process, DEP fine-tunes the approved scopes of work to avoid overlap and assure proper consideration of regional alternatives.
5. In developing the implementation programs for the comprehensive wastewater management plans, the issues listed in "Definition" above are thoroughly addressed (for example, for what management functions will the district have responsibility?).
6. If the district concept gains approval through the public participation activities of the comprehensive planning work, the towns bring in their town counsels, the local state representative, and DEP, EOEA and County staff to begin more detailed planning.



7. The most appropriate method is selected for forming the district (see "Mechanisms" above).
8. Articles are put before both town meetings to gain authorization, perhaps including draft legislative language if a special act is selected as the best vehicle.
9. The local legislative representative files the bill, after gaining formal support from DEP and EOEPA.
10. The district is organized in accordance with the procedures and under the terms set forth in the bill.

If the district were to be located entirely within a single town, the process would be generally the same, centered on Steps 5 through 10 above.

Discussion Points

The following points are pertinent to this matter, and should be discussed by the County, DEP and towns interested in districts:

1. Barnstable County should continue to take a lead role in organizing and facilitating inter-town discussions and promoting public education on the related issues.
2. It might take a year or more to form a district through special legislation. Under Chapter 40N, the process could be less time consuming if it involves a single town.
3. District formation would logically be debated and decided upon as part of a town's comprehensive wastewater management planning. Would it be better if the district were formed first and took the lead role in conducting the comprehensive planning?
4. DEP's 2003 report "The Massachusetts Estuaries Project: Embayment Restoration and Guidance for Implementation Strategies" contains further discussion of several options for district formation that are summarized above.
5. While wastewater is the focus of this project, a watershed-based district could also take on responsibility for related activities, such as stormwater management.



*Town Cove
Watershed spans Orleans and Eastham*

L. MANAGEMENT OF WASTEWATER TREATMENT RESIDUALS



WASTEWATER RESIDUALS

Statement of Problem

Every wastewater treatment system generates residual solids, whether it is a simple Title 5 septic tank and leaching field or an advanced system with nutrient removal. The residual solids from conventional treatment systems are called sludge (when disposed of without beneficial reuse) or biosolids (when beneficially reused). Septage is the term used to describe the solids pumped from septic tanks. Another often-overlooked residual is the grease removed from restaurant grease traps or from the headworks of conventional wastewater treatment systems.

If residual solids are not regularly removed from treatment systems, the systems do not continue to function properly. This is particularly true of Title 5 systems, where solids carryover from the septic tank to the leaching system can cause system failure.

The quantity of residual solids generated on Cape Cod is expected to increase for several reasons. First, increasing population creates more wastewater which results in more residuals. Second, as individual septic systems are replaced by cluster, satellite or centralized facilities, the higher level of wastewater treatment results in more residuals per gallon treated. Third, there is increasing awareness of the need to properly handle fats, oils and grease from restaurants and other food preparation facilities, increasing the frequency of pumping and the resulting volumes.

Several existing or potential problems deserve attention:

- The lack of public understanding of the need for regular removal of solids from wastewater systems;
- A possible shortfall of acceptable disposal locations as quantities increase; and
- Increasing costs for pumping, transport, and disposal if local options become unavailable.

Recommended Solutions

There are several steps that should be taken to ensure reliable local facilities for handling wastewater residuals. These include the following measures:

1. Reasonable efforts should be taken to support existing septage and sludge handling facilities on Cape Cod. Barnstable County and the towns should support the stand-alone septage facilities in Yarmouth and Orleans (the Tri-Town plant), and centralized wastewater facilities should be encouraged to receive septage from the towns they serve.
2. Towns should require owners of cluster and satellite plants to conduct regular pumping of residuals and to provide documentation of the date pumped, the quantity pumped and the receiving location for treatment. This requirement should be part of the local regulation or bylaw recommended earlier in Section 5B of this chapter (Municipal Involvement in Private Satellite and Cluster Systems).



3. Each town should have a formal arrangement that allows the septage generated within its borders to be taken to an approved facility. For a town with a centralized plant, that may involve the addition of receiving facilities and the setting aside of capacity at

Management of Wastewater Treatment Residuals

- ◆ *Educate public on need for regular pumping*
- ◆ *Mandate pumping of cluster & satellite systems*
- ◆ *Make formal arrangement with centralized wastewater plants or regional septage facilities*
- ◆ *Increase grease handling capacity*

the plant for the town's own septage. For towns without centralized facilities, the town should have contractual arrangements with another town that has a centralized plant, or with one of the stand-alone septage facilities. These arrangements assure a disposal location for all residuals as well as facilitate long-term planning and help stabilize costs. Alternatively, towns can rely on private haulers to find cost-effective disposal options. (It should be noted that private haulers have the right to take septage to a private or public facility different from one with which the town may have made arrangements.)

4. Many treatment plants will not accept grease due to difficulties in properly treating it. Facilities for proper grease handling should be incorporated into new or upgraded centralized wastewater plants, and the grease handling capabilities of the Yarmouth and Tri-Town plants should be expanded as necessary to provide assured disposal locations for this material.
5. The need for regular solids removal from individual systems should be part of every town's public education program.

Discussion Points

The following points are pertinent to this topic:

1. Septage and sludge are typically high in nitrogen content. In cases where centralized wastewater facilities must meet very stringent nitrogen limitations, septage is a nitrogen source that may be more easily transported outside the critical watershed (or even off-Cape) than is wastewater.
2. Where septage handling has been properly planned for, some towns have found that septage receiving fees can be an important revenue source.
3. Some fats, oils and greases can be diverted from the wastewater stream for use in rendering, as an energy source, or as feedstock for biodiesel production.
4. The Town of Orleans has received funding from the Wastewater Implementation Committee to evaluate future needs of the Tri-Town plant. The scope of that study has been expanded to consider septage needs Cape-wide.

CHAPTER 6

CASE STUDY -- ORLEANS

BACKGROUND

Orleans has a year-round population of about 7,000 people and significant seasonal population. It has no public wastewater facilities. Within Orleans' borders there are 3 satellite plants (two at commercial laundries and the 21,000-gpd facility serving the Community of Jesus) and about two dozen enhanced treatment systems. The Tri-Town Septage Treatment Plant is located in Orleans, and is run by the Orleans Brewster Eastham Groundwater Protection District. It provides septage treatment services to the three District towns as well as other Cape communities.

The Town has established a Wastewater Management Steering Committee (WMSC) which comprises representatives of the Board of Selectmen, the Board of Health, the Conservation Commission, the Board of Water Commissioners, the Planning Board and the Finance Committee. The Town Director of Planning, George Meservey, is the staff liaison with the WMSC.

The water quality sampling and analysis efforts for the Massachusetts Estuaries Project are entering their fourth year. Orleans is expected to receive its findings in mid 2005. In the interim, the WMSC has embarked on selected planning tasks and has formed a Citizens Advisory Committee.

In light of its schedule for completing the MEP studies and starting formal comprehensive wastewater planning, Orleans is a good candidate to apply some of the tools described in Chapter 5 of this report. This chapter illustrates how a town can undertake some of the proposed interim measures, conduct a thorough build-out analyses, and plan for possible use of power line easements, road rights-of-way and other open space for effluent disposal.

INITIAL IDENTIFICATION OF SITES FOR WASTEWATER FACILITIES

Based on screening criteria developed by its engineering consultant, the WMSC has identified 28 potential sites for pump stations, wastewater treatment facilities and effluent disposal. The identified sites are widely distributed across town, and have a range of development hurdles. The location of the sites has not been publicized until further analysis is complete. Nonetheless, the WMSC now has a list of sites that it will monitor with respect to availability and development, and can begin to consider options for acquisition of title or easements. The WMSC has also gained a sense of the importance of timely action with respect to site evaluation and acquisition.

ANALYSIS OF WATER USE DATA TO ESTIMATE SEASONAL OCCUPANCY

Orleans is a seasonal community, and the impacts of wastewater disposal are not limited to the year-round population. While estimates have been prepared of Orleans' peak summer population, little work has been done to quantify the population in the "shoulder" seasons. It is very important to know the equivalent annual population to properly calibrate water quality models and to identify wastewater management options. Further, estimating future wastewater quantities can only be done effectively if planners understand the seasonal component and consider how it may change over time.

The Town's GIS database was linked to assessor's and water department records to determine the number of bedrooms and water consumption for every parcel in each of the residential land use classifications. The analysis was segmented between year-round and seasonal houses, based on the assessor's determination of seasonal use. The evaluation was performed for each of the 14 watersheds established by USGS.

Water meter readings are taken twice per year for residential properties. We summed the water use in the two periods and divided by 365 to arrive at an annual average water use in gallons per day (gpd). It is important to recognize that the resulting figure includes periods of actual water use and periods when the home is unoccupied. For seasonal homes, the figure does not represent water use during occupied periods, which would be higher than the annual average. For example, a seasonal home that uses 36,500 gallons per year would have an annual average of 100 gpd, even though its occupants consume 200 gpd over 6 months and none for 6 months.

Table 6-1 summarizes the number of residential lots and the associated water use in both year-round and seasonal categories.

Basic Water Use Statistics

The Town has an extensive water system that serves most of Orleans' residents from 7 municipal wells. During the period of 1998 to 2001, Orleans' residential water customers consumed between 217 and 255 million gallons per year. The database that was subject to detailed analysis includes water use records for the 12-month period of August 2002 to July 2003, with a town-wide total of 228 million gallons. Thus the database falls within the range of recent years' water use. (A multi-year database is preferred to lessen the likelihood of atypical data related to drought or uncharacteristic levels of seasonal visitors.)

The database shows 3,515 (93%) residential lots with town water and 273 (7%) residential lots without town water. Of the residential buildings served by town water, 3,232 (92%) are single-family homes, or 283 (8%) are multi-family. About 83% of residential water use occurs in single-family homes, with the rest in apartments, condominiums and mixed-use commercial buildings.

Water Use per Residential Lot

Single-family homes with town water service consume 159 gpd on average. Other residential categories (including multi-family houses, apartments and condos) consume 385 gpd of town water per lot.

**TABLE 6-1
CURRENT ORLEANS WATER USE DATA (RESIDENTIAL)**

	Year-Round	Seasonal	Town-Wide
Number of Lots with Town Water			
Single-family	1,833	1,399	3,232
Multi-family	71	212	283
Subtotal	1,904	1,611	3,515
Number of Lots without Town Water			
Single-family	104	104	208
Multi-family	38	27	65
Subtotal	142	131	273
Total Number of Residential Lots	2,046	1,742	3,788
Water Use per Lot--single family homes			
1 and 2 bedrooms	150	80	
3 bedrooms	181	127	
4 bedrooms	197	168	
5 bedrooms	235	174	
6 or more bedrooms	476	188	
Overall	182	128	159
Number of bedrooms per home	3.09	3.12	3.10
Water Use per Lot--multi-family	459	312	385
Water Use per Bedroom--single family homes			
2 bedrooms	76	42	
3 bedrooms	60	42	
4 bedrooms	49	42	
5 bedrooms	47	35	

Seasonal Versus Year-Round Houses

For lots served by town water, 43% of the single-family houses are categorized by the Town Assessor as seasonal. An even higher percentage of multi-family properties (74%) are considered seasonal.

As a town-wide average, there are 3.10 bedrooms per single-family home. There is no significant difference between year-round and seasonal homes: 3.09 bedrooms per year-round home and 3.12 bedrooms per seasonal home.

For single-family homes served by town water, year-round homes use 182 gpd on average, compared with 128 gpd for seasonal homes.

Variation among Watersheds

Of the 14 watersheds in Orleans, the variation in average per-lot water use among watersheds is relatively small, with the most extreme figures typically associated with watersheds with few homes. For example, for 3-bedroom year-round homes, the average per-lot water use varies from 147 gpd to 238 gpd depending on the watershed. Ten of the 14 watersheds have average per-lot water use within 10% of the 181 gpd town-wide average for 3-bedroom homes.

Relationship of Water Use to Number of Bedrooms

For single-family homes, the per-lot water use increases predictably with the number of bedrooms. For year-round homes, per-lot water use increases from 150 gpd for 1- and 2-bedroom homes to 235 gpd for 5 bedroom homes. For seasonal homes the trends are similar.

For single family homes with either 2, 3 or 4 bedrooms (93% of the year-round homes with town water and 91% of the seasonal homes with town water), the per-lot water use for seasonal homes is 71% of the comparable figure for year-round homes.

Water Use per Bedroom

Regulations developed by DEP use the figure of 110 gpd per bedroom to estimate wastewater flow. This figure is derived from 55 gpd per capita and 2 persons per bedroom. (Total water consumption is typically higher than wastewater volume due to uses of water that do not generate sewage, such as lawn irrigation and car washing.) The water use figures shown in Table 6-1 illustrate that water use per bedroom actually decreases as the number of bedrooms in the house increases. For single-family year-round homes, water use ranges from 76 gpd per bedroom for 2-bedroom homes down to 47 gpd per bedroom for 5-bedroom homes. Three-bedroom year-round homes on average use 28 more gallons per day more than 2-bedroom homes, while four-bedroom homes use only 16 gpd more water than the typical 3-bedroom home. The water use per bedroom in seasonal homes is lower due to reduced period of occupancy and varies little with the number of bedrooms.

Occupancy

Given that these data show that seasonal homes in Orleans use about 70% as much water as year-round homes, does that mean that seasonal homes are typically occupied 70% of the year? It is the WMSC's opinion that seasonal occupancy is much less than 70% of the year and the water use data reflect both more people per home and a higher water use per capita in seasonal homes (reflecting more frequent laundry and shower use, etc.).

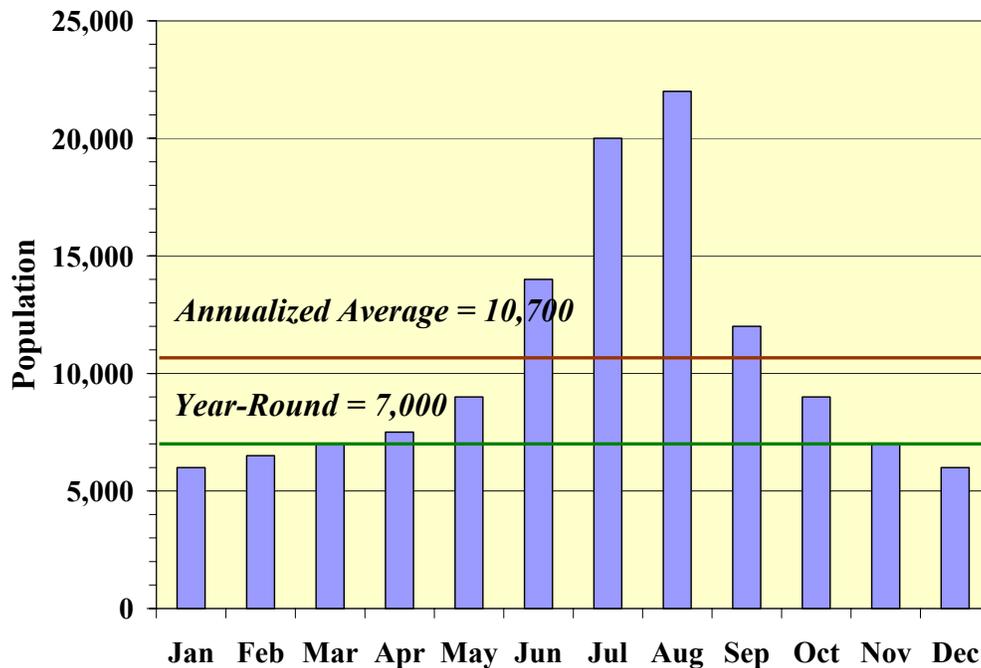
Estimated Population

U.S. and Town census figures support an estimate of about 7,000 people year-round. Estimates of population in July and August are in the range of 20,000 to 25,000. Lot-by-lot water use data are not available on a month-by-month basis, but annual water use figures can be used to predict an annualized average population. Using 64 gpd per capita as an average water use, this analysis of residential water meter readings, projected upward to account for the small number of homes without town water, indicates about 10,700 people in Orleans as an annualized average. The WMSC has combined various data to arrive at the following estimate of resident population by month.

January	6,000	July	20,000
February	6,500	August	22,000
March	7,000	September	12,000
April	9,000	October	9,000
May	9,000	November	7,000
June	14,000	December	6,000

Figure 6-1 illustrates graphically the estimated seasonal variation in resident population.

FIGURE 6-1
SEASONAL DISTRIBUTION OF POPULATION IN ORLEANS



Using water consumption data as a surrogate for resident population, we estimate that the annual nitrogen load from wastewater disposal is about 50% higher than would be predicted from year-round population alone.

BUILD-OUT PROJECTIONS TO ESTIMATE FUTURE WASTEWATER FLOWS

Given the current water use statistics presented above, and the seasonal population they reveal, how can the Town use his information to predict build-out conditions and the associated wastewater flow? There are a number of possible approaches to conducting build-out analyses, and the best approach depends on the intended use of the projections (school planning, traffic improvements, etc). This section illustrates one approach that focuses on water use and seasonal occupancy as they relate to future wastewater flows and nitrogen loads.

Methodology

Table 6-2 depicts a spreadsheet-based methodology for estimating build-out conditions for residential development. It can be used to predict the number and size of future residential stock, and most importantly, the water use in the residential sector that can be a surrogate for annualized average population, wastewater flow and nitrogen load.

Table 6-2 contains three blocks of data: "current", "changes through build-out", and "build-out". In the "current" columns we have summarized the results of the water use evaluation that lead to the overall estimate of 513,000 gpd of water use in 3,232 single-family homes comprising 10,016 bedrooms. In the "changes through build-out" section, one can estimate the number of new homes, the number of homes that may be converted between seasonal and year-round use, and the number of bedroom that may be added to existing homes. The "build-out" columns compute the number of homes and bedrooms at build-out, based on the assumed additions and conversions. Here the future water use can be projected after applying estimates of water use per lot for each size and type of home.

Description of One Scenario

Table 6-2 represents Scenario B, one of the several scenarios investigated by Town staff. The Town's Director of Planning estimates that current zoning will allow 993 new single-family homes, of which 60% were assumed to be occupied year-round. The size of the new homes was estimated based on the current stock and the assumption that new homes would likely contain more bedrooms than existing homes. In this scenario, it was assumed that there would be conversions of homes from seasonal to year-round use, and vice versa, but with no net change. It was further assumed that 1,200 new bedrooms would be added to the existing 3,232 homes, distributed among year-round and seasonal homes at about the same percentage as currently exist. While water use per home is expected to increase due to larger homes with more bedrooms, it was assumed that water use in future 3-bedroom homes would be the same as in current 3-bedroom homes.

**TABLE 6-2
PROJECTED WATER USE IN ORLEANS:
BUILD-OUT SCENARIO B**

	Current				Changes through Build-Out				Build-Out			
	Number of BR's	Number of Homes	gpd per Home	Water Use gpd	New Homes	Seasonal Conversions	Homes w/ New BR's		Number of BR's	Number of Homes	gpd per Home	Water Use gpd
Year-round Homes												
1 and 2 bedrooms	803	417	150	62,550	0	50		-210	495	257	150	38,550
3 bedrooms	2,763	921	181	166,701	100	-50	210	-260	2,763	921	181	166,701
4 bedrooms	1,576	394	197	77,618	300	30	260	-180	3,216	804	197	158,388
5 bedrooms	450	90	235	21,150	100	-20	180	-20	1,650	330	235	77,550
6 or more bedrooms	66	11	476	5,236	100	-10	20		726	121	476	57,596
Total	5,658	1,833	182	333,255	600	0	670	-670	8,850	2,433	205	498,785
Seasonal Homes												
1 and 2 bedrooms	655	342	80	27,360	43	-50		-150	354	185	80	14,800
3 bedrooms	1,944	648	127	82,296	60	50	150	-220	2,064	688	127	87,376
4 bedrooms	1,248	312	168	52,416	170	-30	220	-140	2,128	532	168	89,376
5 bedrooms	355	71	174	12,354	60	20	140	-20	1,355	271	174	47,154
6 or more bedrooms	156	26	188	4,888	60	10	20		696	116	188	21,808
Total	4,358	1,399	128	179,314	393	0	530	-530	6,597	1,792	145	260,514
Total Single-family Homes	10,016	3,232	159	512,569	993	0	1,200	-1,200	15,447	4,225	180	759,299
Year-round	56%	57%		65%	60%		56%		57%	58%		66%
Seasonal	44%	43%		35%	40%		44%		43%	42%		34%

For these assumptions, this exercise predicts that the total water use in all single-family homes will increase by about 48% to 759,000 gpd. When these figures are projected upward to include single-family homes not on town water, and multi-family homes, the total residential water use becomes 937,000 million gallons per day as an annual average. If the current estimate of per-capita water use is applied, these figures translate to an annualized average population of about 14,600 people.

The scenario depicted in Table 6-2 predicts that single family water use will increase by 48% through build-out, and by inference, annualized average population will increase by the same percentage. About 85% of the increase in water use and population would occur in new homes, and only 15% would be associated with the tendency for more people to occupy homes with more bedrooms.

Range of Scenarios

The usefulness of this approach lies in the ability to quickly evaluate a number of build-out scenarios. Three scenarios are summarized in Table 6-3. In each case, the number of new homes was held constant, based on the detailed evaluation of vacant lots and current zoning restrictions. The number of new bedroom at existing homes was varied from 400 (about 12% of homes adding a bedroom) to 2000 (62%). The number of seasonal conversions was varied from a negative 150 (conversion of year-round to seasonal, as has been the apparent recent trend) to a positive 300. In the first two scenarios, it was assumed that the water use in a home with a given number of bedrooms would not change from current conditions. In Scenario C, the per-lot water use in seasonal homes was increased by 20% over current conditions to reflect the possibility of these homes being occupied over a greater portion of the year.

For these scenarios, the number of homes increases by 31%, but the number of bedrooms increases by 46% to 62%. The number of bedrooms per home increases by 12% to 24%. The estimated number of persons per bedroom declines to 0.77 (from 0.80) in Scenarios A and B and rises to 0.82 in Scenario C.

The predicted town-wide annualized average population varies from 14,000 people in Scenario A to 16,400 in Scenario C. To the extent that water use is an appropriate indicator of occupancy, this exercise predicts that continued reliance on individual sewage disposal systems will result in a 31% to 53% increase in annual wastewater flow and nitrogen load from this source.

It should be recognized that this evaluation is focused on annualized average population as a tool to estimate total annual wastewater production and nitrogen loading. This approach should also be helpful in providing a baseline for predicting peak demands on the water system and on future wastewater infrastructure. Peak summer water demand or wastewater flow could be proportionally higher or lower than the annual average, depending on the peak day or peak weekend conditions.

This study established some convenient benchmarks that the Town can use to monitor important trends. The benchmarks include: 3.10 bedrooms per single-family home; 159 gpd per lot for single-family homes and 385 gpd per lot for multi-family homes; and water use at seasonal homes that is 70% of that used at year-round homes.

The Orleans zoning bylaw allows two houses on certain "grandfathered" parcels that are greater than one acre in area. About 700 additional houses could result from full utilization of that provision. That possibility is not included in the scenarios shown in Table 6-3. If 700 additional homes were considered with the other assumptions of Scenario C, this build-out model predicts an equivalent annual population of 18,400, about 26% higher than Scenario B, and 72% higher than the current situation. The Town must carefully consider the likely number of properties of this sort that may be developed through build-out, given the significant potential impact.

**TABLE 6-3
PROJECTED WATER USE IN ORLEANS:
SUMMARY OF BUILD-OUT SCENARIOS**

	Current Conditions	Build-out Conditions		
		Scenario A	Scenario B	Scenario C
Number of New Homes		993	993	993
Number of Bedrooms				
Existing	10,016			
Added in Existing Homes		400	1,200	2,000
Projected Future Total		14,627	15,447	16,272
Number of Seasonal Conversions		-150	no net change	300
Number of Bedrooms per Home	3.10	3.46	3.65	3.85
Average Water Use per Home, gpd	159	172	180	201
Number of Persons per Home	2.48	2.68	2.81	3.15
Number of Persons per Bedroom	0.80	0.77	0.77	0.82
Estimated Water Use, gpd annual average				
Single family homes	513,000	725,000	759,000	851,000
All residential lots	685,000	895,000	937,000	1,050,000
Annual Average Population	10,700	14,000	14,600	16,400

FACILITATING CLUSTER SYSTEMS AND ACCOMMODATING EFFLUENT DISPOSAL ON LAND TO BE SET ASIDE FOR OPEN SPACE

Existing Situation

The so-called Ford property is a 9.5-acre parcel in South Orleans that has recently been put on the market. The land is located on Arey's Pond, a poorly flushed salt pond that has shown signs of nitrogen overloading. Most of the parcel is located in a water supply Zone 2. The current zoning sets a 40,000-square-foot minimum lot size that would allow 10 lots. Since the parcel is in a nitrogen sensitive area, as defined in Title 5, each lot could have a 4-bedroom home, for a total of 40 bedrooms.

A prospective developer has proposed to build five new homes on 4 lots with a total of up to 23 bedrooms. A portion of the parcel would be set aside for conservation purposes. This would include a single 40,000-square-foot parcel nearest Route 28 (South Orleans Road), a 30-foot strip on the lot's south perimeter, and a wider strip along South Orleans Road. The 30-foot perimeter strip would also include a 10-foot easement for a walking path.

The Ford property is in the midst of a largely residential area with town water and individual septic systems; see Figure 6-2. There are two nearby cottage colonies that have been converted to condominiums; the Nauset Village condominiums immediately to the north of the Ford property and the Golden Eagle condominiums about 500 feet to the north and across Route 28. The Nauset Village development installed a 990-gpd enhanced treatment system within the past two years, and the Golden Eagle recently submitted plans for a 3,300-gpd enhanced treatment system which the Board of Health has ordered to be installed in the near future.

Figure 6-3 shows the study area which includes the Ford property, the Golden Eagle and Nauset Village condominiums and vicinity. There are 45 parcels in the study area; 34 developed and 11 vacant. Of the 11 vacant lots, only 7 are developable. The area shown represents nearly one-half of the lower watershed to Arey's Pond. In the study area, there is about 15,000 gpd of Title 5 wastewater flow and an estimated sewage nitrogen load of about 700 pounds per year, all within 1,000 feet of the upgradient edge of the pond. At build-out, the Title 5 wastewater flow would be about 23,000 gpd with a sewage nitrogen load of about 950 pounds per year.

Early water quality sampling results indicate the need for nitrogen control to protect Arey's Pond. This has prompted the Town to require enhanced treatment at the two condominium projects, and to discuss such systems with the developer of the Ford property. Given this set of existing conditions, what can the Town of Orleans do to optimize the situation?

Range of Solutions

For the five houses proposed by the developer, the Town could require either Title 5 systems or individual enhanced treatment systems, or could work with the developer to build a cluster system (with or without enhanced treatment). Even though a total of 23 bedrooms may be permitted, it is likely that 5 homes will not generate enough wastewater to make a cluster system

STUDY AREA IN VICINITY OF FORD PROPERTY, ORLEANS

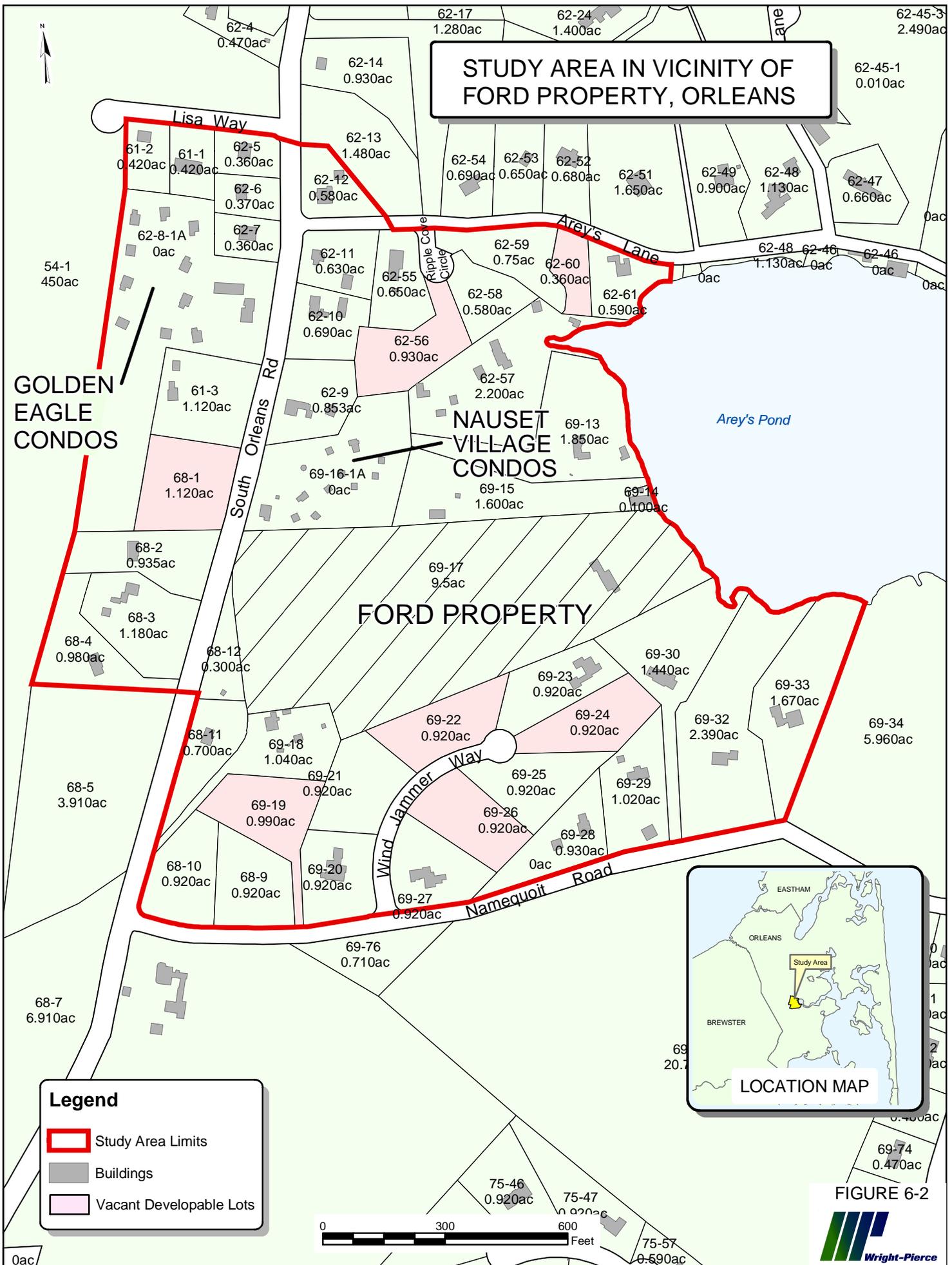


FIGURE 6-2



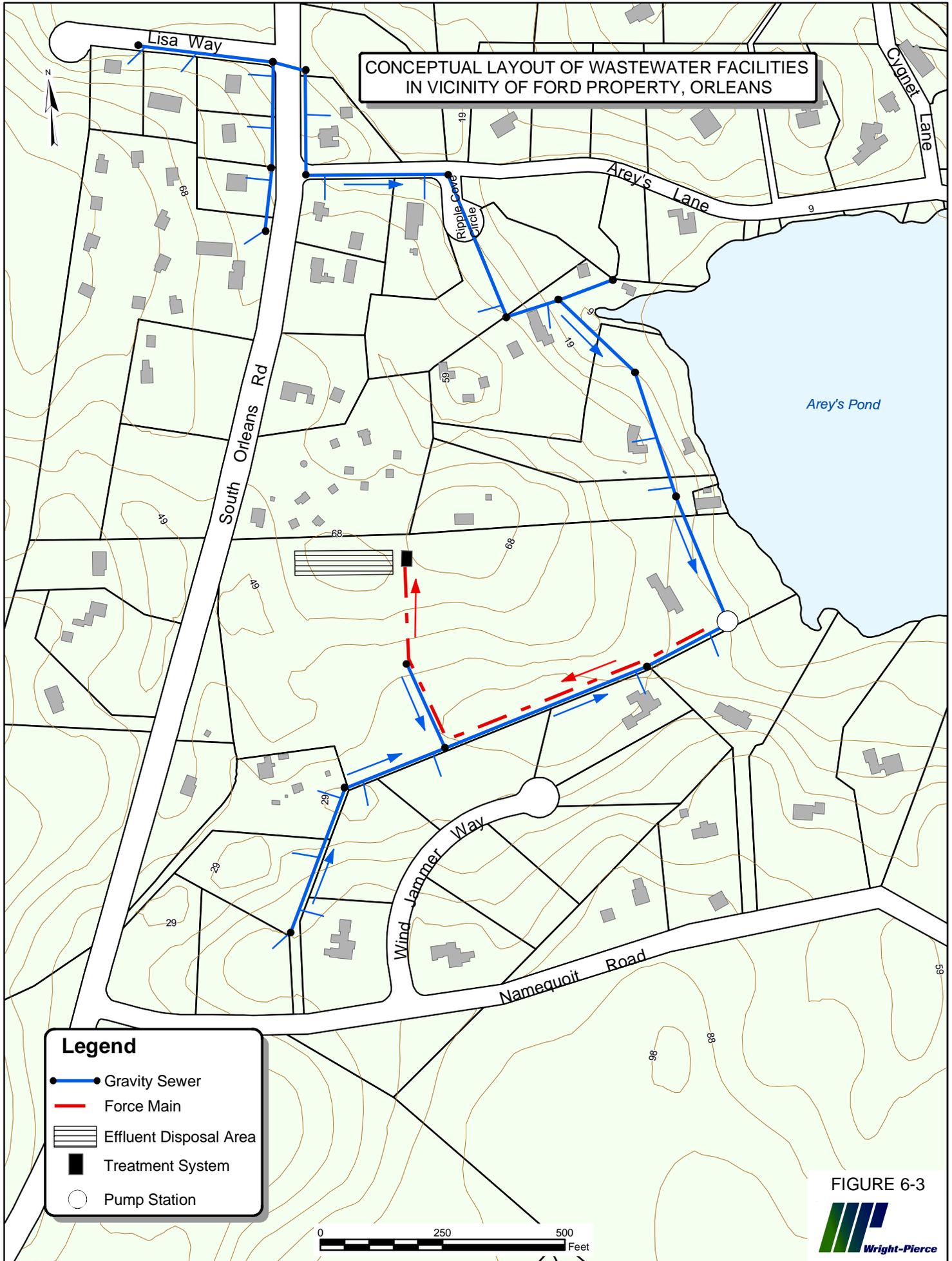


FIGURE 6-3



with enhanced treatment effective in the face of seasonal fluctuations. Individual enhanced systems could provide some degree of nitrogen removal, but at relatively high cost for the amount of nitrogen removed. Those costs include the initial installation costs and the long-term maintenance and monitoring expenses.

Given the likely need to reduce nitrogen loading to Arey's Pond, and the pending installation of a relatively large enhanced treatment system at the nearby condominium project, the Town should consider taking the first steps toward a cluster or satellite system for South Orleans. Three scenarios have been considered in concept.

Scenario 1. In the simplest case, the Town could facilitate the cooperation between the Golden Eagle condominium association and the developer of the Ford property to build a cluster system serving both projects. The two properties are sufficiently close that the savings in a joint treatment system would likely offset the relatively small transport cost. Several technologies are available that could effect significant nitrogen removal and be located unobtrusively either within the conservation set-aside on the Ford property or on the undeveloped portion of the Golden Eagle property. (The combined Title 5 flow from these two projects is about 6,000 gpd. The land to be set aside by the Ford property developer is apparently large enough to accommodate more than 10,000 gpd for effluent disposal. The capacity of the Golden Eagle site for effluent disposal is unknown.) The joint system could be developed privately and taken over by the Town once the system is complete and tested. The Town's role would be to coordinate the permitting of each project, obtain easements for the connecting piping and ensure that the constructed facilities are suitable for Town take-over.

Scenario 2. In a more extensive scenario, wastewater from some of the homes on Windjammer Way and Namequoit Road could be included in the cluster system. The Town could work with the Ford property developer to locate a sewer line along the southern edge of the Ford property within the walking trail easement already proposed. That line could provide gravity collection to the lots within the Ford property as well as 5 to 10 homes on Windjammer Way and Namequoit Road. The total Title 5 flow would be about 9,000 gpd. The treatment and disposal facilities could be located at either the Ford property or the Golden Eagle property.

Scenario 3. A possible further expansion of the system could be accomplished by bringing the wastewater from Golden Eagle down Arey's Lane and across lots through easements to the Pond side of the Ford property. The scenario would allow the connection of another 10 to 12 lots and would bring the total Title 5 flow to about 11,000 gpd, which would require a groundwater discharge permit (and make the combined treatment facility a "satellite" plant in the terms used in this report). This scenario would provide for wastewater collection and nitrogen control for about one half of the wastewater load in the lower Arey's Pond watershed. It could be also expanded somewhat to include other properties further east on Arey's Lane, including the marina and other buildings that are situated very close to the water.

Figure 6-3 shows the conceptual layout of the collection, treatment and disposal facilities. Treatment and disposal are shown on the Ford property, but may also be possible on the Golden Eagle property. Effluent nitrogen standards would be 10 mg/l in Scenario 3, and should be as

stringent as possible in Scenarios 1 and 2, consistent with the capabilities of available technologies.

Implementation Steps

The Town is currently considering two applications: the subdivision of the Ford property being heard by the Planning Board, and the installation of an enhanced treatment system being reviewed by the Board of Health. What can the Town do now to implement one of these sewerage scenarios, or at least to plan for its implementation in the future?

The most pressing issue is to deal with the two pending applications before the Town, the two "anchor projects" that provide the opportunity for a cluster system.

The Town should work with the developer of the Ford property to allow: 1) use of the proposed set-aside lot for a modular treatment system and effluent disposal; 2) the walking trail easement to be used for a gravity collection line leading to a small pumping station near the Pond; 3) easements necessary for the 5 lots on the Ford property to connect to the gravity sewer; and 4) an easement along the Pond for possible future connection of a line from Arey's Lane. Preliminary engineering would also be needed to determine the capacity of the set-aside lot for effluent disposal while still allowing significant native vegetation to remain. Discussions with NStar are also needed since that set-aside lot is traversed by overhead utility lines. The Town could work with the developer to install the cluster system instead of individual enhanced systems.

With respect to the Golden Eagle condominiums, the Board of Health could relax its requirement for immediate installation of the enhanced treatment system, and have the condominium association put funds into escrow until the details of this plan can be worked out.

For other properties that might be served by the more extensive scenario, the Town could begin to talk with property owner about easements and could allow septic system upgrades to be deferred, with escrow accounts established to set aside funds. The Town would also meet with MassHighway to review options for a pipe crossing of South Orleans Road.

As Town officials review this evaluation, important issues should be discussed:

- Are funds available, perhaps through permit review fees, to conduct the preliminary engineering needed to firm up these conceptual alternatives and look into disposal site capacity? In the more limited scenarios, that engineering work would most likely be provided by the applicants.
- The Health Department should conduct a more detailed review of sewer needs in the vicinity. Are there failing septic systems that should be addressed in a future phase of this project?
- Given that some commitment of Town resources is needed to implement a cluster system here, whether it be a capital appropriation or the time of Town staff, does the Arey's Pond watershed have high enough priority among all the watersheds in Orleans to commit those resources here?
- Which Town board or department would be responsible for overseeing this project? Is there adequate manpower and/or expertise within the current Town structure?

- If a cluster system were to be located on the conservation set-aside within the Ford property, could the currently proposed effluent disposal site on the Golden Eagle lot be set aside for conservation purposes?

This evaluation is intended to illustrate how, with proper Town planning, the piecemeal development of properties and the installation of enhanced treatment systems can be constructively channeled into Town wastewater infrastructure. While the immediate implementation of the more extensive scenario would certainly require Town funds, it may be possible to have the two "anchor projects" construct facilities they need anyway, but in a fashion that allows the more extensive scenarios to be implemented later. One of the most important aspects of this planning exercise is providing for effluent disposal on a parcel, centrally located in this watershed, in a way that still provides an open space resource for the development and the neighborhood. If no action is taken by the Town, a prospective effluent disposal site will no longer be available. Further, within a year, there could be three enhanced treatment systems (Golden Eagle, Nauset Village and Ford property) all within about 600 feet of one another, each requiring monitoring and testing, and each small enough to suffer from seasonal variations in wastewater flow.

USE OF ROAD AND NSTAR RIGHTS OF WAY FOR EFFLUENT DISPOSAL

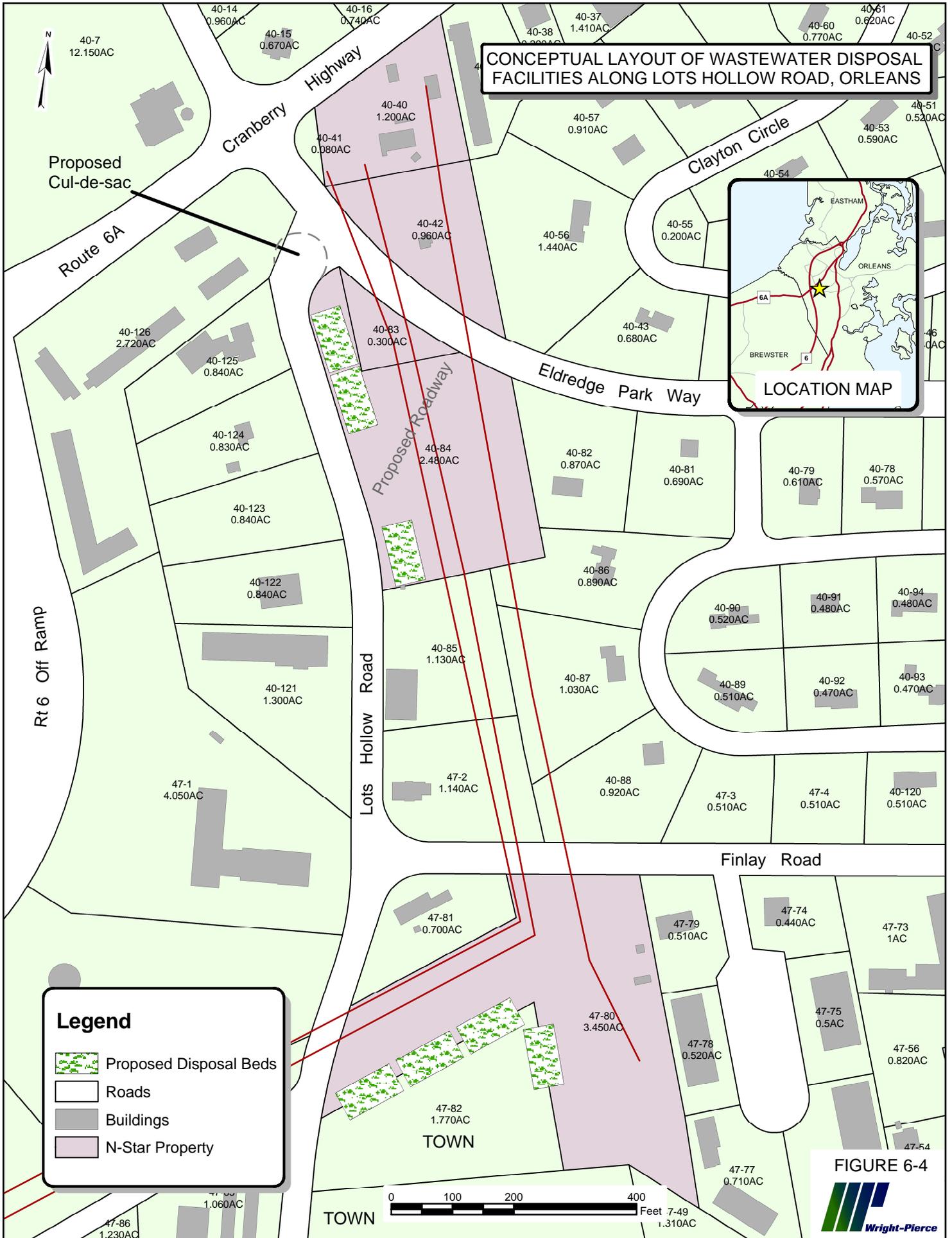
In another part of Orleans, the Town is considering a road re-alignment project that may provide an opportunity to set aside land for effluent disposal near a concentrated area of wastewater generation and near potential treatment plant sites.

Figure 6-4 shows the vicinity of Route 6A, Eldredge Park Way and Lots Hollow Road. Lots Hollow Road, the access to the municipal landfill, enters Eldredge Park Way within 150 feet of Route 6A, and this situation creates traffic delays and safety concerns. The Town has applied for a grant to relocate the point of entry of Lots Hollow Road further from Route 6A, as shown in Figure 6-4.

NStar power lines in the vicinity lead to and from a large substation at the intersection of Eldredge Park Way and Route 6A. NStar owns certain parcels and holds easement rights across other adjacent properties. The Town is working with NStar to acquire land needed to relocate Lots Hollow Road.

Figure 6-4 shows the layout of 7 leaching beds that could be built along the edges of Lots Hollow Road or along the common border of Town and NStar property to the south. The potential effluent disposal area might accommodate about 75,000 gpd of tertiary treated effluent. The location is favorable in that it is near the municipal landfill; it is typical that towns consider such sites as a potential location for a wastewater treatment plant. This site is within the Town Cove watershed, which has the highest nitrogen load of any Orleans watershed.

While the leaching beds shown in Figure 6-4 are shown only in concept, the Town could consider this plan as it negotiates with NStar for the road relocation. If that project proceeds, the



Town could conduct soil testing during construction, and could design the roadway project to accommodate the beds. The relocation will create a small island between the new and old alignments where a town park could be created with subsurface effluent disposal beds.

While wastewater planning in Orleans has not progressed to the point of knowing the need for effluent disposal sites, this is a pertinent example of how the Town can keep future wastewater needs in mind as it conducts other municipal projects.

PROGRESS TOWARD IMPLEMENTATION OF THESE RECOMMENDATIONS

The build-out analysis presented above has been helpful to Town officials by focusing attention on the link between water quality and planning/zoning issues. The Town will be reviewing the build-out assumptions with MEP representatives to ensure consistency of assumptions and approach between this work and the upcoming estuary modeling. The resulting build-out analysis will form the basis of comprehensive wastewater management planning.

The Orleans Planning Board considered the recommendations of this report in its deliberations with the developer of the Ford property. The approved subdivision plan includes 5 developable lots with a limit of 24 total bedrooms. A one-acre lot has been offered to the Town (an upcoming Town Meeting will vote on acceptance), with conservation restrictions and a 10,000-square-foot envelope reserved for possible effluent disposal. The Board of Health voted to defer approval of the Golden Eagle Condominium application for a separate enhanced treatment system for one year to allow time for a possible joint system to play out.

CHAPTER 7

CASE STUDY -- MASHPEE

INTRODUCTION

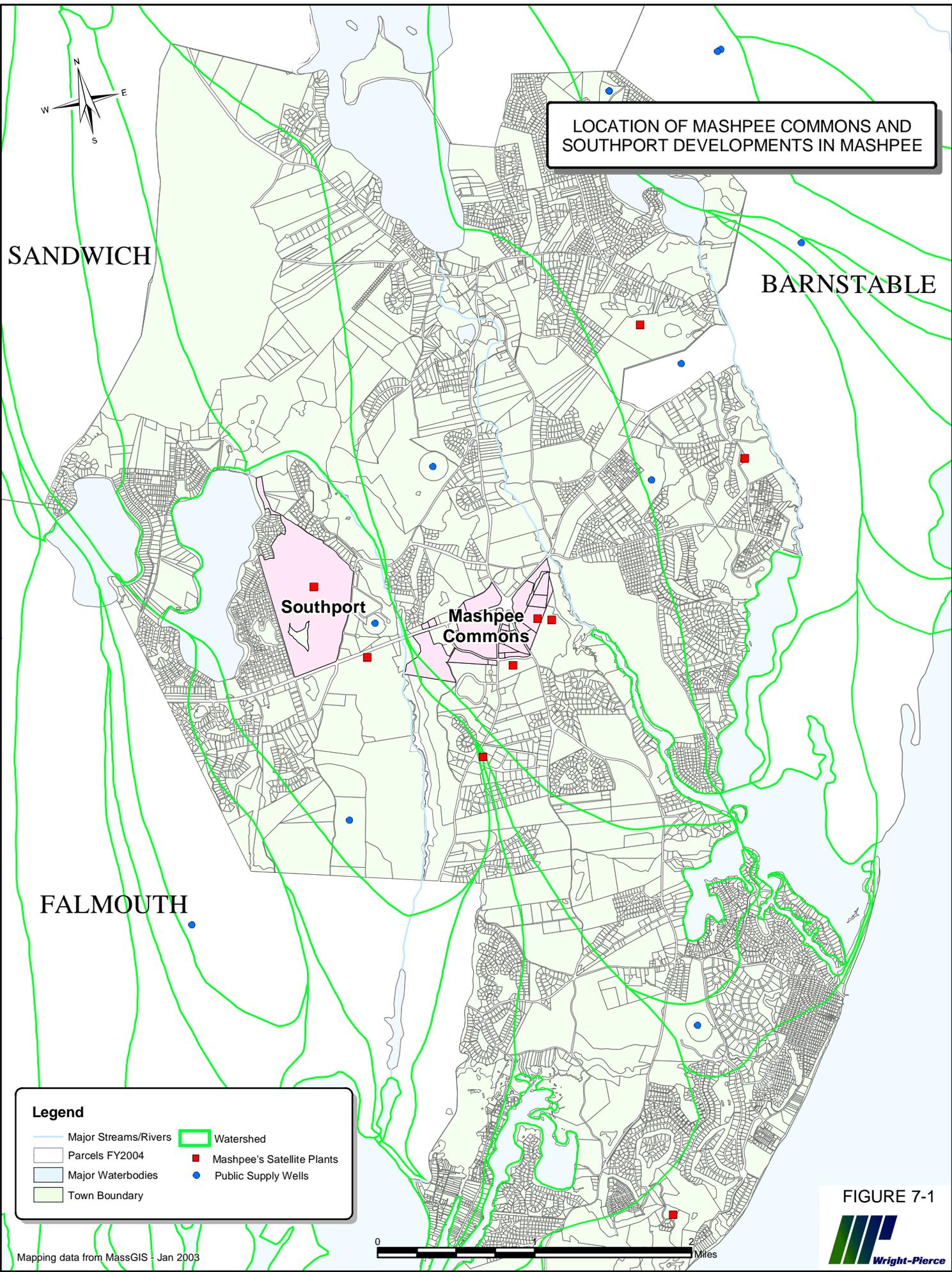
Rapid development occurred in Mashpee in the 1980s and 1990s following resolution of Native American land claims. In the absence of public sewerage, developers turned to private wastewater treatment systems for projects with flows in excess of 10,000 gpd. There are now 9 private plants in Mashpee, with several more proposed. The four largest plants have an aggregate permitted capacity of over 600,000 gpd, more than the municipal centralized plants in Chatham and Provincetown.

The Mashpee Sewer Commission was established in 1987, with the intention of taking over some or all of these private treatment plants. In the approvals for two large projects (Willowbend and Windchime Point) the Planning Board required permit conditions that the private treatment plants will be turned over to the Town at no cost once the Town is ready to take them over. The Sewer Commission has developed a conceptual plan to link some of the private plants to an effluent main to convey tertiary treated effluent to a disposal site along Nantucket Sound, thought to be a more acceptable location than the current disposal facilities that are in the watersheds of Popponesset and Waquoit Bays which are nitrogen-sensitive embayments.

The Town's wastewater management planning is on hold pending completion of Massachusetts Estuaries Project studies of Popponesset Bay and the eastern tributaries of Waquoit Bay. The MEP report for the Popponesset Bay system is due to be completed in the spring of 2004, and the Mashpee portions of the Waquoit Bay study are expected shortly thereafter. Assuming resumption of the comprehensive planning in mid 2004, it should reach completion by late 2005.

There are two types of private development that affect how private treatment plants are managed. First, for residential projects, such as condominium complexes, the developer designs, builds and starts up the treatment plant and then turns it over to a homeowners or condominium association. In the second case, typically for commercial projects, the developer designs and builds the plants, retains ownership of the project and wastewater facilities, and operates those facilities. Operation and maintenance costs are supported by user fees in both cases.

Two private projects have been identified in Mashpee, one each of these two types that are candidates for transfer to the Town. The paragraphs that follow describe these two projects and illustrate the steps that the Town would take to obtain ownership of the wastewater facilities. Figure 7-1 shows the locations of these projects in relation to watershed and town boundaries.



SOUTHPORT RETIREMENT COMMUNITY

Description of Project

This condominium development was originally permitted in the 1970s. It includes 750 condominium units in townhouses located around an 18-hole golf course, with clubhouse and exercise facilities. The project is located just north of Route 151 and west of Old Barnstable Road. The project is located in the Waquoit Bay watershed, which is overloaded with respect to nitrogen. There are currently 350 completed units. The developer owns and operates the wastewater collection, treatment and disposal facilities, and will turn them over to the condominium association once 75% of the units are built.

Wastewater is collected in a conventional gravity system and conveyed to the treatment plant through a system of pump stations and force mains. The treatment plant is a conventional RBC plant with a permitted design capacity of 172,000 gpd. Current summer wastewater flows are about 40,000 gpd. The developer estimates that summer flows at full development will be on the order of 100,000 gpd, well below the design capacity. The plant has routinely met its discharge permit limits. Effluent is disposed of in leaching pits located below one of the golf course fairways.

Both the developer and the condominium association officials have expressed interest in municipal take-over of the plant.

Nearby Development

Immediately across Old Barnstable Road from the Southport project is Mashpee Village, a low-income housing project built in the 1970's. Mashpee Village consists of 110 apartment units located in 14 two-story buildings and 35 detached single-family homes. Wastewater treatment and disposal are provided in a series of septic tanks, leaching fields and leaching pits. This project is immediately adjacent to a public water supply well, and most of the wastewater disposal systems are located within 1,500 feet of the well. The estimated Title 5 wastewater flow is 36,000 gpd.

Immediately north of Southport is a recently approved residential subdivision called Quashnet Valley West. A total of 65 single-family homes will be built here, just across Payamps Road from Southport. Individual Title 5 systems are proposed. The aggregate Title 5 flow is 21,000 gpd, assuming an average of three bedrooms per home.

Actions Necessary for Transfer of Ownership to the Town

There are a number of actions that should be taken toward the conversion of the Southport's wastewater facilities to Town ownership. These actions are listed below along with steps the Town should consider to tie in nearby areas. The steps are listed in general chronological order.

1. **Assess nearby sewer needs.** The Town should determine the nature and extent of sewer needs in the vicinity to determine if it might be desirable to expand the Southport plant to serve more than the immediate project. The Board of Health should be involved. Mashpee Village and Quashnet Valley West are two candidates. Affordable housing needs should be considered if appropriate.

2. **Assess the status and upgrading needs of existing facilities.** The Southport collection, treatment and disposal facilities should be inspected and evaluated with respect to code compliance, remaining useful life, upgrading needs, etc.
3. **Evaluate capacity of plant and disposal system.** It is likely that the original conservative sizing of the facilities resulted in reserve capacity that will not be needed even at full development of the condominium complex. An engineering evaluation should be conducted to "re-rate" the plant and disposal area, and determine the amount of the capacity that might be available to satisfy other sewer needs.
4. **Determine expansion capability.** The treatment plant and disposal area could be expanded to accommodate additional wastewater flow. An appraisal should be made of the site limitations that might restrict expansion to determine the feasible increments of expansion.
5. **Develop conceptual plans for possible expanded use of the system.** Both short-term and long-term plans should be developed to accommodate nearby sewer needs. For example, a short-term plan might include collection of a portion of the Mashpee Village flow (perhaps that now discharged in closest proximity to the municipal well) and transport to the Southport plant to make use of surplus capacity within the existing plant. A longer-range plan could include the transport of the remainder of the Mashpee village flow and the entire Quashnet Valley West project to an expanded Southport plant. These plans should be coordinated with the Town's overall comprehensive wastewater management plan. A cost-effectiveness analysis should be conducted to compare options involving the Southport plant with alternatives involving the construction of new facilities to accomplish the same goals. (Such a cost-effectiveness analysis will be necessary to support an application to DEP for SRF loans for improvements to and expansion of the Southport facilities.)
6. **Conduct an assessment of groundwater conditions at the existing effluent disposal site.** It will be important to ascertain if any elevated contaminant concentrations exist in the groundwater in the vicinity of the plant, so that responsibility for remediation can be assigned before any land transfers.
7. **Conduct property surveys.** The Town should conduct the necessary field and registry work to develop appropriate descriptions of the lands or easements to be acquired.
8. **Develop conveyance documents.** Town counsel should prepare deeds and easements necessary to convey title to or interest in the wastewater facilities from the developer or condominium association to the Town. These documents should be reviewed by DEP to address any issues related to the SRF program. With respect to the treatment plant, the Town should acquire fee simple interest in the buildings and equipment and the associated land and improvements necessary to operate, maintain and expand the plant. For the collection system, the Town should obtain title to the pipes, manholes, pump stations and related equipment, and obtain easements necessary for operation, maintenance, repair and replacement. Effluent disposal now occurs below one of the golf

course fairways. The Town could obtain an easement allowing effluent disposal on land owned by the condominium association. Alternatively, the land could be conveyed to the Town and the Town could grant an easement to the condominium association permitting golf activities. As-built drawings of the wastewater facilities would be important attachments to the conveyance documents.

9. **Arrange for transfer of groundwater discharge permit.** The Town should apply to DEP to have the discharge permit transferred to the Town. There are a number of administrative issues that would be handled at the same time that relate to DEP permit conditions.
10. **Apply for SRF Loans.** It is a recommendation of this report that DEP expand the SRF program to allow low-interest loans for municipal acquisition of private wastewater facilities, provided that they are appropriately planned and cost-effective. The Town should meet with DEP early in this process to identify needs and constraints, and conduct its investigations accordingly. (Since the publication of the first draft of this report, DEP has indicated that SRF funds may, in general, be used for this purpose.)
11. **Set up billing system.** Residents now pay a monthly condominium fee that includes the costs of maintaining the wastewater system. The Mashpee Water District now bills the condominium owners semi-annually for water use; that billing may be easily modified to include a sewer use fee. The conveyance documents should address the responsibility for payment of sewer fees and provide a mechanism for collection of unpaid fees. The Town should consider a single quarterly bill for sewer service paid through the Water District instead of billing each separate condominium unit.
12. **Make Arrangements for Operations.** The Town could hire staff to operate and maintain the wastewater facilities. A more cost-effective alternative would involve retaining the current contract operator, until the Town has more significant town-wide facilities to manage.
13. **Set up a Capital Account.** The developer established an escrow account for long-term maintenance and repair of the wastewater facilities during the DEP groundwater discharge permitting process. As part of the negotiations between the Town and the developer or condominium association, the parties should reach agreement on the disposition of that account. The most logical approach would involve that account being transferred to the Town, and supplemented as necessary to meet municipal requirements.
14. **Undertake a Public Participation Process.** The public should be consulted on the proposed transfer of facilities to the Town. These activities could be part of the comprehensive wastewater management plan.
15. **Obtain Permits and Approvals.** A number of permits and approvals may be required including: the DEP groundwater discharge permit (if an expansion is included); MEPA approvals (if thresholds are exceeded); and perhaps site assignment.

16. **Develop a Sewer Use Bylaw or Regulation.** These are the fundamental operating rule established by a town or district to set the requirements for service connections, procedures for payment of sewer fees, definition of acceptable and unacceptable wastes, etc.
17. **Establish a Project Financial Plan.** The Town must estimate the capital costs of the transfer, including: any payments to the developer or condominium association; any construction costs for immediate improvement, future expansion and connection of nearby properties; and the legal engineering and administrative cost associated with many of the tasks described above. The Town should review the developer's budget for operation, maintenance and replacement costs and modify it if necessary. The financial plan should address both the initial transfer and subsequent phases that might address nearby sewer needs. Such estimates are important to allow the Town to effectively manage the financial aspects of the project. These estimates may also be helpful to establish a basis for contributions to the Town by developers who must address the Cape Cod Commission's "no net nitrogen increase" policy for Developments of Regional Impact.
18. **Negotiate the price and terms of transfer.** Once all of the above noted issues are identified and addressed, the parties must reach agreement on the terms of the transfer and price. Any payment to the developer or condominium association should be based on the developer's actual documented costs less depreciation (book value) or such other generally-accepted utility valuation method as may be mutually agreed. The Town should be prepared to offer assurances to the developer and condominium association that the town guarantees capacity for the full build-out of the project, and that user fees will be consistent with a town-wide system. In addition, the Town should identify the circumstances where the condominium association may be subject to betterments to pay for future plant upgrading needs that relate to major repairs or more stringent effluent limits.
19. **Obtain Town Meeting Approval.** The transfer of property to the Town must be approved by town meeting, even if the transfer itself involves no expenditures. This approval could be done separately or as part of a series of articles dealing with implementation of the comprehensive wastewater plan.

MASHPEE COMMONS

Description of Project

Mashpee Commons is a large mixed-use development at the intersection of Routes 28 and 151. The developer, Mashpee Commons Limited Partnership, owns all of the land in the project, which is designed with a traditional New England town center concept. The project is being built in phases. The project is now permitted for 100 housing units and 452,810 square feet of retail, restaurant and office space, of which 371,062 square feet is built or under construction. Future phases of the project include an additional 403,000 square feet of commercial space, 530 housing units and a 120-room hotel. The entire project is located in the watershed of Popponesset Bay, which is overloaded with respect to nitrogen.

Wastewater is collected from the project in a conventional gravity system and conveyed to the project's treatment plant through a series of pump stations and force mains. The treatment plant is located to the east of the project near the Mashpee River. It is an RBC plant that was built in the 1980s and upgraded with a denitrifying filter in 1996. Effluent disposal is via open sand beds adjacent to the plant and along an NStar power line right-of-way. The plant is designed to treat 80,000 gpd. Mashpee Commons has plans to upgrade the plant to provide another 100,000 gpd of capacity in the next two years. The groundwater discharge permit has already been modified to allow a discharge of up to 180,000 gpd. Current summer flows are reported to be only about 20,000 gpd on average. The plant's permit requires effluent nitrogen below 10 mg/l; the plant has routinely met this limit and has shown the ability to produce effluent with nitrogen concentration below 5 mg/l.

The concept of municipal take-over of the treatment plant has been discussed at length between the developer and the Sewer Commission. This plant is one of the private plants that the Town has considered connecting to an effluent main to convey effluent outside the watershed.

Nearby Development

In addition to future phases of the Mashpee Common project, there is considerable additional development in the area, including commercial, residential and institutional uses. Several Town properties have been identified as having the potential to tie into the Mashpee Commons wastewater system. These include the library, the police/fire department, a new senior center and two schools. In addition, a nearby church and the Mashpee Housing Authority's Homeyer Village (24 senior housing units) could also be served.

There is a strong incentive for adjacent properties to be served by the Mashpee Commons wastewater facilities. The Mashpee Commons project is a DRI located in the watershed of a stressed coastal embayment. Therefore, the Cape Cod Commission's "no net nitrogen increase" policy applies. Mashpee Commons must offset each increment of nitrogen load from its project with some means of nitrogen removal for other nitrogen loads in the watershed. This requirement is part of the impetus for expansion of the Mashpee Commons treatment plant.

Actions Necessary for Transfer of Ownership to the Town

The Mashpee Commons project is similar to the Southport project described above, in that both are private treatment plants where transfer of ownership to the Town has been actively considered. Many of the steps outlined for the Southport project apply to Mashpee Commons, but there are several significant differences. There is no intention to turn over the Mashpee Commons wastewater facilities to a condominium or homeowners association; the future phases of the Mashpee Commons project have not been permitted; and the Commission's "no net nitrogen increase" policy applies. Further, Town properties could be connected to the Mashpee Commons wastewater facilities, which would make the Town a customer of a private wastewater provider. Mashpee Commons has the ability to provide sewer service to a number of private properties, but has no legal ability to require those properties to connect. The Town has the ability to require connections to a public sewer, and is in the best position to evaluate and prioritize all local sewer needs. While Mashpee Commons must comply with the "no net nitrogen increase" policy, it is the Town that will be ultimately responsible for managing long-term nitrogen loads in the watershed.

Given those factors, the Town should undertake the following steps toward eventual town ownership:

1. **Assess nearby sewer needs.** The Town should determine the nature and extent of sewer needs in the area of the Mashpee rotary to determine the overall wastewater flows and nitrogen loads that might be treated and disposed of here. Involvement of the Board of Health is important, and affordable housing should be considered.
2. **Assess the status and upgrading needs of existing facilities.** The Mashpee Commons collection, treatment and disposal facilities should be inspected and evaluated with respect to code compliance, remaining useful life, upgrading needs, etc.
3. **Evaluate capacity of plant and disposal system.** An engineering evaluation should be conducted to "re-rate" the plant and disposal area, and determine the amount of the capacity that might be available to satisfy other sewer needs without any physical expansion.
4. **Determine expansion capability.** An appraisal should be made of the site or groundwater limitations that might restrict expansion to determine the feasible increments of expansion.
5. **Develop conceptual plans for possible expanded use of the system.** Both short-term and long-term plans should be developed to accommodate sewer needs in the area. A phased development plan should be identified that addresses future wastewater flows and nitrogen loads from three categories: 1) existing unsewered development; 2) future phases of the Mashpee Commons project; and 3) future development other than that proposed by Mashpee Commons.
6. **Prepare cost estimates.** The Town should prepare cost estimates to construct, operate and maintain the wastewater infrastructure needed for each category of need identified in Step 5, including upgrading/expansion of the Mashpee Commons treatment plant and disposal facilities.
7. **Apportion costs to each project phase.** The Town and Mashpee Commons should review the cost estimates and agree upon a rational allocation of cost between the facilities needed by Mashpee Commons and the remainder of the overall project. The allocation of costs should be specific to each phase of future development so that a fair price can be established for the capacity that the Town could make available to Mashpee Commons or to other developers that must address the "no net nitrogen increase" policy.
8. **Determine most cost-effective strategy for building future wastewater capacity.** The cost estimates described above should be reviewed to determine whether public or private development of the wastewater facilities is more cost-effective. For example, Mashpee Commons may be able to construct expanded facilities at lower cost than the Town. Conversely, the Town can obtain lower interest rates for long-term financing. The possibility of low interest loans under the SRF program must also be considered. In one

possible scenario, Mashpee Commons could build and start up the expanded facilities, and then turn over the facilities to the Town.

9. **Negotiate an agreement.** Once the best development approach is determined, the parties would negotiate an agreement that would: establish the responsibilities of each party during construction; identify all of the conditions of Town take-over and the associated schedule; allocate plant expansion costs between the parties; fix the cost to Mashpee Commons for reserve capacity it may need to purchase in the future to provide nitrogen offsets; and establish the value of existing wastewater infrastructure to be acquired by the Town.

The actions identified above should provide a rational approach to determining if a public-private partnership can address the needs of both the Town and Mashpee Commons. If an agreement can be reached, then follow-on steps would be similar to those identified for the Southport project (see Steps 6 through 19 in the Southport section of this chapter).

A generalized approach has been presented that addresses the fundamental needs of the Town and Mashpee Commons. There are many details that must also be addressed. For example, close coordination with the comprehensive wastewater management plan is very important. Town and state procurement requirements must be addressed. Both parties should consider a "negotiated condemnation" as a tool to effect the transfer of ownership in a tax-advantage fashion.

CHAPTER 8

CASE STUDY -- FALMOUTH

INTRODUCTION

In Falmouth, enhanced wastewater treatment systems (either individual or cluster) are addressed in various ways by the bylaws, regulations and policies of the following boards, departments and commissions: the Planning Board, the Board of Health, the Conservation Commission, and the Wastewater Department. Enhanced wastewater treatment systems may be required under several explicit provisions of code, or by the policies used by the various boards in setting conditions of approval or in granting variances and exemptions. The purpose of this case study is to review existing regulations, bylaws and policies and recommend a procedure by which the Town can coordinate and optimize its actions related to enhanced treatment systems.

EXISTING BYLAWS AND REGULATIONS

Summarized below are the principal provisions of applicable bylaws, regulations and policies, categorized by the responsible board, department or commission.

Planning Board

Water Resource Protection District Bylaw (Chapter 240, Sections 71 and 72). This bylaw establishes overlay districts that are geographic areas shown on a December 23, 1999 town map and made part of the Zoning Bylaw. The bylaw applies to all new construction, reconstruction or expansion of existing buildings and to new or expanded uses. Uses that are prohibited in the underlying zone are not permitted in the WRPD, and the bylaw extends the list of prohibited uses to those activities that pose a threat to water quality including wastewater treatment works requiring a DEP groundwater discharge permit. Exceptions to the latter prohibition include replacement or repair of an existing treatment plant and replacement of an existing subsurface sewage disposal system with a new treatment plant. The repair or replacement must not provide any more treatment capacity than already exists.

The Zoning Board of Appeals may grant special permits under this bylaw. A special permit is required for the enlargement or alteration of an existing use that is not otherwise prohibited in this overlay district. In considering a special permit application, the Zoning Board of Appeals must seek written recommendations from the Board of Health, the Conservation Commission, the Public Works/Engineering Departments, the Planning Board and the Town Administrator. The applicant must show that the proposed use will not exceed a nitrogen loading standard of 5 mg/l or such more stringent limit that could be determined by a cumulative impact analysis. If an applicant seeks to make alterations to an existing permitted use, without increasing the wastewater flow, this special permit provision could push the applicant toward providing an enhanced treatment system to replace an existing Title 5 system.

Coastal Pond Overlay District Bylaw (Chapter 240, Sections 97 through 102). This bylaw establishes overlay districts that represent the recharge areas of all coastal ponds in Falmouth, as shown on an August 1, 2001 map on file with the Town Clerk. The bylaw applies to: subdivisions of greater than 5 acres or involving more than 5 lots; commercial development requiring site plan review; and projects located within 2,000 feet of listed coastal ponds and that require a special permit from the Zoning Board of Appeals. Applicants are required to file an "analysis of development impact" as defined in Section 113C of the Zoning Bylaw.

This bylaw sets standards in three tiers. Certain coastal ponds are deemed "high quality areas" others are termed "stabilization areas", and the remainder are defined as "intensive water use areas". Critical trophic levels are set for each category, ranging from 0.32 mg/l to 0.75 mg/l total nitrogen. The applicant must show that the project's nitrogen load will be controlled so as not to cause the critical trophic levels to be exceeded. In high quality areas, applicants that cannot meet the standard must restrict the property to fewer bedrooms, less square footage or fewer subdivision lots. Applicants can receive an exemption if it can be shown that the nutrients from the development will not reach the designated water body, or that there will be no increase in nutrient load. Applicants can receive an exemption from the requirement to complete an analysis of development impact if the applicant agrees with conditions set by the Planning Board.

It is the written policy of the Planning Board to grant exemptions from the requirement to prepare an analysis of development impact if the applicant agrees to reduce bedrooms by a factor of two, or to provide enhanced wastewater treatment.

Senior Care Retirement District Bylaw (Chapter 240, Section 65). This bylaw allows Senior Care Retirement Communities by special permit. Each community must be located on a tract of no less than 35 acres, at least 65% of which must be set aside as open space. The cumulative impact of the community must be no more than that associated with permitted uses in the single-family and agricultural zones. The bylaw restricts the Planning Board from approving a community unless tertiary treatment of wastewater is provided.

Site Design Bylaw (Chapter 240, Sections 111 to 113). This bylaw requires that any new building construction or site alteration provide for adequate sewage disposal. For any new structure requiring a special permit that lies within a zoned water recharge area, as shown on the zoning map, the applicant must show that the project will not cause critical trophic levels to be exceeded in receiving waters. The critical trophic level for freshwater ponds is defined as 0.02 mg/l of phosphorus. The critical trophic levels for nitrogen are as defined in the Coastal Pond Overlay District Bylaw, or as 5 mg/l in the case of well recharge areas. Applicants must complete an "analysis of development impact", using the loading factors stipulated in the bylaw.

Subdivision Bylaw (Chapter 305, Sections 1 through 19). For definitive subdivision plans, Section 13 of this bylaw requires that applicants file the plan with the Board of Health with information on soil percolation rates, and that the Board of Health report to the Planning Board on its findings. The Board of Health sometimes uses this opportunity to make recommendations about enhanced treatment. Section 14 of the bylaw requires the applicant to submit an "environmental and economic impact statement", which includes a determination of nutrient loading. The applicant must propose measures to reduce nutrient loading if critical loading rates

are exceeded. Critical levels are the same as noted above in the Site Design bylaw for surface waters, coastal ponds and groundwater.

Board of Health

Falmouth Health Regulations. These regulations were adopted in 1991 as supplement to Title 5. They contain no specific provisions with respect to enhanced treatment. In Section 15.2.1, the regulations prohibit the construction of a leaching system within 100 feet of a watercourse, water body, or bordering vegetated wetland, or on a coastal bank, barrier beach or dune. Section 15.1.3 specifies that variances may be granted only if the applicant has proved that the same degree of environmental protection is provided that would be achieved with strict conformance with these regulations. It has been the Board's unwritten policy that applicant must install enhanced treatment systems to provide the same degree of protection against virus transport as would be provided by the 100-foot setback otherwise required from watercourses, water bodies and bordering vegetated wetlands. For system repairs, the Board generally allows conventional Title 5 systems if the leaching system is between 75 and 100 feet from the resource. It generally requires pressure dosing of the leaching system where the setback is 50 to 75 feet, and enhanced treatment where the setback is less than 50 feet.

Oversight of Enhanced Treatment Systems by Barnstable County Department of Health and Environment. The Falmouth Board of Health relies on the County to compile operational data on enhanced treatment systems in Falmouth, to monitor the status of operational contracts, and to suggest modifications to improve performance.

Sewer Connections. When the Board of Health is consulted on applications for sewer connections, it generally recommends against connection if the property can accommodate a Title 5 system with reasonable variances.

Conservation Commission

Falmouth Wetlands Regulations. These regulations were adopted by the Conservation Commission in 1998 as supplements to the Massachusetts Wetlands Protection Act. The regulations presume that resource areas are adequately protected if no component of a septic system is located within a resource area and if the leaching facility is set back at least 100 feet from the edge of a resource area. It is presumed that significant or cumulative adverse impact will result if these conditions are not met. That presumption may be overcome by credible evidence including a hydrogeologic study. It is the unwritten policy of the Conservation Commission that an applicant may install an enhanced treatment system as an alternative to the hydrogeologic study.

It is an unwritten policy of the Conservation Commission to consider, and sometime require, enhanced treatment systems in the Areas of Critical Environmental Concern and Districts of Critical Planning Concern in Falmouth, where water pollution control, fishing and shell fishing are critical interests under the Wetland Protection Act and the Falmouth Wetland Regulation.

Public Works Department

Sewer Use Bylaw (Chapter 180, Sections 1 through 33). This bylaw is a traditional set of rules for use of the public sewer. In Section 180-6, it requires connection to the public sewer within 90 days of notification to do so, provided that the sewer is within 100 feet of the property line. This bylaw is administered by the "Superintendent of Sewage Works".

Comprehensive Wastewater and Nutrient Management Planning. It is the Town's unwritten policy that the Wastewater Department within the Department of Public Works will oversee the ongoing wastewater and nutrient management planning activities.

Sewer Connections. In accordance with Section 180-7 of the Sewer use Bylaw, the Wastewater Superintendent approves connections to the public sewer.

Board of Selectmen

New Silver Beach Sewer Service Area Bylaw (Chapter 180, Sections 37 to 50). This bylaw was enacted in April 1997 to deal with a public health emergency. It establishes the New Silver Beach Sewer Service Area that is to be served by a new satellite treatment plant currently designed but not constructed. The bylaw mandates that all properties in the service area connect to the public sewer within 90 days of it becoming available. The bylaw prohibits connections to properties outside the service area. The design capacity of the system is based on the number of bedrooms in existing single-family residences or three bedrooms, whichever is less. Single-family residences with fewer than three bedrooms are allowed to add bedrooms up to three in total. New residences of up to three bedrooms can be built on vacant lots after obtaining a variance from the Board of Selectmen. Multi-family and non-residential properties are not allowed to increase their level of activity beyond that in existence on January 1, 1999, as measured by water use. Variances to this bylaw can be granted by the Board of Selectmen provided sufficient capacity exists in the sewerage system.

Sewer Extensions. The Board of Selectmen, acting as the Board of Public Works, approves minor extensions of the public sewer (flows under 2,000 gpd and extensions of less than 1,000 feet).

Nutrient Management Working Group

The Town formed the Nutrient Management Working Group to ensure proper coordination of Town activities related to wastewater and nutrient management, including the activities related to the preparation of the Comprehensive Wastewater Management Plan. The Wastewater Superintendent is the chair of this working group.

RECOMMENDATIONS FOR IMPROVED COORDINATION AMONG BOARDS, DEPARTMENTS AND COMMISSIONS

A concerted long-term plan for effective use of enhanced treatment systems will evolve from comprehensive wastewater management planning. In the interim, the Town should modify its policies and procedures to more consistently and selectively apply these systems. The following actions are recommended:

1. The Town should develop and implement a written policy for the requirement and management of enhanced treatment systems. This policy must be flexible to allow it to adjust to new information as it becomes available through comprehensive wastewater management planning. We recommend that the Board of Selectmen direct the Nutrient Management Working Group to develop this policy and make it consistent with other nutrient management activities and policies.
2. The Wastewater Superintendent should propose, for the purpose of discussion with the Nutrient Management Working Group, a map segmenting the Town into three general areas: a) areas where public sewer service is expected to be provided in the near or medium term (say 5 to 15 years); b) areas where nitrogen loading is not likely to be a concern even at build-out; and c) all other parts of town. Requirement of enhanced treatment systems would then be considered only in the third area, in which public sewers are not expected to be installed in the next 15 years, but in which nitrogen loading is expected to be a concern. However, the Nutrient Management Working Group should also discuss means of addressing concerns about "interim" nutrient management between now and the time when public sewers can be installed (see Item 6 below for one option).
3. All Town boards, departments and commissions should seek written recommendations from the Board of Health whenever enhanced treatment is proposed for individual or cluster systems under any Town bylaw or regulation. The Board of Health should review applications according to standard conditions (see Item 4 below), and should be authorized to veto applications of enhanced treatment systems that it deems inappropriate.
4. The Nutrient Management Working Group, with significant input from the Board of Health, should develop standard conditions of approval for enhanced treatment systems. These conditions could include performance standards, monitoring requirements and flow/sizing requirements. These conditions will form the basis for a uniform approach and will serve as the platform for site-specific special conditions.
5. The Nutrient Management Working Group should organize and conduct a training session on enhanced treatment systems for members of all applicable boards, departments and commissions. The training should cover the basic technologies, likely performance in nutrient removal, conditions under which performance may be compromised, benefits with respect to pathogens, and the improvement in performance expected at higher design flows.
6. The Town should consider putting into place a system of escrow accounts and nitrogen offset funds that would allow money otherwise spent on enhanced treatment to be set aside to contribute to long-term solutions (see Section 5A of this report).
7. The Town should amend current regulations and bylaws to make them more consistent with respect to enhanced treatment and related issues, and to reflect information that emerges from the MEP studies and comprehensive wastewater management planning. For example, a single assessment report or study should replace the "analysis of

development impact" required in the Coastal Pond Overlay District and the "environmental and economic impact statement" required under the subdivision bylaw. The critical trophic thresholds in the Coastal Pond Overlay District Bylaw should be updated to reflect the results of the MEP studies.

8. The Town should evaluate means of encouraging multi-home housing developers to design cluster wastewater treatment systems, rather than individual treatment system for each home. That evaluation should include consideration of a new bylaw that requires developers to provide conceptual plans for both conventional development and alternative development using cluster systems, as recommended in Section 5B of this report.
9. For those instances where enhanced treatment systems are appropriate, the Town should enact a license or permit system, impose annual fees, and contract with the Barnstable County Department of Health and Environment for inspection and oversight services; see Section 5J of this report.
10. The written plan for use of enhanced treatment systems should be reviewed and updated annually to reflect information emerging from planning studies and advances in technology.

PROGRESS TOWARD IMPLEMENTATION OF THESE RECOMMENDATIONS

Since the publication of the first draft of this report, the Town's Wastewater Superintendent has convened two meetings of Town officials to begin to address these recommendations. Additional meetings are planned to work toward the formulation of a written plan for enhanced treatment systems.

CHAPTER 9

CASE STUDY -- BARNSTABLE

INTRODUCTION

The Town of Barnstable has undertaken a program to upgrade the wastewater treatment plant at the Horace Mann Charter School (formerly the Marstons Mills Charter School) to improve its performance and to provide capacity for an abutting affordable housing project. The program illustrates the application of several of the recommendations of this report.

BACKGROUND

In the late 1990s, the Town's Open Space Committee identified a prospective land purchase in Marstons Mills adjacent to the Horace Mann Charter School. A portion of that parcel was deemed appropriate for affordable housing. The Housing Land Trust for Cape Cod acquired that portion of the parcel and entered into an agreement with the Town to participate in the upgrading of the wastewater treatment plant at the school, as a way to facilitate the future affordable housing project.

The wastewater treatment plant at the school was built in the 1980s with a capacity of 32,000 gpd. It has experienced problems meeting its DEP groundwater discharge permit, in part due to low flows during school vacations. Upgrading of the plant is necessary to more reliably achieve the permit limits. The more constant flow expected from a residential development would help achieve that goal.

The wastewater treatment plant provides primary and secondary treatment and nitrogen removal for the wastewater generated at the Horace Mann Charter (Middle) School and the Marstons Mills Elementary School. Current combined enrollment is 1,409 students with a staff of 181. Student population at build-out is expected to be 1,751. Both schools are open Monday through Friday from September through June. Typical average flows at the plant are 22,000 gpd. The abutting affordable housing project is expected to connect to the plant in November 2004 and add about 7,600 gpd of flow.

TREATMENT PLANT MODIFICATIONS

The Town of Barnstable, through its Department of Public Works (DPW), commissioned a study of the treatment plant to determine the upgrading needs. The study found that modifications are needed to both improve treatment performance and increase capacity for the affordable housing project. The plant will be expanded from 32,000 gpd to 42,000 gpd. Process modifications will include new primary settling and pre-equalization tanks, changes to the denitrification filters, addition of ultraviolet disinfection facilities, and expansion of the leaching pits for effluent disposal. To facilitate connection of the affordable housing project, 650 feet of sewer will be

installed across the school parcel to its common boundary with the site of the affordable housing project.

IMPLEMENTING AGREEMENT

In March of 2004, an agreement was signed by the Housing Land Trust, the Barnstable School Department and the Town of Barnstable. This agreement provides for the Housing Land Trust to pay its share of design, permitting and construction costs for plant upgrading. The agreement also provides for the Housing Land Trust to pay a sewer connection fee and a sewer use fee based on the flow treated at the plant and the water use in the affordable housing project. The Town of Barnstable, through the DPW, is designated as the party responsible for operation, maintenance and repair of the plant. The Town and the School Department agree to create a capital reserve account for future improvement.

PROJECT COSTS

The current project cost estimate is \$466,000 to upgrade the plant, including \$242,000 in construction costs and \$224,000 in engineering/legal expenses and contingencies. The estimated cost of the sewer connection is \$98,000. The project agreement calls for the Housing Land Trust to pay 73% of the plant upgrading costs and 100% of the sewer connection costs. Overall, the Housing Land Trust will pay \$438,000 and the School Department will pay \$126,000, based on current estimates and a projected total cost of \$564,000.

RELATION TO RECOMMENDATIONS OF THIS REPORT

This project illustrates the practical application of several recommendations of this report as detailed in Sections 5B and 5I, specifically:

- Planning for affordable housing projects;
- Connection of nearby properties to satellite plants; and
- Transfer of responsibility for a satellite plant to Town wastewater professionals.

As a result of this project, the Town has also begun to develop design and construction standards for such projects, another recommendation of this report; see Section 5B.

CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

Many Cape Cod communities are struggling with the technical, legal and financial issues associated with providing comprehensive wastewater management. To begin to address these concerns, Barnstable County has established a regional Wastewater Implementation Committee (WIC) as a forum for sharing information, funding municipal planning studies, and participating in the development of a regional wastewater strategy. The WIC is comprised of representatives from each of the Cape's 15 towns, as well as various agencies and environmental groups. An important component of the regional effort championed by the WIC is the development of planning, legal and administrative guidance to the towns on wastewater issues, including the potential role of wastewater management districts.

Barnstable County, through the WIC, has funded this analysis of planning, administrative and legal tools to improve wastewater management on Cape Cod. This study has been conducted by a Working Group, led by Wright-Pierce and subconsultants Teal Ltd and CLF Ventures, and comprising town, Barnstable County and Cape Cod Commission staff that have advanced the project through several phases. First, an inventory was developed of existing wastewater infrastructure, and current regulatory programs were evaluated. In the second phase, the Working Group identified those aspects of current programs and policies that are hurdles to more effective management. Next, we identified specific enhancements to existing programs and proposed new programs to supplement them. In the fourth phase, those existing and potential tools were applied to four towns as case studies. Through the case studies, several important tools were fine-tuned and further developed to be available to other towns.

Proper wastewater treatment and disposal is needed to:

- Protect public and private water supply wells,
- Prevent unsanitary conditions,
- Avoid nutrient contamination of fresh and salt water resources,
- Preserve community character, and
- Support sustainable development.

While the recommendations of this report cover all of these fundamental areas, the greatest emphasis is on those tools that towns can use to control nutrient enrichment, a still evolving field in wastewater management.

EXISTING WASTEWATER FACILITIES

Cape Cod has 5 **centralized** wastewater facilities (the municipal plants in Falmouth, Barnstable, Chatham and Provincetown and the federal facility at Otis), over 40 **satellite** plants (serving schools, nursing homes, commercial developments, condominium projects, etc.), a handful of **cluster** systems, and over 120,000 **individual on-site** systems. **Enhanced treatment**, necessary to address nutrient issues, is in place for less than 15% of the 70 million gallons of daily capacity of these wastewater systems. Two regional facilities (Yarmouth and Tri-Town) receive and treat septage and the sludge removed from satellite plants. Chapters 2 and 3 provide definition of these terms and details of the size and location of these facilities.

APPLICABLE PLANNING, FUNDING AND REGULATORY PROGRAMS

Towns use **Title 5**, the state sanitary code, to address the fundamental sanitary aspects of on-site wastewater disposal. Towns develop **comprehensive wastewater management plans** to assess needs; identify and evaluate options for collection, treatment and disposal; identify and acquire treatment and disposal sites; and formulate implementation plans. The **Massachusetts Estuary Project (MEP)** is undertaking comprehensive studies of 89 embayments that will determine their threshold nitrogen loads and serve as the basis for nutrient control programs developed through comprehensive planning. The DEP provides low interest loans for eligible public wastewater facilities through its **State Revolving Fund**. DEP also licenses facilities with design flows over 10,000 gallons per day through its **Groundwater Discharge Permit Program**. The Cape Cod Commission assists towns in adapting the standards of the **Regional Policy Plan** into local comprehensive plans, and regulates wastewater issues at Developments of Regional Impact. Chapter 3 provides further description and discussion of these programs.

CURRENT CHALLENGES TO EFFECTIVE WASTEWATER MANAGEMENT

Among the challenges faced by towns in effectively managing wastewater are the following:

1. Comprehensive wastewater management planning is a lengthy, expensive and often controversial process. While that planning process is underway, local boards are often uncertain about continuing their usual permitting practices for on-site systems. Often there is a desire to institute interim measures to begin to address perceived problems before planning is complete.
2. Individual enhanced treatment systems have been viewed as a panacea for real or perceived problems with nitrogen loading, and are routinely required by one or more local boards, whose members may not be aware of their limitations. These systems generally do not provide the degree of nitrogen removal that is expected, or that collectively may be needed to protect sensitive embayments.

3. Suitable sites for wastewater facilities are rapidly being developed for residential, commercial or municipal uses. The lack of timely progress in comprehensive planning may be significantly limiting municipal options for siting wastewater treatment and disposal facilities.
4. Many of Cape Cod's stressed embayments receive nitrogen loads from more than one town. The lack of coordinated and synchronized planning efforts among towns may preclude the most cost-effective solutions or delay their implementation.
5. There are over 40 satellite treatment plants on Cape Cod, many designed built and operated by private developers. These facilities are typically developed outside the municipal wastewater planning process, and are potential assets as municipal infrastructure.
6. Affordable housing projects built under MGL Chapter 40B are not subject to locally-imposed wastewater treatment and disposal regulations that are more stringent than state requirements. Wastewater disposal from these projects may be contrary to the water quality needs of freshwater ponds and coastal embayments.
7. Towns must be careful in predicting wastewater volumes and nitrogen loading at build-out conditions, particularly with respect to seasonal occupancy and how seasonality may change in the future. There is the risk of either "under-building" or "over-building" facilities if build-out projections are not carefully prepared.
8. Under current state law, towns cannot deny the application of a property owner to connect to a town sewer if that property abuts the street in which the sewer is located. Without special legislation, towns are unable to implement "checkerboard" sewer systems designed to serve selected individual lots, especially those that cannot meet Title 5 requirements.
9. Towns typically recover a portion of the costs for wastewater infrastructure through betterment assessments. Betterment can be assessed only against those properties that are directly connected to the public facilities. Properties not connected to municipal infrastructure, even if they are sources of nitrogen loading in the watershed, cannot be charged betterments.

Chapter 5 provides further discussion of these challenges.

RECOMMENDED SOLUTIONS

After extensive evaluation of these problems and discussion of a range of possible solutions, the Working Group developed a number of recommendations. A summary of these recommendations follows, categorized by the entity which should take the lead in implementing them. We recommend that either the towns, Barnstable County or DEP take the lead role in addressing these recommendations. (Barnstable County and DEP logos are used to highlight their recommended roles, without implying any formal approval by these entities).



Action that **towns** should take include:

1. Towns should do whatever is necessary to accelerate comprehensive planning for wastewater management. *Section 5A*
2. Towns should undertake wastewater planning tasks in advance of, or concurrent, with studies underway in the Massachusetts Estuaries Program: *Chapters 5 (A, B, E, I, K) and 6*
 - Involve town planners in integrating wastewater issues with overall town growth plans to ensure a growth-neutral approach;
 - Identify prospective growth centers and estimate sewer needs;
 - Plan for affordable housing projects;
 - Evaluate water use data as a tool for determining seasonality and conducting build-out analyses;
 - Establish a mechanism for escrow accounts for deferral of private expenditures;
 - Identify prospective sites for wastewater treatment and disposal; and
 - Consider earlier-than-build-out planning horizons, phasing, and their impact on reserve capacity.
 - Consider implementation of interim water quality goals.
3. Boards of selectmen should review and fine-tune their town's short-term approach to wastewater management to: *Chapter 5 (C, D and K) and Chapter 8*
 - Ensure coordination among local boards;
 - Promote inter-town cooperation where appropriate; and
 - Begin to consider long-term organizational structures, including management districts.
4. Towns should adopt a local bylaw or regulation on private cluster systems and satellite plants that will: *Section 5B, Chapter 7 and Chapter 9*
 - Require evaluation of cluster systems for projects with flow greater than 2,000 gpd;
 - Require a consistent engineering basis for estimating design flows;
 - Require consideration of the town's wastewater planning activities and the treatment of wastewater from nearby areas;
 - Establish design and construction standards;
 - Require discussions on potential town ownership; and
 - Establish a town role in the oversight of plant operations.
5. Towns should undertake a comprehensive analysis to evaluate, rank and acquire potential sites for wastewater facilities. This should be a hierarchal approach that, in general, ranks disturbed open space first, followed by joint use of developed open space, vacant undeveloped land and, last, land formally set aside as open space. *Section 5H and Ch. 6*

6. Towns should evaluate and develop regional solutions where appropriate, with support from the County and DEP, including: *Sections 5D and 5K*
 - Participate in the Barnstable County Wastewater Implementation Committee; and
 - Evaluate the feasibility of a County-wide entity as proposed by APCC/Business Roundtable; and
 - Consider wastewater management districts and districts of critical planning concern.
7. Towns should educate the public on the importance of regular pumping of individual systems and ensure proper handling of wastewater residuals by: *Section 5L*
 - mandating regular pumping and proper disposal of waste solids from cluster and satellite plants; and
 - making long-term arrangements with septage treatment facilities or centralized plants with septage handling capability.



COUNTY

Barnstable County should take a lead role in the following:

8. The County should continue to support the Wastewater Implementation Committee as an important forum for discussion of regionally-consistent wastewater management plans and public education. *Section 5D*
9. The County should continue to participate in and support the Massachusetts Estuaries Project in its work to provide science-based management for the protection and restoration of Cape Cod's coastal embayments. *Section 5D*
10. The County should continue to actively participate in and provide regional input on DEP's efforts to develop new regulations and policies on all wastewater management issues on Cape Cod, and continue to support towns' development of related regulations and bylaws. *Section 5D*
11. The Cape Cod Commission should expand its application of a uniform regional approach in identifying nitrogen sensitive areas to assist towns in interim planning in advance of completion of studies under the Massachusetts Estuaries Project. The Commission should also identify watersheds where wastewater management districts could be effective. *Sections 5A, 5I and 5K*
12. The County should take the lead role in working with the legislative delegation to modify MGL Chapter 83, Section 3 to allow checkerboard sewer systems when part of an adopted comprehensive wastewater management plan. *Section 5F*
13. The County should expand its program for oversight of enhanced treatment systems and work with the towns to develop a standard agreement that provides for town-imposed fees to be passed on to the County. *Section 5J*



DEP

The **DEP** should undertake the following actions:

14. DEP should amend its guidelines for small wastewater treatment facilities to: *Section 5B*
 - Allow a consistent engineering design basis for estimating design flows; and
 - Promote consideration of local wastewater planning issues (changes in DEP guidelines have been recently put in place)
15. DEP should modify its requirements related to groundwater discharge permits to:
 - Require consideration of town wastewater planning issues; and
 - Modify the fee structure, review period and monitoring requirements for smaller projects. *Section 5B*
16. DEP should modify the SRF program to allow eligibility of costs for town purchase of private facilities and costs for early planning activities. (DEP has indicated informally that SRF funds may be used for these purposes.) *Section 5B and Chapter 7*
17. DEP should modify its site assignment policies as they may relate to town take-over of private satellite plants. *Section 5B and Chapter 7*
18. DEP should amend Title 5 to allow the establishment of Nitrogen Sensitive Areas (without being linked to 440 gpd/acre standard) as determined through comprehensive wastewater management planning. *Section 5I*
19. DEP should support the appropriate use of innovative effluent disposal techniques. *Section 5H*

Chapter 5 of this report provides more detail on these recommendations as well as background information and discussion points. Chapter 6, 7, 8 and 9 illustrate the application of some of these recommendations in four Cape Cod towns.

APPENDIX A
Summary of Abbreviations and Acronyms

**APPENDIX A
SUMMARY OF ABBREVIATIONS AND ACRONYMS**

Abbreviation or Acronym	
BCDHE	Barnstable County Department of Health & Environment
CCC	Cape Cod Commission
CWMP	Comprehensive Wastewater Management Plan
DCPC	Districts of Critical Planning Concern
DEP	Department of Environmental Protection
DPW	Department of Public Works
DRI	Development of Regional Impact
EOEA	Executive Office of Environmental Affairs
EPA	Environmental Protection Agency
gpd	Gallons per day
MEP	Massachusetts Estuary Project
mg/L	milligrams per liter
mgd	million gallons per day
MGL	Massachusetts General Laws
MOU	Memorandum of Understanding
RBC	Rotating Biological Contactor
SRF	State Revolving Fund
STEP	Septic Tank Effluent Pump
TMDL	Total Maximum Daily Load
USGS	United States Geologic Survey
WIC	Wastewater Implementation Committee
WMSC	Wastewater Management Steering Committee
WRPD	Water Resources Protection District

APPENDIX B
Existing Satellite Systems on Cape Cod

APPENDIX B
SUMMARY OF SATELLITE SYSTEMS ON CAPE COD¹

Town	DEP ID	Project Name	Treatment Type ²	Permitted Flow, gpd	Year of Initial Operation	Current Permit Expiration Date
Barnstable	576	Barnstable Middle School	RBC	32,000		21-Jun-98
	728	Cotuit Stop & Shop	ZENON	21,600		07-Jan-07
Bourne	164	Bourne Laundromat	LAUN	9,600	not yet built	15-Aug-99
	415	Brookside Golf Club	SEPTIC-P1	10,000		02-Nov-04
	670	Pioneer Valley School	RBC/DN	35,400		28-Sep-04
Brewster	84	Camp Wono	LAUN	2,300	1986	23-Dec-01
	599	Brewster Manor	RBC/ANOX	32,000	1996	24-Jan-06
	633	Ocean Edge Resort	AMPH	24,000	1997	22-Dec-02
Chatham	636	Chatham Bars Inn	AMPH	35,000	2002	19-Mar-03
Dennis	112	Coin Laundry	LAUN	20,000		11-Dec-96
	672	Patriot Sq. Shopping Ctr.	BIOCL	17,000		26-Apr-05
Eastham	661	Sheraton Hotel	RBC/FAST/UV	28,500		13-Sep-04
Falmouth	49	Seacrest Condo Assoc.	RBC	85,000	not yet built	07-Jan-07
	669	Village Laundromat	SND FLTR	10,800		16-Nov-05
	719	Atria-Woodbriar	RUCK SYS	16,450		24-Sep-06
	738	New Silver Beach	SBR	60,000		19-Jan-07
Harwich	324	Snow Inn	RBC	80,000		23-Mar-03
	357	Cranberry Point at Harwich	RBC	12,800		16-Dec-07
	613	Harwich Laundry & Cleaners	SAND FLTR	14,400		11-Mar-01
	631	Middle & Elem. Schools	BIOCL/TETR	16,100		02-Sep-02
Mashpee	263	Windchime Point Condo.	AMPH	40,000	not yet built	24-Feb-04
	272	Southport Retirement Comm.	RBC	172,000		27-Oct-03
	306	Mashpee Commons	RBC/ANOX	80,000		13-Feb-01
	382	Stratford Ponds Condo.	AMPH/TETR	35,500		18-Dec-01
	577	Willowbend Development	RBC	113,000		04-Aug-98
	608	Mashpee Jr/Sr High	SBR	18,000		18-Jul-00
	668	South Cape Village	AMPH PLUS	24,000		19-Jul-06
	693	Medical Facility	BIOCL	6,250		31-Jul-05
698	New Seabury	RBC/DN	300,000	14-Mar-06		
Orleans	71	Acme Laundry	MTKFLTR	15,000	2003	01-Nov-98
	109	Maytag Laundry	LAUN	12,000		29-Sep-97
	585	Community of Jesus	RBC/DN/UV	20,943		17-Oct-06
Provincetown	-	No Satellite Systems	-	-	-	-
Sandwich	110	K.W.E.	LAUN	9,600		25-Jun-91
	401	Forestdale School	RBC	20,000		24-May-00
	402	Ridge School	RBC	20,000		24-May-00
	398	Sandwich High School	AS	20,000		11-Aug-93
Truro	-	No Satellite Systems	-	-	-	-
Wellfleet	640	Schuster's Trailer Park	AMPH	21,600	not yet built	30-Jan-03
Yarmouth	1	Buck Island Condo.	RBC	30,000	1979	10-Aug-01
	162	Cove Resort Hotel	RBC	39,000		12-Jul-99
	180	Acme Laundry	LAUN	12,420		22-Jul-01
	305	Mayflower Place Condo.	RBC	25,000		25-May-00
	307	King's Way Condo.	RBC	165,000		20-Nov-02
	344	Thirwood Place	RBC	24,000		20-Nov-02
	742	Mill Pond Villages	RUCK SYS	44,800		not yet built

Notes:

1 Data provided by Mass DEP, April 2004

2 DEP-designated Type of Treatment Used:

RBC = Rotating Biological Contactor
 REUSE = Reuse of treated wastewater
 FAST = FAST treatment system
 EA/EXT AER = Extended aeration
 UV = Ultra violet disinfection
 AMPH = Amphidrome system

ANOX = Anoxic RBC
 LAG = Lagoon
 DN = Denitrification
 TETR = Tetra Filter
 RSF = Rapid Sand Filter
 TF = Tricking Filter

SOLAR AQ = Solar Aquatics
 BIOC = Bioclere Unit
 ZENON = Zenon system
 SBR = Sequencing Batch Reactor
 AS = Activated Sludge

APPENDIX C
Falmouth's New Silver Beach Bylaw

Part 3, Service Areas and Districts, [Adopted ASTM 4-5-1999, Art. 41,
approved 7-23-1999]

ARTICLE VII, New Silver Beach Sewer Service Area

§ 180-37. Public health emergency.

Because of high ground water, high density of development, significant numbers of failed septic

systems, groundwater contamination, recreational water contamination and the inability of property owners to meet the requirements for Title V septic systems, there presently exists a public health emergency in the area designated by Town Meeting, Article 19, Annual Spring Town Meeting, April, 1997, as the New Silver Beach Sewer Service Area.

§ 180-38. Mandatory connection.

The owner of any house, building or property located in the New Silver Beach Sewer Service Area which is used for human occupancy, employment, recreation or other purpose is hereby required, at his expense, to install suitable toilet facilities therein, including appliances required by § 180-48, and to connect such facilities directly with the public sewer in accordance with this chapter and the provisions contained herein, within ninety (90) days from the date the sewer shall be declared ready for operation by the Board of Selectmen. Any new construction occurring within the New Silver Beach Sewer Service Area after such date shall be properly equipped with suitable toilet facilities and connected with the sewer prior to the issuance of a certificate of occupancy.

§ 180-39. Limited treatment capacity.

The treatment plant for the New Silver Beach Sewer Service Area is designed with limited capacity. The design capacity is capable of properly treating the effluent of all existing lots in the district and the North Falmouth School provided that each residence is limited to a maximum of three (3) bedrooms plus allowance for residences in existence with more than three bedrooms as reflected in the Assessor's records as of January 1, 1999. A bedroom is defined in 310 CMR 15.002, Title V Regulations, and includes that circumstance where the total number of rooms for single-family dwellings exceeds eight (8), not including bathrooms, hallways, unfinished cellars and unheated storage areas, the number of bedrooms presumed shall be calculated by dividing the total number of rooms by two (2) then rounding down to next lowest whole number.

§ 180-40. Allocation of treatment capacity.

Each single-family residence in the New Silver Beach Sewer Service Area is presumed to have three (3) bedrooms. Residences with less than three (3) bedrooms may be expanded to three (3) bedrooms as a matter of right relative to sewer capacity. No residence may be expanded beyond three (3) bedrooms unless the owner shall first obtain a variance pursuant to this part of the chapter. New construction is limited to three (3) bedrooms.

§ 180-41. Existing residences.

Any residence in existence on January 1, 1999, regardless of its number of bedrooms, as determined by the Assessor's records, may maintain that number of bedrooms without regard to the three-bedroom limitation. Further expansion of existing residences beyond three (3) bedrooms as defined herein shall not be allowed unless a variance pursuant to § 180-46 is first obtained.

§ 180-42. Undeveloped parcels.

For the purposes of sewer capacity any existing lot, otherwise qualified, may be permitted for a three-bedroom single residence. Pursuant to MGL c. 41 § 81U, the Board of Health shall disapprove a definitive plan of subdivision of property within the New Silver Beach Sewer Service Area unless and until the applicant shall first obtain a variance pursuant to § 180-46. Without an approved variance, any approval by the Planning Board shall be on condition that no building or structure shall be built or placed upon the areas designated without benefit of a variance in accordance with § 180-46.

§ 180-43. Transferability of development rights.

The size of a residence or number of bedrooms on any particular parcel of land cannot be sold, exchanged, transferred or otherwise used to benefit another's right to connection or the number of bedrooms on another lot.

§ 180-44. Multiple-family and nonresidential uses.

Any multiple-family or nonresidential use legally in existence on January 1, 1999, may maintain its current level of activity, as measured by water consumption, as a matter of right. Any expansion of such multiple-family or nonresidential use cannot occur unless the owner or operator shall first obtain a variance pursuant to § 180-46. No new multiple-family or nonresidential use may be commenced unless the owner or operator shall first obtain a variance pursuant to § 180-46.

§ 180-45. Properties outside of the New Silver Beach Sewer Service Area.

Because of the limited treatment capacity, properties located outside of the New Silver Beach Sewer Service Area, with the exception of the North Falmouth School for which specific capacity was included in the treatment facility, that abut a sewer line may not, as of right, connect to the sewer. In cases of unusual hardship, not owing to the acts or omissions of the property owner, and with the permission of the Board of Selectmen after a public hearing and provided the Board of Selectmen shall first make a specific finding that adequate treatment capacity exists,

such owner whose property is outside the New Silver Beach Sewer Service Area may connect to the sewer. Any costs associated with such connection are the responsibility of the individual seeking the connection.

§ 180-46. Variances.

In case of unusual and substantial hardship, not the result of acts or omissions of the landowner, the Board of Selectmen, after a public hearing of which notice has been given by publication and posting for a minimum of two (2) weeks, may grant a variance to this part of the bylaw, provided that sufficient capacity exists and such relief may be granted without substantially derogating from the intent of purpose of this bylaw.

§ 180-47. Rebuilding because of fire, flood, storm or other acts of nature.

Relating to this chapter, a property owner may rebuild a structure destroyed by fire, flood, storm or other acts of nature as a matter of right provided that the new structure does not exceed the number of bedrooms of the structure being replaced.

§ 180-48. Mandatory water conservation.

The Board of Selectmen, after public hearing, may adopt mandatory water conservation measures including restricted flow plumbing devices for the New Silver Beach Sewer Service Area. Such restrictions may be permanent.

Excerpts from "Code of the Town of Falmouth, Massachusetts, v11 updated 5-15-2003

§ 180-49. Termination and elimination of septic systems.

Within thirty (30) days of the property's connection to the public sewer, any septic system, cesspool, privy or other waste disposal system located on the property shall be pumped out and permanently decommissioned in accordance with methods and procedures approved by the Board of Health and the Sewer Division of the Department of Public Works.

§ 180-50. Violations.

- A. Any person found to be violating any provision of this Part 3 shall be served by the town with written notice stating the nature of the violation and providing a reasonable time limit for the satisfactory correction thereof.
- B. Any person who shall continue any violation beyond the period permitted in Subsection A shall be guilty of a misdemeanor and subject to a fine in an amount not exceeding fifty

*Town of Falmouth
PC/Codebook for Windows*

dollars (\$50) for each violation. Each day in which such a violation shall continue shall be deemed a separate offense.

- C. This section shall in no way limit the town's power and authority to seek other remedies at law that it may have. Any person violating any of the provisions contained herein shall be liable to the town for any expense, loss or damage occasioned the town by such violation.

APPENDIX D
**BCDHE Brochure on Management Program for
Innovative/Alternative Septic Systems**

Barnstable County Management Program for I/A systems

Every year, more I/A systems are installed and it appears that this trend will continue in the future. Several towns already have 50 or more of these systems installed.

At present, local Health Department staff must oversee these systems to ensure they are maintained and monitored properly, and institute corrective measures when they are not.

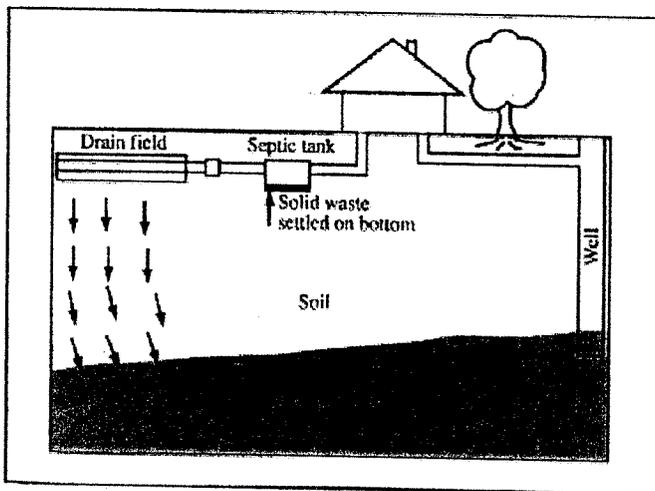
To assist local Health Departments, Barnstable County Department of Health and Environment (BCDHE) is creating of a County I/A Management Program.

This program will have several components:

- The program will cover all I/A systems in Cape Cod towns that choose to participate.
- BCDHE will partner with local boards of Health to ensure that I/A systems are performing as intended.
- Owners of all I/A systems will obtain an annual operating permit for their systems from the local Board of Health. A nominal fee will be charged for this permit for the County I/A Management Program Services.
- All system operators will be licensed by local Boards of Health.
- Operators will report results of monitoring and maintenance activities for each I/A system to the County I/A Management Program for record keeping and tracking.
- System performance information will be entered into a database so that reliable data can be produced as to how effectively particular system technologies are performing.
- BCDHE will report results of monitoring to the Board of Health. For systems that are not performing properly, BCDHE will work with Boards of Health and system operators to bring these systems into compliance.

The I/A Management Program will provide the following benefits for system owners:

- Proper maintenance of I/A systems will ensure system longevity and protect each owner's financial investment in their system.
- I/A systems, performing as designed, will protect public health and the environment.
- Information on I/A technology performance will be forwarded to Massachusetts DEP. The I/A Program will petition DEP to reduce monitoring requirements for system technologies that are performing effectively. Decreased requirements for monitoring will save money for system owners.



For more information, please contact :

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**Barnstable County
Department of Health
and Environment**

Management Program For Innovative/ Alternative Septic Systems

**Barnstable County Department of
Health and Environment**

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What's the problem with wastewater?

Cape Cod has developed rapidly over the past 30 years. Unfortunately, much of our public infrastructure has not kept pace with development. Almost all homes and businesses on Cape Cod are served by on-site sewage treatment systems (also called septic systems), rather than sewers and traditional sewage treatment plants. It is estimated that 85% of all wastewater on Cape Cod is disposed of via septic systems and that these systems annually recharge approximately 10 billion gallons of minimally treated wastewater to the ground.

Septic systems are designed to safely dispose of wastewater, not to treat it for contaminant removal. In the septic system, wastewater is treated only minimally, primarily to remove solids. The resulting effluent still contains many contaminants. After the wastewater is disposed of in the soil, some contaminants can be carried to the groundwater. Nitrogen is a contaminant that is of particular concern. High levels of nitrogen in groundwater can impact drinking water supplies, causing public health concerns.

More recently, excess nitrogen from wastewater has also been identified as a threat to the health of our coastal embayments. Groundwater discharges into coastal surface water bodies. When the nitrogen in groundwater reaches the embayments, it stimulates biological growth. Too much nitrogen in embayments causes eutrophication with associated water quality impacts such as excessive growth of algae and loss of eelgrass, shellfish beds and finfish nursery areas.

Because of these concerns, it is widely agreed that Cape Cod must begin a transition from septic systems, which do little to treat wastewater, to a wastewater infrastructure that provides a much higher level of treatment.

What are Innovative/Alternative Systems and why are they installed?

In recent years, new technologies have been developed that treat wastewater on-site, rather than sending it by sewer to a wastewater treatment plant. These are known as innovative/alternative, or I/A, systems. I/A systems are septic systems with added components that perform the treatment process.

On Cape Cod, most I/A systems are designed to remove a substantial portion of the nitrogen in wastewater. There are several reasons that I/A systems may be installed. These include situations where the septic system cannot meet Title 5 requirements for setbacks to groundwater, drinking wells or wetlands, or to get extra density (bedrooms) when building on a small lot.

In the future, greater numbers of on-site I/A systems may be required to remediate or prevent the serious impact that nitrogen is having on our coastal embayments.

Why do I/A systems need to be maintained and monitored?

Traditional septic systems are passive; water flows through the septic tank, where solids settle, and out into the soil absorption system (or leach field) where the water disperses into the soil for disposal. In contrast, I/A systems rely on several biological processes to treat the wastewater. These processes often occur in separate chambers, or by changing parameters within a single chamber, such as switching air flow on and off. These processes involve active components such as electrical switches, pumps and blowers. If these devices are malfunctioning, wastewater treatment will not be efficient or complete. For this reason, DEP requires that owners of I/A systems contract with operators who periodically check the system and take samples of the wastewater to make sure that the system is operating properly.

Owner Responsibilities for I/A Systems

Just like any other major household appliance, I/A systems need oversight from the owner. As the owner of an I/A system, you should:

- Make sure the system is properly maintained by system operator. **DEP requires that you keep a service contract in effect at all times.** The operator checks the system to ensure all parts are functioning correctly and effluent is of required quality. The fees you spend on a service contract pay you back in system performance and longevity.
- Check your effluent quality results when your system is monitored. If the effluent is not meeting discharge limits, you should contact your operator who will take action to bring the system into compliance.
- Perform any routine maintenance, such as septic tank pumping, when suggested by the operator.
- If your home is seasonally occupied, make sure the operator knows this, so that the system can be properly shut down when you are not in residence and re-started before occupancy.
- Notify any potential purchaser of the home that there is an I/A system installed.

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