

# **Part I: Framework**

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# 1.0 Introduction

## 1.1 Background

Protecting our estuaries, ponds and groundwater from the damaging effects of excessive nutrient enrichment is widely recognized as a critical issue on Cape Cod. Over the past decade many towns, working in concert with the Massachusetts Estuaries Project (MEP), have undertaken the task of quantifying the extent of nutrient loading in coastal embayments on Cape Cod. Based on MEP technical assessments completed to date it appears that nearly all towns will need to install some form of wastewater infrastructure in order to protect or restore the health of coastal embayments, ponds and drinking water supplies. Addressing this need presents challenges and opportunities. This infrastructure will be costly to build and will require the investment of significant public resources. Decisions about the design and placement of infrastructure will be complex and will have the potential to influence the character of our communities for years to come.

Several towns are in the process of developing a Comprehensive Wastewater Management Plan (CWMP) that further defines their community's wastewater management needs, and recommends the size and type of infrastructure required to meet those needs. In developing its CWMP a town may consider how wastewater infrastructure would help to address a number of important local or regional needs, which may include:

- Protecting public health from failed or poorly functioning on-site septic systems;
- Protecting water supply from nutrient or bacterial pollution;
- Protecting community character from unsightly or unworkable on-site systems;
- Achieving sustainable economic growth, including the creation or revitalization of town centers; and
- Protecting surface water resources from excessive nutrient enrichment.

The weight assigned to each need in a CWMP will vary from town to town depending on many factors. However, all CWMPs will share a common goal in seeking to control the flow of nutrients from decades of residential and commercial development serviced predominantly by on-site septic systems. Residential and commercial growth has enlivened our communities and fostered a robust year-round economy on Cape Cod, but it has also reinforced land use patterns that consume land and create sprawl. The options available to each town to effectively and efficiently manage nutrient loading through wastewater infrastructure will continue to be influenced by how land is developed and redeveloped in the decades ahead.

Planning and implementation of wastewater infrastructure also present important opportunities to guide future development and redevelopment in ways that reflect preferred land use patterns and broader community planning objectives. For example, wastewater infrastructure can facilitate revitalization of village centers and the creation of

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

economically diverse housing opportunities. Conversely, wastewater infrastructure also has the potential to reinforce undesirable growth patterns. To fully achieve the beneficial growth management potential, planning and implementation for wastewater infrastructure should occur in tandem with other components of growth management, land use planning, and resource protection.

## **1.2 Purpose of the Report**

The Cape Cod Water Protection Collaborative (CCWPC) has undertaken the *Sewers and Smart Growth* project to explore the possible growth management challenges and opportunities that could arise when a community installs wastewater infrastructure, and to provide a set of tools each community can consider when anticipating or seeking to address potential growth management challenges and opportunities. In so doing this project also seeks to demonstrate to each community the potential benefits achievable when wastewater planning is integrated with broader community growth management practices.

This project does not seek to evaluate or influence wastewater infrastructure planning in any town, nor does it seek to prescribe the actions any town should take to manage growth. This report is intended as a resource to each town as it studies, designs, installs or adaptively manages wastewater infrastructure.

## **1.3 Process of Developing the Report**

In 2007 the CCWPC obtained a grant from the Massachusetts Environmental Trust to undertake this project. The CCWPC appointed a County project manager and hired Ridley & Associates, Inc. to coordinate and develop the report and conduct public workshops. The CCWPC also established a work group of local and county officials involved in wastewater planning and growth management to provide guidance and support throughout the project. The work group members represented the disciplines of town and regional planning, wetland protection, wastewater planning, health regulation, environmental protection and town administration across Cape Cod.

In addition to the wide variety of perspectives offered by the work group, input from local and regional officials was sought at many stages during the development of the report. A survey was sent to each town to gage the relative importance of growth management issues related to sewerage. The twelve responses received confirmed and further defined the planning objectives and assumptions outlined in Chapter 2.0 of this report. A summary of the survey results is found in an Appendix to this report. In addition to the survey, progress on the report was discussed periodically with the CCWPC at its monthly public meetings.

As this project was developing, the CCWPC also was involved in support of landmark state legislation to help towns fund and implement nutrient management infrastructure projects. This legislation, described below, provides an important context

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

for communities as they consider the relationship between growth management and wastewater management and the analysis and information contained in this report.

## **1.4 State Wastewater Legislation**

The passage of Sections 5 and 10 of the 2008 Environmental Bond bill<sup>1</sup> provides towns with critical tools needed to proceed with wastewater infrastructure projects that will help protect Cape Cod's water resources.

### **1.4.1 Interest Savings**

Section 5 provides access to State Revolving Fund (SRF) loans without interest for construction of wastewater infrastructure projects intended for nutrient management and that meet certain criteria. Through 2019, up to one-third of the SRF annual allocations, approximately \$85 to \$100 million annually, will be available to finance eligible projects. In order to qualify for zero percent interest financing a project must appear on the Massachusetts Department of Environmental Protection (MassDEP) Intended Use Plan between 2009 and 2019, and be consistent with any regional wastewater management plan. In addition, the municipal applicant must:

- Not be subject to MassDEP enforcement action;
- Have a MassDEP approved CWMP; and
- Have adopted land use controls (subject to state approval) to ensure that the wastewater project will not result in an increase in wastewater flows beyond what was authorized under zoning and wastewater regulations at the time the CWMP was adopted.

For communities able to complete their CWMPs and move forward with projects within this timeframe, Section 5 translates into millions of dollars in savings from foregone interest payments.

### **1.4.2 Local Option Provision**

Section 10 of the law creates a new local option provision of the General Laws, Chapter 83A, described below:

Section 1A. Authorizes by local vote, a community to construct and maintain a wastewater treatment system for the purpose of nutrient reduction and drinking water protection. Communities may only adopt this section if they have a Comprehensive Wastewater Management Plan (CWMP) approved by MassDEP.

Section 1B. Requires landowners with property adjacent to a sewer line to connect to the sewer if their property is specifically identified by the municipality in its CWMP as requiring sewage treatment for wastewater flows on the property in existence at the time of local adoption of Chapter 83A. In addition to those

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<sup>1</sup> *Chapter 312 of the Acts of 2008, An Act providing for the Preservation and Improvement of Land, Parks and Clean Energy in the Commonwealth.* The full text of the act is available at [www.envirobond.org](http://www.envirobond.org).

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

properties required to connect, this section allows for the connection of facilities served by failed septic systems for which no other on site solution is possible and for the connection of affordable housing built under chapters 40B and 40R. Properties designated for connection but which are being served by an onsite innovative wastewater treatment system provisionally approved by MassDEP may not be required to connect to the sewer if the owner pays to monitor and inspect the system under a plan approved by MassDEP.

No properties other than those described above may be allowed to connect to the sewer system. The municipality may amend its plan, subject to MassDEP approval, to include new areas requiring treatment.

Section 1C. After initial connections are made, additional ones can be made if an existing on site system cannot be maintained or for new buildings, as long as the flow does not exceed what would have been allowed by Title 5 and the zoning as it existed at the time of adoption of this act. Municipalities are authorized to expand the system to connect municipal buildings, public restrooms, or other public service uses as it so defines them to include but not be limited to affordable housing constructed under Chapters 40B and 40R.

Section 1D. Allows municipalities to make betterment assessments at the time of connection to the sewer or estimated assessments prior to completion of the system.

Section 1E. Requires any decision to deny access to a sewer system to be made in writing and authorizes an appeal to court.

Section 1F. Prohibits discrimination in the application of this section.

Section 1G. Authorizes a community to allow the use of a conventional Title V system in an area determined to be nitrogen sensitive if the property is in an area scheduled to receive sewers. The municipality is further authorized to collect, and place in a separate fund, the difference in cost between a standard Title V system and a nitrogen reducing system. The funds in the account are to be used to offset the cost of the construction of the wastewater system and any applicable betterment and connection fees.

Section 1H. Extends the period of time that a community may assess betterments to the shorter of fifty years or the useful life of the wastewater system. Communities are also authorized to short term borrow for up to five years for wastewater construction.

### **1.4.3 Implications of Flow Neutral Requirements**

Both Sections 5 and 10 of the legislation are contingent upon a town's ability to demonstrate that sewers will not enable more growth than otherwise would be allowed under current zoning and wastewater regulations. For example, among the criteria

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

required to access the zero percent SRF funds, a town must have adopted land use controls intended to limit wastewater flows to a level that would have been allowed under regulations in effect when the CWMP was approved. Similarly, in order for a town to opt to utilize the checker boarding provision, it must have a MassDEP-approved CWMP that clearly differentiates properties requiring sewerage and those not requiring sewerage. In addition, the town must demonstrate that properties allowed to hook up to sewers will only be allowed to generate a level of flow equal to the greater of either the pre-existing flow or the flow that would have been allowed under local regulations in effect at the time the Act was adopted.

As with all groundbreaking legislation, the specific local actions necessary to satisfy the requirements of Sections 5 and 10 will need to be fleshed out among state agencies and, ultimately, will be tested in initial applications. However, the legislation's intent is unmistakably clear: towns need to correlate land use planning with wastewater infrastructure planning, and act quickly to ensure that plans for wastewater infrastructure are matched with other land use regulations to ensure that sewers meet the resource protection and growth management goals of the community, and support growth where it is desired. This *Sewers and Smart Growth* report is intended to help towns as they seek to address many of the requirements inherent in Section 5 and 10.

## **1.5 Organization of the Report**

The report is structured in the following sections:

**Part I: Framework** explores the relationship between sewers and growth management and describes the ways in which installation of sewers may influence community growth patterns. In addition to this Introduction, Part I contains *Chapter 2.0 Planning Terms, Assumptions and Objectives*, which sets forth the background information, planning objectives and assumptions underlying this report. *Chapter 3.0 Growth Management Outcome Assessment*, identifies four scenarios that describe the possible growth influences from sewerage, and around which much of the subsequent analysis and information is geared.

**Part II: Regulatory Concepts** provides a description of regulatory options available to towns to address the outcomes described in Chapter 3.0, in order to achieve the planning objectives outlined in Chapter 2.0. The regulatory concepts are organized into three areas that reflect their means of implementation. Chapter 4.0 addresses flow and nutrient management concepts primarily implemented through sewer and health regulations and bylaws. Chapter 5.0 addresses land use concepts primarily implemented through zoning and subdivision regulations. Chapter 6.0 addresses natural resource protection concepts primarily implemented through wetlands protection bylaws and regulations.

**Part III: Applications** is designed to illustrate and provide real world examples of the regulatory concepts described in Part II. *Chapter 7.0 Case Studies*, contains four case studies from Cape Cod towns that exemplify the growth outcome scenarios and

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

application of regulatory concepts described in the preceding chapters *Chapter 8.0 Policies, Regulations and Bylaws*, provides actual samples of proposed bylaws and regulations discussed in the previous chapters and lists resources for further information. The report also contains three Appendices of related documents: a glossary of terms, data from the survey of town officials, and additional maps depicting where the scenarios of potential growth influences may apply within Cape Cod towns.

## **2.0 Planning Terms, Assumptions and Objectives**

### **2.1 Terms and Assumptions**

Towns on Cape Cod differ markedly in terms of the growth management challenges and opportunities they must manage, and the nature and extent of sewerage that is likely to be required to address the community's wastewater management needs. This chapter defines certain terms, assumptions and common objectives used throughout the report, in order to explore how the installation of sewers might affect community growth patterns in a way that is meaningful to all fifteen Cape Cod towns. The ways in which the introduction of sewers influences growth may be different in areas currently served by onsite septic systems where Title 5 regulations apply, as opposed to sewerage areas where Title 5 regulations do not apply. This report focuses on situations where Title 5 currently applies—although some of these areas may be sewerage in the future—since this accounts for the vast majority of areas on Cape Cod.

#### **2.1.1 Definition of Sewerage**

In this report, the term wastewater infrastructure and sewerage are used interchangeably and refer to any public or private wastewater collection system serving multiple properties that has the potential of bypassing the flow design criteria of Title 5 (310 CMR 15.203), and to which a property owner could reasonably expect to be connected.

In other words, sewerage could mean a centralized sewer system serving a large portion of a town, or a cluster or satellite system serving a neighborhood or subdivision, provided that system is not permitted under Title 5. Innovative and Alternative (I/A) systems permitted under Title 5 are not included in this definition.

#### **2.1.2 Common Characteristics of Sewerage**

As noted above, the wastewater infrastructure plan (CWMP) for one town will vary from another's based on the towns' differing needs, priorities and resources. In order to assess growth impacts from sewerage that would be relevant to all towns, it was necessary to isolate those characteristics of wastewater infrastructure that would most likely apply in all towns. Those common characteristics are:

**Treatment, collection and disposal capacity will be designed to meet TMDLs and other environmental and socio-economic objectives identified in the CWMP.** Wastewater infrastructure is a costly endeavor and it is assumed that towns will only plan for capacity needed to meet the needs identified in the CWMP.

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

**Treatment, collection and disposal capacity will be designed to meet needs based on anticipated build-out over a planning horizon.** The planning horizon for most town CWMPs is twenty years, which includes the time it takes to develop the CWMP, and design and build the infrastructure. Towns will quantify buildout expected to occur during this period based on assumptions about zoning and other related factors such as population growth and market trends.

**Unplanned growth beyond predicted build-out, if it occurs, could overload capacity, delay compliance with TMDLs, or absorb capacity planned for other needs.** In many towns, sewerage is likely to occur in phases over a number of years. Most wastewater technologies are modular to allow for incremental growth. However, if the rate of growth is faster than the rate at which capacity is put in place, wastewater flow could exceed system capacity or nitrogen load from that flow could prevent or delay compliance with TMDLs. Unplanned growth also could absorb capacity targeted to meet community needs such as affordable housing or revitalization of town centers.

**A town's ability to increase system capacity to accommodate unplanned growth will be limited by effluent disposal options, as well as the community's ability to pay.** The two most limiting factors to expanding wastewater infrastructure are the availability of sites for effluent disposal and the cost of installing and maintaining that infrastructure. Thus, wastewater treatment and disposal capacity should be viewed as limited resources that require careful coordination with growth management.

### **2.1.3 Influences on Development from Sewers**

Installation of sewers may influence development activity in two significant ways:

**Sewers are not subject to the design flow and land area requirements of Title**

**5.** When sewers are installed in an area currently served by on-site systems, the following aspects of Title 5 regulations that influence growth no longer apply:

- System design flow criteria – these criteria establish flows based on residential bedroom count and commercial uses. Without these criteria, the number of bedrooms allowed on a given residential property could increase, and certain commercial uses may be allowed that otherwise could not be accommodated on a property due to on-site system design requirements;
- Nitrogen Sensitive Area (NSA) flow criteria – similar to the design flow criteria, the NSA limitation of 440 gallons per day per acre limits the number of bedrooms to four per acre (and proportionally less on lots of less than one acre.) Removal of this requirement could result in more bedrooms per property within NSAs;
- System setbacks and other siting criteria – these criteria establish setbacks from lot lines and wetland resource areas, and establish other topographical and hydro-geological conditions that must be met to permit an on-site system. Removal of these criteria could potentially increase lot coverage and development intensity,

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

and could result in more intensive development of some lots previously unable to meet such standards.

**Sewers may be viewed as enhancing property values and removing permitting hurdles, which may increase the attractiveness of developing or expanding in sewered areas.** Sewers may also encourage developers and property owners to invest more in a property or view it as a more suitable year-round residence or rental property. This could intensify occupancy (seasonal to year-round), or increase the desirability of structural additions or expansions that include bedrooms as well as other rooms that are not tied to Title 5 or other design flow criteria. In commercially zoned areas, sewers may increase development pressure by allowing uses with a higher design flow that might not otherwise be permissible under Title 5 or other design flow criteria.

The ability to increase the number of bedrooms or building density may be desirable in areas such as town centers, but could pose a planning challenge in areas where more intensive development is not desired. Adjustments to land use controls and other growth management tools may be called for to ensure that sewers support desired growth patterns.

#### **2.1.4 Definitions of “Growth Neutral”**

Many towns are opting to adopt the planning principal that sewerage in their community should be *growth neutral*. Growth neutral in this context means that installing sewers should not result in any more growth than would otherwise be allowed if Title 5, or more stringent Board of Health regulations, were to remain in effect.

Most growth neutral regulations have been implemented through sewer connection regulations whereby properties that are allowed to hook up to the sewer are either restricted to their existing flow or to some small incremental increase (See 4.3.) In this context, the term *growth neutral* refers to growth as measured by Title 5 or other design flow criteria. Thus the regulations are neutral only with respect to growth in *design flow*. Important as they are, such regulations do not address the increase in development potential that could result from displacement of Title 5 land area requirements, or from the increased attractiveness to develop in sewered areas (See 2.1.3). As described further on in this report, other regulatory tools are available to towns to address other growth implications from sewerage.

In order for sewers to be truly growth neutral, towns need to look beyond regulating flow and consider regulatory concepts to address non-flow related growth effects from sewerage. (See Chapters 5.0 and 6.0)

## **2.2 Planning Objectives**

As communities plan sewers to meet multiple local needs they will make choices about system capacity and technology based on a projected development build-out. The term build-out refers to the total amount of development that could be permitted under applicable zoning and other development regulations. Ideally, the build-out used to

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

design sewer system capacity accurately reflects the community's long-term growth vision. Otherwise, sewers will be designed for a level of growth that is inconsistent with community desires. However, the experience of many Cape Cod towns is that zoning adopted over the last two decades is not always consistent with the community's vision for the future. When projecting build-out communities should assess whether current zoning reflects the community's growth goals or whether anticipated changes in zoning should be incorporated in the build-out calculations. Such a step fosters consistency between plans and regulations for land use and wastewater management and helps to ensure that sewerage promotes broader community growth objectives and minimizes any unintended growth related consequences.

Three broad planning objectives are likely to be of concern in all communities and can be used as guide points for coordinating land use and wastewater planning. These objectives are:

**Manage growth within entire watersheds and not just sewerage portions to ensure that TMDLs are met and are not exceeded.**

Coordinated watershed planning considers how to manage growth within entire watersheds and not just sewerage portions of watersheds. Coordinated land use and wastewater planning on a watershed-wide basis is critical whether the watershed encompasses a neighborhood, a town or is shared by multiple towns. Sewer system capacity designed to meet TMDLs will take into account build-out within the entire TMDL watershed, even if the entire watershed is not sewerage. This is because unanticipated growth outside the sewerage area of a watershed with a TMDL also could result in increased nitrogen loading to the watershed. If this occurs to a large enough extent, it could cause the watershed as whole to exceed the level of total nitrogen from effluent consistent with TMDLs and require sewerage of additional areas.

**Allocate limited sewer capacity to areas and uses that support broader community planning goals.**

An objective of sewer system design is to provide treatment capacity needed to achieve TMDLs. In many towns there may be multiple system design alternatives that could meet that objective. One of the criteria used to select among alternatives should be how the sewer system configuration would facilitate desired land use patterns in terms of the type, location or intensity of growth. On the other hand, the selected alternative should not facilitate intensification of undesired growth.

**Ensure that community character and natural resources are protected or enhanced.**

One of the prime benefits of sewerage is that it will help to restore or protect the health of our coastal embayments. In designing systems to achieve this important aim, communities need strategies to ensure that sewers do not facilitate growth patterns that threaten community character or encroach on habitat and natural resources.

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

Each community faces different challenges in balancing these objectives. For instance, planning to avoid exceeding TMDLs will be more of an issue in some communities, while guarding against unwanted growth will be a greater challenge in other communities. Towns have a range of regulatory tools available to address the potential growth impacts in order to achieve planning objectives. Table 1 lists the possible ways sewers can influence growth patterns in relation to community planning objectives and the types of regulations that can be relied on to respond to growth influences.

**Table 1. Potential Growth Influence, Planning Objective & Regulatory Tools**

<b>Planning Objective</b>	<b>Potential Growth Influence</b>	<b>Applicable Regulations</b>
<b>Meet &amp; do not exceed TMDLs</b>	<ul style="list-style-type: none"> <li>• <b>Removal of Title 5 design flow criteria</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Sewer Connection</b></li> <li>• <b>Board of Health</b></li> </ul>
<b>Allocate sewer capacity to desired areas &amp; uses</b>	<ul style="list-style-type: none"> <li>• <b>Removal of Title 5 design flow criteria</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Sewer Connection</b></li> <li>• <b>Land Use</b></li> </ul>
<b>Protect natural resources &amp; community character</b>	<ul style="list-style-type: none"> <li>• <b>Removal of Title 5 setback &amp; site criteria</b></li> <li>• <b>Increase in attractiveness of development/redevelopment</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Conservation</b></li> <li>• <b>Land Use</b></li> </ul>

Exactly how local regulations and policies may be changed or applied to address growth influences and achieve objectives depends on a range of factors. Chapter 3.0 defines a series of four scenarios that depict in greater detail the possible ways sewers could influence growth management outcomes. The scenarios demonstrate the facets of each planning objective, and also provide a means of exploring the specific strategies and tools towns have available to choose from to address each objective. Chapters 4.0, 5.0 and 6.0 describe regulatory concepts in nutrient and flow management (health and sewer bylaws and regulations), land use (zoning and subdivision regulations), and natural resource protection (wetlands and habitat protection regulations.)

## **3.0 Growth Management Outcome Assessment: Scenarios and Strategies**

One of the first project tasks was to identify and describe a number of scenarios that would illustrate the potential ways in which sewerage may influence community growth patterns. Criteria for selecting the scenarios included that they characterize the most significant potential effects of sewerage for residential and commercial growth, and that they be generally applicable to a majority of towns. A list of potential scenarios was discussed by the work group with input from the town surveys, and was culled to a list of four.

The four scenarios typifying significant potential growth management outcomes identified were:

- **Scenario #1: Sewering existing dense residential neighborhoods;**
- **Scenario #2: Sewering commercial and mixed-use town centers;**
- **Scenario #3: Sewering under-developed areas susceptible to growth;**
- **Scenario #4: Sewering a portion of a TMDL watershed, with areas within the watershed remaining unsewered.**

Each scenario is described below, followed by a table listing some of the possible growth outcomes associated with the scenario. The outcomes are grouped by planning objective, which helped to identify possible tools and strategies. The tools and strategies themselves are described more fully in Parts II and III of this report. While any of the four scenarios could occur independent of the others, Figure 1 juxtaposes all four scenarios by depicting the path of a sewer line and identifying the areas along the way that reflect each scenario. It is important to note that the four scenarios are not intended to encompass every possible growth related outcome from sewerage, but rather to encapsulate the primary outcomes applicable to most Cape Cod towns. Other possible outcomes may arise out of site- and case-specific circumstances that could not be predicted or assessed within the scope of this project.

### **3.1 Scenario #1: Sewering dense residential neighborhoods**

In this scenario, sewers are installed in a densely developed residential neighborhood for remediation purposes. In this type of area, existing residences were built decades ago and consist mainly of small, cottage-like homes. Lots are predominately less than one-half acre, and some lots may be smaller than one-quarter acre. There may even be a few undeveloped pre-existing non-conforming lots that previously would not qualify for a septic system due to inadequate land area or setbacks. While there is little new construction in these neighborhoods, there are teardowns and remodeling projects that have enlarged existing homes. Homes are located fairly close together, and wetlands may be interspersed throughout the neighborhood. This scenario resembles many of the south-facing neighborhoods developed in the early to mid-

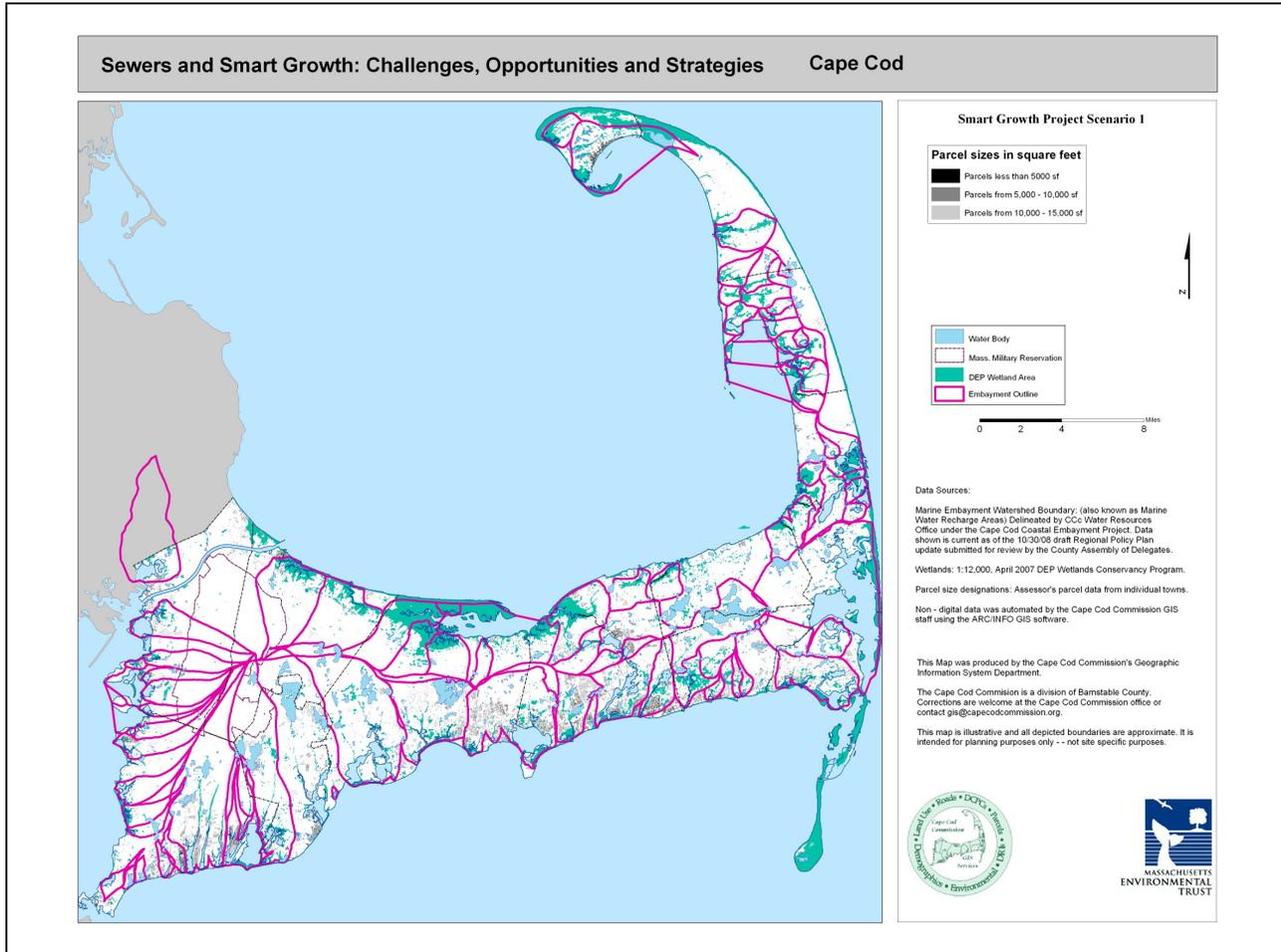
**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**

twentieth century. Because of the age of many septic systems, development density and proximity to wetlands and estuaries, many such neighborhoods will be among the first targeted for sewerage. This scenario demonstrates the importance of the planning objective of *ensuring that community character and natural resources are protected or enhanced*.

**Table 2. Scenario 1 Potential Outcomes and Strategies**

Objective	Potential Outcomes	Selected Strategies
<b>Ensure that TMDLs are met and are not exceeded by future growth</b>	<p>Increase in number of bedrooms in new and renovated homes as bedroom count is no longer limited by septic capacity.</p>	<ul style="list-style-type: none"> <li>○ Apply <u>nutrient management regulation prior to sewers</u>.</li> <li>○ Adopt <u>local option provision</u> (Ch. 312 Acts of 2008) to select areas for sewer treatment.</li> <li>○ Adopt <u>flow neutral standards</u> in sewer connection regulations.</li> </ul>
<b>Ensure that community character and natural resources are protected or enhanced.</b>	<p>Additional residential bedroom growth as unbuildable lots become buildable with loss of septic site criteria.</p> <p>Lot coverage could increase, if not at zoning maximum, with loss of area devoted to leaching areas. Intensity of uses increases as seasonal homes are converted to year round use Alteration of neighborhood character as dwellings are added or enlarged or grow taller.</p> <p>Wetland resources and buffer zones may be encroached on as dwellings are enlarged or lots are built on.</p> <p>Stormwater discharges increase with additional lot coverage as homes are added or expanded.</p>	<ul style="list-style-type: none"> <li>○ <u>Quantify build-out of undeveloped lots.</u></li> <li>○ <u>Amend bulk &amp; building form regulations:</u> lot coverage, FAR, height, etc.</li> <li>○ <u>Amend zoning re:</u> alteration of pre-existing non-conforming uses, structures and lots.</li> <li>○ Adopt <u>design guidelines</u> applicable to single-family homes.</li> <li>○ Amend wetland bylaw or regulations: add to list of <u>protected interests;</u> increase <u>no build/no disturb buffer zones.</u></li> <li>○ <u>Use TDR or offsite mitigation purchases</u> to protect undeveloped areas.</li> <li>○ Adopt <u>Stormwater management bylaw or LID bylaw</u> for single-family homes.</li> </ul>

# Sewers and Smart Growth: Challenges, Opportunities and Strategies



**Figure 2. Scenario 1 Neighborhoods Cape-wide**, shows the location of dense areas of small lot development in shades of gray and black. Most such areas are located toward the southern shore of Cape Cod.

**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**

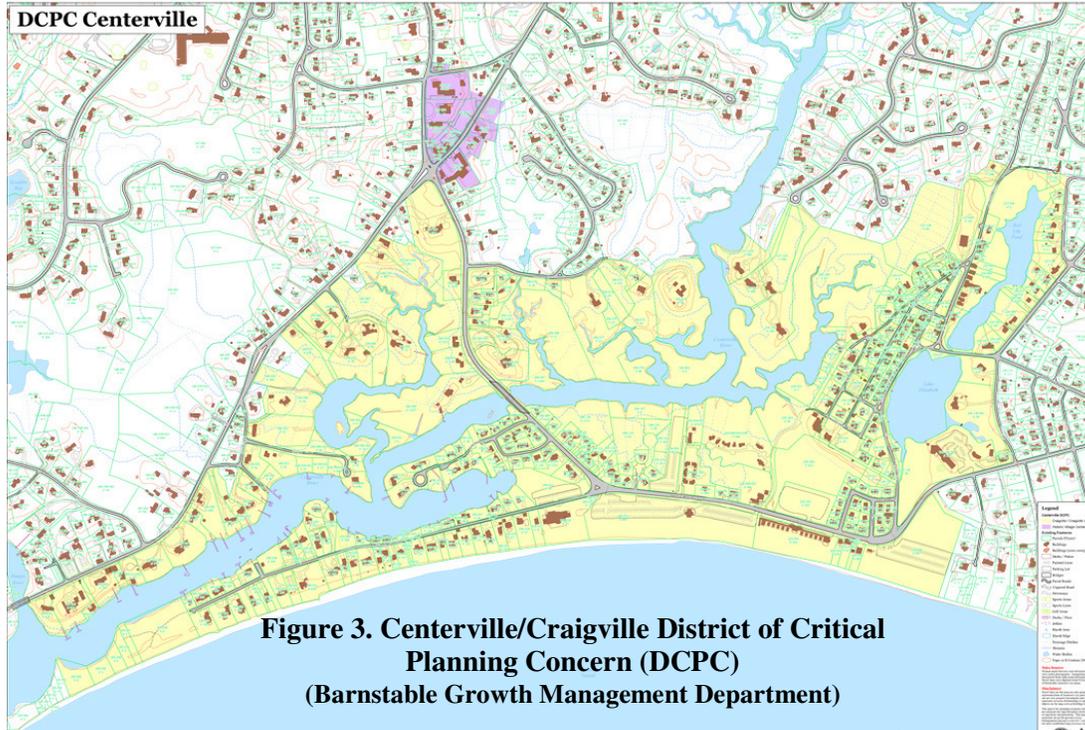
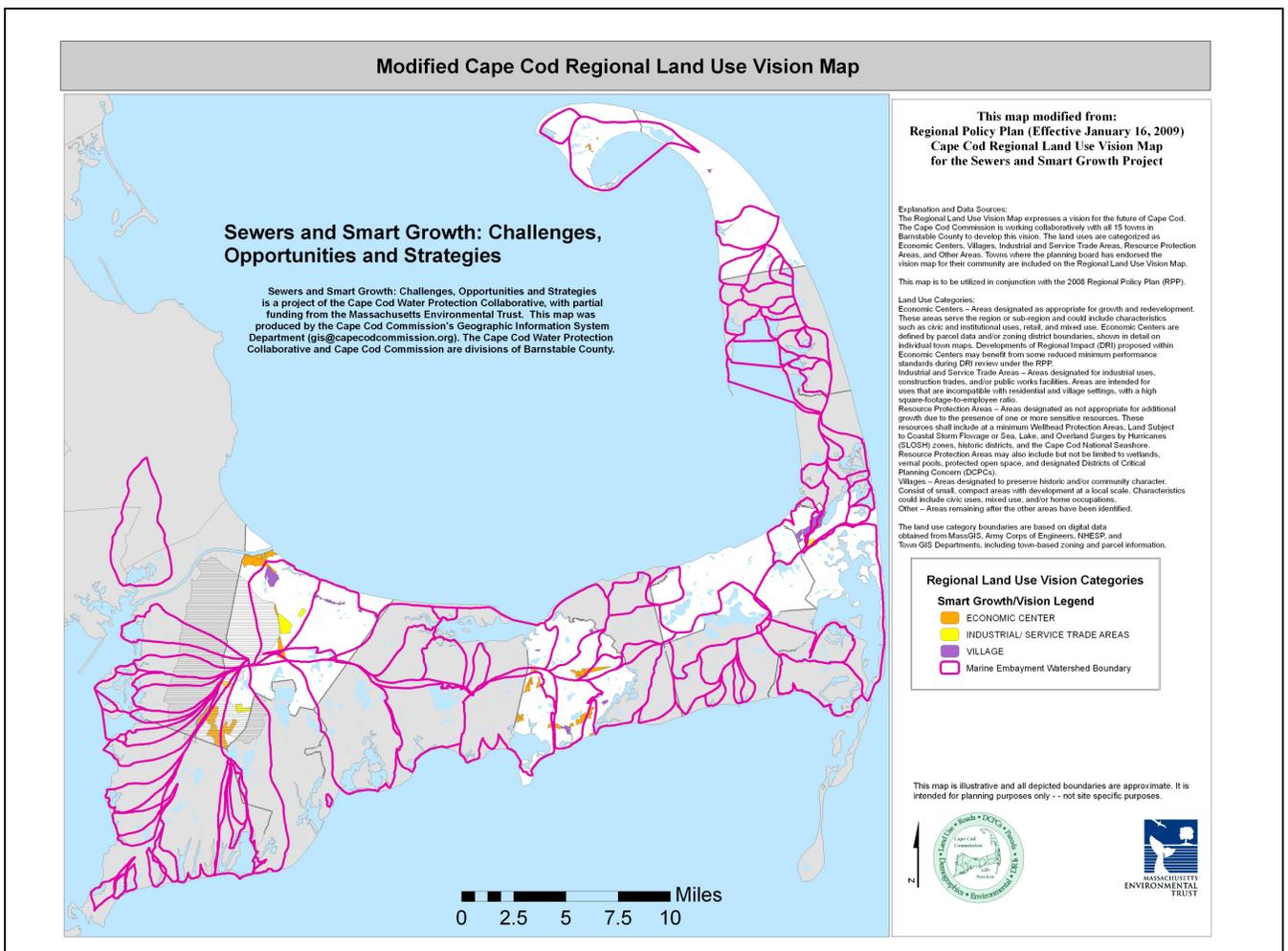


Figure 3 shows the boundary of the Centerville Village/Craigville Beach District of Critical Planning Concern (DCPC), which includes neighborhoods characteristic of scenario 1. Sewers planned for the area could prompt investment to enlarge existing properties, which could alter community character. Figure 4 demonstrates the potential for expansion of residences to occur significantly out of scale with existing development.

**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**

**3.2 Scenario #2: Sewering commercial and mixed-use centers**

In this scenario sewers are installed in a designated town center where there is pre-existing commercial development and a mixed-use environment with multi-family housing. Additional commercial growth may or may not be desired. There may be a considerable amount of additional development potential through development of vacant parcels and build out of underdeveloped parcels. The area may include residences on commercially zoned land, and may be surrounded on either side by residential neighborhoods. This scenario is intended to depict a town or village growth center of any magnitude in any Cape Cod community. This scenario demonstrates the importance of the objective of *Ensuring that limited sewer capacity is allocated to areas and uses that support broader community planning goals.*



**Figure 5. Scenario 2, Potential Mixed Use Growth Centers**

This map adapted from the 2008 Regional Policy Plan shows economic centers and villages that could experience some of the characteristics described in scenario 2. Note that not all towns identified economic centers within their borders, but more such areas could exist.

**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**

**Table 3. Scenario 2 Possible Outcomes and Strategies**

Objective	Potential Outcomes	Strategies
<p>Ensure that TMDLs are met and are not exceeded by future growth</p>	<p>Additional unplanned growth would exceed planned treatment capacity and/or slow compliance with TMDL</p>	<ul style="list-style-type: none"> <li>○ Apply <u>nutrient management</u> regulation prior to sewers</li> <li>○ Include <u>flow neutral standards in sewer bylaw/regulation</u></li> <li>○ Adopt <u>local option provision</u> (Ch. 312 Acts of 2008) to select areas for sewer treatment.</li> <li>○ Adopt <u>general bylaw to require coordinated wastewater planning</u> for private facilities.</li> </ul>
<p>Ensure that limited capacity is allocated to desired uses</p>	<p>Commercial uses convert to higher impact wastewater uses, which displaces capacity for mixed use development.</p>	<ul style="list-style-type: none"> <li>○ Use <u>compact town center zoning and/or form based code</u> to promote desired uses and building size; and control or condition high wastewater impact uses.</li> </ul>
<p>Ensure that community character &amp; natural resources are protected or enhanced.</p>	<p>Existing commercial buildings in the area expand to full buildout;            Undeveloped commercially zoned land outside the area is developed;            Residences within the commercial zone are converted to commercial uses or alternatively            Residential growth displaces commercial activity;</p> <p>Neighborhood character is altered as buildings are added or enlarged, and traffic intensifies.            Additional commercial growth includes high impact wastewater users (e.g. restaurants) which were previously limited by septic regulations.</p> <p>Storm water discharge increases.</p>	<ul style="list-style-type: none"> <li>○ Use <u>compact town center zoning and/or form based code</u> to: achieve desired building form; desired maximum store size; desired lot coverage; control uses and require mixed uses.</li> <li>○ <u>Rezone</u> some areas to lower intensity commercial or residential uses.</li> <li>○ Adopt <u>design review guidelines and procedures.</u></li> <li>○ Adopt <u>stormwater management bylaw or LID bylaw.</u></li> </ul>

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

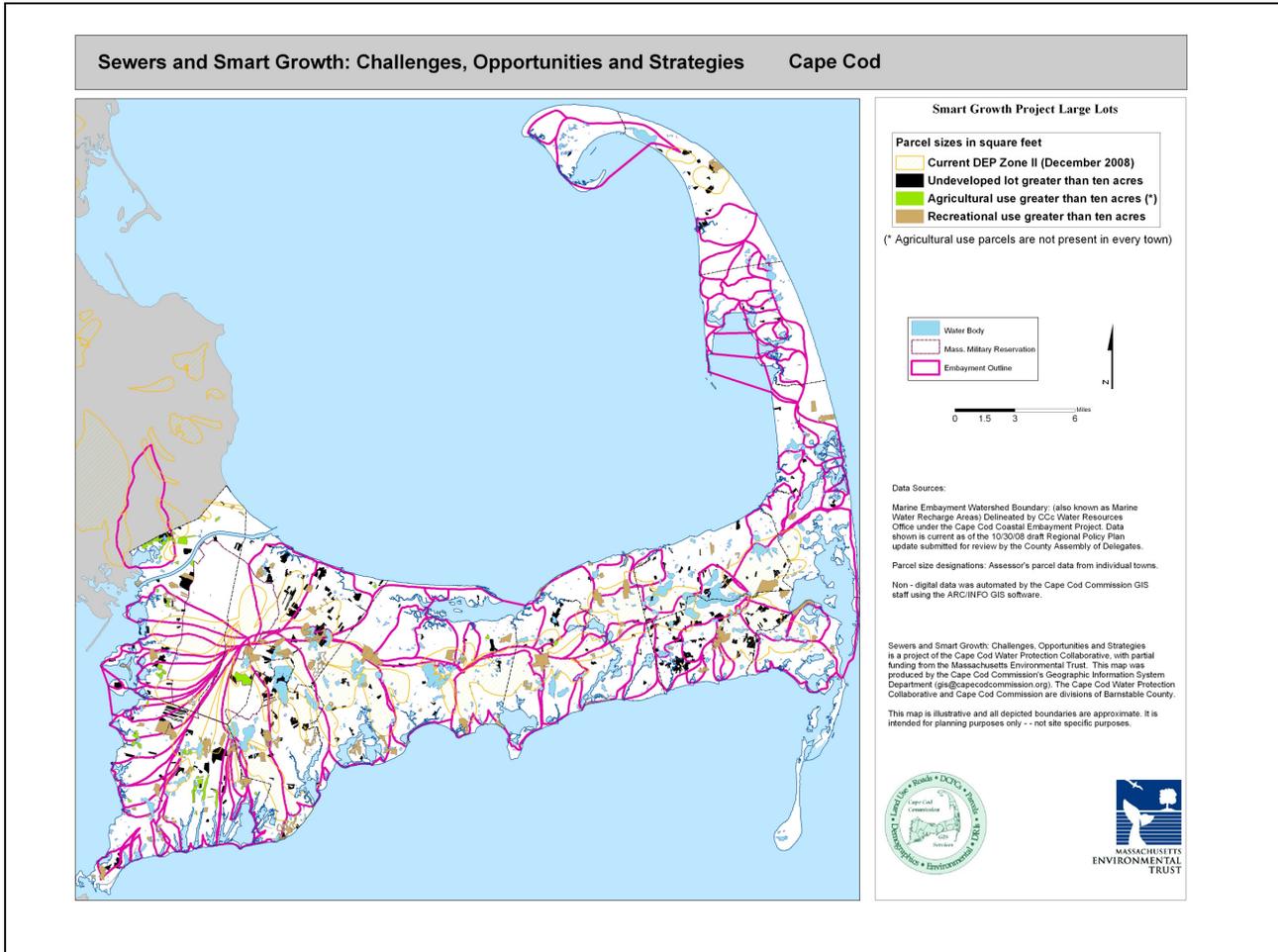
**3.3 Scenario #3: Sewering Under-developed Residentially Zoned Areas**

This scenario describes areas that sewer lines may need to pass through to reach areas described in either scenario 1 or 2, or to extend between them. In this scenario, sewers are extended through or near an area containing undeveloped or under-developed parcels of land. The presence of sewers will increase the prospect of residential expansion or further subdivision, possibly under a 40B Comprehensive Permit. However, denser residential development in these areas may not be consistent with community planning objectives and or planned wastewater treatment capacity. This scenario demonstrates the importance of the planning objectives of *managing growth within entire watersheds and not just sewered portions to ensure that TMDLs are met and are not exceeded; and Ensuring that community character and natural resources are protected or enhanced* (2.2).



**Figure 6. Scenario 3, East Harwich Village Center.** The East Harwich planning area consists of the existing commercial district surrounded by residential neighborhoods and several hundred acres of undeveloped residentially zoned land. The residential development potential could be altered if the sewers are installed to serve properties in the adjacent commercial district. This situation mirrors many of the issues outlined in scenario 3.

# Sewers and Smart Growth: Challenges, Opportunities and Strategies



**Figure 7. Scenario 3, Large Undeveloped Areas on Cape Cod,** shows the rough distribution of large (10 or more acre) lands that are undeveloped or currently used for recreation. Many of these areas are within Zones of Contribution to Public Drinking Water Supplies (Zone 2s.) Title 5 limitations on development in Zone 2s would not apply if these areas are sewered, which could increase development potential.

**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**

**Table 4. Scenario 3 Possible Outcomes and Strategies**

Objective	Potential Outcomes	Strategies
<p>Ensure that TMDLs are met and are not exceeded by future growth</p>	<p>Residential growth leads to flows that exceed TMDLs and/or planned treatment capacity.</p>	<ul style="list-style-type: none"> <li>○ Quantify potential <u>build out</u> of available lots.</li> <li>○ <u>Downzone</u> or transfer development outside of treatment area or watershed using <u>TDR</u> or Purchase undeveloped <u>parcels for offsite mitigation</u> for DRIs.</li> <li>○ Apply Interim nutrient management <u>regulation prior to sewers</u>.</li> <li>○ Include <u>flow neutral component in sewer bylaw</u> or regulation.</li> <li>○ Adopt <u>local option provision</u> (Ch. 312 Acts of 2008) to select areas for sewer treatment .</li> </ul>
<p>Ensure that community character and natural resources are protected or enhanced.</p>	<p>Environmentally sensitive land is developed with impacts on wetlands and habitat.</p> <p>Storm water discharge increases.</p> <p>Elimination of Title 5 requirements results in potentially denser 40B development.</p>	<ul style="list-style-type: none"> <li>○ Encourage/require OSRD or <u>cluster subdivision variant</u>.</li> <li>○ Add to list of <u>protected interests in wetland</u> regulations.</li> <li>○ Increase <u>no build/no disturb buffer zones</u>.</li> <li>○ <u>TDR</u> or DRI <u>open space mitigation purchases</u>.</li> <li>○ Adopt <u>habitat corridor overlay</u>.</li> <li>○ Adopt <u>stormwater management bylaw/ LID bylaw</u> for single family homes.</li> <li>○ <u>Require compliance with DEP approved CWMP</u> for all subdivision plans.</li> <li>○ <u>Identify/zone areas for dense residential development &amp; obtain state-certification of housing plan</u>.</li> </ul>

**Sewers and Smart Growth:**  
*Challenges, Opportunities and Strategies*

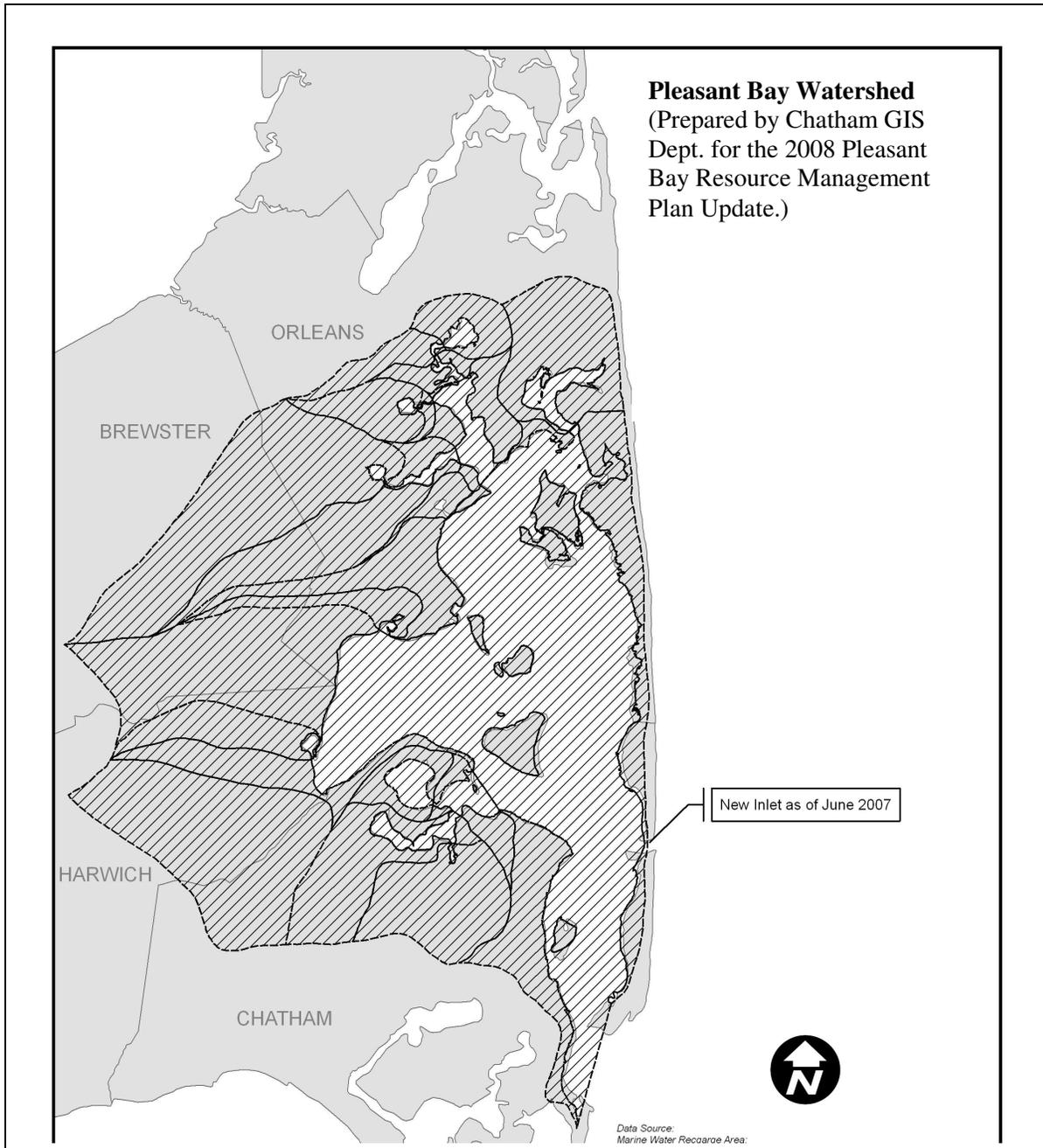
**3.4 Scenario #4: Sewering a Portion of a Watershed, with areas within the watershed remaining unsewered.**

In this scenario a town installs sewers in a watershed to meet TMDLs, and the remainder of the watershed remains on septic systems without further growth controls. Future residential or commercial growth in the unsewered portion of the watershed has the potential to result in watershed TMDLs to be exceeded. This scenario could exist within one town, but is likely to reflect a watershed shared by multiple towns. This scenario demonstrates the importance of the planning objective of *managing growth within entire watersheds and not just sewered portions to ensure that TMDLs are met and are not exceeded (2.2)*, and underscores the need for comprehensive watershed planning and inter-municipal cooperation where a watershed is shared by one or more towns.

**Table 5. Scenario 4 Possible Outcomes and Strategies**

Objective	Potential Outcomes	Strategies
Ensure that TMDLs are met and are not exceeded by future growth	Additional unplanned growth would exceed planned treatment capacity or put the town out of compliance with TMDL.	<ul style="list-style-type: none"> <li>○ Apply Interim <u>nutrient management regulation</u> prior to sewers.</li> <li>○ <u>Amend bulk &amp; building form</u> standards to control uses and square footage.</li> <li>○ Adopt <u>bylaw to require coordinated wastewater planning</u> for private facilities.</li> <li>○ <u>Require cluster systems</u> for developments above a certain threshold.</li> <li>○ <u>Require all development to comply with DEP approved CWMP or no net nitrogen policy for discharge permits.</u></li> </ul>

**Sewers and Smart Growth:  
Challenges, Opportunities and Strategies**



**Figure 8. Scenario 4, Pleasant Bay Watershed** encompasses 15,118 land acres in four towns and includes residential lands, golf courses, commercial centers and an industrial park. Two towns, Chatham and Orleans are proposing to install sewers in portions of the watershed within the next 10-20 years. Significant portions of the watershed are expected to remain unsewered.

Figure 1. Depiction of Scenarios 1 through 4 along a Hypothetical Sewer Line

