

BUZZARDS BAY
Comprehensive Conservation and
Management Plan

Volume II

Financial Plan

BUZZARDS BAY PROJECT

U. S. Environmental Protection Agency

Massachusetts Executive Office of Environmental Affairs

Final 8/91

Acknowledgements

The Buzzards Bay Project gratefully acknowledges the work of Apogee Research in developing the Financial Plan under the direction of Ann Carey. We also acknowledge the guidance and assistance provided by Carol Kilbride of the U.S. Environmental Protection Agency Region I, Claudia Shambaugh, formerly of the Massachusetts Coastal Zone Management Office, David Janik of Massachusetts CZM, Bruce Rosinoff of U.S. EPA Region I, and Kathy Bartolini, formerly of the Executive Office of Communities and Development.

Much of the information contained in this report was gathered from meetings and telephone conversations with citizens and local managers in the Buzzards Bay area, as well as from state and federal government officials. All contributed generously of their time, for which we are thankful. In particular, we wish to acknowledge Edwin H.B. Pratt, Selectman, Town of Marion; Virginia Valiela, Selectman, Town of Falmouth; Jeffrey Osuch, Executive Secretary, Town of Fairhaven; Michael Gagne, Executive Secretary, Town of Dartmouth, and Dennis Luttrell, Executive Director, Buzzards Bay Action Committee.

The financial plan was prepared through the New England Interstate Water Pollution Control Commission and the Massachusetts Executive Office of Environmental Affairs as part of the Buzzards Bay Project.

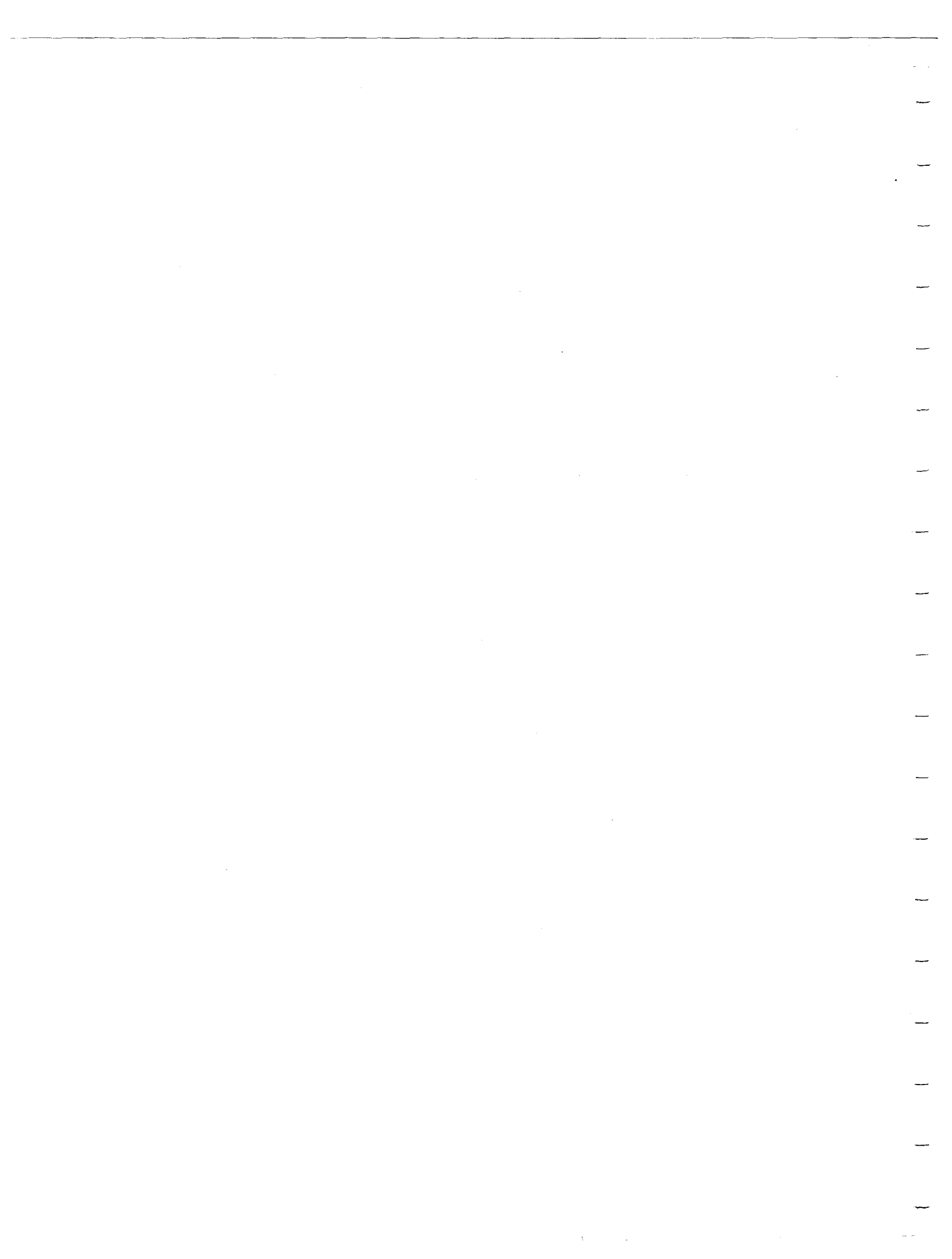


Table Of Contents

Acknowledgements.....	i
Table of Contents.....	iii
Document Summary.....	v
Chapter 1: Funding Sources.....	1
Introduction.....	1
Background	2
Grants And Loans From Federal And State Sources	8
Taxes.....	23
Charges And Fees	29
Private Funds	34
Selection And Implementation Of Funding Sources.....	39
Chapter 2: Preliminary Cost Estimates for CCMP Actions	43
Introduction.....	43
Stormwater Control	44
On-site Septic System Improvements.....	60
Boat Pump-out Facilities.....	66
Oil Spill Containment Equipment.....	71
Toxic Audit Teams	73
Chapter 3: Financial Planning Guide	77
Introduction.....	77
Overview	77
Using This Guide.....	78
Introduction To Revenue Options.....	78
General Revenues.....	79

Table of Contents

Taxes.....	82
Fees And Charges	88
Fines And Penalties	94
Bonds.....	96
Grants And Loans	100
Independent Financial Management Mechanisms	105
Enterprise Funds.....	106
Bond Banks	107
Special Districts	108
Regional Revolving Funds.....	110
Application To Selected Actions	110
Septic System Upgrade Programs.....	114
Stormwater Management Programs.....	118 ⁹
Boat Pumpout Program.....	124 ⁵
References Cited.....	129
Appendix A:	133
Appendix B:.....	137
Appendix B:.....	

Document Summary

The Buzzards Bay Comprehensive Conservation and Management Plan (CCMP) lays out an approach for achieving the goal of a clean and healthy Bay. The CCMP contains 11 Action Plans that address the problems facing the region and present detailed recommendations on how to protect and preserve water quality and living resources in Buzzards Bay. The Management Plan identifies what actions need to be taken and who should take them. Implementing the recommendations of the CCMP will require the participation of federal, state, and local government agencies as well as private parties.

The Financial Plan for the Buzzards Bay CCMP is comprised of three chapters that taken together provide the basis for estimating costs and identifying funding sources for proposed actions. The three chapters are described in more detail below.

The first chapter provides an evaluated inventory of potential funding sources to finance the recommendations and commitments of the CCMP. Possible sources of funds for estuary protection and restoration can be made available through existing programs at the federal, state, and local level, or can be created through new initiatives at any of these three levels. This is not a comprehensive review of all possible funding sources for estuary protection and restoration. Rather, it identifies the most relevant revenue sources that may finance particular actions. The funding sources examined include grants and loans from federal and state sources, taxes, fees, fines, and private funding.

The selection of appropriate funding sources will be influenced by a number of factors, including the economic and financial situation in Massachusetts and the Buzzards Bay area, the political acceptability of different revenue sources, legal and administrative requirements, fiscal capacity, and revenue potential. This chapter identifies how the various funding sources compare with respect to several factors that may affect the likelihood and desirability of implementing the different financing tools. These include the distribution of benefits and cost of the instrument, the ease with which it can be administered (the degree to which new administrative procedures and personnel are required), the legal authorization required, the potential revenues that can be derived, and the stability of revenues.

The second chapter presents cost estimation procedures and preliminary costs for various CCMP actions. Many of the actions call for regulatory changes or improved land use controls. Others call for investment in capital equipment or improvement in operating practices. The focus of this chapter is on those actions that may impose significant capital or operating costs on public or private entities in the Buzzards Bay area. Cost estimation procedures are presented for the following activities:

- Stormwater control;
- On-site septic system improvements;
- Boat pump-out facilities;
- Oil spill containment equipment; and
- Toxic audit teams.

The form of the cost estimates vary for each activity. For example, capital operating costs are specified for eight management practices that could be used to control

Document Summary

stormwater runoff. Equipment and training costs are specified for maintaining a selected inventory of oil spill containment equipment and training local staff response techniques.

These cost estimation procedures are intended to assist program managers in comparing the relative cost of alternative remedial measures. They do not reflect the total cost of implementing the Buzzards Bay CCMP. Other factors, such as technical feasibility, geographic characteristics, and regulatory requirements, should also be taken into consideration in the selection process.

The third chapter provides additional guidance to local governments on potential sources of new funding for recommended actions. It reflects the fact that many of the actions contained in the CCMP ultimately will be implemented at the local level, and that new and dedicated sources of funds are necessary to ensure successful implementation. This chapter reviews six revenue options available to local governments in the Buzzards Bay region: general revenues; taxes; fees and charges; fines and penalties; bonds; and grants and loans. For each option, potential feasibility and suitability is reviewed.

In addition to revenue options, four independent financial management mechanisms (enterprise funds, bond banks, special districts, and revolving funds) are covered. These mechanisms can be used to facilitate access to a particular revenue option, or to manage the funds generated by one or more options, thereby linking the sources of funds to their intended uses. Examples are included of how the various revenue and institutional options can be applied to selected actions identified in the CCMP.

The Financial Plan establishes the foundation for sound financial planning for implementation of the Buzzards Bay CCMP. It provides the tools for estimating the costs of selected actions, an inventory of possible existing and new sources of funds at the federal, state, and local levels, and guidance to local governments interested in developing new sources of revenues for locally implemented actions.

Chapter 1

Funding Sources for the Buzzards Bay Project Comprehensive Conservation and Management Plan

Introduction

The Buzzards Bay Comprehensive Conservation and Management Plan (CCMP) identifies a wide range of actions that are needed to restore and improve the water quality and living resources in Buzzards Bay -- one of only 12 estuaries of national significance designated under the U.S. Environmental Protection Agency's National Estuary Program. Many of the activities envisioned in the Plan will be initiated at the local level. While some actions are designed to address discrete sources of contaminants (e.g., municipal wastewater treatment plants, industrial discharges), the majority of recommendations are aimed at controlling widely dispersed sources of pollution (e.g., stormwater runoff, septic systems, boat discharges). A critical ingredient for successful implementation of the CCMP is adequate funding for the activities recommended in the Action Plans.

This chapter provides an evaluated inventory of potential funding sources to finance the recommendations of the Buzzards Bay CCMP. Possible sources of funds for estuary protection and restoration can be made available through existing programs at the federal, state, and local level, or can be created through new initiatives at any of these three levels. Because of the recent decline in federal funding for environmental programs, however, new federal initiatives are not discussed in this study. This study is not a comprehensive review of all possible funding sources for estuary protection and restoration¹. Rather, it attempts to identify the most relevant revenue sources that may finance actions recommended by the Buzzards Bay CCMP.

The selection of appropriate funding sources for actions recommended in the CCMP will be influenced by a number of factors. These include the economic and financial situation in Massachusetts and the Buzzards Bay area, the political acceptability of different revenue sources, legal and administrative requirements, fiscal capacity, and revenue potential. This chapter provides, essentially, a list of funding sources that are potentially available and appropriate for financing actions recommended by the CCMP. Selecting specific mechanisms and combining them into a financial plan is the next step. While the specification of a complete financial plan is beyond the scope of this study, each instrument included in this chapter is described and discussed in terms

¹ A more general discussion of estuary financing, as well as some specific examples from around the nation, can be found in Rubin and Alderson, (1988).

Chapter 1: Funding Sources

of the factors that may affect its applicability, so that the results of this initial effort support the implementation of the CCMP.

Fundamentally, there are three ways local or regional governments raise revenues: (i) grants from federal and state sources; (ii) taxes; and (iii) charges or fees. In addition, government can engage private resources to promote public purposes. This can be done directly, through requests for voluntary contributions or private matching of public funds, or by directing private funds taken as penalties or fines to ameliorate the associated problems. Finally, the government can proceed indirectly by mandating that other entities (either businesses or households) take certain actions and shoulder the related costs.

After a brief description of the backdrop to the choice of financing tools for funding activities recommended in the CCMP, the four sources of revenues are detailed. In Section 3, grants and loans from federal and state sources are described. As there are several good inventories of such sources (U.S. EPA 1989b. Boyer, Bennett & Shaw, Inc. 1989), especially at the federal level, only the most pertinent grant and loan sources for Buzzards Bay are included. Section 4 describes possible tax programs that may be used at the state or local level, focusing on programs that are not currently in use today for estuarine management efforts in the Buzzards Bay area. In Section 5, possible charges and fees that may be applicable to the Buzzards Bay clean-up effort are described. Section 6 focuses on the possibilities for using private funds for financing actions suggested in the Buzzards Bay CCMP. Nationwide, the interest in such possibilities has increased in recent years with the realization that public funds may be insufficient to meet the growing cost of environmental protection (US EPA, 1989c). The chapter ends with a short discussion of the issues that should be considered by jurisdictions in selecting and implementing financial mechanisms to fund specific actions suggested in the Buzzards Bay CCMP.

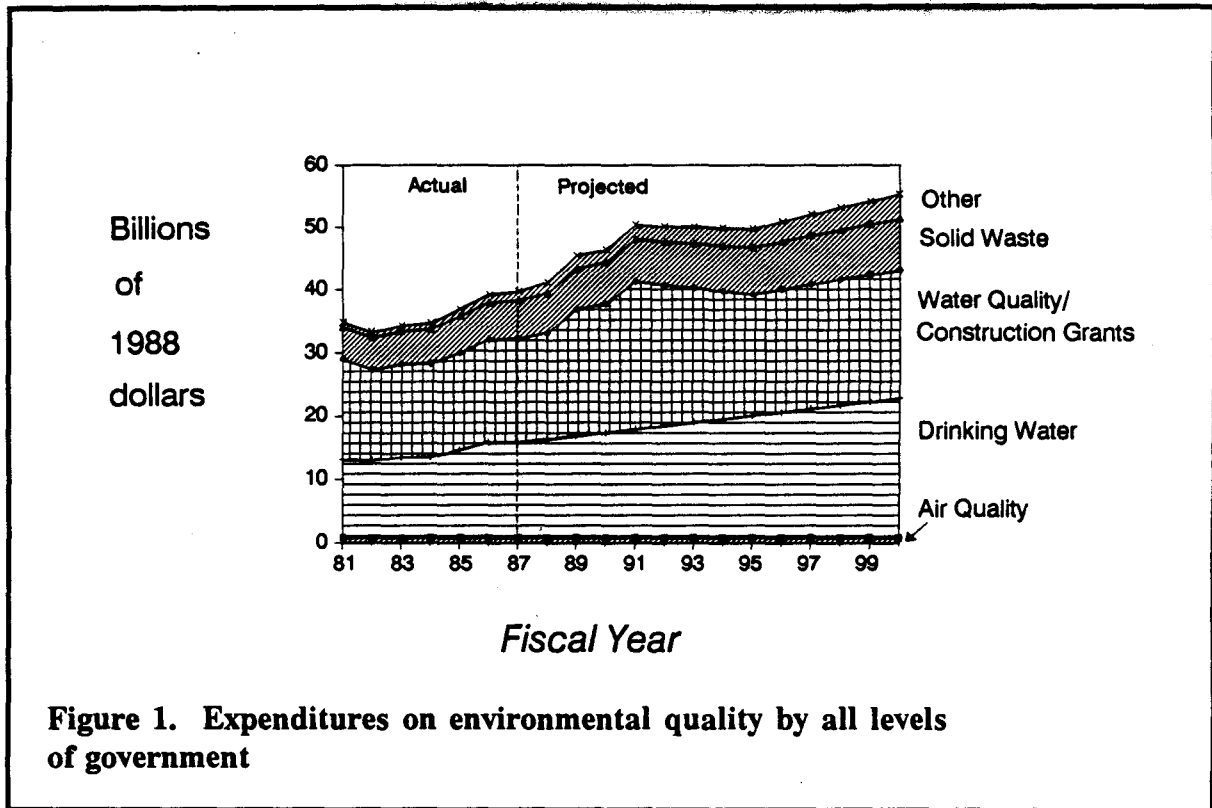
Background

The development of an inventory of funding options for implementing the Buzzards Bay CCMP is set against a background of diminishing fiscal capacity at the federal, state, and local level. This section reviews the trends in environmental finance and the constraints on availability of funds at the state and local level in Massachusetts.

Against this backdrop the demands of the CCMP are cast. These demands have two facets. One, the types of actions proposed in the CCMP have ramifications as to the flow and magnitude of funds needed. Two, the types of issues and measures recommended to address them reflect on the level of government that need to shoulder the responsibility for implementing the activities advanced in the CCMP. Overall, the types of issues and actions suggested in the CCMP suggest that, similar to the national trend, most of the burden of implementing the CCMP will be borne by local governments in the Buzzards Bay area.

Trends in Environmental Finance -- Growing Costs and Increasing Local Share

Financing environmental restoration and protection has become increasingly challenging in the last decade, and promises to be even more so in the 1990s. A recent comprehensive assessment of the cost of environmental protection, which examined historic and projected expenditures at all levels of government (federal, state, and local), identifies the following trends (Apogee Research, 1989f):



Increasing Costs

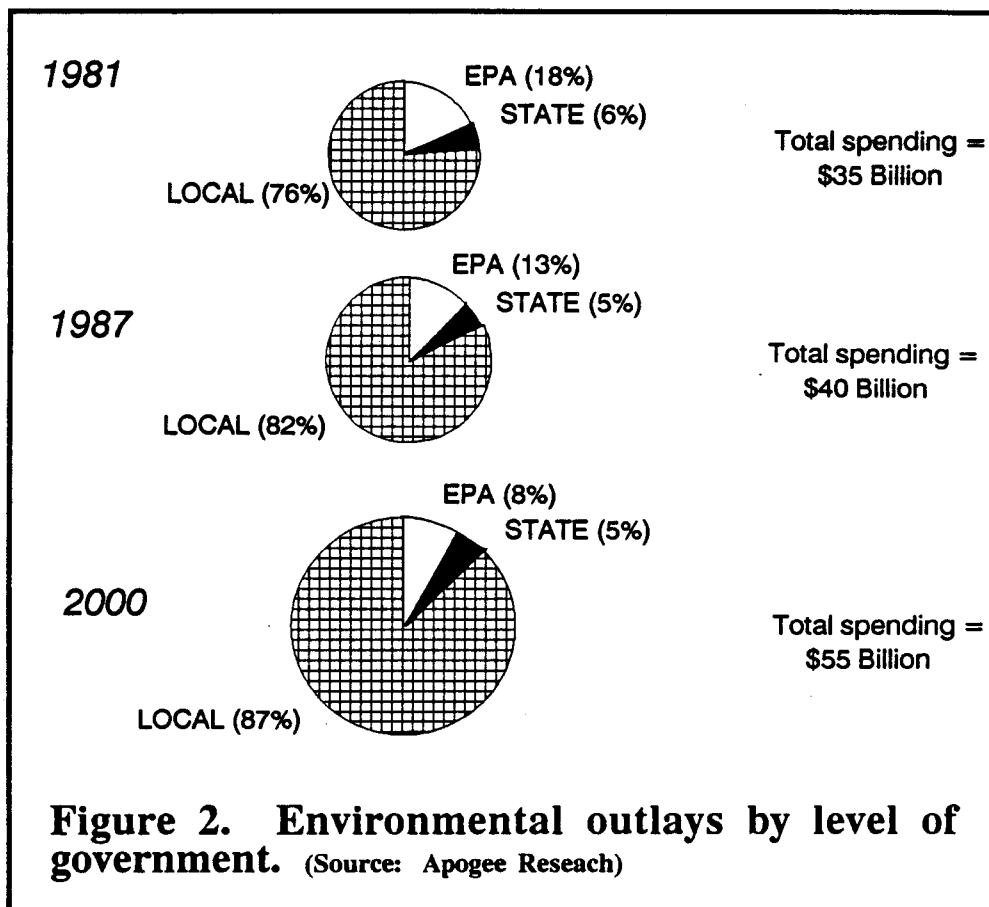
In 1987, EPA, states, and local governments spent an estimated \$40 billion for environmental protection (including air, water, solid and hazardous waste programs). If recent trends continue, environmental expenditures by all levels of government are expected to increase to \$55 billion in the year 2000 (a 37 percent increase over 1987 expenditures) just to maintain *current* levels of environmental quality (see Figure 1).

Growing Local Share

The burden of funding environmental quality in the future will fall disproportionately on local governments. While EPA expenditures are expected to decline by a third between 1981 and 2000, local governments will be expected to *double* their annual

Chapter 1: Funding Sources

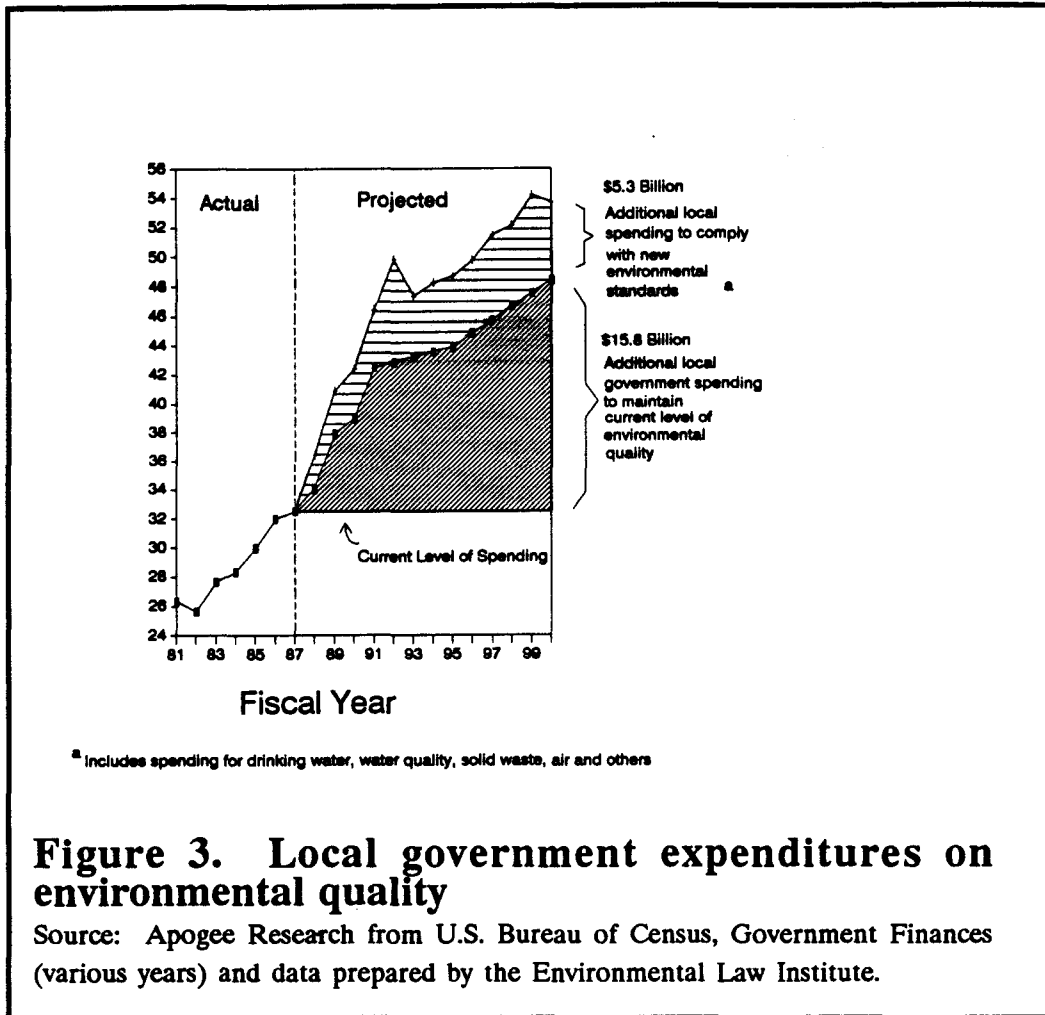
expenditures to maintain current levels of environmental quality. By the year 2000, localities are expected to spend over \$48 billion and bear more than 87 percent of the public sector cost of environmental programs (see Figure 2).



New Regulation

At the same time costs for existing regulations are increasing, *new* regulations are being proposed or anticipated. The costs to local governments associated with new regulations are estimated to reach \$5.3 billion by the year 2000, of which more than \$3 billion is for water quality and drinking water improvements (see Figure 3).

While the above cost estimates encompass all major environmental programs (air, water, solid and hazardous wastes), they nevertheless provide compelling evidence of the trend towards increased costs for environmental quality, with the majority of those costs falling on the shoulders of local governments. For the Buzzards Bay Project, this suggests that local or regional solutions will be of particular importance. Thus, while this chapter takes stock of existing federal and state grant and loan programs that may be potentially available for implementing elements of the Buzzards Bay CCMP, the emphasis is on possible sources of *additional* revenues -- primarily at the local level.



Constraints on State and Local Financing in Massachusetts

For Buzzards Bay, this national trend towards greater reliance on local resources for environmental restoration and protection is compounded by serious financial constraints at the state and local level in Massachusetts. Identifying realistic sources of funding for the Buzzards Bay CCMP must be projected against the backdrop of the state and local situation in the Commonwealth. Understanding the special character of Massachusetts' fiscal situation requires a long historical perspective.

Following a period of economic stagnation in the 1970s, the state's economy enjoyed comparatively explosive growth for the first two thirds of the 1980s. The state government entered the 1980s experiencing rapid growth in state revenues. But it also faced a major legacy of the slow-growth 1970s -- proposition 2 1/2, a severe limitation of local property tax levels and rates of increase. At the local level, many jurisdictions faced immediate budget cuts; nearly all faced restrictions in the rate of growth of locally generated tax revenues. The fallout from the resulting pressures on local budgets was

Chapter 1: Funding Sources

strong pressure on the state government to "share" the austerity by rapidly increasing state aid to local governments.

In the early 1980s, revenues at the state level experienced extraordinary growth (as compared with growth in the 1970s and as compared to growth in other industrial states). As a result, it was possible for the state to absorb a large fraction of the Proposition 2 1/2 generation austerity by expanding state aid and still have enough left over to increase its own direct spending relatively rapidly. Over the course of the 1980s the "state aid to localities" component of the state budget has grown rapidly, and now accounts for nearly a third of all state expenditures.

In the last several years, however, the growth in the state's economy -- and state tax revenues -- has slowed markedly when compared to its rapid growth in the early 1980s. At the same time the cost of several spending programs have escalated, and have proved difficult to control. A salient example of these programs is the Medicaid program, which provides health care for people who cannot otherwise afford it. The rapid increase in cost of its existing commitments has put enormous pressure on the state to avoid making commitments to new priorities.

Over the recent period, opposition to tax increases as a method of balancing the budget at both the state and local level has grown stronger. The state has experienced operating deficits as it has found itself unable to identify expenditure cuts or to raise taxes. Concerns that elected officials would choose tax increases rather than expenditure cuts as a way to bring the budget into balance has spurred strong lobbying by tax limitation groups. The opposition to taxes in Massachusetts has been successful as taxpayers have consistently supported anti-tax measures.

The result of these conflicting demands is an increasing competition for state dollars from a variety of existing programs. Furthermore, in what has been described as a "legislative gridlock," the state has been unable to balance its budget in the past two years, and the immediate prospects for agreement that either limit spending or raise sufficient additional revenues do not appear promising.

In Massachusetts, the current (and foreseeable) economic situation suggests that raising funds to pay for local initiatives contained in the Buzzards Bay CCMP will be extremely difficult. In today's political climate, new taxes are unlikely to be viewed favorably. In addition, a deteriorating local economy further undermines the ability to raise revenues. The implication of this rather bleak economic outlook is that each action in the CCMP will have to be justified in the eyes of those asked to pay for it, and a clear link will have to be established between each funding mechanism and the actions it supports. Unless a clear appreciation for the importance and value of actions suggested in the CCMP is established in the minds of those asked to pay for them, the prospects of raising the necessary funds for the projects recommended in the CCMP are dim.

An Overview of Buzzards Bay CCMP Financial Needs

The Buzzards Bay CCMP addresses a wide variety of issues. At its heart are 14 Action Plans, each addressing a particular topic. Each Action Plan suggests a number of activities that should be undertaken to address the topic of the plan.

Most pollution in the Buzzards Bay watershed stems from small diffuse sources that are not regulated by state or federal agencies. Yet, the cumulative effect of these sources is significant. Due to the nature of pollution sources, most actions recommended by the CCMP fall within the purview of local jurisdictions. The availability and applicability of revenue sources for implementing the actions recommended in the CCMP should, therefore, also be viewed from the perspective of local jurisdictions.

The CCMP suggests a very diverse set of activities as part of each Action Plan. Many of these activities are regulatory, thereby imposing much of the cost on the private sector (an approach discussed in Private Funds section of this chapter). Many other activities require relatively small occasional expenditure of funds. Examples of such activities include the acquisition of lands, easements, development rights, and small scale local capital projects such as stormwater retrofitting facilities (detention ponds, infiltration trenches, grass swales). Some of the activities mentioned in the CCMP require continuous allocation of funds for program administration. Most notable among these are monitoring activities. Several activities may require allocation of more significant funds for capital projects, such as treatment plants and sewer connections².

Revenue sources also differ in terms of the flow and magnitude of funds they provide. While many grant and loan programs may provide funds on a case-by-case basis, for example, user fees tend to provide a relatively predictable and constant source of revenues. This suggests that most jurisdictions will have to use several revenue sources to fund the variety of activities proposed by the CCMP. The flow of funds that can be expected from each instrument is included in the discussion of each instrument in the sections that follow.

Selecting Appropriate Funding Sources

Against this economic backdrop, selecting appropriate funding sources for the actions recommended in the CCMP will be influenced by a number of factors. Foremost among these factors is the link between actions and sources of funds. *Equity*, or fairness, is reflected in the distribution of the funding burden among individuals (and, in some instances, over time). In environmental programs, equity can be approached from two directions -- those who create or contribute to environmental problems should bear the funding burden (the "polluter" pays) or those who benefit from expenditures should bear the funding burden (the "beneficiary" pays). In practice, many programs rely on a combination of these two principles when selecting funding sources.

Other factors that may influence selection include *fiscal capacity* (what is the underlying financial health of the state or local community); *revenue potential* (that is, will sufficient amounts of money be raised from a particular source); *legal considerations* (does the jurisdiction have authority to impose a fee or tax); and *administrative*

2 Cost estimates for several activities recommended in the CCMP are described in Chapter 2 of this volume.

Chapter 1: Funding Sources

requirements (what effort is needed to implement a funding source and collect revenues). Given the many different actions included in the CCMP, it is likely that multiple funding sources will be needed to support the Plan.

While there are several attempts to relate various financial tools to specific actions and the attributes of the affected jurisdiction³, there is no simple prescription for making these connections. This chapter presents the most salient attributes of financial instruments needed to provide jurisdictions with an appropriate background for analyzing the desirability and applicability of the different financing instruments. For existing grant and loan programs a description of program goals, available funds, and administrative requirements is usually sufficient for jurisdictions to decide whether to apply or not. For new funding instruments a discussion of attributes that may affect the political acceptability of the tool is included, in addition to relevant information regarding revenue potential and administrative and legal requirements.

Grants And Loans From Federal And State Sources

Federal Sources

Historically, the federal government has played a significant role in financing environmental protection, especially capital-intensive projects. The most striking example of this role is the Construction Grants Program, established under the Clean Water Act (CWA). Since 1972, the federal government has spent more than \$54 billion on the construction of wastewater treatment plants. However, in today's fiscal environment federal dollars for environmental protection are declining. While there are still many federal programs offering financial assistance for environmental protection measures⁴, only some are directly relevant to Buzzards Bay. The most significant federal sources of funds for Buzzards Bay can be found in programs administered by the EPA under the Clean Water Act, the U.S. Department of Agriculture (USDA), and the Department of Housing and Urban Development (HUD). The most significant grant and loan programs from these agencies are described below. As the question of identifying funding sources is not limited to a year or two, the list of federal as well as state grant programs includes sources that may have no significant funds available in the upcoming fiscal year, yet could be significant sources of funds in the future.

EPA Administered Sources

EPA has the lead role at the federal level in financing estuary programs, through its authorizations under the Clean Water Act. Until recently the Construction Grants Program under Title II of the CWA constituted the single largest source of funds for

3 The most comprehensive is Rubin and Alderson (1988). Other related attempts include: Braden et. al. (1988) and Chesapeake Bay Critical Area Commission (1987).

4 For a comprehensive list of federal programs pertinent to coastal management, see EPA (1989b)

environmental infrastructure. New appropriations for these grants, however, will be unavailable as of FY 1991. Instead, EPA now provides states 80 percent matching grants to capitalize state revolving funds (SRFs). SRFs are most suitable for financing capital projects, such as wastewater treatment plants and stormwater control facilities. Yet, other programs administered by the EPA can help fund a wider range of activities.

The funds available through programs administered by EPA are best described by the section of the CWA under which they are authorized. Table 1 provides an overview of the relationship between sources of funds for estuarine protection by section under the CWA and estuary protection and restoration activities.

Section 106: Clean Water Program Administration

Section 106 provides grants to states for water pollution control programs. Estuary management may qualify for support as part of a state clean water program. Recurrent activities such as monitoring and enforcement may be financed from section 106. Massachusetts received more than \$1 million from this source.

Title II: POTW Construction Grants and Set-Asides

Title II provides construction grants for publicly owned treatment works (POTW). Before FY 1991, when its authorization expired, Title II also provided set-asides for water quality planning, remediation of combined sewer overflows (CSO) to marine waters, and development and implementation of ground-water protection and non-point source (NPS) management programs. An estuary management action that qualifies as an eligible activity could receive a Title II grant.

Section 201(g)(1) and 201(n)(1): Treatment Works

Under section 201(g)(1) EPA can make grants to public agencies for POTWs as defined in section 212(2). At least 80% of the funds must be used for "eligible" costs: secondary treatment, advanced treatment, or any cost-effective alternative; new interceptors and appurtenances; and infiltration-inflow correction. Section 201(n)(1) provides that if the governor of the state designates CSO remediation a priority in the state, CSO projects may also be counted as eligible costs. Under section 201(g)(1)(a) up to 20% may be used for other POTWs ("ineligible costs"), subject to the limits on sewage collection systems and separate stormwater systems in section 211⁵.

Sections 201(n)(2) and 205(1): Remediation/Mitigation of CSO

Section 201(n)(2) authorizes EPA to provide grants for remediation or mitigation of CSO problems in marine and estuarine waters.

Section 205(1) funds are set aside from Title II appropriations before allocations to states are made. The total set-aside is 1.5%. Two thirds of the set-aside (1% of the

⁵ Under section 201(g)(1)(b) the 20% discretionary funds may also be used for any purpose authorized under section 319. See discussion of section 319.

Chapter 1: Funding Sources

Table 1. Major sources of funds for estuarine protection under the Clean Water Act Amendments of 1987.

TITLE/ SECTION ACTIVITY	I	II				III		VI
	106	(205L) 201G1	(604B) 201N	(205J5) 205J1/2	(201G1B) 319	(205L) 320	(603)	
COMBINED SEWER OVERFLOW		X	E				X	
OTHER TREATMENT WORKS		X					X	
GROUND WATER PLANNING	X		X	X	X			
NONPOINT SOURCE PLANNING	X		X	X				
GROUNDWTR & NPS IMPLEMENT	X			X	X		X	
NEP CCMP ACTION PLANNING	X		X			E	X	
NEP CCMP ACTION IMPLEMENT	X						X	

NOTES TO TABLE:

1. "E" MEANS THAT THE SECTION(S) PROVIDE FUNDS ONLY FOR ESTUARINE ACTIVITIES.
2. "PLANNING" INCLUDES TECHNICAL ASSESSMENTS AND DEVELOPMENT OF PROGRAMS.
3. SECTIONS NOT IN PARENTHESES PROVIDE FEDERAL GRANT AUTHORITY AND AUTHORIZE APPROPRIATIONS. SECTIONS IN PARENTHESES ONLY AUTHORIZE APPROPRIATIONS (EXCEPT THAT SECTION 603 AUTHORIZES FUNDING FOR IMPLEMENTATION OF NEP CCMPs).
4. FUNDING FOR ADMINISTRATION, CHIEFLY THROUGH SECTIONS 106 AND 205G, IS NOT SHOWN.
5. ESTUARINE PROTECTION ACTIVITIES THAT QUALIFY FOR AN ACTIVITY CLASS ARE ELIGIBLE FOR FUNDING AS MEMBERS OF THAT CLASS.

Title II appropriation) is to be used for marine and estuarine CSO projects. Using section 201(n)(2) grant authority, EPA grants these funds to selected recipients.

Sections 205(j)(1)/604(b): Special Planning Set-Asides

Section 205(j)(1) funds are set aside from each state allotment under Title II. Section 604(b) funds are set aside from each state allotment under Title VI which will continue through FY 1994. These set-asides are to be used for identical purposes: water quality management planning of all types, including estuary-related planning. In both cases, one percent of each allotment, but no less than \$100,000, is set aside and awarded as a grant under section 205(j)(2).

Section 205(j)(5): Non-Point Source Program Development and Implementation Set-Aside

Section 205(j)(5) funds are also set aside from each Title II allotment. One percent of each allotment, but no less than \$100,000, is set aside. These funds are awarded as section 319 grants. These funds may be used for both development and implementation of NPS management programs that have been approved by EPA. The federal share is 100% of development costs and 60% of implementation costs.

Title III: Grants for NPS and Estuary Management

Title III provides grants for planning and implementation of ground-water protection and implementation of NPS management under NPS programs approved by EPA (section 319), and development of management programs for the NEP estuaries designated by the Administrator under section 320. Title III appropriations are authorized through FY 1991. Estuary management may receive support as part of an approved NPS program or if the estuary has been designated under section 320.

Sections 319 and 201(g)(1)(b): Management of Non-Point Sources

Congress authorized appropriations of \$400 million through FY 1991 for grants to finance the implementation of NPS management programs (including development and implementation of applicable ground-water protection programs) under section 319. The first appropriation under section 319 was made in FY 1990, totaling \$40 million. In December 1989, EPA established initial planning targets for each state for FY 1990 section 319 grants. Massachusetts' target was set at \$476,288. For each state, EPA earmarked a portion of its planning target for ground-water protection. In Massachusetts, \$42,000 was earmarked as the ground-water protection planning target. The actual allocation of funds is to be a function of the planning targets and the state's NPS program. The final allocation can be anywhere between 50% and 150% of the planning target. In FY 1990, Massachusetts received 85% of its allocation. However, no projects in Buzzards Bay were approved this fiscal year. With the completion of the CCMP, projects in the Buzzards Bay area can expect funding from this source.

Grants under section 319 (and section 320) have various matching requirements. The federal cost share for NPS implementation activities receiving grants is 60%. The federal cost share for ground-water protection activities receiving grants is 50%, with a limit of \$150,000 per state per year. The state is responsible for the matching funds. The state may pass on some of the funds and match requirement to local jurisdictions.

Section 320(g) and 205(l): Comprehensive Conservation and Management Plans (CCMPs) for Designated Estuaries

Section 320(g) provides the basic source of funds for the development of management programs for NEP estuaries designated by the Administrator. Under this section, EPA enters into a signed agreement with the Management Conference for an NEP estuary. The agreement includes a five-year work plan for CCMP development. EPA then awards grants for up to 75% of the cost of technical studies, financial planning, and other program development activities leading to CCMPs for the designated estuaries.

In addition, one third of the section 205(l) set-aside, or one-half of one percent of Title II funds, is available for CCMP development in national estuarine projects, such as Buzzards Bay. These funds are provided as section 320(g) grants. To date, a significant proportion of these funds has been provided for "priority action demonstration projects." These projects test on a limited scale the feasibility of management measures that are contemplated for estuary-wide implementation.

Title VI: State Revolving Fund Program

Title VI of the CWA provides for the establishment of state revolving funds (SRF). SRFs may provide loans, refinance existing debt, and provide loan guarantees or bond insurance. Under sections 601(c) and 603(c), SRF assistance may be provided for construction of wastewater treatment works (meeting the definition in section 212), implementation of NPS and ground-water programs and projects under section 319, and implementation of estuary conservation and management plans prepared in accordance with section 320.

SRFs are expected to be phased in while the Construction Grants Program is closed out. Initial capital for the water pollution control SRFs comes from three sources. One, capitalization grants from EPA to states with funds appropriated under Title VI of the CWA. Two, a state may elect to include in its capitalization grants, some or all of its Title II appropriations from FY 1987-1990, which are then transferred to the SRF. Three, each state must provide funds equal to 20% of the Title II transfers and Title VI capitalization grants⁶.

SRFs may be most suitable for financing lump-sum costs, such as facilities and equipment. Section 604(b), however, provides for set-asides for planning purposes under section 205(j) and 303(e), thus assuring continued funds for such activities, even as construction grants are phased out. This reserve is for one percent of the state allotment or \$100,000, whichever is greater.

The Massachusetts SRF was established by a new state law, Chapter 275, in July 1989. Through the sale of state bonds, \$900 million in state SRF program funds is expected to be available, of which approximately \$700 million will be earmarked for interest rate subsidies. The new law also provided for \$430 million in hardship grants for communities in need. The first Intended Use Plan submitted by Massachusetts has

6 A state may also elect to provide capitalization funds in excess of the 20% requirement.

four projects, three large projects for the Massachusetts Water Resources Authority and a small project in New Bedford. The dry weather overflow correction project for New Bedford has an estimated total cost of \$1.2 million.

Senior Environmental Employment Program

EPA also may help finance specific elements of the Buzzards Bay CCMP through programs administered through authorizations other than the CWA. One such program is the Senior Environmental Employment Program. The objective of this program is to use the talents of older Americans to provide technical assistance to federal, state, and local environmental agencies for pollution prevention programs of direct benefit to EPA or agencies directly funded by EPA.

This program has been used to a limited extent in EPA Region I. Buzzards Bay may qualify for such funding due to its status as a recipient of EPA funding. SEE employees can be used to help with certain activities, such as monitoring, which will be necessary to implement the Buzzards Bay CCMP.

Score Grants

The Small Community Outreach and Education (SCORE) Grants provide funds to state agencies or non-profit organizations to develop public education materials related to wastewater treatment, such as videotapes and handbooks. Each EPA Region receives funds yearly and evaluates proposals to award small grants. A 50% match is required from the receiving agency or organization.

EPA Region I has awarded one grant per year under this program. Vermont received a grant in FY 1988 to develop educational materials. In FY 1989, the New England Interstate Water Pollution Control Commission received a grant to develop a videotape on the importance of wastewater treatment operators, which was used in its program to help alleviate the shortage of wastewater treatment plant operators in Region I. For FY 1990, the Maine Department of Environmental Protection has been awarded a \$1,200 grant to develop a handbook on planning, constructing, and financing wastewater treatment plants.

USDA Administered Sources

Several programs administered by the U.S. Department of Agriculture (USDA) allocate funds that may be targeted to point or non-point source water pollution mitigation activities⁷. These programs are limited for the most part to farms and rural communities.

Agricultural Conservation Program

The Agricultural Conservation Program (ACP) is administered by the Agricultural Stabilization and Conservation Service (ASCS). ACP provides funds on a cost share basis

⁷ The USDA through its various agencies may have wider influence than discussed here on non-point source pollution. The Soil Conservation Service (SCS) provides extensive technical assistance, mostly subsidized, to farmers for the implementation of best management practices (BMP), which reduce non-point source pollution from farms. In addition, several of the assistance programs administered by USDA agencies can be made conditional on the use of best management practices. Both approaches, while important, are beyond the scope of this review, which is limited to sources of direct funds from federal agencies.

Chapter 1: Funding Sources

for practices directed toward the solution of critical soil, water, energy, woodland, and pollution abatement problems on farms and ranches. Funds are allocated in part by annual agreements and in part through long term agreements with farmers. Typical practices funded through long term agreements include animal waste system storage facilities, drainage systems, and paving of heavy use areas. Payments from this program range up to 75% of cost.

In FY 1989, ACP allocations for Bristol County and Plymouth County totaled \$98,000 (approximately \$49,000 each), out of \$414,380 allocated for all of Massachusetts. The FY 1990 ACP allocations were \$35,701 for Bristol County and \$51,581 for Plymouth County. These funds have been relatively stable in recent years. They are most appropriate for dealing with farm generated non-point source pollution.

Water and Waste Disposal Systems for Rural Communities

Funds are provided through this program as loans or grants to small rural communities (of less than 10,000 people) for projects directed towards the alleviation of health hazards and for new or improved rural water and waste disposal facilities. This program, administered by the Farmers Home Administration (FmHA), serves as a lender of last resort to rural communities for installation, repair, improvement, or expansion of water facilities, and the installation, repair, improvement, or expansion of rural waste disposal facilities including the collection and treatment of sanitary, storm, and solid waste. The maximum term on all loans is 40 years. The interest rate charged on such loans is a function of the community's median household income. If a community's median household income is below the state's non-metropolitan median income, the community may be eligible for a grant, so as to reduce user fees to a reasonable level.

Under this program, several Buzzards Bay communities recently qualified for both loans and grants for sewer projects. In FY 1989, the FmHA approved a \$468,200 loan and a \$10,035,600 grant for Wareham, and all but \$103,600 of the grant money has been advanced to the town. The FmHA approved a \$560,600 loan and a \$1,447,800 grant for Wareham for FY 1990. Also for FY 1990, a \$983,000 loan and a \$2.6 million grant are approved for Bourne. Wareham and Bourne are eligible for this program because the population of their urbanized area is less than 10,000. Because it treats towns differently from cities and special districts, the FmHA only considers the population of the urbanized area for New England towns. A subdivision in Wareham Pine Trees Estate, has applied for a \$180,200 loan and \$1.1 million grant.

Other Federal Sources

Other federal programs have potential to fund various facets of estuary protection and restoration efforts (US EPA, 1989b). Two programs that may be useful in the Buzzards Bay effort are the Land and Water Conservation Fund grants and Community Development Block Grants.

Land and Water Conservation Fund Grants

The National Park Service (Department of Interior) provides assistance to states and their political subdivisions for planning, acquisition, and development of outdoor recreation areas and facilities for the general public. As these grants are targeted at development of basic, rather than elaborate, facilities, purchase of riparian land under this program may well be coordinated with efforts to mitigate non-point source pollution. The program has recently been expanded to include wetlands.

This program reimburses jurisdictions for up to 50% of the cost of park facilities, or for the cost of acquiring land for recreation use, for protection of rare and endangered natural features, species habitats, natural resource systems, or important coastal sites. As appropriations to this program have been relatively small in the last eight years, emphasis has been placed on relatively small projects. The appropriation to Massachusetts totaled \$419,063 in FY 1989 and \$391,000 in FY 1990.

Community Development Block Grants (CDBG)

~~The purpose of this program, administered by the Department of Housing and Urban Development (HUD), is to develop viable urban communities by providing decent housing and a suitable living environment, and by expanding economic opportunities, principally for persons of low and moderate income. Under the CDBG Entitlement program, grants are available to cities in Metropolitan Statistical Areas with populations of at least 50,000; qualified urban counties of at least 200,000 (excluding the population of entitlement cities); and cities with populations under 50,000 which are central cities in Metropolitan Statistical Areas. For nonentitlement communities, grants are available under the CDBG Small Cities program.~~

Entitlement communities develop their own programs and funding priorities as long as programs/activities conform with statutory standards and program regulations. CDBG Entitlement Grants can be used for provision of public facilities and improvements such as water and sewer facilities. The only entitlement community around Buzzards Bay is New Bedford, which received \$5 million in CDBG funds over FY 1988 and 1989.

Massachusetts administers the Small Cities program for nonentitlement communities. The Small Cities program awards 35-40 grants per year. The maximum grant is \$800,000 and the minimum is \$100,000. Although most of the projects funded under this program are for housing rehabilitation, CDBG Small Cities Grants can be used for sewer and water projects. Approximately \$20 million per year was available in FY 1989 and 1990 under the Small Cities Program. No projects were funded in Buzzards Bay.

Communities eligible for Small Cities Grants also are eligible for Feasibility Study Grants under the CDBG program. These grants provide funds for predevelopment feasibility studies of private or public development proposals. A feasibility study can include identification of environmental issues. The maximum grant is \$30,000 and at least a 10% local cash match is required. Applications are taken on a continuous basis. Communities are encouraged to discuss their application with state personnel before it is submitted. No studies have been funded in Buzzards Bay, however, Buzzards Bay communities, such as Falmouth, have made inquiries. New Bedford is not eligible because it is an entitlement community.

State Options

Historically, states have played a relatively minor role in financing environmental programs, contributing on average only 5 percent of the total public outlay for environmental protection. The current financial situation in Massachusetts suggests that the state is unlikely to become a major source of grants or loans for Buzzards Bay in the near future. While a few state programs in Massachusetts may have some pertinence to the actions proposed in the CCMP, no current state program is directed *exclusively* at

Chapter 1: Funding Sources

Buzzards Bay. As a result, Buzzards Bay will have to compete with other parts of the state for the limited funds that may be available from existing state programs. Most state funds in Massachusetts are subject to spending caps, further limiting their potential for Buzzards Bay. The state sources described here are those deemed most applicable to the actions proposed in the CCMP. These options were selected from among more than 200 state grants listed in a catalog for municipal officials (Boyer, Bennett and Shaw, Inc., 1989).

In Massachusetts, the Executive Office of Environmental Affairs (EOEA) is the principal agency for managing the Commonwealth's environment and natural resources. The main source of state funds is through EOEA programs. Other state funding sources are available through the Executive Office of Communities and Development (EOCD) and the Executive Office of Transportation and Construction. The options reviewed below are classified by department/division of EOEA and EOCD. Table 2 provides an overview of the potential sources of state funding through EOEA related to estuarine protection and restoration activities.

Department of Environmental Management

Acquisition

The Commonwealth's 1987 Open Space bond issue set aside \$40 million to the Department of Environmental Management (DEM) for coastal land acquisition. Another \$11 million was earmarked to acquire inholdings and adjacent holdings to DEM's existing properties. In Buzzards Bay, DEM used \$1.65 million of its bond money to acquire 338 acres on West Island in the Town of Fairhaven. In Westport, DEM used \$145,000 to purchase two parcels of 1.3 acres for expansion of Horseneck Beach. The bond issue also set aside funds for development projects, including \$3 million for the New Bedford marina on Popes Island.

Rivers and Harbors Grants

The Waterways Division within the Department of Environmental Management administers the Rivers and Harbors program, which provides financial assistance to communities to improve their waterways. Eligible projects for coastal waters and harbors include dredging and beach nourishment; construction or rehabilitation of piers, wharves, bulkheads, seawalls, or other coastal facilities; and development of boatways and public access facilities. Eligible projects for inland waters include river channel dredging, riverbank shoreline erosion control, flood control and dam repair, pond dredging and rehabilitation, boat ramps, and public access facilities. Assistance is provided through Rivers and Harbors grants, and through in-house funds for direct state assistance on specific projects, as authorized under Chapter 91 or by line item appropriations. Many Buzzards Bay communities have received financial assistance from the Waterways Division, primarily through in-house funds.

The Commonwealth's 1987 Open Space bond issue set aside \$8 million for rivers and harbors grants. Towns can submit applications at Rivers and Harbors hearings held around the state. The applications received are evaluated to make grant awards, which can range from \$50,000 to \$500,000. A 25% local match is required for dredging projects and a 50% local match for all other projects. Currently, all funds are

Table 2. State sources list

Source	Revenues	Allocation to Buzzards Bay	Allocation Criteria
1987 Open Space Bond Issue	\$250M total; \$40M earmarked for coastal land acquisition by DEM	Two land acquisition projects: \$1.65M purchase of 338 acres on West Island \$145,000 purchase of 2 parcels of 1.3 acres in Westport to expand Horseneck Beach	Most of funds earmarked for specific agencies for specific programs or projects; state prepares priority list; funds being spent slowly because of state fiscal crisis
Agricultural Preservation Restriction Program	Supported by \$35M earmarked from 1987 bond issue	A voluntary program; farmland owners can apply for state purchase of agricultural preservation restrictions (APRs)	State funds about 50% of total effort to purchase APRs; only \$5M of the bond funds remains available; local government contributions and bargain sales are also important
Coastal Facilities Improvement Fund	\$10M authorized by legislature in 1987 to be spent over FY 1989-1991	New Bedford received funds for two CFIP projects in New Bedford harbor: \$685,000 for extension of Steamship Pier and \$35,000 for repairs to the South Terminal	Cities or towns are eligible if within designated coastal zone; a 50% local match is required; the 50% state share is provided on reimbursement basis
Harbor Planning Grants	\$1M authorized by legislature in 1988 to be spent over FY 1989-1991	New Bedford and Fairhaven received \$26,000 to develop New Bedford Harbor Plan; Wareham received \$10,000 for Wareham and Onset Harbor Plan	Cities or towns are eligible if within designated coastal zone; a 50% local match is required; the 50% state share is provided on reimbursement basis
Infiltration/Inflow Rehabilitation of Abatement Facilities Grants	Approximately \$11M for FY89; No information on FY90 yet	New Bedford already has a \$350,000 step 1 grant and is on list now for a \$400,000 additional grant; Dartmouth got a \$143,000 step 1 grant and has applied for increase; Fairhaven got a \$530,000 step 3 grant for construction; Mattapoisett already has a \$22,000 step 2 grant and is on list now for a \$140,000 step 3 grant; Marion got a \$53,500 step 1 grant	Awards grants for three steps: 1) analysis, 2) design, and 3) construction Approximately 80% of funds awarded for step 1 grants; Local share is 25 percent

Chapter 1: Funding Sources

Table 2. State sources list (continued)

Source	Revenues	Allocation to Buzzards Bay	Allocation Criteria
Rivers and Harbors Program	Direct state assistance using agency funds; also grants supported by \$8 million from 1987 bond issue	Many Buzzards Bay communities have received direct state assistance for specific projects from the Waterways Division, DEM	All funds for Rivers and Harbors grants are committed to approved projects
Self Help Program	Supported by \$20M earmarked from 1987 bond issue	Communities where funds have been used include Bourne, Falmouth, New Bedford, and Westport	Reimburses local governments for acquisition of land for conservation purposes; reimbursements range from 63-90 percent; all but \$8M already obligated
Shellfish Local Aid	FY89 - \$300,000 FY90 - no provision in state budget	In FY89, reimbursed 15.4% of each town's FY88 expenditures: Bourne \$13,217 Fairhaven \$6,289 Falmouth \$7,268 Marion \$6,762 Mattapoisett \$5,058 New Bedford \$10,968 Wareham \$6,674 Westport \$6,523	Towns submit budget for their shellfish program; Division of Marine Fisheries determines percentage of budget to be reimbursed; usually around 20%
Supplemental Grants for Construction of Pollution Abatement Facilities	FY89 - \$20M, FY90 - do not expect \$ to be available, FY91 - will be a loan program	New Bedford received a \$438,000 grant in FY 1989 to eliminate 3 dry weather overflows to the inner harbor; No Buzzards Bay communities on current priority list	Grants for 70 percent of the costs for construction of wastewater plants, sewer lines, and pumping stations

committed to approved projects. In FY 1990, \$340,000 was available for rivers and harbors grants. No information is available yet on FY 1991 funding.

Department of Environmental Protection

Infiltration/Inflow Rehabilitation Program

The Infiltration/Inflow Rehabilitation Program is administered by the Division of Water Pollution Control within the Department of Environmental Protection (DEP). Chapter 472 of the Acts of 1984 made available \$100 million to reimburse cities, towns, and districts for eligible costs of infiltration/inflow rehabilitation projects for sewer systems. Initially, the program reimbursed communities for 90% of eligible costs, but the state share is now 75%. DEP awards Infiltration/Inflow Rehabilitation Grants according to a priority list which is revised yearly. The program awarded grants of approximately \$11 million in FY 1989. In FY 1991, this program will become a loan program.

Any city, town, or district with a sewer system can apply for a grant. Applicants must certify appropriation of funds for the 25% local match required. Approximately 80% of the funds are awarded for infiltration/inflow analysis (step 1 grants), which involves using state guidelines to systematically evaluate potential infiltration/inflow sources in a sewer system. Other infiltration/inflow rehabilitation grants are awarded for design (step 2 grants), and construction (step 3 grants).

Several communities in Buzzards Bay have already received grants. New Bedford has a \$350,000 step 1 grant and is now on the list for a \$400,000 additional grant should money become available in FY 1990. Mattapoisett already has a \$22,000 step 2 grant and is now on the list for a \$140,000 step 3 grant if money becomes available in FY 1990. Dartmouth received a \$143,000 step 1 grant in 1987 and has applied for an increase. Marion received a \$53,500 step 1 grant in 1987 and Fairhaven received a \$530,000 step 3 grant for construction in 1988.

Communities must apply yearly in order to be on the priority list. DEP sends project information requests to communities each year and the communities can apply at any time during the year. To date, no Buzzards Bay communities have applied for consideration under the new loan program for FY 1991.

Supplemental Grants for Construction of Pollution Abatement Facilities

This program, administered by the Division of Water Pollution Control within the Department of Environmental Protection, provides state grant funds for construction of wastewater treatment plants, sewer lines, and pumping stations. Grants are awarded according a priority list which is revised yearly. The grant covers up to 70% of eligible costs, with the local share covering the other 30% of eligible costs and 100% of ineligible costs. Eligible costs are most construction and engineering costs. Ineligible costs include land acquisition (unless it is an integral part of the treatment process), acquisition of easements for construction, incremental costs for oversizing the facility (costs in excess of what is determined to be a reasonable flow for the community's needs), certain maintenance equipment, and office equipment.

Chapter 1: Funding Sources

The Commonwealth had \$20 million available for this grant program in FY 1989, however, DEP does not expect money to be available in FY 1990 because of the state's fiscal crisis. In 1991, this program will award loans instead of grants. In Buzzards Bay, New Bedford received a \$438,000 grant in FY 1989 to eliminate three dry weather overflows to its inner harbor. No Buzzards Bay communities are on the current priority list.

Department of Fisheries, Wildlife and Environmental Law Enforcement

Shellfish Local Aid

The Shellfish Local Aid program is administered by the Division of Marine Fisheries within the Department of Fisheries, Wildlife and Environmental Law Enforcement. The program provides funds on a reimbursement basis to assist coastal communities with shellfish management programs. To be eligible, communities must submit a certified copy of the budget for their shellfish management program. All eligible communities are reimbursed for a percentage, usually around 20%, of their prior fiscal year expenditures. The percentage is established by comparing total eligible requests to the program's allocation.

In FY 1989, a total allocation of \$300,000 reimbursed eligible coastal communities for 15.4% of their FY 1988 shellfish expenditures. In Buzzards Bay, these communities received the specified amount: Bourne (\$13,217), Fairhaven (\$6,289), Falmouth (\$7,268), Marion (\$6,762), Mattapoisett (\$5,058), New Bedford (\$10,968), Wareham (\$6,674), and Westport (\$6,523). There is no provision for the Shellfish Local Aid program in the FY 1990 state budget.

A proposal currently under consideration in the state legislature, House Bill 1755, would establish a grant program for Shellfish Local Aid. Instead of reimbursing previous fiscal year shellfish expenditures, communities would receive funds up-front in the form of grants. A state review committee would determine grant allocation among the eligible communities.

Acquisition

The Commonwealth's 1987 Open Space bond issue set aside \$30 million to the Department of Fisheries, Wildlife and Environmental Law Enforcement for acquisition of land along rivers and streams, rare and endangered species habitats, and adjacent holdings to the Department's existing properties. In FY 1989, the Department spent \$8.5 million for land acquisition, primarily with funds from a 1983 bond issue. In FY 1990, the Department expects to spend \$2.8 million on land acquisition, using funds from the 1987 bond issue and the last of the 1983 funds. Approximately \$28 million of the \$30 million from the 1987 bond issue will still be available at the end of FY 1990. Although the Department is authorized to purchase coastal land, most land acquired by the Department is not on the coast.

Department of Food and Agriculture

Agricultural Preservation Restriction Program

The Agricultural Preservation Restriction Program is a voluntary program providing for public purchase of development rights to farmlands. Farmland owners can apply to sell the rights to develop their land for non-agricultural uses. Acting under the authority of the Department of Food and Agriculture (DFA), the local conservation commission must approve the application. If approved, the state pays the farmer the difference between the land's agricultural value and its appraised commercial market value.

The Commonwealth's 1987 Open Space bond issue set aside \$35 million for acquisition of agricultural preservation restrictions (APR). Of the \$35 million, \$18-19 million is already spent and all but approximately \$5 million of the remaining funds are already allocated. State funding provides around 50% of the purchase of APRs. Many local governments make contributions, which are often substantial. The Town of West Newbury in Essex County actually overrode Proposition 2 1/2 to get a contribution for purchase of APRs. In addition, farmers often gift part of the APRs value through bargain sales.

Coastal Zone Management Office

Coastal Facilities Improvement Program

The Coastal Facilities Improvement Program (CFIP) is administered by the Executive Office of Environmental Affairs and the Massachusetts Coastal Zone Management Office (MCZM). CFIP provides financial assistance on a reimbursement basis to coastal cities and towns for planning, construction, maintenance, and improvement of public coastal facilities. This program funds projects such as bulkheads, docks, beaches, parks, or other facilities for public access, marine recreation, or marine industry. Established in 1983 by the state legislature, CFIP was initially funded by an \$18 million bond issue. In 1987, the state legislature authorized an additional \$10 million for CFIP, to be spent over FY 1989-1991.

The program reimburses communities for up to 50% of project costs, within the maximum reimbursement established for specific types of projects. A 50% local match is required and applicants must demonstrate that 100% of project financing has been sought or obtained. The local match can be provided through revenues from municipal bonds, bequests, gifts, in-kind contributions, contributions from federal, state or local governments, or by corporations or associations. In Buzzards Bay, New Bedford has received CFIP funds for two projects in New Bedford harbor for repairs to commercial fishing facilities. New Bedford received \$685,000 in FY 1985 for extension of Steamship Pier, and \$35,000 in FY 1987 for repairs to the South Terminal.

Harbor Planning Grants

In 1988, the legislation creating CFIP was amended to enable EOE/MCZM to provide harbor planning grants to coastal communities to fund development of comprehensive harbor plans. The state legislature authorized \$1 million for the harbor planning program

Chapter 1: Funding Sources

to be spent over FY 1989-1991. Harbor plans cover both land and marine issues, and can include water quality management plans. Harbor planning grants reimburse communities for up to 50% of the costs of developing comprehensive harbor plans. Applicants must appropriate the entire amount in advance of the 50% reimbursement. A 50% local match of cash or in-kind services is required. In Buzzards Bay, New Bedford and Fairhaven jointly received a \$26,000 grant to develop a harbor plan for New Bedford harbor. Wareham received a \$10,000 grant to develop a harbor plan for Wareham and Onset harbors.

Division of Conservation Services

Self Help Program

The Self Help Program provides funds primarily to preserve lands and water in their natural state. The most recent funding for this program, in existence since 1961, was \$20 million set aside from the Commonwealth's 1987 Open Space bond issue. All but \$8 million of this bond money is obligated to projects.

Self Help funds reimburse local governments for acquisition of land for conservation purposes only. Development of facilities on land acquired with Self Help funds is limited. To be eligible, a community must have an established conservation commission. In addition, the community must have an Open Space Plan approved by the Division of Conservation Services. Self Help grants reimburse communities for up to 90% of the funds spent on land acquisition. There is a minimum 10% local cash match, although a larger local match may be required based on the community's relative equalized valuation. Among the Buzzards Bay communities using Self Help funds are Bourne, Falmouth, New Bedford, and Westport.

Municipal Development Division, Executive Office of Communities and Development

Strategic Planning Grants

Both Municipal and Regional Strategic Planning Grants are available through the Municipal Development Division of the Executive Office of Communities and Development. Municipalities can apply individually for a Municipal Strategic Planning Grant and a group of communities can apply through a lead community or regional planning agency for a Regional Strategic Planning Grant. The purpose of the grants is to develop growth management strategies, addressing such issues as affordable housing, natural resource protection, economic development, cultural resource protection, or land use management. A 10% local cash match is encouraged.

In FY 1989, \$1 million was available for Strategic Planning Grants. In FY 1990, \$175,000 was available to fund six projects. Currently, the program is not funded for FY 1991. In Buzzards Bay, Mattapoisett was the lead community for a \$25,000 Regional Strategic Planning Grant in FY 1988, which also involved the towns of Marion, Rochester, Fairhaven, and Acushnet. The grant funded a regional water supply protection project to preserve the quality of the Mattapoisett River aquifer and protect public drinking water supplies in the Mattapoisett River watershed. In FY

1987, two Buzzards Bay communities received Municipal Strategic Planning Grants for affordable housing studies, Falmouth (\$20,000) and New Bedford (\$28,000).

Municipal Management Grants -- Incentive Aid Program

Municipal Management Grants are one of several separate programs administered under the Incentive Aid Program by the Municipal Development Division of the Executive Office of Communities and Development. Local governments or public school districts can apply separately or jointly for grants to finance management improvements, including support of professional positions, management training, and operational improvements. The local cash match required varies with the type of project supported. In FY 1990, a 50% cut in the program budget allowed just enough funds to meet multi-year commitments. No funds will be available in FY 1991. In Buzzards Bay, Dartmouth received a \$70,000 grant for FY 1988-1990 to support the salary of a personnel director and Falmouth received a \$5,000 grant in FY 1987 for a management training program. In a joint project, the towns of Marion, Mattapoisett, Wareham, Bourne, Sandwich, and Carver received a \$9,000 grant in FY 1989 for a feasibility study of regional health coverage.

Department of Public Works, Executive Office of Transportation and Construction

Transportation Bond Issue

The Commonwealth's 1988 Transportation Bond Issue set aside \$5 million for grants to cities and towns for water supply, drainage, or sewer facilities along state highways or bridges. Because of a capital spending cap for the Department of Public Works, none of the \$5 million has been spent and a grant program has not been established. If funds become available, cities and towns could only use the grants for drainage facility improvements impacted by or adjacent to state highways or bridges.

Another \$20 million from the 1988 Transportation Bond Issue was made available to the Department of Public Works for improving water supply, drainage, or sewer facilities impacted by or impacting on a state highway or bridge. These funds can be spent directly by the Department of Public Works or made available as grants to cities and towns. To date, the only project funded from the \$20 million is a \$110,000 grant for Buzzards Bay communities. The \$110,000 grant was made available in October 1989 to the Coastal Zone Management Office of the Executive Office of Environmental Affairs to fund development of a stormwater runoff remedial action plan for the Buzzards Bay area.

Taxes

A tax is a publicly-legislated charge, generally levied against income, sales or property. States have authority to levy taxes as the sovereign entities that formed the federal union. By contrast, local jurisdictions (or regional entities, like counties) have only those taxing powers explicitly granted to them by the state. If the Massachusetts state legislature determines that the problems of Buzzards Bay are sufficiently important, it might be persuaded to levy new taxes and appropriate the funds to Buzzards Bay or

Chapter 1: Funding Sources

earmark the receipts either for Buzzards Bay or for specific activities within it. The state legislature may also grant greater taxing authority to local jurisdictions or create new (for example, regional) taxing jurisdictions. Alternatively, the legislature could allow local jurisdictions (or a regional authority acting on behalf of several local jurisdictions) to adopt local riders on existing state taxes within their boundaries.

To maintain the necessary political support for a tax levy, taxpayers must be convinced there is value being received in return for the tax payment they are making. To maintain the linkage between tax and the Buzzards Bay protection effort, it will be helpful to use tax bases that are logically related to activities recommended by the CCMP, or to the need for cleanup. In general, the relevant tax bases can be linked to activities related to the Bay, or to properties in the Bay watershed.

Activity Based Taxes

Activities that are linked to water quality and that would serve as logical bases for taxation, at least in some parts of Buzzards Bay, include coastal tourism (e.g., lodging, meals, and entertainment), the sale of marine fuel, and land use charges (e.g., a real estate transfer tax). Each one of these taxes is likely to encounter opposition from the groups affected by it. However, as any of these options can be related directly to benefits flowing from the Bay, or to sources contributing to its pollution, they may be more acceptable than an increase in property taxes or any other general tax.

Sales Tax on Lodging, Meals, and Entertainment

One source of water contamination in some parts of Buzzards Bay is the demand placed on local services by seasonal tourists. Wastewater treatment facilities in areas accommodating a large number of seasonal tourists must account for peak demand caused by such tourists. The need to supply capacity for peak demands increases system costs. A sales tax on lodging, meals, and/or entertainment may be used to help shift the burden of this extra cost to the seasonal tourists. In addition, such a tax can also be viewed as an equitable way to translate the recreation benefits associated with a clean estuary into revenues needed to sustain pristine conditions.

An example of such a tax is the three percent occupancy tax, which has been used successfully in Dare County, North Carolina, and raised \$1.6 million between January 1986 (when the tax became effective) and April 1987 (Rubin and Alderson, 1988). Proposed sales taxes on meals in Dare County met political opposition from the restaurant lobby. While such taxes can be imposed at the local level, any town imposing such a tax unilaterally will decrease its competitive advantage to attract tourists compared to neighboring towns. A state sales tax affecting all coastal areas may mitigate this distributional impact. If seasonal tourists consider neighboring states as alternatives to Massachusetts waterfront communities, a state level sales tax may lead to some shift of seasonal tourists to other states. The extent of such a shift cannot be assessed at this point without additional empirical study.

The revenues that may be derived from such a tax are a function of the tax rate and number of tourists. As the effects of such taxes on tourism are currently unknown (at least without additional study) it may be difficult to forecast revenues *a priori*. However, once the tax is enacted, it may be possible after several years of experience

to predict the likely range of revenues in a fairly reliable manner. Still, as the tourist industry is very sensitive to a host of unpredictable factors (weather, economic downturns, perceptions, etc.), the revenues from such taxes will always involve some measure of uncertainty.

Tax on Sale of Marine Fuel

Boats are a common source of pollution in Buzzards Bay. Boaters are also among the major beneficiaries of a cleaner Bay. Thus, an equitable way to finance both operating and capital costs of the Buzzards Bay cleanup is to tax boaters.

A tax levied on the sale of marine fuel may be an effective way to tax boaters. Alternative methods, such as boat registration taxes, may be circumvented by boat owners registering their boats in other states. The burden of a tax on sale of marine fuel is most likely to fall on boaters, on the basis of actual place and extent of the boating they are involved in. Such a tax could apply to both recreational and commercial users. It is possible, however, to exempt one of these groups (most likely commercial users) from such a tax.

A marine fuel tax has been used to fund the federal Inland Waterway Trust Fund. The fuel tax was initiated in 1980 at four cents per gallon, and will increase incrementally so that after 1995 commercial carriers operating on most of the nation's waterways will be paying a 20 cents per gallon tax on fuel.

The potential revenues of a sales tax on marine fuel in Buzzards Bay will be a function of the amount of fuel pumped at marinas along the Bay and the tax rate. Revenues may also be influenced by the type of boats subject to the tax (e.g., certain classes of boats may be exempted from the tax), and the size of the geographic area over which the tax is imposed. If the tax is imposed only in Buzzards Bay, boaters may buy fuel in nearby marinas outside the Bay. This tax will be much more effective if imposed at the state level, or preferably at the regional level (including, for example, also Rhode Island, Connecticut, and New York). Once imposed, however, the revenues from such a tax can be expected to be fairly predictable and stable.

Shellfish Taxes

The risk of pollution to shellfish is a major concern in Buzzards Bay, as it is in other estuaries and coastal states. One way to finance programs intended to manage and enhance shellfish resources is through taxes on shellfishing or leasing of commercial shellfish harvest areas. The state of Maryland raises revenues for its Oyster Propagation Program by placing a tax on harvested bushels of oysters⁸. In contrast, the state of Georgia leases commercial harvesting areas, based on a bid procedure to finance in part its Shellfish Program.

The Maryland tax, 45 cents per bushel of oysters remaining in the state and an additional 15 cents per bushel on oysters leaving the state, generated \$600,000 in 1986. The Georgia leasing program raised only \$5,700 in revenues, but has important non-monetary benefits in terms of rebuilding Georgia's commercial shellfish industry.

⁸ This approach has a similar rationale to that of a seafood sales tax -- taxing the beneficiary of the program

Chapter 1: Funding Sources

The burden of a shellfish tax may be borne, at least in part, by commercial fishermen. Some of the burden may be shifted over to consumers. If the revenues of these taxes are dedicated to shellfish-related programs, such as in Maryland and Georgia, then the linkage to beneficiaries can be maintained. As the experience in Maryland and Georgia suggests, however, the revenues that can be expected from this source are quite limited.

Local Option Riders on State Taxes

Massachusetts, like most other states, has several sale-related taxes in place. If the state legislature came to see the Buzzards Bay restoration effort as sufficiently important, it might be persuaded to permit local jurisdictions in the area (or a regional collection of local jurisdictions) to adopt local riders on state tax levies. For example, the area may adopt a one percent additional sales tax, or add an increment to the state's motor fuel taxes. Use of such options would require state enabling legislation, which would almost surely require some form of local referendum (probably with a 2/3 majority required) to impose the local tax rider. The use of such a mechanism is likely to be seen politically as a tax override petition, and be strongly resisted by tax-limitation advocates. Nonetheless, such devices may be worth exploring because they would allow the area to tap a sizable and reliable source of revenues. Yet, as communities around Buzzards Bay vary in size, wealth and degree of fiscal austerity, the likelihood of such a referendum being passed would also differ across communities.

Property Based Taxes

Property Tax

The only major *local* tax in Massachusetts is the property tax. Revenues from this tax are severely limited by a constitutional provision that limits the overall tax rate (to 2.5% of real estate market values) as well as the rate of growth of each local tax levy. As a result of ongoing and expected reductions in the distribution of state aid to localities, local communities in Massachusetts will have to rely on property taxes to finance an increasing number of activities. In addition, the cost of many activities currently funded from property tax revenues (such as police, fire, and school services) has been increasing faster than the 2.5 percent increase allowed in the property tax. Thus, the prospects for obtaining funding for new initiatives through allocations from *existing* property tax levies are relatively remote.

The constraints of Proposition 2 1/2 can be relaxed through a 2/3 vote in a local "override" referendum. However, Proposition 2 1/2 is the major symbol of resistance to tax increases, so except in a small number of instances obtaining additional revenues through the override route is remote. If a community is strongly committed to a specific environmental program, the funding for that activity can be offered as a separate override item. In effect, this funding approach provides a direct link between the tax being paid and the activity, because voters approve it specifically and directly. This approach requires that a very strong case be made for the activity to be funded.

A number of Massachusetts communities have presented voters with general override provisions. For FY 1990, 81 communities presented a total of 138 override questions for approval, and about 90 percent of these communities passed at least one of the override questions presented to them. Capital overrides were generally more successful, with approximately 90% passing in FY 1989 while only about 60% of general operating

Hypothetical example: In the town of Summer's Breeze, sewers need to be extended to the Pine Knoll neighborhood. The residents in the Pine Knoll section are generally predisposed to support the program. The town will borrow the funds for the project, with principal and interest to be repaid through a property tax surcharge levied on residents of the district. The town authorizes the creation of a betterment district, which the local residents in the Pine Knoll Improvement District support.

overrides passed. Until recently, small and wealthy communities were much more likely to have override questions presented to them, and were much more likely to approve them. As fiscal problems have deepened, more communities are likely to face overrides, and the most recent results seem to suggest that a smaller fraction will pass, though this will depend critically on how the questions are structured and presented.

While general override provisions have been successful in some Massachusetts communities, they do not provide a very likely route for major funding of activities proposed as part of the Buzzards Bay CCMP. In the Buzzards Bay area, only Marion has had substantial success in obtaining override approvals. Recent attempts at overrides in other communities in the area have been largely unsuccessful, and given the general economic climate in the region, overrides seem unlikely soon to enjoy greater popularity.

Special Taxing Districts

One way in which property tax levies might be tied to some of the actions proposed in the CCMP, thereby attracting community support (and taxpayer tolerance), is through the use of special taxing authorities, such as betterment districts -- defined areas within which a particular service is to be provided, funded through a self-imposed tax levy. For example, an area in which sewer lines are to be extended might vote to accept the new service together with a tax levy to finance it. In most cases, the levy would be imposed as a surcharge on the property tax, and therefore distributed among taxpayers within the defined betterment district in proportion to assessed property values. Other ways to allocate these costs among the households serviced by the new sewer lines include a charge per hookup, amount of sewer usage, or on the basis of linear feet of property frontage.

The main advantage of a betterment district lies in the establishment of a closer link between services, or cleanup activity, and the provision of resources through a tax. Betterment districts will be a useful device for procuring additional funds to the extent to which the arguments that can be made for the cleanup activity are compelling enough to people within the district so as to overcome the general resistance to any form of tax override.

The burden of a betterment district falls largely on property within the district. This may create some problems for lower income residents in the district. To reduce the burden on lower income residents the district may consider a loan program, paying for

Chapter 1: Funding Sources

some of the project from other funds (typically borrowed), to be repaid later as homeowners in the betterment district pay off their loans.

A betterment district is usually contained within a single jurisdiction. On a similar principal a regional entity can be created⁹. This will require political support from the different jurisdictions involved. Communities in the Buzzards Bay region range considerably in size, wealth, degree of fiscal austerity, and extent to which they would benefit from (or find costs imposed upon them by) different activities proposed in the CCMP. These differences make inter-community cooperation a major challenge to be overcome if any regional authority with taxing power is to be formed. In addition, some enabling legislation will probably be required for the formation of any such entity.

Dedicated Real Estate Transfer Taxes

One of the problems afflicting Buzzards Bay is non-point source pollution. To address this issue the CCMP suggests a series of land management measures. Land management strategies usually include regulatory measures and a land acquisition program. Land (or development rights or easement) purchases are intended to assure that sensitive land will remain undeveloped in perpetuity¹⁰. One way to finance acquisition of land, development rights, or easements is by dedicating the receipts of a property transfer tax to a land trust.

A partially dedicated real estate transfer tax has been used successfully in Maryland to finance its Open Space Program for over 20 years. Of the \$77 million generated in 1988 by a one half of one percent real estate transfer tax (0.5%), \$39 million was allocated to Program Open Space, due to a "cap" imposed by Maryland's legislature in 1984. In Massachusetts, dedicated real estate transfer taxes are used to finance the Nantucket Island Land Bank. In 1986, the two percent transfer fee generated \$5.1 million in revenues for the Land Bank Fund. A similar transfer tax was recently established on Martha's Vineyard.

Massachusetts currently levies a real estate transfer tax in the form of a deeds excise tax, currently at the rate of about 1/2 percent of sale value. If the state legislature saw the priority of Buzzards Bay as sufficiently high, it could increase the transfer tax in the region, or permit local jurisdictions to increase it. This option might enjoy both local and legislative support due to the perceived connection between land use and water quality in Buzzards Bay. On the other hand, there are other activities and issues which may also lay claim to the transfer tax revenues. Such a tax is also likely to be opposed by the anti-tax lobby, who may view it as an attempt to raise taxes.

While the revenues from a property transfer tax may be sizable, they are also cyclical, as they are dependent on transaction in the highly volatile real-estate market. Thus, in periods of economic downturn these revenues may drop sharply.

9 One possible regional entity, which has received some attention in the Buzzards Bay region, is a drainage district -- a regional entity encompassing the Buzzards Bay drainage basin.

10 Land use controls do not assure the perpetuity of any use, as they can be modified or variances from them granted, over time.

While the administrative apparatus for a real estate transfer tax already exists, dedicating the tax to a new purpose (such as supporting activities recommended in the Buzzards Bay CCMP) would require new enabling legislation. Massachusetts recently raised the transfer tax, dedicating the increase to the support of county correctional systems. An initiative to increase the tax further, and use the proceeds to support general statewide environmental purposes, was recently defeated. The likelihood that a dedicated real estate transfer tax can readily and quickly be established to support activities in Buzzards Bay does not seem very high at this time.

Charges and Fees

A fee is a charge for a particular activity or service. Fees for public services are intended to establish a direct link between the demand for services and the cost of providing them. Fees and charges are a growing source of public funds. To escape being identified legally as a tax, a charge or fee must have a legitimate basis in costs borne by the jurisdiction levying it. For a fee or charge to be sustained in court, if challenged, requires that all costs of the services to be supported by the fee can be traced. This means that careful cost accounting of public services to be supported with fees or charges is essential when attempting to recover full costs through fees or charges.

Whether a particular charge or fee is a practical and effective public financing mechanism depends upon whether it is associated in some meaningful way with the provision of services believed to be valuable. Because of the relatively tight association that must be made between the cost of service and the charge -- both politically and legally -- fees and charges can be used to fund only limited forms of service provision. Namely, fees may be used only where the beneficiaries are readily identifiable and the service area is clearly defined. In those circumstances, however, fees may be very effective devices because they tend to be seen as both fair and reasonable.

Fees that may be considered in financing recommendations of the Buzzards Bay CCMP include water and sewer charges, mooring fees, resident or non-resident privilege fees, and impact fees.

Water and Sewer Charges

One of the most common municipal fees are charges for public provision of water and/or sewer services. Generally, provision of water is metered, and charges are assessed according to a rate schedule. Often, the rates are low for the first units used (up to an amount of usage typical of medium-sized residences), with higher rates for larger users and then lower rates again for a third category of very large users. Where sewers are provided, usage is generally measured by water intake, with a block rate structure similar to that for water.

When water and sewer charges are low to moderate, they usually enjoy reasonable taxpayer acceptance. They have a face plausibility -- a direct service is being rendered to private households and businesses. The benefits of water and sewer services are generally felt to be enjoyed largely by the direct user (though wider public health benefits are often conferred by municipal water quality assurance and sewage treatment and disposal).

Chapter 1: Funding Sources

In recent years many Massachusetts communities (particularly those in the metropolitan Boston area) have faced dramatic increases in water and sewer rates. Consequently, sensitivity to water and sewer charges has increased. Still, in eastern Massachusetts water and sewer charges have generally been very low. Thus, while water and sewer charges -- at current or somewhat higher levels than common today in the Buzzards Bay area -- are effective and sustainable mechanisms for funding small to moderate projects and operating costs, substantial increases in water bills for funding large projects may generate considerable taxpayer resistance.

Mooring Fees

In many of the communities along Buzzards Bay, the public provision of moorings could be a source of revenues. The desirability and availability of both public and alternative moorings varies widely across communities, but in areas where moorings are scarce and in high demand a fee might be assessed for the use of public services associated with the harbor. As with other charges and fees, the jurisdiction imposing the fee must be able to show a "nexus" of costs related to the services for which the fee is charged, in order to sustain the fee in a court challenge. This imposes extra administrative burdens to establish and maintain the cost accounting system that justifies the rates assessed by showing what the associated costs are.

There are important local political problems with the use of this device. In many communities, moorings have been provided for free or for a nominal charge to residents. Sudden large changes thus may be strongly resisted, particularly if some local residents find the new high rates unreasonable.

Resident or Non-resident Privilege Fees

A device used in a number of communities in Massachusetts to defray costs of specific local services is a system of fees or charges for particular privileges (for example, stickers entitling the holder to use of the local landfill, access to a local beach, or harvesting from a local shellfish resource).

Again, this device is limited as a general fundraising tool by the fact that the jurisdiction must be able to justify the charge on the basis of associated costs. Thus, for instance, the cost of dune conservation might be reasonably included within a charge for access to public beaches, but the cost of reducing nutrient loadings due to stormwater runoff into a marsh that is not available to the public through the privilege card or sticker would probably not be. Thus, only a limited range of cleanup activities are likely to be supported with this mechanism.

Impact Fees

In many cases new development will impose direct costs on the local jurisdiction due to the demand it creates for public services. When public capital costs are clearly related to

Chapter 1: Funding Sources

development, fees can be imposed to offset the financial impact on the town. For example, if a new development will require expansion of a sewer treatment facility, some of the cost of expansion might be retrieved through an impact fee on the development¹¹.

Generally, impact fees are quite acceptable to taxpayers at large and opposed by developers. The concerted opposition of developers has led to a number of court challenges to the mechanisms through which impact fees are assessed. Generally, the community must be able to show that the costs for which it is seeking reimbursement are directly related to the development on which the fees are being imposed¹². If it is unable to do so -- as was recently the case in Montgomery County, Maryland -- a community may need to forfeit the fees or seek approval by the state legislature. In Massachusetts enabling legislation exists for Cape Cod. Wider enabling legislation is necessary if impact fees are to be considered on the western shore of Buzzards Bay.

Hypothetical example: In the town of Silver Oaks, the town's in-ground sewer pipe system served only approximately one-half of the households concentrated on the hill overlooking the shore of Clearwater Harbor; the rest of the town's residents were widely dispersed over the inland portions of the town, and relied on septic systems. A number of these systems were known to have failed, and town officials suspected that a large number of them were on the verge of failing. Water quality in the two creeks that drained into the harbor had been steadily declining for years, and the shellfish bed at the head of the harbor was now often closed. To get more general control of its water quality, the town could define a general sewer utility, to include both the in-ground pipe sewers and the use of septic systems, pumpout services, and septage disposal. Declaring that the treatment of household wastewater, whether through piping it to the local treatment plant, or by passing it into leach fields with septage removed and treated separately, is provided by a general sewer utility provided by the town (and billed by the town) provides a way of asserting the town's interests in the standards for effluent treatment being met. Establishing such a utility does not imply that the town would be responsible for conducting all of the activities involved; it might contract with private septage haulers for pumpout and transportation, and may treat the residual itself or contract with another town or private entity for that service as well. But under the existing, decentralized system of private households contracting with private haulers for septage services, the more general public interest is not present or represented at the site of the relevant transactions.

Given the tight link between the costs generated by development and the level of charges sustainable in court, impact fees mechanism will not, in general, provide any funds for activities recommended by the CCMP but not directly attributable to

11 For a detailed analysis of impact fees as a financing tool for wastewater projects see Schulette (1989).

12 For guidance on structuring impact fees using the rational nexus test see Nicholas and Nelson (1988).

Chapter 1: Funding Sources

development. But, to the extent that impact fees reduce the amount of general revenues a town would otherwise direct to infrastructure, they free up funds which can be used for other purposes, such as implementing activities proposed in the CCMP. Moreover, if jurisdictions are careful to assess the environmental impacts of developments and keep track of the costs of mitigating them, future capital costs for projects required by the CCMP, such as sewer services, may be financed directly through impact fees.

Hypothetical example: The town of Reed's Farm was experiencing aquifer contamination from a series of long-standing practices of local farmers that would be expensive to halt and reverse. The farmers, barely making it from one year to the next as it was, could ill afford to make any of the changes. But contamination of local wells was increasing. To fund the cleanup project, the town might establish a groundwater utility consisting of the aquifer and the open space that recharges it. This utility uses assets that are partly publicly and partly privately owned. By charging for groundwater use, funds could be provided to support the cleanup of the areas causing low level contamination. Charges for groundwater use could conceivably be on the basis of metering, but are more likely to be estimated on the basis of type of utilization (residential or farm) and on level of demand (family size, acres under cultivation, number of livestock dependent on wellwater, etc.).

Hypothetical example: Town of Laurel Hill has a new development under construction in the Red Creek section. Before the town established its town-wide stormwater utility, the developer would probably have paid no attention to stormwater runoff. Given the contours of the land being developed, most of it would have run almost immediately into Red Creek, exacerbating an already serious coliform problem in the area of the bay at the mouth of the creek. Since the utility was established, however, the town is in a position to charge the developer a substantial fee for the use of the local creek as a stormwater catchment. As a result, the development will be designed so that the stormwater from impermeable surfaces on each lot is funneled into dry wells constructed by the developer. Stormwater from the road surfaces is captured in a standard storm drain system, except that the outfall of the system is not into the town's stormwater sewers (because the development is too far from where the system ends); instead, it runs into a settling pond constructed by the developer in a wooded area provided permanently as part of the common space of the development. The common fees paid by the development's residents will cover the upkeep of the system and cleanouts of the catch basins.

Utility Districts

One way in which charges and fees may be extended to support a wider set of activities in the Buzzards Bay area is through expansion of the concept of a "utility district." In principle, a public utility can be defined around the provision of any service that uses scarce and publicly controlled, owned, provided, or regulated resources. For example, one could define a "Septage Utility" responsible for monitoring the performance of septic systems, arranging for pumpouts (either by public employees or private firms), regulating the activities of companies that pump septic tanks, and arranging for or

providing disposal of the residual waste. Alternatively, the system of monitoring septic systems could be embedded in a wider sewer or water and sewer utility, providing an array of services through different technologies to different households (e.g., in-ground pipe sewers in some locations, septic tank pumping in others).

Areas in which publicly-provided services depend upon publicly-owned resources, that can be pertinent for implementing actions proposed in the Buzzards Bay CCMP, include:

- Water (provided through municipal pipes);
- Sewer (provided through a sewer system);
- Septage (sewer services provided through private or public pumpout and hauling);
- Stormwater (construction and maintenance of stormwater facilities).

The usefulness of the utility concept depends on the extent to which it receives support from those required to pay for its services. Such support is a function of whether (1) the service is believed to be valuable, (2) public resources are used, and (3) the revenues are spent efficiently on the provision of the relevant services. To the extent these three factors are affirmative, utilities may be supported by rate-payers.

The provision of traditional municipal utility services (water and sewer services, for example) is readily covered under existing enabling legislation. Whether the standard concept of water and sewer could be extended to include the regulation of septage -- currently generally approached under Board of Health or environmental statutes -- cannot be assessed definitively without a detailed legal examination. It appears likely, though, that new authority might have to be developed for the provision of extensive septage (and, possibly, stormwater) services under the utility concept.

An important decision in setting up utilities is the determination of rates. If rates are too low revenues may be insufficient to cover cost. High rates may induce political opposition by rate payers. In addition, consideration needs to be given to whether and how rates should reflect actions taken by those requested to pay -- such as on-site stormwater controls in the case of stormwater utilities¹³.

In some cases (water and sewer) authority clearly exists, and is being used for setting up utilities. In other cases some authorization by legislature may be needed, although existing enabling legislation can usually be found. In most cases, however, additional record keeping and collection can be anticipated, thus creating some additional administrative burden.

13 For detailed guidelines regarding stormwater utilities see Lindsey (1988)

Private Funds

The growing cost of environmental programs in the face of limited public budgets has heightened interest in private participation. Examples of recent public-private financing in environmental services include drinking water, wastewater, solid waste, habitat protection, and preservation of open space. Generally, private funds can be directed to environmental programs such as the Buzzards Bay Project either willingly or through coercion.

Voluntary Private Participation

There are two reasons private parties may make funds available for activities recommended in the Buzzards Bay CCMP -- moral commitment and/or profits. Public participation programs and educational efforts may help arouse public consciousness regarding the Bay and possible private contributions to its welfare. Such contributions may take many forms. Direct monetary contribution is one form. Other forms can be the bequest of land or easements. Such donations, if managed properly, can be part of a larger effort to control non-point source pollution, acquire open space, protect critical habitat, increase productivity, and improve public access to Buzzards Bay. In addition, contribution of time may help in administering programs such as monitoring, thereby reducing their cost to the public sector.

In some cases activities suggested in the Buzzards Bay CCMP can become a basis for private profits, thus inducing the private sector to invest in such activities. Usually such investments are part of a public-private partnership initiative. Public-private partnerships are contractual relationships between a public and private party that commits both to providing an environmental service. In general, all voluntary private participation approaches enjoy wide public support. However, the utilization of several of these options may require the establishment of institutional and administrative structures not in existence today in the Buzzards Bay area.

Contributions and Donations

The first mechanism that can be used to gain access to private funds for activities proposed in the CCMP is through private donations. To use this mechanism, a non-profit enterprise may be established to engage in fund-raising, and would spend the money it raises directly on activities suggested in the CCMP. Alternatively, private individuals or businesses can contribute to designated trust funds or revolving accounts established by local jurisdictions. Either way, contributions on behalf of a charitable public purpose would be exempt from federal income tax. To the extent that private individuals value the Buzzards Bay effort in general, and specific activities proposed in the CCMP in particular, they may be prepared to make contributions of this kind. Contributing through an independent, free-standing non-profit enterprise is often preferred by donors because they may be able to exercise more control over the distribution of funds than when the funds are donated directly to the public sector. Private philanthropy has been increasingly encouraged as a means to provide for various social priorities (for example, addressing problems of homelessness, hunger, and lack of educational opportunity), so there is strong competition over the limited

funds that private donors potentially have available. Nonetheless, significant private donations have been raised for a wide variety of environmental programs. While the funds that can be derived from contributions and donations are unpredictable and erratic, they can very well be useful for funding certain activities suggested in the CCMP, particularly those requiring occasional case-by-case expenditures, such as land or development right acquisitions.

Lotteries

One device increasingly used by non-profit enterprises for raising funds is sponsoring a lottery in which some (typically donated) item or items are awarded through a drawing. Many non-profits that purchased items (some as large as houses) to award through lotteries have found this a risky approach -- but it has been an element of many successful private fund raising campaigns. Still, the revenues derived from lotteries are limited and highly erratic. A major advantage of lotteries is that revenues are often not earmarked, allowing their use for a wide variety of activities proposed by the CCMP.

Sponsorships

An increasingly common private funding device is the use of corporate or individual sponsorships of environmental or other public services. For example, upkeep of parks or other open public spaces is sometimes donated by a corporation; typically, a small sign in the area credits the donor with providing the upkeep. Similarly, specific and identifiable activities proposed by the CCMP could be sponsored by individuals or firms.

Again, the extent to which individuals or businesses value the quality of Buzzards Bay or specific activities, or value being associated with publicly spirited activities, may determine their willingness to donate either money, time, or material toward projects they sponsor. The major incentives for businesses and individuals to sponsor projects and activities are the direct control they have over the use of the funds and the direct credit received. Sponsorships may provide activities with more reliable funding than other contributions. However, the scope of activities that may attract sponsors is likely to be very limited.

Public-Private Partnerships

The profit motive can lead in some instances to direct private investment in facilities and activities serving Buzzards Bay. Such investments usually require some contractual relationship between a public and private party that commits both to providing a certain environmental service. Such contractual relationships are usually termed public-private partnerships.

Chapter 1: Funding Sources

Hypothetical example: A new Buzzards Bay Regional Commission, faced with the problem of dealing with shellfish closures from failing septic systems, could establish region-wide regulations establishing uniform standards for the performance of septic systems and for the performance of the private companies that provide pumpout and disposal services. A small per gallon of per transaction fee could be imposed to support a system of public inspections, record-keeping, and oversight to monitor both the septic systems themselves and the companies with whom households contract for pumpouts. To establish an effective system, the town would have to have accurate records of pumpouts so as to be able to monitor the behavior of both households and haulers. One such system is a duplicate billing system, in which a copy of the bill given to the household must be sent to the town. An alternative is that all pumpouts would be arranged through a town dispatcher, who contracts private haulers and monitors their activities (for example, the congruence between the volume of pumpout that households are billed for and the amount delivered to certified treatment facilities).

Public-private partnerships may take one of several forms¹⁴:

- Contract services, whereby a private partner is contracted to provide a specific municipal service, such as septic tank pumping, or to maintain and operate a facility, such as a wastewater treatment plant;
- Turnkey projects, where a private partner designs, constructs, and operates an environmental facility that is owned by the public sector (which usually assumes the financial risk);
- Developer financing, a situation whereby a private developer finances directly the construction or expansion of an environmental facility in return for the right to build residential, retail, or industrial facilities;
- Privatization, when a private party owns, builds and operates a facility. In such cases the private party may also partially or totally finance the operation;
- Merchant facilities are fully privately owned and operated facilities for whom all decisions are made exclusively by the private sector.

In the case of developer financing, privatization, and merchant facilities the private party invests directly in providing the needed services. Contract services and turnkey projects do not necessarily reduce the direct public cost, but they can allow savings due to a larger service area (one private operator serving several jurisdictions) or more efficient operations by the private party. One drawback to these arrangements is that in a short-term contract, the private operator may not have sufficient incentive to maintain the publicly owned capital facility. The possibility for public-private partnerships is determined to a large extent by the specific circumstances of the parties involved and the services required¹⁵. Such partnerships will have to be tailored to specific locales within the Buzzards Bay area. In most cases establishing a public-private partnership involves considerable administrative efforts, as it alters the previous procedures for attaining environmental goals.

¹⁴ For examples of the different types of arrangements see U.S. EPA 1989c

¹⁵ For guidance as to the appropriateness of different types of public-private partnerships, and on the steps necessary to build such partnerships, see U.S. EPA 1989d.

Massachusetts Bay Project

In 1988, EPA fined the Commonwealth of Massachusetts and the Metropolitan District Commission (MDC) nearly \$2.5 million for violations at two NPDES-permitted wastewater treatment facilities. The court noted in the settlement that discharges from the two plants were significantly responsible for water pollution in the Boston Harbor/Massachusetts Bay area. The court ordered the Commonwealth and MDC to deposit \$2 million of that fine into the newly-established Boston Harbor-Massachusetts Bay Environmental Trust Fund (the "Trust").

The settlement specifies in detail how the \$2 million in funds from the Trust must be allocated. The settlement outlines numerous projects including remediation programs for affected salt marshes and wetlands, beach cleanup and monitoring efforts, and pollutant transport studies.

Mandates, Regulations, and Fines

Mandates and Regulations

When public funds are unavailable for direct action, government entities can impose the responsibility for action on private parties through regulations or mandates. For example, if septic system failures are a major source of pathogenic contamination, and funds are unavailable for direct government action, local jurisdictions may achieve most of the desired results by setting standards for septic system performance, regulating private hauling companies, and establishing a monitoring and enforcement system (funded either through tax revenues or through inspection or oversight fees). In this way jurisdictions may shift most of the cost to the private sector (in this case, households or businesses). Mandates do not completely eliminate the need for public funds. The government must still provide oversight activities (e.g., monitoring and enforcement) in order to ensure the effectiveness of private operations.

While assuring that desired actions be taken by the private sector, at its expense, mandates and regulations are often strongly resisted by those on whom the mandates fall. The use of mandates and regulations by local jurisdictions around Buzzards Bay will depend on the extent to which people in the different communities perceive that the activities proposed in the CCMP are important for the future of the Bay, and that the specific mandates and regulations are related in a meaningful way to the accomplishment of the CCMP goals. The effectiveness of mandates and regulations is also closely related to the degree of compliance that can be enforced. Unless regulations or mandates are enforced, the private sector is unlikely to invest the necessary funds to comply with them.

Fines and Penalties

Fines and penalties are imposed primarily for *violations* of mandates or regulations. Whereas fees and taxes may be collected on everyday activities, fines and penalties are

Chapter 1: Funding Sources

collected only on the exceptions to normal operations. More often, fines and penalties have been used to create positive incentives (e.g. improved compliance).

Fines and penalties adhere closely to the principle of "polluter pays." As a result, they enjoy both public and legislative acceptability. Another major advantage of fines and penalties as funding sources is the wide discretion jurisdictions can exercise in use of these revenues to fund a wide variety of activities. The collection of fines and penalties is dependent on the ability to detect violations, which may require extensive inspection, monitoring, and enforcement activities. The ability to use revenues from fines or penalties on violations of federal or state statutes may require some legal authorization. Revenues from fines and penalties may be sporadic, and do not provide a steady stream of revenues. Consequently, they cannot be counted upon in long range financial planning. Furthermore, reliance on fines or penalties as the *only* source of funds for program activities may create perverse incentives for unnecessary enforcement actions.

Development-Based Sources

An additional way governments may induce the private sector to defray some of the cost of environmental infrastructure, such as sewer and water systems, is to make development contingent on the availability of such services. Once this nexus is established, developers can be forced to provide funds for the needed services as a condition of development. These revenues can be collected through a variety of mechanisms:

- **Impact Fees**, where a charge is assessed against a development to recoup costs that will be incurred by the local jurisdiction in providing services, or to mitigate costs, imposed by the development. This option was described in the previous section.
- **Direct Development of Infrastructure.** A jurisdiction may require a developer to provide infrastructure, such as on-site stormwater retention facilities, as a precondition to development, rather than charging the developer and building the facility itself. This approach is useful for big developments, but may be inefficient for small developments, as it does not allow for economies of scale in construction of the desired facilities.
- **Offset Requirements.** A developer may be required to mitigate for an environmental impact by producing an environmental benefit similar to that being lost. For example, if development requires that a wetland be disturbed the developer can be required to construct an offsetting addition to a wetland elsewhere. Such offsets can be required for a wide variety of activities. In the Chesapeake Bay Critical Area, for example, offsets can be required by local jurisdictions for forest cutting, disturbance of a 100 foot buffer adjacent to the Bay, and reducing stormwater pollutant loadings. In contrast to impact fees and developer financed infrastructure, offsets can require that developers offset more than they disturbed, thus providing some additional funds for addressing existing concerns around Buzzards Bay. However, this approach is highly controversial, and may be difficult to administer, due to the difficulty inherent in determining whether the offset truly compensates for the development impacts.
- **Access Fees for Existing Public Services.** A jurisdiction may also impose hookup fees on a development intended to recapture some of the capital costs from creating the capacity to accommodate the needs of the new development. Such fees may reduce the debt burden of a jurisdiction,

providing some additional funds for activities such as those recommended by the Buzzards Bay CCMP.

Selection and Implementation Of Funding Sources

The Buzzards Bay CCMP proposes a wide set of actions and activities to address a wide variety of issues affecting the quality of the Bay. The jurisdictions that will need to implement these actions and activities are also diverse in terms of population, economic base, development trends, political orientation and relationship to Buzzards Bay. Consequently, no one set of financial instruments can be expected to fund the actions recommended in the CCMP. Rather, each jurisdiction will need to select and implement those funding mechanisms most appropriate to its particular situation from among the alternatives suggested in this chapter.

There are several factors that may affect the likelihood and desirability of implementing the different financing tools. These include the distribution of benefits and cost of the instrument, the ease with which it can be administered (the degree to which new administrative procedures and personnel are required), the legal authorization required, the potential revenues that can be derived, and the stability of revenues. Table 3 summarizes some of the possible relationships between the new instruments described in this chapter and these factors.

The relationships depicted in Table 3 are intended only to suggest the main strengths and weaknesses of each instrument. They do not attempt to measure the relative advantages and disadvantages of one instrument relative other instruments, as these have to be analyzed within the context of specific funding needs. The selection of specific financial instruments should also be a function of the characteristics of the jurisdiction involved. An instrument that may be viable for a jurisdiction with a very active high-cost housing market, such as impact fees, may be detrimental for a jurisdiction with a sluggish housing market dominated by low-cost housing.

Another factor not mentioned in Table 3, but very important for the choice and implementation of financial mechanisms, is institutional structure. In some cases existing local jurisdictions are an appropriate implementing institution, given their existing authority, the scope of the activity to be funded, and the legal authority required to use specific funding mechanisms. In other instances, however, proposed actions may extend beyond the bounds of existing jurisdictions. For example, the drainage area for a bay or inlet may extend into several localities. Stormwater control may be most effectively implemented by creating a stormwater management district, which would be defined by the drainage basin and may encompass several local jurisdictions.

Likewise, some of the financing options may work only within an appropriate institutional structure. For example, fines cannot be directed to projects related to Buzzards Bay unless there is an institutional structure, such as a trust fund or land trust, that has been designated to receive such funds. Other financial tools may work within several institutional structures, but with different effects. For example, fees can be collected and dispensed at a local or regional level. However, if there are economies of scale in collection, monitoring, or enforcement, a regional effort may be more

Chapter 1: Funding Sources

cost-effective. Similarly, implementation of fee or tax schemes on activities at a local level is more prone to evasive action by the targets of such fees or taxes. For example, if mooring fees are implemented only in one jurisdiction, boaters may simply moor in other neighboring jurisdictions. If fees or taxes are implemented at the regional level such evasive action becomes more difficult, and both the total revenue potential and the predictability of revenues increase.

This study is a first step toward preparation of a financial plan for the Buzzards Bay area. The next steps include matching funding sources with the activities recommended in the CCMP, and identifying the appropriate institutional structures for implementing the plan's recommendations.

Table 3: Attributes of Possible New Revenue Sources for Buzzards Bay

Financial Tool	Who Pays¹	Administration²	Authorization³	Potential⁴	Stability
Sale Tax on Lodging, Meals or Entertainment	Polluters/ Beneficiaries	Adjustments Needed	Moderate	Moderate*	Seasonal*
Tax on Sale of Marine Fuel	Polluters/ Beneficiaries	Adjustments Needed	Moderate	Moderate*	Stable*
Shellfish Tax	Beneficiaries	Adjustments	Moderate	Low	Seasonal
Local Option Riders on State Sales Tax	Public	Exists	Low	Moderate	Stable
Property Tax	Public	Exists	Low	Low	Very Stable
Special Tax Districts	Beneficiaries	Exists	Moderate	Moderate*	Very Stable
Dedicated Real Estate Transfer Taxes	Public	Exists	Low	Moderate	Cyclical
Water and Sewer Fees	Polluters/ Beneficiaries	Exists/ Adjustments	High	Moderate	Very Stable
Mooring Fees	Polluters/ Beneficiaries	Minor Adjustments	Moderate	Moderate*	Seasonal/ Stable
Resident Fees	Beneficiaries	Adjustments	Moderate	Low	Moderate

Chapter 1: Funding Sources

Financial Tool	Who Pays ¹	Administration ²	Authorization ³	Potential ⁴	Stability
Impact Fees	Polluters	Adjustments	Low	Moderate	Cyclical
Utility Districts	Polluters	Adjustments	Moderate/ Low**	Moderate	Stable
Lotteries	Public	Adjustments	High	Low	Low
Public-Private Partnerships	***	Requires Negotiations	Medium	Medium	***
Exactions	Polluters	Requires Negotiations	Low	High	Unstable
Fees and Charges	Polluters	Adjustments	High	Low	Erratic

* Revenues will be a function of level of government that implements the tool.

** Depends on whether enabling legislation is needed.

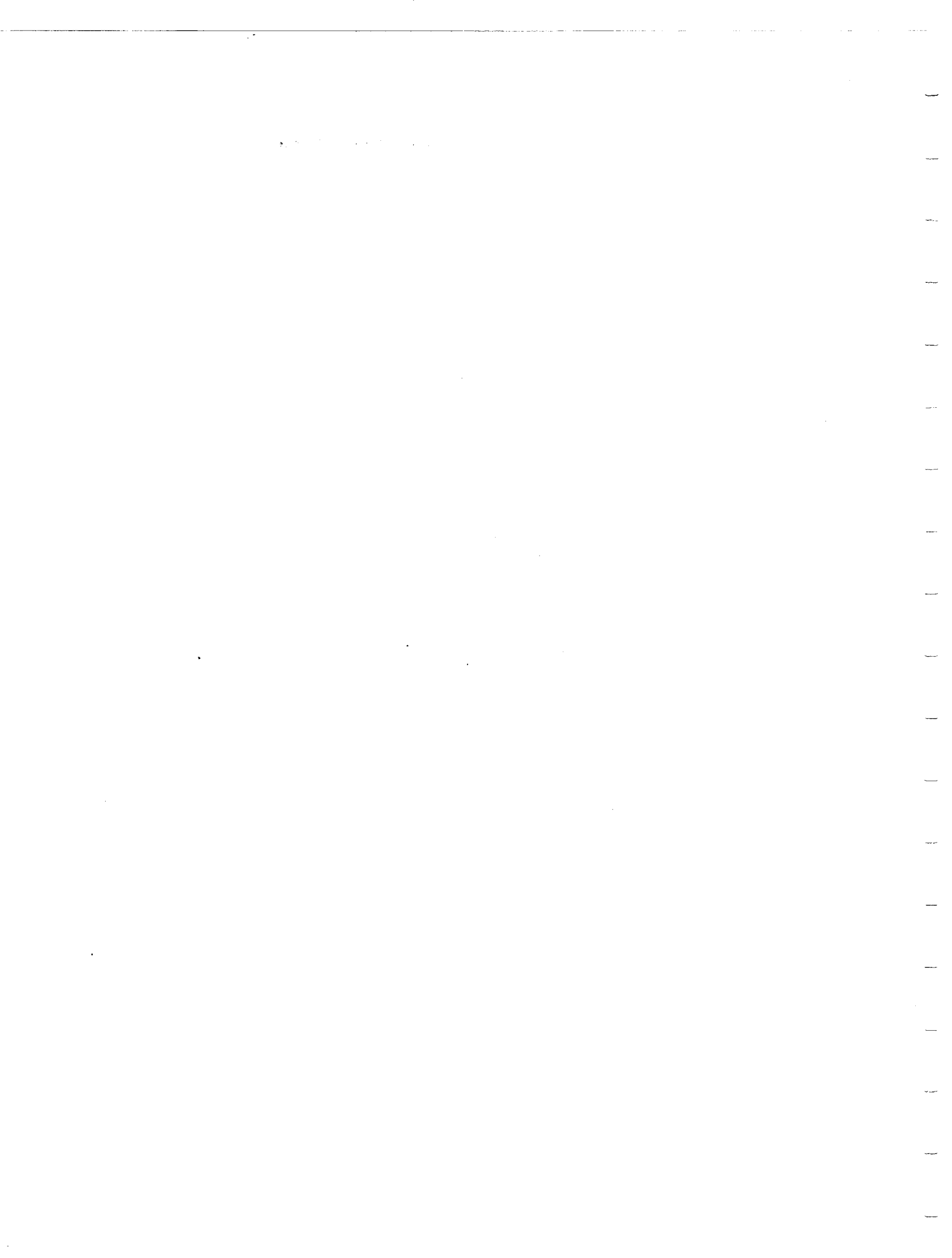
*** Depends on the type and structure of the partnership.

1 Indicates whether burden falls primarily on polluters or beneficiaries of a cleaner Buzzards Bay or the general public.

2 Indicates whether the administrative mechanism is already in operation, needs adjustment, or new administrative efforts are needed.

3 Indicates whether the likelihood of obtaining legal authorization by a local jurisdiction seems high, moderate, or low.

4 Indicates the revenue potential relative to needs that may be financed by the financial tool discussed.



Chapter 2

Preliminary Cost Estimates for Recommended Actions Contained in the Buzzards Bay Comprehensive Conservation and Management Plan

Introduction

This chapter presents preliminary cost estimates for various actions recommended in the Buzzards Bay Comprehensive Conservation and Management Plan (CCMP). The CCMP includes 14 Action Plans that address different sources of contaminants that affect the water quality of the Bay. Many of the recommendations in the Action Plans call for regulatory changes or improved land use controls. Other recommendations call for investments in capital equipment or improvements in operating practices.

The focus of this chapter is on those actions that may impose significant capital or operating costs on public or private entities in the Buzzards Bay area. Cost estimates are presented for the following activities:

- Stormwater control;
- On-site septic system improvements;
- Boat pump-out facilities;
- Oil spill containment equipment; and
- Toxic audit teams.

The form of the cost estimates varies for each activity. For example, capital and operating costs are specified for eight management practices that could be used to control stormwater runoff. Equipment and training costs are specified for maintaining a selected inventory of oil spill containment equipment and training local staff in response techniques.

The cost estimates presented here are, essentially, unit cost estimates, based on engineering estimates or empirical evidence from similar communities. These cost estimates do not reflect the total cost of implementing the Buzzards Bay CCMP. Rather, they are intended to assist local officials in comparing the relative cost of alternative remedial measures. Other factors, such as technical feasibility, geographic characteristics, and regulatory requirements, should also be taken into consideration in the selection process.

Stormwater Control

The Buzzards Bay CCMP identifies a number of actions to control stormwater runoff. These include mapping and categorizing drainage systems, development of drainage regulations, education, and the employment of Best Management Practices (BMP). There are a number of BMPs that can be used to control stormwater runoff. The selection and effectiveness of each BMP depends on local conditions, regulations, and the area serviced. The BMPs reviewed in this chapter include:

- Extended Detention Ponds (dry, shallow, and wet);
- Wet Ponds;
- Infiltration Trenches;
- Infiltration Basins;
- Porous Pavement;
- Water Quality Inlets;
- Grassed Swales; and
- Catch Basins.

The sections below provide a brief description of each BMP and the estimated costs for new construction, routine and non-routine maintenance, and retrofitting. Table 1 summarizes the costs for each BMP. Cost equations for each BMP were initially developed in 1983 by the Metropolitan Washington Council of Governments (MWCOG). These equations were updated in 1987 from a survey of engineering estimates and construction bids for 65 facilities built in the Washington metropolitan area since 1982 (Wiegand et. al, 1986; Schueler, 1987).

Dry Extended Detention Ponds

An extended detention pond is characterized by a two-stage design. The upper stage of the pond is sized and graded to remain dry except during infrequent large storms. The bottom stage is expected to be inundated regularly. Frequently the bottom stage is too wet to mow, and is best managed as a wetland, shallow pool, or wet pond. The storage volume of the bottom stage should equal the runoff produced by the mean storm in an area. At a minimum, the volume of runoff detained by the two-stage design should equal the volume of runoff from a one inch storm.

Extended detention ponds are the least cost urban BMP available that can both remove pollutants and control stormwater. They are a cost-effective option for any sized development and particularly attractive in developments of 10 to 100 acres. Whenever stormwater is detained for 24 hours or more, 90% removal of particulate matter is possible. However, soluble phosphorus and nitrogen levels are reduced only slightly. Removal of these pollutants can be enhanced if the inundated area of the pond is managed as a shallow marsh or permanent pool.

Table 1. Estimated construction, maintenance and retrofitting costs for stormwater control

TOTAL CONSTRUCTION TYPE	ROUTINE MAINTENANCE COSTS	NON-ROUTINE MAINTENANCE COSTS	SEDIMENT COSTS	RETROFIT REMOVAL	COSTS
Extended Detention Pond ¹	\$26,000	\$510 - 765	\$ 255 - 510	\$ 6 - 11/cy	\$ 6,500
Wet Ponds ¹	\$28,000	\$510 - 765	\$ 255 - 510	\$6.80-24.40	\$ 7,000
Surface Infiltration Trenches ²	\$13,000	\$285	\$2,500	\$ 2,500	
Underground Infiltration					
Trenches ²	\$13,000	\$285	NA	\$13,000	
Infiltration Basins ¹	\$26,000	\$765 - 1,275	\$ 250 - 500	\$ 6 - 11/cy	NA
Porous Pavement ³	\$77,000	\$1,400			
Water Quality Inlets ⁴	\$5,000-15,000	\$650	NA	NA	
Grassy Swales ⁵	\$5 - \$9/linear foot				
Catch Basins	NA	\$14-20/basin	NA		

1. Based on a storage capacity of 50,000 cubic feet.
2. Based on a storage capacity of 5,000 cubic feet.
3. Based on a partial exfiltration parking lot of 1 acre.
4. Standard, three-chamber inlet design.
5. 15 feet wide and 3:1 side slope.

Construction Costs

The major expenses for constructing a dry extended detention pond are earth moving including the cost of dike or dam construction, purchase and protection of water control devices, wetland creation in the bottom stage, and construction labor. These costs are estimated using the following equation:

$$C = 11.67V_s^{0.88}$$

where C = construction cost

V_s = storage volume, in cubic feet, of the pond up to the crest of the emergency spillway.

Construction costs can be significantly lower if natural depressions and topography are used to reduce excavation requirements. An additional 25% should be included for designing the pond, securing the necessary permits, and overseeing construction. Land costs are not included because of the high variability in prices. Table 1 estimates total costs, excluding the purchase of land, for dry extended detention ponds with a storage capacity ranging from 10,000 to 100,000 cubic feet.

Table 2. Estimated Construction Costs for Dry Extended Detention Ponds

Storage Space (cf)	Construction Costs	Other Costs	Total Cost
10,000	\$ 6,715	\$1,679	\$ 8,394
20,000	\$10,834	\$2,708	\$13,542
30,000	\$14,331	\$3,583	\$17,914
40,000	\$17,478	\$4,370	\$21,848
50,000	\$20,387	\$5,097	\$25,484
60,000	\$23,120	\$5,780	\$28,900
70,000	\$25,715	\$6,429	\$32,144
80,000	\$28,197	\$7,049	\$35,246
90,000	\$30,584	\$7,646	\$38,230
100,000	\$32,891	\$8,223	\$41,113

Pond Maintenance

Extended detention ponds have moderate to high maintenance requirements. If regular maintenance and inspections are not undertaken, the pond will not achieve its intended purpose. Two surveys in suburban Maryland found 40-50% of the dry ponds to be structurally unsound as a result of poor maintenance.

Routine Maintenance

Routine maintenance consists of grass mowing, pond inspection, debris and litter control, and erosion control.

- Mowing must be done on the upper stages, side-slopes and embankments of the dry pond. The grass should be mowed at least twice a year in non-residential areas and more frequently in residential areas.
- The pond should be inspected during mowing to ensure it is meeting specified detention times.
- Debris and litter collection should occur during each mowing.
- Erosion should not be a problem if the pond was properly constructed, but if the banks suffer from periodic slumping and erosion, re-vegetation may be necessary to correct the problem.

Non-Routine Maintenance

Sediment removal is the only non-routine maintenance activity of concern in extended detention dry ponds. When properly designed, extended detention dry ponds will accumulate significant quantities of sediment. Approximately 1% of the storage volume capacity can be lost annually. Accumulated sediment may need to be removed from the lower stage every 5 to 10 years. More frequent spot clean-outs will be needed around the detention control device.

Total Maintenance Costs

The annual cost of maintaining a dry extended detention pond averages from \$325 to \$550 per maintained acre (a maintained acre includes the pond and the surrounding buffer, and is generally equivalent to three times the surface area of the pond). Annual costs for non-routine maintenance are estimated to range from 1-2% of the pond's base construction cost, or approximately \$260 to \$520 for a pond with 50,000 cf of storage space.

Mechanical sediment removal typically ranges from \$6 to \$11 per cubic yard (cy), depending on the size and accessibility of the pond. Whenever on-site disposal is not available, transportation and landfill tipping fees will increase the total cost of sediment removal.

Retrofitting

Eventually, the various inlet/outlet and riser works in a pond will deteriorate and must be replaced. Corrugated metal pipe has a useful life of about 25 years, whereas the concrete barrels and riser may last from 50 to 75 years. Since the various water works constitute about 25% of the initial construction cost, their replacement will be a significant expense. The estimated cost of retrofitting a 50,000 cf dry extended detention pond is approximately \$6,500.

Wet Ponds

Wet ponds have a moderate to high capability of removing most urban pollutants. Wet ponds utilize both settling and biological intake, and are capable of removing both particulate and soluble pollutants. In addition to increasing the volume of the permanent pool, wet pond removal rates can be enhanced by establishing marshes around the perimeter and by adjusting the geometry of the pond.

A wet pond is a permanent pool of water in rectangular shape with a length to width ratio of at least 3:1. The optimal depth of the pond is between three and six feet.

Chapter 2: Preliminary Cost Estimates

Establishment of aquatic vegetation around the perimeter of the wet pond enhances pollutant removal. The vegetation will protect the shoreline from erosion and trap incoming sediments. Wet ponds are a cost-effective BMP for developments greater than 20 acres.

Construction Costs

The major expenses for constructing a wet pond are excavation of the site, water inlet/outlet devices, and labor. Wet pond construction costs are largely determined by the total storage volume. The construction cost for a wet pond with less than 100,000 cf of storage can be estimated using the following equation:

$$C = 6.65Vs^{0.75}$$

Similarly, construction costs for wet ponds with a storage capacity greater than 100,000 cf can be derived using following cost equation:

$$C = 37Vs^{0.64}$$

where C = construction cost

Vs = storage volume, in cubic feet, of the pond up to the crest of the emergency spillway, including the permanent pool.

Both equations estimate only the cost of constructing a wet pond and do not include land costs. An additional 25% should be added to the construction cost for designing the pond, securing the necessary permits, and overseeing construction. Table 3 below outlines the total construction cost for wet ponds with a storage capacity less than 100,000 cf. Table 4 contains the same information for wet ponds with a storage capacity in excess of 100,000 cf.

Table 3. Estimated Costs for Wet Ponds

Storage Space (cf)	Construction Costs	Other Costs	Total Cost
10,000	\$ 6,650	\$1,663	\$ 8,313
20,000	\$11,184	\$2,796	\$13,980
30,000	\$15,159	\$3,790	\$18,948
40,000	\$18,809	\$4,702	\$23,511
50,000	\$22,236	\$5,559	\$27,795
60,000	\$25,494	\$6,373	\$31,867
70,000	\$28,618	\$7,155	\$35,773
80,000	\$31,633	\$7,908	\$39,541
90,000	\$34,554	\$8,639	\$43,193

Table 4. Estimated Costs for Wet Ponds

Storage Space (cf)	Construction Costs	Other Costs	Total Cost
100,000	\$ 58,641	\$14,660	\$ 73,301
125,000	\$ 67,643	\$16,911	\$ 84,554
150,000	\$ 76,015	\$19,004	\$ 95,019
175,000	\$ 83,897	\$20,974	\$104,871
200,000	\$ 91,382	\$22,846	\$114,228
225,000	\$ 98,537	\$24,634	\$123,171
250,000	\$105,410	\$26,353	\$131,763
275,000	\$112,040	\$28,010	\$140,050
300,000	\$118,457	\$29,614	\$148,071

Generally, the unit cost for construction declines as the size of the pond increases. There is a loss in the economies of scale at 100,000 cf because of the shift between the two equations used to estimate costs.

Pond Maintenance

Wet ponds have moderate to high maintenance requirements. Regular maintenance and inspections are necessary to preserve the infiltration capacity of the wet pond.

Routine Maintenance

Routine maintenance consists of grass mowing, pond inspections, debris and litter control, erosion control, and nuisance control.

- Grass mowing must be done for weed control and to discourage woody growth on the embankments, side slopes, and emergency spillways. The grass should be mowed at least twice a year in non-residential areas and more frequently in residential areas.
- Annual inspections should be conducted during wet weather to determine if the pond is meeting the targeted detention times.
- Debris and litter should be collected during each mowing.
- Re-vegetation may be necessary to correct periodic slumping and erosion of the embankment.
- When insects, weeds, odors, or algae become a problem, fathead minnows and other fish are more preferable for nuisance control than chemical applications.

Non-Routine Maintenance

There are essentially two non-routine maintenance activities for wet ponds: structural repairs and replacement, and sediment removal.

- Some ponds that suffer from excessive and chronic drawdowns often have problems with leakage or seepage of water through the embankment. Proper

Chapter 2: Preliminary Cost Estimates

compaction of the embankment and the use of antiseep collars can help to avoid this problem.

- When sediment accumulates in the permanent pool the storage volume capacity is reduced. A sediment clean-out cycle of 10 to 20 years is recommended.

In addition, sediments should be cleaned out prior to any reduction in capacity. The permanent pool should provide for sediment accumulation prior to capacity reduction.

Total Maintenance Costs

The annual cost to maintain a wet pond ranges from \$510 to \$765 per maintained acre. Annual costs for non-routine maintenance are estimated to range from 1-2% of the pond's base construction cost, or \$255 to \$510 for a wet pond with 50,000 cf of storage capacity.

The costs associated with each cycle of sediment removal can be sizeable. One-time operations in excess of \$100,000 are not uncommon in large wet ponds. A review of several pond dredging projects in suburban Northern Virginia indicated that the average dredging cost was over \$15/cy, with a range of \$6.80-\$24.40/cy. The variation in these costs is due to differences in the size and accessibility of the pond, the proximity of the disposal site, and the method used to remove and transport sediment. Costs for smaller wet ponds (4,000 cf) typically range from \$6-11/cy since sediment can be mechanically removed with a front-end loader after the basin is de-watered. Larger ponds normally require the use of draglines or a hydraulic dredge. Sediment removal costs become even higher when on-site disposal areas are not available. In Northern Virginia, transportation costs and tipping fees may increase disposal costs by \$5-\$10/cy.

Retrofitting

Over time the various inlet/outlet and riser works in a pond will deteriorate and must be replaced. During the initial construction phase the various water works constituted about 25% of the cost. Replacement can entail a significant expense. The cost of replacing the water works for a wet pond with 50,000 cf of storage space is approximately \$7,000.

Infiltration Trenches (Full and Partial)

Infiltration trenches are an adequate BMP that effectively removes both soluble and particulate pollutants. As with other infiltration systems, trenches are not intended to trap coarse sediments. Basically, runoff is diverted into a shallow (3-8 feet deep) excavated trench that has been backfilled with stone to form an underground reservoir into the underlying subsoil. Individual trenches are primarily on-site control, and are seldom practical or feasible on sites larger than 5 acres. Trenches are only feasible when soils are permeable and the water table and bedrock are situated well below the bottom of the trench.

Construction Costs

Proper construction is extremely important for successful trench applications. A substantial number of trenches fail shortly after construction due to inadequate site investigation prior to construction, or lack of sediment control.

Chapter 2: Preliminary Cost Estimates

The major construction expenses are for labor, excavation of the site, and stone/aggregate material. These costs can be estimated using the following equation:

$$C = 28.9V_s^{0.66}$$

where C = construction cost

V_s = storage volume, in cubic feet, of void space in the trench
(approximately 40% of the excavated trench volume).

This planning equation should not be used when trench storage volumes are greater than 10,000 cf. An additional 25% should be added for the design of the trench and construction oversight. Table 5 below outlines construction, other, and total costs for constructing a new infiltration trench.

Table 5. Estimated Construction Costs for Infiltration Trenches

Storage Space	Construction Costs	Other Costs	Total Cost
1,000	\$ 3,395	\$ 849	\$ 4,244
2,000	\$ 5,478	\$1,369	\$ 6,847
3,000	\$ 7,246	\$1,812	\$ 9,058
4,000	\$ 8,837	\$2,209	\$11,047
5,000	\$10,308	\$2,577	\$12,885
6,000	\$11,690	\$2,923	\$14,613
7,000	\$13,002	\$3,251	\$16,253
8,000	\$14,257	\$3,564	\$17,821
9,000	\$15,464	\$3,866	\$19,330
10,000	\$16,630	\$4,158	\$20,788

A more accurate cost estimate can be derived using in-place unit cost data for the infiltration trench components. Component costs for trenches fall into five general categories, and the quantity of each component can be estimated from trench geometry. The five categories include the following:

- All sediment and runoff must be diverted away from the site until the grass filter strip is well established.
- Excavation constitutes about 20-25% of the total trench cost. Excavation requirements for a trench are equivalent to the total trench volume (width*depth*length).
- Stone fill typically comprises 45-55% of the total trench cost. Again, the quantity of stone required can be estimated on the basis of trench volume.
- Filter cloth is needed to line the sides, bottom, and top (option). This protective layer may contribute approximately 10-15% to the total cost.
- Inlet and outlet pipes needed for underground trenches make up about 10-30% of the total cost of the trench.

Chapter 2: Preliminary Cost Estimates

Site Maintenance

Infiltration trenches have high maintenance requirements. Regular maintenance and inspections are a necessary to preserve the trench's infiltration capacity.

Routine Maintenance

The routine maintenance requirements of infiltration trenches consist of inspection, buffer maintenance, mowing, and sediment removal.

- Trenches should be inspected monthly in the first few months of operation, and then annually thereafter. Inspections should check for surface ponding.
- An annual inspection of the buffer strips should be conducted to check vigor and density of the grass. Bare spots and eroded areas should be reseeded or re-sodded.
- Regular grass cutting of the filter strip is necessary. The performance of the filter strip will be impaired if the grass is cut too short.
- The pre-treatment inlets should be checked and sediment removed when more than 10% of the available capacity is lost. This can be done manually or by a vacuum pump.

Non-Routine Maintenance

The primary non-routine maintenance task involves rehabilitation of the trench after it becomes clogged. Clogging in surface trenches is most likely to occur near the top of the trench, between the upper layer of stone and the protective layer of filter fabric. Surface clogging can be relieved by carefully removing the top layer of stone, removing the clogged filter fabric, installing new filter fabric, and cleaning or replacing the top stone layer.

Clogging of underground trenches is a more serious problem, as it is likely to occur at the bottom of the trench. Rehabilitation of an underground trench requires the removal of the topsoil/vegetation layer, the protective plastic layer, the entire stone aggregate layer, and the bottom filter fabric layer. The subsoil layer must be tilled to promote better infiltration, and each layer must be replaced.

Total Maintenance Costs

No reliable data are currently available to assess maintenance costs for infiltration trenches. One estimate places annual O&M costs at \$286 per acre. Routine maintenance for surface trenches will be higher than underground trenches because of the need for regular grass cutting.

The opposite is true with non-routine maintenance. The cost to rehabilitate an underground trench is roughly equivalent to the construction of a new trench. Rehabilitation of surface trenches should equal approximately 20% of the initial construction cost. In the case of a 5,000 cf underground infiltration trench, the estimated cost of rehabilitation is \$12,800. The same size infiltration trench on the surface would cost approximately \$2,500 to rehabilitate.

Infiltration Basins

Infiltration basins are effective in removing both soluble and fine particulate pollutants borne in runoff. The appearance and construction of infiltration basins is similar in many respects to conventional dry ponds. An impoundment is formed by excavation or by construction of an embankment. The impoundment stores a defined quantity of runoff, allowing it to exfiltrate slowly through the permeable soils of the basin floor. The floor is graded as flat as possible and a dense turf or grass is established to promote infiltration and bind up sediment deposits. Additional storage can be provided for temporary detention of larger runoff volumes associated with larger storms by utilizing a conventional riser. An emergency spillway is used to pass runoff volumes in excess of the design capacity. Basins can provide full control for large design storms and can serve drainage areas up to 50 acres.

Construction Costs

Given the similarities in design and construction methods between infiltration basins and dry extended detention ponds, the dry pond equation can be used as a surrogate measure of cost. Some extra costs are incurred when additional dead storage is needed for exfiltration. Thus, the following cost equation can be used to estimate costs for an infiltration basin:

$$C = 11.67V_s^{0.69}$$

where C = construction cost

V_s = storage volume up to the crest of the emergency spillway

in the basin (including any dead storage reserved for exfiltration purposes).

This cost equation does not include any additional costs for land acquisition or for any sediment trapping structures. An additional 25% should be added for the design, planning, and construction oversight. Since the cost equation is similar for dry extended detention ponds and infiltration ponds, see Table 2 for construction costs.

Basin Maintenance

Infiltration basins appear to fail at a higher rate than other infiltration practices. The most common problem has been the partial or total loss of infiltration capacity. In most instances basin failure was due to inadequate field testing of soil infiltration rates, prior use as a sediment basin, sediment compaction, or poor upland sediment control. Better testing before constructing an infiltration basin may reduce future maintenance costs. If the structure has already been constructed, frequent maintenance is necessary to improve or preserve infiltration rates.

Routine Maintenance

The maintenance for infiltration basins is slightly greater than that needed for dry extended detention ponds. Normal maintenance tasks include inspection, grass mowing, debris and litter removal, erosion control, and tilling.

- Basins should be inspected after every major storm in the first few months after construction. Thereafter, annual inspections should include a check on the following conditions: differential settlement, cracking, erosion, leakage, tree growth on the embankment, the condition of the riprap in the inlet,

Chapter 2: Preliminary Cost Estimates

outlet and pilot channels, sediment accumulation in the basin, and the vigor and density of the grass turf on the floor of the basin.

- The buffer, side-slopes, and basin floor should be cut at least twice a year. More frequent mowing may be required in residential areas.
- Trash will collect in full infiltration basins since they do not have outlets. Uncollected trash will clog the riser or low flow orifice.
- Erosion control is important because eroded sediments can adversely affect the infiltration capacity of the basin. Eroded or barren areas should be immediately re-vegetated.
- If a basin is located on marginally permeable soil, annual or semi-annual tilling operations may be needed to maintain infiltration capacity. Tilled areas immediately need re-vegetation to prevent erosion.

Non-Routine Maintenance

Non-routine maintenance includes the replacement of the water works if the basin is for detention versus full exfiltration. In addition, tilling or sediment removal may be necessary.

- If the basin is of the infiltration/detention basin design, the pipes and barrels will eventually need to be replaced. However, if the basin is designed for full exfiltration then the frequency and cost of structural repairs are reduced.
- Over time, the original infiltration capacity of the basin floor will be lost. Deep tilling, regrading, and leveling can be used to break up the clogged surface layer. Deep tilling may be needed every 5 to 10 years.
- Infiltration basins located in small residential watersheds have infrequent sediment problems. However, the sediment will still have a negative impact on basin exfiltration.

Total Maintenance Costs

Infiltration basins have only recently come into widespread use, and consequently there is very little data on which to base maintenance costs. However, since the routine and non-routine maintenance tasks for infiltration basins appear to be similar to those associated with conventional dry extended detention ponds, it may be reasonable to assume that annual maintenance costs will comprise 3-5% of the basin's initial construction cost. For a facility with 50,000 cf of storage volume, the estimated cost for annual maintenance would be \$765 to \$1,275.

Porous Pavement

Porous pavement refers to a porous asphaltic paving material and high void aggregated base that allows for rapid infiltration and temporary storage of runoff and precipitation. A typical porous pavement section is characterized by a 2.5-4.0 inch thick slab of porous pavement, a course one inch filter consisting of 0.5 inch diameter gravel, a variably sized 1.5-3.0 inch diameter stone reservoir depending on the storage volume needed, a 2 inch deep gravel filter, filter fabric, and then undisturbed soil. This type of pavement is an applicable substitute for conventional asphalt pavement on parking areas and low-traffic volume roads provided that the grades, subsoil drainage characteristics, and groundwater table conditions are suitable for use. Generally, the grades must be very gentle to flat, the subsoil must be at least moderately permeable, and the depth to the water table or bedrock must be 2 to 4 feet. When these conditions are met, porous pavement is a reasonably cost-effective BMP, particularly if

Chapter 2: Preliminary Cost Estimates

the runoff from non-permeable areas is not great. Porous pavement is not commonly utilized in Massachusetts. Currently, the Massachusetts Department of Public Works uses porous pavement only for small repair jobs.

Construction Costs

Porous pavement costs should be considered as incremental, or extra costs, incurred over and above the cost of installing a conventional asphalt parking lot. Preliminary cost estimates can be prepared for a site using the average in-place unit costs combined with the basic geometry of the site. Table 6 provides unit cost data for common porous pavement construction components, and was obtained from a survey of over 60 construction bid or bonding estimates prepared by both the public and private sectors in metropolitan Washington, D.C.

The cost of constructing a one-acre partial exfiltration porous pavement parking lot using the unit cost estimates in Table 6 is approximately \$77,000. Included in this estimate is a 12 inch stone reservoir; 4946 square yards of filter cloth; 4807 square yards of extra costs for porous pavement; 300 feet of 6 inch PVC pipe; 150 feet of 8 inch PVC pipe; \$1000 for sediment and erosion control; and an additional 10% for contingencies.

Table 6. Unit Costs for Porous Pavement Construction Components

ITEM	UNITS ^a	AVERAGE IN-PLACE UNIT COST (\$)	TYPICAL RANGE (\$)
Common Excavation	cy	3.07	2.18-5.45
Clear and Grub	ac	3052.00	1635-3815
Seed/Mulch	sy	0.63	0.27-1.09
Rip-Rap	sy	41.42	27.25-59.95
Select Fill	cy	4.33	3.27-6.00
Gabions	cy	124.26	****
Silt Fence	ft	4.48	2.18-5.45
Filter Cloth	sy	2.95	2.18-5.45
PVC Pipe			
6 inch	ft	3.39	1.51-6.96
8 inch	ft	5.71	2.70-12.00
12 inch	ft	12.03	6.10-25.76
Stone fill (1-2")	cy	24.52	16.35-27.25
Clean Washed Sand	cy	15.26	****
Pea Gravel	cy	8.18	****
Stone Tramping	cy	2.18	****
Observation Well	lf	163.50	27.25-436.00
Sediment Control	lf		1090-8720

a Unit cost data derived from MWCOG (1983a) and supplemented by 45 itemized SWM construction bids or bonding estimates analyzed in the Washington, D.C. area, 1983-1986. Items for which less than five independent estimates were available are denoted by ****. Material costs may vary among jurisdictions and regionally. All dollar values are in 1990 dollars.

ac = acre, lf = linear feet, cy = cubic yards, sy = square yard

Maintenance

Routine Maintenance

The surface of porous pavement must be cleaned regularly to prevent the pores from becoming clogged with fine material. Cleaning is best accomplished through use of a vacuum cleaning street sweeper. Outside of regular sweeping, porous pavement requires no more maintenance than conventional pavement. In times of heavy snowfall the application of abrasive material should be closely monitored to avoid clogging problems once the snow and ice have melted. No method of maintenance has been satisfactory on fully clogged pavement. Only superficially clogged pavement sections can be restored to normal operation. The best method for cleaning porous pavement is brush and vacuum sweeping followed by high pressure water washing. Vacuum cleaning is ineffective once the pavement is clogged. The oils in the asphalt bind dirt, and only an abrading and washing technique can be effective in the removal of such dirt. Clogging to a depth of one-half inch is sufficient to prevent water penetration. Spot clogging can be relieved by drilling half-inch holes through the porous asphalt layer every few feet. Potholes and cracks can be repaired with non-porous pavement as long as the repaired area does not exceed 10% of the parking lot area.

Non-Routine Maintenance

A much more serious problem occurs if the subsoil or the subsoil/filter cloth interface becomes clogged over time. At present, nothing short of complete replacement can correct this condition.

Total Maintenance Costs

In metropolitan Washington, it takes 3.5-4 hours and cost approximately \$350 to clean and wash a one-acre parking lot. Based on this estimate the annual maintenance cost for cleaning a one-acre porous pavement lot would be \$1,400. When more serious problems arise and the filter cloth becomes clogged, the estimated cost of repairs is comparable to the cost of new construction.

Water Quality Inlets

A water quality inlet is a rectangular concrete chamber connected to the storm drain system. Runoff passes through three chambers that are specifically designed to separate out sediment, grit, and oil from parking lot runoff before exiting through a storm drain pipe. Since runoff is only briefly retained in the inlets, only moderate removal of coarse sediments, oil/grease, and debris occurs. Soluble pollutants quickly pass through inlets without any modification.

Construction Costs

Installation costs of standard sized, three-chamber inlet design ranges from \$5,000 - \$15,000 and average \$7,000 - \$8,000. The cost per inlet will drop when pre-cast versions are readily available.

Maintenance

Routine maintenance costs are high since pollutant removal should occur at least twice a year. The normal method used is to pump out the contents of each chamber. The turbulence of the vacuum pump in the chamber produces a slurry of water and sediment that can be transferred to a tank truck. An alternative disposal method is to siphon out each chamber and allow it to infiltrate over a nearby grass area. The remaining grit must be removed with a shovel.

Contractors in the Washington Metropolitan area charge on the average \$125/hour to pump out a water quality inlet. The contractor will dispose of the waste from each inlet for an additional \$200. In the metropolitan Washington area the annual cost to maintain a water quality inlet at peak level is approximately \$650.

Grassed Swales

The purpose of a vegetated or grassed swale is to serve as natural drainage ways for stormwater runoff. A swale slows down the concentrated runoff velocity and filters out some particulate pollutants.

Grassed swales are typically applied in residential developments and highway medians as an alternative to curb gutter drainage systems. A swale will remove some particulate pollutants by filtering action but is not capable of removing soluble pollutants.

Swales have a limited capacity to accept runoff from large storms, and often must lead into storm drain inlets. Usually, swales are used in combination with other BMPs to control stormwater runoff.

Construction Costs

Costs for constructing a grassy swale can vary depending on the side-slope, width, and method of establishing vegetation. The cost for establishing a permanent grass cover with various seeding methods in a 15 foot wide 3:1 side-slope swale is:

- \$5.00 per linear foot for seeding/straw mulching;
- \$9.00 per linear foot for seeding/net anchoring;
- \$8.50 per linear foot for sodding/stapling.

Maintenance

Swale maintenance is largely aimed at keeping the grass cover dense and vigorous. Grass mowing is the major maintenance expense. Maintenance costs are dependent on the frequency of mowing. Areas that require frequent mowing are more expensive to maintain. Other, but infrequent expenses include spot reseeding and weed control.

Catch Basins

Catch basins are installed at the point where storm water enters the sewer system, and may be a significant source of pollution. Catch basins remove large particles and organic debris from the runoff, but they are ineffective in removing fine materials including most of the organic matter. The material removed by the catch basins decomposes over a period of time in the standing pools of water, and unless cleaned

Chapter 2: Preliminary Cost Estimates

out, it is flushed into the drainage system during subsequent storms. To alleviate the problem, catch basins must be cleaned periodically or their usefulness is greatly impaired.

Construction Costs

When catch basins are built they are usually part of large stormwater projects. The design and cost of a new catch basin depends on local soil conditions and the intended use of the catch basin. Catch basins that have infiltration capabilities are more expensive than non-filtration catch basins. Construction costs for catch basins are not included in this chapter.

Table 7. National Average Cleaning Costs per Catch Basin

Type	\$/Catch Basin	\$/m ³	\$/yd ³
Manual	17.97	44.25	34.04
Eductor	13.89	12.94	9.53
Vacuum	18.79	26.41	20.15

Maintenance

Catch basins must be cleaned frequently to prevent sediment and debris from accumulating to such a depth that the outlet to the sewer might become blocked. The sump must be kept clean to provide storage capacity for sediment and to prevent resuspension of sediment. Since the volume of stormwater detained in a catch basin will reduce the amount of overflow, it is important to clean catch basins to provide liquid storage capacity.

Effective catch basins require cleaning at least twice a year, depending upon conditions. Contractors in the Washington Metropolitan area charge on the average \$125/hour to pump out a catch basin. The contractor will dispose of the waste for an additional \$200. The reported costs for cleaning a catch basin will vary, depending on the size and design of the catch basin used by a location and the amount of sediment present. Cost estimates per catch basin can be derived from the national averages in Table 7.

Retrofitting

The accumulation of sediment in the catch basin should be mitigated by new designs with flow limitations and siphon drainage. These measures ensure complete emptying of the catch basin contents and reduce the need for cleaning. The cost to retrofit a catch basin is unknown. Retrofitting a catch basin is usually included as part of a much larger rehabilitation project. When this is the case, it would be equivalent to constructing a new catch basin.

Selected Case Studies

The following case studies present the estimated capital costs for selected stormwater control projects in the Buzzards Bay area. The case studies represent demonstration projects conducted or supervised by either the Massachusetts Department of Environmental Protection or the U.S. Environmental Protection Agency.

Snell Creek Watershed -- Westport, Massachusetts

Cost estimates were developed for a stormwater demonstration project for the Snell Creek watershed, a Buzzards Bay tributary. The demonstration project had two components and both require structural modifications to the existing drainage systems. The first component was to control runoff from Route 88, a significant source of fecal coliform bacteria to Snell Creek. The new stormwater control design for the Route 88 drainage system includes eight leaching gallies. Each of the eight gallies is approximately 30 feet high with the mounds approximately 50 to 60 feet long and 20 feet wide.

The second component involves a drainage outlet from Kirby Road that discharges directly into Snell Creek. The Kirby Road system requires the installation of a large dry well with an overflow discharge into a wooded area, thereby eliminating the direct connection to Snell Creek. The costs for these two recommended plans are outlined in Table 8.

Electric Avenue Beach -- Bourne, Massachusetts

This storm drainage system receives runoff from approximately five acres of residentially developed land. Lot sizes average 3,000 square feet. Seven catch basins collect surface runoff and discharge flow to the outlet at Electric Avenue Beach. The new treatment facility is expected to reduce stormwater discharges from two-year storm events and control bacterial loadings.

Final calculations and designs required 11 leaching chambers to store and infiltrate two-year storm intensity flows. The chambers are located off-line from the main drainage system but connected to in-line installed manholes. This is needed to reduce the volume of solids and other debris from reaching the chambers and clogging the infiltration system. Four feet of 1-2 inch stone surround each chamber. The estimated capital costs for the stormwater facility are indicated in Table 9 below.

Red Brook -- Wareham, Massachusetts

The Red Brook drainage system receives runoff from about 10 acres of intensively developed watershed. An estimated 50% of the surface area is considered impervious. Nine catch basins collect the stormwater and discharge it directly into Red Brook. Fecal coliform counts have been as high as 200,000 fc/100ml in the storm drainage. The proposed treatment measure is to divert these flows into a dugout infiltration basin. The demonstration stormwater management project is anticipated to begin construction in the Spring of 1990.

Preliminary calculations show that an infiltration detention basin measuring 100' by 100' and 6' deep will be adequate to infiltrate runoff from a ten-year storm. The basin is designed to be dry except during periods of runoff. A stone trench will be installed

Chapter 2: Preliminary Cost Estimates

in the basin to ensure that infiltration will occur even if the basin surface is frozen. An emergency spillway will be provided for safety during high intensity storms. Ground-water quality will be monitored throughout the project period. The estimated total construction cost for this facility is \$100,000.

Table 8. Cost Estimates for Snell Creek Watershed Demonstration Projects

Item	Estimated Cost
Design	
Engineering Design, Plans, Specification, and Contract Documents	\$50,000
Permits	\$12,000
Administration	\$10,000
Construction	
Materials	\$150,000
Labor	\$250,000
Construction Supervision	\$21,000
Total Capital Costs	\$493,000
Annual Maintenance Costs	\$3,000

Source: Metcalf & Eddy, Inc. Nonpoint Source Management Plan for the Watershed of Snell Creek, Westport, Massachusetts.

Table 9. Estimated Cost: Bourne Stormwater Treatment Facility

Install 4 Manholes	\$10,880
Install 2 Sediment Removal Chambers	\$ 8,740
Install 11 Leaching Chambers	\$33,770
Install 250 feet 12" pipe	\$ 4,725
Asphalt 4000 sq. ft. of Disturbed area	\$ 4,450
Miscellaneous	\$11,000
Estimated Total Capital Cost	\$73,565^a

Source: U.S. Environmental Protection Agency, "Stormwater Treatment Project Buttermilk Bay: Bourne & Wareham, Massachusetts," July 1987.

^aTotal does not include engineering and design, labor, contract administration, or project supervision costs.

On-site Septic System Improvements

In the Buzzards Bay drainage basin, septic systems are used by over 100,000 people or 43% of the population. These on-site systems represent a serious source of contamination to the Bay itself as well as to other resource areas within the drainage basin. Septic systems may contaminate the basin through a number of ways, including

overt failure, and travel through groundwater. Title 5 of the State Environmental Code (Minimum Requirements for the Subsurface Disposal of Sanitary Sewage) include basic rules for regulating septic systems. Title 5 regulations were originally written as minimum standards of protection. Consequently, the CCMP includes an action plan for managing on-site systems in the drainage basin. The plan states several recommendations for strengthening the Title 5 regulations and further prevent public health threats and environmental degradation from on-site septic systems.

Preliminary cost estimates for activities related to on-site septic systems are divided into the following areas:

- **Full-time health agent.**
- **Inspection costs** (the boards of health expand regulations requiring, in effect, more inspections).
- **Upgrades** (upgrade pre-existing Title 5 systems (cesspools); correct identified failing systems).
- **Maintenance costs** (primary O&M costs include pumping and monitoring).
- **Tight tank installation and long-term pumpout costs** (the Buzzards Bay communities install tight tanks where no other alternatives are available).
- **Denitrification technology** (the Buzzards Bay communities install denitrifying septic systems).
- **Limited sewerage alternatives** (costs associated with public or private small wastewater treatment plants and community septic systems).

The sections below present more detailed profiles of these activities and their associated costs.

Full-time Health Agent

The CCMP recommends that the Buzzards Bay communities employ a full-time health agent to oversee all aspects of on-site wastewater disposal. An agent is required to adequately enforce state and local regulations. Small towns with limited growth may wish to share a health agent. Currently, Acushnet, Rochester and Marion have established a Regional Health District that employs a sanitarian. The cost associated with hiring a full-time health agent (sanitarian) is \$35,000 - \$40,000 per year including benefits, overhead, travel, and other expenses.

Inspection

The CCMP recommends several activities that could be considered part of inspection, including:

- **inspections at time of selling a home or expanding the living space, and**
- **review of all variances in environmentally sensitive areas by DEP personnel.**

Each of these recommendations is discussed in further detail below.

Inspections When Selling a Home or Expanding Living Space

The CCMP recommends that local boards of health adopt regulations to require septic system inspection when the home is sold, expanded to year round use, or renovated to add living space.

Current regulations require a homeowner to hire a registered sanitarian to inspect on-site septic systems. The homeowner would then present the completed inspection forms to the town health agent. The majority of the costs would not involve government employees. The homeowner would pay the inspection costs. The sanitarian's inspection costs would range from about \$200 to \$500 per inspection.

Complete Review of All Variances in Environmentally Sensitive Areas

The CCMP recommends that the DEP review all variances in environmentally sensitive areas such as barrier beaches and coastal dunes. The cost associated with variance review amounts to the work of one senior sanitary engineer @ \$30,000 - \$40,000 per year (salary, without benefits or overhead).

Upgrading and Correcting Failing Systems

The CCMP recommends that local boards of health require failing systems to be upgraded to Title 5 standards.

Many on-site septic systems are outdated by Title 5 standards. The homeowner is required to replace or modify a sub-standard septic system if it fails and results in a public health or environmental problem. Often these upgrade requirements affect pre-Title 5 (1977) seasonal cottages where sub-standard systems (e.g., cesspools) are still in place and require complete replacement. In many cases, the out-of-date system cannot simply be replaced due to site design, that is, the system is too close to groundwater or the soil type is inadequate. Consequently, replacements cost vary significantly. Typically, the costs for repairing or replacing a failed system range from about \$5,000 to \$15,000. Costs associated with specific conditions include the following:

- Draw up engineering plans without on-site work: \$500 - \$1500 (depending on firm).
- Repair septic tank alone (not including drainfield) under good conditions: \$2500 (where \$1500 for septic tank, \$1000 for installation).
- Repair/replace entire septic system (necessitated by catastrophic failure) under extremely poor conditions, \$40,000. Activities include excavation of field and replacement with clean fill, and construction of retaining wall to stop slope breakout. Under severe conditions the total cost of replacement could be as high as \$50,000.

In some cases to correct or prevent system failure, the local board of health may require a homeowner to install flow reduction devices. These devices reduce the amount of

water used in the house and may improve the performance of any on-site septic system. The private costs associated with simple water-saving devices such as low-flow faucets, toilets, and showers are relatively small. To slow the waterflow from a faucet, the homeowner would install an aerator at the end of the faucet costing about \$2.50. To slow the water flow from a shower from 8 gallons per minute to 2.7 gallons per minute, the owner would change the shower head; the associated costs would range from \$7 to \$50. Throughout Massachusetts, the water flow from a toilet is already relatively slow at 3 gallons per flush.

Maintenance

To maintain a septic system, the homeowner should hire a pumper (licensed by the health agency) to pump the system once every two or three years, depending on conditions (soil, frequency of use) as well as to conduct an equipment check. The costs associated with pumping are generally \$55 to \$75 per visit, however, at the treatment facility, the town may charge an additional dumping fee of about \$40 to \$75. Annualized, these costs would drop to about \$50 to \$75.

Tight Tank Installation and Long-term Pumpout

For wet or excessively damp soil conditions not suitable for a conventional septic system, a water-tight tank is a suitable alternative. The differences between a tight tank and a regular concrete tank or fiberglass tank are (1) an additional outside coat of a tar-based solvent to prevent water penetration, and (2) an inside hydraulic cement seal of the seams. The total capital and O&M costs associated with a 1,500 gallon tank system typically range from \$5,000 to \$10,000. The component costs include the water-tight tank, pump chamber, installation, and pumping, as detailed below.

- **Water-tight tank:** The cost of a 1,500 gallon tight tank ranges from \$800 to \$3000. A smaller 1,000 gallon tank is about \$200 to 300 less. Included in these tight tank estimates is the cost associated with the additional coat and hydraulic cement seal which is about \$350 for a 1,500 gallon tank and about \$250 for a 1,000 gallon.
- **Pump:** The cost of a pump depends on such factors as how much flow, how far pumping, single or double pump station). As an example of a typical pump, a single sewerage pump installed in pump chamber costs approximately \$1500 to \$2000.
- **Installation:** Installation costs vary significantly depending on site-specific conditions. Typical installation costs may range from about \$3,000 to \$5,000.
- **Pumping out:** The costs associated with pumping range from about \$55 to \$80 per visit (by pumpout truck). However, many towns charge dumping fees at the treatment plant, ranging from about \$40 to \$75 per plant visit. The average frequency of pumping out sludge is once every two to three years. Consequently, the total cost may range from \$55/visit (only pump-out cost, no dumping fee) to \$155/visit (high-range cost, dumping fee). If pumped out once every two years, the annual pump-out cost for a tight tank ranges from about \$30 to \$80.

Denitrifying Septic Systems

Denitrifying septic systems may be necessary in certain nitrogen sensitive embayments bordering Buzzards Bay to reduce the amount of nitrogen entering surface water. Currently, a variety of denitrifying methods are being tested in the country; of these methods, the RUCK system is the most prominent and is described in detail below.

Technology

The RUCK system is an alternative on-site wastewater disposal system that enhances denitrification or nitrogen removal from wastewater. This system requires that a home's plumbing be separated into blackwater (toilet water) and greywater (sinks, tubs, etc.) components.

The blackwater goes to a septic tank for the separation of solids and floatables as well as some anaerobic of the solids. The supernatant from the blackwater septic tank passes through an aerobic sand filter or rock filter to facilitate the conversion of various nitrogen compounds into nitrate (NO_3). This nitrate rich effluent from the filter is then discharged into the greywater septic tank along with all the greywater from the house. The greywater in this tank has a high enough carbon load to make this an anaerobic tank which allows for denitrifying bacteria to convert the nitrate into N_2 gas and thus remove the nitrogen from the wastewater. The effluent from the greywater septic tanks is then disposed of through a typical leaching facility.

Application

The RUCK septic system, a new experimental denitrifying system design, has been installed in East Falmouth, Massachusetts, and more extensively in Pinelands, New Jersey. In Massachusetts, the RUCK system does not yet have status as an "approved" septic system as defined by Title 5 regulations. The system is considered an "experimental" system under these regulations (i.e., Title 5 (18.1) -- miscellaneous disposal) and requires a case-by-case approval by the state DEP and by the local board of health. Currently, the approval process can take 6 to 8 months. Advocates of the RUCK system are taking steps to change the status of the system from "experimental" to "approved." The system has been under testing and review for about three years in efforts to demonstrate that the system is no more detrimental to the environment than an "approved" system and should therefore be considered such. Once the regional office administrator releases a statement recognizing the RUCK system as "approved," the system should be readily available for installation.

At present, the DEP has approved two experimental systems, with only one actually installed in the state of Massachusetts. In southern New Jersey, approximately 85 RUCK systems have been approved in the past 3 to 4 years. Of those approved, at least 74 systems are in operation. Currently, the Pinelands Commission is monitoring 18 of these systems for effectiveness in terms of reducing nitrogen and phosphorus discharged from standard on-site septic systems.

Costs

The primary costs associated with a denitrifying septic system include both construction costs and O&M costs (see Table 10). Depending on the conditions where

Chapter 2: Preliminary Cost Estimates

the system is installed, O&M costs could include pumping and/or inspection costs. Monitoring may also be included in the maintenance program.

Table 10. Denitrification Technology: RUCK Septic Systems

<u>Massachusetts (Falmouth) and New Jersey (Pinelands)</u>	
Construction Costs	\$15,000
Annual O & M (removal of septic tank solids)	\$75-\$100
Additional Costs (pump chamber ^a)	\$2,000
useful life	same as conventional system 25-year average

^a Necessary where treatment unit is too close to groundwater

The East Falmouth system was constructed by hand with the costs based on time and materials. Consequently, the system's construction costs were relatively high, approximately \$15,000. The RUCK system designer in Falmouth believed that if the system achieved certain economies through mass production, the technology costs would be lowered. For instance, through standardizing size and utilizing a precast concrete tank for the RUCK filter, he stated that a manufacturer could potentially reduce the construction costs by as much as 40 or 50 percent, or to about \$9,000. For comparison, the cost associated with a conventional septic system installed in similar conditions to those in East Falmouth would be about \$4,500 to \$5,000. However, in New Jersey, the construction costs were similarly high despite the larger scale production. Therefore, it is questionable whether costs can be reduced through standardization or mass production.

Depending on the depth to groundwater on specific sites, a pump may be necessary to meet Title 5 requirements.

The maintenance costs are similar to those for a conventional septic system. Generally, a system is pumped once every two years. The pumping cost (including disposal at a wastewater treatment plant) for a 1000 gallon septic tank in Falmouth is approximately \$150. In addition, regular inspections are suggested to avoid surprise failures. The cost for one inspection depends on the town; however, on average, inspections require a board of health official working half-time, with an annual salary of \$25,000.

A maintenance program may be supplemented by a monitoring program. Monitoring is often used as a method for determining (1) the overall effectiveness of the RUCK system, and (2) in New Jersey's case, the minimum size of building lots that require a denitrification system (if the lot is of sufficient size, the owner can use a normal septic system). For example, in January 1984, the Pinelands Commission in New Jersey adopted a monitoring program for RUCK septic systems. The program's primary objective was to determine how well RUCK systems attenuate nitrogen. The Commission's six-month progress report (July-December, 1989) for the 18 systems sampled found mixed results in terms of average final effluent total nitrogen (FETN)

Chapter 2: Preliminary Cost Estimates

concentrations -- a rough indicator of system performance. To date, the average FETN of the 18 RUCKs is 22.3 mg/l. In general, the RUCK systems have had fairly good results in terms of percent nitrogen removed where, on the average, almost 60% of the blackwater total nitrogen is removed. The Commission's total projected expenses for the current monitoring program (18 systems) is \$95,250¹. This figure includes all related costs such as labor, lab analysis (\$35 per sample, or approximately \$3,000 total), equipment, gas for vehicle travel, and overhead.

Useful Life

The life span of a RUCK system is expected to be the same as that for a normal system, depending on certain variables such as soil conditions and maintenance and utilization by the homeowner. At present, a RUCK system has been in operation over 10 years at the home of its inventor/patent holder, Rien Laak, in Storrs, Connecticut.

Limited Sewering Alternatives

Small wastewater treatment plants or community septic systems (a conventional septic system serving a number of users, or cluster developments) are feasible alternatives to on-site septic systems in cases where site and/or soil conditions do not permit on-site systems, or are more conducive to a collective system. A small treatment facility may be a good alternative for subdivisions that are far from central facilities and where the houses are too close together to allow on-site systems on each lot. The total costs are associated with a small system capable of handling a typical flow of 8,000 gallon/day (serving about 25 three-bedroom homes). The cost estimates may be broken down into the following components:

- Treatment facility ranges in cost from \$120,000 to \$220,000.
- Annual O&M (including sampling of effluent, operator, professional engineer, electricity, etc.) ranges in cost from \$25,000 to \$30,000.

A community septic system is another alternative to separate on-site systems in cases where there is sufficient density and number of housing units. The Buzzards Bay area does not utilize community septic systems. However, in 1986, the town of Plymouth to the north began a project to build a septic system for the White Cliffs cluster development of about 300 houses. The total costs associated with this project over the three and a half year period are \$750,000 for capital expenses and \$20,000 for O&M.

Boat Pump-out Facilities

The CCMP notes that sanitary wastes from boats are being discharged regularly in near shore waters of the Bay. These wastes and the chemicals discharged with them from on-board marine sanitation devices (MSDs) degrade the water quality and have contributed to the closing of shellfish areas.

1 Funding for this program is made available through contributions from those residential and commercial developers using or expecting to use the RUCK system. As of early January 1990, contributions have been made on 115 systems (out of a potential 343 developments) at a fee of about \$800 each.

Chapter 2: Preliminary Cost Estimates

The CCMP contains a number of recommendations aimed at eliminating the discharge of wastewater from all boats in harbor areas and designating Buzzards Bay as a zone where discharges are banned. To meet these goals, the two primary needs are: the provision of adequate numbers of facilities to pump out boat waste holding tanks; and ensuring compliance through education and enforcement. Cost estimates for boat pump-outs are described below.

Facility Costs

Cost estimates for boat pump-out facilities were obtained by contacting marinas in Buzzards Bay and the Chesapeake Bay and the Maryland Boating Administration. The cost of constructing a boat pump-out facility generally ranges from \$3,000 to \$15,000 depending upon several factors. The three primary capital cost components are: the pump-out system; piping to transport the waste to the sewer or holding tank; and the holding tank (if needed).

Pump-Out Systems

There are three types of boat pump-out systems: portable; stationary; and boat mounted. Portable systems consist of a pump and small tank which are rolled along the pier to the boats. They are inexpensive and easy to install. However, they have several drawbacks, each of which increases the time and effort required to operate these systems and therefore the operating costs. First, they must be transported from boat to boat and, when full, can be extremely cumbersome. Second, they have limited storage capacity and must themselves be emptied. Third, the smaller portable units tend to take longer to empty boat holding tanks. Commercial portable systems usually cost between \$1,600 and \$3,800 but one boatyard (Edward's Boatyard in Falmouth) was able to construct one for about \$250.

Stationary pump-out units are more convenient and efficient to use but are more expensive to purchase and install. As with the portable system, personnel costs are significant. Waste is pumped directly to the sewer system or holding tank. There are two types of stationary systems -- single station and multi-station. Single station systems consist of a single stationary unit containing the pump, hose, and nozzle and cost between \$2,300 and \$6,000.

Multi-station systems consist of several stations, called "ejector modules," which are connected to a main pump and collection tank. The tank capacity ranges from 100 to 850 gallons and can be connected to a sewer system, or can be emptied by a licensed pumper and hauled to a treatment plant. The advantage of this type of system is that the ejector modules can be placed in several places in a marina including at the slips themselves. The cost of these systems varies with the number of stations, the size of the pump, the size of the tank, and the distance the waste is pumped to the holding tank. The costs for these systems with two stations ranges from \$5,695 to \$14,300 plus installation.

A boat mounted pump-out system is just that -- a pump-out system and a holding tank mounted on a boat. The type of system depends primarily on the size of the boat, which can be as small as 16 feet or as large as is practical for the task. The major cost component for a boat mounted system is not the equipment -- the state of Maryland retrofitted a boat with pump-out equipment for less than \$5,000 -- but the cost of

Chapter 2: Preliminary Cost Estimates

maintaining the necessary two-person crew. In addition, there is the added cost for boat maintenance and fuel.

The major operating cost for the portable and stationary pump-out systems is the salary of the personnel required to operate the pump. This can range from two people in the case of a portable pump, to none where the pump is self-serve and coin operated. The need for and cost of pump maintenance in all likelihood depends on the type and age of the pump and the amount of use it receives. In the survey conducted for this chapter, the majority of the pumps were new and required little or no maintenance, with two notable exceptions. First, the Edgartown Harbormaster reported that their pump, which is two years old, requires annual overhauls and other maintenance totaling about \$1,000 a year. Second, the pump on the pump-out boat maintained by Edgartown Marine requires \$500 to \$600 per year in maintenance chiefly due to problems with the impeller. It should be noted that both of these pump-out facilities were more heavily used than others in the survey.

Piping

The second capital cost component, the cost of piping, depends upon the terrain and the length of the pipe. If the terrain is favorable, the waste will be able to travel by gravity flow to the sewer, septic system, or tank; if not, a pump may be required. From the marinas contacted for this study, the average cost of piping was \$4.50 per foot.

Tanks

The third major cost factor is whether the marina is able to connect to municipal sewer lines, or if it must install a tight tank. Typically, the costs associated with a tight tank including pump, installation, and time and other materials range from \$5,000 to \$10,000. The cost of the tank alone ranges from about \$800 to \$3,000. Installation costs vary. If the system uses a tight tank, the cost to have it emptied by a licensed pumper ranges from around \$60 to \$80. The frequency that a tank is emptied depends upon the size of the tank and the number of users. Since most sewage pumpers charge a flat fee for pumping out holding tanks, one strategy might be to size the holding tank according to the capacity of the pumper's truck.

Compliance Activities

There is reluctance on the part of marinas in both Buzzards Bay and Chesapeake Bay to install boat pump-out systems because they are so underutilized that marinas feel that they will not be able to cover their costs. There are four steps that can be taken to improve this situation: (1) boater education; (2) enforcement; (3) make pump-out facilities convenient and easy to use; and (4) provide grants to marinas for the installation of pump-out facilities.

Education and enforcement programs and costs were not included in this chapter, but several of the marina representatives expressed the opinion that education was a more cost-effective means of increasing compliance because of the difficulty of enforcing discharge regulations. One marina owner suggested that boats be required to pass safety and environmental compliance inspections similar to car inspections. Once Type III MSDs are required on all boats, they would be included in the inspection. Under this system marinas would perform the inspections just as gas stations do for automobiles.

Several of the marina representatives as well as an official from the Maryland Boating Administration indicated that the willingness of boaters to use pump-out facilities depends on three considerations. First, the facility should be conveniently located and be in deep enough water to accommodate larger boats. The second consideration is ease of operation. In one marina surveyed, a coin-operated system has proven to be popular with boaters. The third consideration is price.

The state of Maryland has recently instituted a program to provide grants up to \$10,000 to public and private marinas to construct boat pump-out facilities. The construction costs of the facilities applying for these grants range from \$4,000 to \$12,000 and average slightly over \$7,000. This program will require two full-time staff, one engineer and one biologist, to administer. The funds for this program come from the Maryland Waterway Improvement Fund which is in turn funded by a tax on the sale of boats.

Holding Tank Chemical Additives

A major issue in the CCMP is the effect that chemicals used in boat holding tanks, particularly formaldehyde, may have on the performance of treatment works. In Maryland, concern with this issue has led some treatment plants to make it difficult for marinas to dispose of their waste by charging high fees or demanding pretreatment. However, the true nature and extent of the effects of these chemicals is still unclear.

A recently published study concludes that treatment plants, even small package plants, are able to process and quickly recover from relatively large ("shock") loadings of these chemicals. Preliminary reviews of this research were mixed, but definitive conclusions cannot be made until the study is subject to the scrutiny of the scientific and technical community.

Selected Case Studies

Eight marinas -- seven in the Buzzards Bay and Cape Cod area and one in Chesapeake Bay -- and the state of Maryland were contacted for boat pump-out facility cost figures. In order to provide a context for the cost figures cited in this chapter, this section provides more complete information from six of those marinas.

Onset Bay Marina, Onset, Massachusetts

Size: 115 slips.

Pump Type and Cost: Diaphragm (Marlin), \$2,200.

Sewer, Septic System or Holding Tank and Cost: 1,500 gal. concrete tank, \$3,000.

Operating Cost: NA

Charge to Boaters: Residents \$5, Non Residents \$15.

Number of Pump-outs: Less than 20 per season.

Comments: According to the marina representative, the fee to boaters will not cover installation or operating costs. The representative felt that he would be able to cover costs if he had been able to connect to a sewer system instead of installing a tank. System is four years old but has yet to need emptying because of low use.

Chapter 2: Preliminary Cost Estimates

Edward's Boatyard, Falmouth, Massachusetts

Size: 48 slips

Pump Type and Cost: \$250 (self built portable system)

Sewer, Septic System or Holding Tank and Cost: Septic (500 gal. tank and leaching field.)

Operating Cost: \$6 per pump-out (2 attendants for 1/2 hour at \$6/hour).

Charge to Boaters: \$15

Number of Pump-outs: 12 to 24 per summer (plus end of season pump outs)

Bevan's Marina, Buzzards Bay, Massachusetts

Size: 44 slips.

Pump Type and Cost: Macerator, \$400; hoses, etc., \$400

Sewer, Septic System or Holding Tank and Cost: 500 gal. holding tank, \$500

Operating Cost: NA

Charge to Boaters: \$10

Number of Pump-outs: Less than 20 per season.

Comments: Because a bridge prevents many boats from entering the marina and since most smaller boats do not have holding tanks, the system is very small and inexpensive.

Middle Branch Moorings, Baltimore, Maryland

Size: 360 slips and moorings (current at 60 percent of capacity).

Pump Type and Cost: Wobbler (Johnny Trap), \$2,500.

Sewer, Septic System or Holding Tank and Cost: Sewer connection, \$1,700 (for 400 feet of pipe).

Operating Cost: Minimal (\$0.08/hour for electricity and \$30/year to winterize and maintain).

Charge to Boaters: \$1

Number of Pump-outs: 80 per month (this estimate might be high because it is based on end of season volume).

Comments: This is a self-service coin-operated pump-out facility. It appears to be very successful from several standpoints. Because it is self-serve, operating costs are negligible and are covered by the \$1 fee. Judging from the high volume of use, boaters are very willing to use this facility.

Edgartown Marine Pump-Out Boat, Edgartown, Massachusetts

Edgartown Marine maintains a 16-foot boat fitted with a pump and a sealed 55 gallon drum that services all boats in Edgartown Harbor, resident or transient, for no charge. Boaters can request a pump-out by telephone or radio. The boat services 8 to 10 boats per day during the height of the season. The marina plans to add another pump-out boat this year.

The primary operating expense is salaries for the two-person crew (one full-time employee and one summer employee), or about \$150 per day. Maintenance costs run \$500 to \$600 per year for pump repair.

Maryland Pump-Out Boat

The state of Maryland provides free pump-outs from a vessel retrofitted with pump-out equipment that moors in heavy traffic areas in the Chesapeake Bay from Thursday through Sunday during the summer. The boat is a 48-foot icebreaker which was already owned by the state. It cost only \$5,000 to retrofit with a pump and holding tanks. Operating expenses, which consist primarily of the salaries of the two-person crew, are considerable. In spite of the high operating costs, the state feels that the pump-out boat has the added value of increasing public awareness and plans to retrofit another vessel this year.

Oil Spill Containment Equipment

Buzzards Bay is a major transit route for small tankers and barges carrying heating and industrial oils. In the event of an oil spill, private firms contracted by the state Department of Environmental Protection (DEP) and the U.S. Coast Guard are on call to respond. However, because the principal factor in minimizing environmental damage from oil spills is the speed of the response, the CCMP recommends that communities acquire sufficient equipment necessary for controlling or containing an oil spill until DEP or Coast Guard response teams can arrive.

This section provides cost estimates for obtaining the amount of equipment and training necessary to contain oil spills of the type and size expected in Buzzards Bay.

Equipment Costs

The minimum level of equipment recommended by the Coast Guard is enough six to eight inch containment boom to surround the largest vessel expected -- 300 to 400 feet of boom on average, 200 feet at a minimum -- enough small anchors and lines to secure the boom, and about 200 sorbent pads. On average, it will cost about \$4,000 to acquire this equipment².

Town of Dennis

In order to protect environmentally sensitive areas -- such as marshes and aquifers -- in the event of an oil spill, the town of Dennis, on Cape Cod, recently purchased the equipment it felt was necessary to respond quickly and contain a spill. With the advice of the Coast Guard Marine Safety Office, Dennis has outfitted a trailer with hazardous spill response equipment for both land and water spills. The total cost of the equipment was about \$12,900. The major costs for spill containment equipment were:

trailer	\$2,500
3" trash pump and hose	\$1,100
300" of boom, connectors and tow plate	\$3,675
sorbent pads	\$200
speedy dry, pallets	\$240
full helmets for hazardous dives	\$1,600

² Information on equipment minimum requirements is based on discussions with Bob Hazelton, Coast Guard Marine Safety Office.

Chapter 2: Preliminary Cost Estimates

The town already owned the two boats that it will use for spill containment operations.

The type and quantity of the equipment purchased was determined by three factors. First, the Coast Guard recommendations. Second, cost considerations. Third, the booms were selected to be compatible with those of neighboring communities.

Police, fire, and other town personnel have undergone training for spill response using this equipment. Training was provided by the Coast Guard at no cost. Joint training sessions were also held with the police and fire departments of neighboring communities.

Training Costs

The Coast Guard Marine Safety Office is very involved in providing spill containment training to communities. The Coast Guard training focuses on safety considerations when dealing with petroleum products, and the deployment and handling of booms and other containment equipment. It consists of classroom instruction and spill drills on the water and is provided free to government entities.

This training is designed to provide the necessary rudimentary knowledge and experience to those who are most likely to be first on the scene of an oil spill. Because the actual cleanup will be left to professional response teams, the Marine Safety Office did not feel that it was necessary that this training meet OSHA requirements for hazardous materials handling. This policy is currently being reviewed within the Coast Guard.

If OSHA certified training were desired, it can be provided by most spill response contractors. The price for that training varies according to three factors: the number of people being trained; the level of training (OSHA has five levels); and whether the training is part of a larger package of services. The courses can cost between \$150 to \$450 per person per day. The length of the training depends on the level and runs from 8 to 24 hours. Eight hours of training is required for "first responders" and costs about \$150 per person.

Other Considerations

The following two considerations were raised during interviews with federal, state, and local officials. The first, coordination among communities, was emphasized by officials from the Town of Dennis and the Coast Guard. The second, retaining professional spill response contractors, was suggested by a DEP representative.

Coordination Among Communities

Coordination among communities is important for two reasons. First, in the event of a spill that requires two or more communities to respond, such as a large spill or a spill on the boarder of two communities, compatibility of the equipment and coordination among the teams are essential. Second, when one community's team is responding to a spill, a team from a second community should be available to respond to a second spill.

Professional Contractors

An alternative to having each community maintain its own equipment would be for several communities to pool their funds in order to retain a contractor to respond to spills. The advantages of this alternative are that a contractor would be better trained and able to respond to more types and sizes of spills. Minimum response times could be stipulated in the contract and costs could be recovered from the party responsible to the spill. This may be redundant, however, since the DEP and Coast Guard already rely on the same contractors who would likely be available to communities in Buzzards Bay.

Toxic Audit Teams

The Buzzards Bay area is considering the use of toxic audit teams to identify potential sources of contamination in commercial and industrial establishments. The goal of the program is to determine potential environmental problems at the source rather than wait for them to manifest themselves as more costly contamination problems downstream. To determine the costs involved in establishing a toxic audit team, this chapter examines: (1) the appropriate composition of the team; (2) the time required for a typical audit; (3) the associated sampling and lab costs; and (4) other activities.

In 1987, the Rhode Island Department of Environmental Management (DEM) established the Hazardous Waste Reduction section within the Office of Environmental Coordination (a non-regulatory section of DEM). The following year, 1988, the Hazardous Waste Reduction Project was set up to provide technical assistance to Rhode Island government operations and businesses for reducing disposal of toxic and hazardous materials. The program's budget is \$150,000 to be allocated over a two-year period. Approximately half of the total budget is used for conducting the actual assessments. The remaining portion is available for education and outreach, seminars, travel, and materials. Over the course of project, the Rhode Island DEM expects to conduct approximately 31 assessments (including five cooperative audits with large generators).

In addition, the Massachusetts Department of Environmental Management operated a pilot toxic audit program in the Attleboro/Taunton area for approximately 3.5 years, until funding was withdrawn in June, 1989. This program was a multimedia on-site technical assistance project targeting the jewelry industry in the area. The focus of the program was on source reduction and public education but also considered a pre-treatment program as an additional component. At present, the DEM is nearly complete with its evaluation of the program's effectiveness. Through discussions with several members of this team and the supervisor of the Rhode Island project, this chapter has compiled a profile for a potential toxic audit team that could be established for the Buzzards Bay area. The sections below outline a list of activities and associated costs for a typical toxic audit team.

Audit Team Activities

The total time required per audit varies according to the characteristics of the facility. However, the estimated time necessary for a typical audit of a medium sized facility (75

Chapter 2: Preliminary Cost Estimates

to 100 employees) is approximately 50 to 65 hours. For this audit, the DEM would establish a toxic audit team that would conduct the following activities:

Pre-assessment activities (20 to 25 hours):

- Train students to conduct on-site evaluation of facility -- outline process to identify chemicals used, amount of effluent discharged, and source reduction recommendations. In addition, to student interns, DEM would use the services of retired engineers to conduct facility audits. DEM would train them in the procedures for conducting facilities audits. (These retired engineers have substantial industry experience and are usually willing to work part-time at reasonable rates.)
- Distribute questionnaire to companies to be completed and returned to DEM (at least 3 weeks prior to the audit). About 1 to 2 hours preparatory work would be required to gather necessary process data and vendor information, etc. (two people, 5 hours).
- Conduct desk-top review where audit team reviews data prior to on-site visit.
- Consultants volunteer full day at facility, compile recommendations to company. (Volunteer consultants would play a minor role in the program. In the past, DEM had a difficult time finding consultants that have experience in industrial source reduction.)
- As part of the pre-assessment activities, DEM could also draw up some form of an agreement, (e.g., "memo of understanding" used in Attleboro) to increase industry involvement in the program and target limited resources at the most flagrant polluters. Under an agreement with the federal, state and local regulatory agencies and DEM, the regulatory agencies would refer business to use DEM's free, multi-media, nonregulatory service.

On-site activities (20 to 25 hours):

On-site activities would utilize the combined skills of project staff, interns, and retired engineers, and to a lesser extent, volunteer consultants.

- Opening conference in which management explains its own priorities and discusses ideas. (1 hour)
- Audit in which two team members tour the plant focusing on major (multi-media) problems. (5 to 10 hours, total staff time)
- Closing conference to discuss conclusions and next steps. (1 hour)

Follow-up activities (10 hours):

- Assemble team to brainstorm where the team lists important areas to focus on and assigns responsibilities to its members.
- Draft report, review, and deliver to highest level of management. The report includes executive summary, conclusions and detail of processes with engineering recommendations, cost-estimates, and comments regarding follow-up (return visit company) and tracking (quarterly report updating team on waste reduction efforts).

Total Costs

The annualized costs associated with establishing a toxic audit team in the Buzzards Bay area would be in the area of \$150,000. This estimate reflects some degree of cost sharing between DEM and industry, often for consultant services for part of on-site visits and guest speakers at seminars. However, in Rhode Island, cost sharing was extended to the entire audit. Where the company was sufficiently large (greater than 100 employees), the Rhode Island team partnered with the company to take advantage of the facility's technical expertise and its ability to reduce cost through economies.

Listed below are the activities associated with a typical audit, the associated annualized labor costs, the sampling and lab expenses for each audit, and other costs incurred in setting up an audit team.

Composition of Toxic Audit Teams (labor subtotal: \$150,000 with 2 engineers)

The ideal background of the engineers (and interns) should include industrial and chemical engineering. They should have knowledge in environmental policy and related issues as well as previous experience in industry. Other skills which are also important include political savvy, organizational skills and public speaking.

In the cases where the audit team is responsible for conducting the entire assessment, the audit team is comprised of the following members:

- Two industrial engineers (with ideal background in chemical and environmental engineering @ \$50,000 (including 25% fringe benefits).
- Two to three Interns @ half-time for a total of \$30,000.
- (In the Greater Attleboro project, DEM used Boston University. Other local engineering schools include Northeastern and Tufts University.)
- One retired engineer, half-time, @ 20 per hour for a total of \$20,000.
- Voluntary expertise from local university³.

In the other cases where the audit team partners with company, the team requires less agency staff (one FTE) together with two additional members. In the case of the Rhode Island project these two team members include a contractor with experience in manufacturing and the Chairman of the Chemical Engineering Department, University of Rhode Island.

Lab Costs and Other Expenses -- subtotal cost, \$10,000 (reflects only partial costs to DEM; remainder borne by company).

- Testing. Sampling and lab expenses for testing. These expenses would be shared by DEM and the company where DEM would contribute about one-third or about \$200-\$300 per company. (Note: Sampling information on the type of pollution problems may already be available or acquired at relatively little expense since, typically, in any given area, two or three

3 The Rhode Island DEM has an on-going contact with the University of Rhode Island. As a result, the toxics audit team includes the Chairman of the Chemical Engineering Department and a few students with waste minimization training.

Chapter 2: Preliminary Cost Estimates

industries dominate and have similar pollution problems. Consequently, the primary task is to identify the source reduction solutions not the problems).

- Travel (about \$4,000). Travel expenses incurred on site visits and conferences.
- Training (\$5,000 to \$6,000). Costs associated with training include (1) printing expenses for fact sheets, newsletters, and informational brochures; (2) conferences/seminars for educating commercial and industrial generators on source reduction opportunities; and (3) workshops (speakers) as a way to establish a national network.

Other Activities -- subtotal cost, \$5,000 - \$7,000

As part of the toxic audit program, the DEP should promote a working relationship with the local Chamber of Commerce or Regional Planning Agency to make efforts more regional. This can be accomplished through marketing, seminars, and workshops. Therefore, in the event of funding withdrawal, a system would still be in place at the Chamber of Commerce. Through workshops, DEP should establish a network of environmental managers (with similar waste streams but who are not competitors) who could benefit from sharing experiences on source reduction.

Alternative To In-house Provision: Contract With Private Firm

The alternative to establishing a toxic audit team in-house is to contract with a private firm. Through contracting with a firm that has experience with audit teams, the locality could reduce its service costs through taking advantage of established expertise in the private sector and potentially reduce its overall costs due to production economies. Currently, many private firms specializing in environmental management offer services in pre-purchase environmental audits as well as more regular environmental audits. The Buzzards Bay community may be able to lower its costs by using the private contractor's expertise for activities related to toxic audits.

Chapter 3

Financial Planning Guide

Introduction

The Buzzards Bay Project was established in 1985 as part of the National Estuary Program under the U.S. Environmental Protection Agency (EPA). The Buzzards Bay Comprehensive Conservation and Management Plan (CCMP) outlines a series of management strategies developed by the Project to help preserve and protect Buzzards Bay.

The recommended actions cover a wide variety of activities and address both point and non-point sources of pollution. In particular, the CCMP focuses on three problems: the health risks from pathogens associated with the improper disposal of human wastes, and resulting closure of shellfish beds; nutrient loadings into the Bay and the consequent degradation to water quality; and the contamination of marine life from toxic substances released into the Bay.

Many of the projects envisioned in the plan will be initiated at the local level. Local governments, however, are finding it increasingly difficult to pay for these and other programs. The financing issues facing local governments need to be addressed and creative solutions sought. This guidebook is designed to help local governments meet this financing challenge.

Overview Of Guidebook

The guidebook is designed to assist local governments in identifying revenue options available to them to help finance actions recommended in the Buzzards Bay CCMP. Once particular actions have been identified and the costs of implementation estimated, the guidebook can help towns and cities select the revenue options most appropriate to their situation. It will also provide them with an understanding of the procedures associated with using particular revenue sources.

The guidebook is divided into three major sections that include:

- A review of revenue options available to towns and cities in the commonwealth, and the conditions under which they are feasible and suitable,
- An introduction to alternative mechanisms that can be used to help access various revenue options, and
- An application of the options to specific actions. This includes a summary of the relative merits of each revenue option and financial mechanism augmented by suggestions for their application to the actions outlined in the CCMP and a series of case studies that serve as examples of how particular actions might be funded.

The three particular actions focused upon throughout the guidebook are:

Chapter 3: Financial Planning Guidebook

- On-site septic system upgrade programs,
- Stormwater management programs, and
- Boat pumpout programs.

While this guidebook should help local governments in their selection of financing options, it is not meant as a directive on local policy. Each local government must take into consideration its particular circumstances in determining which combination of revenue options and mechanisms are most appropriate for it. This guidebook is designed to help answer many of the questions local leaders will have regarding funding sources, to offer creative approaches to the challenges local governments face. II.

Using the Guide

Town and city managers can make best use of this guidebook by analyzing their financing needs in three steps. These include:

- Fully understanding their town's role and responsibility in implementing the program;
- Identifying the specific program to be funded, and the costs associated with implementing that program; and
- Assessing the nature of the program's cash-flow needs.

Once these factors are understood, town and city managers can consider each of the revenue options in turn and rank them to help decide which option best suits their town's particular situation. In conjunction, city and town leaders need to consider the various financial mechanisms as their use may affect the desirability of particular revenue options. The effect of the financial mechanisms should therefore be applied to this ranking of revenue options. For example, the General Court is more likely to grant new taxing authority to a special district that will use the tax for a special purpose than to a town on its own for a less well specified purpose.

The criteria listed in the two summary tables in Chapter IV can be used to "short-list" certain revenue options and mechanisms. Once this has been done, a closer examination of feasibility and suitability, as discussed in Chapters I-III, can help town leaders make the best choice from a short-list of revenue options and mechanisms for their particular situation.

Introduction To Revenue Options

Six revenue alternatives are considered as potential funding options for actions taken in response to the Buzzards Bay CCMP. These include:

- General revenues;
- Taxes;
- Fees and charges;
- Fines and penalties;
- Bonds; and

- Grants and loans.

The Buzzards Bay CCMP recommends a wide variety of actions be undertaken to improve the quality of the Bay. These activities differ from one another as do the towns and cities asked to implement them. Thus, each town and city affected will need to select the revenue option(s) most appropriate to its situation. In order to facilitate this selection, the discussion of each option is designed to answer two overriding concerns local jurisdictions will have. These include a determination of:

- Whether the option is feasible; and
- Whether the option is suitable.

The discussion of feasibility focuses mainly on the legal issues that may arise when towns and cities attempt to use a particular revenue option. The constraints on using an option are outlined, along with suggestions for overcoming those constraints. When considering whether an option is appropriate, given that it is legally feasible, several factors must be kept in mind. These include a consideration of:

- The option's ability to raise revenue, and the timing of that revenue flow;
- Potential political obstacles, or advantages, to using the option;
- The extent to which the option can address equity issues and prevent undue burden being placed on one particular group; and
- Administrative requirements that will arise.

The answers to these questions will vary from one jurisdiction to another, depending on the particular circumstances in each (e.g., population size, industrial/commercial base, income or wealth, number of units involved (boat, septic tanks) or level of activity, and political situation.) Therefore, the suitability of any option presented in this guidebook cannot be determined in a vacuum. Towns must first assess their particular situation, needs and constraints before an option or combination of options can be selected. The evidence suggests that in many cases more than one option may be feasible and equally appropriate to Buzzards Bay towns and cities. The particular options ultimately selected are thus a function of the particular situation of each local government unit.

General Revenues

General revenues refer to monies residing in the general operating funds of local governments. Local general revenues do not include any monies restricted by law to a specific use.

Scope -- Feasibility

Under Massachusetts law, property tax revenues (which make up the bulk of general revenues) may be used to finance any activity that helps to maintain clean estuaries or provides clean water. The activities suggested under the CCMP fall into these categories and may therefore be funded from general revenues. At the local level, general revenues pay for most public services including, for example, community centers, fire and police services, libraries, and so forth. Because, however, financial

Chapter 3: Financial Planning Guidebook

needs usually outweigh funds available, the annual process of appropriating general revenues to specific purposes results in competition for available funds.

One option towns may exercise that may "free-up" monies from the general fund for environmental purposes, is to put other services currently funded with general revenues onto a fee-for-service basis. Such charges could include building permit fees, beach access fees, mooring fees, snow removal fees, garbage collection fees, and so forth¹.

In addition to yearly appropriations, local governments may allocate up to ten percent of revenues to a stabilization fund, where the money in the fund will carry over from year to year². Such funds provide assurance that capital projects will be completed if their original source of funding is cut off, and it allows local governments to engage in capital planning.

Constraints on Use

The major constraint to raising property tax revenues is Proposition 2 1/2³. Under this law, tax rates must be set such that revenues in any year do not exceed 2.5 percent of the market value of the town or city's real estate. In addition, it limits growth of these revenues to 2.5 percent per year plus an amount allowing for new growth, defined as previously undeveloped land or land that has undergone significant improvement⁴. The limit on growth from existing sources means that property tax revenues cannot grow as fast as real estate values if the latter's growth rate exceeds 2.5 percent per year. It also means that towns with low property tax rates cannot increase revenues rapidly. Thus, when the cost of government services increases by more than 2.5 percent per year, the demands on the general revenue will grow much faster than the supply of funds to it.

Overcoming Constraints

One caveat to Proposition 2 1/2 has historically been excess levy capacity, which arose when rates were not raised to their limit each year. Under excess levy capacity a town

- 1 It should be noted that while non-environmental fees may free general revenues for environmental uses, such projects will have to compete with the other fiscal needs of local governments. For information on fees used throughout the Commonwealth, see Johnson et.al. (1990). For further discussion, see Chapter 2, section on Fees and Charges.
- 2 Massachusetts General law Chapter 40 Section 5 lists over seventy purposes for which a local government may appropriate money. Clauses 53 (relating to estuaries) and 54 (the provision of clean water) apply to Buzzards Bay projects. Local governments draw their resources primarily from the property tax and local aid provided by the state. Other sources of general revenue include excise tax and local aid provided by the state. Other sources of general revenue include excise taxes on hotel occupancy and jet fuel, various fees and assessments, the motor vehicle excise and free cash carried over from previous budget surpluses.
- 3 Proposition 2-1/2 is a state constitutional amendment which limits the ability of local governments to raise property taxes.
- 4 Currently no town or city in the state has rates equal to this cap. Report of the Governor's Task Force on Local Finance, p. 93. Significant improvement is defined as increasing the value of residential property by 50% or more or for other properties by at least \$100,000. New growth typically adds about 3% to the value of revenues each year.

can raise its levy to what would have been the maximum amount in that year had the town been raising its levy by 2.5 percent every year. Exercising this option is not subject to referendum. Excess levy capacity constitutes a reserve that gives towns flexibility within the confines of Proposition 2 1/2. This reserve, however, has been depleted in recent years. From 1987 to 1989, statewide excess levy capacity fell from \$102 million to \$75 million, or less than one percent of total local budgets. Since local aid was cut in 1990 and may be cut in 1991, it must be assumed that the total excess levy capacity has shrunk even more. This indicates that excess levy capacity is not a viable revenue option for the majority of towns.

Three realistic methods for overcoming Proposition 2 1/2 are:

- tax overrides;
- debt exclusions; and
- capital outlay exclusions.

All three methods require local voter approval. *Tax overrides* represent a permanent increase in the tax. *Debt exclusions* are temporary increases in the tax levy to cover interest payments on debt issued for specific projects. The exclusion lasts only as long as the term of the debt. *Capital outlay exclusions* are one-time increases in the levy for expenditures to cover specific capital projects.

Indirect use of fees to fund environmental programs (achieved by moving other services currently funded from general revenues onto a fee-for-service basis) may prove easier than trying to achieve a successful override of Proposition 2 1/2. This is because fees are based on the beneficiary pays principle⁵. As long as users are a readily identifiable group, the fee-for-service principle can be a successful method of financing that service (see User Fees).

Selection -- Suitability

General revenues can legally be used by Massachusetts cities and towns to finance activities recommended under the CCMP. This section looks at factors that may help determine whether general revenues are also the most appropriate source to finance these activities.

Revenue

The revenue potential is limited by two factors. In any one year monies available for environmental projects are subject to the budget appropriations process. While authorization may be secured for future years, annual revenue growth (and hence potential authorization amounts) is constrained by Proposition 2 1/2 unless a local vote to override it can be secured. The stabilization fund can smooth out disbursements from general revenues to some extent. If funds are made available by moving other services onto a fee-for-service basis, the revenue "freed up" may be substantial, but it is also subject to annual appropriations.

5 Emerson College v. City of Boston.

Political Issues

It may prove difficult to secure funding from general revenues for more than one year at a time. Competing needs outweigh money available already, and a case for targeting a portion of funds to environmental projects would have to be made each year. This suggests general revenues are better suited to one-time needs rather than projects which would require guaranteed annual funding.

Impacts/Equity

Using general revenues is not equitable from an environmental standpoint, as the major source of funding is based on property value. Equity considerations for activities that protect or restore the environment, however, typically require that either the polluter pays, or that the beneficiaries of the environmental programs pay for those programs. Using general revenues satisfies neither criteria.

Administrative Burden

Using general revenues would impose a minimal administrative burden on towns and cities.

Taxes

Taxes are a legislated charge generally levied against income, sales, and property. There are two methods by which a Massachusetts locality can impose new taxes:

- It can be granted authority by the state to levy a new tax on a previously untaxed good or service; or
- It can gain permission to attach a local rider to an existing state tax.

Scope -- Feasibility

New taxing authority is an ideal revenue option because once the authority to levy a tax is granted, its proceeds can be used for almost anything. The major hitch, however, is getting new tax authority. One alternative is to change the scope or structure of an existing tax such as the boat excise tax. This may prove to be easier to secure from the General Court.

Authority to Levy a New Tax

The first type of new taxing authority is the authority to levy a *new* tax on a good or service previously untaxed. Examples of current local taxes include the property tax, the boat excise, and the motor vehicle excise.

Authority to Attach a Local Rider

The other type of new taxing authority is the authority to place an additional levy on goods and services subject to *existing* state taxes. For example, cities and towns have the option of placing a four percent hotel and motel room occupancy tax on top of the existing five percent state tax. The proceeds from this local rider are sent to the state which reimburses localities at least once every six months. The marine fuel tax provides one target for a rider. A second target is the Deeds Excise Tax. This tax, a real estate transfer tax, is a charge equal to a percentage of the sale price of the real estate in the

taxing jurisdiction. Massachusetts presently has a statewide deeds excise tax of slightly less than one half of one percent.

Constraints on Use

Securing approval from the General Court is the primary constraint to securing either type of new taxing authority. The state must explicitly grant such authority to local governments. There are two ways the General Court can grant new taxing authority, as shown below:

Methods for Granting New Taxing Authority		
Local Governments are Granted Authority to:	The General Court Can:	
	Grant Authority to Petitioning Town	Grant Local Option Statewide in Response to Town Petition
Levy a New Tax	Town Collects New Tax	Local Vote Required to Exercise Option -- If "Yes" Town Collects New Tax
Attach a Local Rider to an Existing Tax	Town is Reimbursed for Rider Share from State Collection Agency	Local Vote Required to Exercise Option -- If "Yes" Reimbursed Rider Share by State Collection Agency

If a town wants to impose a new excise tax or rider, it can petition the General Court for special taxing authority. The use of tax proceeds does not have to be specified in the petition, but a clearly defined end use may help a town successfully gain new taxing authority. Two municipalities, Nantucket and Martha's Vineyard, have local riders to the real estate transfer tax, the revenues of which are dedicated to land purchase funds. In the last three years, the Court has turned down two similar petitions from towns. Alternatively, when a town petitions for such authority, the state may decide to grant all towns the option of exercising the tax or rider being requested. In this case, towns can adopt the tax or rider by passing a local referendum.

Overcoming the Constraints

Overcoming the constraint of legislative approval directly may not be possible. Legislative resistance may be lower, however, if it is petitioned for a change to an existing tax rather than petitioned for a new tax or new rider. The boat excise tax lends itself to this strategy.

The boat excise tax is a statewide local tax. Currently, half the proceeds from the boat excise must be dedicated to a Waterways Improvement Fund as dictated by state law. Towns can increase revenues from this existing tax by:

- stepping up enforcement by linking payment to receipt of mooring stickers or some other harbor service,
- petitioning for an increase in rates under the present excise schedule, or
- petitioning that the structure of the present excise schedule be changed to a percentage of the market value.

Stepping Up Enforcement

Most towns could increase their revenue by improving their collection methods. Further, improvement in collection is critical if any change to the rate or structure is to be meaningful. Many towns have found the tax difficult to collect because they depend on owners reporting their boats to the assessor's office. As a result, towns do not approach their potential revenue. It is possible to deal with this problem by requiring proof from the owners that they have paid the excise before they receive their mooring slips. A town could also devise a list of all boats that are moored and find out which have not paid the excise, although this approach is only feasible for smaller harbors. Dartmouth uses this strategy, for example, as does Marion. Below are examples of the methods employed by these two towns.

Case I: Collection Improvements In Dartmouth Harbor

According to Massachusetts General Laws Chapter 60B all watercraft, including documented boats and ships, must pay the boat excise annually. The town of Dartmouth has greatly improved its collection of the boat excise tax by making a few simple adjustments to its collection procedure. Formerly, the town tax collector relied on the registration list sent from Boston. (Boat owners register with the state, in Boston.) This list was incomplete because some harbor users were unregistered and some owners documented their boats with the Coast Guard exempting them from having to register in Boston, although they must pay the excise. In addition, Dartmouth was unable to collect the tax from some registered users because they either dry-docked their boats or moved from harbor to harbor making them difficult to track. As a result the tax was collected from only about 50 percent of the owners.

Under the new collection scheme, the tax collector keeps a record of which boat owners have paid the tax. He does this by improving upon his original list. This is done by (i) visually spotting boats in the harbor that are not listed, (ii) requesting that private marinas provide lists of boat owners, and (iii) sharing information with neighboring towns. He then informs the harbor master which boat owners are delinquent, and the harbor master then encourages the owner to pay by reminding him that the town can impound the boat, although such action is rare.

Although these measures have improved Dartmouth's collection rate to between 75 and 80 percent, Dartmouth still does not reach its potential revenue (as some owners keep their boats on trailers rather than mooring them). In 1989, the town collected \$56,500. If the town collected 100 percent of its potential revenue, Dartmouth could receive between \$70,000 and \$75,000.

Case II: Collecting The Boat Excise In Marion

Marion has also shown that it is possible to improve the collection of the boat excise. The harbor master in Marion simply denies a mooring to anyone who cannot prove that he has paid the boat excise. Marion's approach is attractive because the change was implemented administratively by the tax collectors office. No voter approval was required.

Alternatively, towns could petition the state to change, by statute, the location of boat registration. Towns could propose that they be given the power to register boats locally on behalf of the state. Presently, all boats must be registered with the state in Boston every three years. Requiring registration with a town at the time of sale and yearly thereafter would give towns a comprehensive list from which they can collect the excise. A final provision that towns could request is that the state impose penalties for failure to pay the excise. Presently there are no state mandated penalties for non-payment. Towns may institute their own penalties, but a boat owner can avoid especially stiff penalties by shifting to another harbor where the excise is not collected effectively. Thus it is critical for towns to work together to enforce the boat excise so boat owners cannot avoid the tax by changing harbors. Examples of such penalties could include fines, revocation of registration, and impoundment of boats.

Petitioning for an Increase in Tax Rates

The current tax is based on the boat's "value" which is calculated solely as a function of boat age and length. Further, boat "values" are capped at \$50,000 making the maximum tax \$500 per year. Under the first strategy for altering the excise, towns can petition the state to increase the rates under the present excise schedule⁶. For instance, doubling the excise schedule would net Dartmouth almost \$113,000 (Dartmouth Annual Town Report, 1989).

Changing the Boat Excise to a Percentage of Value

Towns can petition the general court to change the structure of the present excise schedule to one based on boat value. This would entail finding a sponsor for the legislation and then building a strong case for the change. The argument could include estimates of possible revenues from the new excise and specific examples of ways to spend that revenue that would markedly improve Massachusetts' water quality.

One structure would set the tax as some fixed percentage of the boat's value. This is exactly how the motor vehicle excise is set. In that case, the tax equals 2.5 percent of the value of the car. Annual car values are determined by their purchase price and are depreciated annually for five years, dropping to 10% of the purchase price in the fifth

⁶ Petitioning the General Court to change a state tax merely requires that a sponsor for the legislation be found within the General Court. Towns may lobby their respective representatives.

Chapter 3: Financial Planning Guidebook

year. The value remains at 10% of the purchase price thereafter. The boat excise could easily work using a similar depreciation schedule. Alternatively, boat values could be assessed periodically like real estate⁷.

Case III below demonstrates the revenues that could be collected by adjusting the structure of this tax. In this example, a one percent excise would yield \$195,000, an increase of 345 percent over the present excise. A 2.5 percent excise would generate \$487,000, an increase of over 860 percent over current revenues.

Case III: Boat Excise Revenue Estimates For Dartmouth

Using Dartmouth's list of all boats moored in its harbor, an estimate was made of the market value of those boats to determine the possible revenue from a new boat excise based on market value. Dartmouth was selected because its success in collecting the present excise (see Case I) indicates that the list of boats is reasonably complete. Given the present method of assessing the excise, Dartmouth's list contained the make, age, and length of each boat. Using the *BUC Used Boat Price Guide*, Dartmouth's current information can be adjusted to reveal the actual "blue-book" value of its boats.

To get a rough idea of potential revenues:

1. A sample of 300 boats was selected and categorized according to 48 categories of age (four categories) and length (nine categories). Categories were chosen based on the present excise, with an additional age category included.
2. The categories were used to determine the approximate distribution of boats in the harbor for the purpose of obtaining an aggregate value estimate. The accuracy of the distribution was limited somewhat by the presence of custom boats on the list as well as vagaries in the model names and years listed. However, well over two-thirds of the boats were successfully categorized.
3. The average price per category was determined using the average market price of a random selection of the boats within a category. Prices were obtained from the *BUC Used Boat Price Guide*.
4. The average price for each category was multiplied by the number of boats estimated to be in the category and aggregated to determine the total market value of the boats in the harbor.
5. Potential revenues from the excise were estimated by applying different tax rates to the total market value.

<u>Tax Rate</u>	<u>Potential Revenue</u>
1%	\$195,000
2.5%	\$487,500

At the 2.5% tax rate, the resulting tax ranged from \$140 to \$4,225 per boat, and averaged \$450 per boat.

⁷ Publications such as the *BUC Used Boat Price Guide* Volumes I and II, BUC Research International, Winter/Spring 1990 can be used to assess the value of boats.

Selection -- Suitability

The restrictions to imposing taxes overwhelm all other criteria in determining whether taxes are the appropriate mechanism for funding activities suggested by the CCMP. If, however, taxing authority is granted, taxes provide an excellent revenue option. This section discusses factors that may help determine whether taxes are an option worth pursuing and when their use is appropriate for financing CCMP actions.

Revenue

Potential revenue from taxes depends entirely on the tax base. There are three taxes that may be relevant to the CCMP actions: property taxes, the boat excise, and the deeds excise (the real estate transfer tax). The property tax has already been discussed. The boat excise is collected according to a schedule which has not changed since 1978. Without change, this revenue will not provide adequate funding for new activities. However, if collection rates improve, or if towns can successfully petition the General Court to change the structure of the boat excise to a percentage-of-value basis, a real revenue potential exists.

The deeds excise is not presently a revenue option because it is collected by the state. However, the General Court has twice permitted riders to be attached to fund regional land banks. This happened in Nantucket and Martha's Vineyard. If Buzzards Bay towns could convince the legislature to allow a local rider to fund CCMP activities, the revenue potential is very large, although revenues would fluctuate with the real estate market.

Political Issues

Obtaining taxing authority from the state is a two-step process. Each step presents political obstacles. The first problem is convincing the legislature to give local governments permission to implement the tax or rider. Thus while legally the uses to which new taxes or riders can be put is relatively unconstrained, in fact, the closer the tax is tied with specific purposes the more likely it is to be accepted by the legislature. Towns may need to voluntarily limit the uses to which they intend to put tax or rider revenues, in order to get the authority to impose such a tax or rider. The second problem is convincing local residents to approve the tax. Again, if a tax is clearly tied to specific programs with specific benefits and if local officials take the time to explain fully the reason behind the tax, it may become acceptable.

Impacts/Equity

Taxes have a wide scope for achieving equity. The degree to which this occurs depends on the tax's structure. For example, to the extent that boaters pollute Buzzards Bay and benefit from a clean bay, the boat excise can be perceived as equitable.

Administrative Burden

The effort required to get new taxing authority can be great. Additionally, once a tax has been approved it must be collected and a paper trail created. In the case of the boat

excise, collecting the tax has proven quite difficult, although towns such as Dartmouth and Marion have improved their collection methods.

Fees and Charges

A fee is a charge for a particular activity or service. It establishes a direct link between the demand for the service and the cost of providing the service. The legal difference between a fee and a tax is that revenues from a fee must be no greater than the cost of providing the service. Fees, therefore, require an administrative structure that can **account for the costs** of providing a service. These records must be well documented for a fee to withstand a legal challenge. Two general criteria for successful initiation of a fee are readily identifiable beneficiaries of the service and a clearly defined service area.

Scope -- Feasibility

The rules for setting fees in Massachusetts were set forth by the decision in *Emerson College v. City of Boston*⁸. The court ruled that a fee is different from a tax if three conditions are met. First, the fee must be in exchange for the provision of a particular service that benefits the party paying the fee in a way not benefitting the entire community. Second, the use of the service and the payment of the fee must be by choice. Third, the fee cannot be a source of revenue and can only be charged to compensate for the service provided. Within these criteria, cities and towns have extensive authority to set and raise fees as long as the charge can be justified by the cost of the good or service. If a local government decides to raise an existing fee as a revenue option, the town counsel should consult the General Laws to determine whether there is a statewide limit on the fee. While this will not generally be the case, limits have been placed on such things as fees for services that the town clerk or sheriff would perform. Otherwise, establishing a fee can be undertaken directly by the local government.

Although the examples that follow focus on the direct use of fees and charges to finance environmental protection projects, cities and towns can also charge fees for non-environmental services currently being funded by general revenues and thus "free up" monies from the general fund for environmental purposes. These monies could then help support those environmental projects that are not eligible for funding through fees⁹. To get a better idea of how other cities and towns in the Commonwealth have pursued this strategy, towns may want to consult the *Compendium of User Fees*, which is published annually by the Massachusetts Municipal Association (Johnson et. al. 1990). Services which could be put on a fee-for-service basis include garbage

8 There is no one place in the Massachusetts General Laws that specifically grants local governments the authority to charge fees, although several services for which fees may be charged are listed in Chapter 40. (This chapter explains the general duties and powers of towns.) The Court's decision in *Emerson v. Boston* outlined specific criteria that all fees must meet.

9 It should be noted that while non-environmental fees may free general revenues for environmental uses, these uses will have to compete with the other fiscal needs of local governments.

collection and snow removal fees. Towns such as New Bedford, for example, charge fees for over 120 different services. Towns may also pass on certain costs, such as the cost of hiring an outside consultant to examine a development proposal. This can be charged to the developer himself¹⁰.

Generally, there are several types of fees local government can use. These include:

- betterments,
- local system fees,
- user fees,
- impact fees/special permits, and
- capacity credits.

In Massachusetts, towns have the legal authority to impose all of these types of fees, subject to the constraints outlined above. Each type of fee is reviewed to highlight its particular constraints and methods for overcoming these constraints.

Betterments

A betterment is a project specific charge levied against individuals who receive some benefit from a public improvement separate from any benefit received by the community as a whole. Unlike most user fees, betterments are not voluntary. Because betterments are project specific, they are limited to capital projects. Legal authority to impose betterments is given by Chapter 80, Section 1 of the Massachusetts General Laws. The only constraint to imposing betterments is that the decision to charge the betterment must be reached at the time the original work order to undertake the improvement is approved and that work order must include an estimate of the betterment. After construction has taken place, the town has six months to determine the actual amount of the betterment and can charge for the cost of the improvement accordingly.

In practice, towns generally issue bonds to pay for the improvement and use betterment revenue to cover the debt service because betterments cannot be collected until the improvement is completed. Collection can be in a lump sum or annualized over a period of up to 20 years. If undeveloped land is part of an area receiving an improvement, the town can decide to delay the time of payment of the betterment until the land is developed. This allows the town to collect money based on the full-build value of the property.

As is the case with all fees, the betterment charges must be levied in proportion to the benefit received. In practice, however, "the traditional method of determining individual betterments is to allocate costs on the basis of front-footage abutting the improvement [or] the acreage adjacent to the improvement. Realistically, this approach does not truly distribute costs based on benefits received but on the cost of providing the improvement to different properties. However, courts have upheld these methods" (Central Massachusetts Regional Planning Commission, unpublished) Thus, towns actually have more flexibility in setting their betterment charges than would appear from the beneficiary pays requirement.

¹⁰ Massachusetts General Laws, Chapter 44, Section 53G.

Chapter 3: Financial Planning Guidebook

Two ways betterments can be used to support CCMP actions are for on-site septic system improvements or to pay for stormwater control measures. In the latter case, a town could declare that controlling stormwater improved the value of property within a region. Property owners receiving the benefit could be compelled to pay for the cost of the program according to the benefit they receive. In this case, that benefit would be reflected by the improvement in their property value. Alternatively, towns could construct the betterment as a function of the amount of the owner's land that is adjacent to or abutting the improvement, since the charge does not actually have to correlate with the amount of benefit received (as shown by previous court decisions). The steps to using betterments for on-site septic systems improvements are outlined below.

Case IV: Betterments For On-site Septic System Improvements

Betterments can be used to improve a town's on-site septic system. The steps are as follows:

- The town posts a notice requesting that all property owners who need to have their septic tanks upgraded sign up by a certain date.
- It then estimates the cost of the program, and
- approves a bond issue to cover the costs at the town meeting.
- property owners then receiving the funds to perform the upgrades reimburse the town through a betterment.

The betterment would be spread out over the term of the bond issue so that the payments cover the debt service. The town could cover some of the overhead costs with general revenues in order to lower the cost to the property owner.

Property owners would be encouraged to participate through an incentive program. Anyone volunteering for the upgrade would be allowed time to accept bids for the work and find the least costly way of performing the upgrade. Property owners who were found in violation of the town's septic standards could be compelled under the state's nuisance statutes to make the repairs within 60 days. Failure to comply would force the Board of Health to perform the work itself. Nuisance statutes allow the Board of Health to place a two-year lien on the owner's property to cover the costs.

Local System Fees

System fees are charges associated with water pollution abatement projects and the systems of which those projects are a part. The right of cities and towns to levy such

fees was granted under legislation passed in 1989. The act grants cities and towns the authority to charge fees, rents, or assessments to cover the cost of operating water pollution abatement projects¹¹.

Towns can charge fees for the operating costs of a group of services by setting up a public utility¹². This can be created around the provision of any service that uses scarce and publicly controlled, owned, provided, or regulated resources. For example, a septic system utility could be created to monitor the performance of septic systems, arrange for pumpouts of septic tanks, regulate the activities of companies that pump septic tanks, and dispose of residual waste. The utility could recover the costs of providing those services from those who receive the services. Creating a utility allows for charging one fee for several services and covering the indirect as well as direct costs associated with the provision of a service.

User Fees

User fees are the most common type of local charge. These fees are charged against individuals for the right to use a good or service provided by the city or town. Examples include mooring fees and sewer and water charges. If, for example, the town determines that its septic tanks require biannual inspections for leakage, the cost of providing this service can be covered by user fees levied against all households and businesses that use septic tanks for their wastewater.

User fees can be used even more creatively than would initially appear. The town of Marion, for example, has adopted a broad interpretation of the fee-for-service concept. In addition to recovering all direct costs associated with running the marina, it also recovers part of the costs of its municipal fire and police services by allocating some portion of their costs to protecting and serving the marina and its users. Therefore, included in the user fees that pay for marina services are payments covering the apportioned municipal fire and police services.

Impact Fees

A fourth fee to consider, if new development is occurring, is an impact fee. Impact fees are charges levied on a developer where his investment leads to an increase in public capital costs. For example, if a new housing development requires an extension of the sewer system, the developer can be charged for the cost of the extension. The use of impact fees is constrained primarily because towns do not automatically have the right to charge impact fees; permission must be specifically granted by the state¹³. Petitioning can be successful, however, as demonstrated below.

Having to obtain state permission to levy an impact fee can be avoided by using a *Special Permit* system instead. This approach also requires developers to pay for expansion of

11 Massachusetts General Laws, Chapter 29C Section 12(d)

12 A utility can be simply a separate department or office within the town government. It need not be a separate entity

13 It should be noted, however, that several bills have gone before the General Court that would grant statewide impact fee authority.

infrastructure required due to the development, but in this case the developer undertakes the activity himself.

Case V: Impact Fees In Medford

Medford received permission to develop an impact fee program in 1989. Medford's enabling legislation allows for the imposition of a "linkage exaction" (impact fee) on construction, enlargement, expansion, substantial rehabilitation, or change of use of non-residential and residential projects that require some form of zoning relief or exceed a threshold established by the city council.

The exaction is to be used to defray the costs of capital improvements provided by the city caused by, and necessary to support, future development. Such improvements include those made to school facilities, public facilities, roads, sewers, water supply lines, affordable housing, child care facilities, job training facilities, public safety facilities, and parks, playgrounds, and other recreational facilities. In other words, for any development which causes a certain amount of disruption to the town's existing infrastructure, the developer may be charged a fee to cover the costs of new infrastructure provided by the towns.

A revolving trust fund must be set up for each linkage ordinance which is passed. The trust fund is merely an accounting mechanism which collects the exaction and disburses funds to pay for the capital improvements. Any funds not spent within three years of their collection must be returned to the landowner with interest.

Permit systems establish thresholds of development pertaining to size and type. Within the threshold the developer does not have to provide services outside the scope of his project. When the threshold is exceeded, however, the developer must perform certain tasks that mitigate the burden his development places on the community. The most common example is the requirement that the developer of a shopping mall widen its access road to accommodate the resulting increase in traffic.

It should be noted that revenues from special permits are currently limited to being used for improvements to open space, traffic flow, pedestrian improvements, public amenities, and housing¹⁴. It has been suggested that the phrase "public utilities" be added to the list of improvements to extend the Special Permit concept to include instances where development would inundate the existing stormwater drainage system. Additionally, amendments to the law have been proposed which would allow developers to pay a fee to the state in place of making the required improvements themselves (Connery Associates, June 1990). Special permits are currently relevant as an option, therefore, only insofar as they could be used to pay for an investment that otherwise would be funded from general revenues. If the phrase "public utilities" is added, however, the constraint on direct use of the special permit option is lifted.

14 Massachusetts General Laws, Chapter 40A, Section 9.

Capacity Credits

An alternative "fee" to finance new development is to charge capacity credits. Once a town's environmental facilities have reached capacity, and the town needs to build new capacity, it can sell capacity credits in new facilities to developers. When enough capacity credits have been sold, the investment in the new infrastructure can be made. In order to ensure that developers will buy capacity credits, obtaining building permits can be made conditional on their purchase. Local governments can encourage early purchase of the credits by offering them at a discount for a set period of time. Some capacity credit systems have allowed resale of the credits at a profit. Again, this fee option is only relevant where there is strong local demand for increased capacity.

While the law suggests that cities and towns have the authority to create and charge for capacity credits, attempts to do so might be challenged by developers, as no town in the Buzzards Bay region has exercised this right. The only constraint, therefore, is the risk of being challenged and brought to court. Cities that have successfully implemented capacity credit systems include Escondido, California, Houston, Texas, and Upper Merion Township, Pennsylvania.

Selection -- Suitability

Fees are probably the most under-utilized revenue option available to local governments. This section will consider those factors that influence whether fees are appropriate.

Revenue

Fee revenues, as with taxes, are a function of rate schedule and number of units subject to the charge. Fee revenue, by definition, cannot exceed the cost of providing a particular service. Therefore, revenues will vary with the cost of providing the service. This is the case regardless of whether fees are used directly or used for a non-environmental service in order to free up general revenues for environmental (and other) programs. Once a fee is in place, it provides a continuous and dependable source of revenue to fund on-going services.

Political Issues

New fees must be passed locally. Even where a fee is not subject to direct voter approval, town councils must be sensitive to potential public resistance and response to fees. As with taxes, the more obvious the connection between the fee and the benefit, the more acceptable it will be. Overcoming public resistance can be especially difficult when a fee is being applied to a previously free service.

Impacts/Equity

Fees can be considered equitable since they are voluntary and only the beneficiary pays. They can also be regressive, however, because users typically pay the same fee regardless of income.

Administrative Burden

In order to meet the legal criteria set forth in the *Emerson v. Boston* decision, fees must match costs to benefits. This requirement is more rigorously adhered to for user fees than for betterments. This can require extensive accounting. In fact, courts often require the creation of an enterprise fund to prove that those paying the fee only pay for the service provided¹⁵. Additionally, any new fee must be collected. The extent of the administrative burden will, therefore, depend on the difficulty of collecting the fee, and the costs associated with determining the appropriate fee to charge.

Fines and Penalties

Fines and penalties are imposed primarily for violations of government requirements or regulations. Fines and penalties may be imposed for civil or criminal offenses, and may be levied administratively or judicially. Whereas fees and taxes may be collected on everyday activities, fines and penalties are collected only on the exceptions to normal operations. As such, fines and penalties do not typically provide a steady stream of revenues for program operations. More often, fines and penalties have been used to create positive incentives (e.g., to encourage improved compliance within the regulated community), rather than as a revenue raising tool. Fines and penalties are worth considering, however, as they may provide occasional revenue windfalls.

Scope -- Feasibility

The federal and state governments have jurisdiction over most actions that could threaten the environment. Any fines for actions such as illegal discharge into the Bay typically go directly into the federal or state general fund, depending on the statutes under which the violation occurred. Towns are limited to fines for things such as failure to pay a local user fee or failure to file a local operating permit. Fines could be levied for non-criminal violations of harbor regulations as well. The state, at the request of a town, could withhold boat registration from owners who have outstanding citations, safety violations or other local ordinances in the manner that states withhold new driver's licenses from those who have outstanding parking tickets. This would give towns collection power in enforcing local codes.

While fines and penalties are usually deposited into the general fund, there are some notable exceptions to this rule. For example, the Massachusetts Bay Environmental Trust Fund was created, through cooperation with the judicial system, as part of a settlement between EPA, the Commonwealth of Massachusetts and the Metropolitan District Commission. (The box below describes the Trust in more detail.) The Trust may offer a source of funds to the Buzzards Bay communities. If the Trust receives additional funding, projects in the Bay are eligible for that funding, as they would qualify as areas where pollution violations incurred. Alternatively, the Trust can be used as a model if Buzzards Bay communities wish to set up their own trust to capture

¹⁵ For example, see *Northeast Builders Association of Association of Massachusetts and Gerland J. Jussier v. Town of Dracut*

finances either from large violations which may occur in the Bay, or from smaller violations, which could be used as a reserve in case funding for a particularly important program is cut off.

Selection -- Suitability

Fines and penalties are a legal but limited method of financing actions suggested by the CCMP. This section will describe the limitations of fines and penalties and generally areas where they may be useful.

Case VI: Massachusetts Bay Environmental Trust Fund

In 1988, EPA fined the Commonwealth of Massachusetts and the Metropolitan District Commission (MDC) nearly \$2.5 million for violations at two NPDES-permitted wastewater treatment facilities. The court ordered the Commonwealth and MDC to deposit \$2 million of the fine in the newly-established Boston Harbor-Massachusetts Bay Environmental Trust Fund (the "Trust"). Monies from the Trust may be used for activities carried out under the National Estuary Program. In particular, the funds are intended to be used for restoration and protection activities, and for environmental education. The projects must be undertaken in addition to regulatory compliance obligations. Buzzards Bay, along with the Massachusetts and Cape Cod Bays and Boston and Lynn Harbors, is eligible to receive funds from the Trust. Although the original \$2 million has been allocated, the Trust still exists and may receive funds from the legislature, voluntary contributions, and future penalties.

Revenue

Since fines and penalties are based on violations of the law, resulting revenues are not predictable or reliable as an on-going revenue source. At best, the revenues from collecting a large fine could be used to fund a one-time project or establish a trust. In general, however, these windfall revenues are likely to result from violations of state and federal laws and not local laws, making them unavailable for local use. One exception are funds secured from the Massachusetts Bay Environmental Trust Fund. Because of the uncertain nature of the revenue stream, towns cannot budget programs around fines and penalties.

Political Issues

Local governments can collect fines only for laws that do not fall under federal or state jurisdiction. One area that has not been explored is local harbor regulations. In those areas where local fines are possible, the revenue can easily be dedicated to a program related to addressing the problems that resulted from the violation and therefore would probably encounter very little political opposition.

Impacts/Equity

Fines are considered equitable based on the polluter-pays principle.

Administrative Burden

Once a regulation is established, violations must be policed. Enforcement may cost more than the potential revenue from violations.

Bonds

A bond is a written promise to repay a debt at a specific date or maturity, with periodic payments of interest. Municipalities may issue either general obligation bonds or revenue bonds. A *general obligation bond* is secured by the full faith and credit of an issuer with taxing power, and is repaid from ad valorem taxes or appropriations from general revenues. A *revenue bond* is secured by the pledge of specific project or system revenues (e.g., user charges for wastewater treatment services). A local government may not raise taxes or fees to repay a revenue bond. One exception to this is Tax Increment Financing (TIF) revenue bonds. TIF revenue bonds may be issued if the project can be expected to increase local property values and thus property tax revenues. The local government can dedicate a percentage of the increase in property tax revenues over a base year to the repayment of the bond issue. Statehouse notes offer an alternative to issuing bonds.

Scope -- Feasibility

General Obligation Bonds

Bonds can be issued to finance most environmental projects. Chapter 40, Section 7 of the Massachusetts General Laws states that there are specific purposes for which a local government may issue general obligation bonds. These purposes appear to include most water quality related projects. However, if a project does not clearly fall into one of the permitted categories, the opinion of the town's legal counsel should be sought before the debt is issued. The primary requirements for using this option are:

- achieving a 2/3 vote in favor of the bond at the town meeting or meeting of the town or city council;
- not exceeding the debt ceiling; and
- having a good credit rating.

When a town decides to issue bonds, the local legislative body must approve the issue by a two-thirds vote. It must then post a notice that the debt will be issued. Anyone who opposes the issue has 20 days to call for a referendum by submitting a petition with 12,000 signatures or 12 percent of the town's population, whichever is smaller¹⁶.

16 Massachusetts General Laws Chapter 44, Section 8A.

Constraints on Use

The use of bonds as a source of revenues is limited by the requirements noted above. Towns may not be able to secure the 2/3 vote required. Voters may not agree to take on more debt than is currently being carried.

The second limiting factor is the ceiling to which any debt issues are subject. Towns are limited to net indebtedness of 2.5 percent of the equalized valuation (the sum total of the property value) of the town. City debt is limited to five percent of the equalized valuation of the city. Under certain conditions, a local government may issue debt in excess of the indebtedness cap. These conditions include construction of a water supply system, reservoirs, and wastewater treatment and disposal systems. Debt issued under such conditions may double the total indebtedness of a town or city to five and ten percent, respectively¹⁷.

In addition to remaining under the indebtedness cap, the town must appropriate a percentage of the cost of the capital outlay from general revenues. This portion of the financing can come from a stabilization fund. The percentage of the cost that must come from general revenues depends on the nature of the project. For example, bonds issued for sewer construction must have terms of 30 years, and two percent of the cost of the project must be paid for out of general revenues¹⁸.

The third factor that would prevent the successful use of general obligation bonds is a poor credit rating. While towns with poor ratings can issue debt, it can become prohibitively expensive¹⁹.

Overcoming the Constraints

Whether town managers will be able to secure a 2/3 vote at a town meeting or by the city or town council will depend upon the project in question and the town's attitude toward debt financing. This must be tested or ascertained in advance of proposing a bond issue.

The debt ceiling should not prove a real obstacle as no town in the region has approached this ceiling. Credit ratings in the Buzzards Bay region are also good. Of the towns that are rated, all enjoy ratings of at least Baa. Towns with no rating can overcome this potential obstacle by securing bond insurance.

The two principle insurers of municipal bonds are the Municipal Bond Insurance Agency (MBIA) and the American Municipal Bond Assurance Corporation (AMBAC). If these associations are used, local governments should expect a thorough

17 Massachusetts General Laws Chapter 40, Section 8.

18 Specific percentages as well as the mandated term of the issue, can be found in Massachusetts General Laws Chapter 40, Section 7.

19 In addition, the costs associated with bond financing in general have raised. The federal Tax Reform Act of 1986 increased the cost of issuing bonds for infrastructure by limiting the conditions under which tax-exempt bonds may be issued. This may also raise the costs prohibitively.

Chapter 3: Financial Planning Guidebook

assessment of the risk of their proposed investment. This risk assessment will determine the town's premium. Municipal bonds issued to finance wastewater treatment plants or sewer system construction typically require a premium worth about 0.35 to 0.65 percent of the total issue²⁰. Premiums are paid at the time of issue. A low risk investment does not guarantee insurance, however. The insurer will also want to determine whether he has extra capacity for that particular type of bond. Since the insurers seek to diversify their holdings, they may turn down a town's request if they have underwritten too many similar issues.

Bonds must be investment quality (Baa from Moody's Investors Service or BBB from Standard and Poor's Insurance Rating Services) in order to be eligible for insurance. Currently, all Buzzards Bay cities and towns with ratings have investment quality ratings. Once a bond issue is accepted for insurance by either MBIA or AMBAC, it carries an Aaa/AAA rating with Moody's and Standard and Poor's investment services. This rating will lower the interest that the issuer has to pay. The savings on bonds issued by a "bad credit" state such as Massachusetts may be considerable.

Revenue Bonds

Towns and cities have the authority to issue revenue bonds for specific purposes, including water pollution abatement projects. When authorized by a two-thirds vote by the appropriate local legislative body, a town may issue bonds that are to be repaid using local system revenues²¹.

Constraints on Use

The factors inhibiting the use of revenue bonds are:

- failure to achieve a 2/3 vote at a town meeting or from the town or city council;
- failure to secure a revenue stream to cover bond liability; and
- the project's credit rating.

Towns need to show that they have secured a reliable revenue stream to cover the bond liability, issuance costs, and insurance premiums (assuming the town has chosen to employ an underwriter). Ultimately, user fees will have to cover these costs as well as the principal repayment. The ability to issue bonds will, therefore, depend on the town's ability to repay its debt.

Overcoming the Constraints

If care is taken in selecting projects that are politically acceptable and a suitable revenue stream is secured, the factors noted above should not block bond issuance. Again, towns may wish to use bond insurance if they want to guarantee the revenue

²⁰ Source: AMBAC. This is an approximation. Individual premiums may vary considerably. Premiums on bonds for hospitals, for example, have reached two percent.

²¹ Massachusetts General Laws Chapter 29C, Section 14. For further discussion of local system revenue see "Fees and Charges"

stream from the project. Overcoming the constraints is, therefore, a two-step process. Once a capital project has been selected, towns must secure a fee or tax to repay the bond. Once it has been proven that revenues will be forthcoming, voter approval may be easier to secure.

Statehouse Notes

As an alternative to issuing bonds, towns can borrow through the statehouse note program. This program provides a low cost way for towns, schools, districts, and counties to access short and medium-term debt. While statehouse notes are not bonds, they may be used either in anticipation of a bond issue or in lieu of bonds to meet capital financing needs. Short-term notes may be secured, for example, to provide start-up finance in anticipation of a bond issue. Medium-term notes (5-10 years) can finance small capital expenditures. In addition, statehouse notes can also provide bridge finance for anticipated revenue in the form of tax revenue or federal grants.

The procedure that towns must follow to issue the notes depends on the use of the notes. If the notes are used as revenue anticipation notes, then the selectmen can simply decide to issue the notes. If they are used in anticipation of a bond issue or to make small capital expenditures, then the notes must be approved by a two-thirds vote at a town meeting like a bond issue. Once the decision to issue the notes has been made, towns must secure financing from a local bank. The state then certifies the note, acting in lieu of bond counsel. While interest rates are slightly higher using the program, the high costs associated with issuance are avoided. For small issues, the relatively fixed nature of issuance costs may make this option more attractive to towns, as overall costs may be lower than they would be if the town were to issue a bond. Statehouse notes are always repaid from general revenues or grants. They are not repaid from a dedicated revenue stream such as a user fee. In fiscal year 1990, over 2000 participants borrowed over \$1.5 billion through the program.

Constraints on Use

The use of statehouse notes is limited by the legal constraints on the size of the notes (\$750,000) and the repayment term (ten-year maximum), as well as by the need to secure a two-thirds vote in some instances. These constraints narrow the types of expenditures that could be financed with statehouse notes.

Overcoming the Constraints

Although the constraints on size and repayment terms cannot be overcome, it may be possible to obtain a two-thirds vote at a town meeting or a meeting of a city or town council by explaining that statehouse notes are less expensive than a bond issue because bond counsel is not necessary.

Selection -- Suitability

Bonds are an excellent way for local governments to fund *capital* projects. This section discusses when bond issuance is an appropriate way to finance actions suggested by the Buzzards Bay CCMP.

Revenue

Issuing bonds allows the local government to collect large amounts of money in a short period of time to finance capital projects. Revenues are likely to be available in one lump sum.

Political Issues

All debt issued by a town must be approved by its citizens. Depending on the town's charter, either the governing legislature must vote, or a voter referendum of the town must be held. The critical issue is whether the townspeople are willing to accept higher property taxes or user fees in the future to repay this debt. If not, securing the 2/3 vote may prove to be impossible.

Impacts/Equity

Bonds spread the cost of capital projects over many years. This allows all the beneficiaries of a project to share in the repayment rather than placing an inordinate burden on the current town residents.

Administrative Burden

Administrative costs such as acquiring insurance and building political support can be extensive. Once the debt is issued, however, the administrative burden is minimal.

Grants And Loans

Grants are defined as monies given to local governments that do not require repayment. Loans require repayment, usually with interest²².

Scope -- Feasibility

Grant Programs

In general, there are a number of federal and state grants that are targeted at environmental programs. Major government sources identified below include the Environmental Protection Agency, Department of Housing and Urban Development, the Department of Environmental Management, the Division of Conservation Services, and the Commonwealth's Transportation Bond Issue.

One federal grant available is the Small Community Outreach and Education (SCORE) grant program administered by EPA. This program is aimed at educating the public about environmental issues. A 50% match is required from the receiving agency or organization. EPA Region I has awarded one grant per year under this

²² For a more exhaustive look at grant and loan programs available, see Boyer, Bennet & Shaw, Inc(1988), U.S. EPA (1988); and U.S. EPA (1989).

program. The program is thus highly limited in scope and availability. In 1990, the Maine Department of Environmental Protection was awarded a \$1,200 grant to develop a handbook on planning, constructing, and financing wastewater treatment plants. The Buzzards Bay Project could use such a grant to develop educational material that promoted a regional approach to stormwater control, for example.

HUD runs the Community Development Block Grants program which provides funds for sewer and water projects to Standard Metropolitan Statistical Areas (SMSA) with populations of greater than 50,000, urban counties with populations greater than 200,000, and cities with populations less than 50,000 that are central to an SMSA. Nonentitlement cities, generally those with less than 50,000 people, can get aid through the Small Cities program. The only entitlement community around Buzzards Bay is New Bedford, which received \$5 million in CDBG funds over FY 1988 and 1989.

The Massachusetts Small Cities Program (MSCP) is administered by the Executive Office of Communities and Development with funds that are provided by HUD. This program awarded over \$23 million to 40 communities in FY 1990. Communities that are ineligible for Community Development Block Grants from HUD may apply. Most of this money went to housing rehabilitation programs (\$15 million), but almost \$4 million went to infrastructure and public facility improvements. These would include water and sewer facilities and flood and drainage facilities. The MSCP encourages joint applications by two or more eligible communities. Joint applicants must enter an inter-local cooperative agreement that will allow the lead applicant to carry out work within other communities. This provision may be useful for addressing some of the drainage problems in Buzzards Bay. Applications for grants must be made yearly. In FY 1990, Plymouth received \$507,272 and Wareham received \$311,688. Both awards were for housing rehabilitation.

The Waterways Division of the Department of Environmental Management administers the River and Harbors Grant program. Eligible projects for coastal waters and harbors include dredging and beach nourishment; construction or rehabilitation of piers, wharves, bulkheads, seawalls, or other coastal facilities; and development of boatways and public access facilities. Eligible projects for inland waters include river channel dredging, riverbank shoreline erosion control, flood control and dam repair, pond dredging and rehabilitation, boat ramps, and public access facilities. Approximately \$4 million in grants were dispersed in FY 1990, and the Waterways Division has requested funding for \$8 million worth of projects this year. To become eligible for a grant, towns must petition the program for approval. Presently, there are \$24 million worth of programs which have been approved and are awaiting funding. Buzzards Bay towns already approved include New Bedford, Wareham, Westport, Falmouth, and Bourne. Towns which would like to bypass the waiting list for funds may petition the legislature directly or have the program petition the legislature for a project to be approved as a line item on the state budget. This is usually an option for larger projects.

The Self Help Program, administered by the Division of Conservation Services, provides funds primarily to preserve lands and water in their natural state. Self Help funds reimburse local governments for acquisition of land for conservation purposes only. To be eligible, a community must have an established conservation commission. In addition, the community must have an Open Space Plan approved by the Division

Chapter 3: Financial Planning Guidebook

of Conservation Services. Funding for the program comes from a \$20 million set-aside from the 1987 Open Space bond issue. All but \$8 million of this bond money is obligated to projects. Also, the Division of Conservation Services has not obligated any new money to projects for three years due to the state's fiscal crisis.

The Commonwealth's 1988 Transportation Bond Issue set aside \$5 million for grants to cities and towns for water supply, drainage, or sewer facilities along state highways or bridges. Because of a capital spending cap for the Department of Public Works, none of the \$5 million has been spent and a grant program has not been established. If funds become available, cities and towns could only use the grants for drainage facility improvements affected by or adjacent to state highways or bridges.

Another \$20 million from the Transportation Bond Issue was made available to the Department of Public Works for improving water supply, drainage, or sewer facilities affected by or affecting a state highway or bridge. These funds can be spent directly by the Department of Public Works or made available as grants to cities and towns. To date, the only project funded from the \$20 million is a \$110,000 grant for Buzzards Bay communities. The \$110,000 grant was made available in October 1989 to the Coastal Zone Management Office of the Executive Office of Environmental Affairs to fund development of a stormwater runoff remedial action plan for the Buzzards Bay area.

Constraints on Use

The major constraint to using grant money is its relative scarcity. Most grant programs, especially federal ones, have little or no money available. Those that do have funds are widely sought after and competition for funds can be fierce. However, grants are worth pursuing.

Overcoming the Constraints

Accessing these programs will remain difficult until federal and state support for them increases. This may not be forthcoming in the near future.

Loan Programs

The Massachusetts Water Pollution Control State Revolving Fund (SRF) is the primary loan program available to towns in the Buzzards Bay region²³. The SRF program was set up to replace the Construction Grants Program, which financed publicly owned wastewater treatment works. SRFs offer low cost loans to local governments. Loans are made according to the state's project priority list at rates of interest ranging from zero to nearly market rates. This project priority list is updated annually. Loan recipients must set user fees or raise taxes to meet their repayment schedule. Repayment allows the lending ability of these funds to revolve.

Massachusetts established its Water Pollution Abatement Revolving Fund in 1989 through a bond sale and EPA matching grant. The trust managing the fund determines each year how much money it will make available to local governments by examining

23 Massachusetts General Laws Chapter 29C.

the potential revenue streams of the fund. These revenue streams normally include federal funding, capital repayment from previous loans, revenue bond proceeds, and general obligation bond proceeds. The fund has received \$126 million over the past two years under Titles I and II of the Clean Water Act, and is authorized \$200 million for 1991²⁴. Under the SRF program, Massachusetts is required to provide at least a 20% match to federal appropriations. In order to reach its goal of \$750 million in funds available, the state is planning to leverage its federal contributions through revenue and general obligation bond issues.

Loans from the Massachusetts SRF are subsidized and carry an interest rate from zero to three or four percent. Towns and cities must begin repaying the loans one year after they are authorized. The average loan from the SRF will be \$2-3 million for construction and \$250-500 thousand for planning and design. The SRF also has a "grant equivalency" program. Grant equivalency is defined as follows: any loan of zero percent interest is equivalent to a 50% grant when compared to what the recipient would have to repay at a market rate of interest. A town that qualifies for a hardship grant can receive up to a 75% grant equivalent. This entails receiving an interest free loan plus capital repayment forgiveness so that grant equivalency becomes 75% of the amount of the loan. Hardships are based on the relation between a town's sewer costs and its per capita income. Any town whose sewer costs equal approximately two percent of average per capita income will qualify for the maximum hardship.

Constraints on Use

Loan programs are also constrained. While the decision to apply for an SRF loan must be approved locally, this does not normally present an obstacle. It is more likely that towns will have trouble getting a loan due to:

- extensive needs competing for limited funds; and
- low ranking on project priority lists.

Programs to upgrade or improve wastewater treatment plants in the Buzzards Bay region are eligible for loans from the SRF. However, these projects will have to compete for funds with an estimated \$7 billion worth of other water pollution abatement projects identified by the Federal Needs Survey as existing in the Commonwealth, and success will depend on their position on the project priority list. Thus, the magnitude of identified needs, and the demands placed on the fund, may effectively block access to the SRF. Moreover, according to the state Intended Use Plan, the state has earmarked \$250 million in continued support for existing programs. The remaining \$500 million will support five programs, including \$122 million for CSO projects in New Bedford.

Further, while the state has set aside five percent of its funds to finance non-point source programs such as stormwater runoff control, it has also reserved the right to re-allocate such funds to point source projects in order to meet its equivalency

24 It is unlikely to receive the full amount, however, due to the war in the Persian Gulf.

Chapter 3: Financial Planning Guidebook

requirements mandated under the SRF regulations²⁵. Thus projects that do get a high enough ranking to get funding may get passed over anyway. The 1990 Intended Use Plan contains no non-point source projects as the state is still evaluating its non-point source problem and developing appropriate responses. It expects non-point source projects to begin appearing on the Intended Use Plan within five years. While non-point source projects should certainly try to receive SRF financing, the overall size of the needs in Massachusetts may make the SRF of limited use for the Buzzards Bay project.

Overcoming the Constraints

In the short-run towns may have great difficulty in accessing the SRF program, although in the future this may prove a more viable option.

Other Loan Programs

A second source of loans is a federal program run by USDA. The Farmers Home Administration runs a water and waste disposal loan and grant program for communities of less than 10,000. In order to qualify for a loan, the community must be unable to obtain credit on its own. In order to qualify for a grant, the community must first qualify for a loan and also have a per capita income that is less than the state average for non-metropolitan areas. Any community wishing to access these funds should apply to the regional office of the Farmers Home Administration. The average award by the Administration was \$450,000 in 1990. Bourne and Wareham were approved for both loans and grants in 1990.

Other loan programs include the Infiltration/Inflow Rehabilitation Program, administered by the Division of Water Pollution Control within the State Department of Environmental Protection. Any city, town, or district can apply. Applicants must certify appropriation of funds for the 25% local match required. Approximately 80% of the funds are awarded for infiltration/inflow analysis, which involves using state guidelines to systematically evaluate potential infiltration/inflow sources in a sewer system. Other infiltration/inflow rehabilitation loans are issued for design and construction. Communities must apply yearly in order to be on the priority list. DEP sends project information requests to communities each year, and the communities can apply at any time during the year. The priority list is, however, quite long. Towns that have not previously applied for a loan will have difficulty acquiring funds.

Selection -- Suitability

Grants and loans from federal and state agencies can be used to fund specific actions suggested by the Buzzards Bay CCMP, but lack of funding for grant and loan programs overrides any other criteria for using this option. This section looks at factors that may help determine when grants and loans are a feasible option.

²⁵ The Equivalency ruling requires that states fund projects that satisfy Title II requirements, equal to the value of their capitalization grant. These are publicly owned treatment works.

Revenues

The revenue potential of grants and loans is affected by two factors. In any one year the competition for appropriations from state and federal programs is high. From year to year program budgets as well as the existence of the programs are uncertain. Because of this uncertainty, towns should plan to apply early for funding and the projects should be able to be completed within the first year of the appropriation unless a back-up source is available.

Political Issues

Grants are always politically acceptable. Loans face the same acceptability problems as any other debt with the exception that loans from government agencies may carry below market interest rates.

Impacts/Equity

Whether grants and loans are equitable cannot be ascertained.

Administrative Burden

Given the competition for limited funds, the application process can be extensive. Additionally, lobbying may be necessary, further increasing the administrative burden.

Independent Financial Management Mechanisms

All of the revenue options described in the previous section are potentially available to cities and towns. Nevertheless, in some situations, using or creating an independent financial management mechanism may facilitate a particular option's use. These are not sources of revenue themselves, rather, they help to link the sources of funds to their intended uses. Four such mechanisms are examined below. They include a consideration of:

- Enterprise funds;
- Bond banks;
- Special districts; and
- Regional revolving funds.

Each mechanism can either help access a particular revenue option, or it can establish the right framework within which several options can be more easily used.

Enterprise Funds

Enterprise funds are off-budget accounts that are created to manage activities that are supported by user fees. As an off-budget account, revenues from the user fee are dedicated to the enterprise fund and are therefore not part of the general revenues. This money is thus protected from the appropriations process. Enterprise funds are

Chapter 3: Financial Planning Guidebook

meant to be self-supporting although some receive an occasional infusion from general revenues. The separate accounting procedures associated with enterprise funds allow local governments to judge the appropriateness of the user fee in relation to the costs of the program as excess fee revenue would be transparent. It also lets towns document the link between the fee and the service in case the fee is challenged in court.

The use of the fees as a source of revenues dictates the development of an enterprise fund. Once a fee has been established, the town may want it protected, and may wish to establish a clear and separate accounting system for it. Setting up an enterprise fund protects funds raised and establishes a clear record of all transactions.

Enterprise funds may be established to pay for utility, health care, recreational, or transportation facilities²⁶. They may also be established to finance water pollution abatement projects, either on their own, or through an agreement with the trust of the SRF²⁷. The budgets for these accounts must be submitted yearly for approval by the local government. If the revenues of the fund are greater than appropriations spent by the fund, the surplus may go into a separate account which would fund future capital improvements of the enterprise. Where a fund is established under an agreement with the state trust, the trust will aid the local government in defining costs of a project and in the operation of a pricing system for the services provided by the project and the system of which it is a part.

One example of an enterprise fund that has been approved by the State Bureau of Accounts is a Waterways Enterprise Fund. Towns in the Buzzards Bay region can set one up by simply expanding their existing Waterways Improvement Fund and following the accounting rules of an enterprise fund. In addition to the revenues the expanded fund would receive from half of the boat excise tax, this new enterprise fund could receive revenue from mooring fees, transient mooring fees, and boat launch fees. The enterprise fund could pay for such expenses as the operation of the harbor master's office, maintaining and improving public facilities at the harbor, dredging, and harbor planning (Courtney 1989). These expenses are presently covered by the boat excise with additional funds often allocated from general revenues. The new enterprise fund would remove the subsidy from general revenues and clearly demonstrate the cost of providing harbor-related services.

Bond Banks

A bond bank can lower the cost of capital for towns trying to issue bonds. It buys up local bond issues, pools them together, and reissues them at an interest rate lower than the local government can achieve on its own. Bond banks are an ideal service for small communities with infrequent capital needs and towns with poor credit ratings.

Massachusetts does not have a bond bank per se. However, the Massachusetts SRF, the Water Pollution Abatement Revolving Fund, has the authority to buy, hold, and

26 Massachusetts General Laws Chapter 40 section n 39(k)

27 Massachusetts General Laws Chapter 29C section 12(c)

sell local debt obligations and therefore act in that capacity²⁸. Cities and towns may also enter into such agreements with a corporate trustee. Authorization to do this requires a two-thirds vote by the appropriate legislative body of the local government²⁹.

Bonds issued by the SRF for local governments may be either general obligation or revenue bonds. To date, the Massachusetts SRF has not acted as a bond bank on behalf of local government. The first package of revenue bonds is scheduled to be issued in June 1991. This may be delayed, however, because control of the statehouse has switched from Democrat to Republican, and a new consensus may need to be reached regarding SRF management and activities.

If all or any part of a project fails to be approved for financial assistance by the SRF, the city or town may apply to the Massachusetts Industrial Finance Agency (MIFA)³⁰ for help in financing all or any part of the project³¹. This agency will evaluate the proposal and issue taxable or tax-exempt bonds on the open market to finance the project. To date, the agency has financed approximately 30 environmental capital projects.

MIFA can perform the function of a bond bank in several ways. First, MIFA can insure bonds, thereby lowering the interest payments that towns have to make. Second, it can pool small debt requirements of several towns and issue the bonds as a package. Third, MIFA has established a \$100 million letter of credit facility to aid towns in their short-term borrowing needs. Since most towns have little trouble issuing debt individually, several of these options may not be relevant. However, MIFA's ability to issue debt for groups of towns may prove quite useful.

Special Districts

Special districts are an alternative to conventional local government when the area of service does not fit into one existing jurisdiction or the governmental unit chooses not to (or cannot) perform the required service. They can also be used when the entity with jurisdiction has neither the tax base nor the debt capacity to fund the service. The Bureau of the Census defines special districts as having three characteristics that make them different from a subordinate agency of the existing municipal government. They must exist as an organized entity, be governmental in nature, and have substantial administrative and fiscal autonomy so that it may be truthfully thought of as a separate government. This definition does not include counties, municipalities, townships, and school districts. Special districts are also known as "public corporations" and "authorities."

28 Massachusetts General Laws Chapter 29C section 3(b)(iv).

29 Massachusetts General Laws Chapter 29C section 15(a)

30 MIFA is an authority created by the General Court as an entity separate from the Commonwealth. MIFA does not receive any funding from the Commonwealth, nor do any obligations issued by MIFA have any relation to the general obligation of the Commonwealth. It was originally set up to issue Industrial Development Bonds (IDBs). MIFA has turned to environmental financing as the 1986 Tax Reform act curtailed the widespread use of IDB financing.

31 Massachusetts General Laws Chapter 29C section 10(e).

Chapter 3: Financial Planning Guidebook

Two examples of special districts are described below, to illustrate their applicability to certain types of environmental programs, such as stormwater runoff control. The first example describes a formal special district. The second considers an informal special district, and shows that the choice between the two may depend on the revenue source selected.

Example I: A Buzzards Bay Stormwater District

Non-point source pollution such as stormwater runoff is difficult to control on a town-by-town basis. Effective action requires a regional effort. A stormwater special district encompassing a portion or even the entire Buzzards Bay area could coordinate mitigation programs such as implementation of best management practices. It could be financed by a betterment or a tax where the rate schedule is proportional to contribution of runoff to the system. Total fee or tax revenues would cover operating costs and possibly capital costs if they were small. Alternatively, a small bond issue could be used for capital costs. It would be repaid either out of new taxes imposed on the district inhabitants or from similarly imposed user fees. Overall, a steady and dependable stream of financing could be secured for best management practices like the installation and maintenance of street inlets.

Special districts involving two or more towns may be created as follows. Each town or city that wishes to be a part of the district must petition the General Court. Petitions can be approved by each locality either by a vote of the city council or town meeting or by a voter referendum in a city or town election. The petitions are considered by the governor. Following a positive recommendation by the governor, each house of the General Court must approve the creation of the district by a two-thirds majority. It is at this time that the privileges of the special district are established. These privileges may include the right to levy taxes and establish fees. Following the approval by the General Court, each city or town that was part of the original petition must ratify the charter of the district.

If a subdivision of a town wishes to be included in a district that does not contain the rest of the town, the town must approve the petition to the General Court. The enabling legislation that comes out of the legislature will draw the physical boundaries of the district as well as determine who must ratify the charter.

Districts generally have the right to issue debt for the same purposes as cities and towns and any other purposes that the General Court sees fit to grant. Districts are subject to caps on indebtedness which are proportional to the caps of the cities and towns that make up the district. The net indebtedness of cities and towns within a district does not count toward the cap on indebtedness of the district and thus has no effect on the ability of a district to issue debt. It should be noted that most cities, towns, and districts are not approaching their limits on indebtedness. The ability of a district to issue debt depends more on the quality of the project that needs funding rather than the outstanding debt of the district.

Once the revenue raising privileges of the district have been established, the district may raise taxes or fees within the limits of the charter. For example, regional water and sewer districts are limited to a 2.5 percent increase in revenues each year. They may override this increase limit through a two-thirds vote by the governing body of the district followed by a two-thirds vote by the appropriating authority of each city and

town in the district. In the case of a two-town district, an override may be approved by a majority vote at a district meeting.

It is important to note that special districts can access *new* revenue options as they are granted their revenue raising privileges in their enabling legislation. This legislation can contain whatever provisions the General Court see fits to include. A carefully packaged petition may convince the legislature to proceed with this new option.

Example II: Informal Special Districts

The goals of a special district can be achieved without going through the cumbersome procedure of creating a special district through the creation of an "informal special district." In an informal special district, the towns that constitute the problem area agree to adopt similar laws to address the problem.

It should be understood, however, that informal special districts do *not* open new revenue options. An "informal special district" is not a legal entity. It is the result of towns acting in concert to address a regional problem. Individual towns are still subject to the normal restrictions on revenue raising. Therefore, informal special districts are a viable alternative to formal special districts only when the financing needs can be met by individual towns through conventional sources of revenue, such as the use of betterments. Additionally, informal special districts are not feasible when the solution to the problem requires large capital expenditures. In this case, the town in which the capital project was located would bear an inordinate portion of the cost burden while the benefits would accrue throughout the region. In such a case, debt which is supported by the region should be issued, and this requires a special district.

Even though they do not improve the ability of local governments to raise revenue, informal special districts are presented as an independent financing mechanism because they make certain action plans more viable. Non-point source pollution is one of the largest problems in Buzzards Bay. It is also one that defies political boundaries. For one town to attempt to mitigate such pollution without the cooperation of neighboring towns makes little sense. If adjoining towns agree to form an informal special district, then some of these actions become more practical.

One case where it might be more advantageous to create an informal special district is for a stormwater control program. As previously described in the section on betterments, a town could decide to charge a betterment to an area that received a benefit from a stormwater control program. Individual towns can do this without having to go through the state. However, stormwater problems often do not limit themselves to existing political boundaries. For example, a river which serves as the boundary between two towns might flood during large storms. Improving the drainage system to prevent this requires action on the part of both towns. The natural inclination would be to ask the state to create a special district with special taxing authority that could implement a control system. However, it might be more effective for the towns to act in concert using their existing betterment authority to implement a control system in an informal district. Not only does an informal district spare the towns the effort of gaining legislative approval, but it allows them to pick the appropriate financing option. If the state gets involved, then the General Court will determine the financing mechanisms that can be used by the special district.

Regional Revolving Funds

Revolving funds at any level have the advantage of providing a self-sustaining source of funds for capital projects for an indeterminate length of time. Their long-term nature anticipates new environmental problems that will continue to arise even if the state is successful in addressing current problems. The creation of a regional revolving fund in Buzzards Bay could be even more valuable because the state revolving fund is undercapitalized for the problems that Massachusetts faces. The small, but important, projects of Buzzards Bay may get pushed aside in favor of the massive problems of Massachusetts Bay. A Buzzards Bay revolving fund would provide a mechanism to foresee change, address new problems, and establish stability in the maintenance of local environmental investments.

The same principles that lie behind the State Revolving Fund could be applied here: low cost loans, the repayment of which allows the lending ability of the fund to revolve over time. Like the Massachusetts SRF, such a fund would need an initial capitalization. Participating towns could secure this by issuing a pooled bond issue through MIFA. Funds could provide low-interest loans to home owners, for example, wishing to upgrade their septic tanks. It could also provide interest rate subsidies for a variety of environmental projects. No matter what projects the fund covered, it would ensure that Buzzards Bay projects received priority and that funds would be available for years to come.

Application To Selected Actions

The Buzzards Bay Comprehensive Conservation and Management Plan considers several programs that should be undertaken to improve water quality in the region. These include septic system upgrades, stormwater control measures, and provision of boat pumpout facilities, among others. This section looks at all the revenue options and financing mechanisms together and highlights the primary factors affecting the use of each one in financing these three activities. This should help town managers develop a "short list" of the options and mechanisms most appropriate for them.

Following this summary, several case studies are offered to illustrate how towns can develop effective programs and how they can pay for those programs. The examples cited for septic system upgrades and stormwater control are actual programs occurring in other parts of the country. While differences in state laws may prevent direct application of these programs or financing methods to Buzzards Bay, they can still demonstrate the types of actions that comprise effective programs as well as illustrate how other towns and cities have used revenue options and financial mechanisms successfully. The section on boat pumpout facilities offers several versions of a theoretical program designed to achieve increased compliance.

The tables below summarize the revenue options and the financial mechanisms discussed in earlier chapters. While the factors listed as affecting the feasibility and desirability are by no means exhaustive, they do comprise the primary "hoops" through which towns must jump in order to successfully exercise the option in question. Some of the primary factors that may affect the practicality and desirability of the revenue options are:

- **Approval by Local Governing Body** -- This refers to either approval at a town meeting or by the town council, depending on the local government structure.
- **Approval by the General Court** -- To use certain revenue options, the Massachusetts legislature must formally approve such use. Towns can petition the General Court to allow them to use such options.
- **Voluntary Participation** -- In some instances targeted parties are subject to a fee, for example, only if they voluntarily engage in the assessed activity.
- **Equity Issues** -- From an environmental perspective, a revenue option is considered equitable if either the beneficiary or the polluter pays.
- **Continuity of Revenues** -- The timing of cash flows from a revenue option will affect the type of actions that it can support.
- **Financial Management Mechanisms** -- Revenue options must be considered concurrently with the feasibility and desirability of the various financial mechanisms. For example, the use of an enterprise fund may help towns overcome political obstacles to using fees, and thus help make that option more attractive.

Table 1. A summary of revenue options

A SUMMARY OF REVENUE OPTIONS						
	Approval by Local Governing Body	Approval by the General Court	Voluntary Participation	Equity Issues	Continuity of Revenue	Financial Management Mechanisms
General Revenues	Yes	No	No	General Taxpayer	Subject to Annual Appropriations	None
Taxes	Depends	Depends	No	Can Charge Selectively	Continuous	Special Districts
Boat Excise						
a) Change Collection Method	No	No	No	No Change in Relative Burden	Annually Collected	None
b) Raise Rate Using Current Schedule	No	Yes	No	No Change in Relative Burden	Annually Collected	None
c) Change Structure	No	Yes	No	Can be Progressive	Annually Collected	None
Fees						
Betterments	Yes	No	No	Beneficiary Pays	Lump Sum or Continuous	Special Districts
System or User Fees	Yes	No	Yes	Fee-for-Service	Continuous	Enterprise Funds
Impact Fees	No (1)	Yes	No	Charged to Developer	Lump Sum	No History of Any Used
Special Permits	No	No	No	Charged to Developer	Lump Sum	None
Capacity Credits	Yes	No	No	Charged to Users -- Indirectly	Lump Sum	None

1/ If Commonwealth passes as local option, local approval required, if passed as new fee, no local approval required.

Table 1. A summary of revenue options (continued)

A SUMMARY OF REVENUE OPTIONS						
	Approval by Local Governing Body	Approval by the General Court	Voluntary Participation	Equity Issues	Continuity of Revenue	Financial Management Mechanisms
Fines & Penalties	No	Local - No State & Federal - Yes If Sent to Mass. Bay Trust Fund	No	Polluter Pays	Erratic -- Not Dependable	None
Bonds						
General Obligation Bonds (1)	Yes	No	No	General Taxpayer	Lump Sum	MBIA & AMBAC
Revenue Bonds (1)	Yes	No	No	Beneficiary Pays	Lump Sum	MBIA & AMBAC
Grants & Loans	Yes (2)	No	No	Depends on Repayment of Loans	Depends	N/A

1/ Note, these options are also limited under the state imposed debt ceilings for local governments.

2/ Exceptions to this are Tax Anticipation Notes and Revenue Anticipation Notes. Massachusetts General Laws Chapter 44 section 17.

Chapter 3: Financial Planning Guidebook

The table below similarly summarizes the independent financing mechanisms that may be used in conjunction with various revenue options discussed. Again, some of the primary factors influencing the ease with which these mechanisms are used, and their relative desirability, are listed, such as whether approval needs to be secured at the local or state level.

SUMMARY OF INDEPENDENT FINANCIAL MECHANISMS				
	Revenue Option	Approval by Local Governing Body	Approval by the General Court	Primary Benefit
Enterprise Funds	Fees	Yes - Yearly Approval of Budget	No	Protects and Tracks Fees
Bond Bank Services	Bonds	Yes - 2/3 Vote to Use	No	Lowers Costs of Debt Financing
Formal Special Districts	Betterments, Bonds, Taxes	Yes	Yes	Opens up New Revenue Options
Informal Special Districts	Fees (Betterments)	Yes	No	Regional Coordination without State Involvement
Regional Revolving Funds	Bonds & Loans	Yes	No	Lower Cost Financing and Dedication of Funds

Septic System Upgrade Programs

Over 100,000 people use septic systems for wastewater disposal in the Buzzards Bay area (Buzzards Bay Project 1990). When employed properly, on-site disposal systems can be safe, reduce costs, and keep bacterial pathogens at bay³². There is evidence, however, that many of the systems in Buzzards Bay are failing even to keep out bacterial pathogens. Effluent from the failing systems is reaching the ground and surface water around the Bay causing unacceptable levels of fecal coliform and nitrogen to be present.

Through their boards of health, local governments already have the legal authority to regulate septic systems. However, due to a lack of funding and staff this regulation has

³² Even properly working disposal systems, however, can contribute to nitrogen loading and viral contamination.

not been enforced. A financially independent self-sustaining system would be helpful to towns in developing and implementing comprehensive programs.

Comprehensive on-site system management programs are generally divided into two parts. The first centers on monitoring on-site systems while the second ensures that appropriate actions are taken when systems fail. This dual approach allows the program to cover the four problem areas associated with septic systems: siting, design, installation, and maintenance. Thus towns may want to look for a combination of revenue options (and mechanisms) that would provide a continuous revenue stream to cover monitoring and maintenance costs with a more lumpy revenue stream to pay for actions that must be taken when systems fail. Alternatively, they may want to fund capital as well as operating and maintenance costs on a pay-as-you-go basis.

The monitoring step of an on-site program requires the development of regulations and their enforcement through regular monitoring. The cost of doing this, when distributed over many systems, is minimal. Because of the expense involved, the second step, taking action when systems fail, is more difficult to implement because costs are being imposed on households. Implementation can be approached several ways. This guidebook has already addressed funding septic repairs through betterments or through a regional revolving fund. In the case studies that follow, system owners pay for their individual maintenance costs. The Okanogan County, Washington, and Stinson Beach, California, case studies both require owners to pay directly for their own maintenance. The Otter Tail, Minnesota, case study takes another approach. The utility performs all maintenance work itself and spreads the cost over the entire system. The result is a higher yearly utility charge, but home owners avoid large capital costs and the need to borrow.

All three case studies employ user fees to cover their operation and maintenance costs. Bonds, grants, property taxes, and impact fees are utilized to finance capital (and sometimes also operating and maintenance) costs.

Mazama Water Quality Protection System: Okanogan County, WA

Background

In 1985 the Okanogan County Commissioners created the Mazama Water Quality Protection System, a county owned utility, to protect the quality of the ground and surface water in the county. This is a preventative program that demonstrates how water quality problems can be anticipated and prevented at little cost. Additionally, the utility only serves about 12,000 people, showing that a small revenue base can effectively develop septic monitoring programs.

Program Description

The program has two components. The first is a monitoring and inspection plan, and the second is the establishment of sewer maintenance districts. The monitoring and surveillance program has established baseline water quality levels which are continuously monitored for possible problems. The county has built 15 monitoring well and surface water stations which are tested regularly for fecal coliform bacteria and other contaminants. These monitoring wells are used to spot areas of possible system failure. Spot inspections of individual systems are made as a result.

Chapter 3: Financial Planning Guidebook

The protection system also set up sewer maintenance districts as subunits of the utility. The districts are responsible for the regulation of on-site waste disposal systems. They govern the construction of new systems and issue discharge permits. To obtain a permit, the owner must perform a site evaluation and place observation ports in the disposal field for future monitoring. The districts also can perform spot inspections of existing on-site systems. The sites for inspection are chosen as a result of the program's monitoring of the well and surface water stations. If violations are discovered, the owner must make the repairs at his own expense. If the owner fails to respond, the county performs the work and places a lien on the owner's property equal to the cost of the work. Additionally, the county has assumed ownership of any system which handles over 3,500 gallons per day.

Funding

The three revenue sources used were grants, bonds, and user fees. Capital costs were \$352,700. Seventy-five percent of the cost was obtained through a grant from the Washington state Centennial Clean Water Fund. The remaining 25 percent was funded through a bond issue. Capital funds were used in the construction of monitoring wells and monitoring equipment and the performance of on-site repairs. Operation and maintenance costs of approximately \$108,000 were covered by utility charges. In 1988, a single-family house paid \$8.20. A grant from the Centennial Fund is expected to lower utility charges by 75 percent in 1991.

ACTIVITY	REVENUE SOURCE	REVENUE (1988)
Capital Improvement	Grants and Bonds	\$352,700
Operation and Maintenance	Rates and Charges	\$108,000
	Average Household Rate per Month	\$8.28

Applicability to Massachusetts

Buzzards Bay towns could finance a similar program by using a bond issue in combination with user fees.

On-Site System Maintenance: Stinson Beach Water District, CA

Background

Stinson Beach (population 1500) originally planned to build a sewage treatment plant to replace its failing septic system. This idea, however, was rejected by town voters in a referendum. Instead, the town was able to work within its original system to improve on-site disposal. Over a ten-year period, 185 septic systems that were not in compliance were repaired. The town is presently saving money to build a septic system disposal facility that will make the system completely self-contained.

Program Description

The on-site maintenance program has four components, the most important of which is the monitoring of ground and surface waters. Stinson Beach originally tested surface waters weekly for fecal coliform bacteria and quarterly for nitrates and ammonia. As water quality has improved, surface water has shifted to bi-monthly testing for fecal

coliform bacteria, nitrates, nitrites and ammonia with a comprehensive test performed every six months. Groundwater was tested every two weeks for fecal coliform bacteria and quarterly for everything else. Groundwater is now tested quarterly for fecal coliform bacteria and twice yearly for everything else.

The other three program components include inspecting all on-site systems every two years, issuing discharge permits for all on-site systems, and ordering maintenance performed on failing systems at the owner's expense. If the owner fails to comply with a maintenance order, his water is cut off.

Funding

Original funding was obtained through an EPA grant under the Clean Water Act³³, and it was earmarked for the construction of a sewage treatment plant. When the plant was defeated at the polls, the EPA determined that a septic district would perform the same function as the treatment plant and allowed the funding to remain in place. The 1988 budget of approximately \$140,000 was covered by discharge permit fees of \$12 per month per household, property taxes and separate fees for monitoring and inspection, new connections, and variance applications.

ACTIVITY	REVENUE SOURCE	REVENUES
On-site Program	Discharge Permit Fees	\$86,000
Management	Other Fees	\$25,000
	Property Taxes	\$35,000
	Average House Rate per Month	\$12.00

Applicability to Massachusetts

In this case, bonds backed by betterments could cover capital costs, and again, fees could be levied to cover bond repayment and operating and maintenance costs. While Proposition 2 1/2 will prevent towns from diverting property taxes to cover costs, a case can probably be made for the fees to cover the difference.

On-site Maintenance: Otter Tail Lake Sewer District, MN

Background

In 1981 the Otter Tail Lake Sewer District was created to protect six lakes in Otter Tail County from contamination due to failing on-site systems in the area. A referendum of lake area residents established the district as a separate entity from the county government. It covers only the lake area.

This program is an excellent example of a flexible approach to meet the preferences of the local population. Residents can choose between active and passive maintenance, and the resulting charges in the active program are a function of the owner's residency. This flexibility may be attributable to the fact that the system has to monitor less than

33 This grant was probably part of the Construction Grants Program.

Chapter 3: Financial Planning Guidebook

1400 systems. It remains, however, an example of a way to build political support for a new program.

Program Description

The on-site maintenance program has two components. They include inspection and repair and maintenance. All on-site systems are regularly inspected according to their use category: permanent residents are inspected every two years; summer residents have their systems inspected every three to four years; resorts and businesses are inspected yearly. The program is unique, however, in that it offers a two-tier level of participation and hence repair and maintenance. Septic system owners can sign a Passive Maintenance Agreement (PMA) or Active Maintenance Agreement (AMA). The PMA caters to households generally opposed to the system. These households do not form a part of the routine maintenance program, and if problems develop the district will make repairs only at the owner's expense. PMA systems are inspected occasionally to ensure that they are in compliance with town standards. Under AMAs, the district provides routine inspections of the systems and pays for all maintenance deemed necessary. This includes tank pumpout. In sum, the district performs all necessary maintenance for those systems on the active program and ensures that maintenance is performed on those systems in the passive program. It also builds and maintains community drainage fields and engages in groundwater monitoring with special emphasis on areas around drainage fields.

Funding

The start-up costs for the district, such as assessing needs and designing the program, were covered through grants from the state of Minnesota and the EPA under the Clean Water Act³⁴. Operation and maintenance as well as drainage field construction and ground-water monitoring are covered by fees. Owners under Passive Maintenance Agreements pay \$25 per year to cover administrative costs. Fees under the Active Maintenance Program vary according to the type of septic system each owner has and whether they are a permanent resident, charging more for year-round residents. For example, a permanent resident with a gravity system would pay \$78 per year. The program has a total annual budget of \$70,000. Program revenue is divided into funds which are earmarked for specific uses, tank line and drain field construction and repair, and maintenance, pumping, and control systems.

ACTIVITY	REVENUE SOURCE	REVENUES
On-site Program Management	Fees	\$70,000
	Average Household Rate Passive Maintenance (per month)	\$2.00
	Average Household Rate Active Maintenance (per month)	\$6.50

34 These funds were most likely part of the Construction Grants Program.

Applicability to Massachusetts

This program is fully applicable to Massachusetts. While a town could set up a utility to run the program, given the unusual way that costs are covered (fees paid bear no relation to the amount of maintenance received) and economies of scale possible (more than one town may want to join this program), it might be advisable to ask the state to create a special district to oversee this kind of program. In lieu of receiving funds from the Construction Grants Program, a entity could apply to the Massachusetts SRF for a loan or sell a small bond issue to cover start-up costs.

Stormwater Management Programs

Stormwater refers to runoff following storms caused by disturbances of natural drainage patterns. These disturbances most often take the form of impervious surfaces which must be laid down as a part of development. Water flowing over impervious surfaces is not permitted to go through a natural filtration process and often reaches waters with excess contaminants. Stormwater contributes to water quality problems such as bacterial loading, pollution from hydrocarbons, metals, and floatable debris, and accelerated sedimentation.

Any comprehensive stormwater control system must address four major concerns: flooding, erosion, water quality, and groundwater recharge. There are three categories of best management practices that can be employed to meet these goals:

- Infiltration devices to increase the percolation of stormwater into soil and decrease overland runoff volume. Examples include downspouts, porous pavement, dry wells, infiltration trenches, percolation basins, and grass swales.
- Wet detention basins to detain runoff and allow for settling of pollutants associated with sediments and reduction of nutrients through biological processes.
- Public works cleaning practices to remove potential pollutants from streets and storm sewers. Examples include street cleaning and cleaning catch basins and stormsewer pipes³⁵.

Stormwater problems (and the benefits derived from stormwater control) are typically not limited to town boundaries. Thus in many cases, Buzzards Bay towns will need to form either an informal special district or a formal special district around the affected area. Either way, the beneficiary group will have been separated from the rest of the community. It is also possible that this group will comprise most of the contributors to the problem as well, if the special district is based on physical proximity to the waterway.

If towns form an informal special district, no *new* revenue option is open to them, but they may be able to impose betterments or system fees successfully on the beneficiary

35 Refer to CCMP Volume I, Controlling Stormwater Runoff Action Plan

Chapter 3: Financial Planning Guidebook

group. (It must be remembered that betterments cannot be levied until the project is completed. Therefore, the town would have to borrow the funds and use the betterment revenue to pay off the debt service.) If a formal special district is selected, the participating towns can petition for new taxing authority. The advantages of the latter strategy are two-fold: the special district can encompass just the beneficiary group, and taxes, if authority is granted, can be levied on a polluter-pays principle. The main disadvantage is that towns must go through the state to exercise this option.

The advantage using an informal special district is that towns do not need to go through the state. The main disadvantage is that for two towns to set up an informal special district, they would need to encompass the whole of both towns as this option requires passing parallel laws in the two towns. Not all inhabitants, however, may be beneficiaries. Thus local approval may not be forthcoming. A second disadvantage is that if fees are selected as the revenue option to use, they cannot be applied on the polluter-pays principle, which might be the funding principle that raises the least political opposition. One option towns could try is to levy the betterment based on water use. While this is not a polluter-pays principle, it does reflect the cost of providing the service to the user. In the case of farmers, high water use may actually approximate contribution to runoff as larger farms use more fertilizer as well as more water. For city users, however, the link would not hold.

The appropriate mix of these actions will depend on the locality. The case studies present several approaches to various problems.

Stormwater Management Utility: Cincinnati, OH

Program Description

Cincinnati determined that it needed to create a utility that would have sole authority over the development and implementation of a comprehensive stormwater management plan. Previously, responsibility for various aspects of stormwater control had been given to various agencies within the city government. Since it was not the primary responsibility of any one agency, however, stormwater control funds were usually an early target in budget negotiations. The utility has thus far concentrated on cleaning and repairing the city's 30,000 street inlets. It is beginning to engage in capital planning and plans to extend the system to areas that are not presently served.

Funding

The utility has the power to levy a stormwater control fee which is based on individual property contribution to runoff. This fee has two components.

- Area Range Number (ARN). This is an indication of lot size.
- Intensity of Development Factor (IDF). This is a coefficient based on the percentage of each property that is covered by impervious surfaces.

The total financial needs of the system are calculated as follows. Each property owner's Equivalent Runoff Units (ERUs) are calculated by multiplying an individual's ARN by his IDF. The monthly charge per ERU then is calculated by dividing total program costs by the total number of ERUs and again by 12. Each individual's property charge is obtained by multiplying the monthly charge per ERU by the ERU of the individual property.

In 1984, the utility had a budget of \$5.2 million. This worked out to \$1.28 per ERU per month. To simplify the administrative requirements, the ERUs for one or two family residential properties were calculated under a flat rate system: properties with less than 10,000 square feet of property were assumed to equal one ERU while households with more than 10,000 square feet were given ERUs of 1.4. Since the city had not finished assigning an ERU to each parcel of property yet, the utility collected only \$3 million.

ACTIVITY	REVENUE SOURCE	REVENUES
Stormwater Management	ERUs	\$3,000,000 (partial user base)
	Monthly Charge per ERU	\$1.28

Comments

The largest task for the utility was determining the appropriate ERU for each piece of property. By beginning to collect fees before the data base was complete, the utility proved that it could act quickly despite a complicated system. Measured by the number of complaints following large storms, the utility has been a great success.

Applicability to Massachusetts

Unless a special stormwater management district is created by the General Court, the method of fee collection used in Cincinnati is probably not legal in Massachusetts as it might be construed as a tax. However, it may be possible to pay for such a system through betterments. The principle drawback of using betterments is that revenue collection does not begin until after the work is complete. A stormwater utility would have to issue bonds or engage in short-term borrowing to cover the costs of the system until betterments are assessed.

Everett Stormwater Management Program, WA

Background

The Everett Stormwater Management Program is an example of a program that successfully expanded to meet more stringent water quality requirements. The city had operated a moderately successful stormwater management program since 1976, but the adoption of the Puget Sound Water Quality Management Plan shifted the emphasis from flood control to improving water quality. The original program was part of the Public Works Department. When expanded in April 1989, a separate utility was created.

Original Program

Everett's first stormwater management program had five components. It was responsible for drainage system maintenance, construction of regional drainage improvements in developing areas, planning review and permit issuance for new development, basin planning and improvements, and record keeping. The goals of the original program were to control the amount of stormwater runoff and limit flooding as a result of new development in the city.

Expanded Program

Chapter 3: Financial Planning Guidebook

The expanded program added three components. It began undertaking capital improvements including the construction of regional detention ponds and artificial wetlands. These serve to reduce the disturbance to natural drainage within the city. A program of surface water monitoring was added to track trends in water quality and assist in identifying sources of pollution. The final new component was a community involvement program designed to educate the public on the ways their behavior affect water quality. The new components reflected the new goal of the program of reducing contaminants in stormwater as well as controlling the amount of runoff.

Funding

The original stormwater management program did not have a specific rate structure. However, in the later years of the original program, the fees averaged out to \$1.20 per month for a single family house. Additionally, developers contributed approximately \$50,000 per year in fees that were accepted in lieu of the construction of on-site control facilities³⁶. The total budget for the original program was approximately \$500,000 per year.

The expanded management program established a formal rate schedule based on single-family-home equivalents. This fee system is unusual in that it does not attempt to measure the contribution to runoff by each parcel of property. Instead, the charge is based on water consumption with a base unit of 900 cubic feet per month for a single family household. The current charge is \$3.40 per month per single-family-home equivalent. Residents now see a separate line on their sewer bills for stormwater management. The unusual basis for the fee schedule probably results from the program's past as part of the Department of Public Works.

Under the expanded program, the city only collects \$10,000 per year in developer fees because the city now requires the provision of on-site control facilities at construction sites.

<u>ORIGINAL PROGRAM</u>		
<u>ACTIVITY</u>	<u>REVENUE SOURCE</u>	<u>REVENUES</u>
Stormwater Management	Rates	\$450,000
	Developer Fees	\$50,000
	Average Household Rate (per month)	\$1.20
<u>EXPANDED PROGRAM</u>		
<u>ACTIVITY</u>	<u>REVENUE SOURCE</u>	<u>REVENUES</u>
Stormwater Management		\$1.4 million
Rates		
	Developer Fees	\$10,000
	Average Household Rate (per month)	\$3.40

36 This type of impact fee program is not presently legal in Massachusetts.

Applicability to Massachusetts

Except for the developer fees, this program is fully applicable to Massachusetts. Regarding the developer fees, Everett now stresses the construction of on-site control measures instead of fee payment. Requiring on-site control can be done in Massachusetts.

Bellevue Storm and Surface Water Utility, WA

Background

The Bellevue Storm and Surface Water Utility was designed to address problems created by explosive development. From 1970 to 1988, the population of Bellevue, Washington, grew by almost 80 percent to 82,000. Bellevue established the utility in 1974 to manage storm and surface water in order to prevent property damage, protect water quality, and provide for the "health, safety, and enjoyment of citizens, and the preservation and enhancement of wildlife habitat." (Bellevue Urban Runoff Program, 1984).

Program Description

The operations of the Bellevue utility can be divided into two broad categories, actions to address erosion and flood control, and actions that concentrate on improving water quality and maintaining its use in terms of habitat, recreation, and aesthetics. Under the first category, the utility developed a Drainage Master Plan and implemented a Capital Improvement Program. The goal was to maximize stormwater detention time through improving sedimentation and enhancing the water quality of stormwater. The utility also regulates new development and construction procedures. It requires developers to obtain cleaning and grading permits and to construct on-site control facilities. Additionally, developers are required to employ the Best Available Technology in order to control erosion. The utility also protects streams and steep slopes from erosion.

The second category includes wetlands protection, emergency response to hazardous materials spills, monitoring water quality as part of the NPDES permit program, education of the public, and investigation of drainage code violations. Violations are met with a \$500 per day fine for each violation.

Funding

Bellevue issued \$10 million in revenue bonds to finance the construction of the original control facilities. Operation and maintenance costs are met by service charges which are based on contribution to runoff. In order to build public acceptance of the service charges, the utility charged the average household 80 per month for the first three years of the program. The issuance of the revenue bonds allowed the utility to begin operations despite low revenue from service charges. In the fully operating system, the city has five categories of development intensity which, combined with the size of the property, determines the fee. An average household lot of 8-10,000 square feet, with lightly developed land, pays about \$10.36 per month. Heavily developed commercial property of the same size pays \$17.76 per month. The provision of on-site controls by a property owner will lower the intensity of development category by one step. The city

Chapter 3: Financial Planning Guidebook

also has provisions to reimburse senior citizens and low income families for part of the service charges.

The utility has an annual operations and maintenance budget of nearly \$5 million. Service charges provide \$4.5 million. A "late-comer provision" which is equivalent to an impact fee yields about \$315,000 per year. The utility also receives \$30,000 to \$100,000 per year in grants from Washington state. The state also provides funds to pay for the cost of runoff from state highways.

ACTIVITY	REVENUE SOURCE	REVENUES
Stormwater Management	Service Charges	\$4,500,000
	Permit Fees	\$315,000
	Grants	\$30,000-100,000
	Average Household Rate (per month)	\$10.36

Applicability to Massachusetts

The Bellevue program has the same applicability problems as the Cincinnati program. The service charges would be considered an illegal tax in Massachusetts. The "late-comer provision" is equivalent to an impact fee, and state funding for a program is not a viable option. However, these problems can be overcome by using funding mechanisms such as betterments, special permits, and bonds which have already been discussed.

Snohomish Surface Water Management Program, WA

Although the specific actions of the Snohomish Surface Water Management Program are not unusual, this case study is an excellent example of how to gain public support for a stormwater management utility. Snohomish established its first utility in 1981 to serve unincorporated areas of the county. Fee collection began in 1983 with the intention of financing the planning stage critical for an effective program. However, without clearly defined actions, the fees were not accepted by the public and the utility was repealed in a referendum in 1984.

The utility would not be accepted without a completed action plan but the county did not have sufficient funding to conduct thorough studies. The county thus decided to begin by conducting a small siting study that would be funded by general revenues. It determined that the county needed six detention ponds to control runoff. The need for capital to build the ponds formed the basis on which they could recreate the utility. County leaders decided to concentrate on building the ponds first and focus later on water quality improvement. To help bolster initial public support for the utility, the county combined construction of drainage facilities with recreational facilities such as ball fields and nature trails.

The increased support for the utility allowed it to expand beyond the construction of the six detention ponds. The utility is currently planning actions to improve water quality. Further, the utility's boundaries have been extended to include the Lake Stevens area.

Boat Pumpout Program

Unlike stormwater management and septic system upgrade programs, real examples of effective boat pumpout programs are harder to find. This is because boat pumpout programs face a fundamental problem beyond planning and financing, that is compliance. In harbors where pumps are available, even when the service is free, boater participation is very low. In Edgartown, for example, pumps are available at no charge. The Harbor Master estimates that 1,500 gallons per day should be pumped during peak season. In fact, however, Edgartown pumps out 5,000 gallons *per year*³⁷.

Due to the paucity of concrete examples, a theoretical program is presented in two parts. The first part addresses financing issues. This section can be applied to any program. The second part discusses several methods to improve participation. Although one approach is recommended, individual towns are in the best position to judge what will work for them.

Financing Boat Pumpout

Towns should first remove harbor-related expenditures from general revenues and create enterprise funds to manage harbor costs. The source of revenue for the enterprise fund would be mooring fees. This has two advantages. First, it allows towns to recover the costs of providing a service from the distinct group that benefits from the service. Second, removing harbor costs from the town budget would allow the town to lower property taxes or provide a new service to the general populace. Towns must, however, be careful which harbor costs they try to cover with mooring fees. The Massachusetts Attorney General has stated that "a fee to collect revenue that is intended to pay for the availability of augmented harbor services rather than a fee payable for a benefit limited to the boat owners would constitute a tax"³⁸ and would be illegal without special permission from the General Court. An example of an activity that could *not* be funded through mooring fees would be the upkeep of a dock that was used for fishing and not mooring.

The best way to finance a boat pumpout program, whether or not the entire harbor is enterprise funded, is to include the program in the services covered by mooring fees. Since disposing of human waste in Buzzards Bay is illegal, towns can rightly claim that the provision of adequate pumpout facilities is essential to the operation of a harbor.

37 It should be noted that Edgartown is considered to have a model program. Through a combination of education and the provision of convenient pumps, they have lowered their fecal coliform bacterial levels to near zero. However, locational factors such as the size of the marina and its proximity to open water help make this success possible. Buzzards Bay does not benefit from these advantages.

38 Excerpted from an Attorney General's statement approving a town by-law of Gosnold, March 27, 1985.

Chapter 3: Financial Planning Guidebook

The Office of the Attorney General has stated that "to the extent that a local community is incurring costs for the necessary provision of services reasonably necessary for the Commonwealth tidelands located therein, there may be justification for the local legislative body to seek to recoup such expenditures through appropriate legislative enactment."³⁹ The specific benefit to boat owners is successfully linked because without the provision of pumping equipment boats would have to travel to a harbor that had pumps.

The town of Marblehead can be used as an example of an enterprise funded harbor that could easily add a boat pumpout program to the services it provides to boaters. The harbor has 2300 slips and runs on a budget of \$385,000. The average boat, therefore, pays \$167 per year in mooring fees⁴⁰. The annualized cost of a medium sized multi-station pump would add approximately \$5,000 to the town's harbor budget bringing the mooring fees to \$170 per boat. If one multi-station pump could not meet the harbor's demand for pumpout or if Marblehead wanted to make pumpout as convenient as possible, a mobile pumpout station could be added for an additional \$16,000 per year. The addition of both stations would increase mooring fees to \$177 per year or \$10 per boat per year higher than when the harbor had no pumpout facilities.

Increasing Participation in Boat Pumpout Programs

Even after paying for the systems, towns still face the difficulty of convincing boaters to take the time to pump out their boats. Since emptying a boat tank is a simple procedure, enforcement of pumpout regulations is difficult if not impossible. Additionally, where enforcement is possible, many boat owners may choose to pay a fine rather than take the trouble to pump out their boats. A two-pronged approach is suggested to address this problem.

The first step is to increase voluntary compliance with the pumpout program. The second step is to offer an incentive to more reluctant boaters. Towns can increase compliance by making pumpout easy and convenient and educating boaters on the consequences of their actions. Edgartown has employed such a program with some success. A section on water pollution is included with the harbor regulations given to every boat entering the harbor. The Edgartown Harbor Master estimates that well over 1,000 copies of these regulations are handed out each year. Edgartown also provides pumping facilities free of charge to any boat in the harbor whether or not it is moored there. When transient boats pay their daily mooring fees at the private marinas, the collector suggests that they have their tank pumped at the mobile station. The Harbor Master keeps track of houseboats to see how often they are pumped out and suggests occasional pumpouts to those boats that are delinquent.

³⁹ Excerpted from an Attorney General's statement disapproving a Wareham by-law regarding mooring fees, March 11, 1985. Although the specific by-law was struck down, the Attorney General made it clear that cost recovery linked to specific benefits for a specific group was an appropriate application of user fees.

⁴⁰ In reality, Marblehead charges an annual fee of \$5.50 per foot. For the sake of the example, an average charge per boat was used as the mooring fee.

While the Edgartown system works moderately well, it is a small harbor, so it is relatively easy to keep track of which boats regularly pump their tanks and which do not. Edgartown is also near open water. The Harbor Master suspects that many of the boats that moor in the harbor empty their tanks once out in the ocean.

An alternative program offers a financial incentive to comply. Marblehead will serve as the sample case. Three versions of a boat pumpout program are examined.

System I

In this system, a deposit in addition to the mooring fee is collected at the beginning of each season and put in escrow. Boat owners will be expected to comply with a pumpout schedule. At the end of the season, those owners who have complied will receive their deposit back with interest. In addition, they will receive a share of the deposits (plus interest) of those owners who failed to comply with the schedule. The reason for the bonus is two-fold. First, Massachusetts law prohibits the collection of any fees for the purpose of raising revenue. If a town kept the surcharges of owners who failed to comply, then the revenue collected from boat owners would exceed the costs of providing harbor-related services and would be illegal. Second, the possibility of a rebate in addition to the return of the surcharge is an added incentive for owners to participate.

For example, if Marblehead were to request a \$400 deposit from each of the 2300 boats moored there and 75 percent of the boat owners complied with the pumpout schedule, then the compliant owners would receive their \$400 deposits back plus interest. They would also divide the deposits of the 575 non-compliant owners among themselves. This would amount to \$133 per owner plus interest. At the limit of full compliance, each owner receives just his or her deposit back plus interest. On the other hand, the lower the compliance rate, the higher the bonuses. A ten percent compliance rate, for example, would mean rebates of \$3600 plus interest to each compliant owner at the end of the season.

For the system to work three details must be worked out. How often must boats be pumped? How is this enforced? What happens to those who partially comply?

The first question can be addressed in two ways. The town can decide whether every boat should be pumped out after a certain number of outings, or it can decide that every boat must be pumped a flat number of times per season regardless of use. The Harbor Master can specify the two alternatives such as "boats must be pumped every fourth time they are used" or "boats must be pumped once a month during the season," and allow boat owners to vote on the system they feel is more equitable.

One factor that will affect the selected schedule and determine whether it can be put to a vote is the ease with which the selected schedule can be enforced. The ability to enforce a more complicated system will vary. If a check-in system (such as a manned gate at the entrance to the harbor) can be established that will effectively reflect boat use, then requiring one pumpout for every three or four outings is the most equitable system. If, however, a check-in system is infeasible, then a flat pumpout rate will have to be implemented.

Regarding partial compliance with a schedule, partial shares in the rebates can be offered at the end of the season. For example, if an owner was expected to pump his

Chapter 3: Financial Planning Guidebook

boat eight times during the summer and he only pumped it four times, then that owner would receive half of the rebate that a fully compliant owner would receive.

The success of this system rests on the assumption that there is an implicit relationship between the potential rebate and the rate of compliance. Since rebates could be very high if the compliance rate is low, it is felt that this system will achieve a higher rate of participation than any other even though the actual rebates fall as the compliance rate rises. The difficulty in implementing the system is that it is very unusual. However, if town leaders explain that at the very least, compliant boaters will get their money back with interest and that they will probably get at least a partial rebate on their mooring fee, it should be politically acceptable. The second problem lies in requiring boat owners to put up \$400 (or a similar amount) at the beginning of the year. This should be a problem only in the first year of the fee system since compliant owners can apply the money they get back to the next year's charge.

System II

In System II the deposits of non-compliant owners are redistributed to every owner moored in the harbor. For example, if 75 percent of the boats in Marblehead comply with the schedule, then compliant owners receive their \$400 deposits back plus interest, and all boat owners receive a rebate check for \$100 plus interest⁴¹. The advantage to this system is that all boat owners pay the same mooring fee each year, and this may be more politically viable. The main disadvantage to this approach is that the participation incentive is not as strong, as the potential rewards are not as great, and the penalties are not as severe.

System III

If neither System I nor II prove to be politically acceptable (or legal)⁴², a system of negative incentives may be possible. A town could pass a harbor regulation requiring that boats adhere to a pumpout schedule. Those who do not would be subject to a very large fine. The specific schedule and enforcement mechanism must be decided on in a manner similar to System I.

41 $2300 \times .25 = 575$ non-compliant owners \times \$400 = \$230,000 to be rebated equally to all 2300 boat owners.

42 While deposits are commonly used in the private sector, it is not clear that such a system can be imposed by a government entity. Legal analysis should be performed before such a system is implemented.

References Cited

Apogee Research. 1987. *Financing Infrastructure: Innovations at the Local Level*. National League of Cities.

Apogee Research. 1988. *Financing Marine and Estuarine Programs: A Guide to Resources*. Office of Marine and Estuarine Protection, U.S. EPA. September 1988.

Apogee Research. 1989a. *Local Financing for Wellhead Protection*. Office of Water, U.S. EPA. June 1989.

Apogee Research. 1989b. *Inventory of Funding Sources for the Cleanup and Maintenance of the Narragansett Bay*. Narragansett Bay Project, Draft Report, June 1989.

Apogee Research. 1989c. *Local Government Water Quality Finance Guidebook*. Puget Sound Water Quality Authority Revised Draft. September 1989.

Apogee Research. 1989d. *A Preliminary Analysis of the Public Costs of Environmental Protection: 1981-2000*. Office of Administration and Resources Management, U.S. EPA.

Apogee Research. 1989e. *Funding the Cleanup and Protection of Puget Sound*. Puget Sound Water Quality Authority. December 1989.

Apogee Research. 1989f. *The Cost of Environmental Protection: EPA, the States, and Local Governments*. Office of the Comptroller, U.S. Environmental Protection Agency,

Apogee Research. 1990a. *America's Environmental Infrastructure: A Water and Wastewater Investment Study*. Clean Water Council. December 1990.

Apogee Research. 1990b. *Overview Economic Assessment of Remedial Action Plans for the Great Lakes Areas of Concern*. Ontario Ministry of the Environment.

Apogee Research. 1990c. *Identifying Beneficiaries of Water and Sewer Infrastructure and Examining Alternative Financing and Administrative Arrangements*. Ontario Ministry of the Environment Draft Report. November 1990.

Apogee Research. 1990d. *Public-Private Partnerships for Environmental Facilities: A Self-Help Guide for Local Governments*. Office of Administration and Resources Management, U.S. EPA.

Apogee Research. 1991. *Financial Strategies for Nutrient Control Measures in Long Island Sound*. Long Island Sound Study Final Draft. January 1991.

Baltimore Regional Planning Council. 1988. *Retrofit Planning for Urban Stormwater Runoff*. Baltimore, MD: Regional Planning Council.

Bellevue Urban Runoff Program. 1984. *Summary Report*. June 25, 1984. p. 135.

Boyer, Bennet & Shaw, Inc. 1988. Catalog of State Grants for Municipal Officials 1988-1989. Executive Office of Communities and Development, Commonwealth of Massachusetts.

Bureau of the Census. 1984. 1982 Census of Governments: Volume 4 -- Government Finances, No.2 -- Finances of Special Districts. Washington DC: U.S. Government Printing Office. p. vi.

Buzzards Bay Project, 1991. Comprehensive Conservation and Management Plan.

Carey, A. and K. Rubin. 1989. Discussion Paper on Alternative Financing Mechanisms for State Water Programs. Office of Water, U.S. EPA. September 1989.

Carlin, A. and Environmental Law Institute. 1989. Environmental Investments: The Cost of a Clean Environment. Office of Policy, Planning and Evaluation, U.S. EPA.

Connery Associates. 1990. Land Use Commentary. Vol I, No 2. June 1990.

Chesapeake Bay Critical Area Commission, 1987.

Courtney, Fara. Waterways Enterprise Funds Available. Coastlines. p4.

Dartmouth, Town of. 1989. Annual Town Report. p. 36.

Engineering News Record. January 11, 1990.

Field, R. 1988. Storm and Combined Sewer Overflow: An Overview of ORD's Disestablishment Program.

Hamill. J. 1990. Report of the Governor's Task Force on Local Finance.

Johnson, Marie, M. Ryand and P. Marquis. 1990. Compendium of User Fees: Massachusetts Cities and Towns. Massachusetts Municipal Association.

Lindsey, Greg. 1988. Financing Stormwater Management: The Utility Approach. Sediment and Stormwater Administration, Maryland Department of Environment

Maryland Department of Natural Resources. 1986. Maintenance of Stormwater Management Structures: A Departmental Summary. July 1986.

Maryland Department of Natural Resources. 1990, Boating Administration, A Guidebook for Marina Owners and Operators On the Installation and Operation of Sewage Pumpout Stations.

Metcalf & Eddy, Inc. 1988. Nonpoint Source Management Plan for the Watershed of Snell Creek Westport, Massachusetts. DEP report.

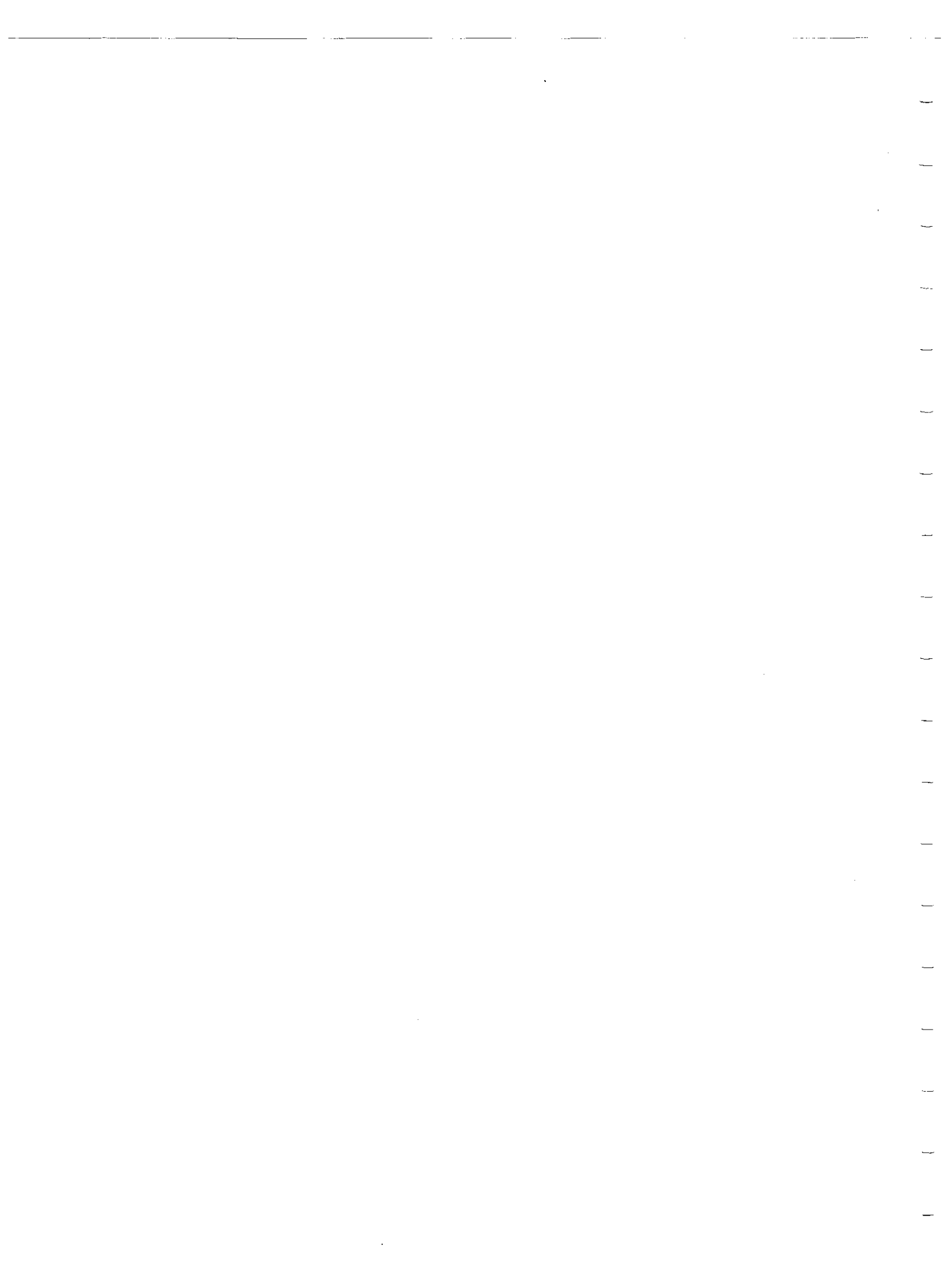
National Governors' Association. 1989. Funding Environmental Programs: An Examination of Alternatives.

Nicholad, James C and Arthur C. Nelson. 1988. Determining the Appropriate Development Impact for Using the Rational Nexus Test. Journal of the American Planning Association, Vol. 54.

Novak, John T., C.R. McDaniel, and S.C. Howard. 1990. The Effect of Boat Holding Tank Chemicals on Treatment Plant Performance. Research Journal of the Water Pollution Control Federation, May/June 1990. Vol. 62, p. 228.

References Cited

- Novotny, V. and G. Chesters. 19xx. Handbook of Nonpoint Pollution: Sources and Management. Van Nostrand Reinhold Environmental Engineering Series.
- Pensyl, L.K. and P. Clement. 1987. Results of the State of Maryland Infiltration Practices Survey Paper, State of Maryland Sediment and Stormwater Management Conference, Washington College, Chestertown, Maryland. August 1987.
- Porter, D., B. Lin, and R. Peiser. 1987. Special Districts: A Useful Technique for Financing Infrastructure. Urban Land Institute, Washington, DC.
- Rubin, K.I. and Alderson, M. 1988. Financing Marine and Estuarine Programs: A Guide to Resources. EPA 503/8-88/001.
- Scheuler, T.R. 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments.
- Schulette, Theodore C. 1989. Funding Wastewater Project with Impact Fees. Water Environment and Technology, Vol. pp 412-417.
- State Funding for Natural Areas, Progress Report, The Nature Conservancy, June 1990.
- U.S. EPA. 1979. Benefit Analysis for Combined Sewer Overflow Control. Government Printing Office.
- U.S. EPA. 1987. Stormwater Treatment Project Buttermilk Bay: Bourne & Wareham, Massachusetts.
- U.S. EPA. 1988. Financing Marine and Estuarine Programs: A Guide to Resources. Office of Marine and Estuarine Protection.
- U.S. EPA. 1989a. State Use of Alternative Financing Mechanisms in Environmental Programs. Office of Policy, Planning and Evaluation.
- U.S. EPA. 1989b. Federal Financial Assistance Programs: Targeting Programs Applicable to Coastal Management. Office of Marine and Estuarine Protection, U.S. EPA 503/8-90-001 (draft)
- U.S. EPA. 1989c. Public-Private Partnership Case Studies: Profiles of Success in Providing Environmental Services. Office of Administration and Resources Management (PM-225).
- U.S. EPA. 1989d. Public-Private Partnerships for Environmental Facilities: A Self Help Guide. Office of Administration and Resources Management (draft).
- Walker, William R., et al. 1989. Effects of Holding Tank Additives on Treatment of Boat Holding Tank Wastes. Virginia Water Resources Research Center.
- Wiegand, C., T. Schueler, W. Chittenden, and D. Jellick. 1986. Cost of Urban Runoff Quality Controls. Urban Runoff Quality Proceedings of Engineering Foundation Conference, Urban Water Resources. American Society of Civil Engineers/Henniker, NH, June 23-37, 1986.



Appendix A

List Of Contacts For Chapter 1

Federal Agencies

Guy St. Andre, Wastewater Management Section, Water Management Division, EPA Region I, Boston, MA

Ralph Caruso, Section Chief, Wastewater Management Section, Water Management Division, EPA Region I, Boston, MA

Sharie Centilla, Municipal Facilities Division, Office of Municipal Pollution Control, EPA, Washington, DC

George Denning, Municipal Construction Division, Office of Municipal Pollution Control, EPA, Washington, DC

Craig Dore, Chief, Community and Business Program, Farmers Home Administration, U.S. Department of Agriculture, Amherst, MA

Carol Kilbride, Marine and Estuary Protection Section, Water Management Division, EPA Region I, Boston, MA

Nancy Laplante, Director of Program Support, Community Planning and Development Division, Department of Housing and Urban Development, Boston, MA

Mark Malone, Municipal Evaluation Section, Water Management Division, EPA Region I, Boston, MA

Richard McIntire, Program Specialist, Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture, Amherst, MA

Bill Nuzzo, Chief, Office of Water Program Coordination, Water Management Division, EPA Region I, Boston, MA

Jerry Potamis, Section Chief, Wastewater Financial Management Section, Water Management Division, EPA Region I, Boston, MA

Nancy Sullivan, Non-Point Source Coordinator, Water Quality Management Section, Water Management Division, EPA Region I, Boston, MA

Fred Suffian, Water Resources Coordinator, Soil Conservation Service, U.S. Department of Agriculture, Amherst, MA

Bruce Rosinoff, Project Officer, Water Management Division, EPA Region I, Boston, MA

Stuart Tuller, Assessment and Watershed Protection Division, Office of Water Regulation and Standards, EPA, Washington, DC

State Agencies

Jim Allicatta, Agricultural Land Use Division, Department of Food and Agriculture, Executive Office of Environmental Affairs

Robert Austin, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Kathy Bartolini, Director of State and Local Planning, Executive Office of Communities and Development

Rodney Brown, Coastal Planner, Planning Division, Department of Environmental Management, Executive Office of Environmental Affairs

Jack Buckluy, Division of Fish and Wildlife, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Frank Burke, Department of Public Works, Executive Office of Transportation and Construction

Joe Costa, Coastal Zone Management Office, Executive Office of Environmental Affairs

James Courchaine, Program Manager, Division of Water Pollution Control, Department of Environmental Protection, Executive Office of Environmental Affairs

Dane Crook, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Jim Fair, Division of Marine Fisheries, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Bill Fitzpatrick, Council, Committee on Transportation, Massachusetts House of Representatives

Jean Foley, Committee on Transportation, Massachusetts House of Representatives

Glenn Hoss, Department of Environmental Protection, Executive Office of Environmental Affairs

Pat Hughes, Coastal Zone Management Office, Executive Office of Environmental Affairs

Brian Jeans, Department of Environmental Protection, Executive Office of Environmental Affairs

Jennifer Jillson, Program Coordinator, Division of Conservation Services, Executive Office of Environmental Affairs

Joel Lerner, Director, Division of Conservation Services, Executive Office of Environmental Affairs

Leslie Lewis, Rivers and Harbors Program Administrator, Waterways Division, Department of Environmental Management, Executive Office of Environmental Affairs

References Cited

Andrea Lukens, Planning Division, Department of Environmental Management, Executive Office of Environmental Affairs

Larry McCavitt, Coastal Zone Management Office, Executive Office of Environmental Affairs

Bill Minor, Division of Fish and Wildlife, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Sue Moor, Coastal Zone Management Office, Executive Office of Environmental Affairs

Ray Murphy, Capital Expenditure and Program Office, Department of Public Works, Executive Office of Transportation and Construction

Mark Nardone, Municipal Development Division, Executive Office of Communities and Development

Joe Pelczarski, CFIP Manager, Coastal Zone Management Office, Executive Office of Environmental Affairs

Jeff Peterson, Municipal Development Division, Executive Office of Communities and Development

Claudia Shambaugh, Coastal Zone Management Office, Executive Office of Environmental Affairs

Mark Siegenthaler, Municipal Development Division, Executive Office of Communities and Development

Alan Slater, Program Manager, Division of Water Pollution Control, Department of Environmental Protection, Executive Office of Environmental Affairs

Kevin Sowyrda, Division of Local Services, Department of Revenue, Executive Office of Administration and Finance

Wesley Ward, Deputy Director, Trustees of Reservations

Mark Winetrou, Massachusetts Cultural Council

Henry Woolsey, Non-Game Endangered Species Division, Department of Fisheries, Wildlife and Environmental Law Enforcement, Executive Office of Environmental Affairs

Patricia Wulftange, Municipal Development Division, Executive Office of Communities and Development

Local Sources

Bill Ellis, Harbor Master, Town of Wareham

Mike Gagne, Executive Secretary, Town of Dartmouth

Lee Hartmann, Planner, Town of Plymouth

Bill Larssen, Vice Chairman of the Finance Committee, Town of Wareham

Bill Napalitano, Planner, Southeast Regional Planning and Economic Development District

Jeff Osuch, Executive Secretary, Town of Fairhaven

Heather Paine, Tax Collector, Town of Falmouth

Ray Pickles, Executive Secretary, Town of Marion

Ted Pratt, Selectman, Town of Marion

Charlie Swain, Town of Falmouth Local Waterways Committee

John Wylde, Selectman, Town of Wareham

Appendix B

Sources of Information for Chapter 2

Personal communications with:

Frank Burke, Massachusetts Department of Public Works, 10 Park Plaza, Room 6361, Boston, MA 02116-3973, (617) 973-7513

Carmen Foster, The CSO Partnership, P.O. Box 26505, Richmond, VA 23286-8749, (804) 780-4812

John Gallagher, Massachusetts Department of Public Works, 10 Park Plaza, Boston, MA 02116-3973, (617) 973-7751

Robert Kubit, Massachusetts Department of Environmental Protection, Division of Water Pollution Control, Lyman School, Rt. 9, Westborough, MA 01581, (508) 366-9181

Robert Morehouse, U.S. Environmental Protection Agency, J.F.K. Federal Building, Boston, MA 02203, (617) 565-3513

Thomas Schueler, Metropolitan Washington Council of Governments, 777 N. Capitol Street, N.E., Suite 300, Washington, D.C. 20002-4201, (202) 962-3200

On-site Septic System Improvements

1. Source of RUCK system information: Bob Bergman, Holmes and McGrath, Falmouth, (508) 548-3564.
2. For RUCK system and monitoring program: Martha Windisch, Pinelands Commission, P.O. Box 7, New Lisbon, N.J. 08064, (609) 894-9342 .
3. For inspections, variance review, and upgrades: Brian Dudley, Massachusetts DEP, (508) 946-2753.
4. For upgrades, Jeff Gould, Southeast Regional Office, Dept. of Water Pollution Control, (508) 946-2750.
5. For institutional agency costs related to sanitary survey: Mike Hickey, (508) 888-1155.
6. For tight tank and installation estimates: Jim Lopes, Salesman, ACME Precast Company, Inc., Cape Cod, Massachusetts, (508) 548-9607.
7. For small wastewater treatment plants cost estimates: Mark Pare, Defeo and Waite, (508) 823-7136.
8. For costs associated with White Cliffs development, Plymouth, Massachusetts: Bill Napalitano, Southeast Regional Planning and Economic Development District, (508) 824-1367. For general information about project: Lee Hartman, Town Planners Office, Plymouth (508) 747-1620.

Boat Pump-out Facilities

Contacts

For information on the Maryland pump-out facility program: Jack Arney, Waterway Improvement Section, Maryland Boating Administration, (301) 974-7611.

For information on Chesapeake Bay programs including boat pump-out issues: Ann Swanson, Chesapeake Bay Commission, (301) 253-3420.

Alliance for the Chesapeake, (301) 377-6270.

Chesapeake Regional Information Service, (800) 662-2747.

For information on the effects of holding tank chemicals on treatment facilities:

John T. Novak, Professor of Civil Engineering, Virginia Polytechnic and State University, (an author of "The Effect of Boat Holding Tank Chemicals on Treatment Plant Performance"), (703) 231-6132.

Dr. C. M. Sawyer, Director, Division of Wastewater Engineering, Virginia Department of Health, (804) 786-1755.

Boatyards, Marinas, and Harbors :

Middle Branch Moorings, (301) 539-2628.

Robert Gilkes, Edgartown Harbor, (508) 627-4746.

John Tiroli, Edgartown Marine, (508) 627-4388.

Doug Elmiger, Onset Bay Marina, (508) 295-0338.

Bevan's Marina (508) 759-5451.

Charlie Swain, Edward's Boatyard, (508) 548-2216.

Bill Cody, Stone Bridge Marina, (508) 295-0266.

Brodie MacGregor, Concordia Company, Inc. (508) 999-1381.

5. Pump-out System Manufacturer: Mark Smiley or John Grooms, Air Vac, (219) 223-3980.

Oil Spill Containment Equipment

1. For training information or equipment recommendations: Chief Randy Grady or Lt. Bob Hazelton, Coast Guard Marine Safety Office, (508) 968-5556.

2. For information on the spill response trailer and equipment purchased by the Town of Dennis: Wade Saucier, Health Department or Allen Marcy, Shellfish Constable, (508) 394-8300.

3. Commercial spill response companies:

Clean Harbors, (617) 344-2510.

Joel Pickering, Jet Line, (800) 535-5463.

Toxic Audit Teams

For information on program in Greater Attleboro area:

1. Tim Greiner, Department of Environmental Management, (617) 727-3260.
2. Bill Napalitano, planner and toxic audit contact, Southeast Regional Planning and Economic Development District (SRPEDD), (508) 824-1367.
3. Judy Pederson, Massachusetts CZM, (617) 727-9530.
4. Rick Rebstdein, Massachusetts DEP, (617) 727-3260.
5. Tim Auge, Massachusetts Water Resources Authority, (617) 245-6000 (information on toxics audit pre-treatment program).

For information on program in Rhode Island:

6. Richard T. Enander, Hazardous Waste Reduction Project Supervisor, DEM, (401) 277-3434.

