

**Town of Bourne
Wastewater Advisory Committee**

Report to Board of Sewer Commissioners

March 2008

Wastewater Advisory Committee

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March 6, 2008

**Town of Bourne
Wastewater Advisory Committee**

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Attachments

- I – “Project Implementation Timeline” (2/29/08)
- II – “Opinion of Probable Costs” (2/29/08)
- III – Section 7 of the *Wastewater Management Study*

Also included with this report:

DRAFT *Wastewater Management Conceptual Alternatives Analysis – South of the Cape Cod Canal*

Distributed previously:

DRAFT *Environmental Notification Form, Executive Office of Environmental Affairs*
DRAFT *Wastewater Management Study* (includes Tasks 1, 2 and 3)

Town of Bourne Wastewater Advisory Committee

Report to the Board of Sewer Commissioners

Introduction

In August 2007, the Wastewater Advisory Committee met with the Bourne Board of Sewer Commissioners to discuss the concept of responding to the urgent economic, infrastructural, and environmental need to expand wastewater treatment capacity for Bourne's Downtown, the Village of Buzzards Bay. The Committee recommended the further study of a central treatment and groundwater discharge facility on Town-owned land in Bournedale (Alternative 1B in Tighe & Bond's *Wastewater Management Study* forwarded to Sewer Commissioners in December). At that meeting, the Commissioners endorsed the concept as presented in a report from the Wastewater Advisory Committee and encouraged the Committee, along with Tighe & Bond, to continue the study by going to Task 3 as outlined in the contract between Tighe & Bond and the Bourne Financial Development Corporation.

In the interim Tighe & Bond has completed both Task 3 and a supplemental report that examines alternatives for wastewater management in two "Near-term need" areas on the south side of the Cape Cod Canal where MA Department of Environmental Protection (DEP) is studying water quality: Monument Beach and Tahanto/North Shore/Hen Cove in Pocasset. A copy of the supplemental report is included with this report.

These deliberations and discussions regarding expanded wastewater treatment in Buzzards Bay are directly attributable to a major goal outlined in the Town's Local Comprehensive Plan and a goal adopted by the Board of Selectmen, namely: to "revitalize" the Village of Buzzards Bay – Bourne's downtown.

The Local Comprehensive Plan, the Board of Selectmen and many other townspeople wish to see the Village become a vibrant place to live with a sustainable commercial sector. However, potential investors strongly indicate that several factors compel them to take their projects elsewhere:

- Limited wastewater treatment capacity
- Flood zone restrictions/added expense
- Dual regulatory process
- Traffic and transportation challenges
- Unknowns – appropriate density, viable commercial types
- Other infrastructure issues: electrical capacity, water, parking, *etc.*
- Lack of clear guidelines – architectural, site design

The goal of the Wastewater Advisory Committee is to help the Board of Sewer Commissioners work their way through the multitude of questions that arise when trying to meet the first of the issues listed above. The Committee has been assisted by the environmental engineering firm Tighe & Bond. The private citizens and Town officials who make up the committee have spent many hours in meetings, poring over documents, and discussing the several Tighe & Bond reports, as well as reviewing other sources of information, and formulating recommendations to the Commissioners.

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Accordingly, the members of the Wastewater Advisory Committee are now making three recommendations to the Sewer Commissioners: one primary and two secondary.

Primary Recommendation

Several recommendations from the Wastewater Advisory Committee to the Board of Sewer Commissioners and the Town of Bourne have emerged from the Committee's recent deliberations. The primary recommendation is to:

Start the planning process for a centralized treatment facility and ground water discharge field on the north side of the Cape Cod Canal to expand the wastewater treatment capacity for Bourne's Downtown, the Village of Buzzards Bay. The recommended site is on Town-owned land just north of Scenic Highway/Route 6 and east of Route 25, in proximity to, but separated from, the new elementary school.

- a. Committee members are asking that 40 acres of the 120+ acre Town parcel be reserved for a near-to-mid term wastewater treatment facility and groundwater discharge area.
- b. As the first step in planning for a wastewater treatment facility, Committee members are asking the Commissioners to review the draft Environmental Notification Form (ENF) included with this report and within a month consider a vote to submit the form to MEPA, as is or with modifications. The ENF process will identify what issues the Town will need to address before going further in its wastewater management planning on the north side of the Cape Cod Canal. The process usually takes three months.
- c. Additionally, Committee members are asking that the Commissioners request \$372,000 from the Capital Outlay Committee for planning over three years, the first commitment phase shown on Attachment I - Project Implementation Timeline: \$22,000 for Year 1 planning, \$300,000 for Year 2 planning, and \$50,000 for Year 3 planning (in 2007 dollars). At the end of year 3 the Town will have completed environmental permitting and will have a preliminary design. Also, at this point the engineer's opinion of probable project costs will be better defined.

Primary Recommendation Background – Tasks 1 and 2

Tighe & Bond's work was divided into three Tasks and is recorded in their report: *Wastewater Management Study* (December 2007). Task 1 identified 20 "study areas" in the Town of Bourne and, using a consistent set of criteria, assessed each one as to its need for wastewater management alternatives to septic systems (see Tighe & Bond *Wastewater Management Study*, Section 2, Tables 2.1 and 2.2 and Figure 2-5). Study Area 1 – Buzzards Bay Village – was identified as having an "imperative" need for action, the highest need in the town. The need is driven by the following:

- a. The Town's certified Local Comprehensive Plan and the Selectmen's goals call for the revitalization of Buzzards Bay. However, any meaningful growth in the number of residential units or in commercial activity will require additional treatment capacity. There is very limited capacity in the current agreement with Wareham and this capacity is unlikely to change with the negotiation of a new agreement.

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- b. De-centralized solutions, including package plants, on-site and/or cluster systems are not feasible for a number of reasons. In the first place, challenging subsurface conditions for effluent discharge (low permeable soils, high groundwater, and floodplain) are prevalent throughout the Main Street area of Buzzards Bay Village. Secondly, package plants, on-site and/or cluster systems require substantial groundwater discharge fields and will take away from the land available for redevelopment. These are the same factors that led to the construction of the existing sewer system in the 1980s.
- c. The existing pumping station is almost 20 years old with equipment and controls that need replacement in the immediate future.

In Task 2, Tighe & Bond studied various alternatives to meet this need for expanded wastewater management capacity and recommended constructing a wastewater treatment facility and groundwater discharge area (Alternative 1B) that is:

- Centralized – the treatment facility and groundwater discharge site are co-located.
- Designed, in its first phase, to service an area that encompasses Buzzards Bay Village and areas surrounding Buttermilk Bay and Little Buttermilk Bay (Study areas 1 and 2 in Figure 2-5, *Wastewater Management Study*).
- Designed to handle 461,000 gpd (gallons per day) and to be expandable depending upon future needs.
- Located on a Town-owned parcel east of Route 25 and north of the Scenic Highway (see Figure 6-2, *Wastewater Management Study*).

Primary Recommendation - Task 3

The Task 2 concept involving Alternative 1B was endorsed by the Sewer Commissioners in their August 2007 meeting. With that endorsement, Tighe & Bond proceeded to Task 3 which included developing an implementation plan, outlining the regulatory/ permitting issues, identifying potential financing programs, and describing a potential management program. Those actions are reported in Section 7 of the *Wastewater Management Study*, appended here as Attachment III along with Attachment I - “Project Implementation Timeline” which includes a distribution of costs over the timeline.

Updated Alternative 1B Recommendation

Tighe & Bond’s Alternative 1B recommendation in Tasks 2 and 3 was based on a facility that services both Study Areas 1 and 2 – both the currently sewered area of Buzzards Bay Village and the residential area around Buttermilk Bay. Each Study Area has different reasons for inclusion. The reasons for expanding the capacity for the currently sewered area in Buzzards Bay Village are listed beginning at the bottom of page 2 as part of the “Primary Recommendation Background – Tasks 1 and 2” discussion in this document. The need for sewerage the residential area around Buttermilk Bay is driven by the environmental impact that nitrogen from septic systems may be having on our estuaries.

The Wastewater Advisory Committee members carefully reviewed the advantages and disadvantages of including Study Area 2 in their recommendation to the Sewer Commissioners:

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Advantages of including Study Area 2

- There may be economies of scale in constructing a system that services a larger geographic area.
- The septic systems now servicing the area's residential areas are not designed to remove substantial amounts of nitrogen, potentially threatening the quality of the area's estuaries.
- Including both areas in the Environmental Notification Form (ENF) does not alter cost or time elements of the ENF process and would identify regulatory/environmental issues relative to both study areas that could be used in subsequent wastewater planning phases if it is determined that Study Area 2 will not be part of the initial project.

Disadvantages of including Study Area 2

- The cost of wastewater infrastructure for Study Area 1 is less than half the cost of wastewater infrastructure for both Study Areas 1 and 2 (see below).
- The number of miles of sewer pipes in Study Area 2 exceeds a regulatory threshold that mandates an Environmental Impact Report (EIR) which is more costly and extends the project's time line. (While MEPA may still determine that an EIR is required for Study Area 1 only, the scope will likely be smaller.)
- It is unlikely that there will be significant new development in Study Area 2.
- The environmental issues have not yet been defined – the impact of Nitrogen in the Buttermilk Bay estuaries has not been quantified by the Massachusetts Estuary Project to date, and a TMDL for Nitrogen has not been issued.
- Buttermilk Bay watershed is shared by three towns and future solutions should be shared.

The Committee members are unanimous in their recommendation to alter the original area included in Alternative 1B by planning for expanded wastewater treatment capacity for Study Area 1 only and including in facility design the capability for efficient future expansion.

Updated Opinion of Probable Costs

As discussed in the *Wastewater Management Study*, project costs for constructing the originally recommended Alternative 1B facility to serve Study Areas 1 and 2 were estimated to be \$47 million in 2007 dollars. However, for a project that includes Study Area 1 only, the opinion of probable cost is between \$14 and \$26 million in today's dollars. The range takes into account the variables and unknowns that exist in a conceptual estimate. In Attachment I – "Project Implementation Timeline" and Attachment II – "Opinion of Probable Costs" the data is based on 2007 dollars.

In the "Project Implementation Timeline" dated February 29, 2008 both activities and costs are broken into three main phases: planning, design and construction. This timeline, Attachment I, shows costs/year based on the proposed project implementation schedule and opinion of probable project costs prepared by Tighe & Bond based on a modified Alternative 1B that includes only Study Area 1.

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In the *Wastewater Management Study* Section 7, Tighe & Bond describes nine potential financing programs and five options for cost recovery programs that might be applicable to the Bourne project. Part of the planning process will be to develop the appropriate mix of these programs. Committee members believe that one particular program deserves careful study – the state’s District Improvement Finance program (DIF). In a preliminary meeting with the DIF program manager late in 2006¹ it was indicated that the DIF program might work very well for the infrastructure improvements needed for the Village’s revitalization plans, including wastewater treatment.

Secondary Recommendations

The secondary recommendations to the Sewer Commissioners and the Town are:

- 1- *Begin creating a Town-wide water quality management program that would start by researching and evaluating cost-effective alternative technologies and actions that may successfully reduce and limit nutrient-loading Town-wide and particularly in the sensitive freshwater ponds and marine estuaries.*
- 2- *Explore ways to join other municipalities in a proposal that would look toward a shared regional facility on the MA Military Reservation if sewerage on the South side of the canal becomes worthwhile.*

Background to Secondary Recommendations

Members of the Committee discussed the fact that the MA DEP is currently engaged in a multi-year plan to examine water quality in the region’s estuaries, including several in Bourne. Committee members questioned whether those studies would change the level of need in the 20 Study Areas examined by Tighe & Bond. Specifically they questioned whether Study Area 13 – Monument Beach – and/or Study Area 16 – Tahanto/North Shore/Hen Cove in Pocasset – should take precedence over the Buzzards Bay Village planning.

In a separately commissioned report, Tighe & Bond conducted a preliminary analysis of collection sewers with central wastewater treatment alternatives for these areas. Their work is included with this report in the Draft report *Wastewater Management Conceptual Alternatives Analysis – South of Cape Cod Canal*. In summary, the analysis shows two options:

- a. Building one or more treatment facilities on land in Town with groundwater discharge areas created on Massachusetts Military Reservation (MMR) land.
- b. Working with the towns surrounding the MMR to create a regional treatment facility and ground water discharge area on the MMR.

After a thorough review of the report and discussion among Committee members and with the Tighe & Bond consultant, a consensus developed that planning for a treatment facility and groundwater discharge fields to service Study Area 1 (the Village of Buzzards Bay) is still the highest priority.

At the same time, Committee members came to consensus on two other recommendations, those of beginning a process to research and create a Town-wide

¹ Attended by representatives of Bourne’s tax assessor’s office, the Planning Board, the BBVA, and BFDC along with the Chief of Police John Ford representing the Town Administrator, and others

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nutrient management program, and beginning a process to explore a regional plan involving the MA Military Reservation.

The first of the Secondary Recommendations was formed as Committee members looked towards alternatives to a sewer system in the Study Areas south of the Canal. The question, basically, is whether there are activities that will effectively reduce the level of nutrients in the sensitive water bodies. It is not too soon to consider such programs as mandating fertilizer management, beefing up monitoring and requirements for septic systems, managing storm water runoff, aerating coastal waters to increase dissolved oxygen, etc. In fact, Committee members suggest that such a program, if enacted, should be Town-wide.

The other Secondary Recommendation originated in the Tighe & Bond analysis that shows that it could identify only a few parcels that could house a treatment facility south of the Canal – none of which provide significantly sized areas to support groundwater discharge. Preliminary discussions with planners and engineers at the MMR opened the door to the possibilities of working with MMR for a treatment facility and/or groundwater discharge. However, other towns surrounding the base also have wastewater needs and a regional request would be better received than individual municipal approaches.

Conclusion

In August 2007, the Board of Sewer Commissioners accepted a recommendation from the Wastewater Advisory Committee based on the Alternative 1B described in Tighe & Bond's *Wastewater Management Study*, Section 6. In summary, Alternative 1B described a consolidated wastewater treatment facility and groundwater dispersal field on Town-owned land in Bournedale serving both Study Areas 1 and 2.

Today, in its Primary Recommendation, the members of the Wastewater Advisory Committee, with the continuing assistance of Tighe & Bond and Town staff (especially George Tribou and Mike Leitzel), are recommending moving into a planning phase for a modification of the Alternative 1B recommendation. The modification is based on planning for infrastructure that will serve Study Area 1 *only*. This modification lowers the probable costs and responds to an immediate infrastructure and economic need – the aging and limited capacity of the current sewer system.

Committee members also examined the situation created by the already completed and pending water quality studies by the MA Estuaries Project, especially for watersheds on the south side of the Canal. The members concluded that:

- 1- The pending studies do not alter the imperative need for increased wastewater treatment capacity in Buzzards Bay.
- 2- Even when the Estuaries Project reports arrive, there may well be alternatives to sewers that can be used to effect the required water quality improvements.

In that context, the Committee has proposed two secondary recommendations for the Board of Sewer Commissioners' consideration.

With this as background, the members of the Wastewater Advisory Committee offer the Draft Motion included here.

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DRAFT Motion:

That the Bourne Board of Sewer Commissioners accept the recommendations of the Wastewater Advisory Committee. Specifically, that:

1. The Sewer Commissioners request that the Town Administrator, other appropriate Town officials, and the Wastewater Advisory Committee begin planning for a centralized wastewater treatment facility and groundwater discharge on the Town-owned parcel Map 20, parcel 33. The facility will be permitted and designed to meet the capacity needs of Study Area 1 with the capacity to efficiently expand in the future.
 - a- The Commissioners will strongly urge the appropriate Town officials or body to reserve 40 acres on the Town-owned parcel for a wastewater treatment and groundwater discharge facility. This act would not commit the Town to building a facility at this time, but would preserve the space that will be needed at the appropriate time.
 - b- As the first step in planning for a wastewater treatment facility, the Commissioners will review the draft Environmental Notification Form and meet within a month to consider a vote to submit the form, as is or with modifications. A modified copy of the ENF will be provided to the Commissioners within ten days for review.
 - c- The Commissioners will request \$372,000 from the Capital Outlay Committee for the first “Commitment Phase” of three years: \$22,000 for Year 1 planning, \$300,000 for Year 2 planning, and \$50,000 for Year 3 planning as described on Attachment I – Project Implementation Timeline.
2. The Sewer Commissioners request that the Town Administrator, other appropriate Town officials, and the Wastewater Advisory Committee, or an appropriate sub-committee, research the scientific basis of cost-effective alternatives to sewers to improve the water quality in the Town’s freshwater ponds and marine estuaries. The Commissioners request periodic progress reports.
3. The Sewer Commissioners request that the Town Administrator, other appropriate Town officials, and the Wastewater Advisory Committee, or an appropriate sub-committee, explore with neighboring municipalities the possibility of creating a regional response to developing needs south of the Canal. The Commissioners request periodic progress reports.

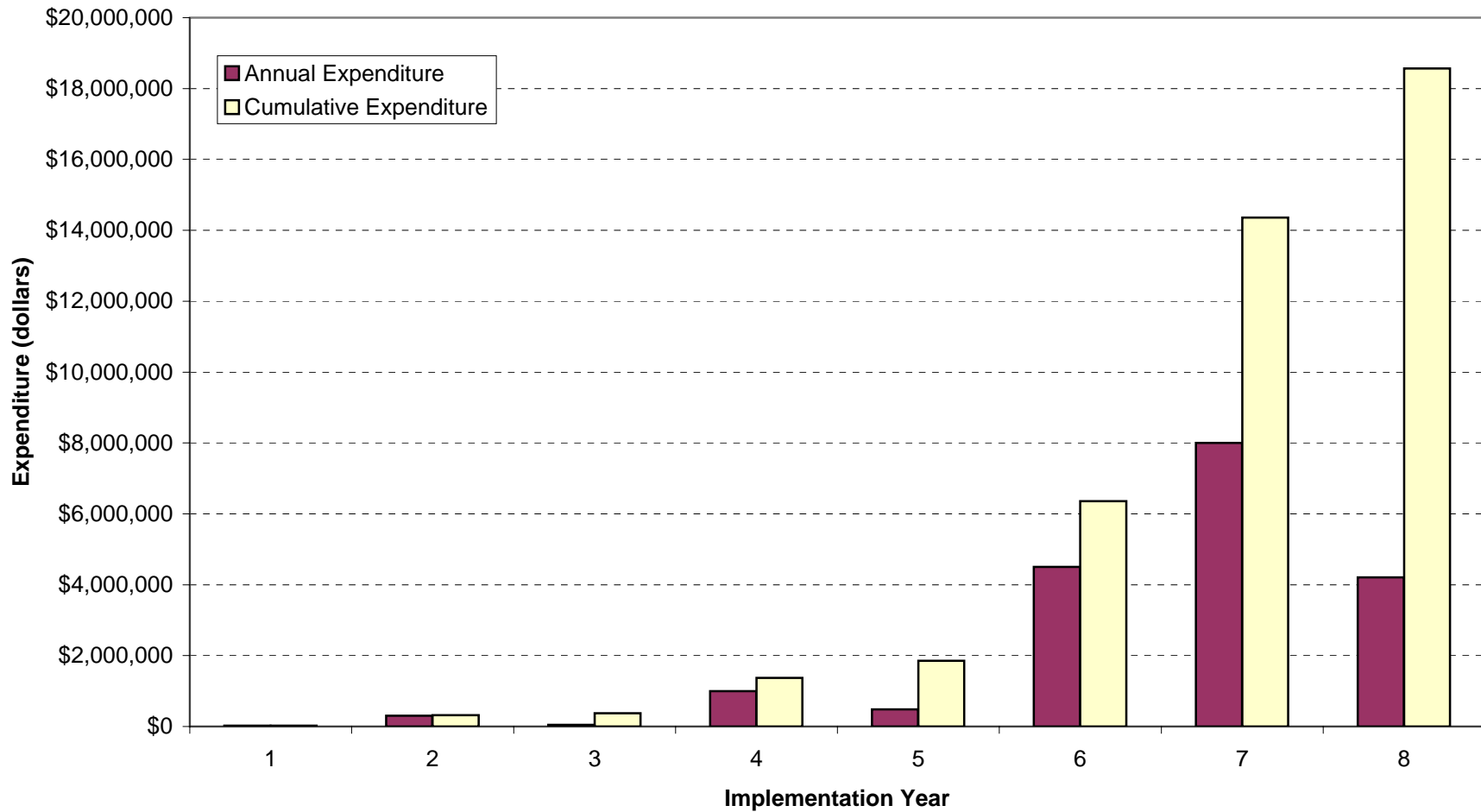
Project Implementation Timeline
Recommended Plan: Modified Alternative 1B - Phase 1
Main Street Area of Buzzards Bay Village (Study Area 1)
February 29, 2008

Project Year	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8
Project Quarter								
1. Project Authorization and Funding								
a. Identify funding sources	■							
b. Develop revenue generating mechanism	■	■						
c. Assist with Preparation for Town Meeting Authorization	■							
2. Preliminary Design and Environmental Permitting¹								
a. MEPA Environmental Notification Form (ENF) (assumed to be completed)								
b. Preliminary Design		■						
c. Draft Environmental Impact Report (DEIR)			■					
d. Cape Cod Commission Development of Regional Impact Review (DRI)			■					
e. Final Environmental Impact Report (FEIR)				■				
f. Final Cape Cod Commission DRI Approval				■				
3. Design and Permitting								
a. Owner's Project Manager compliance				■				
b. Final engineering drawings and technical specifications				■	■			
c. MassDEP groundwater discharge permit				■	■			
d. Land parcel acquisitions, easements and/or land use agreements				■	■			
e. Local and State environmental permits				■	■			
f. Local and State road opening permits				■	■			
g. State cultural resources permits				■	■			
h. Local planning and zoning permits				■	■			
i. MassDEP permit to construct				■	■			
j. Wastewater residuals management contract or agreement					■			
4. Construction								
a. Construction contracts bidding and award						■		
b. Construction						■	■	■
c. Commissioning								■
Projected Cash Flow²								
a. Projected Annual Expenditure (2007 Dollars)	\$22,000	\$300,000	\$50,000	\$1,000,000	\$485,000	\$4,500,000	\$8,000,000	\$4,211,000
b. Cumulative Expenditure (2007 Dollars)	\$22,000	\$322,000	\$372,000	\$1,372,000	\$1,857,000	\$6,357,000	\$14,357,000	\$18,568,000
c. Cumulative Percent of Total	0.12%	1.73%	2.00%	7.39%	10.00%	34.24%	77.32%	100.00%
Commitment Phases	PLANNING			DESIGN		CONSTRUCTION		

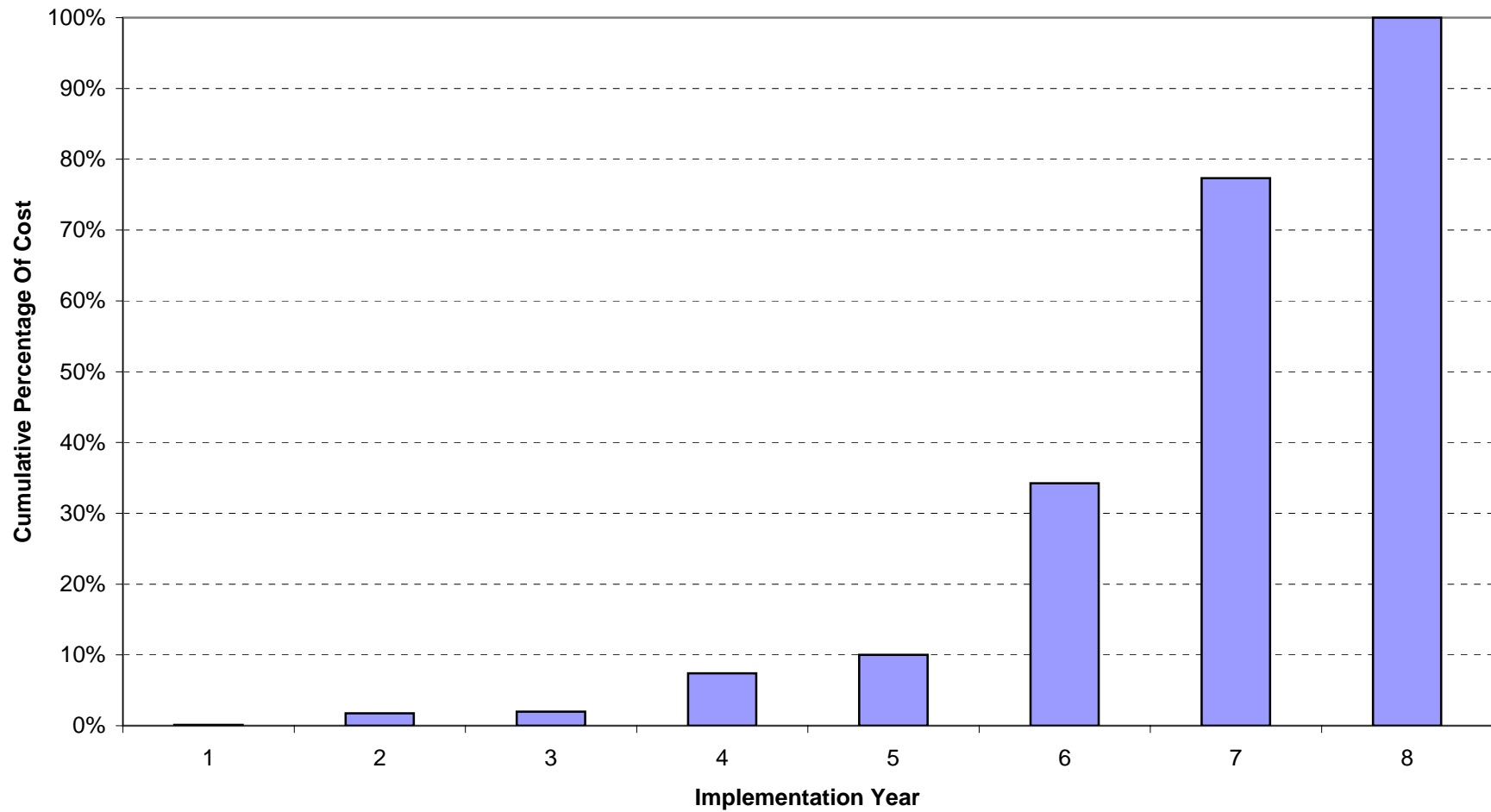
1. If MEPA determines an EIR is not required for this project based on the review of the ENF, Tasks 2c and 2e will be eliminated, and both the project schedule and planning expenditures will be reduced. Similarly, if the Cape Cod Commission determines a DRI is not required, Tasks 2d and 2f will be eliminated, and both the project schedule and planning expenditure will be reduced.

2. Based on the Association for the Advancement of Cost Estimating (AACE) Recommended Practice No. 17R-97 titled "Cost Estimating Classification System", the Engineer's Opinion of Probable Cost is a Class 4 concept study estimate that carries an expected range of accuracy of +40% to -25%, resulting in a range of \$14 million to \$26 million based on 2007 dollars. As the project proceeds through planning and design, the accuracy of the opinion of probable cost will increase and the range will narrow.

Projected Cash Flow (Dollars)
Recommended Plan: Modified Alternative 1B - Phase 1
Main Street Area of Buzzards Bay Village (Study Area 1)
February 29, 2008



**Project Cash Flow (Cumulative Percentage)
Recommended Plan: Modified Alternative 1B - Phase 1
Main Street Area of Buzzards Bay Village (Study Area 1)
February 29, 2008**



Modified Alternative 1B (Study Area 1) - Opinion of Probable Costs Summary

Infrastructure Component	Cost (2007 Dollars)¹	Description
Sewers	\$1,000,000	Allowance for collection system improvements
Pump Stations	\$810,000	1 pump station
Forcemains to WWTF/ Discharge	\$2,538,000	9,400 LF forcemain
Wastewater Treatment Facility (WWTF)	\$12,600,000	206,000 gallons per day (gpd) average flow ²
Groundwater Disposal	\$1,620,000	4 acres active area (16 acres total including reserve and undetermined site conditions)
Total	\$18,568,000	

1. Based on the Association for the Advancement of Cost Estimating (AACE) Recommended Practice No. 17R-97 titled "Cost Estimating Classification System", the Engineer's Opinion of Probable Cost is a Class 4 concept study estimate that carries an expected range of accuracy of +40% to -25%, resulting in a range of \$14 million to \$26 million based on 2007 dollars. As the project proceeds through planning and design, the accuracy of the opinion of probable cost will increase and the range will narrow.
2. Flow projection is based on assumption that 180,000 GPD from Study Area 1 will be pumped to Wareham for treatment and disposal.

Modified Alternative 1B

Phase Description

- 1 Sewer Study Area 1, Build a wastewater treatment plant (206,000 GPD*), discharge Study Area of ±4 acres
- 1b Sewer Study Area 2, expand the WWTF by 255,000, increase discharge Study Area of ±6 acres
- 2 Sewer Study Area 7, expand the WWTP by 375,000 GPD, discharge Study Area increases by ±8 acres
- 3 Sewer Study Area 3 and 6, expand the WWTP by 130,000 GPD, increase discharge Study Area by ±2 acres
- 4 Sewer Study Area 4 and 5, expand the WWTP by 293,000 GPD, increase discharge Study Area by ±6 acres

*Flow projection is based on assumption that 180,000 GPD from Study Area 1 will be pumped to Wareham for treatment and disposal.

Modified Alternative 1B - Collection System

Phase	Length of Pipe (LF)	Length of Pipe (miles)	Cumulative Length (miles)	Unit Cost (\$/LF)	Total Cost	Cumulative Cost
1	allowance			\$270	\$1,000,000	\$1,000,000
1b	64,000	12	12	\$270	\$17,280,000	\$18,280,000
2	115,000	22	22	\$270	\$31,050,000	\$49,330,000
3	27,000	5	27	\$270	\$7,290,000	\$56,620,000
4	102,000	19	46	\$270	\$27,540,000	\$84,160,000
Total	308,000	58			\$84,160,000	

1. Study Area 1 is sewerred, and the estimate includes an allowance for upgrades and extensions to the system.

Modified Alternative 1B - Pump Stations

Phase	Number of Small Pump Stations	Unit Cost	Number of Large Pump Stations	Unit Cost	Cumulative No. Pump Stations	Total Cost	Cumulative Cost
1	0	\$405,000	1	\$810,000	1	\$810,000	\$810,000
1b	8	\$405,000	0	\$810,000	9	\$3,240,000	\$4,050,000
2	5	\$405,000	1	\$810,000	15	\$2,835,000	\$6,885,000
3	4	\$405,000	0	\$810,000	19	\$1,620,000	\$8,505,000
4	20	\$405,000	1	\$810,000	40	\$8,910,000	\$17,415,000
Total	37		3			\$17,415,000	

1. Study Area 5 (Phase 5) is a candidate for low pressure or vacuum sewers due to topography that will necessitate a significant number of pump stations.

Modified Alternative 1B - Forcemain to WWTF/Groundwater Discharge

Phase	Forcemain Length (LF) ¹	Cumulative Length (LF)	Unit Cost	Total Cost	Cumulative Cost
1	9,400	9,400	\$270	\$2,538,000	\$2,538,000
1b		9,400			\$2,538,000
2	16,500	25,900	\$392	\$6,460,000	\$8,998,000
3		25,900		\$0	\$8,998,000
4		25,900		\$0	\$8,998,000
Total	25,900			\$8,998,000	

1. Phase 1 forcemain from Main Street Pump Station to Town-owned potential groundwater discharge parcel.
 Phase 2 forcemain from Rt. 3/Scenic Highway to Town-owned potential groundwater discharge parcel.

Modified Alternative 1B - Wastewater Treatment Facility

Phase	Capacity (gpd)	Cumulative Capacity (gpd)	Cost	Cumulative Costs
1	206,000	206,000	\$12,600,000	\$12,600,000
1b	255,000	461,000	\$10,620,000	\$23,220,000
2	375,000	836,000	\$12,600,000	\$35,820,000
3	130,000	966,000	\$7,290,000	\$43,110,000
4	293,000	1,259,000	\$11,160,000	\$54,270,000

Total 1,259,000 \$54,270,000

Modified Alternative 1B - Groundwater Discharge

Phase	Active Area (acres)	Cumulative Area (acres)	Total Area ¹ (acres)	Cumulative		Unit Cost (\$/acre)	Total Cost	Cumulative Cost
				Total Area (acres)	Unit Cost (\$/acre)			
1	4	4	16	16		\$405,000	\$1,620,000	\$1,620,000
1b	6	10	24	40		\$405,000	\$2,430,000	\$4,050,000
2	8	18	32	72		\$405,000	\$3,240,000	\$7,290,000
3	2	20	8	80		\$405,000	\$810,000	\$8,100,000
4	6	26	24	104		\$405,000	\$2,430,000	\$10,530,000
Total	26		104				\$10,530,000	

1. Active area increased by factor of 4 to account for 100% reserve area and undetermined site conditions.
2. Subsurface groundwater discharge systems (chambers and trenches) can support other land uses at the surface, for example parking and ballfields.

Modified Alternative 1B - Opinion of Probable Costs

Phase	Sewers	Pump Stations	Forcemains to		Groundwater Disposal	Total	Cumulative Total
			WWTF/ Discharge	WWTF			
1	\$1,000,000	\$810,000	\$2,538,000	\$12,600,000	\$1,620,000	\$18,568,000	\$18,568,000
1b	\$17,280,000	\$3,240,000	\$0	\$10,620,000	\$2,430,000	\$33,570,000	\$52,138,000
2	\$31,050,000	\$2,835,000	\$6,460,000	\$12,600,000	\$3,240,000	\$56,185,000	\$108,323,000
3	\$7,290,000	\$1,620,000	\$0	\$7,290,000	\$810,000	\$17,010,000	\$125,333,000
4	\$27,540,000	\$8,910,000	\$0	\$11,160,000	\$2,430,000	\$50,040,000	\$175,373,000
TOTAL	\$84,160,000	\$17,415,000	\$8,998,000	\$54,270,000	\$10,530,000	\$175,373,000	

Modified Alternative 1B - Opinion of Probable Costs per Parcel

Phase	Total Project Cost	Existing Parcels	Existing Developed Parcels	Projected Future Parcels	Projected Future Developed Parcels	Cost per Existing Parcel	Cost per Parcel including Future Parcels
1b	\$33,570,000	1,009	896	1,183	1,070	\$33,271	\$28,369
2	\$56,185,000	1,493	1,241	1,823	1,571	\$37,632	\$30,814
3	\$17,010,000	127	68	389	330	\$133,937	\$43,774
4	\$50,040,000	811	480	1,562	1,231	\$61,702	\$32,042
TOTAL	\$175,373,000	3,934	3,109	5,593	4,768		

Unit Costs (In 2007 Dollars)

Pipe (per lineal foot)

\$200 Unit costs include 8" gravity pipeline <10 feet deep, traffic control, roadway restoration, and 10% allotment for stream/utility crossings
 \$270 including engineering and contingency

Force Main (per LF) - Surface Streets

\$125 Unit costs include 6" forcemain, traffic control, roadway restoration in Town road, and 10% allotment for stream/utility crossings
 \$169 including engineering and contingency

Force Main (per LF) - Portion in State Highway

\$200 Unit costs include 6" forcemain, traffic control, roadway restoration in Town roads/portion in State Highway, and 10% allotment for stream/utility crossings
 \$270 including engineering and contingency

Force Main (per LF) - Majority in State Highway

\$290 Unit costs include 6" forcemain, traffic control, roadway restoration primarily in State Highway, and 10% allotment for stream/utility crossings
 \$392 including engineering and contingency

Pump Station - Small

\$300,000 Neighborhood stations within service areas
 \$405,000 including engineering and contingency

Pump Station - Large

\$600,000 Pump stations to transfer flow from study areas to WWTF/Discharge parcels
 \$810,000 including engineering and contingency

Wastewater Treatment Facility

Variable Wastewater Treatment Facility costs were extrapolated from data for other WWTFs constructed in MA and CT. Costs for WWTF built for private developments were escalated by 15% to account for prevailing wages on municipal projects and by 10% to account for odor, noise, and aesthetic considerations.

Costs were adjusted to 2007 dollars using the ENR CCI for Boston. 20% was added to the costs to account for engineering. WWTP Expansion costs for the MMA were reduced from the extrapolated data because the WWTF does not need nitrogen removal and site conditions are well defined. WWTF Expansions were assumed to be 75% of the cost of a new WWTF.

Groundwater Discharge Active Area (per acre)

\$300,000 Cost per active area and based on leaching chamber system with design loading rate of 2.5 gpd/sf (5-10 min/inch percolation rates)
 \$405,000 including engineering and contingency

Engineering and Contingency

35%

The results of the alternative comparison were presented to the BFDC and Bourne Wastewater Advisory Committee in a series of meetings in June and July 2007, as described in Section 1.4. On August 7, 2007 the Board of Sewer Commissioners passed a motion to endorse the Committee's recommendation to accept the initial phase of Alternative 1B as the recommended plan and proceed with development of an implementation plan and submission of an ENF. The recommended alternative and implementation plan is described in this section.

7.1 RECOMMENDED ALTERNATIVE

Based on the alternative evaluation, Alternative 1B – centralized treatment and groundwater discharge is the preferred alternative. The recommended plan consists of construction of Phase 1 only, including the following:

- Providing sewer service to Study Areas 1 and 2
- Construction of a centralized wastewater treatment facility and groundwater discharge system. Based on the screening performed for this project, the Town-owned parcel on Scenic Highway is the preferred location for these facilities

Alternative 1B is the least expensive alternative on a total project cost basis, provides the greatest flexibility for expansion starting at the initial phase, and consolidates the WWTF and groundwater discharge into a single area, making permitting more straightforward and operation and maintenance of the facilities easier.

Benefits of implementing Phase 1 of Alternative 1B include:

- Solves the imperative need for additional wastewater capacity in the Buzzards Bay Area
- Provides additional wastewater infrastructure to allow for economic redevelopment of the Main Street area of Buzzards Bay
- Provides for compliance with likely upcoming TMDL to limit and reduce nitrogen loads to Buttermilk Bay and Little Buttermilk Bay
- Provides for future expansion to other areas north of Cape Cod Canal, including surrounding municipalities.
- Allows for continued flexibility for future wastewater management considerations for Bourne south of the Cape Cod Canal
- Recommends utilization of town-owned parcel
- Minimizes construction impacts

- Compatible with many funding and financing sources.

7.2 IMPLEMENTATION PLAN

Implementation of the recommended alternative involves not only design development but also additional input at the local level and from state regulators to resolve outstanding issues including:

Regulatory/Permitting Issues:

- Completion of the environmental review process
- Initiation of project permitting
- Developing a growth management plan for areas served by centralized sewers

Local Issues:

- Financing
- Cost apportionment
- Organizational structure

7.2.1 Design Development

Preliminary design is required for completion of the EIR to adequately define project impacts and mitigation measures. The preliminary design will include identification of potential sewer alignments, treatment plant processes and further study of the groundwater discharge system, including a hydrogeological study.

7.2.2 Regulatory/Permitting Issues

The environmental review process is summarized in Section 6.4.1, and anticipated permits are summarized in Section 6.4.2. The following environmental review documents are anticipated to be required for this project:

1. Environmental Notification Form
2. Draft Environmental Impact Report/DRI
3. Final EIR/DRI

During the environmental review process, preliminary discussions with the permitting agencies and collection of required data are typically initiated.

7.2.3 Growth Management

Executive Order 385 requires state and local agencies to plan for sustainable development and protection of resources. This is done in part by focusing infrastructure improvements in areas where clear need exists and where denser development is appropriate, while directing development away from valuable resource areas. As sewer projects are considered to allow for additional growth, proposals for new sewers must have a strong environmental basis and be in accordance with local and regional growth management policies. The proposed project is in compliance with growth management policies, in that the proposed sewer will direct new development in an area that is served by existing infrastructure and that has been targeted for higher density development. In addition, providing sewer service within the watersheds of Buttermilk Bay and Little Buttermilk Bay will alleviate nutrient loading that is impairing the water quality in these embayments.

7.2.4 Potential Project Financing

Capital costs to build the required infrastructure for the initial project phase will be significant. Potential funding sources for the project include:

- Bonding
- Reduced interest loans through the State Revolving Fund (SRF)
- Zero interest loans through the SRF (legislation pending, not yet available)
- Grants and reduced interest loans from USDA Rural Development
- Massachusetts Sewer Rate Relief Fund
- State and Federal earmarked appropriations
- Grants
- District Improvement Financing (DIF)
- Tax Increment Financing (TIF)
- Community Development Action Grant (CDAG)

Potential funding programs are discussed in more detail the following subsections. Generally, State and Federal earmarked appropriations and grant funding are limited for municipal

wastewater projects in Massachusetts. Funding through the Massachusetts Sewer Rate Relief Fund is variable and depends on the annual appropriation in the state budget. Therefore, Bourne will need to evaluate how to borrow funds for a significant portion of the capital cost of the project and will need to develop a cost apportionment program, as discussed in Section 7.2.3.

7.2.4.1 Bonding

Municipalities have the ability to borrow funds for capital projects through bonds. Issues that can impact municipal borrowing capacity are existing debt, the length of borrowing period, the structure of the debt service, and opportunities to modify short-term impacts of the debts service. Careful planning for municipal borrowing that takes into account other capital expenditures in Town is imperative to maximize ability to borrow for major capital projects and minimize adverse fiscal impacts to the Town's bond rating and budgets.

7.2.4.2 State Revolving Fund (SRF) Loans

The Massachusetts State Revolving Fund (SRF) is jointly administered by the Division of Municipal Services of the Department of Environmental Protection (MassDEP) and the Massachusetts Water Pollution Abatement Trust. The fund provides low-interest loans to public and private entities for qualifying planning and construction projects. Currently, 20-year, 2% loans are available, and the fund has approximately \$300 to \$350 million to lend per year (MassDEP July 2007).

To be considered for SRF funding, a community must submit a Project Evaluation Form (PEF), which typically has an annual deadline at the end of August. Based on the forms, applicants are ranked based on a set of criteria that rates the project's impact on state and federal water quality and the State's Commonwealth Sustainable Development Initiative. The ranked projects are published in the Intended Use Plan (IUP) Project Listing, which is typically released at the end of the year or in early January. In addition to the ranking priority, projects require local funding appropriation by June 30 in the upcoming year.

Once a project has been placed on the IUP Project List, the municipality needs to complete a loan application and obtain a Project Approval Certificate from MassDEP. The loan applications are due October 15 of the upcoming year and must include information about funding authorization, repayment ability, and project schedule. For construction loans, the application also needs to include construction contract drawings and specifications and evidence of compliance with applicable environmental reviews and permits.

When MassDEP approves the application, a binding loan commitment is issued by the Trust, and MassDEP issues a Project Regulatory Agreement (PRA), which includes the MassDEP regulation and supervision conditions and limitations, cash drawdown schedule, and provisions

of the Project Approval Certificate (PAC). Once a PAC is issued, the project must commence within six months.

Currently the State Legislature is considering a modification to the SRF program authorization to create no interest loan possibilities for applicants that meet specific criteria, which is typically associated with the Cape Cod region wastewater management programs. As the Legislative process evolves the applicability to the Bourne wastewater projects should be evaluated.

7.2.4.3 USDA Rural Development

USDA Rural Development provides grants and loans to rural communities, counties, special-purpose districts and Indian tribes with populations less than 10,000 people. Eligibility for grants is dependent upon the median household income for the Town relative to the poverty line and the state non-metropolitan median household income. For entities that do not qualify for grants because their median income is too high, USDA Rural Development offers below market rate and market rate loans. Similar to the grant program, the median household income for the Town is used to determine for which loan category the entity is eligible. Additional restrictions on funding include a maximum disbursement of \$3 million per project phase with a maximum of three project phases.

Based on population, Bourne does not qualify for the USDA Rural Development Water and Waste Disposal program. If the town establishes a sewer district, the population of the district will have to be evaluated to determine whether it exceeds the population threshold.

7.2.4.4 Massachusetts Sewer Rate Relief Fund

The Massachusetts Sewer Rate Relief Fund was established by the Legislature in 1993 under the provisions of Chapter 29 Section 2Z of the General Laws. The fund was established to defray sewer service costs and provides annual grants of up to 20% of eligible debt service. Eligible debt service is defined as:

- Permanent debt issued on or after January 1, 1990 for a term greater than five years
- For water pollution projects that have not received state grants or have not been financed through the Massachusetts Water Pollution Abatement Trust, including the SRF program.

Funding levels can not be guaranteed beyond the current year's appropriation. In 1994 the annual budget appropriation to the fund was \$20 million. The appropriations increased annually to over \$60 million by 2002. Due to the state's fiscal crisis, the funding appropriation was eliminated in 2003. In 2004, funding was restored to the Sewer Rate Relief

Fund but at much lower levels than the fund had historically received. Appropriations for the last five years are listed in Table 7-2.

TABLE 7-2
Annual Appropriations to Massachusetts Sewer Rate Relief Fund

Year	Appropriation
2008	\$23 million
2007	\$25 million
2006	\$12.5 million
2005	\$10 million
2004	\$5 million

The Massachusetts Water Resources Authority (MWRA) received the majority of the appropriations each year due to their substantial debt service. In 2007, awards to applicants were equivalent to approximately 7.6% of the eligible debt service.

7.2.4.5 State and Federal Earmarked Appropriations

Bourne may be able to lobby lawmakers for state and federal appropriations for its wastewater system. These appropriations are not typical and must be politically well-supported.

7.2.4.6 Grants

Currently, grant funding for wastewater infrastructure is not widely available, and any available grants will typically only offset a small percentage of total project costs. According to a presentation by Peter Shanaghan from USEPA at the Paying for Sustainable Water Infrastructure Conference in March 2007, the trend over the past quarter century in Federal infrastructure programs has been a reduction in available grant subsidies.

7.2.4.7 District Improvement Financing (DIF)

Massachusetts General Law Chapter 40Q, enacted in August 2003, established the District Improvement Financing (DIF) Program. DIF is a public financing alternative that municipalities can use to fund infrastructure projects. The fund works by allocating future, incremental tax revenues collected from a predefined district to pay for the project costs. The proposed project should focus on infrastructure needs that will encourage private investment in the designated area. The future increase in taxes in the targeted redevelopment district is used for collateral for the financing. DIF offers loans for up to 30 years. The municipality must designate a development district and a development program. Both must be certified by the Massachusetts Economic Assistance Coordinating Council (EACC). It is anticipated that the DIF program may be applicable to the Main Street Buzzards Bay area.

7.2.4.8 Tax Increment Financing (TIF)

The DIF Program described above is a form of Tax Increment Financing (TIF), where improvements are funded by anticipated future tax revenue increases. The general concept of a TIF program is that the public improvements will result in an increase in the value of surrounding real estate. The increased tax revenue is used to finance the debt issued to pay for the project. The TIF must be approved by the municipal governing body. In addition, executed agreements with each property owner in the designated TIF zone are required. The TIF zone must be in an area designated as an Economic Opportunity Area by EACC. TIF are allowed to finance bonds up to 20 years. It is anticipated that the TIF program may be applicable to the Main Street Buzzards Bay area.

7.2.4.9 Community Development Action Grant (CDAG)

The Community Development Action Grant (CDAG) Program is a state-funded program that supports public projects with the goal of stimulating economic development and leverage private investment, which may include job retention and creation, and revitalization of distressed areas. CDAG can be used in a variety of ways, including installation, improvement, construction, repair, rehabilitation or reconstruction of utility distribution systems, including water and sewer lines. CDAG-funding is financed through 30 year bonds, and CDAG-funded projects must be publicly owned or managed for a period of not less than 30 years. The maximum amount of funding under CDAG is \$1 million per project. It is anticipated that the CDAG program may be applicable to the Main Street Buzzards Bay area.

7.2.5 Cost Apportionment

Bourne will need to evaluate the cost recovery program options and develop an approach that is acceptable to the town. Potential cost recovery (revenue) programs to recover capital costs include:

- Local property taxes
- Betterments
- User fees
- Special fees and taxes

The opinions of probable cost are presented in Section 6.3, and the town will need to determine how these costs are apportioned. One option for capital cost sharing includes town-wide sharing of initial costs through general taxation and/or other funding mechanism and sharing of service area costs by system users within the service areas through betterments and/or other targeted mechanisms. Potential cost apportionment programs are discussed in the following subsections.

7.2.5.1 Local Property Taxes

Local property taxes are a primary source of revenue for municipalities. However, with the limitations on property tax increases under Proposition 2-1/2, the ability of municipalities to levy taxes is capped at 2.5% of the taxable value of property within the municipality. Overrides to the limit have to be voted, and in several municipalities, Proposition 2-1/2 overrides have been difficult to pass. Alternatively, voters can vote to exclude specific bonds or debt issued for municipal capital improvements. The exclusion will only be in place for the length of the borrowing.

Without first implementing long-term capital facility planning and potentially passing a project-specific bond exclusion, funding a major wastewater capital project solely through general taxation is typically not attractive, and in many cases not possible, without severely impacting the other services and programs funded through general taxation. However, with planning, general taxation can be a viable revenue source and, in many cases, can be justified for a portion of the project cost because the capital project often benefits the municipality as a whole, even if the infrastructure is only provided to a portion of the population.

7.2.5.2 Betterments

Betterments are the funding mechanism commonly used to assess initial capital costs to system users. A betterment is a one-time charge to property owners within a service area who have the right to connect to the system. Betterments are assessed to properties whether or not they are actually connected to the system. Typically, a betterment fee is paid back by the property owners either as an initial lump sum or with interest over time. Any outstanding balances must be paid in full upon transfer of property. However, the structure of betterments can include relief to qualifying parties, such as suspension or deferral for elderly owners or undeveloped parcels. At its September 23, 1992 special meeting, the Board of Sewer Commissioners set betterments for the Buzzards Bay area served by the sewer system. The authorized "Order of Estimated Sewer Assessments" was recorded in Book 8221 Page 296 at the Barnstable County Registry of Deeds. A 40% betterment was assessed based on a formula taking into account the frontage and area of parcels of land abutting the sewer system.

In Massachusetts, assessment options to determine individual property costs can be based on parcel frontage, parcel area, an equivalent flow basis, or a combination of these options.

7.2.5.3 Connection and Change-in-Use Fees

Connection and change-in-use fees are other means of generating revenue to cover capital expenditures from system users. Properties that have been bettered are typically not subject to these fees, but properties that were subsequently subdivided or had a change in use that resulted in a higher flow contribution to the system could be assessed a fee before they tie into

the system. Connection fees are paid at the time of connection therefore can not be accrued in advance of construction of the infrastructure.

7.2.5.4 User Fees

User fees are recurring charges to system users that are assessed based on system use. Most commonly, they are intended to fund the annual operation and maintenance budget associated with the system. In some cases, capital expenditures are included in the user fees, but most municipalities do not finance major capital projects solely through user fees. User fees for wastewater systems are typically calculated based on water use, which approximates the amount of wastewater generated. Where water use is not metered, user fees are typically based on an equivalent dwelling unit (EDU) basis with assumed water use rates as a function of the property use.

7.2.5.5 Special Fees and Taxes

In addition to the more commonly used revenue programs, there are also several special fees and taxes that could be used to recover a portion of the capital costs of the project. Three examples of these fees include real estate transfer taxes, flush fees, and impact fees. These types of fees have been used in other systems and are being considered as potential revenue generation sources in other communities in Massachusetts.

Real Estate Transfer Tax

A real estate transfer tax is charged to buyers and/or sellers of property at the time of sale and is typically based on a percentage of the value of the property. This type of tax has been used in other states including Maryland to fund Chesapeake Bay protection. The tax has been considered in several Cape and Island communities in Massachusetts. Chatham is currently implementing its CWMP recommendations that include town-wide construction of sewers and expansion of the wastewater treatment plant, and is considering a 1% real estate transfer tax to generate revenue for the Town's capital projects. The potential to generate revenue is a function of the real estate market and the number of property transactions. Voter approval is required to impose this type of tax.

Flush Fees

Flush fees are currently charged to sewer system users in Maryland to generate revenue for wastewater treatment plant upgrades to reduce the amount of nitrogen discharged to the Chesapeake Bay. The fee of \$30 is charged annually to system users. Maryland also charges the fee to septic users, and the revenue is used to fund septic system upgrades for nitrogen removal and mitigate runoff from agricultural fields.

Impact Fees

The Cape Cod Commission established Impact Fee Enabling Regulations, Barnstable County Ordinance 98-6 in May 1998. These regulations lay the ground rules for municipalities setting impact fees for proposed developments to offset specific impacts of the proposed developments, including sewers and sewage treatment facilities. An impact fee bylaw must be established that sets the rational nexus for the fee, and ensures that the fee is roughly proportional to the anticipated impact created by the development. The collection of impact fees would not be available until projects are proposed.

7.2.6 Organizational Structure

The Town will need to determine how to manage the new wastewater utility and its budget. Options include:

- Creation of a new town department
- Inclusion in an existing town department
- Creation of a new sewer district
- Expansion of an existing utility district

Towns typically have a general fund and may have one or more enterprise funds for its municipal services. Enterprise funds are for a specific designed use, such as a water or wastewater utility. If the new sewer utility is included within an existing town department or a new town department is created, the town will need to determine whether to establish a separate enterprise fund for the utility. While the accounting will become more complex with the establishment of an enterprise fund, the main advantage is that revenue collected through user fees and other special fees associated with the utility are kept separate from the general fund and can be earmarked for operation, maintenance, and capital projects associated with the sewer utility.

Districts can be established by the following methods, depending on the type and size of district:

1. General state law
2. Special act of the Legislature
3. Municipal home rule authority, bylaws and regulations

Establishment of an independent Sewer Commission under general state law requires local voter approval and does not require approval by MassDEP or the state legislature. Currently, the Board of Selectmen also serves as the Sewer Commission. Potential benefits of establishing a district include financial independence and ability to provide targeted services.

7.3 FUTURE TASKS AND PROPOSED SCHEDULE

Figure 7-1 contains a timeline chart that details the tasks and schedule for implementation of the recommended alternative.

1. Obtain project authorization (Town Meeting) and funding
 - a. Obtain Town Meeting authorization
 - b. Identify and secure funding sources
 - c. Develop and implement revenue generating mechanism
2. Preliminary design and MEPA/CCC Environmental Permitting
 - a. Receive the Certificate on the ENF from MEPA and develop scope for EIR/DRI (draft and final) by MEPA and CCC
 - b. Develop preliminary design of recommended plan including hydrogeologic investigation of groundwater discharge site(s) – pump station locations – WWTP layout including building heights – sewer system layout
 - c. Complete environmental review process with submittals of draft and final EIR/DRI
3. Design and permitting
 - a. Determine and implement the Owner’s Project Manager requirement for the WWTP and Pumping Station Construction Contracts.
 - b. Prepare engineering design drawings and specifications
 - c. Obtain MassDEP groundwater discharge permit
 - d. Identify and obtain any required land parcels or right-of-way easements
 - e. Obtain local and/or state environmental permits
 - f. Obtain local and state road opening permits

- g. Obtain state cultural resources permits
 - h. Obtain local planning and zoning review permits
 - i. Obtain MassDEP permit to construct
 - j. Identify wastewater residuals management method and any necessary contract service arrangements
4. Construction and commission
- a. Prepare bidding documents for each construction contract
 - b. Complete the public bidding process and contract awards for each construction contract
 - c. Complete construction
 - d. Complete commissioning of new facilities

Figure 7-1 is a graphical presentation of the implementation tasks and probable timeline. The timeline assumes a consistent and continuous effort by all Stakeholders to address and perform tasks without undue delay. Projects of the magnitude add complexity of constructing wastewater collection, treatment and discharge have significant potential for delays, particularly relative to environmental and cultural resources permitting challenges. Also obtaining local support, project authorization and a suitable funding and financing methodology often require more time than anticipated. Figure 7-1 is based on reasonable expectations for each tasks but should be considered as a dynamic process to be adjusted as the project evolves.

