DRAFT
Comprehensive Wastewater Management Plan

Mattapoisett, MA

CWSRF #2921

Prepared for:

Water & Sewer Commissioners

April 2008

Tighe&Bond

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

September 22, 2008

Mr. Nick Nicholson, Superintendent
Water & Sewer Department
19 Country Road
Mattapoisett, MA 02739

RE: Mattapoisett Comprehensive Wastewater Management Plan, CWSRF- 2921

Dear Mr. Nicholson,

The Department of Environmental Protection (the Department), offers the following comments on the Town of Mattapoisett Comprehensive Wastewater Management Plan (CWMP).

1. It is not clear whether the Interbasin Transfer Act (IBTA) will apply to the proposed program. The town and their consultants should meet and discuss the specifics of the program with the staff of the Interbasin Transfer Act at the Department of Conservation and Recreation (DCR) to determine if the IBTA will apply.

2. The CWMP must include further discussion of the IMA modification with Fairhaven and, at a minimum, develop a written agreement in principle between the two parties that demonstrates that the proposed 20-year plan is implementable. Also explain how Mattapoisett will evaluate revised TMDL permit limits at the Fairhaven WPCF when modifications are made to the NPDES permit.

3. It is not clear whether the Fairhaven treatment plant will need an increase in capacity to accept the additional flows from Mattapoisett or that existing capacity in the Fairhaven plant could be used for the increased flows from Mattapoisett.

4. A current and projected flow analysis for the Fairhaven treatment plant should be presented along with the impact of the Mattapoisett flow increase.

5. The CWMP must address the issue of potential secondary growth impacts from sewering of the proposed areas. Because there are several areas where outlying areas of need must be sewered, but intermediate areas do not need sewering, the CWMP should develop a more

detailed analysis of options for controlling these impacts. In particular, a Provincetown-like approach should be analyzed and presented to the community to see if only the needed sewering could be accomplished without having to sewer intermediate areas. Recently enacted legislation allows for this to be implemented at the local level without special legislation. In addition, this approach would reduce the flows needed to be handled by the main pump station and transported to Fairhaven.

6. The complete 20-year plan recommended in the CWMP must be presented to MEPA for review. Because the complete program (Phases 1 and 2) exceeds 10 miles in length of sewering, it will require the preparation of an EIR.

7. Page 3-44: The current Fairhaven treatment plant flows should be presented in this section.

8. Page 8-15: As part of the measures to control impacts from the sewering program, the CWMP should include the provisions to control development and redevelopment of properties in the wetlands and flood plain high-hazard areas. The CWMP should state that the town will fully implement the recently adopted provisons of the Wetlands Protection Act and the State Building Code that apply to these situations.

9. Section 8.3.4.1: An estimated cost per user (including fees for the use of the Fairhaven WPCF) should be included in the CWMP.

The DEP appreciates the opportunity to comment on this proposed project. If you have any questions regarding these comments, please contact Ron Lyberger at (617) 617-292-5738.

Sincerely,

David DeLorenzo, Deputy Director
Division of Municipal Services

Cc: Tighe & Bond
Bill Straus, State Representative
Ron Lyberger, DEP/DMS/BOS
Jennifer Olivier, DEP/DMS/BOS
Dick Keith, DEP/SERO/DMS
Jack Hamm, DEP/DMS /BOS

Tighe&Bond
Consulting Engineers
Environmental Specialists

M-382-1-29
April 17, 2008

Mr. Nick Nicholson, Superintendent
Water & Sewer Department
19 County Road
Mattapoisett, MA 02739

Ref: CWMP Draft Report

Dear Mr. Nicholson:

Enclosed is a "Draft" of the Comprehensive Wastewater Management Plan (CWMP) that focuses on the Mattapoisett sewerage system. To complete the CWMP process and prepare a Final report, the following is needed:

- The report recommendations need to be discussed with you and the Board of Water & Sewer commissioners.
- A third public meeting should be scheduled so that the final recommendations of the CWMP can be presented to the public and discussed in an open forum.
- An Environmental Notification Form (ENF) needs to be prepared and submitted to the MEPA office to review environmental aspects of the CWMP. This effort should not proceed until the third public meeting is held.
- The Draft plan needs to be updated to include the above.

The final recommendations of the CWMP are consistent with information that has been discussed over the last 9 months. Rather than highlighting the recommendations herein, attached to this letter is Table 8-8 from the report titled Summary of Recommendations that provides a good overview of the report findings.

As you are aware, Mattapoisett has sewage capacity to serve sewer extensions to the Mattapoisett Neck area of the community. However, the future (2028) sewage capacity needs of Mattapoisett total a minimum of 0.747 MGD versus the existing capacity limit of 0.5 MGD. The noted capacity is needed to serve areas of the community where

53 Southampton Road ▪ Westfield, MA 01085 ▪ Tel. 413-562-1600 ▪ Fax. 413-562-5317
www.tighebond.com

sewage needs exist and can be effectively addressed by extensions of the municipal sewerage system.

If you have any questions on the Draft, contact Ian Catlow, PE at 508- 471-9605 or the undersigned at 413-572-3203.

Very truly yours,

TIGHE & BOND, INC.

Ronald A. Michalski, PE
Senior Consultant

J:/M/M0382/LTR/ram12.doc

TABLE 8-8
Summary of Recommendations

Item	Recommendation
Existing Sewerage System Needs	• Replace old North Street Sewer • Implement phased Eel Pond Pump Station Improvement program • Implement defined sewerage system maintenance plan • Implement computerized maintenance program
I/I Control & Mitigation	• After North Street Sewer replacement is complete, investigate service connections for inflow • Address construction deficiencies at Barstow Street, Water Street, and Church Street to mitigate infiltration • Implement annual manhole inspection program to address minor infiltration sources • Address additional potential inflow sources
Wastewater System Expansion & Upgrade	• Address all significant need areas • Phase 1 - extend Mattapoisett's centralized sewer system to serve significant need areas in the Mattapoisett Neck area (Study Areas 9, 11, 12, 13, 17, 18, 19, & 20) • Phase 2 - when capacity is available, extend sewer system to additional significant need areas in vicinity of sewer system (Study Areas 8, 10, 14, 15, 21, 22, 23, 25, & 26) • For remote, significant need areas: - encourage homeowners to adopt water conservation measures - encourage homeowners to address on-site sewage problems via septic system repairs and/or upgrades - if problems persist, encourage homeowners to work with Town to determine if satellite treatment systems are appropriate for the area - if satellite systems are deemed appropriate, develop preliminary layouts of treatment system to determine discharge locations, treatment technology, and cost
Fairhaven Negotiations	• Continue negotiations with Fairhaven for increased capacity at WWTP
Non-Structural Recommendations	• Develop bylaw for existing flow allocation policy • Consider implementing amendment to Sate's sanitary code (Title 5) to expand definition of nitrogen sensitive areas to protect Mattapoisett River or Buzzards Bay

LETTER OF TRANSMITTAL

SECTION 1 INTRODUCTION
1.1 Overview 1-1
1.2 Comprehensive Wastewater Planning Process 1-1
1.3 Wastewater Planning Needs 1-2
1.4 Project Scope 1-2
1.5 Acknowledgements 1-4

SECTION 2 BACKGROUND
2.1 Previous Wastewater Studies 2-1
2.1.1 Water Pollution Control Facilities Plan 2-1
2.1.2 Eel Pond Flushing Study 2-4
2.1.3 Study on Eel Pond Improvements, CLE Engineering 2-7
2.1.4 Comprehensive Conservation and Management Plan 2-8
2.2 Regulatory Framework 2-10
2.2.1 Massachusetts Water Policy 2-12
2.2.2 Title 5 2-13
2.2.3 Groundwater Discharge Permits 2-13
2.2.4 Private Sewage Treatment Facilities for Multiple Lot Residential Development – Interim Policy 2-14
2.2.5 Nutrient Loading Approach to Wastewater Permitting and Disposal - Interim Policy 2-15
2.2.6 Guidelines for Small Wastewater Treatment Facilities 2-15
2.2.7 Interim Guidelines on Reclaimed Water (Revised 2000) 2-15
2.2.8 Surface Water Disposal – NPDES Permit Program 2-16
2.2.9 Massachusetts Water Quality Standards – Antidegradation Requirements 2-17
2.2.10 Intermunicipal Agreements 2-18
2.2.11 Interbasin Transfer Act 2-19
2.2.12 Water Management Act 2-20
2.2.13 Water Quality Assessments: TMDLs 2-21
2.2.14 Massachusetts Environmental Policy Act (MEPA) 2-21

SECTION 3 EXISTING CONDITIONS ASSESSMENT
3.1 Planning Area Description 3-1
3.2 Demographic Data and Land Use 3-2
3.2.1 Existing Land Use 3-2

3.2.2 Zoning 3-5
3.2.3 Demographic Profile 3-8
3.2.4 Protected Open Space 3-9
3.2.5 Master Planning Efforts 3-12
3.3 Existing Environment 3-14
3.3.1 Topography, Geology and Soils 3-14
3.3.2 Water Resources 3-17
3.3.3 Natural and Environmental Resources 3-24
3.4 Decentralized Wastewater Systems 3-28
3.4.1 On-Site Septic Systems 3-28
3.4.2 Septage Management 3-29
3.4.3 Innovative/Alternative (I/A) Title 5 Systems 3-29
3.4.4 Satellite Wastewater Treatment Facilities 3-30
3.5 Existing Sewerage System 3-31
3.5.1 Gravity Sewers 3-31
3.5.2 Low Pressure Sewers 3-33
3.5.3 Pump Stations 3-34
3.5.4 Force Mains 3-36
3.6 Eel Pond Pump Station Assessment 3-36
3.6.1 Building Structure 3-37
3.6.2 Equipment 3-38
3.6.3 Electrical Equipment 3-41
3.6.4 HVAC Equipment 3-42
3.6.5 Cost Estimates 3-42
3.7 Sewage Flows 3-43
3.8 Fairhaven Water Pollution Control Facility (WPCF) 3-44

SECTION 4 INFILTRATION AND INFLOW
4.1 Sewage Flow Records 4-2
4.2 Sewer Department Interviews 4-5
4.3 Manhole Inspections 4-6
4.4 Flow Isolation 4-7
4.5 Smoke Testing 4-13
4.6 Infiltration/Inflow Summary 4-17

SECTION 5 NEEDS ANALYSIS
5.1 Study Area Definition 5-1
5.2 Evaluation Criteria 5-8
5.2.1 Existing On-Site Wastewater Disposal Problems 5-8
5.2.2 Lot Size 5-10
5.2.3 Soils 5-12
5.2.4 Groundwater 5-12
5.2.5 Water Resources 5-15
5.2.6 Summary of Evaluation Criteria 5-17

5.3 Needs Analysis 5-18
5.4 Card Survey 5-18
5.5 Summary of Needs 5-24

SECTION 6 FUTURE CONDITIONS
6.1 Demographic Projection 6-2
6.2 Commercial Growth Potential 6-4
6.3 Wastewater Flows 6-4
6.3.1 Existing Flows 6-5
6.3.2 Full Build-Out 6-9
6.3.3 Future Flows (Year 2028) 6-11
6.3.4 Peak Flows 6-13
6.4 Build-out Analysis 6-13
6.5 Wastewater Constituents 6-15

SECTION 7 WASTEWATER MANAGEMENT ALTERNATIVES
7.1 Wastewater Treatment Overview 7-3
7.1.1 Wastewater Constituents 7-3
7.1.2 Wastewater Treatment 7-4
7.1.3 Wastewater Discharge Permits and Water Quality . 7-5
7.2 Regional Alternatives 7-7
7.2.1 Collection Alternatives 7-7
7.2.2 Study Area Collection Alternatives 7-9
7.3 Community Systems (Greater than 10,000 gpd) 7-9
7.3.1 Satellite Treatment Facilities 7-11
7.3.2 Centralized Treatment Facilities 7-12
7.3.3 Effluent Discharge Alternatives 7-13
7.3.4 Technology Alternatives for Treatment Disposal, Reuse, and Residuals Management 7-14
7.3.5 Treatment Alternatives 7-14
7.3.6 Groundwater Discharge Alternatives 7-21
7.3.7 Effluent Reuse Alternatives 7-26
7.4 Decentralized Systems (Less than 10,000 gpd) 7-26
7.4.1 Conventional On-Site Systems 7-28
7.4.2 Tight Tanks – Off-site Treatment and Disposal 7-32
7.4.3 Innovative/Alternative (I/A) Systems 7-32
7.4.4 Cluster (Shared) Systems 7-36
7.4.5 Collection Alternatives 7-38
7.4.6 Septage Management 7-38
7.4.7 Decentralized System Management 7-38
7.5 Summary of Wastewater Management Alternatives 7-39
7.6 Study Area Collection System Alternatives 7-41
7.6.1 Study Area 1 7-41
7.6.2 Study Area 5 7-41

7.6.3 Study Area 8 7-42
7.6.4 Study Area 9 7-42
7.6.5 Study Area 10 7-42
7.6.6 Study Area 11 7-42
7.6.7 Study Area 12 7-43
7.6.8 Study Area 13 7-43
7.6.9 Study Area 14 7-43
7.6.10 Study Area 15 7-43
7.6.11 Study Area 17 7-43
7.6.12 Study Area 18 7-44
7.6.13 Study Area 19 7-44
7.6.14 Study Area 20 7-44
7.6.15 Study Area 21 7-44
7.6.16 Study Area 22 7-45
7.6.17 Study Area 23 7-45
7.6.18 Study Area 25 7-45
7.6.19 Study Area 26 7-45

SECTION 8 RECOMMENDED PLAN
8.1 Existing Sewerage System Needs....................................8-1
8.2 Infiltration/Inflow Control & Mitigation................................8-3
8.3 Wastewater System Expansion & Upgrade 8-4
8.3.1 Results of Wastewater Management Needs Analysis...8-5
8.3.2 Recommendations for Significant Need Areas........8-6
8.3.3 Centralized Sewer System Recommendations.......8-6
8.3.4 Satellite Treatment Systems 8-12
8.4 Fairhaven Negotiations..8-13
8.5 Non-Structural Recommendations.................................8-13
8.5.1 Flow Allocation Bylaw 8-14
8.5.2 Title 5 Addenda..8-14
8.6 Recommended Plan Summary.....................................8-14

SECTION 9 PUBLIC PARTICIPATION PROGRAM
9.1 Public Meetings 9-1
9.1.1 March 22, 2007 - Public Meeting No. 1 9-1
9.1.2 July 19, 2007 – CAC Briefing Meeting 9-1
9.1.3 August 16, 2007 – Project Update Meeting.............9-2

APPENDICES

APPENDIX A	MATTAPOISETT SEWER SYSTEM MAP
APPENDIX B	MATTAPOISETT WATER SYSTEM MAP
APPENDIX C	MATTAPOISETT 2007 REPORT PURSUANT TO CHAPTER 73 OF THE ACTS OF 2002
APPENDIX D	I/I INVESTIGATION DATA
APPENDIX E	CARD SURVEY QUESTIONNAIRE
APPENDIX F	I/A TECHNOLOGIES
APPENDIX G	SEWER SYSTEM ALTERNATIVES
APPENDIX H	SEWER SYSTEM EXPANSION COSTS
APPENDIX I	PUBLIC PARTICIPATION PROGRAM INFORMATION

LIST OF TABLES

Table 2-1	Action Plans Outlines in CCMP and Mattapoisett Relevance
Table 2-2	Mattapoisett Water Policy Recommendations
Table 2-3	Interim Guidelines on Reclaimed Water: Effluent Standards
Table 2-4	Federal Water Quality Standards for Secondary Treatment
Table 2-5	Water Management Act Summary
Table 3-1	Existing Land Use
Table 3-2	Zoning Districts
Table 3-3	Permanently Protected Lands
Table 3-4	Comparison of Number of Acres Enrolled in Chapter 61 Statues, 1989-1997
Table 3-5	Unprotected Lands of Conservation or Recreation Intent
Table 3-6	Massachusetts Water Quality Classification for Waterbodies Bordering Mattapoisett
Table 3-7	Massachusetts Year 2006 List of Integrated Waters; Category 5 Waters
Table 3-8	Public Water Supplies
Table 3-9	Annual Water Balance
Table 3-10	Rare Species in Mattapoisett

Table 3-11	State Register, Historic Places in Mattapoisett
Table 3-12	Licensed Septage Haulers
Table 3-13	Innovative/Alternative Facilities
Table 3-14	Mattapoisett Wastewater Pump Station Features
Table 3-15	Mattapoisett Force Mains
Table 3-16	Eel Pond Pump Station, Summary of Estimated Costs for Repairs
Table 5-1	Study Area Description
Table 5-2	Wastewater Management Needs Analysis Evaluation Criteria
Table 5-3	Mattapoisett Wastewater Needs Analysis Scoring Summary
Table 5-4	Card Survey Results
Table 5-5	Summary of Wastewater Management Needs Analysis
Table 5-6	Needs Analysis vs. Card Survey Results
Table 6-1	Population Projections
Table 6-2	Flow Generation Rates
Table 6-3	Existing Wastewater Generated from Study Areas
Table 6-4	Full Build-out Flows
Table 6-5	Future 2028 Flows
Table 6-6	Anticipated Peak Factors
Table 6-7	Build-Out Factors for Town-wide Projections
Table 6-8	Summary of Town-wide Build-Out Results
Table 6-9	Anticipated Wastewater Constituent Concentrations
Table 7-1	Wastewater Management Alternatives
Table 7-2	Discharge Permits and Minimum Effluent Quality Requirement
Table 7-3	Biological Treatment Technologies
Table 7-4	Subsurface Disposal Design Loading Rates
Table 7-5	Effluent Loading Rates for Title 5 Systems
Table 7-6	Wastewater Characteristics for Typical Residential Title 5 Systems
Table 7-7	Sewer Extension Alternative Costs
Table 8-1	Eel Pond Pump Station, Summary of Estimated Costs for Repairs
Table 8-2	Flow Projections for Significant Need Areas
Table 8-3	Flow Projections for Mattapoisett Neck Area
Table 8-4	Flow Projections for Additional Significant Need Areas
Table 8-5	Recommended Centralized System Expansion Areas & Flows
Table 8-6	Recommended Satellite System Areas
Table 8-7	Opinion of Probable Construction Costs – Recommended Plan for Sewer Expansion
Table 8-8	Summary of Recommendations

LIST OF FIGURES

Figure 3-1	Orthophotography
Figure 3-2	Land Use
Figure 3-3	Zoning
Figure 3-4	Mattapoisett Population
Figure 3-5	Surficial Geology
Figure 3-6	Water Resources
Figure 3-7	Environmental & Cultural Resources
Figure 3-8	Pump Station Schematic
Figure 5-1	Wastewater Management Study Areas
Figure 5-2	Lot Size Constraints
Figure 5-3	Soil Constraints
Figure 5-4	Groundwater Constraints
Figure 5-5	Water Resource Areas
Figure 5-6	Wastewater Needs Assessment
Figure 6-1	Mattapoisett Population Data
Figure 6-2	Mattapoisett Precipitation and Flow Summary
Figure 7-1	Fairhaven WWTP
Figure 7-2	General Process Flow Diagram Community Treatment System
Figure 7-3	Estimated Groundwater Disposal System Site Area Requirements
Figure 7-4	Typical Wick Well Schematic
Figure 7-5	General Process Flow Diagram Conventional On-Site System
Figure 7-6	General Process Flow Diagram Tight Tank
Figure 7-7	General Process Flow Diagram On-Site System with Additional Treatment by Alternative/Innovative Technology
Figure 7-8	General Process Flow Diagram Cluster Treatment System
Figure 7-9	Collection System Alternatives
Figure 8-1	Recommended Plan

1.1 OVERVIEW

Over the last 24 years the Town of Mattapoisett has been implementing a master plan established in a 1983 Water Pollution Control Facilities Plan prepared by Tighe & Bond. During this time the Town has established an intermunicipal agreement with Fairhaven for wastewater treatment and constructed over 16 miles of sewer and 7 pump stations. Much of this work has been performed to address septic system problems and protect coastal resources.

In recent years, some of the final recommendations of the 1983 plan have been implemented and the Town has recognized the need to prepare a new plan that addresses wastewater management issues for the next 20 years. The Comprehensive Wastewater Management Plan (CWMP) that follows is the first step in a process that will evaluate existing conditions, identify wastewater needs, and propose solutions.

A number of wastewater management problems and challenges have shaped the Mattapoisett CWMP planning process including:

- 1996 Title V changes
- degraded surface water quality in local coastal embayments
- the need for added sewage capacity
- poor soil conditions and septic system failures

The study that follows evaluates these and other issues with the goal of establishing a wastewater master plan that addresses the Town's needs for the next 20 years.

1.2 COMPREHENSIVE WASTEWATER PLANNING PROCESS

The Massachusetts Department of Environmental Protection (MADEP) established the CWMP process to assist communities with the evaluation of wastewater collection, treatment, and disposal options. In areas without sewer service, this planning approach requires a community to perform a needs analysis to identify septic system problems. Septic system problems typically include areas with poor soils or high groundwater, vulnerable water resource areas, failing septic systems, and densely developed areas.

In communities that already have sewer systems and wastewater treatment facilities, the CWMP also evaluates system capacity and performance. This typically involves an assessment of infiltration and inflow (I/I) throughout the sewer system, as well as a detailed review of WWTP equipment, operations and performance.

Wastewater management options, including continued reliance on individual on-site septic systems, satellite systems, centralized collection and treatment systems, or export to regional systems are analyzed for applicability in addressing the community's wastewater needs. The financial and environmental costs and benefits of these options are evaluated along with the indirect growth and development impacts.

Public input is sought throughout the CWMP process through the publication of reports and pubic meetings. Review is also required by MADEP and through the Massachusetts Environmental Policy Act (MEPA) process. The CWMP process is required in order to receive funding from State sources, such as the State Revolving Fund (SRF) program, for implementing wastewater management projects.

1.3 WASTEWATER PLANNING NEEDS

Mattapoisett has a number of wastewater planning needs that must be addressed by the CWMP process. Specifically, the CWMP has been undertaken for the following reasons:

- To evaluate and plan for the impacts of community growth on existing wastewater management systems over the next 20 years.
- To evaluate and quantify infiltration and inflow conditions within the existing sanitary sewer collection system.
- To evaluate the feasibility of on-site sewage disposal options for future growth areas and existing un-sewered areas with failing systems.
- To evaluate alternatives to traditional surface water disposal methods, including groundwater disposal and water reuse, with the intent of minimizing any increased discharge to the Fairhaven WWTF.
- To review the long-term effectiveness of regional disposal options, including the existing IMA with Fairhaven.

Upon completion of the CWMP process, it is anticipated that the Town will begin to implement the new plan in order to address the issues outlined above.

1.4 PROJECT SCOPE

The Project Scope for the Mattapoisett CWMP is defined by the Plan of Study (POS) which was reviewed by MADEP prior to project initiation. The POS follows a number of guidelines established by MADEP and MEPA. These guidelines are intended to make communities assess current and future conditions, identify wastewater needs, develop and evaluate alternatives, and propose a recommended plan. The Mattapoisett POS complies with these guidelines by completing the following tasks:

Review Prior Planning Efforts – This task evaluates the research and findings of previous wastewater studies and other planning documents. The intent of this task is to understand how previous plans have shaped existing conditions, and future activities.

Existing Conditions Assessment – This task evaluates existing conditions within the community. The organizational context of federal, state and local officials is defined. Existing environmental conditions such as land use, topography, geology and water resources are identified. Both on-site septic systems and regional collection and treatment systems are evaluated to determine their capacity and condition. One specific component of the collection system evaluation is the investigation of existing sewers for infiltration and inflow.

Wastewater Needs Analysis – The needs analysis identifies wastewater collection, treatment and disposal needs under both existing and future conditions. Specific areas of need, as well as the severity and nature of the problems are determined. Each identified need area is prioritized based on the severity of the documented problems. Input from Town officials and residents is critical to this phase of the process as these groups have the best first hand knowledge of existing problems.

Future Conditions Assessment – This task is designed to evaluate future wastewater needs based on community growth projections. All projections are based on a 20-year planning horizon.

Evaluation of Alternatives – A series of alternate solutions to the Town's wastewater needs are developed and evaluated in a two phased approach. In the first phase, a short list of alternatives are developed and subjected to a screening process which rejects options that do not meet the physical constraints of the defined planning area, or are incompatible with water quality plans. The screening process determines which alternatives appear to provide the greatest environmental and cost benefit. In the second phase of the evaluation, each alternative is evaluated in greater detail based on the following criteria: effects on land use, impact on water resources, limitations on future expansion, system operability and reliability, environmental and economic costs of delays, legal and municipal agreements, and permitting.

Recommended Plan – The preferred alternatives identified by the previous task are assembled into a recommended plan which addresses the Town's wastewater needs. Once the plan is assembled, a number of factors are analyzed, including; environmental impacts, governmental implementation capability, design requirements, regulatory requirements, and an implementation schedule. All components of the CWMP through development of the recommended plan are compiled into an Environmental Notification Form (ENF). The ENF is required under the Massachusetts Environmental Policy Act (MEPA) and is intended to provide a venue for stakeholders to evaluate potential environmental impacts associated with the project.

Detailed Recommended Plan – Upon completion of the MEPA ENF review process, stakeholder comments are reviewed and the recommended plan is revised to address environmental and institutional impacts. Preliminary design criteria, a project financing plan and an implementation plan are also developed in this task. The complete detailed recommended plan serves as the master plan for the next 20 years.

Throughout all phases of the project, public participation is an integral part of the planning process. At critical points in the project, public input is solicited through direct mailings, interviews, public meetings or work sessions.

1.5 ACKNOWLEDGEMENTS

Tighe & Bond would like to acknowledge all those in the Town of Mattapoisett who contributed data and insight to this project including:

- Water & Sewer Superintendent – William (Nick) Nicholson
- Board of Water & Sewer Commissioners
    - Daniel Chase, Chair
    - Gary Gaspar, Clerk
    - Christopher Joskolka, Member
- Citizens Advisory Committee Members
    - Dan Lee (Board of Health)
    - David Nicolosi (Conservation Commission)
    - Tom Tucker (Planning Board)
    - Ray Andrews (Board of Selectmen)
    - Dana Barrows (Citizen Appointee)
- Board of Health
    - Dale Barrows, Agent
    - Amelia Mello, Assistant

2.1 PREVIOUS WASTEWATER STUDIES

To guide the Comprehensive Wastewater Management Plan efforts, previous studies and documents related to wastewater management have been compiled and reviewed. Brief summaries of the relevant information from each report are presented in this section.

2.1.1 Water Pollution Control Facilities Plan

The 1983 Water Pollution Control Facilities Plan studied the wastewater needs of Mattapoisett and performed a detailed analysis of existing methods of wastewater disposal in the Town and the impact of such practices on the community.

At that time, Mattapoisett was described as a small community with an estimated year round population of 5,700. The report noted a significant amount of undeveloped land in Town and industrial/commercial development throughout the Town was limited.

In 1983 roughly 75 homes in Town had been sewered since the early 1900's when combined storm drains and sewers were constructed on Mechanic Street, Barstow Street, North Street, and Main Street. These sewers discharged directly to the Mattapoisett Harbor in Shipyard Park. The Plan also mentioned a 1968 Report on Sewage Works, which discussed the costs and benefits of a municipal sewerage system. The Report recommended a comprehensive sewering program with wastewater treatment at a Regional Treatment Facility in the neighboring Town of Fairhaven.

The 1972 Amendments to the Federal Water Pollution Control Act compelled Mattapoisett to apply for a National Pollution Discharge Elimination System (NPDES) permit, since the Town's discharge of sewage into the Harbor was considered illegal. In 1974, a NPDES permit was issued and State and Federal governments, acting through the permit, ordered the Town to take action to eliminate wastewater discharges to the harbor or be subject to fines and penalties.

The 1975 Feasibility Study of a Mattapoisett Wastewater Treatment Facility, prepared to comply with the NPDES permit, recommended a limited collection system starting with the central downtown areas of Mattapoisett. Also, it was advised that an in-town wastewater treatment facility utilizing land disposal of treated effluent was not practical because of poor soil conditions. Subsequently, a regionalization of wastewater facilities with Fairhaven was recommended.

The 1983 Plan also presented a "Review of Current Situation", which discussed past, present and future development trends throughout Mattapoisett. This portion of the report provided information regarding local demographics, past reports, the existing sewer system, sewer use charges, infiltration/inflow (I/I), water supply, water quality, zoning requirements, soils, and septage disposal.

The population of Mattapoisett more than doubled from 1955 (2,661 persons) to 1975 (5,375 persons) as industrial growth in New Bedford and an influx of summer residents brought new people to the area. By late 1979, Mattapoisett was served by a limited sewer collection system. Within the sewer service area roughly 315 dwellings generated approximately 96,000 gallons of wastewater per day. This flow was routed to the Eel Pond Pump Station, which pumped wastewater through a force main almost two miles to the Fairhaven sewer collection system. Wastewater was then treated at the Fairhaven Wastewater Treatment Facility (WWTF) and discharged to the Acushnet River.

In 1976, an agreement between Mattapoisett and Fairhaven was negotiated for the following capacities:

- Peak Flow in Fairhaven Interceptor Sewer: 2.6 MGD
- Peak Flow at Main Fairhaven Wastewater Pump Station: 2.6 MGD
- Average Daily Flow at Fairhaven WWTF: 0.25 MGD

Since wastewater generation from Mattapoisett at the time was only 96,000 gpd, the purchase left capacity for future sewer extensions. Also, Mattapoisett was aware that Fairhaven had intentions of expanding the WWTF, which would in turn provide more capacity for Mattapoisett to purchase in the future.

Infiltration and inflow (I/I) in Mattapoisett was estimated at 13,000 gpd at the Eel Pond Pump Station in1983. This small amount of I/I was considered reasonable for the size and age of the system. The Facilities Plan recommended the sources of I/I be eliminated.

Water supply in Mattapoisett was also described by the Plan in detail. Ninety percent of the housing units in Town were served by approximately 49 miles of water main. The water supply consisted of three wells along the Mattapoisett River Aquifer which had an estimated safe yield of 1.7 MGD. The Town maintained two elevated storage tanks with a combined capacity of 820,000 gallons which provided adequate fire protection and storage capacity for the system. The estimated average per capita per water usage in Town was 75 gpcpd; however, it was recognized that it was difficult to estimate this value due to the amount of seasonal homes in Town. Chlorination facilities were provided at the pump stations for the water, but were not operational since the water was considered safe without treatment.

The Plan provided a limited discussion of zoning requirements throughout Town and how these requirements impact septic system design and installation. This is noteworthy because even in 1983 the challenges of constructing functional septic systems on small lots, with poor soils, were well known to the Town.

The report evaluated water quality in Town and concluded that "the sampling and analysis program indicated some points of concern, but there was no obvious correlation between water quality and failing on-site wastewater disposal systems".

Board of Health records were evaluated and it was found that 1.8% of homes had on-site wastewater disposal system repair work done each year. This was considered a high percentage which substantiated that there were on-site wastewater disposal problems in Mattapoisett.

The Plan evaluated future wastewater conditions in Town over the next twenty years. The section projected future conditions by drawing from a number of published population projections. The 1965 Master Plan estimated the 1990 population to be 10,900 persons; the 1969 Report on Sewage Works estimated the 1985 population to be 8,800 persons; the 1978 Southeastern Regional Planning & Economic Development District (SRPEDD) estimated 1995 population to be 7,550 and the 1983 Tighe and Bond Facilities Plan estimated the 2002 population to be 7,000. Current population in Mattapoisett is discussed in Section 3.2.3 of this report.

The Facilities Plan continued with a description of the Fairhaven WWTF as follows:

- Existing Capacity: 2.1 MGD
- Fairhaven Allocated Capacity: 1.85 MGD
- Mattapoisett Allocated Capacity: 0.25 MGD
- Proposed Future Capacity: 5.0 MGD
- Proposed Fairhaven Allocated Capacity: 4.13 MGD
- Proposed Mattapoisett Allocated Capacity: 0.85 MGD

The annual septage generated in Mattapoisett was estimated at 700,000 gallons per day (0.7 MGD) in 1983.

The Facilities Plan presented Financial Details for several wastewater management alternatives. This chapter summarized financing options to assist the Town in making future decisions. The Plan emphasized: "work included in the following summaries is not recommended water pollution control work that should be completed in the near future. On the contrary, it merely summarizes costs of alternate projects so that viable long term decisions and choices can be made in the final chapter of this Study and by Town officials".

The last chapter of the Plan presented final recommendations in terms of sewerage needs, rehabilitation potential, effectiveness of community septic systems, review of public health rules and regulations, a recommended water pollution control project, the Mattapoisett-Fairhaven agreement, and septage management. Regarding sewerage needs, the Plan stated that the Town experiences problems with on-site sewage disposal caused by high groundwater, poor soils, and overused/old systems. It was explained that a repair and rehabilitation program would improve conditions. Seven areas of Town were identified where community septic systems could be effective. The Plan recommended that the Board of Health strictly enforce Title 5 regulations to insure that development does not take place in areas unsuitable for septic tanks/cesspools. A program of sewer extensions was also recommended to resolve issues with on-site wastewater disposal in many areas of Town.

In terms of the Mattapoisett-Fairhaven agreement, it was noted that there was no available capacity to serve other sewer extensions in Mattapoisett beyond those already proposed. This lead to the recommendation for Mattapoisett to negotiate and purchase an additional 200,000 gallons per day of capacity in the proposed Fairhaven WWTF upgrade. Furthermore, if Mattapoisett envisioned substantial industrial development, it would be necessary to review needed capacity and adjust accordingly.

Lastly, it was recommended that the septage from Mattapoisett continue to be disposed of at the Marion Wastewater Treatment Plant (WWTP) as it was a cost effective disposal technique.

2.1.2 Eel Pond Flushing Study

Eel Pond is a small, shallow, coastal salt pond located at the head of the Mattapoisett Harbor. The Pond is a 24 acre coastal, salt pond, about 3 feet deep, at the head of Mattapoisett Harbor. The land area contributing to the Pond, 680 acres, is 28 times larger than the area of the Pond. The condition of the Pond has become an increasing concern since around 1992 when studies on the Pond began. Several reports have been composed in an effort to address water quality problems in Eel Pond, including the 1996 "Buzzards Bay Program - Coalition Citizen Monitoring Report for Eel Pond", the 1998 "Coalition Citizen Monitoring Report for Eel Pond", and the 1999 "Nitrogen Management Options for Eel Pond, Mattapoisett". Excerpts of the 1996 and 1998 reports and the entire 1999 report can be found on the Buzzards Bay National Estuary Program website (www.buzzardsbay.org). These reports, and the Eel Pond Flushing Study, will be discussed in this section.

The study explains that Eel Pond has two tidal channels identified as the eastern and western channel. The eastern channel has been in place since the 1800s and the western channel appeared by the early 1970s. Evidence suggests that the eastern channel is filling in, while the western channel is widening and negatively impacting tidal flushing and water quality in the pond.

There is a sewer line that runs under the barrier beach that forms Eel Pond. A portion of this sewer line under the western channel was believed to be encased in concrete. The study states, "With the migration and widening of the western channel, and the erosion of the shoreline there, there is a concern that, in the event of a severe hurricane, a shifting beach may expose and destroy the sewer line buried there."

Eel Pond was suffering from excessive nutrient loading and tidal flushing of the embayment is decreasing as the eastern channel filled in. Improving tidal flushing was suggested to improve the Pond's water quality and also to slow down the migration and expansion of the western channel.

An excerpt of the 1996 "Citizens Report: Eel Pond, Mattapoisett" was also presented on the BBNEP website. This excerpt stated that the Pond received nitrogen loading from heavily developed portions of Mattapoisett. However, the primary sources of nitrogen were identified as the nearby golf course, lawn fertilizer, and urban runoff. Residential septic systems contribute nutrients to the pond, but are not considered a primary source since most homes in the Eel Pond watershed are sewered. Eel Pond has been a historically important shellfish resource. However, high fecal coliform levels have closed to shellfishing in recent years. Because the Pond did not have adequate tidal flushing and its volume was small, it was significantly impacted by nitrogen loads that were smaller than those received at the mouth of the Mattapoisett River. The Report states that restoration of tidal flushing to the embayment was important to managing water quality problems.

The 1998 "Citizen Coalition Monitoring Report for Eel Pond" excerpt discusses the characteristics of the embayment, the watershed, water quality, and management needs.

Eel Pond's flushing has been lowered by the construction of a railway bed, which in turn "lowered its ability to tolerate nutrient loading and clear-out bacterial contamination" (Citizen Coalition Monitoring Report for Eel Pond, 1998).

Seven years of water quality data showed that the nutrient loadings received by Eel Pond were sufficient to create poor water quality and habitat conditions. The Pond suffers from high nitrogen levels and oxygen depletion.

Management needs described in the 1998 Report are similar to those previously described in this section. Even though Eel Pond's nitrogen loading was less than that observed at the mouth of the Mattapoisett River, there was significant degradation of the Pond due to its small volume and reduced flushing. Findings from other reports are referenced in the 1998 Report, including from a Horsley & Witten, Inc. (H&W)

beginning an outreach initiative to educate residents about what steps can be taken to restore and protect Eel Pond.

2.1.3 Study on Eel Pond Improvements, CLE Engineering

Similar to the Flushing Study reports discussed in the previous section, another study was completed in 2006 titled, "Study on Eel Pond Improvements" by CLE Engineering, Inc.

Between 1992 and 2001, several studies were conducted on Eel Pond. These studies showed that Eel Pond is one of the most eutrophic embayments in Buzzards Bay with consistently poor water quality. As a follow-up to the multiple studies conducted on Eel Pond, the Town of Mattapoisett contracted CLE Engineering, Inc. (CLE) to perform surveying and engineering services. The intent was to find ways to increase salt-water flow and improve water quality in the Pond. CLE was to provide detailed topographic mapping of the Pond and adjacent areas, including the 12 inch sewer force main crossing the railroad and the western channel of the embayment.

CLE's mapping included features such as resource areas, shellfish, water bodies, beaches, entrance channels, and the sewer line route. The sewer line was found to be buried approximately five feet below grade and with only 18 inches of cover at the deepest point of the western channel. CLE stated that this "is a matter of serious concern, as a major storm event (such as a hurricane) could uncover and possibly rupture the pipe" discharging several million gallons of untreated wastewater into the Harbor before repairs could be made. This lead to CLE's recommendation to close the western channel by filling and restoring the original beach grades. This would also require that the eastern channel and railroad culvert be enlarged.

To determine the best ways to improve tidal flushing in Eel Pond, CLE created a computer model of the Eel Pond watershed and connecting channels. The model showed CLE found that the current average daily exchange of the Pond was 65%, without rainfall. CLE recommended that the West Channel not be closed until railroad culvert improvements are made, otherwise, dredging the East Channel and closing the West Channel would reduce the exchange. The optimal method would be to dredge the East Channel, close the West Channel and combine that with enlarging the railroad culvert; improving the flows to 120% of the volume.

CLE performed calculations to determine the optimal method and size of a new culvert under the railroad embankment. It was determined that a 24 foot by 8 foot culvert would provide optimal flow and adequate scour protection during most storm conditions. The 24 foot culvert also was found to be the minimum advisable culvert to provide adequate storm surge flowage.

CLE concluded with three major recommendations which they determined would improve water quality in Eel Pond and protect the existing sewer line under the channel. These recommendations included eastern channel improvements, western channel filling, and replacement of the asbestos cement pipeline in the railroad embankment and barrier beach with a more durable material such as HDPE. The combined improvement program was projected to more than double water exchanges in Eel Pond.

2.1.4 Comprehensive Conservation and Management Plan

The Buzzards Bay Project was established in 1985 after Buzzards Bay was designated as an "estuary of national significance" by Congress. The Project joined the National Estuary Program (NEP) in 1987. The mission of the Buzzards Bay National Estuary Program (BBNEP) is "to protect and restore water quality and living resources in Buzzards Bay and its surrounding watershed through the implementation of the Buzzards Bay Comprehensive Conservation and Management Plan" (Buzzards Bay National Estuary Program, 2005). The Buzzards Bay Project sponsored numerous scientific and technical studies from 1985 to 1991 which were used as a basis for the CCMP along with an analysis of regulatory programs designed to protect Buzzards Bay.

The CCMP was comprised of the main planning document, the CCMP Financial Plan and the CCMP Monitoring Plan. The main planning document is summarized in this section of the CWMP. The Financial Plan identified the costs associated with the management actions recommended in the CCMP and financial strategies to meet these costs. The Monitoring Plan detailed monitoring strategy for the management actions.

The Comprehensive Conservation and Management Plan provides a history of past projects, a review of relevant scientific data, and a number of action plans to improve coaster water quality.

The focus of the Action Plans and recommendations was derived from three pollution problems identified by the Buzzards Bay Project:

- Health risks from pathogens associated with the improper treatment or disposal of human wastes, and the subsequent closure of shellfish beds
- Excessive nutrient inputs to the Bay, and their potential for causing water quality degradation and loss of habitat
- Contamination of fish, shellfish, and lobsters by toxic substances such as trace metals, hydrocarbons, pesticides, and polychlorinated biphenyls (PCBs)

- Massachusetts Estuaries Project
- Massachusetts Environmental Policy Act (MEPA)

2.2.1 Massachusetts Water Policy

EOEA's Water Policy Task Force has developed a policy for long-term management of the Commonwealth's water resources. This policy, titled the "Massachusetts Water Policy", was published on November 9, 2004. Through implementation of the policy's recommendations, the state seeks to provide municipalities with guidance, technical resources, and financial assistance to enable management of local water resources that supports the policy's vision for water resource management.

The policy contains ten recommendations, which are listed below in Table 2-2. Recommendation number four, "increase treated wastewater recharge and reuse," is the motivation for DEP's current emphasis on wastewater recharge and reuse.

TABLE 2-2
Massachusetts Water Policy Recommendations

No.	Recommendation
1.	Create a "Stress Framework" with increasingly stringent performance standards, recommendations and requirements as a community's basin approaches highly stressed.
2.	Develop clear guidance and planning materials to help communities meet existing and future water uses by developing watershed solutions based on water budgets.
3.	Pursue legislation requiring the use of enterprise accounts to fund operation and maintenance of infrastructure, stormwater mitigation and other water resource protection efforts.
4.	Increase treated wastewater recharge and reuse.
5.	Promote stormwater recharge close to its site of origin.
6.	Advance effective management of water supplies.
7.	Protect and restore critical land and water resources.
8.	Promote sustainable development, timely maintenance of old infrastructure (Fix-It-Early), and the protection of priority water resources through refinements to the Clean Water and Drinking Water State Revolving Fund.
9.	Develop clear guidance and planning materials (including the "Growing Smarter Toolkit") to help municipalities, developers and consultants advance development that reduces negative impacts on the environment. Also, provide a single point of contact for technical assistance on permits requiring multiple agency review, environmentally-friendly development strategies, fast-tracking, and resource protection strategies within EOEA.
10.	Take advantage of the new OCD (Office of Commonwealth Development) structure to advance more effective planning with MassHighway and other development agencies.

2.2.2 Title 5

The State Environmental Code (310 CMR 15.00), "Title 5: Standard Requirements for the Siting, Construction, Inspection, Upgrade and Expansion of On-Site Sewage Treatment and Disposal Systems and for the Transport and Disposal of Septage", regulates wastewater treatment and disposal systems up to design flows of 10,000 gpd. The most recent version of the regulations was issued in 1995. The DEP website provides a summary of changes made to Title 5 as of April 21, 2006. This is included in a separate document. Local Boards of Health are responsible for overseeing compliance with Title 5 in their communities. DEP approval is required for Innovative/Alternative (I/A) systems, shared or cluster systems, and systems requiring variances beyond modification of setback requirements.

Any work on a new or existing system requires a Disposal System Construction Permit. Typically, the Board of Health reviews system designs, monitors percolation tests, and reviews soil evaluations for the disposal systems, also referred to as Soil Absorption Systems (SAS). Title 5 specifies system design requirements based on soil types and groundwater depths and includes minimum siting offsets from features, such as wetlands, watercourses and wells.

The Board of Health is also responsible for administering inspections of existing systems and regulating repairs to these systems. Inspections are required when a property changes ownership, existing facilities are expanded or when the use of a facility served by a septic system changes. Repairs are intended to maximize compliance with current regulations. When a system cannot be upgraded to current standards, the standard of "maximum feasible upgrade" as determined by the Board of Health is used and may include allowable variances or conversion to an I/A treatment method.

Title 5 identifies Zone IIs, Interim Wellhead Protection Areas, nitrogen-sensitive embayments, and other areas designated by DEP as nitrogen sensitive areas. Title 5 limits discharges to 440 gpd/acre in nitrogen sensitive areas to achieve nitrogen concentrations in the groundwater that do not exceed the drinking water standard of 10 mg/L. Increases in the allowable discharge per acre may be allowed by using enhanced treatment systems (I/A systems) to reduce nitrogen loading.

2.2.3 Groundwater Discharge Permits

The Groundwater Discharge Permit program (314 CMR 5.00) regulates wastewater treatment and groundwater disposal from facilities with flows in excess of 10,000 gpd. Permit applications must include the following components:

- Permit application forms

- Engineering report
- Plans and specifications for the effluent disposal area
- Statement by a Registered Professional Engineer that wastewater treatment plant plans and specifications have been prepared in accordance with DEP standards
- Hydrogeologic study of the disposal site and surroundings
- Groundwater monitoring plan

The timeframe for obtaining a Groundwater Discharge Permit is significant: months to years. This permit is administered solely through DEP and typically does not require review by EPA.

Groundwater discharge permits are based on water quality based limits, as opposed to technology standards. Permit limits for most facilities are 30 mg/L biochemical oxygen demand (BOD), 30 mg/L total suspended solids (TSS) and 10 mg/L total nitrogen. Where dictated by receiving water quality requirements, DEP may impose more stringent permit requirements. More stringent limitations may be imposed for discharges located within nitrogen sensitive areas or Zone II wellhead protection districts. Because of the greater flow and more stringent effluent quality, the permit application and review process is much more involved than the Title 5 process. These systems require regular sampling, reporting, and proper operation and maintenance to comply with permit requirements.

2.2.4 Private Sewage Treatment Facilities for Multiple Lot Residential Development – Interim Policy

This policy allows flows from multiple single family homes to be treated at privately-owned wastewater treatment plants with groundwater discharge permits. DEP developed this policy to provide guidance regarding the private ownership and operation of wastewater treatment facilities serving multiple lot residential developments. Prior to issuing this policy, DEP did not allow treatment facilities with discharges of 10,000 gpd or greater that served residential development to be privately owned. This policy establishes criteria for system ownership and maintenance, funding for continued maintenance and repairs, and requires that these systems comply with the Nutrient Loading Policy (described in Section 2.2.5) for systems located in nitrogen sensitive areas.

2.2.5 Nutrient Loading Approach to Wastewater Permitting and Disposal - Interim Policy

This policy was developed by DEP to regulate the nitrogen load to groundwater from a site. Compliance standards for nitrogen and non-nitrogen sensitive areas are presented. For wastewater discharges, two approaches can be taken to wastewater management: 1) construct a wastewater treatment facility to provide 10 mg/L nitrogen at the point of discharge, or 2) utilize the nutrient loading approach to achieve required nitrogen concentrations in the groundwater at the property line (10 mg/L in non-nitrogen sensitive areas and 5 mg/L in nitrogen sensitive areas). Nitrogen sensitive areas include Public Water Supplies Zone II's, Interim Wellhead Protection Areas, areas served by private wells and nitrogen sensitive estuaries. The regulatory compliance point for the nutrient loading approach is the property boundary. Down-gradient wells are required to be installed and monitored to confirm permit compliance. The ambient water quality standard is required to be met at the property line regardless of additional sources of nitrogen loading. Utilizing the nutrient loading approach for permit compliance is an option for new facilities. DEP may impose stricter requirements if warranted by environmental conditions.

2.2.6 Guidelines for Small Wastewater Treatment Facilities

DEP's April 2004 "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal" addresses facilities that treat flows from 10,000 to 150,000 gpd and discharge treated effluent to the ground. The Guidelines contain permitting, design, performance, operation and maintenance, and monitoring and reporting requirements.

2.2.7 Interim Guidelines on Reclaimed Water (Revised 2000)

DEP's "Interim Guidelines on Reclaimed Water", effective January 3, 2000 addresses the use of "highly treated" sanitary wastewater for non-potable uses. Specific reuse applications may include irrigation (urban reuse), artificial recharge of aquifers, toilet flushing and other non-contact uses.

To protect public health and the environment, DEP developed comprehensive requirements for effluent reuse including water quality standards, operation and maintenance (O&M), environmental monitoring, public awareness, and guidelines for developing agreements regarding the delivery and use of reclaimed water. Additionally, reclaimed water projects must include an alternate disposal system, typically a groundwater disposal system. The most stringent design standards and effluent requirements apply to the discharge of reclaimed water in the Zone II of a public water supply. Effluent standards are summarized in Table 2-3.

TABLE 2-3
Interim Guidelines on Reclaimed Water: Effluent Standards

Constituent	Urban Reuse Standards	Aquifer Recharge Standards[1]	Toilet Flushing Standards
BOD	≤10 mg/L	≤10 mg/L or ≤30 mg/L	≤30 mg/L
TSS	≤5 mg/L	≤5 mg/L or ≤10 mg/L	≤10 mg/L
Turbidity	≤2 NTU	≤2 NTU or ≤5 NTU	≤5 NTU
Fecal Coliform	Median of ND/100 ml over running 7-day	Median of ND/100 ml over running 7-day	Not to exceed 100/100 ml
	Not to exceed 14/100 ml	Not to exceed 14/100 ml or 100/100 ml	
pH	6-9	6-9	6-9
Total Nitrogen	< 10 mg/L	< 10 mg/L	< 10 mg/L
Class I GW Standards	SDWA Drinking Water Standards	SDWA Drinking Water Standards	

[1]Must meet more rigorous standards if travel time to drinking water well is less than 2 years
ND – None detected

2.2.8 Surface Water Disposal – NPDES Permit Program

Surface water discharges are regulated under the National Pollutant Discharge Elimination System (NPDES) Program (40 CFR 122.44) which was established by the Clean Water Act in 1972. NPDES permits in Massachusetts are administered jointly by EPA and DEP. State regulations related to NPDES permits are specified in 314 CMR 1.0-4.0.

No permits for a new municipal wastewater discharge have been granted in Massachusetts for over 25 years, primarily due to challenges complying with the anti-degradation policy (Section 2.1.9). It is recommended by DEP that the following steps be taken prior to submitting an application for a new or modified discharge permit:

1. Contact EPA and DEP to begin discussions and scope of project.
2. Complete a comprehensive study and evaluation of potential subsurface disposal options.
3. Demonstrate compliance with Massachusetts Water Quality Standards (WQS) antidegradation requirements (314 CMR 4.04), which serves to protect water quality. DEP has developed an antidegradation review procedure that includes review of the proposed treatment process and discharge limits relative to protection of the receiving water quality.

The timeframe for obtaining a NPDES permit is significant. EPA has no specified timelines for review, and while DEP has specific timelines prescribed in their regulations for permit review and MEPA procedures, the process can take over a year.

40 CFR 133.102 defines the minimum water quality requirements for secondary treatment, which is applicable to municipal wastewater treatment facilities. More stringent standards can be required when deemed necessary to maintain existing water quality and use goals. These minimum, technology-based standards are summarized in Table 2-4.

TABLE 2-4
Federal Water Quality Standards for Secondary Treatment[1]

Constituent	Average Month	Average Week
BOD	30 mg/L and 85% removal	45 mg/L
TSS	30 mg/L and 85% removal	45 mg/L
pH	6-9	6-9

[1]40 CFR 133.102

Limits for nutrients and metals are commonly included in NPDES permits to maintain the quality of the receiving waters. Limits for ammonia, total nitrogen, phosphorus and copper are common. Limits for other wastewater constituents may be established for a specific discharge.

2.2.9 Massachusetts Water Quality Standards – Antidegradation Requirements

Water Quality Standards (WQS) antidegradation requirements are outlined in 314 CMR 4.04. These regulations include six subsections:

1. **Protection of Existing Uses:** Water quality that protects existing uses must be maintained.
2. **Protection of High Quality and Other Significant Waters:** Existing water quality must be maintained for high quality or other significant waters unless limited degradation is authorized by DEP. High quality waters include waters that exceed minimum quality levels necessary to support the national use goals. The classification can be applied to individual parameters.
3. **Protection of Outstanding Resource Waters (ORW):** This section prohibits new or increased discharges to outstanding resource waters, which include drinking water supplies and other significant waterbodies identified as such by the Commonwealth.

4. **Authorizations**: This section defines the authorizations necessary for discharges to waters designated for protection under 314 CMR 4.04(2) (high quality waters or significant resource waters) and 314 CMR 4.04(3) (discharges to outstanding resource waters). Authorizations to discharge to high quality waters may be allowed by the Department where the applicant demonstrates that:

   - *"The discharge is necessary to accommodate important economic or social development in the area in which the waters are located.*
   - *No less environmentally damaging alternative site for the activity, source for the disposal, or method of elimination of the discharge is reasonably available or feasible.*
   - *To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices: and*
   - *The discharge will not impair existing water uses nor result in a level of water quality less than that specified for the Class."*

5. **Control of Eutrophication:** New or increased point source discharges of nutrients to lakes and ponds are prohibited, and discharges to tributaries must not cause or worsen eutrophication or weed growth. Any existing discharges with nutrient concentrations that promote eutrophication are required to provide the highest and best practical treatment to remove the nutrients.

6. **Discharge Criteria**: In addition to any other provisions, any authorized discharge must provide a level of treatment equal to or exceeding the requirements of the Massachusetts Surface Water Discharge Permit Program (314 CMR 3).

2.2.10 Intermunicipal Agreements

Intermunicipal agreements (IMAs) are legal mechanisms that allow government units to share or transfer services. These agreements are regulated in Section 4A of Chapter 40 of Massachusetts General Laws. IMAs must be approved by a Town Meeting or City Council with the approval of the Mayor. They must also establish limits for maximum financial liability, and provide for financial safeguards. In Massachusetts, the maximum term for an IMA is 25 years.

IMAs are commonly used for collection, treatment, and disposal of a guest community's wastewater into a host community system. Typical provisions include:

- Capacity allocation
- Water quality requirements

- Allocation for capital, operation and maintenance costs
- Operation and maintenance requirements
- Regulatory and permitting requirements
- Monitoring and recordkeeping requirements
- Enforcement mechanisms
- Term of agreement and procedures for renewal and severance

IMAs are typically negotiated by the participating municipalities with participation by their engineers and counsel.

2.2.11 Interbasin Transfer Act

The 1984 Massachusetts Interbasin Transfer Act (M.G.L. Ch. 21, Section 8B-8D) gives the Massachusetts Water Resources Commission (MWRC) the authority to approve or deny water and wastewater transfers outside river basin (watershed) boundaries. The regulation (313 CMR 4.00) is only applicable to transfers outside municipal boundaries. The goal of the act is to protect the quantity of water within each river basin to support drinking water and environmental resources.

Eight action criteria must be met to satisfy the requirements for interbasin transfer approval:

1. Complete the MEPA process.
2. Prove that cost-effective, technologically feasible, and environmentally sound alternatives cannot be found within the basin.
3. Demonstrate water conservation including reduction of inflow and infiltration.
4. For communities with surface water supplies, implement a comprehensive forestry management plan (applicable to drinking water transfers).
5. Maintain in-stream flow to support local environmental resources.
6. Perform pumping test (applicable to drinking water transfers).
7. Develop local water resources management plan.
8. Assess cumulative impacts of other transfers.

At the discretion of MWRC, transfers less than 1 MGD can be deemed "insignificant."

2.2.12 Water Management Act

Water Management Act (WMA) (M.G.L. ch. 21G) and associated regulations (310 CMR 36.00), policy (April 2004), and guidance (January 2006) direct DEP to balance water withdrawals and uses with protection of the public health and the environment. Limits on water withdrawals and conservation requirements are a function of the basin stress category. A stressed basin is defined as a basin in which the quantity of stream flow has been significantly reduced, or the quality of the stream flow is degraded, or key habitat factors are impaired. There are four categories of basin stress indicating the status of water availability within the watershed: High, Medium, Low and Unassessed. The requirements are more stringent in High and Medium stressed basins and are summarized in Table 2-5.

TABLE 2-5
Water Management Act Summary

	Basin Classification			
Requirement	**High**	**Medium**	**Low**[1]	**Unassessed**[1]
Residential Water Use Cap	65 gpdc	65 gpdc	80 gpdc	80 gpdc
Unaccounted-for Water Standard	10%	10%	15%	15%
Summer Withdrawal Cap[2]				
• Calendar Trigger	Limits on non-essential withdrawals between May 1st and Sept. 30th [3]		N/A	N/A
• Stream Flow Trigger	Limits on non-essential withdrawals when stream flow drops below U.S. Fish and Wildlife's Aquatic Base Flow default value of 0.50 cfsm for three consecutive days between May 1st and Sept. 30th [3]		N/A	N/A
Offset Feasibility Study	Required when withdrawal exceeds baseline (largest of: volume from previous year, previous 3-yr average or registered volume)		N/A	N/A

[1]Policy indicates that DEP reserves the right to require the high and medium stressed basin standards.
[2]Permittees have the option to implement either calendar trigger or stream flow trigger.
[3]Limited lawn watering allowances depending on actual summer to winter withdrawal ratio relative to 1.2 benchmark.
cfsm – cubic feet per second per square mile
gpdc – gallons per day per capita

While the primary focus of the WMA is on drinking water sources, these regulations and policies can impact interbasin transfers of wastewater. Water conservation, local recharge of wastewater, and reduction of inflow and infiltration are all factored into the evaluation of interbasin transfer applications, with the goal of minimizing the environmental impact of the transfer.

2.2.13 Water Quality Assessments: TMDLs

According to Section 303(d) of the Federal Clean Water Act (CWA) and 40 CFR 130.7, states are required to identify waterbodies that will not meet water quality standards through implementation of technology-based standards required by regulation. Per Massachusetts General Law Chapter 21, DEP reports these "303d" rivers, lakes, and coastal waters to EPA in their Integrated List of Waters in *Category 5: Impaired or threatened for one or more uses and requiring a TMDL*. TMDL is an acronym for total maximum daily load. A TMDL is defined as the maximum amount of a pollutant that can be introduced to the waterbody to allow it to meet its intended beneficial use. Water quality standards for intended beneficial uses are defined in 314 CFR 4.00.

The development of a TMDL requires quantification of pollutants, identification of sources, determination of the maximum allowable load, and implementation of a plan to bring the waterbody into compliance with water quality standards. Pollution reduction measures are required for both point and non-point sources, depending on their relative contribution to the impairment.

There are a few waterbodies in Mattapoisett that are classified as Category 5 Waters (listed under Buzzards Bay) which require a TMDL according to the Proposed Massachusetts Year 2006 List of Integrated Waters. Among the waterbodies listed are the Mattapoisett River, Mattapoisett Harbor, and Eel Pond.

2.2.14 Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires project proponents to identify and mitigate detrimental environmental impacts. The MEPA process does not culminate in a specific permit but facilitates project review by permitting agencies and interested parties through requirements for submission of Environmental Notification Forms (ENF) and, when appropriate, Environmental Impact Reports (EIR).

MEPA review is required if a project requires a state agency action, such as a permit, and a review "threshold" is met or exceeded. Review thresholds determine if a project triggers the filing of an ENF or if the project triggers an ENF and a mandatory EIR. Thresholds are specified for a variety of potential environmental impacts including land disturbance, impacts to rare and endangered species, wetlands and historic sites, and infrastructure (water, wastewater, transportation) impacts.

The ENF is required to provide a concise description of the project, including the alternatives developed and potential environmental impacts. The ENF is submitted to the EOEA and other interested parties for public review and comment which could include the following for Mattapoisett: Massachusetts Historical Commission, DEP, Central Massachusetts Regional Planning Commission (CMRPC), Massachusetts

Department of Agricultural Resources (MADAR), Massachusetts Water Resources Commission (MWRC), and interested members of the public.

An EIR is required if a mandatory threshold is exceeded or if the Secretary of the Executive Office of Environmental Affairs (EOEA) determines that additional review is warranted. An EIR provides a more detailed description of the project, the potential environmental impacts, and the mitigation measures proposed. The EIR is also subject to public review and comment through the MEPA process and requires EOEA approval.

This section of the report assesses existing conditions in the Town of Mattapoisett. Information presented relative to existing conditions includes: planning area description, land use, zoning, demographics, open space, master planning efforts, topography, geology, soils, water resources, natural and environmental resources, decentralized wastewater systems, sanitary sewer collection system, and the Fairhaven Water Pollution Control Facility.

3.1 PLANNING AREA DESCRIPTION

Mattapoisett is a New England coastal town located in southeastern Massachusetts. It is bordered by Fairhaven and Acushnet on the west, Rochester on the north, Marion on the east, and Buzzards Bay on the south. The Town is located fifty-six (56) miles south of Boston, thirty-nine (39) miles southeast of Providence, RI, and six (6) miles east of New Bedford. Mattapoisett is a member of the Southeastern Regional Planning & Economic Development District (SRPEDD).

The total area of Mattapoisett is 23.3 square miles with total land area of 16.5 square miles. According the US Census Bureau, the population in Mattapoisett in 2005 was estimated at 6,479 persons. The Town's form of government includes a Board of Selectmen, Executive Secretary, and Open Town Meeting.

Mattapoisett was settled around 1750 as a part of Rochester until it was incorporated in 1857 as a separate town. According to Town documents, the earliest settlements occurred around 1680 and shipbuilding was established around 1740. During the 1800's, Mattapoisett was one of the most important shipbuilding towns on the east coast, building over four-hundred ships during a one-hundred year period. The whaling and shipbuilding industry began to decline in the 1800s. This prompted the increase in resort development and many summer homes were built on large estates.

Development is prevalent along the coast of Mattapoisett and throughout the western portion of town. Figure 3-1 shows an orthophotograph of Mattapoisett. Most of the development occurs along North Street, which runs north to south in town. Areas along Route 6 (Fairhaven Road, County Road, Chapel Road), Interstate-195, and the coastline include a significant amount of development as well.

Mattapoisett is served by the airport and port facilities of New Bedford, Massachusetts. Major highways include Route 6 (County Road) and Interstate-195. The Town is a member of the Southeastern Regional Transit Authority (SRTA), which provides bus route service between New Bedford, Fairhaven, and Mattapoisett.

The Old Rochester Regional School District serves the towns of Mattapoisett, Marion, and Rochester, which includes over 2,700 students. The District operates six schools, four of which Mattapoisett students attend including: Center School, Old Hammondtown School, Old Rochester Regional Junior High, and Old Rochester Regional High School.

A town hall, library, fire and police departments, churches, and historical museum are all located in the center of Town.

3.2 DEMOGRAPHIC DATA AND LAND USE

To plan for future development in Mattapoisett, several documents have been produced including the Zoning By-Laws (2005), Master Plan (2000), and Open Space Plan (1998). This section provides information on land use, zoning, and demographics as well as summaries of the Master Plan and Open Space Plan.

3.2.1 Existing Land Use

Figure 3-2 depicts land use in Mattapoisett according to MassGIS. This figure shows that much of the land in Town is currently designated as forest, with residential land use along the coast. According to the Town Assessor's database, the majority of parcels in Mattapoisett are classified as residential. Table 3-1 presents data for different land use categories based in the Mattapoisett Assessor's database.

TABLE 3-1
Existing Land Use

	Number of Parcels	Parcel Acreage	% Total Acreage
Residential	5,074	11,598	73.4
Commercial	126	259	1.6
Industrial	10	41	0.3
Chapter 61 Lands	82	1,696	10.7
Exempt Property	286	2,204	14
Total	5,578	15,799	100

Source: Town of Mattapoisett Assessor's Database, December 2006.

As shown in Table 3-1, Mattapoisett has approximately 5,578 parcels with a total land area of 15,799 acres. Of the 15,799 acres in Town, about 73% are designated as residential. The MassGIS land use designations for Mattapoisett differ slightly from the parcel classifications kept by the Assessor since parcels classified as residential also include parcels not yet built upon.

3.2.2 Zoning

Zoning regulations are contained in the Mattapoisett Zoning By-Laws from May 2005. The Town of Mattapoisett is divided into thirteen classes of districts and three overlay districts:

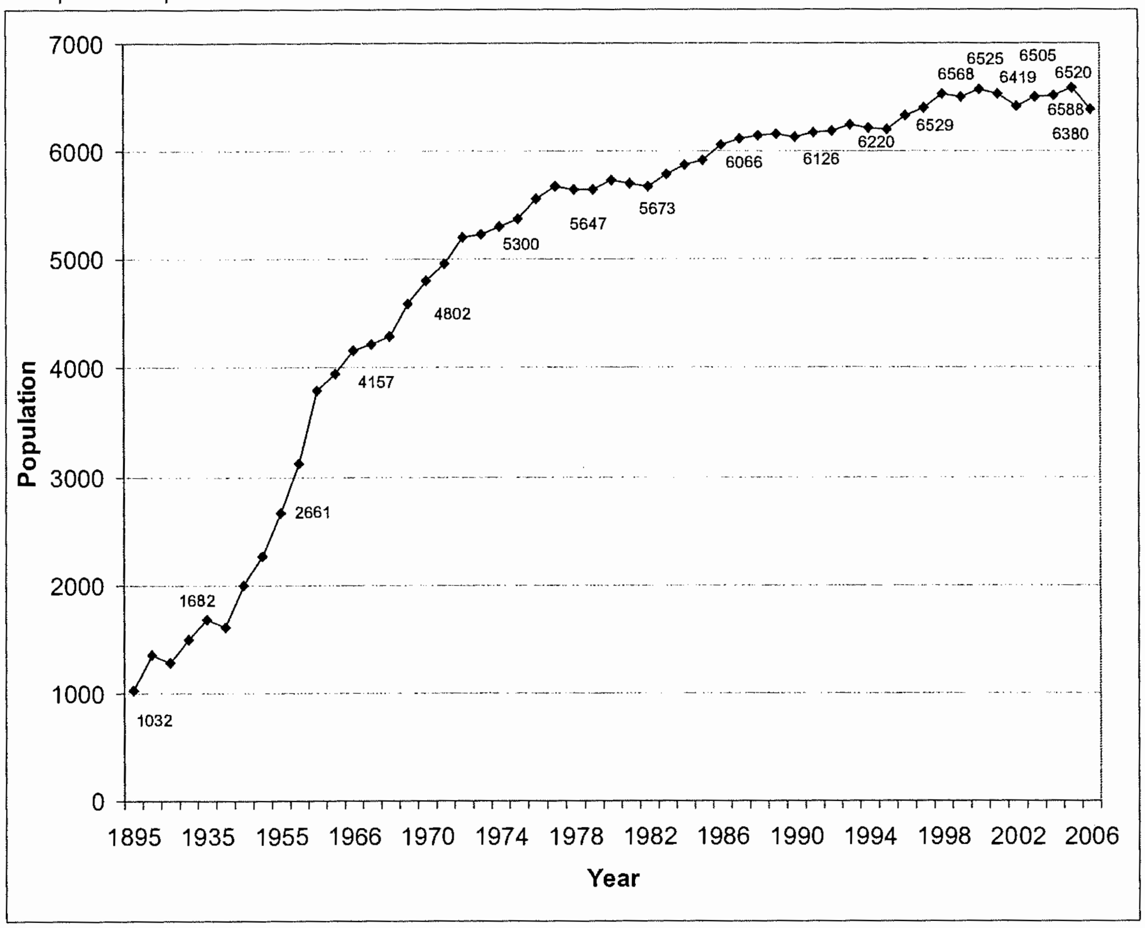
1. Residence 80 (R 80)
2. Rural Residence 80 (RR 80)
3. Rural Residence 45 (RR 45)
4. Residence 40 (R 40)
5. Rural Residence 40 (RR 40)
6. Residence 30 (R 30)
7. Rural Residence 30 (RR 30)
8. Waterfront 30 (W 30)
9. Marine Residence (MR)
10. Residence 20 (R 20)
11. Village Residence (VR 10)
12. General Business (GB)
13. Limited Industry (LI)
14. Mattapoisett River Aquifer Protection District Overlay District
15. Flood Plain Overlay District
16. Telecommunications Facilities Overlay District.

The locations and boundaries of these districts, not including the overlay districts, are presented in Figure 3-3. The majority of the town is zoned as one of the eleven residential districts listed above. The characteristics of each zone, summarized from the Zoning By-Laws, are described in Table 3-2.

3.2.3 Demographic Profile

According to the Mattapoisett Town Clerk, the Mattapoisett population in 2006 was 6,380. Historic Town census data from the Town Clerk is shown in Figure 3-4 below. The figure shows that the Mattapoisett population has shown little change over the past several years, remaining around 6,500. Population peaked in 2005 with 6,588 people, a 7.5% increase over the 1990 population of 6,126.

FIGURE 3-4
Mattapoisett Population



According to the US Census Bureau, there were a total of 3,172 housing units in Mattapoisett in 2000. Approximately 80% of these housing units (2,532) were occupied and approximately 20% (640) were vacant. Of the 640 vacant housing units, 84.1% (538) were seasonal, recreational, or occasional use properties. Other vacant housing units include those for rent, sale, or other vacancy (US Census, 2000). Assuming an average persons per unit of 1.97 (Buzzards Bay National Estuary Program, 2006), and approximately 538 seasonal, recreational, or occasional units, the

Mattapoisett population can fluctuate by as much as 1,151 persons in the summer. This change in population can impact wastewater flow rates seasonally.

3.2.4 Protected Open Space

Assisted by the Buzzards Bay National Estuary Program, Mattapoisett completed their 1997 update of the 1989 Open Space and Recreation Plan. The Plan is a guide to facilitate the preservation and maintenance of the natural and recreational resources of the Town. The Plan reflects the people, history, natural resources, and charm of Mattapoisett. Using surveys and public meetings, the Open Space Committee created a set of Goals and Objectives, described below. These Goals and Objectives are intended to improve outdoor recreational opportunities and to protect both Mattapoisett's natural resources and scenic landscapes.

Goal 1: Protect Water Quality and Natural Resources in the Mattapoisett River Valley

- Continue to acquire undeveloped lands in the Mattapoisett River watershed for permanent conservation. Establish river corridor as highest priority for land acquisition.
- Investigate the benefits of nominating the Mattapoisett River watershed from the Route 6 herring weir to Snipatuit Pond as an Area of Critical Environmental Concern (ACEC).
- Support efforts to restore herring populations in the Mattapoisett River system.
- Support the Enforcement of the Aquifer Protection District Zoning Bylaw.

Goal 2: Improve and Sustain Land Conservation efforts in Mattapoisett

- Acquire important open space parcels for permanent protection.
- Develop funding and institutional mechanisms for a sustained land acquisition program.
- Encourage private and alternative methods for land conservation.
- Increase community education that addresses land conservation efforts.

Goal 3: Preserve the Quality of Mattapoisett's Wetlands, Wildlife Habitats, and Coastal Resources

- Support acquisition of important wildlife habitats as defined by the Massachusetts Natural Heritage and Endangered Species Program.
- Preserve and restore water quality in Brandt Island Cove, Mattapoisett Harbor, Eel Pond, and Aucoot Cove and along Mattapoisett's beach communities.
- Support protection of wetland resources throughout Mattapoisett.

and the Town's environmental and cultural resources are becoming increasingly more at risk.

TABLE 3-5
Unprotected Lands of Conservation or Recreation Interest

Organization/Department	Total Acres	% of Total Mattapoisett Acreage
Board of Selectmen	67.4	0.6%
School Department	117.2	1.0%
Cemeteries	20.81	0.2%
Commonwealth of Mass.	14.3	0.1%
Private Recreation	25.9	0.2%
Land in Tax Title	75.3	0.7%
Chapter 61, 61A, 61B	1,729.9	16.4%
Totals	2,050.8	19.2%

Source: Mattapoisett Open Space and Recreation Plan, 1997.

3.2.5 Master Planning Efforts

The most recent Master Plan for the Town of Mattapoisett is the 2000 Master Plan. This Plan, developed by local volunteers and a hired consultant, is a "comprehensive plan to help guide Mattapoisett's growth and development over the next five years and beyond" (Master Plan Study Committee, 2000). The Mattapoisett Master Plan Study Committee gathered and studied information from Town officials, boards and committees, residents, a mapping project, and a computer model to project future population growth and development.

Two studies were conducted, based on the information collected from the above parties as wells as officials from other towns, which showed the need for standardized computer mapping, a town-wide Economic Development Plan, and a need to understand and address several important issues including the following:

- An aging population that desires smaller, affordable housing.
- Town government that is strained and under financial pressures.
- Mattapoisett has not grown as fast as neighboring cities/towns, but might experience a great increase in population as attraction to the Town is still high. Without zoning changes, the Committee's model shows that maximum buildout potential is 4,821 additional housing units, or 10,751 more people for a total of over 17,000 people.
- Sewer projects are impacting growth potential as they will not only service existing homes, but may open up large amounts of land previously not

- Housing – Encourage site planning more sensitive to natural resources. Encourage more efficient land use for single family residential development and a wider mix of housing opportunities for Town's changing age groups.
- Historic Areas, Natural and Cultural Resources – Preserve and enhance the natural and cultural assets of Town, including those of historical significance.
- Public Services & Facilities – Acknowledge and respond to public service demands of elderly, schools, fire, police, recreation, housing, and economic development.
- Traffic and Circulation – Enhance safety of transportation in Town, including circulation/parking along major road-ways, needs of bicyclists and tourists.

The most significant recommendation of the Master Plan was to appoint a Master Plan Implementation task force to be responsible for the implementation of the recommendations of the Master Plan. The recommendations associated with the Implementation Program include appointing a Master Plan Implementation Task Force, initiate a Charter Study, appoint an Economic Development Task force, establish, fund, and fill the position of Town Planner, create community based network of some sort to look for funding opportunities for the Task Force, appoint Community Housing Advisory Task Force, implement zoning bylaw recommendations, and consider formation of a Land Bank.

3.3 EXISTING ENVIRONMENT

The following section includes an evaluation of current environmental conditions throughout the CWMP planning area including: topography, geology, soils, watersheds, surface waters, wetlands, groundwater, drinking water supplies, water balance, rare species and wildlife habitat, certified vernal pools, floodplains, Areas of Critical Environmental Concern, and historic/archaeological sites.

3.3.1 Topography, Geology and Soils

This section presents the characteristics of the topography, geology, and soils in Mattapoisett.

3.3.1.1 Topography and Geology

Topography in Mattapoisett ranges in elevation from 0 to over 330 ft. The highest elevations are located in the area stretching from Tinkham Hill in the northeast part of Town southeast towards Pine Island Brook. High elevations also occur near Jane Lane north of Chapel Road and east of North Street near the intersection with Park Street.

Elevation reaches over 100 meters south of the intersection of Crystal Spring Road and North Street.

As shown in Figure 3-5, Surficial Geology, the majority of Mattapoisett is till or bedrock. Areas along the Mattapoisett River are mostly sand and gravel deposits and floodplains.

3.3.1.2 Soils

This section provides an overview of the main soil classifications in Mattapoisett and discusses permeability of the substratum of the soil, depth to groundwater, and the appropriateness of a given soil for the Title 5 Septic System construction.

Six main soil types exist in Mattapoisett. The most predominant soil type is the Birchwood-Poquonock-Mattapoisett family of soils. Other general soil types in Town include: Freetown-Swansea-Scarboro, Hinckley-Windsor-Deerfield, Scituate-Montauk-Norwell, Ipswich-Pawcatuck-Hooksan, and Raynham-Eldridge-Birdsall.

The Birchwood-Poquonock-Mattapoisett soils are found on the eastern side of Mattapoisett bordered on the west approximately by Little Bear Swamp, Cedar Swamp, and the area around Park Street. Birchwood-Poquonock-Mattapoisett soils are very deep, nearly level to moderately steep, well drained to poorly drained soils formed in sandy mantles underlain by loamy firm to friable glacial till in areas of ground moraines and uplands. These soils are generally poorly suited for on-site septic tank absorption fields because of the slow permeability of the substratum and perched, seasonal high watertables.

Freetown-Swansea-Scarboro soils are very deep, nearly level, very poorly drained soils formed in very deep to shallow freshwater organic deposits, underlain by glacial fluvial deposits in swamps and depressions. These soils are mapped within lowlying depressional areas and are associated with swamps and freshwater wetlands. They also have a seasonal high watertable at or near the surface for most of the year and are often ponded for long durations. Due to the high water table and low soil strength, these soils are not suitable for on-site septic systems.

Hinckley-Windsor-Deerfield soils are very deep, nearly level to steep, excessively to moderately well drained soils formed in glacial fluvial deposits on outwash plains, deltas, kames, and ice contact deposits. Deerfield soils have a seasonal high watertable between 1.5 and 4 feet and require mounded septic systems. According to NRCS, these soils occur in aquifer recharge areas and caution should be taken to protect the aquifer.

Scituate-Montauk-Norwell soils are very deep, gently sloping to steep, well drained to poorly drained soils formed in loamy glacial till overlying dense glacial till; on upland oval hills (drumlins) and ground moraines. These soils are poorly suited to use as sites for septic tank absorption fields because of the slowly permeable dense substratum which does not readily absorb the effluent. Subsurface drainage is also a problem with these soils; the firm substratum causes a perched seasonal high watertable.

Ipswich-Pawcatuck-Hooksan soils are level to steep, very deep, very poorly drained and excessively drained soils formed in organic and mineral marine deposits and eolian sand deposits along coastal areas. Ipswich and Pawcatuck soils border salt water and brackish water bodies that are protected by beaches and sand dunes from the direct forces of ocean waves. The soils are found in tidal areas subject daily to inundation and are vegetated with salt grasses. Ipswich and Pawcatuck soils are best suited for wetland habitat and poorly suited for other uses due to flooding, low strength of soil, and wetness. Hooksan soils are poorly suited for most uses due to droughtyness and high erosional and depositional events.

Raynham-Eldridge-Birdsall soils are very deep, nearly level to gently sloping, very poorly to moderately well drained soils formed in silty lacustrine sediments in areas of glacial lakebeds, plains, and deltas. Raynham soils have a seasonal high watertable of about 0.5 to 1.5 feet below the surface. Eldridge soils have a seasonal high watertable of about 1.5 to 4 feet below the surface. Birdsall soils are found in drainageways and swamps and are ponded for long periods of time. Due to the high watertable and slow permeability, Raynham-Eldridge-Birdsall soils are poorly suited for on-site septic systems.

3.3.2 Water Resources

The Town of Mattapoisett has an abundance of natural water resources including a coastal bay, a river and harbor, ponds, wetlands, and groundwater aquifers used as public drinking water supplies, as shown in Figure 3-6. This section of the report discusses these water bodies and other hydrologic features.

3.3.2.1 Watersheds

Mattapoisett is located in the Buzzards Bay watershed, which comprises portions of 17 municipalities and includes a number of embayments. The boundaries of the watershed extend through parts of the following municipalities: Westport, Fall River, Freetown, Lakeville, Middleborough, Carver, Plymouth, and Bourne. Municipalities entirely within the watershed include: Wareham, Marion, Rochester, Mattapoisett, Acushnet, Fairhaven, New Bedford, and Dartmouth. Sub-watershed boundaries are presented in Figure 3-6 Water Resources.

The Massachusetts Water Resources Commission's (WRC) Stressed Basins in Massachusetts report defines a stressed basin "as a basin or sub-basin in which the quantity of streamflow has been significantly reduced, or the quality of the streamflow is degraded, or the key habitat factors are impaired" (WRC, 2001). However, due to lack of available water quality and habitat data, the WRC has been forced to classify basin stress levels in Massachusetts based on hydrologic stress. Hydrologic stress is defined as the relative strength of rivers in Massachusetts (WRC, 2001). The hydrologically stressed basins represent the rivers with the lowest flows (per square miles of drainage area) in Massachusetts; the more hydrologically stressed, the lower the strength of the river. Some basins did not have adequate coverage of stream gauges to be classified by the WRC, and were therefore not included in the analysis. No conclusions were made about the degree of stress in these basins. The Buzzards Bay Watershed is one of the basins not included in the analysis.

3.3.2.2 Surface Waters

Buzzards Bay, located between the western part of Cape Cod and the Elizabeth Islands, forms the south and southeastern boundaries of Mattapoisett. Because the Elizabeth Islands protect the Bay from large ocean waves, tidal currents and wind are the primary circulation forces in the Bay. The Buzzards Bay Water Quality Assessment Report describes the Bay as "a tidally dominated, well-mixed estuarine system" (DEP, 2000). The Mattapoisett River is the largest river in Town discharging to Buzzards Bay. Major surface water features in Town, including the Mattapoisett River, Mattapoisett Harbor, Eel Pond, Aucoot Cove, and Brandt Island Cove are shown in Figure 3-6.

The Mattapoisett River runs north to south and flows into the Mattapoisett Harbor and ultimately to Buzzards Bay. The River, which originates in Rochester at Snipatuit Pond, also recharges local aquifers which serve as public drinking water supplies. The river is also used by cranberry growers as a source of water for bog irrigation and flooding during harvest.

Eel Pond is located at the head of Mattapoisett Harbor. Studies have shown that reduced tidal flushing in the Pond and increased nitrogen loading from residential development and local golf course have significantly degraded the water quality. Eel Pond appeared on the "Baywatchers III - A Decade of Monitoring Buzzards Bay Embayments 1992-2001" list with "Poor/Eutrophic Conditions" (DEP, 2000). The Health Index Score for Eel Pond is poor (score of 18). Details on water quality issues in the Pond are discussed in Section 2.1.2 and 2.1.3 of this CWMP.

As shown in Figure 3-6, the three embayments along the coast of Mattapoisett are Brandt Island Cove in the southwest corner of Town adjacent to Nasketucket Bay, Mattapoisett Harbor, and Aucoot Cove, which is shared with the Town of Marion.

Unlike Eel Pond, Mattapoisett Harbor and Aucoot Cove are very well flushed and therefore less sensitive to pollutant loadings.

The Massachusetts Surface Water Quality Standards (314 CMR 4.00), adopted by the Massachusetts DEP, classify waterbodies in the Commonwealth based on their designated most sensitive uses and the water quality criteria required to sustain those uses. A summary of the classifications and uses for the listed waterbodies in/adjacent to Mattapoisett in the Buzzards Bay Watershed are presented in Table 3-6.

TABLE 3-6
Massachusetts Water Quality Classification for Waterbodies Bordering Mattapoisett

Boundary	Mile Point	Class	Qualifiers
Sippican River			
Aucoot Cove	-	SA	Shellfishing
Mattapoisett Harbor	-	SA	Shellfishing
Nasketucket Bay	-	SA	Shellfishing

Source: 314 CMR 4.00: Massachusetts Surface Water Quality Standards, Table 25 Buzzards Bay Coastal Drainage Area
[1]Class SA (per 314 CMR 4.05): "These waters are designated as an excellent habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas they shall be suitable for shellfish harvesting without depuration (Open Shellfish Areas). These waters shall have excellent aesthetic value."

Prior to 2002, states were required to submit two lists to the EPA: 1) a *List of Impaired Waters*, from 303(d) of the Federal Clean Water Act (CWA), and 2) the *Summary of Water Quality Report*, from 303(b) of CWA. The *List of Impaired Waters* was used to identify waterbodies that were not expected to meet surface water quality standards and would need development of a TMDL (total maximum daily load). The *List of Impaired Waters* identified waterbodies and their capacity for designated uses. As of November 2001, a combination of these two lists could be created, known as the *Integrated List of Waters*. This list allows states to list waterbodies in one of five categories which include:

1. Unimpaired and not threatened for all designated uses;
2. Unimpaired for some uses and not assessed for others;
3. Insufficient information to make assessments for any uses;
4. Impaired or threatened for one or more uses but not requiring the calculation of a Total Maximum Daily Load (TMDL); or
5. Impaired or threatened for one or more uses and requiring a TMDL.

There are several waters in Mattapoisett in the Buzzards Bay Watershed that are classified as Massachusetts Category 5 Waters, which require a TMDL. Table 3-7 summarizes these waters and the causes of impairment.

TABLE 3-7
Massachusetts Year 2006 List of Integrated Waters; Category 5 Waters

Name	Segment ID	Description	Size	Pollutant Needing a TMDL
Aucoot Cove	MA95-09_2006	From the confluence with Aucoot Creek, Marion to the mouth at Buzzards Bay at a line drawn between Converse Point, Marion and Joes Point, Mattapoisett.	0.50 sq mi	- Pathogens
Buzzards Bay	MA95-62_2006	Open water area encompassed within a line drawn from Wilber Point, Fairhaven to Clarks Point, New Bedford to Ricketson Point, Dartmouth to vicinity of Samoset Street, Dartmouth down to Round Hill Point, Dartmouth and back to Wilber Point, Fairhaven.	8.0 sq mi	- Priority organics - Pathogens
Eel Pond	MA95-61_2006	Coastal pond at the head of Mattapoisett Harbor, Mattapoisett	0.04 sq mi	- Nutrients - Pathogens
Hiller Cove	MA95-10_2006	The water landward of a line drawn between Joes Point, Mattapoisett and the second boat dock northeast of Hiller Cove Lane, Mattapoisett	0.04 sq mi	- Pathogens
Mattapoisett Harbor	MA95-35_2006	From the mouth of the Mattapoisett River, Mattapoisett to a line drawn from Ned Point to a point of land between Bayview Avenue and Grandview Avenue, Mattapoisett	1.1 sq mi	- Pathogens
Mattapoisett River	MA95-60_2006	From the River Road bridge, Mattapoisett to the mouth at Mattapoisett Harbor, Mattapoisett	0.05 sq mi	- Pathogens
Nasketucket Bay	MA95-65_2006	From the confluence with Little Bay, Fairhaven to Buzzards Bay along Causeway Road, Fairhaven (on the south) and along a line from the southern tip of Brandt Island, Mattapoisett to the eastern tip of West Island, Fairhaven	3.7 sq mi	- Pathogens

Source: Proposed Massachusetts Year 2006 Integrated List of Waters, Massachusetts Category 5 Waters, "Waters requiring a TMDL", April 2006.

3.3.2.3 Wetlands

Wetlands mapped in MassGIS are presented in Figure 3-6 Water Resources. While wetlands are dispersed widely throughout the Town, they are most prevalent along the Mattapoisett River, between Tara Road and Mattapoisett Neck Road, around Pine Island, and in the north east parts of Town including Little Bear Swamp and Cedar Swamp. The watershed sub-basin boundary east of Little Bear Swamp and Cedar Swamp lies along Tinkham Hill. Wetlands are abundant on both eastern and western sides of Tinkham Hill.

3.3.2.4 Groundwater

Figure 3-6 highlights potentially productive medium and high yield groundwater aquifers in Mattapoisett. Several of the Town's public water supply wells are served by these aquifers as depicted in Figure 3-6.

3.3.2.5 Drinking Water Supplies

The Town's water supply system is managed by the Mattapoisett Water & Sewer Commission. The primary source of drinking water is the Mattapoisett River Valley Aquifer. There are five wells in the aquifer located in Zone II areas and one IWPA (Interim Wellhead Protection Area). One of the wells in the IWPA (Well #1) has been inactive for more than five years and would need to go through a modified DEP New Source Approval process (DEP, 2003) to return to active status. The four active groundwater supply wells are identified in Figure 3-5 with Source IDs: 4173000-02G, 4173000-03G, 4173000-04G, 4173000-05G and 4173000-01G (the inactive well).

As previously mentioned, the Mattapoisett River Valley Aquifer provides drinking water for 100% of the Mattapoisett water supply, as well as 100% of Fairhaven's supply and 60% of Marion's supply (Rochester is entitled to 50% of the water Marion draws from the aquifer. The 1997 Open Space and Recreation Plan predicts that groundwater supply needs will triple by approximately 2017 "and because of the many diverse users, there is a need for careful water-resource planning" (Open Space and Recreation Plan, 1997).

The Massachusetts Department of Environmental Protection, Source Water Assessment and Protection (SWAP) Report for the Mattapoisett Water and Sewer Department, 2003, was developed to support efforts to improve water supply protection. According to the 2003 SWAP Report, the wells are located in an aquifer with high vulnerability to contamination due to the absence of hydrogeologic barriers that can prevent contaminant migration (DEP, 2003). The Zone II and IWPA for the Water Department have a mixture of land uses including forest, residential, and agricultural. These uses are potential sources of contamination if not managed properly. The Water Department has taken measures to protect the water supply sources such as establishing an Aquifer Protection By-law and working with building/zoning inspectors to protect Zone II areas.

Figure 3-6 shows the three Mattapoisett Water Department wells. The average daily water use for the four Mattapoisett water supplies in 2005 was approximately 535,000 gallons per day (approximately 0.54 MGD). Water treatment for the well water includes pH adjustment for corrosion control (DEP, 2003). Table 3-8 includes a list of municipal water supply wells in Mattapoisett. A map of the Mattapoisett water system is included in Appendix B.

Finally, the three communities of Fairhaven, Marion and Mattapoisett have joined in a regional approach for water treatment by pursing the construction of a facility to remove iron and manganese from well water. The facility will treat up to 6.0 MGD of water and will become operational in 2008.

TABLE 3-8
Public Water Supplies

Public Water Supply Name	Source ID	Source Name	Groundwater Approved Daily Volume (MGD)	2005 Average Daily Use (MGD)	2005 Average Daily Use (gpd)	2005 Yearly Volume Produced (MGY)
Mattapoisett Water Dept.	4173000-01G	GP WELL #1	(inactive)	(inactive)	(inactive)	(inactive)
Mattapoisett Water Dept.	4173000-02G	GP WELL #2	0.099	0.002	1,519	0.6
Mattapoisett Water Dept.	4173000-03G	GP WELL #3		0.011	11,261	4.1
Mattapoisett Water Dept.	4173000-04G	GP WELL #4	0.72	0.233	233,028	85.1
Mattapoisett Water Dept.	4173000-05G	GP WELL #5	1.012	0.289	288,647	105.4

Source: MADEP, January 25, 2007.

3.3.2.6 Water Balance

The purpose of developing a water balance is to see how water flows in and out of a community. A water balance will determine if a community is a net importer or exporter of water and this information may then be used to develop new water management strategies.

In Mattapoisett, there are a number of water supply and wastewater disposal options available to a specific resident or business based on location. However, water supply options generally consist of Town water or private well water, and wastewater disposal options generally consist of on-site disposal and treatment at the Fairhaven WPCF. The average daily flow associated with each of these options is summarized in Table 3-9.

TABLE 3-9
Annual Water Balance

	Potable Water Consumption (gpd)	Wastewater Disposal (gpd)
Private Wells	(Developed lots) - (Water Customers) = # lots with private wells 327,000 gpd[1]	--
Mattapoisett Municipal Wells	534,500[2]	--
On-site Wastewater Disposal	--	767,000 gpd[1]
Fairhaven WPCF Disposal	--	259,000[3]

	Potable Water Consumption (gpd)	Wastewater Disposal (gpd)
In-Town Total:		
Out-Of-Town Total:	0	

[1]Based on flow generation of 210 gpd/dwelling, 20 gpd/1000 SF industrial, 100 gpd/1000 SF commercial.
[2]Data provided by Massachusetts Department of Environmental Protection.
[3]Sum of flows from Eel Pond Pump Station (0.259 MGD) and Brant Beach Pump Station (0.002 MGD); data provided by Town of Mattapoisett.

From the table above it can be seen that private and municipal wells location in Mattapoisett extract an average of roughly 861,500 gpd from local aquifers. Roughly 60% of this water is extracted from the Mattapoisett River Aquifer, north of I-195. The remaining 40% is derived from bedrock aquifer wells serving single family residences.

Out of the 861,500 gpd of extracted water, local septic systems recharge up to roughly 767,000 gpd to the aquifer. This value approximates the summer condition when nearly all of the homes in town are occupied. Average or off season recharge values are probably closer to 550,000 to 600,000 gpd. It is worth noting that the majority of this recharge occurs in areas south of Route 6 where development is dense. Furthermore, recharge applied to areas immediately adjacent to the coast is of little benefit to the Town's wells located north of I-195.

The Town also exports an average of 259,000 gpd of wastewater to Fairhaven for treatment and disposal. While this quantity remains within the Buzzard's Bay watershed, it provides no recharge to the Mattapoisett River subbasin.

Based on the data described above, it is evident that Mattapoisett does not have a major interbasin transfer. However, significant quantities of water are transferred out of the subbasin that contains the Town's public supply wells. Future changes to the wastewater collection system should not worsen this imbalance.

3.3.3 Natural and Environmental Resources

Natural and environmental resources are important to the character of Mattapoisett. This section presents information regarding these resources in Town.

3.3.3.1 Rare Species and Wildlife Habitat

The Massachusetts Division of Fisheries and Wildlife (DFW) has identified the Priority Habitats of Rare Species and Estimated Habitats of Rare Wildlife in Massachusetts through the Natural Heritage and Endangered Species Program (NHESP). Priority Habitat is an area containing rare plants and animals as defined by the Massachusetts Endangered Species Act. Any construction in these areas requires review by the NHESP. Estimated Habitats are a subset of Priority Habitats pertaining to wetland habitats for wildlife only, not plant species. Massachusetts Wetlands Protection Act (310 CMR 10.00) contains provisions for regulation of Estimated Habitat. Projects located in Estimated Habitats are also subject to local review by Conservation Commissions.

The location of these habitat areas is published in the Massachusetts Natural Heritage Atlas and is available through MassGIS. Mattapoisett habitat areas are widely dispersed throughout a large portion of Town as shown in Figure 3-7, Environmental & Cultural Resources.

The Natural Heritage & Endangered Species Program "is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state. The Program's highest priority is protecting the approximately 178 species of vertebrate and invertebrate animals and 264 species of native plants that are officially listed as Endangered, Threatened, or of Special Concern in Massachusetts" (NHESP, 2007). A portion of this list including plants and animals indigenous to Mattapoisett is shown in Table 3-10.

The NHESP also notes that the Most Recent Observation listed in the table should not necessarily lead to the interpretation that the species no longer occurs in the town if the Most Recent Observation is more than several years old.

TABLE 3-10
Rare Species in Mattapoisett

Common Name	Scientific Name	Taxonomic Group	MESA Status[1]	Federal Status[1]	Most Recent Observation
Four-toed Salamander	Hemidactylium scutatum	Amphibian	SC		2003
Piping Plover	Charadrius melodus	Bird	T	T	1998
Roseate Tern	Sterna dougallii	Bird	E	E	2004
Common Tern	Sterna hirundo	Bird	SC		2004
Least Tern	Sterna antillarum	Bird	SC		2000
Water-willow Stem Borer	Papaipema sulphurata	Butterfly/Moth	T		1995
Diamondback Terrapin	Malaclemys terrapin	Reptile	T		2004
Eastern Box Turtle	Terrapene Carolina	Reptile	SC		2005
Bristly Foxtail	Setaria parviflora	Vascular Plant	SC		1908
Britton's Violet	Viola brittoniana	Vascular Plant	T		1909

Source: Natural Heritage & Endangered Species Program, Massachusetts Division of Fisheries & Wildlife, Rare Species Occurrence Lists by Town

[1]MESA (Massachusetts Endangered Species Act) and Federal Status: the abbreviations for these statuses represent the following: E = Endangered, T = Threatened, SC = Special Concern. Massachusetts Division of Fisheries & Wildlife define these statuses as follows:

"Endangered" (E) species are native species which are in danger of extinction throughout all or part of their range, or which are in danger of extirpation from Massachusetts, as documented by biological research and inventory.

"Threatened" (T) species are native species which are likely to become endangered in the foreseeable future, or which are declining or rare as determined by biological research and inventory.

"Special concern" (SC) species are native species which have been documented by biological research or inventory to have suffered a decline that could threaten the species if allowed to continue unchecked, or which occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened within Massachusetts.

3.3.3.2 Certified Vernal Pools

The NHESP certifies vernal pools in the Commonwealth. Vernal pools are depressions that temporarily hold water. They occasionally dry out, preventing fish from establishing a permanent population and thereby providing a fish-predator free breeding habitat for many amphibians and invertebrates. According to NHESP, there are 15 certified vernal pools in Mattapoisett.

3.3.3.3 Floodplain

Floodplains are land areas that are inundated with water during a flood event. They provide storage for floodwaters and protect development. Figure 3-7, Natural and Environmental Resources, shows the floodplains associated with the 100 and 500 year rainfall event as determined by FEMA.

The Mattapoisett Zoning By-Laws establish the Flood Plain District as an overlay district. Boundaries of the district are be determined by scaling distances on the Flood Insurance Rate Map (FIRM) on file with the Town Clerk. Exact locations can be interpreted by the Board of Appeals if necessary. The By-Law also states that no structure or land in the District shall be used and no structure shall be built, located on, extended, converted or structurally altered without full compliance with the terms of the By-Law, the Massachusetts State Building Code, and the Federal Register Federal Emergency Management Agency 44 CFR Ch. 1, Section 60.3(e).

Article 8 of the Mattapoisett Zoning By-Laws presents the Regulation of Flood Hazard Areas. The By-Law restricts or prohibits uses which are dangerous to health, safety, or property due to water or erosion hazards or which cause damaging increases in erosion or in flood heights or velocities. It also requires that uses vulnerable to floods be protected against flood damage during construction. Provisions to promote public safety, and general welfare also include controlling the alteration of dunes and other natural protective barriers, which may cause flood damage. Article 8 also regulates construction of projects which may increase flood damage to other lands.

3.3.3.4 Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) are lands in Massachusetts that receive special recognition because of the quality, uniqueness, and significance of their natural and cultural resources. These areas are identified and nominated at the community level and are reviewed and designated by the State's Secretary of Environmental Affairs. There are no ACECs in Mattapoisett.

3.3.3.5 Historic and Archaeological Sites

The Massachusetts Historical Commission (MHC) publishes a "State Register of Historic Places", which also includes properties from the National Register. The State Register was updated in 2004. Mattapoisett has three historic sites listed on the State Register shown in Table 3-11. Locations of sites on the State Register are shown in Figure 3-11.

TABLE 3-11
State Register, Historic Places in Mattapoisett

Historic Name	Address	No. of Properties or Resources
Lighthouses of Massachusetts	Thematic Group Nomination, 42 Properties in 23 towns	2
Ned Point Light	Lighthouses of Mass., Ned Point Rd.	2
Third Meeting House	1 Fairhaven Rd.	1

Source: Massachusetts State Register of Historic Places, 2004.

3.4 DECENTRALIZED WASTEWATER SYSTEMS

Approximately 55% of Mattapoisett wastewater is disposed of via on-site subsurface sewage disposal systems regulated through Title 5. Currently, there are no wastewater treatment facilities with DEP Groundwater Discharge Permits or that discharge to surface waters in Town. Septage from on-site facilities in Mattapoisett is disposed of at the Fairhaven Water Pollution Control Facility (WPCF) or other local POTWs that accept septage.

3.4.1 On-Site Septic Systems

The Mattapoisett Board of Health maintains records of all on-site septic systems in Town through a program known as SepTrak. Past and current septic data/records have been input into SepTrak since it was installed several years ago. These records were reviewed and evaluated along with data from MassGIS and used for the Needs Analysis discussed in Section 5.

The Board of Health records contain 400 records of on-site septic systems. Data collected and maintained in these records include: pumpouts, inspections, and repairs. A summary of this collected information is presented in the Needs Analysis in Section 5.

Approximately 75 septic systems in Mattapoisett have been recorded as failures in recent years.

3.4.2 Septage Management

Septic tanks are designed to settle solids out of wastewater prior to the discharge of the effluent to a subsurface disposal system. Title 5 recommends that the accumulated solids be removed from the system at a minimum of every three years. In Mattapoisett, septage is pumped from on-site systems by hauling companies and disposed of at the Fairhaven Wastewater Treatment Plant or other nearby septage handling facilities. This is outlined in the Mattapoisett Board of Health Rules and Regulations under Section 12.03 Pumping & Transport Sewage Disposal: "All septage pumped in Mattapoisett shall be delivered to the Fairhaven Treatment Plant unless other arrangements have been made with the Mattapoisett Board of Health" (Mattapoisett, 2006).

Table 3-12 lists the septage haulers licensed by the Mattapoisett Board of Health.

TABLE 3-12
Licensed Septage Haulers

Company Name	Phone Number	Location
Rochester Cesspool Service	(508) 763-2029	Rochester, MA
Baystate Sewage Disposal	(508) 947-2636	Lakeville, MA
Russell Frade Enterprises	(508) 763-5305	East Freetown, MA
Flowmaster Inc.	(866) 292-5510	South Easton, MA

Source: Mattapoisett Board of Health, January 19, 2007

Board of Health records indicate that approximately 465 pump outs occurred in a one year period between November 28, 2005 and November 29, 2006 with a total volume of roughly 683,900 gallons.

3.4.3 Innovative/Alternative (I/A) Title 5 Systems

An Innovative/Alternative (I/A) System is "any on-site sewage disposal system or part of a system that is not designed or constructed in a way that is consistent with conventional Title 5 System guidelines. I/A Systems can perform as well as or better than conventional septic systems, however they require more maintenance and are have higher operations and maintenance costs. Some examples of alternative systems include aerobic treatment units, intermittent sand filters, recirculating sand filters, and peat filters" (DEP, 2006). I/A systems are typically installed in nitrogen sensitive areas such as coastal embayments or Zone IIs, or in areas where the system design flow exceeds 440 gpd per acre.

According to the Massachusetts DEP's Innovative/Alternative (I/A) Program, Mattapoisett has 18 I/A facilities, as presented in Table 3-13.

TABLE 3-13
Innovative/Alternative Facilities

Design Flow (gpd)	System Type	Address
330	MICROFAST	14 Highland View Avenue
	FAST	16 Highview Avenue
330	BIOCLERE	54 Shore Drive, Harbor Beach
440	MICROFAST	3 Maple Road
550	MICROFAST	2 First Street
330	BIOCLERE	3 Henshaw Road
220	MICROFAST	12 North Road
220	MICROFAST	9 Byrne Avenue
330	MICROFAST	20 Riverbend Lane
(NA)[1]	RSF	Lot 128, #29 Nahawena Road
(NA)[1]	BIOCLERE	30 Anawam Road
440	MICROFAST	1 Sea Breeze Lane
220	SINGLE HOME FAST	Lot#1, Nashawena Road
330	MICROFAST	2 David Street
440	MICROFAST	6 Second Street
440	MICROFAST .5	2 Sea Breeze Lane
110	OMNI RSF	29 Nashewena
550	OMNI RSF	50 Ocean Road

Source: Massachusetts DEP, I/A Program, January 22, 2007.
[1]NA: not determined; this information was not provided with DEP data
[2]DEP has noted that this list may not be completely current and that DEP typically does not include in their database General (gen) approved facilities as these do not require Department approval

3.4.4 Satellite Wastewater Treatment Facilities

There are currently no wastewater facilities in Mattapoisett that have DEP Groundwater Discharge Permits.

3.5 EXISTING SEWERAGE SYSTEM

Mattapoisett is served by a series of gravity sewers, low pressure sewers; grinder pumps, force mains and wastewater pump stations that provide centralized wastewater collection to a portion of the Town located south of Route 195. The municipal sewerage system is controlled and managed by the Mattapoisett Board of Water and Sewer Commissioners. In the text that follows, there are numerous references to the "town". The term "town" in this report implies the Board of Water and Sewer Commissioners. All Mattapoisett sewage is transported to the neighboring Town of Fairhaven for treatment and disposal via a 12-inch sewage force main that exists along an old railroad bed between Mattapoisett's main sewage pump station, the Eel Pond station, and the Fairhaven connection point on Shaw Road in Fairhaven.

The Mattapoisett sewerage system consists of approximately:

- 86,000 linear feet of 8-inch to 18-inch gravity sewer
- 23,000 linear feet of 1.5-inch to 3-inch low pressure sewer
- 41,500 linear feet of 4-inch to 12-inch force main.

There are currently two primary pump stations that convey sewage from Mattapoisett to Fairhaven for treatment. There are also five "satellite" sewage pump stations. A map of Mattapoisett's existing municipal sewerage system is included in Appendix A. Details of the sewerage system are provided in the remainder of this section.

3.5.1 Gravity Sewers

The majority of the gravity sewers in Mattapoisett have been constructed during six sewer expansion projects completed over the last 30 years. A brief summary of these sewer expansion projects follows.

Village Sewer System – The area between Route 6 to Water Street and from Main Street to North Street was completed between 1978 and 1980 through two State and Federally funded contracts. In addition, several small sections of sewers were added in the 1980's to extend sewers throughout the Village area. Included in the 1978 to 1980 project were 19,500 feet of gravity sewer and the construction of the Eel Pond Pump Station plus the 9,600 foot force main to deliver sewage to the Fairhaven wastewater collection system and treatment plant.

In addition, there have been a number of sewer expansion projects completed by developers or homeowners that are tributary to the Village area. The projects that include the most flow to the sewer system are located adjacent to the Village area and include the Upland Way/Hitching Post Road area, the Elderly Housing Complex on Wanderer Way and cross country sewers off of Church Street servicing the funeral home, condo complex, police station, Shipyard Galley and the former Salvation Army store.

Ned's Point Sewers – The area bounded by Ned's Point Road to Winnatuxett Beach Road and from the ocean to Old Marion Road was sewered in 1998. The project consisted of 11,500 feet of gravity sewer and the Ned's Point pump station. In addition, some low pressure sewers with grinder pumps were constructed with this project and are summarized later in this section.

Mattapoisett River Basin Sewers – The area north of Route 6 to Park Street and Acushnet Road and from River Road to North Street was sewered in 2002/2003. The project consisted of 19,400 feet of gravity sewer and the River Road pump station that services Old Hammond Town Elementary School plus the Acushnet Road/Crestfield Street area of the community. In addition, some low pressure sewer with grinder pumps was constructed with this project.

Buzzards Bay – Phase I Sewers – This project consists of two areas of the Town and was completed in 2004. The first area was Prospect Road from Route 6 south to Angelica Avenue and the second is Angelica Avenue from Prospect Road to Creek Street (aka the Crescent Beach and Pico Beach area). The project consisted of 15,600 feet of gravity sewer, the Crescent Beach pump station, and more than 8,000 feet of force main that connects to force main in Route 6. In addition, there are numerous sections of low pressure sewer with grinder pumps constructed with this project in the Pico Beach area.

Buzzards Bay – Phase II Sewers – This project consists of the Point Connett beach area, Pine Island Road and Church Street/Sherwood Avenue areas of the community. The project completed in 2005, consisted of 12,100 feet of gravity sewer along with the Highland Avenue and the Pine Island Road pump stations, which both discharge to gravity sewers served by the Crescent Beach pump station. In addition, some low pressure sewers with grinder pumps were constructed in this project.

Brant Beach Sewers – This project consists of Brant Beach Road and all adjoining streets within the Brant Beach area. The project completed in 2006, consisted of 8,200 feet of gravity sewer, and the Island View Avenue pump station which discharges to the Eel Pond pump station force main via a 4-inch force main on Brandt Island Road and Brant Beach Avenue. Some low pressure sewer with grinder pumps were constructed with this project and are summarized later in this report.

3.5.2 Low Pressure Sewers

As previously noted, sections of the Town are served by low pressure sewers with individual grinder pumps. A brief summary of these low pressure sewer projects follows.

Ned's Point Sewers – Sections of Ned's Point Road, Old Marion Road, Winnatuxett Beach Road and Briar Patch Road have about 4,600 feet of low pressure sewers with twenty five (25) individual grinder pumps.

Mattapoisett River Basin Sewers – A section of Park Street from the former railroad bed westerly to the brook crossing have 1,200 feet of low pressure sewers with twelve (12) individual grinder pumps.

Regional School District – This project was constructed by the Old Rochester Regional School District in 2001 and consists of a sewage pumping station at the school complex plus more than 10,000 feet of 6 and 8-inch force main constructed along Chapel Road and Route 6 between the school complex and the Church Street connection to the municipal sewerage system. Once the project was constructed, tested and accepted by the School District, the force main was turned over to the Town for operations and maintenance. The School District maintains ownership of the pump station but the facility is operated and maintained by the Town.

Buzzards Bay – Phase I Sewers – Seamarsh Way and the entire southern end of Pico Beach Road have about 4,100 feet of low pressure sewers with thirty seven (37) individual grinder pumps.

Buzzards Bay – Phase II Sewers – Sections of Highland Avenue, Oak Street and Maple Avenue within the Point Connett Beach area along with Rock, John & Juniper Streets off of Prospect Street have about 1,900 feet of low pressure sewers with thirty (30) individual grinder pumps.

Route 6 Sewers (East) – The Route 6 sewer project consisted of all houses and commercial buildings along Route 6 from Church Street to the Old Rochester Regional High School and all adjacent side streets. The 7,800 feet of low pressure sewers and one hundred twenty one (121) individual grinder pumps that were installed all discharge to the force main constructed under the Regional School District Expansion Project.

Brant Beach Sewers – All of Howard Beach and a section of Brant Beach Avenue from the 'pillars' at the entrance to Brant Beach Avenue to house #18 have about 3,200 feet of low pressure sewers and twenty one (21) individual grinder pumps.

Bay Club Project – This project was completed in 2005 as a private sewer system to be owned and operated by the Golf Course Owners Association. The exact length of pipe and number grinder pumps is unknown but according to the sewer extension permit approved for the project, the development is anticipated to install more than 200 individual grinder pumps.

Route 6 Sewers (West) – The north side of Route 6 for the last 2,000 feet of Route 6 before the Fairhaven town line is served by a low pressure sewer system with seven grinder pumps. The project was privately sponsored in 2001. Sewer users are charged for service however, the system is still privately owned.

Low pressure sewer information including grinder pumps presented in this report is reasonably accurate through December 2006. Minor additions to the numbers noted herein may have occurred since 2006.

3.5.3 Pump Stations

There are two main wastewater pump stations that convey sewage to the Fairhaven Wastewater Treatment Facility. The Eel Pond Pump Station, located 350 feet south of the intersection of Depot Street and Railroad Avenue, receives all sewage from the Town, with the exception of the Brant Beach sewer system and discharges sewage cross-country along a former railroad bed through a 12-inch force main some 9,600 feet to the gravity sewer system in Fairhaven. The Brant Beach Pump Station, located at the intersection of Island View and Highland Avenue within the Brant Beach area, discharges though a 6-inch force main some 9,200 feet at which point it connects to the Eel Pond Force Main and continues to the Fairhaven gravity sewer system.

In addition, there are also five "satellite" sewage pump stations that have been previously described. Table 3-14 contains additional information on each of the pump stations. Figure 3-8 is a pump station schematic that also shows information regarding each of the pump stations.

TABLE 3-14
Mattapoisett Wastewater Pump Station Features

Pumping Station ID	Operation Year	Configuration	Total Number of Pumps/Duty Pumps	Design Capacity (gpm)
Eel Pond	1980	Wet well/dry well	2/1	900
Ned's Point	1998	Suction lift	2/1	200
River Road	2003	Suction lift	2/1	125
Crescent Beach	2004	Suction lift	2/1	400
Highland Avenue	2005	Suction lift	2/1	300
Pine Island Avenue	2005	Suction lift	2/1	125
Island View Avenue	2006	Suction lift	2/1	200

As noted, the Eel Pond pump station has two pumps with a current peak flow capacity of 900 gpm with one pump operating. However, the pump station has room for a third pump that will increase the peak flow capacity to about 1800 gpm (2.6 MGD) with one pump operating in as a standby unit.

Six of the seven pumping stations noted above are less than 10 years old and are in good condition. The Eel Pond pump station is 28 years old. A structural and mechanical assessment of the pump station is provided later in this section.

3.5.4 Force Mains

The Mattapoisett municipal sewer system relies on a series of pump stations and force mains to transport sewage to the central Eels Pond Sewage pumping station or connect directly to the 12-inch force main that discharges to the Fairhaven sewerage system. Table 3-14 summarizes force main details.

TABLE 3-15
Mattapoisett Force Mains

Force Main Name	Construction Date	Size (inches)	Length
Eel Pond	1980	12	9,600
Ned's Point	1998	6	2,200
River Road	2003	4	1,700
Crescent Beach	2004	8	3,800
Highland Avenue	2005	6	3,700
Pine Island Avenue	2005	4	1,300
Island View Avenue	2006	6	9,200
Route 6	2001	6 & 8	10,000

3.6 EEL POND PUMP STATION ASSESSMENT

The Eel Pond Pump Station is located south of Railroad Street along a former railroad bed. The station was constructed in 1978/79 and became operational in 1979. The facility is the primary sewage pump station in town. The following information summarizes current conditions at the station based on an inspection completed on January 19, 2007. Pump station conditions, deficiencies, and recommendations for certain improvements are provided below, as is an opinion of probable cost to address deficiencies noted during the inspection. The cost for improvements are broken down into two priorities: Priority #1 improvements are needed to maintain pump station operations and should be addressed in the next 2 years, while Priority #2 improvements are station needs that can be addressed over a 2 to 10 year period.

3.6.1 Building Structure

1. **Roof** - The existing roofing system consisting of a rolled roof, flashing and skylight is original to the building and leaks. The roof is scheduled for a complete replacement during 2007; therefore, no cost estimate for repairs is included.

2. **Stairs/Handrails** - In general, the handrails and stairway systems in the dry well and wet well are in good condition. The railings and stairs in the wet well lower two floors are somewhat pitted from oxidation but have no apparent failures. Cleaning of the railings and stairs is recommended but is not considered a capital expense. The cleaning should be addressed as part of the station's normal maintenance activity.

3. **Superstructure** - The exterior brickwork for the superstructure is in fair condition with numerous cracks extending from the bottom of the roof to the brick ledge near the concrete foundation. Cracking is probably due to expansion and contradiction of the brickwork. While the cracks impact building aesthetics, the cracks do not impact the structural integrity of the facility. The cracks should be cleaned and caulked. This effort is not considered capital work and should be addressed as part of the station's normal maintenance activity.

4. **Wetwell** - The lowest two levels of the wet well have signs of spalling and effervesce of the concrete walls from the corrosive wet well atmosphere. As an example, there is exposed rebar in ceiling support beams and a sandy feeling to the walls. The concrete should be cleaned and repaired to properly protect the supporting reinforcing bars and a coating applied to protect the concrete surfaces. The estimated cost to repair the concrete is $15,000. This is considered Priority 2 work because the corrosion is not impacting the operation of the wet well.

   Access to the lowest levels of the wet well, where the sewage is stored, is through an opening in the floor using steps that are cast into the walls of the building. The area is a dangerous confined space. There is no safety retrieval system installed for use by personnel when entering the confined chamber area. A permanent anchoring system should be installed that can be connected to a portable retrieval system for entering each wet well. The estimated cost for the anchoring and retrieval system is $3,000. This is a safety issue and considered a Priority 1 cost.

Finally, the wet well door is in fair condition with some rusting on the interior face of the door. In addition, the weather-stripping and the heat coil for the wet well door is corroded and needs to be replaced. At some point in the future, the door should be replaced along with the weather stripping. In the meantime, sanding and painting of the door will prolong the use of the existing door. Repairs to the wet well door are considered normal maintenance activity.

5. **Drywell** – In general the dry well side of the pump station is in good condition. Minor surface cracking in the concrete walls were observed. Three cracks showing effervescence exist in the lowest level between the dry well to the wet well. These cracks should be sealed to prevent moisture movement within the wall. In addition, the dry well door is in good condition but needs new weather-stripping. Neither the weather stripping nor sealing is considered a capital cost and can be addressed by the station's normal maintenance activity.

3.6.2 Equipment

1. **Bar Rack** – The bar rack and support guides are in working condition and do not require any corrective action. Sewer Department personnel clean the rack of debris on an as-needed basis.

2. **Odor Control System** – The odor control system is provided by an outside vendor, Global Odor Control Technologies Inc. of New Bedford, MA. The system operates to maintain order control for air vented from the wet well side of the building.

3. **Slide Gates** – The hand slide gates in the wet well inlet flow channels are original to the station and while they can be used, the gates are heavily pitted with oxidation. The slide gates should be cleaned to improve their existing condition and to facilitate use during maintenance activity. Cleaning can be accomplished as part of the station's normal maintenance activity.

4. **Bioxide® Chemical Feed System** – The Bioxide system for force main odor control and to control the generation of hydrogen sulfide consists of a 1,000 gallon exterior storage tank with a suction pump that discharges to an interior 100 gallon storage tank. A second pump discharges the interior storage tank to an injection point on the sewage pump discharge header located on the 1st lower level of the dry well. The pumps are original to the station and have been rebuilt at various times. The chemical metering pumps should be replaced at an estimated cost of $3,000. The effort is considered a Priority #1 expense because the existing pumps are subject to failure.

5. **Sump Pumps** – There are two sump pumps in a depressed pit located in the pump floor of the dry well. One pump was replaced in 2002 while the second pump is original equipment. In addition, there is no floor grate or handrail around the sump pump pit. The old sump pump should be replaced before it fails and a removable handrail placed around the pit or grating over the pit provided to prevent personnel from accidentally stepping into the pit. The estimated cost to replace the sump pump and install a grate over the pit is $2,000. This work is considered Priority 1 work because the grate will correct a safety concern.

6. **Hot Water Tank** – The hot water tank is original to the station. While the tank is still operational and does not seem to be leaking, the tank is well beyond a reasonable service life and should be replaced. The estimated replacement cost is $1,000. The work is considered Priority #2 work because the hot water tank is not a critical operation item.

7. **Emergency Generator** – The generator is original to the station but has had various maintenance upgrades including new batteries. The generator is exercised on a regular basis and should continue to serve the facility for the foreseeable future.

   Fuel for the generator is stored in an outdoor 500-gallon fuel storage tank and serves as a replacement for the original 2,000 gallon buried fuel storage tank that has been properly abandoned in place. Because the station is immediately along the coastline, the Town has experienced multiple days without power and the 500-gallon tank may be insufficient for long duration power outages. A larger 1,000 gallon fuel storage tank is appropriate to protect the pump. The estimated cost of a larger fuel storage tank is $5,000 and is considered a Priority 1 capital cost because the pump station must remain operational during all power outages.

8. **Sewage Pumps** – The two existing sewage pumps are original to the 1979 construction of the pump station. While the pumps appear to be operating well and the pump capacity is near the original design parameters, the life expectancy of the pumps is approaching. For information purposes, the pumps are Fairbanks Morse, 40 Hp, 1175 RPM, 900 GPM, 5" discharge, 103' TDH with 15.38" impellers.

   When the pump station was designed, a third pump was anticipated for the pump station but not installed. This pump should be installed to increase the pump capacity of the station and to allow for the eventual removal and replacement of pumps #1 & #2 while maintaining a dual pump system in the station. The estimated cost of installing a third sewage pump is $70,000 including the extended shaft, motor, connections and electrical controls. Installing the third pump is considered Priority #1 work because replacing either one of the existing old pumps leaves the station vulnerable to equipment problems or high flow situations while one pump is taken out of service for an extended period of time.

Summary information on the two existing pumps is provided below:

- **Sewage Pump No. 1** – The pump has had seals replaced and the impeller rebalanced.

- **Sewage Pump No. 2** – The pump has had seals replaced and the pump volute rebuilt.

Plans to replace each pump should be initiated. The work includes removal of the existing pump, drive shaft, motor, suction pipe from side gate valve to pump, removal of discharge piping from pump to header pipe, electrical wires from pump starter at MCC to pump, installation of new sewage pump and pedestal, shafts, electrical feed wiring, adjustable frequency drive, suction and discharge piping and pump start-up services. The estimated cost to replace each pump is $70,000 for a total cost of $140,000. This work is considered Priority #2 work as long as the installation of the third pump is proceeds in the next year to two.

9. **Comminutor** – The existing comminutor is original to the pump station and has various operational issues. As an example, the drive motor seals are leaking oil and the cutting blades occasionally become blocked with debris as they are old and undersized for the current flow conditions. In addition, the unit has an extended drive shaft because the motor is located on the 1st floor. The existing drive shaft impedes movement on each intermediate floor level. The existing comminutor should be replaced by a larger macerator unit equipped with a hydraulic drive system so that the existing drive shaft can be eliminated. The estimated cost to replace the comminutor is $45,000. This effort is considered a Priority #1 effort because the existing comminutor is old.

10. **Composite Sewage Sampler** – The composite sampler is original to the station and is no longer used. Grab samples are currently taken and analyzed for BOD and TSS for compliance with the inter-municipal agreement with the Town of Fairhaven. The grab sample method has resulted in issues with the analytical result in exceedance of the permit discharge levels. The sampler should be replaced so that the new unit is capable of continuously sampling the discharge stream. The estimated cost for a new sampler is $8,000 and is considered a

Priority #1 cost because the unit is needed to sample existing wastewater for Intermunicipal Agreement compliance.

3.6.3 Electrical Equipment

1. **Motor Control Center (MCC)** - The MCC is original to the station with minor upgrades for selective equipment buckets. No obvious problems were noted or discussed during the inspection.

2. **Lighting** - Ceiling mounted fluorescent lighting in the dry well and explosion proof lights in the wet well are original to the station. The lights, with the exception of the drop light in the wet well, are in good working order.

3. **SCADA** - A Mission 800 unit was installed in the fall of 2006 for monitoring of the pump station. This unit is capable of monitoring and reporting of pump cycles and wet well levels including eight alarm sequences.

4. **Instrumentation and Controls** - Wet well levels are maintained with a primary bubbler system and a secondary float system. The compressor pumps for the bubbler system have been replaced but the copper tube lines from the compressors to the wet well are original and heavily corroded. These lines should be replaced in their entirety. The estimated replacement cost is $2,000 and is considered a Priority #1 effort because the controls help to maintain pump station operations.

5. **Dry Well Flood Alarm** - The dry well flood alarm float switch located in the lowest level of the dry well does not operate. It is likely that the float has failed and needs to be replaced including the interconnect wiring from the float to the MCC. In addition, water has been observed being discharged from the electrical box where the float wire enters and should be investigated for the source of the water. The estimated repair cost is $1,000 and is considered a Priority #1 cost for security and safety purposes.

6. **Emergency Lighting** - The station does not have emergency lights inside of the building. As the generator waits 5 minutes before starting after sensing loss of power, there is a chance that personnel may be in the building without lights during a power outage transfer. Emergency lights should be placed at each level of the dry and wet well levels. The estimated cost for emergency lighting is $1,000 and is Priority #1 cost because of safety.

3.6.4 HVAC Equipment

1. **Heaters** - The furnace is an oil fired hot air system that was installed when the station was constructed. It can be expected with routine maintenance that the service life of the furnace can be extended for sometime but there is a loss in efficiency to the system due to its age. The furnace should be replaced in the next 10 years to insure its operation for the long term and for increased efficiency. The estimated cost for a new furnace is $5,000 and is a Priority #2 cost.

2. **Ventilators** - The power ventilator units on the roof serve the pump station dry and wet spaces and are original to the station. The ventilator over the wet well is heavily corroded. In addition, both units appear to have motor seal leaks and bearing noise. The units should be replaced at an estimated cost of $15,000. The effort is considered to be a Priority # 1 cost because ventilation is a safety issue at wastewater pumping stations.

3. **Louvers** - All louvers located in ductwork and ventilation fans are in good condition and appeared to be operational.

4. **Dehumidifier** - New dehumidifiers have been installed by the dry well at various levels for removal of humidity within the station.

3.6.5 Cost Estimates

Table 3-16 provides a summary of estimated costs for Eel Pond pumping station repairs and equipment replacements. As noted earlier, Priority #1 costs are needed to maintain pump station operations and should be addressed in the next 2 years. Priority #2 improvements are station needs that can be addressed over a 2 to 10 year period.

TABLE 3-16
Eel Pond Pump Station – Summary of Estimated Costs for Repairs

Item	Priority #1	Priority #2
Wet Well Conc. Repairs		$15,000
Wet Well Safety	$3,000	
Chemical Pumps	$3,000	
Sump Pump		
Hot Water Tank		$1,000
Fuel Storage	$5,000	
New Sewage Pump	$70,000	
Replace Existing Pumps		$140,000
Comminutor	$45,000	
Composite Sampler	$8,000	

TABLE 3-16
Eel Pond Pump Station – Summary of Estimated Costs for Repairs

Item	Priority #1	Priority #2
Bubbler System Upgrades	$2,000	
Flood Alarm	$1,000	
Emergency Lighting	$1,000	
Replace Furnace		$5,000
Replace Ventilator	$15,000	
Miscellaneous	$15,000	$15,000
SUBTOTAL	$170,000	$176,000
35% Eng. & Cont.	$60,000	$62,000
TOTAL	**$230,000**	**$238,000**

Finally, the Mattapoisett Board of Water & Sewer Commissioners were advised of the pump station needs in correspondence generated in Spring 2007.

3.7 SEWAGE FLOWS

Mattapoisett historic average annual sewage flows to Fairhaven are summarized below:

Fiscal Year	Annual Average (MGD)
1999	0.189
2000	0.196
2001	0.182
2002	0.230
2003	0.217
2004	0.232
2005	0.280
2006	0.268
2007	0.252

Average daily flows have increased over the years (1999 through 2007) because Mattapoisett has pursued an extensive sewer program that started in the late 1990's and continued through 2007. The above annual average sewage flow summary was impacted by wet weather in 2005 and 2006 and dry weather in 2007. As a result, flow data for the last three years is somewhat misleading, as explained in the next paragraph.

The 0.252 MGD average annual sewage flow in FY 07 is low because FY 07 was a relatively dry year resulting in low infiltration/inflow rates that, in turn, result in lower average annual sewage flows. Figure 4-1 in the next section provides averages daily flows covering more than two years. The average annual sewage flow represented on Figure 4-1 is 0.271 MGD and is the flow that is used in this report to reflect the existing average sewage flow in Mattapoisett in 2007.

For information purposes, Mattapoisett had special legislation passed in 2002 that summarizes annual sewage flows and reserves available sewage capacity for sewer extension projects that have been constructed and not fully utilized or projects that are planned and for which capacity is reserved. The 2007 annual report that was filed with the State projected future Mattapoisett sewage flows of 497,915 gallons per day. Flow information in the report includes actual sewage flows plus reserves sewage capacity for homes who have access to the sewer system and reserves 86,000 gpd of capacity for the Mattapoisett Neck sewer extension project that is being designed but has not been permitted or constructed. A copy of the 2007 report pursuant to Chapter 73 of the Acts of 2002 is included in Appendix C.

Finally, the calculation of annual sewage flows required to respond to the Special Legislation is slightly different than the flow projections provided in this planning study. For the Special Legislation, flow data estimates are generated by the Board of Water & Sewer Commissioners while flow data in this report was prepared by Tighe & Bond.

3.8 FAIRHAVEN WATER POLLUTION CONTROL FACILITY (WPCF)

The Town of Fairhaven operates a Water Pollution Control Facility (WPCF) in conjunction with Mattapoisett that is located on Arsene Street in Fairhaven, just south of Route 6 and east of New Bedford Harbor. The facility treats wastewater from Fairhaven and Mattapoisett, MA and discharges treated effluent to the Acushnet River. The discharge is located in the New Bedford Inner Harbor in the Buzzards Bay Watershed under the National Pollutant Discharge Elimination System (NPDES) Permit No. MA0100765. The Permit for the Fairhaven WPCF authorizes the plant to discharge 5.0 MGD of treated wastewater to the River. The current NPDES Permit was issued April 3, 2003 and was set to expire two years following the date of issuance. As of yet, the permit has not been reissued.

Discussions with MADEP indicate that a new permit has not been issued because USEPA is waiting for MADEP to issue a Total Maximum Daily Load (TMDL) for the New Bedford Inner Harbor. TMDL issuance is expected within a year and will likely result in lower nitrogen limits for the discharge.

The Fairhaven WPCF consists of preliminary, primary, and secondary (activated sludge) treatment processes. Effluent is disinfected with chlorine and then discharged to the Acushnet River. Sludge is disposed of off-site in Woonsocket, RI.

In 1977, Fairhaven and Mattapoisett entered into an Intermunicipal Agreement which allotted Mattapoisett 0.25 MGD of the Fairhaven WPCF's 2.5 MGD capacity. The 1991 amendments to the Agreement included an amendment "stating" that Fairhaven will provide to Mattapoisett an additional 0.25 MGD of capacity," increasing the Mattapoisett to 0.5 MGD (IMA, 1977 and 1991). This amendment was made to address the future renovation and expansion of the Fairhaven WPCF from 2.1 MGD to 5.0 MGD. The current NPDES Permit limits the WPCF's discharge to the Acushnet River to 5.0 MGD.

Finally, the original and amended IMA allows Mattapoisett to send 0.5 MGD of average flow to the Fairhaven system along with a peak flow limit of 2.6 MGD.

As previously described, the Mattapoisett's sewerage system is relatively new with all sewers constructed between 1978 and 2006 with one exception: a 2,500 foot sewer on North Street that dates back to the 1930's. Section 3.5 identifies the age of much of Mattapoisett's sewers.

The North Street sewer is vitrified clay pipe with joints every 2 to 3 feet and sewers an area with high groundwater and impermeable soils. The North Street sewer has documented I/I problems and the Town expects to replace the pipe in the fall of 2008.

Because a majority of Mattapoisett's sewerage system is relatively new, a traditional I/I study that begins with a comprehensive continuous flow metering program of the entire sewerage system is not warranted. This statement is confirmed by pump station flow information that has been reviewed for many of the areas sewered in the last ten years. As an example,

- The Ned's Point pump station that serves about 15,000 feet of collector sewer does not experience unusual I/I flow fluctuations.
- The Phase I Buzzard Bay Crescent beach sewage pump station that serves about a 30,000 feet of collector does experience I/I flow fluctuations. However, the flow fluctuations are modest and not indicative of large scale I/I concerns. I/I flow fluctuations are probably attributed to manhole frame and cover deficiencies. In addition, the Crescent Beach pump station serves a large area because the facility receives sewage flow from two other pumping stations: Highland Avenue (Point Cornett) and Pine Island Road.
- The Route 6 force main and low pressure sewerage system consisting of about 20,000 feet pipe is a pressure system with no I/I concerns.
- The Phase 2 Buzzard Bay Highland Avenue sewage pump station that serves about 15,000 feet of collector sewer is new and does not experience unusual I/I concerns. Sewage from this facility is pumped into the Crescent Beach system.
- The Brant Beach sewage pump station that serves about 10,000 feet of collector sewer does not experience unusual I/I flow fluctuations.

For the CWMP effort, the following I/I program was pursued:

- Sewerage system map development to document the extent of the Mattapoisett sewerage system,
- A historical review of sewage flow records at the Eel Pond wastewater pumping station,

- Interviews with Sewer Department personnel to gain insights on areas that may generate excessive I/I,
- Field review of 50 manholes to observe manhole conditions and flows,
- Flow isolation of 13,800 feet of sewer pipe to look for infiltration sources,
- Smoke testing of 10,700 feet of sewer pipe to look for inflow sources

4.1 SEWAGE FLOW RECORDS

In 2005 and 2006, 100% of Mattapoisett sewage passed though the Eel Pond wastewater pumping station. In calendar year 2005, the average daily flow at the station was 267,000 MGD. In 2006, the average daily flow was 275,000 MGD. Flow information is generated by recording the number of pump operating minutes each day and multiplying by an estimated 900 gpm pumping rate. The daily flows at the station covering a period 12/19/04 through 3/24/07 are presented on Figure 4-1. In addition, daily rainfall data is presented in the same figure based on data from the New Bedford, MA national weather station.

Before discussing infiltration/impacts to the sewerage system, the terms are defined in the text that follows. Infiltration is defined as the extraneous water entering a sewer system from the ground through defective pipes, pipe joints, connections, manhole walls, and other similar sources. In most cases, infiltration is directly related to groundwater levels. All sewers are subject to some level of infiltration when sewers exist in areas with high groundwater.

Inflow is defined as the extraneous water discharged into a sewer system from distinct sources, including sump pumps, roof leaders, cellar drains, foundation drains, surface drains, drains from springs and/or wet, swampy areas, manhole covers, catch basins, cross-connections with storm drain, and cooling water discharges. Inflow is, in most cases, directly related to the quantity of rainfall and/or rainfall intensity. Inflow sources should not be connected to a municipal sewer system.

Infiltration and inflow are not mutually exclusive. For example, increased infiltration, through a rise in groundwater levels during a storm event, would be recorded as inflow rather than infiltration. In the same fashion, sump pumps connected to the sanitary sewer system (inflow sources) often discharge to the system during dry weather, while groundwater is still at elevated levels. Flow from these sources would be recorded as infiltration.

The standard measure for evaluating the severity of infiltration in a sewerage system is the calculation of an infiltration rate based on sewer system characteristics. The infiltration rate is typically calculated based on the length and diameter of pipe under review, expressed as gallons per day of flow per mile of pipe length per inch of pipe diameter (gpd/idm). As an example, if 10,000 gpd of infiltration were measured within a 1 mile length of j10-inch diameter pipe (10 inch-miles), the calculated infiltration rate would be 10,000 gpd/10 inch-miles = 1,000 gpd/idm.

MADEP has established detailed I/I study guidelines (1993) which stipulate that, where infiltration rates are less than 4,000 gpd/idm, further study to investigate flow sources and possible corrective action are usually not warranted.

Inflow, on the other hand, does not have a standard flow measurement. If a sewerage system or section of a system has a prompt and distinct sewage flow increase during a rain event, inflow is a concern and can be addressed by eliminating catchbasin connections to a system; obvious inflow sources through manhole covers; roof leader connections to a system; sump pump connections or similar inflow sources.

The following general conclusions are based on a review of Figure 4-1:

1. Mattapoisett sewage flows are impacted by heavy rain events. As an example, the average daily sewage flow in 2005 was 267,000 MGD. However, there are a number of rainy days when sewage flows exceeded 400,000 gpd. In fact, in October 2005, a daily sewage flow of greater than 800,000 gpd was recorded at the pump station. Rainfall in October 2005 was very high with many Massachusetts communities experiencing localized flooding and severe flow impacts to their sewage systems. Based on flow records, inflow is a concern in the community. Replacing the North Street sewer that has been previously discussed should significantly reduce inflow impacts.

2. Infiltration exists in the sewerage system but the impact is not significant. As an example, infiltration is generally high in the spring of each year when groundwater is high. In the spring of 2005, the average daily sewage flow at the Eel Pond pump station was about 305,000 versus a yearly average of 267,000 gpd. The seasonal infiltration impact is obvious but not considered excessive. Similarly, in the spring of 2006, the average daily sewage flow at the pump station was about 240,000 versus a yearly average of 275,000. In 2006, infiltration was not obvious.

   If the 2005 seasonal infiltration rate is assumed to be 38,000 gpd (305,000 gpd minus 267,000 gpd), the estimated community infiltration rate is only 260 gpd/idm, a low figure when compared to the 4,000 gpd/idm noted in DEP guidelines.

3. Inflow impacts to the sewerage system vary based on the actual rainfall total. A minor rain event has little impact while a heavy rain has a noticeable impact.

In summary, infiltration is not a problem in Mattapoisett. However, there may be isolated infiltration concerns that will be reviewed by a manhole inspection and flow isolation program. Regarding inflow, there is a concern that manhole inspections plus a smoke testing program will address.

4.2 SEWER DEPARTMENT INTERVIEWS

Prior to initiating I/I field work, the Water & Sewer Superintendent and the Operation's foreman were interviewed to solicit input on potential I/I problems in the municipal sewerage system. Both individuals confirmed that the Eel Pond pump station is impacted by inflow during rain events. The same individuals also noted that infiltration may be concern in isolated locations because higher than average sewage flows occur for a period of time after a heavy rain event. The source of the infiltration were unknown but could be attributed to the following:

- Historic North Street I/I problems
- Isolated foundation drains connected to the sewerage system
- Manhole cover leaks
- Private developer sewer construction concerns
- Normal I/I that is always found in a sewer system

The interview also confirmed that I/I problems may also exist on Barstow Street and Mechanic Street. While new sewers were installed on the two streets in the late 1970's, the homes on the street were already sewered via an old sewer system that dated back to the 1930's. Existing homes were connected to the new sewer, but the original sewer service pipe between the street property line and the homes was connected to the new sewer. If foundation drains and yard drains were connected to the old service connection, the drains and potential I/I sources were still connected to the sewer system.

Finally, the interview confirmed that a number of private sewer extensions were completed in the last 20 years including:

1. Housing developments along Upland Way and Hitching Post Road
2. Housing developments along Atkinson Way and Pepperbush Lane
3. The Elderly Housing Complex located off of Main Street

4. An 8-inch sewer extension off of Church Street to serve the Saunders – Dwyer Home for Funerals

5. An 8-in sewer extension off of County Road to serve the Salvation Army Building

6. Sewer service to "Village at Mattapoisett"

7. Sewer service to the Shipyard Galley

Record plan information for the above noted sewer extensions was obtained and reviewed. In addition, an overall sewerage system map was developed to evaluate I/I concerns in more detail. A copy of the map was presented in Section 3 and is provided in Appendix A.

Based on the interviews and general system knowledge, the CWMP field work for I/I consisted of manhole inspections, flow isolation and smoke testing.

4.3 MANHOLE INSPECTIONS

In April and May 2007, 50 manholes were opened and inspected to review structural conditions and to look for sources of I/I. A portion of the manhole inspections (18) were completed by Tighe & Bond to obtain a better understanding of sewer system conditions. In addition, the same manholes inspected by Tighe & Bond plus an additional 32 manholes were inspected by Crew Two, Inc. as part of the flow isolation work. In general, the condition of the manholes was good. However, construction problems were noted in a few instances. Also, minor sources of I/I were identified.

Table 4-1 on the next page summarizes the inspection information generated by Tighe & Bond. In addition, manhole inspection field notes are included in Appendix D.

Additional I/I comments for select, inspected manholes, are provided in Table 4-2 presented later in this section where actual flow readings were noted during flow isolation work.

TABLE 4-1
Manhole Investigation Details

Street	Date	Location	Description
Barstow Street	4/24/2007	BR-1 , 195' north of Water Street	F/C mortar failing and surface water leaking into manhole
Church Street	4/24/2007	CH-10A, junction manhole from cross country	Leak around Church Street inlet pipe, lift hole above pipe leaking
Condo System	5/22/2007	XC-7, corner manhole near funeral home behind new shed	F/C under surface water AND is not a WTC
Condo System	4/24/2007	XC-2 junction MH to Church St	F/C not mortared, leak around inlet pipe from funeral home, leaking riser joint under flat slab
County Road	4/24/2007	XC-6, junction MH at Bay Club drive	Leaking inlet pipe from Bay Club, leaking lift holes for riser sections and manhole joints
County Road	4/24/2007	CT-1A, Elderly complex junction manhole in sidewalk at north side of County Road	F/C not mortared, bottom MH riser ring leaking
Dexter Lane	5/23/2007	DX-1	Invert brickwork failing and falling into flow channel
Hitching Post Road	4/27/2007	HP-1, junction manhole at Upland Way	Manhole is located under 3" of landscape stone and does not fit frame
Main Street	4/27/2007	MA-6, junction MH at Depot Street	Leaking around service lateral pipe
Main Street	5/23/2007	MA-4A	Leak in lowest riser section near joint
Main Street	4/27/2007	MA-4, junction manhole at Mahoney's Lane	F/C mortar is failing
Main Street	5/23/2007	MA-2	18" AC pipe is cracked and leaking about 4' outside of manhole on inlet pipe side
Pearl Street	4/27/2007	PL-6, 20' south of County Road	F/C mortar is failing, leak around inlet pipe from County Road, MH wall leak near County Road inlet pipe
Water Street	5/23/2007	WA-5A	Leak from service lateral pipe from 37/39 Water Street
Water Street	5/23/2007	WA-3	Chimney from Barstow Street is plugged allowing sewage to outlet at upper overflow pipe.

4.4 FLOW ISOLATION

13,800 feet of sewer pipe was flow isolated on May 22 and 23, 2007 by Crew Two, Inc., a Women Owned Business firm that provided technical assistance on the CWMP effort. For information purposes, flow isolation is used to measure infiltration in sewer pipes. The process involves isolating a specific manhole section and measuring the sewage flow in the pipe section during a 1:00 a.m. to 5:30 a.m. timeframe. Since there should be little or no sewage flow in the pipe during the noted period, the actual measured flow is probably infiltration into the pipe from leaky manholes, pipe joints or cracked pipes. The flow isolation process is typically performed during high groundwater periods and during dry weather so that groundwater is the most likely cause of the flow.

Flow isolation work concentrated on the following sewer locations:

- Hitching Post Road/Upland Way
- Church Street/Route 6 Cross Country
- Church Street
- Barstow Street
- Mechanic Street
- Dexter Lane
- North Street
- Water Street
- Main Street

Table 4-2 summarizes the flow isolation work. In addition, Table 4-3 provides a gpd-idm summary of the data. The flow isolation work did locate some infiltration sources, but a majority of the infiltration was below the 4,000 gpd-idm threshold published by MADEP for excessive infiltration.

Table 4-3 identified 5 manhole stretches with excessive infiltration as summarized below:

Street	Manhole Stretch	Infiltration Rate (gpd-idm)
Barstow Street	BR3 to BR2	18,000
North Street	NS5 to NS4	36,000
North Street	NS3 to NS2	4,500
North Street	NS2 to NS1	4,500
Water Street	WA3 to WA2	16,000

TABLE 4-2
Flow Isolation Summary

Location	Upstream MH #	Downstream MH #	Pipe Diam. (")	Pipe Length (')	Net Line Flow (GPD)	MH Infiltration (GPD)	MH #	Comment
Hitching Post Rd	HP3	HP2	8	312	72			
Hitching Post Rd	HP2	HP1	8	366	360			
Upland Way	~	HP1	8	700	0			
Cross Country	XC11	XC9	8	223	0			
Cross Country	XC9	XC8	8	162	0			
Cross Country	XC8	XC7	8	157	0			
Cross Country	XC7	XC2	8	221	360			
Cross Country	XC2	XC1	8	237	360	720	XC2	wall, corble leak
Cross Country	XC1	CH10A	8	300	0	144	XC1	wall leak
Cross Country	XC6	XC5	8	94	0	360	XC6	wall, pipe connection leak
Cross Country	XC5	XC4	`8	244	0			
Cross Country	XC4	XC3	8	237	360			
Cross Country	XC3	XC2	8	142	0			
Church St	CH10A	CH10	8	228	1080			
Church St	CH10	CH9	8	279	360			
Church St	CH9	CH8	8	284	720			
Church St	CH8	CH7	8	309	0			
Barstow St	BR7	BR6	8	93	0			
Barstow St	BR6	BR5	8	312	1080			
Barstow St	BR5	BR4	8	343	0			
Barstow St	BR4	BR3A	8	152	~	720	BR3A	NO MEASUREMENT, DEBRIS WALL, INVERT LEAK
Barstow St	BR3A	BR3	8	135	~			
					1080			
Barstow St	BR3	BR2	8	39	1440			
Barstow St	BR2	BR1	8	512	0			
Barstow St	BR1	WA3	8	217	144			
Mechanic St	MC6	MC5	8	400	360			
Mechanic St	MC5	MC4	8	356	0			
Mechanic St	MC4	MC3	8	350	0			
Mechanic St	MC3	MC2	8	168	360			
Mechanic St	MC2	MC1	8	297	360			
Mechanic St	MC1	WA4	8	318	360			

TABLE 4-2
Flow Isolation Summary

Location	Upstream MH #	Downstream MH #	Pipe Diam. (")	Pipe Length (')	Net Line Flow (GPD)	MH Infiltration (GPD)	MH Infiltration MH #	Comment
Dexter La	DX2	DX1A	8	161	720			
Dexter La	DX1A	DX1	8	31	0			
Dexter La	DX1	NS7	8	129	0			
North St	NS7	NS6	8	442	1080			
North St	NS6	NS5	8	487	0			
North St	NS5	NS4	8	366	20160			
North St	NS4	NS3	8	31	~			sewer passes through drain manhole @ NS3
North St	NS3	NS2	8	205	1440			
North St	NS2	NS1	8	206	1440			
North St	NS1	WA5	8	44	0			
Water St	BE1	WA8	16	217	0			
Water St	WA8	WA7	16	256	720			
Water St	WA7	WA6	16	245	0			
Water St	WA6	WA5A	16	52	0			
Water St	WA5A	WA5	16	251	0			
Water St	WA5	WA4	18	259	0			
Water St	WA4	WA3	18	315	720			
Water St	WA3	WA2	18	334	17280			majority of measured infiltration from svc, 15' upstream of WA2
Water St	WA2	WA1	18	223	0			
Main St	WA1	MA1	18	77	~			cannot open MA1
Main St	MA1	MA2	18	304	2160	144	MA2	
Main St	MA2	MA3	18	371	0			
Main St	MA3	MA4	18	124	0			
Main St	MA6	MA5	12	135	0			
Main St	MA5	MA4A	12	158	720			
Main St	MA4A	MA4	12	192	0			

TABLE 4-3
Gallons per Day-Inch Diameter Mile Summary

Location	Upstream MH #	Downstream MH #	Pipe Diam. (")	Pipe Length (')	Net Line Flow (GPD)	(GPD/IDM)
Hitching Post Rd	HP3	HP2	8	312	72	150
Hitching Post Rd	HP2	HP1	8	366	360	640
Upland Way	~	HP1	8	700	0	0
Cross Country	XC11	XC9	8	223	0	0
Cross Country	XC9	XC8	8	162	0	0
Cross Country	XC8	XC7	8	157	0	0
Cross Country	XC7	XC2	8	221	360	1100
Cross Country	XC2	XC1	8	237	360	1000
Cross Country	XC1	CH10A	8	300	0	0
Cross Country	XC6	XC5	8	94	0	0
Cross Country	XC5	XC4	`8	244	0	0
Cross Country	XC4	XC3	8	237	360	1100
Cross Country	XC3	XC2	8	142	0	0
Church St	CH10A	CH10	8	228	1080	3400
Church St	CH10	CH9	8	279	360	900
Church St	CH9	CH8	8	284	720	1800
Church St	CH8	CH7	8	309	0	0
Barstow St	BR7	BR6	8	93	0	0
Barstow St	BR6	BR5	8	312	1080	2200
Barstow St	BR5	BR4	8	343	0	0
Barstow St	BR4	BR3A	8	152	~	0
Barstow St	BR3A	BR3	8	135	~	0
Barstow St	BR3	BR2	8	39	1440	8000
Barstow St	BR2	BR1	8	512	0	0
Barstow St	BR1	WA3	8	217	144	450
Mechanic St	MC6	MC5	8	400	360	560
Mechanic St	MC5	MC4	8	356	0	0
Mechanic St	MC4	MC3	8	350	0	0
Mechanic St	MC3	MC2	8	168	360	1500
Mechanic St	MC2	MC1	8	297	360	750
Mechanic St	MC1	WA4	8	318	360	750
Dexter La	DX2	DX1A	8	161	720	3000
Dexter La	DX1A	DX1	8	31	0	0
Dexter La	DX1	NS7	8	129	0	0
North St	NS7	NS6	8	442	1080	1700
North St	NS6	NS5	8	487	0	0
North St	NS5	NS4	8	366	20160	36000
North St	NS4	NS3	8	31	~	0
North St	NS3	NS2	8	205	1440	4500
North St	NS2	NS1	8	206	1440	4500
North St	NS1	WA5	8	44	0	0
Water St	BE1	WA8	16	217	0	0

TABLE 4-3

Gallons per Day-Inch Diameter Mile Summary

Location	Upstream MH #	Downstream MH #	Pipe Diam. (")	Pipe Length (')	Net Line Flow (GPD)	(GPD/IDM)
Water St	WA8	WA7	16	256	720	1100
Water St	WA7	WA6	16	245	0	0
Water St	WA6	WA5A	16	52	0	0
Water St	WA5A	WA5	16	251	0	0
Water St	WA5	WA4	18	259	0	0
Water St	WA4	WA3	18	315	720	1100
Water St	WA3	WA2	18	334	17280	16000
Water St	WA2	WA1	18	223	0	0
Main St	WA1	MA1	18	77	~	0
Main St	MA1	MA2	18	304	2160	3000
Main St	MA2	MA3	18	371	0	0
Main St	MA3	MA4	18	124	0	0
Main St	MA6	MA5	12	135	0	0
Main St	MA5	MA4A	12	158	720	2000
Main St	MA4A	MA4	12	192	0	400

As previously noted, the old North Street sewer is scheduled to be replaced in the Fall of 2008, eliminating the excessive infiltration noted above. The remaining two excessive infiltration locations on Barstow Street and Water Street should be addressed to reduce infiltration.

On a preliminary basis, the infiltration on Barstow Street appears to originate in a manhole constructed for the Center School sewer connection. The manhole connection is not well constructed, allowing groundwater to flow continuously into the manhole. The infiltration on Water Street appears to originate from a sewer service connection located about 15 feet up the Cannon Street sewer and may be associated with 8 Water Street.

In addition, the junction manhole on Church Street that receives sewage flow from an 8-inch cross-country sewer is poorly constructed. Infiltration can be reduced by improving the seal around the incoming cross-country sewer.

Finally, Table 4-2 also notes certain manhole and service connection infiltration rates. While each rate is not excessive, the cumulative infiltration rate is noticeable and impacts daily sewage flows.

4.5 SMOKE TESTING

10,800 feet of sewer pipe was smoke tested looking for inflow connections to the sewer system. Smoke testing is a process where smoke is blown into a stretch of sanitary sewer, normally a manhole stretch or two, and observers look for smoke exiting the sewer from various sources. To concentrate the smoke effort upstream and downstream manhole stretches are plugged so that smoke can only exit the system via one of the following:

- House plumbing vent
- Catchbasins
- Yard drains
- Possible cross connections between the sanitary sewer and a storm drain
- Basement plumbing concern
- Loose sewer cleanout caps
- Cracks in shallow sewer pipe

Ideally, smoke will only exit a sewer system via house plumbing vents, a condition that confirms that the sewer system does not have inflow or potential drainage connections to the sewer system.

In addition, while smoke testing proceeds, field personnel observe adjacent homes and look for potential inflow sources such as roof leaders that do not discharge to the ground. Roof leaders that are connected to an underground pipe network are identified as potential inflow sources. If smoke exists from the roof leaders, a direct connection to the sewer system exists. If smoke does not exit via a roof leader, a potential inflow source exists because a home's roof leaders may be connected to the sanitary sewer system but isolated from the system via a household trap. In this case, smoke cannot get past the trap and a roof leader direct connection to the sewer system cannot be confirmed.

Smoke testing was performed in the same areas where flow isolation work was performed. A complete copy of the smoke testing work performed by Crew Two is provided in Appendix D. The appendix contains detailed sketches, photos and inflow summary comments.

Smoke testing confirmed only one home with roof leaders connected to the sewer system - #4 Pepperbush Lane. Smoke testing did locate a number of potential info sources such as:

- Six exterior cleanouts that leaked. If the cleanouts are located in a low area, ponding water from a rain event could enter the sewer system.
- A number of indirect connections between the sanitary sewer system and storm drainage system on North Street. These connections will be addressed when the North Street sewer is replaced.
- A number of manholes along the cross-country sewer between Church Street and Route 6 have manhole frames and covers that were not secure to the manhole. During rain events, ponding water around the manholes can flow into the sewer system and become a significant inflow source.

In addition, smoke testing confirmed a number of potential inflow sources, with most sources roof leaders that extended underground. Table 4-4 that follows summarizes all suspect inflow sources located during the smoke testing work.

TABLE 4-4
Suspect Inflow Sources

SUB SYSTEM	STREET/LOCATION	POTENTIAL INFLOW SOURCE
	BARSTOW STREET (LIBRARY)	STAIRWELL DRAIN (2) - REAR
	12 BARSTOW STREET	3 ROOF LEADERS
	17 BARSTOW STREET	ROOF LEADER, FLAT ROOF
	9 MECHANIC STREET	ROOF LEADER
	31 CHURCH STREET	ROOF LEADER
	24 MECHANIC STREET	ROOF LEADER
	30 MECHANIC STREET	ROOF LEADER
	MECHANIC STREET (COUNTY ROAD WEBSTER BANK)	ROOF LEADER
	25 NORTH STREET	ROOF LEADER
	27 NORTH STREET	ROOF LEADER
	29 NORTH STREET	ROOF LEADER
	47 NORTH STREET	ROOF LEADER
	40 NORTH STREET	ROOF LEADER
	13 HITCHING POST ROAD	STAIRWELL DRAIN
	20 UPLAND WAY	ROOF LEADER
	22 UPLAND WAY	ROOF LEADER, ALL
	24 UPLAND WAY	ROOF LEADER, ALL
	19 BARSTOW STREET @ WATER STREET	7 ROOF LEADERS @ WHOLE HOUSE
	1736 BARSTOW STREET @ CHURCH STREET (CHURCH)	6 ROOF LEADERS - 1 FRONT LEFT, 5 BACK SIDE
	20 BARSTOW STREET	1 ROOF LEADER, LEFT SIDE FRONT
	22 BARSTOW STREET	ROOF LEADERS, 3 RIGHT SIDE, 1 FRONT, 3 LEFT SIDE
	? BARSTOW STREET (ST. ANTHONY'S CHURCH)	ROOF LEADERS, 4 BACK SIDE
	25 BARSTOW STREET	"SMOKE IN BASEMENT"
	32 MECHANICS STREET	ROOF LEADER, 1 FRONT (INTO FOUNDATION)
	MECHANIC STREET	ROOF LEADERS, 3 BACK OF HOUSE
	1834 MECHANICS STREET	ROOF LEADER, 2 RIGHT SIDE
	34 MECHANICS STREET	ROOF LEADERS, 2 RIGHT, 2 LEFT, 2 BACK
	29 MECHANICS STREET @ HAMMOND STREET	ROOF LEADER, 1 BACK/ SMOKING 6" PIPE IN BACK
	1850 NORTH STREET	ROOF LEADER, 1 RIGHT
	10 NORTH STREET	SMOKE IN BASEMENT
	22 NORTH STREET	ROOF LEADER, 1 LEFT
	24 NORTH STREET	ROOF LEADER, 1 FRONT RIGHT
	6 DEXTER LANE	ROOF LEADERS, 2 LEFT, 2 RIGHT

4.6 INFILTRATION/INFLOW SUMMARY

Mattapoisett's sewerage system is relatively new in that all facilities, with the exception of the North Street sewer, have been constructed within the last 30 years. Based on information reviewed for this study, as well as on limited field investigations, the Mattapoisett sewerage system does not have excessive infiltration. However, the system does have inflow concerns. The following I/I summary comments are provided:

1. The North Street sewer that is scheduled for replacement in the fall of 2008 will mitigate isolated infiltration problems plus mitigate inflow problems that have been historically associated with the North Street sewer. When the replacement project is pursued, each service connection that is connected to the new sewer should be investigated for inflow. If service connection inflow sources are identified, the sources should be brought to the attention of the homeowner and addressed.

2. Three obvious infiltration locations were located on Barstow Street, Water Street and to a lesser degree on Church Street. Construction deficiencies noted at each location should be addressed to mitigate infiltration.

3. Select manhole inspections confirmed that minor infiltration sources exist, but mitigation work is probably not cost effective. However, Mattapoisett should implement an annual manhole inspection program wherein at least 100 manholes are inspected on an annual basis. The inspection should focus on the structural integrity of the manhole, on debris/sediment, and on infiltration/inflow concerns. The program should systematically review the entire sewerage system with initial efforts focusing on the downtown area. Inspection deficiencies should be addressed annually.

4. Inflow does impact the sewerage system. Besides the North Street sewer, other inflow sources should be pursued by the town. Examples include:
    - Leaky manhole frames and covers.
    - Manhole frames and covers that are not properly installed on manhole sections (cross-country sewer between Church Street and Route 6).
    - Roof leaders from 4 Pepperbush Lane.
    - Additional suspect roof leader connections to the sewerage system. Suspect connections should be dye tested to confirm that there is no connection to the sewerage system. Table 4-4 should be referenced for locations.
    - Additional suspect inflow sources identified on Table 4-4 that are not associated with North Street should be investigated.

Inflow into sewer systems is a common problem. Besides the sources noted herein, additional sources include sump pump connections, foundation drain connections and manholes located in wetland areas or in depressed paved areas. Inflow into manhole covers is probably the easiest inflow to mitigate, but the effort takes time and financial resources. Manhole cover inflow can be addressed by any one of the following:

1. Checking manhole locations and addressing obvious low spots.
2. Ensuring that manhole covers are seated on a clean frame surface to minimize inflow opportunities.
3. Installing manhole cover inserts to reduce cover inflow.
4. Installing manhole frame and structure inserts/liners to reduce inflow through deteriorated masonry around and beneath manhole frames.

The adequacy of existing on-site wastewater disposal systems in Mattapoisett and the need for alternative approaches to wastewater management are evaluated in this section. The method for determining need is based on an objective evaluation of the adequacy of on-site systems using criteria that are applied individually to developed parcels located outside Mattapoisett's existing wastewater service area. Wastewater management needs for these unsewered areas are then determined.

5.1 STUDY AREA DEFINITION

Mattapoisett's existing wastewater service area includes all parcels that are currently connected to the sewer, or abut the sewer but are not yet connected. Since these parcels are, or can be, readily served by the existing sewer system, parcels that are within the existing wastewater service area are not included in the wastewater management needs evaluation.

Developed parcels outside the wastewater service area have been divided into study areas for the wastewater needs analysis. Areas of Mattapoisett with large tracts of undeveloped parcels and a limited number of developed parcels were not included in study areas as these areas have an inherently low need. Grouping parcels into study areas provides a logical basis for determining and ranking need throughout Town. Because wastewater management needs are determined for each study area as a whole, careful definition of the study area boundaries is important. The goal is to create study areas in which the majority of lots within the study area have a similar wastewater management need.

Factors that influenced the study area boundaries include:

- Concentration of developed parcels
- Study areas defined in Mattapoisett's 1982 Facilities Plan
- Parcel size
- Zoning
- Land use

A total of 26 study areas were developed for all parcels outside the existing sewer service area using the above-listed factors as a guide. Study areas are shown in Figure 5-1. Major characteristics of each study area are summarized in Table 5-1.

5.2.6 Summary of Evaluation Criteria

Table 5-2 summarizes the evaluation criteria and associated categories that were used for the wastewater management needs analysis.

TABLE 5-2

Wastewater Management Needs Analysis Evaluation Criteria

Actual/Categorical Failure	
Septic System:	Pumpouts: more than 4 times per year
Septic System:	Title 5 inspection failure (current and historical)
Lot Size:	Developed Lots ≤5,000 sf (0.115 acre) with public water or ≤1/4 acre with private well
Water Resources:	Located within Zone 1 Aquifer Recharge Area
High Likelihood Failure/Significant Impact	
Septic System:	Pumpouts: 2-4 times per year
Septic System:	Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record
Lot Size:	5,000 sq. ft. - 1/4 acre with public water or 1/4 - 1/2 acre with private well
Soils:	Low soil permeability (<0.6 in/hr) for greater than 50% of lot area
Water Resources:	Located within 200 feet of surface water supply tributary
Potential Failure/Moderate Impact	
Septic System:	Repaired prior to 3/31/95 (Revised Title 5)
Groundwater:	Shallow groundwater depth (≤4 feet) for greater than 50% lot area
Water Resources:	Located within IWPA or Zone II
Water Resources:	Located within 100 feet of impaired water
System Concern/Potential Impact	
Septic System:	Repaired on or after 3/31/95 (Revised Title 5)
Septic System:	Constructed between 1978 and 1995 without upgrade
Lot Size:	1/4 - 1/2 acre with public water
Water Resources:	Located within 100 feet of surface water or wetland

5.3 NEEDS ANALYSIS

Each developed lot within a study area that met a criterion described in Section 5.2 was assigned points for that criterion. The points were then weighted by criteria category as follows:

1. Actual/Categorical Failure - 8 points
2. High Likelihood of Failure/Significant Impact - 4 points
3. Potential Failure/Moderate Impact - 2 points
4. System Concern/Potential Impact - 1 point.

Points for each study area were summed and divided by the number of developed lots in the study area. The resulting score is an average for the developed parcels within the study area. Table 5-3 contains the scoring summary for the wastewater management needs analysis for each of the study areas.

5.4 CARD SURVEY

In addition to the wastewater management needs analysis, a card survey was distributed to owners of developed properties within each of the study areas. The card survey is intended to supplement and substantiate the results of the needs analysis and provide additional documentation for study area needs.

Questionnaire surveys were mailed to each residence or commercial development in each study area. The survey requested information about individual on-site wastewater disposal systems, and was intended to evaluate homeowners' experience and perceived need for sanitary sewers within individual neighborhoods. The survey was designed as a "self reporting evaluation" to obtain a sense of actual conditions through the experience of the local residents. The survey was coded with a study area designation to allow for evaluation of the responses in a "finite" geographical area; however, specific responses could not be traced to an individual property. A letter of explanation from the Water and Sewer Department was also attached to each survey. A copy of the questionnaire survey and letter is included in Appendix E.

A total of 1,170 surveys were issued to properties in the study areas and 550 were returned, representing a 47% response rate. This is considered a good level of response for this type of survey effort.

The results of the questionnaire survey are summarized in Table 5-4. Some study areas reported problems with their existing on-site wastewater disposal systems or problems within the neighborhood. However, most reported that they desired that their neighborhood be served by sewers.

TABLE 5-4

Card Survey Results

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Area	No. of Surveys Issued	Number of Responses Received	% Rec'd	Year-Round / Seasonal		Problems in Last 3 Years?(1)			Neighborhood Septic Problems?(1)			Last Pumped # Years Ago			Septic System Age			Desire Public Sewer(1)			# Categories >10%?
				YR	Seas	Yes	% Yes	No	Yes	% Yes	No	0 - 2	3 - 4	5 +	0 - 5	5 - 10	10 +	Yes	%	No	
1	88	36	41%	34		5	14%	30	5	14%	22	19	5	4	5	3	26	12	33%	19	3
2	99	48	48%	46	2	4	8%	44	10	21%	28	28	8	8	4	9	34	27	56%	20	2
3	35	19	54%	19		5	26%	14	4	21%	12	17		1	1	1	17	10	53%	8	3
4	93	46	49%	43	1	6	13%	39	14	30%	27	30	4	2	10	5	31	27	59%	16	3
5	95	44	46%	42	1	2	5%	43	6	14%	33	33	3		3	7	33	20	45%	22	2
6	38	17	45%	19		3	18%	16	2	12%	12	15		1	1	5	13	8	47%	7	3
7	48	18	38%	18		0	0%	18	1	6%	15	9	3	6	2	3	11	6	33%	10	1
8	25	11	44%	11		1	9%	10	0	0%	9	7		2	1	2	7	5	45%	6	1
9	28	9	32%	8		1	11%	8	2	22%	6	4	1	1	1		8	2	22%	6	3
10	41	14	34%	10	1	2	14%	10	1	7%	8	4	3		5	1	5	3	21%	7	2
11	22	16	73%	14	2	0	0%	15	2	13%	10	8	2	3	1		14	8	50%	7	2
12	15	5	33%	3	2	1	20%	4	1	20%	3	2		2	1	2	2	2	40%	3	2
13	44	22	50%	22		2	9%	20	6	27%	11	12	3	6	1	2	19	5	23%	15	2
14	24	11	46%	10	1	2	18%	9	2	18%	6	6	1	3			11	4	36%	3	3
15	75	32	43%	31	1	1	3%	30	8	25%	14	22	4	1	3	5	21	18	56%	14	2
16	0	0	0%				0%			0%									0%		0
17	31	17	55%	16		1	6%	15	4	24%	11	12	1	3	2	1	13	5	29%	12	2
18	85	46	54%	40	4	2	4%	44	7	15%	30	32	7	4	6	5	34	19	41%	26	2
19	53	35	66%	24	11	10	29%	25	29	83%	4	24	3	3	3	3	27	34	97%		3
20	4	1	25%	1			0%	1		0%	1			1			1		0%	1	0
21	23	10	43%	8	2	1	10%	8	3	30%	4	4		3	1		8	7	70%	1	3
22	2	0	0%				0%			0%									0%		0
23	86	30	35%	21	8	5	17%	24	6	20%	15	18	1	2	4	5	17	17	57%	9	3
24	14	9	64%	8		0	0%	9		0%	8	4	1	3	2	1	6	5	56%	3	1
25	87	47	54%	25	20	2	4%	44	21	45%	19	25	4	5	9	8	28	28	60%	19	2
26	15	7	47%	6	1	0	0%	7	2	29%	5	6	1		1	2	4	7	100%		2
Total	**1170**	**550**	**47%**																		

(1) Number of "yes" responses compared to # of cards received

As a basis of evaluation, a study area was considered to be potentially problematic if the percentage of respondents answering "yes" to the following questions was 10% or more of the total questionnaires distributed in the area.

- Have you had any septic system problems in the past three years?
- Do septic system problems exist in your neighborhood?
- Do you wish your neighborhood was served by sewers?

Study areas exhibiting problems in all three of the categories listed above could potentially have problems with sustaining on-site wastewater management systems and may need alternate solutions.

5.5 SUMMARY OF NEEDS

Mattapoisett's existing sewage collection system currently provides service to parcels within the sewer service area described in Section 3 of this CWMP. Parcels within the service area that are currently developed, but not connected to the sewer system, as well as undeveloped parcels, will ultimately be served by the existing sewer system in the future and do not need alternative means for wastewater disposal. For these reasons, the existing sewer service area is omitted from the Needs Analysis.

The needs analysis identified a significant need for wastewater management alternatives in many of the developed properties located outside the existing sewer service area. Results of the wastewater management needs analysis are summarized in Table 5-5 and Figure 5-6 at the end of this section. The study areas are classified into two categories:

- Significant need – alternatives to conventional on-site septic systems are needed;
- Moderate/Low need – conventional on-site septic systems appear adequate at this time, but alternatives to conventional on-site septic systems may be needed in the future.

Study areas with nine or more points per developed lot were determined to have a significant need for alternatives to conventional on-site septic systems and are shown in red on Figure 5-6. Seventeen of the twenty six study areas are classified as significant need areas. These lots have a combination of conditions that result in a high likelihood of system failure and significant impacts to the environment and human health. Many of these significant need study areas are adjacent to the coast with the remainder scattered throughout the Town.

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TABLE 5-5

Summary of Wastewater Management Needs Analysis

Study Area No.	Need Rating	Points Per Developed Lot	Number of Lots	Number of Developed Lots	Total Acres	Percent Developed Acres
19	Significant	15.2	129	84	39	57%
23	Significant	13.6	189	135	226	59%
10	Significant	12.3	79	55	89	61%
22	Significant	11.2	42	14	271	53%
26	Significant	11.1	49	28	24	37%
18	Significant	11.0	147	108	143	57%
15	Significant	10.6	143	90	135	68%
25	Significant	10.3	136	106	221	73%
12	Significant	9.8	50	32	54	35%
5	Significant	9.7	158	105	407	46%
21	Significant	9.6	67	36	84	59%
1	Significant	9.6	97	92	185	90%
9	Significant	9.5	47	32	50	85%
13	Significant	9.3	139	58	145	41%
11	Significant	9.2	33	27	91	80%
14	Significant	9.2	50	25	239	35%
20	Significant	9.2	27	15	89	28%
8	Significant	9.1	51	36	45	73%
2	Moderate/Low	8.9	126	112	230	40%
24	Moderate/Low	8.9	41	17	162	16%
17	Moderate/Low	8.7	67	35	308	33%
4	Moderate/Low	8.5	122	93	132	62%
3	Moderate/Low	8.5	56	46	97	64%
6	Moderate/Low	7.0	57	43	258	36%
7	Moderate/Low	4.5	79	62	139	72%
16	Moderate/Low	0.0	6	0	85	0%

The remaining study areas that averaged less than nine points per developed lot are defined as moderate/low need areas. While it appears that current needs in these area can likely be met by Title 5 compliant septic systems, some moderate/low need areas may have conditions that could result in future failures of on-site septic systems.

The wastewater management needs analysis provides an objective approach to evaluating the study areas to determine the adequacy of existing on-site wastewater disposal systems and the need for alternative approaches to wastewater management. Conversely, the card survey is intended to provide locally based, qualitative information regarding on-site system performance. Use of a card survey also increases public awareness and involvement in the CWMP process. The results of the needs analysis for each study area are compared to the results of the card survey in Table 5-6.

TABLE 5-6
Needs Analysis vs. Card Survey Results

Study Areas	Needs Analysis Significant Need	Card Survey Potentially Problematic Areas
1	X	X
2		
3		X
4		X
5	X	
6		X
7		
8	X	X
9	X	
10	X	
11	X	
12	X	
13	X	
14	X	X
15	X	
16		
17		X
18	X	X
19	X	X
20	X	
21	X	
22	X	
23	X	X
24		
25	X	
26	X	

Of the eighteen study areas determined to have a significant need for alternative wastewater management solutions, card survey respondents in six of these study areas also indicated potential problems with existing on-site septic systems. The results of this analysis will be used to develop wastewater management alternatives for Mattapoisett.

Finally, the ranking system discussed in this Section should not be used to establish a firm priority list for future sewer extension programs because the data has some limitations. As an example, septic system pump outs and failures were a key ranking criteria. However, the accuracy of Board of Health data, especially in pump outs, is suspect. A good example is Area 26, the Cove Drive area where existing homes are located only a few feet above sea level, on small lots and with septic tanks actually located above the ground in flood proofed structures. Ironically, the soils in Area 26 are good. Therefore, there are no recent failures or high pump out rates that provide additional points. However, existing conditions are poor because the area frequently floods, has small lots and is literally surrounded by water resources. Septic systems in Area 26 have definite operating limitations.

To prioritize the implementation of sewer projects, the Board of Water & Sewer Commissioners needs to integrate the following information:

- Sewer needs
- Environmental needs
- Homeowner receptiveness

MADEP evaluates wastewater management needs based on three factors:

- Existing system capacity and condition
- Septic system problems
- Future flows and loads

The capacity and condition of existing wastewater management systems was discussed in Sections 3 and 4 which dealt with existing conditions and infiltration and inflow. Septic system problems were evaluated in Section 5 by the needs analysis. This section of the report evaluates future flows and loads. Information developed in this section regarding future flows is used in conjunction with the information developed under Sections 3, 4 and 5 to identify wastewater management needs throughout Mattapoisett. Management alternatives to address the needs identified in Sections 3 through 6 are presented in Section 7 and a recommended plan is developed in Section 8.

The following section presents existing and future flow data for all of the study areas developed for the needs analysis presented in Section 5. Information is provided for each study area so that the amount of flow may be considered before wastewater management alternatives are recommended. Flows associated with some study areas discussed in this section may be connected to the centralized collection system and treated in Fairhaven, while other areas may utilize local treatment alternatives such as decentralized treatment facilities or septic systems. Regardless of which wastewater management alternative is ultimately selected, the flows developed in this section may be used to size collection and treatment infrastructure or negotiate agreements with regional treatment facilities.

In accordance with MADEP guidance documents, Tighe & Bond has developed flow estimates for both existing and future conditions. Existing conditions flow estimates reflect the current level of development in each study area as well as the existing sewer service area. As such, the existing conditions flow estimates reflect the anticipated quantity of wastewater that would be produced within a given study area in 2008. Since all of the study areas defined for the needs analysis utilize septic systems, the wastewater generated in these areas is currently being discharged to the ground within Mattapoisett. If a portion of the areas identified in this report are ultimately connected to the centralized collection system, the existing conditions flow estimates may reflect the flow produced by the connected areas, particularly if the sewer extensions are implemented shortly after the issuance of this report.

Future conditions flow estimates were developed for all study areas as well. Much like the existing conditions flow estimates, the future conditions estimates are intended to quantify the flow produced within a given study area, and the recommended wastewater management alternative for each study area will be discussed in Sections 7 and 8 of this report.

Existing flows within the sewer service area were based on pump station records and sewer billing records. Outside of the sewer service area flow estimates were based on flow generation rates observed within the current sewer service area. Future flows were estimated utilizing existing flow data and population projections to determine flows for year 2028 to reflect a 20-year planning horizon. A full build-out flow estimate is also presented in this section as an estimate of the flow that could be observed if all of the buildable lots were consumed. Additional information describing how flow estimates were generated, as well as the existing and future conditions flow estimates themselves, are presented in the following subsections.

6.1 DEMOGRAPHIC PROJECTION

Demographic or population projections are used to estimate community growth over the 20 year CWMP planning period. Population projections for Mattapoisett have been developed by various planning agencies and departments in the Commonwealth, including the Southeastern Regional Planning and Economic Development District (SRPEDD) and the Massachusetts Institute for Social and Economic Research (MISER). SPREDD published population projections are based on US Census data from 1960 through 2030. The MISER population projections were last updated in 2003 and provide a range of projections through 2020. These population projections are summarized in Table 6-1.

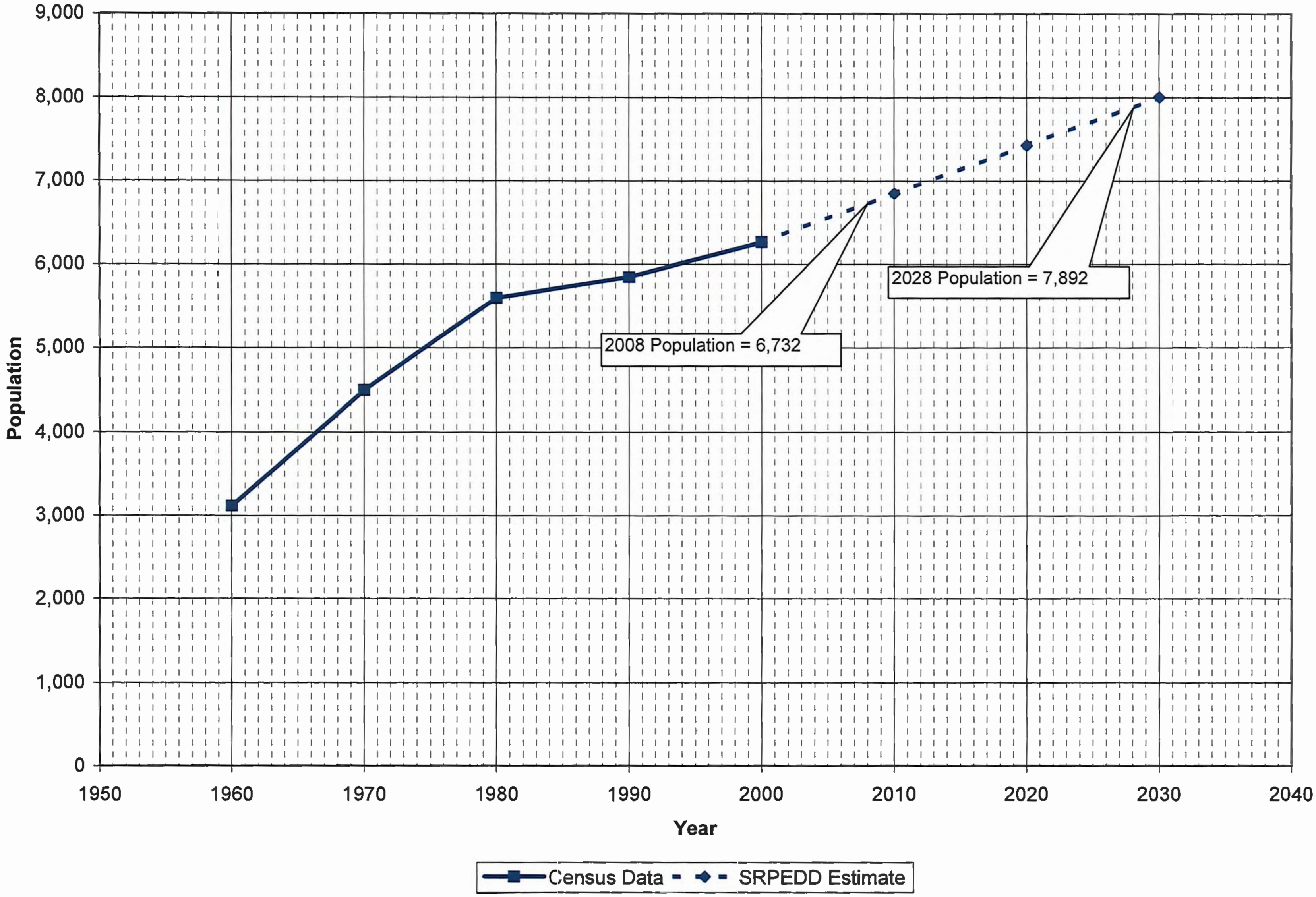
TABLE 6-1
Population Projections

Year	MISER	SRPEDD
2000[1]	6,268	6,268
2010	6,026 – 6,632	6,848
2020	5,606 – 6,366	7,428
2030	NA	8,008

[1]2000 U.S. Census Data

The SRPEDD projection includes the length of the planning study and takes into account staff knowledge and local factors. Therefore the latest SRPEDD population projections (June 2006) were used as the basis for estimating 20-year Build-Out flows for this study. The populations for 2008 and 2028 were estimated by linear interpolation and are shown on Figure 6-1. The population of Mattapoisett is projected to increase by 17.2% over the next 20 years. This equates to an annual growth rate of roughly 0.9%. Since this is a long term projection, actual annual growth rates may vary somewhat based on the economy and regulatory conditions (i.e. environmental permitting requirements and zoning).

Figure 6-1
Mattapoisett Population Data



J:\M\M-0382\Buildout Analysis\Buildout Data\SPREDD Population Projections.xls
Printed: 4/7/2008

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The population projections through 2030 prepared by SRPEDD were used to develop projections for the 20-year span of the CWMP because the SRPEDD analysis presents the best source of population projection data, accounting for regional variables and an understanding of the cyclical nature of development within the region. Tighe & Bond has rounded the SRPEDD growth estimate of 0.9% per year up to 1.0% per year for the purpose of estimating residential wastewater flows. This equates to a total residential growth of 20% town-wide over the next 20 years. It is important to note that all study areas may not experience 20% growth over the planning period due to the current level of build-out or the land available for development.

6.2 COMMERCIAL GROWTH POTENTIAL

While commercial sector growth is anticipated to increase at a slower rate than residential growth, a conservative estimate of 20% growth (equivalent to anticipated residential growth) was used for the 20-year projections. The proportion of commercially derived flows to residential flows is expected to remain the same over the study period, so increases in both areas are evaluated simultaneously.

Commercial uses in Mattapoisett are centered along main transportation corridors, including County Road (Rt. 6) and Industrial Drive adjacent to I-195. Since the Town's zoning limits nearly all commercial development to these two areas, any future commercial or industrial growth is expected to occur in one of these two areas. Existing commercial and industrial water use in Mattapoisett is relatively low, accounting for nearly 15% of the total usage. Future commercial/industrial usage is expected to account for a similar fraction of the total flow.

6.3 WASTEWATER FLOWS

Given the variation in existing and future development throughout Mattapoisett, as well as varying wastewater needs, it is important to account for spatial differences in wastewater flow rates. To account for the spatial variation in flow, study areas developed for the Needs Analysis portion of this CWMP were used as the basis for estimating town-wide wastewater flow rates.

Flows were established for existing conditions, the 20-year planning period (year 2028), and full build-out conditions. Flows were developed for all Study Areas in this section and the resulting estimates will be used in the Recommended Plan to determine future flows to the Fairhaven WPCF and possible decentralized system sizing.

6.3.1 Existing Flows

The existing wastewater flows for the Town of Mattapoisett have been estimated using one of two methods based on whether or not the specified area is within the existing sewer service area. Within the sewer service area flows, were based upon measured pumping rates at the Eel Pond and Brant Beach Pump stations. Conversely, wastewater flow rates from presently unsewered study areas were estimated using building information from the Town Assessor and flow data provided by the Mattapoisett Water and Sewer Department. Additional information regarding both flow generation techniques follows.

Within the current sewer service area, wastewater flows were estimated by adding the amount of wastewater pumped by the Eel Pond and Brant Beach Pump Stations. The Mattapoisett Water & Sewer Commission reported that the actual average daily wastewater flow was 271,100 gpd over the period of January 2005 through February 2007. This flow rate was based on roughly 1,382 connected units. This data is shown graphically in Figure 6-2.

Based on the pumping records mentioned above, it is reasonable to assume that the overwhelming majority of existing sewer customers are residences. Consequently, dividing the average flow specified above, by the number of connections generates an estimated wastewater flow rate of about 210 gpd per residential unit. This flow generation rate was subsequently used to estimate existing residential wastewater generation in all of the study areas defined for this CWMP.

It is worth noting that the 210 gpd per residential unit flow listed above is based on actual flow data, and as such includes infiltration and inflow (I/I). Consequently, an additional allowance for I/I has not been included in existing or future flow estimates.

Existing flows for areas outside of the sewershed were estimated using flow generation rates based on land use and building data from the Town Assessor. As discussed above the residential flow generation rate was based on actual wastewater flow data from Mattapoisett. Commercial and industrial flow generation rates were based on actual flow data from similar communities because a large record of commercial or industrial flow data was not available for Mattapoisett. Municipal flow generation rates were based on actual water use and Assessor's records. The flow generation rates developed for the study are summarized in Table 6-2.

TABLE 6-2
Flow Generation Rates

Use Category	Flow Generation	
Industrial	20	gpd/1,000 SF
Commercial	100	gpd/1,000 SF
Residential	210	gpd/dwelling
Municipal	30	gpd/1,000 SF

The flow rates listed in Table 6-2 were multiplied by the number of developed parcels of a given use designation within each Study Area to develop an existing flow estimate. As an example, if Assessor's records showed that Study Area 1 had 100 dwellings the resulting residential flow for this area would be 21,000 gpd (i.e. 100 dwellings x 210 gpd/dwelling = 21,000 gpd). Flows for industrial, commercial and municipal buildings were estimated in a similar fashion.

Figure 6-2
Mattapoisett Precipitation and Flow Summary

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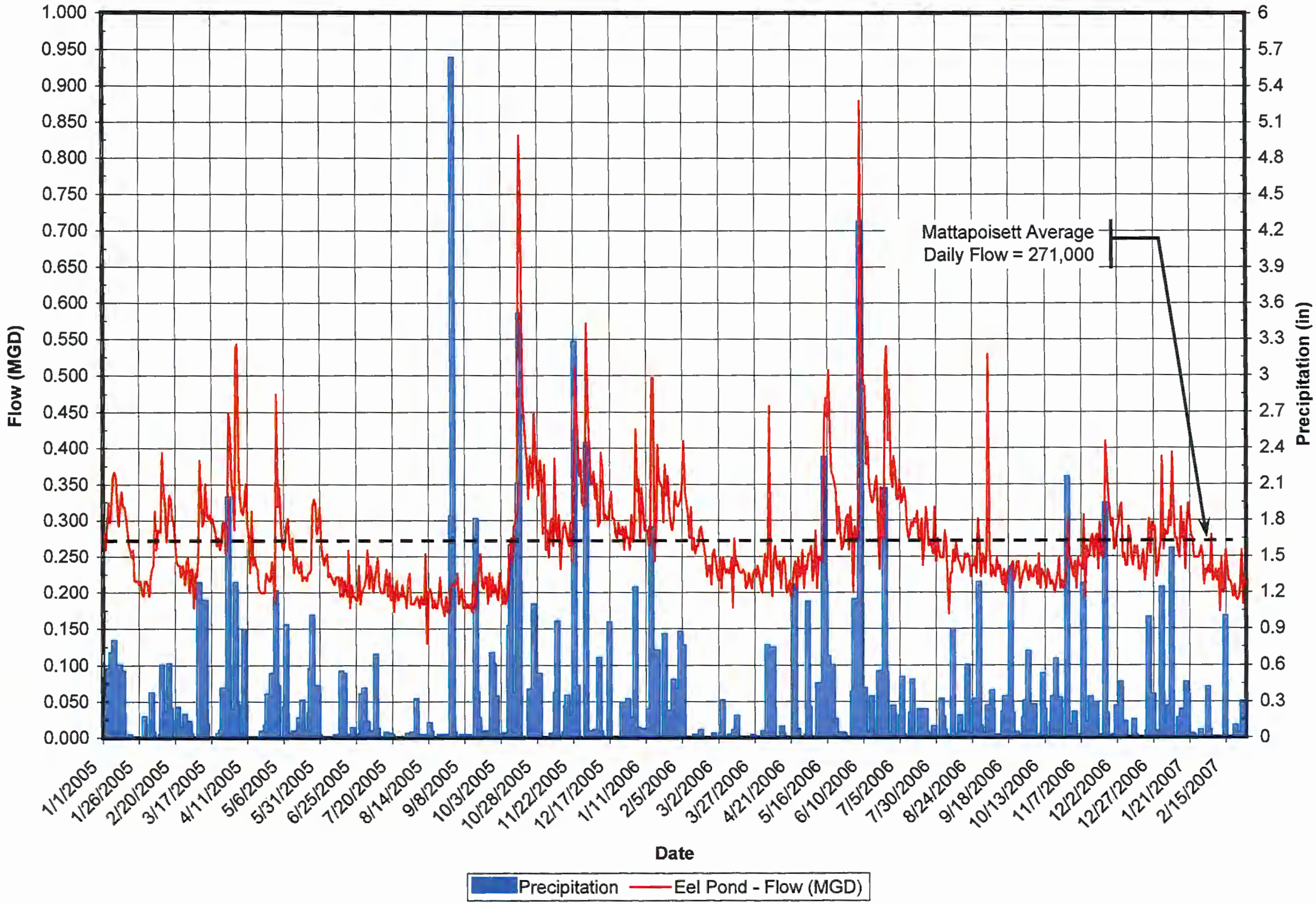

Note: Rainfall data from The National Weather Service New Bedford, MA station.

J:\M\M-0382\Flow Data\Pump Station Flow Data.xls
3/9/2007

Using the methods described above, and the GIS information developed for the CWMP relating to study areas, existing wastewater generated from developed parcels in each study area was calculated. Individual, parcel based "flows" were then grouped together based on the study areas defined for the Needs Analysis portion of this report. The resulting wastewater "flows" generated in each study area are presented in Table 6-3.

TABLE 6-3
Existing Wastewater Generated from Study Areas

Study Area	2007 Existing Wastewater Generated (gpd)	2007 Developed Parcels	Total Parcels
Existing Sewershed	271,000	NA	NA
1	20,000	92	96
2	24,000	112	125
3	10,000	46	54
4	20,000	93	117
5	23,000	104	156
6	9,000	43	57
7	97,000	62	78
8	13,000	36	50
9	9,000	32	45
10	17,000	52	77
11	6,000	27	33
12	7,000	32	50
13	12,000	58	139
14	6,000	28	54
15	21,000	90	143
16	0	0	6
17	8,000	35	66
18	23,000	108	147
19	18,000	84	128
20	4,000	15	27
21	31,000	36	67
22	3,000	14	41
23	29,000	135	189
24	4,000	17	40
25	23,000	106	136
26	6,000	28	49

It is important to note that all of the flows presented in Table 6-3, with the exception of the existing Sewershed, represent flows that are currently discharged to the ground via septic systems. The purpose of providing this flow data in the CWMP is two fold:

1. Existing flows are evaluated in conjunction with septic system needs to determine which wastewater management alternatives are appropriate for each study area, and;

2. Existing flows represent the amount of wastewater being generated in a given Study Area in 2007, and are a reasonable estimate of flow for projects implemented early in the 20-year planning period.

Two notable existing flows listed in Table 6-3 are the values for Study Areas 16 and 22. Study area 16 is presently undeveloped and all available land area is believed to be either protected open space or undevelopable land. For this reason, existing flows and the number of developed parcels are listed as zero (0). Study area 22 is the Town's industrial park, which is located immediately to the south of I-195 on the eastern side of Town. Flow estimates for this Study Area were based on existing water use records for the industries present at the site. In recent years these records have indicated a water use of slightly less than 3,000 gpd for this entire area. Total flows associated with specific wastewater management alternatives are not discussed in this Section, and will be presented in Sections 7 and 8.

6.3.2 Full Build-Out

Full build-out flows were estimated to establish an upper bound on anticipated wastewater flows. Much like the existing flow estimate, full build-out flows were generated using separate methodologies for the existing sewer service area and for the 26 study areas.

The Mattapoisett Water & Sewer Commission has adopted a policy of providing only a single service connection to each lot that abuts a Town sewer at the time of sewer construction. The intent of this policy is to manage available capacity, and distribute the cost of sewer betterments equitably among present and future users. The Town plans to continue to enforce this policy where sewers are extended in the future so all future flow estimates prepared for this CWMP are based on a single connection per buildable lot abutting a sewer line.

The Mattapoisett Water & Sewer Commission has applied this policy and the flow generation rates listed above to the existing sewer service area to estimate flows associated with outstanding permits and commitments. Based on this analysis, there is an estimated 105,000 gpd of flow that could be added to the sewer system, but has not yet been connected. The parcels associated with this flow are scattered throughout the existing sewer service area, as well as the Bay Club and Brandt Beach areas. A copy of the report filed with the State Legislator for 2007 is included in Appendix C.

Much like the existing conditions flow estimate presented above, the full build-out estimate utilizes the flow generation rates specified in Table 6-2. Given the uses allowed by zoning in nearly all of the study areas, it was determined that future flows could best be estimated by assuming that all future development within the study areas will be residential. Therefore, each undeveloped parcel was evaluated as if a single dwelling was constructed on it. The one exception to this approach is study area 22, which is the Town's industrial park. Flows in this area were estimated using the commercial and industrial flow generation rates specified earlier in conjunction with floor area ratios (FAR). FAR represents the developed floor area as a function of the total lot area. FAR can either be defined by zoning or calculated based on existing development. For the purposes of the CWMP, typical FAR values of 0.33 and 0.37 were used for commercial and industrial development, respectively. These values were derived from values used by SRPEDD in a prior build-out analysis.

To account for redevelopment, changes in zoning or other unforeseen circumstances, a contingency of 10% was applied to future flow estimates. The contingency was only applied to flow projections for all of the study areas identified in the Needs Analysis.

Full build-out potential for each of the study areas was also reduced by a factor to account for development constraints such as wetlands, steep slopes, river protection areas, and other environmental concerns. When evaluated on a town-wide basis, these constraints reduce the total developable land area by approximately 25%. Applying the principles listed above to each of the study areas produced the flows listed in Table 6-4.

TABLE 6-4
Full Build-Out Flows

Study Area	Full Build-Out Flow (gpd)	Full Buildout Developed Parcels	Total Parcels
Existing Sewershed	376,000	NA	NA
1	23,100	95	96
2	28,600	122	125
3	12,100	52	54
4	26,400	114	117
5	34,100	143	156
6	12,100	54	57
7	110,000	74	78
8	16,500	47	50
9	12,100	42	45

this analysis, at ultimate Build-Out, the Town's population is projected to increase to 22,877 which corresponds to an approximately 365% increase over the year 2000 population.

The information developed by the SRPEDD build-out analysis was used for comparison purposes with flow estimates developed specifically for this study. Based on current growth estimates, the ultimate build-out condition will not occur within the 20 year planning period of this study.

TABLE 6-7
Build-Out Factors for Town-Wide Projections

Build-Out Factors	EOEA
General Approach	• Subdivision and Build-Out of undeveloped areas • Does not account for redevelopment • Developed land is based on 1985 MassGIS Land Use mapping and updated with subsequent subdivision information • Build-Out calculated for each zoning district
Constraints	• Protected open space • Environmental Constraints: o Wetlands = 0.25 o 8-15% Slope = 0.50 o 15-25% Slope = 0.25 o River Protection Act (RPA) = 1.00 o Wetlands & RPA = 0.25 o 8-15% Slope & RPA = 0.50 o 15-25% Slope & RPA = 0.25
Residential	• R40 = 40,000 SF Lots • RR40 = 40,000 SF Lots • R30 = 30,000 SF Lots • RR30 = 30,000 SF Lots • MR30 = 30,000 SF Lots • W30 = 30,000 SF Lots • R20 = 20,000 SF Lots • VR = 10,000 SF Lots

Build-Out Factors	EOEA
Commercial/Industrial	• General Business District o Retail/Office FAR = 0.15 • Limited Industrial District o Manufacturing FAR = 0.37 o Retail/Office FAR = 0.41 o Warehouse FAR = 0.54

TABLE 6-8
Summary of Town-wide Build-Out Results

Zoning District	Developable Acres	Additional Development Capacity	
Residence 40	661	215	Residential Units
Rural Residence 40	3,556	1,348/556,000	Residential Units/Commercial SF
Residence 30	630	319	Residential Units
Rural Residence 30	3,627	2778/1,551,000	Residential Units/Commercial SF
Marine Residence	479	258/152,000	Residential Units/Commercial SF
Waterfront 30	1,357	738/485,000	Residential Units/Commercial SF
Residence 20	35	6	Residential Units
Village Residence	96	13/2,300	Residential Units/Commercial SF
General Business	224	104/425,000	Residential Units/Commercial SF
Limited Industrial	266	3,760,000	Commercial/Industrial
Total Area	**10,931**	**5,779**	**Single family units**
		6,931,300 sf	**Commercial/Industrial**

Source: EOEA Build-Out June 2000, prepared by SRPEDD

6.5 WASTEWATER CONSTITUENTS

Approximately 87% of the future wastewater flow is estimated to originate from domestic sources. Future wastewater flows are expected to be moderate strength, much like the existing waste, due to the minimal inflow and infiltration associated with new infrastructure and the anticipated per capita water use of 75 gallons per day. Based on recommended design guidelines in New England Interstate Water Pollution Control Commission's Guides for the Design of Wastewater Treatment Works (TR-16), Wastewater Engineering, and existing WWTF data, anticipated influent concentrations of wastewater constituents are presented in Table 6-9.

TABLE 6-9
Anticipated Wastewater Constituent Concentrations

Parameter	Expected Average Concentration Range
Biochemical Oxygen Demand (BOD)	270-350 mg/L
Total Suspended Solids	300-400 mg/L
Total Nitrogen	50-70 mg/L
Total Phosphorus	10-12 mg/L

SECTION 7 WASTEWATER MANAGEMENT ALTERNATIVES

Mattapoisett currently has an existing wastewater collection system which discharges to the Fairhaven wastewater collection system for treatment at the Fairhaven WWTP. A map showing Mattapoisett's existing wastewater collection system is located in Appendix A. For properties currently located within the existing wastewater service area, centralized wastewater management will continue for the foreseeable future. However, areas outside the existing wastewater service area may be required to develop alternative means of wastewater management. These alternatives are described in this Section.

Wastewater management encompasses collection, treatment, disposal, reuse, and residuals management. These terms are defined as follows:

- **Collection:** A system, typically a network of pipes and pump stations, which carries wastewater flow from individual facilities to a treatment plant
- **Treatment:** Processing of wastewater to remove pollutants
- **Disposal:** Discharge of treated wastewater effluent to the environment, typically a surface water or groundwater
- **Reuse:** The use of highly treated wastewater effluent for beneficial purposes such as landscape irrigation, industrial cooling water, or toilet flushing
- **Residuals Management:** Processing and ultimate disposal or reuse of solids generated during the treatment process

The regulatory framework for municipal wastewater treatment and disposal defines the three main categories of management alternatives:

1. **Decentralized** (on-site and cluster) – systems less than 10,000 gallons per day regulated under Title 5
2. **Community** (satellite and centralized) – systems greater than 10,000 gallons per day regulated under the Groundwater Discharge Permit Program or Surface Water NPDES Permit Program
3. **Regional** – Inter-municipal transfers

Table 7-1 lists the wastewater alternatives described in this section grouped by the three main categories of management alternatives.

TABLE 7-1
Wastewater Management Alternatives

	Decentralized Sy			Regional Solutions
Management Component	**Conventional On-site Systems**		**ntralized Systems with urface Water Disposal** 'eater than 150,000 gpd (peak day flow)	**Discharge to Facilities outside Mattapoisett**
Collection	None	None	ty Pressure um	Gravity Low Pressure
Treatment	Septic tank and soil adsorption system	Septi	gical treatment plant ling: Preliminary treatment Primary treatment (potential) Biological treatment by fixed film, suspended growth or combined systems Nutrient removal Advanced treatment (potential) Disinfection	Fairhaven WWTF
Effluent Disposal	Groundwater	Pump dispo	ce water	
Effluent Reuse	None	None	Reuse: Landscape ion and toilet flushing trial reuse: cooling /boiler makeup water ltural reuse: irrigation nd discharge (natural or ucted)	
Residuals Disposal	Septage disposal	Septa	ening and off-site disposal tering and off-site disposal	

gpd gallons per day

Based on the results of the Wastewater Management Needs Analysis discussed in Section 5, significant need areas require solutions other than conventional on-site systems. Moderate need areas, as the designation suggests, may be able to rely on conventional on-site systems, but certain locations could benefit from an alternate solution. Low need areas can, most likely, continue to be served by septic systems. Ultimately, the wastewater management recommendation for Mattapoisett may not be a single alternative for the entire Town, but a combination of alternatives discussed in this section. Recommendations will ultimately depend upon the availability of additional wastewater capacity at the Fairhaven WWTP, availability of sites for groundwater discharge, the ability to obtain a discharge permit, and opportunities for reuse.

7.1 WASTEWATER TREATMENT OVERVIEW

The goal of wastewater treatment is to reduce pollutants in the waste stream to levels that will not harm human health and the environment when the effluent is discharged. A summary of wastewater constituents that are targeted for removal, treatment technologies used to remove the constituents, and regulatory requirements for effluent water quality are presented to provide background for the alternatives discussed in this section.

7.1.1 Wastewater Constituents

The following indicator pollutants found in wastewater are typically targeted for treatment because they are relatively easy to measure and are representative of general pollutant levels in residential and commercial wastewater:

- **Biochemical oxygen demand (BOD):** BOD is a measure of organic pollutants, such as fecal waste and food products; it is the amount of oxygen microorganisms need to consume the organic contaminants in the wastewater. Untreated, BOD can deplete the oxygen levels in receiving waters below life-sustaining levels for the aquatic biota.

- **Total suspended solids (TSS):** TSS is a measure of the suspended solids in the wastewater, including soil, bacteria, and other solid waste products. Suspended solids can block light and accumulate within receiving waters, reducing the overall water quality. Additionally, TSS can contain high levels of BOD and other pollutants.

- **Nitrogen and Phosphorus:** Nitrogen and phosphorus are nutrients that in the appropriate concentrations support aquatic life. However, too much nitrogen or phosphorus can cause excessive growth of algae, which in turn, degrades the water quality by depleting oxygen levels and contributing to high suspended solids. While control of both parameters is important, nitrogen tends to be the parameter of concern in saltwater environments, while phosphorus tends to be the controlling, or limiting, nutrient in freshwater.

Additionally, nitrogen in drinking water may impact human health. High nitrate levels are linked to fetal and birth defects and may cause miscarriages. Nitrate may also cause methemoglobinemia, or blue-baby syndrome, when it is converted to nitrite in the digestive system. Nitrite interacts with hemoglobin in the blood cells to form methemoglobin, which cannot carry sufficient oxygen through the body.

- **Fecal coliform:** Coliform is a family of bacteria found in water contaminated with pathogens, which are disease-causing microorganisms.

7.1.2 Wastewater Treatment

Wastewater is treated by physical, chemical, or biological processes or a combination of these processes. For typical municipal wastewater whose sources primarily are residential and commercial customers with limited industrial discharges, biological processes in combination with physical and chemical process are most commonly used to treat pollutants in wastewater. Typical treatment processes include:

- Preliminary treatment
- Primary treatment
- Secondary Treatment (Biological treatment and secondary clarification)
- Advanced treatment (Nutrient removal)
- Disinfection
- Odor, noise and aesthetic controls

In biological treatment, microorganisms are used to consume BOD and phosphorus and convert various forms of nitrogen into nitrogen gas that is released into the atmosphere. Chemical treatment is typically used for phosphorus removal and to enhance solids removal. These processes, together with disinfection, remove suspended solids reduce fecal coliform to levels that minimize negative impacts to human health and the environment.

The microorganisms found in biological treatment are classified into the following three main categories: aerobic, anaerobic, and anoxic. Aerobic microorganisms treat the wastewater in the presence of oxygen. Biological treatment processes that utilize aerobic microorganisms are the most common type used at municipal wastewater treatment plants. Anaerobic and anoxic microorganisms carry out their reactions in the absence of oxygen and under oxygen-limited conditions, respectively. Anoxic microorganism populations are developed in processes designed to convert nitrate to gaseous nitrogen. The microbes found in the septic tanks of conventional on-site systems are primarily anaerobic.

The three categories of wastewater management alternatives (decentralized, community, and regional) generally correlate to the size and location of the treatment facilities. Within each category there are several technologies that can be employed to treat the wastewater. The selection of technologies depends on the level of treatment required by the discharge permit. Technologies may be applicable to several treatment categories. For example, some of the treatment technologies used in decentralized cluster systems are available in capacities large enough for small satellite systems. Similarly, many of the technologies appropriate for satellite systems are also appropriate for centralized systems. Some technologies were initially developed to handle small-scale residential flows and have since been applied to larger systems up to approximately 50,000 gpd.

7.1.3 Wastewater Discharge Permits and Water Quality

The wastewater management alternatives outlined in this section have limits on the type and quantity of pollutants they are capable of removing, and selection of the appropriate technology will be a function of the required effluent quality. In general, as effluent limits become more stringent and as the number of parameters to be treated increases, wastewater management becomes more complex and costly.

Table 7-2 summarizes the applicable permits and the minimum technology based thresholds required by regulations for the three main categories of wastewater management alternatives for Mattapoisett. Receiving water quality requirements may ultimately dictate more stringent limits than the minimum requirements prescribed in the regulations. More detail regarding the regulatory framework for wastewater management is discussed in the background section of the report (Section 2).

TABLE 7-2
Discharge Permits and Minimum Effluent Quality Requiren

	Decentralizec			Regional Solutions
	Conventional On-site Systems		**ɘntralized Systems with urface Water Disposal** ıter than 150,000 gpd peak day flow)	**Discharge to Facilities outside Mattapoisett**
Discharge Permit(s)	Disposal System Construction Permit Certificate of Compliance	DEP /	ES Permit	NPDES Permit
Regulating Agency	Mattapoisett Board of Health MADEP	MADE Matta Healtl	EP	Massachusetts: EPA and MADEP
Effluent Quality Requirements (Minimum Standards)[1]	Specific limits not prescribed. Typical concentrations of septic tank effluent are[2]: BOD: 140-200 mg/L TSS: 50-90 mg/L Nitrogen: 35 mg/L avg; 25-60 mg/L range (majority is ammonia-nitrogen) Additional removal of BOD and TSS is provided in the soil below the soil adsorption system. Significant quantities of nitrogen are not removed in the subsurface. Systems larger than 2,000 gpd in nitrogen sensitive areas are required to meet limits listed for I/A systems.	Tight any tr	nology Standards (CWA ndary Treatment dards): : 30 mg/L 30 mg/L ɘrical limits for other ituent including nutrients ependent on requirements aintaining water quality of ving water.	Technology Standards (CWA Secondary Treatment Standards): BOD: 30 mg/L TSS: 30 mg/L Numerical limits for other constituent including nutrients are dependent on requirements for maintaining water quality of receiving water.

1. Required effluent limits are based on minimum sta ncentrations listed in this table.
2. Tchobanoglous, George and Franklin L. Burton. W

7.2 REGIONAL ALTERNATIVES

Regional solutions are those that involve export of either raw or treated wastewater outside of Mattapoisett for disposal. Mattapoisett currently discharges untreated wastewater to the Fairhaven collection system for treatment at the Fairhaven WWTP via the Mattapoisett-Fairhaven IMA. The location of the Fairhaven WWTP in relation to the Mattapoisett collection system is shown on Figure 7-1. Continued discharge to the Fairhaven WWTP is expected to be the preferred wastewater management alternative for Mattapoisett for the foreseeable future, up to the current IMA limit of 0.5 mgd. If Mattapoisett's present and future wastewater management needs do not exceed 0.5 mgd, there is less need for Mattapoisett to consider other wastewater management alternatives. However, as noted in Section 6, future flows to Fairhaven at ultimate build-out could be greater than 0.5 mgd and Mattapoisett should consider other alternative wastewater management strategies that would meet the long term wastewater management needs of the Town.

7.2.1 Collection Alternatives

Over the past 20 years, a number of alternative collection systems technologies have become more common including pressure sewers and grinder pumps, Septic Tank Effluent Pump (STEP) systems, small-diameter sewers and vacuum sewers. The topography of the service area influences the relative cost of these systems and ultimate selection. Although Mattapoisett utilizes low pressure sewers, the collection system is comprised primarily of gravity sewers that deliver flow to Fairhaven. This method of wastewater collection is expected to continue in the future. Therefore, the following discussion of collection alternatives will not include Septic Tank Effluent Pump (STEP) systems, small-diameter sewers and vacuum sewers as these alternatives are not expected to be utilized in Mattapoisett.

7.2.1.1 Conventional - Gravity Sewers with Community Pump Stations and Forcemains

Gravity sewers can be used to transport effluent from individual homes or facilities to the community treatment/SAS system. Gravity sewers consist of buried pipe that slopes downward to the point of discharge. Gravity sewers are installed in straight line alignments with manholes at regular intervals (typically 300 feet) to facilitate maintenance. Conventional sewers are constructed with minimum pipe diameters of eight inches and are sloped to maintain a minimum velocity of two feet per second to maintain solids in suspension.

When topography allows, gravity sewers have the advantage of lower operation and maintenance costs compared to pumped systems. However, where topography limitations are present, these systems can become very deep, and pump stations with force mains are required. Each station typically consists of a collection tank (wet well), pumps, controls, building or weather-proof enclosure, and an emergency power supply. The existing Mattapoisett collection system has one primary sewage pumping station that delivers flow to Fairhaven (Eel Pond Pump Station), and seven Town-owned satellite pump stations serving areas that could not otherwise be served by gravity sewers.

7.2.1.2 Low Pressure Sewers with Individual Grinder Pumps

In a low pressure system, wastewater from each home or facility is discharged to a small dedicated on-site pump station. Each pump station discharges to a common force main, called a low pressure sewer. Since a septic tank is not used to settle out solids, grinder pumps with cutter blades are often used. While the septic tank maintenance and pumping requirements are eliminated with this type of system, maintenance of each individual pumping system is required. In Mattapoisett, the Board of Water and Sewer Commissioners maintains pumping systems located on private property.

7.2.2 Study Area Collection Alternatives

Alternatives for extending Mattapoisett's existing wastewater collection system to each of the study areas evaluated in the wastewater management needs analysis are analyzed in Section 7.6. Collection system alternatives are provided for those areas identified as "high need."

7.3 COMMUNITY SYSTEMS (GREATER THAN 10,000 GPD)

Community systems typically serve all or a portion of the entire community. Collection systems transport wastewater to the treatment facility and the treated effluent is either reused or discharged back to the environment either through a groundwater or surface water discharge. Solids produced at smaller facilities are typically transported to other facilities for further processing before ultimate disposal. The treatment plant typically consists of a series of mechanical processes for treating the wastewater and is operated by trained, licensed personnel. A generalized process flow diagram of a community system is shown in Figure 7-2.

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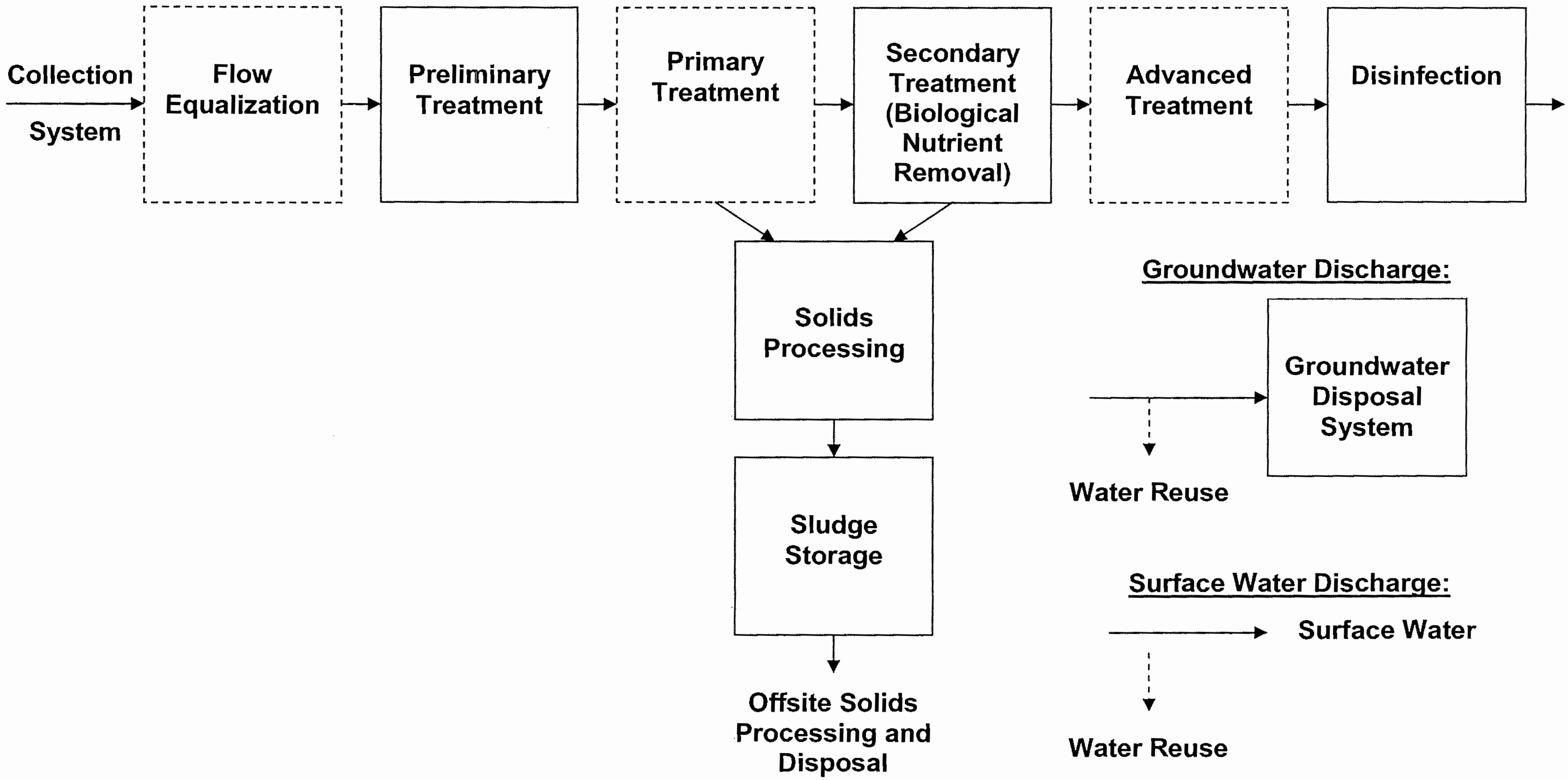
FIGURE 7-2
General Process Flow Diagram
Community Treatment System



Dashed lines indicate process may not be applicable in all situations

Effluent Pumping will likely be required for groundwater disposal alternative and may be required for surface water discharges, depending on the topography of the site and the hydraulic profile of the wastewater treatment plant.

Mattapoisett's flows are currently treated by the Fairhaven WWTP. Current flows are within the IMA flow allowance of 0.5 mgd. However, since future projected flows at ultimate buildout will someday exceed the IMA flow limit, a centralized treatment system may be an option in the future to provide additional wastewater capacity for Mattapoisett. Therefore, a discussion of community systems follows.

The two main types of community systems include satellite (small) systems and centralized systems. The difference between a satellite or small wastewater treatment facility and a centralized facility is size. While there is no regulation that defines the two categories, MADEP's Guidelines for the Design, Construction, Operation and Maintenance of Small Wastewater Treatment Facilities with Land Disposal dated April 2004 defines small treatment facilities as those with flows up to 150,000 gpd.

Satellite systems are often located in close proximity to the service area. It is important that these facilities are "good neighbors," resulting in limited impacts to the neighborhoods. Facilities can be designed to incorporate odor and noise controls, and buildings and enclosures can be designed to fit into the residential landscape. Incorporating visual aesthetics into the facility design can increase costs of initial construction but may improve long-term public acceptance.

While some treatment technologies are only applicable to certain size facilities, the general approach to wastewater collection, treatment, disposal, reuse, and residuals management is the same for any size community system. Therefore, the technology alternatives are presented together in this subsection. Leading into the technology presentation is an overview of the key differences between satellite treatment facilities and centralized treatment facilities and a discussion of the effluent disposal alternatives for community systems. Effluent disposal beyond the conventional groundwater and surface water discharges is also presented.

7.3.1 Satellite Treatment Facilities

7.3.1.1 System Description

While satellite treatment facilities use many of the same processes as larger, centralized facilities, these small plants often experience wider fluctuations in flows and loads and may require flow equalization. Often, these systems are located in heavily-developed areas and process tanks and equipment are often housed inside structures and buried below ground. Because these facilities are often staffed only on a part-time basis, laboratories, offices, and large maintenance shops, typical of larger facilities, are often omitted.

A review of MADEP compliance reports from 2003-2004 indicates that nearly every satellite facility in Massachusetts with a groundwater discharge permit experienced excursions over permit limits for total nitrogen. Consistency of treatment is a major concern for these smaller-sized treatment plants that do not have full time operators. The causes of these excursions are variable and can be attributed to design, operation, or an unanticipated increase or change in flow or loadings. Good engineering design requires site specific evaluations for effluent requirements, influent loadings, and expected fluctuations in flows and temperatures.

7.3.1.2 Operation and Maintenance

Satellite facilities require consistent operation and maintenance by licensed operators to ensure continued permit compliance and to maintain the facility as needed. MADEP's Guidelines for the Design, Construction, Operation and Maintenance of Small Wastewater Treatment Facilities with Land Disposal, dated April 2004, requires on-site operation and maintenance for a minimum of two hours per day, five days a week and continual operator on-call for systems 10,000 gpd or greater. In addition to labor, typical operation and maintenance costs include the power to run the facility, chemical usage, laboratory fees, and solids removal and disposal.

7.3.1.3 Application in Mattapoisett

Given the wide geographic distribution of wastewater needs in Mattapoisett, satellite systems could be a viable alternative for wastewater management to serve severe, moderate, and low need areas. The use of satellite systems will be based on a number of factors, including proximity to existing sewers, impact on water balance, and the net environmental impact.

As a example, areas north of I-195, located adjacent to the Mattapoisett River, are best served by satellite or decentralized systems that enhance water quality while keeping water within the Town's only productive aquifer. Conversely, sewers will be considered for those severe need areas where IMA capacity is available, particularly if the areas are close to existing sewers. The availability of an environmentally acceptable and technically feasible discharge method is a prerequisite to any treatment option.

7.3.2 Centralized Treatment Facilities

7.3.2.1 System Description

Centralized wastewater treatment facilities have been the traditional alternative to on-site systems. Historically, these facilities have been sited away from population centers, usually in close proximity to a surface water body for discharge. Many centralized facilities were constructed with space-intensive technologies and without odor control. However, new centralized treatment plants do not necessarily have to fit this stereotype. Space-saving treatment technologies and odor control systems are now available to allow these facilities to be successfully sited closer to service areas and still be "good neighbors."

7.3.2.2 Operation and Maintenance

Similar to satellite treatment plants, a larger, centralized facility will need to be operated by certified wastewater treatment operators. Depending on the size of the facility, centralized treatment plants may be staffed full-time by several people, including operators, lab technicians, mechanics, and administrators.

7.3.2.3 Application in Mattapoisett

Since Mattapoisett's sewage flows are currently served by the Fairhaven WWTP, Mattapoisett does not need to consider a new centralized treatment facility for flows that are currently treated by Fairhaven. However, a centralized facility would be an option for Mattapoisett if additional capacity is not available at Fairhaven for future flows beyond the limit of the existing IMA. For the purposes of this CWMP, centralized wastewater treatment alternatives are not discussed in detail for Mattapoisett because large scale ground or surface water disposal options are infeasible.

7.3.3 Effluent Discharge Alternatives

Effluent from centralized or satellite treatment facilities can either be discharged to groundwater or surface waters. The prevalence of low permeability soils and high groundwater provide additional challenges for siting groundwater disposal systems. Therefore, developing effluent disposal opportunities for Mattapoisett would be challenging. Effluent disposal options are discussed below. Each option would require new permits.

7.3.3.1 Surface Water Disposal to Local Rivers or Buzzards Bay

From a coststandpoint, a surface water discharge is more advantageous than groundwater disposal. Groundwater disposal systems require extensive dedication of land, typically tens of acres depending on the flow, and on-going operation and maintenance of the disposal system. Alternatively, a surface water discharge is relatively simple, consisting of an outfall pipe and possibly a pump station. However, surface water discharges are regulated by the Clean Water Act's antidegradation policy, which requires that a new or increased discharge have no negative impacts on the receiving water. Therefore, it would be very difficult to site a new surface water discharge in Mattapoisett. A new NPDES discharge permit has not been granted to a municipality in Massachusetts for over 25 years.

The potential receiving waters discharge to salt water estuaries. Through the Massachusetts Estuary Program, DEP has determined that nitrogen is the critical parameter affecting the health of the estuaries on Cape Cod, and that extremely low levels of nitrogen are required for healthy systems. Therefore, any NPDES permit in Mattapoisett would have very stringent nitrogen requirements.

7.3.3.2 Surface Water Disposal to Ocean

Buzzards Bay falls within the Cape and Islands Ocean Sanctuary. An ocean sanctuary protected by the Massachusetts Ocean Sanctuaries Act prohibits ocean discharge of wastewater effluent. However, the distance to the open ocean makes the alternative of an ocean outfall prohibitively expensive. Therefore, this disposal alternative was not given further consideration.

7.3.3.3 Groundwater Disposal

MADEP's current policies and regulations make groundwater disposal the most desirable discharge alternative from a permitting standpoint. However, as noted above, the prevalence of low permeability soils and high groundwater conditions will make permitting technically challenging. Rigorous evaluation of groundwater disposal sites will be required if this option is pursued in the future.

7.3.4 Technology Alternatives for Treatment Disposal, Reuse, and Residuals Management

The technology alternatives for community systems are presented in the following subsections. The technologies are divided into treatment, groundwater disposal, reuse, and residuals management. The intent of this subsection is to provide an overview of the potential alternatives and identify the technologies that could be applicable for use in Mattapoisett. If future facility planning for community systems proceeds, additional evaluation of technologies that are identified for application in Mattapoisett will be required. Collection system alternatives are described in Section 7.6.

7.3.5 Treatment Alternatives

As described in Section 7.1, biologically-based treatment systems are most commonly used to meet secondary treatment standards. In community treatment systems, the biological process is coupled with other physical and chemical processes that can effectively remove BOD, TSS, nutrients, and pathogens to meet surface or groundwater discharge permit requirements. The main treatment components of a biologically-based treatment facility are described in this section including:

- Preliminary treatment

- Primary treatment (potential)
- Secondary treatment (biological/nutrient removal)
- Advanced (tertiary) treatment (potential)
- Disinfection
- Odor, noise, and aesthetic controls

Final selection of processes and technologies will depend upon quantity of flow to be treated, location, the influent characteristics, and effluent permit requirements.

Alternative treatment approaches including physical/chemical treatment or natural treatment have constraints that will preclude their application as a viable substitute for biological treatment. Physical/chemical treatment is not cost effective for municipal wastewater, generates more sludge, and is less consistent at meeting final permit requirements than biological treatment. Natural systems such as a constructed wetland or oxidation pond typically require large tracts of land. Constructed wetlands used for secondary treatment or polishing still require upstream primary pretreatment and potentially subsequent advanced treatment.

7.3.5.1 Preliminary Treatment

Preliminary treatment is the first stage of treatment at a wastewater treatment plant. It removes inorganic particulate solids from the wastewater and provides the necessary hydraulic conditions for downstream treatment processes. Preliminary treatment processes have the potential to generate odors, and odor control for these process areas is typically provided. Most treatment facilities include one or more of the following preliminary treatment process:

- **Grinding** – reduces size of influent solid material to make it easier to remove through downstream screening or sedimentation process. Grinding also protects pumps from clogging or damage caused by rags, sticks or other larger objects.
- **Screening** – removes coarse solids from the flow stream. Similar to grinding, it is employed to protect downstream process equipment. The screened material is a solid waste that requires off-site disposal. Disposal requirements determine the level of any grinding or dewatering required.
- **Grit removal** – removes inorganic sediments including sand and gravel. Typical grit removal processes are designed with swirling flow patterns created by air, mechanical mixing, or basin geometry to separate the heavier grit particles from the remainder of the solids in the flow stream. Grit removal is employed to protect downstream process equipment and reduce the deposition of sediment in downstream pipelines and process tanks.

- **Flow equalization** – dampens diurnal hydraulic and organic fluctuations of the influent wastewater. Flow equalization is typically accomplished through large holding tanks that receive the influent wastewater. Flow is pumped from these tanks at a near-constant rate to downstream processes. Flow equalization is important for the sizing of downstream treatment processes and the overall stability of treatment. Flow equalization is recommended for most satellite wastewater treatment facilities and may be applicable to centralized treatment facilities, depending on the influent flow and load characteristics.
- **Influent pumping** – lifts the influent wastewater to a higher hydraulic grade to enable gravity flow through downstream processes. Wastewater typically flows underground to wastewater treatment plants. At the point of entry to the facility, the collection system pipes can be twenty feet or more below grade. Pumping the influent wastewater also allows construction of downstream treatment processes at grades at or above ground level, reducing construction costs.

7.3.5.2 Primary Treatment

Primary treatment reduces the solids and organic load on downstream processes. Readily settleable solids and floating materials are separated by gravity from the flow in primary sedimentation tanks. The material is typically collected by mechanical rakes and skimmers from the tanks and pumped to downstream solids handling processes for further treatment. Primary treatment typically removes 50% to 70% of the influent total suspended solids and 25% to 40% of the influent BOD. Significant nitrogen is not removed in primary treatment. Primary treatment can reduce the size and cost of the downstream biological treatment process. Disadvantages of primary treatment are the potential for odors and the footprint requirement for the process tanks. Primary treatment tanks are often covered and connected to the facility's odor control system.

Inclusion of primary treatment in the facility design depends on the size of the facility and biological treatment process selected. Several existing satellite treatment facilities in Massachusetts are designed without primary treatment as extended air facilities, without primary treatment. The trade off is potentially lower capital costs but increased O&M costs for power and residuals.

7.3.5.3 Biological Treatment and Secondary Clarification

Biological treatment is designed to reduce organic waste (BOD) and can also be designed to remove nutrients, i.e., nitrogen and phosphorus. The process becomes more complex when designed for nutrient removal due to the need to maintain aerobic, anoxic and/or anaerobic conditions for the microorganisms. Biological treatment technologies can be divided into three main categories based on the microorganism's support system: suspended-growth, fixed film and combined systems. In suspended-growth processes, microorganisms are cultivated in basins where they are suspended by mixing within the wastewater. In fixed film reactors, microorganisms are grown on media, typically rocks, sand, plastic, or some other inert media, over which the wastewater passes for treatment. Combined systems incorporate both suspended-growth and fixed film components. Various biological treatment technology alternatives are listed in Table 7-3.

TABLE 7-3
Biological Treatment Technologies

Suspended Growth	Fixed Film	Combined Systems
Complete Mix Activated Sludge	Trickling Filter	Moving Bed Biofilm Reactors
Plug Flow Activated Sludge	Rotating Biological Contactor[1] (RBC)	
Extended Aeration	Submerged Upflow Reactors[1]	
Oxidation Ditch[1]	Submerged Downflow Reactors[1]	
Sequencing Batch Reactor[1,2]	Fluidized Bed Reactors[1]	
Modified Ludzack-Ettinger (MLE)[1]	Other Package Systems	
Membrane Bioreactor [1,2] (MBR)		
Four-stage[1] or five-stage[2]		
Bardenpho		
Phoredox (A/O)[2]		
A2/O[2]		
UCT[2]		
BioMag[1, 2]		
Other Package Systems		

[1]Technology for biological nitrogen removal.
[2]Technology for biological phosphorus removal.

Integral to the biological treatment is a solids separation process. Secondary clarifiers are most commonly used to separate the microorganisms and solids that are maintained in the biological process tanks. In membrane bioreactor processes, membranes replace the need for secondary clarification.

Generally, suspended growth systems offer more flexibility, allowing the operator to optimize the system to meet changing conditions. This can be a benefit, but it can also be a drawback for satellite treatment systems with limited operator attention. Fixed film systems offer less complexity, but, due to the relatively short hydraulic residence time in the systems, they must be properly designed with adequate flow equalization to accommodate the changing flows and loads that are characteristic of smaller treatment facilities.

The membrane bioreactor (MBR) technology will consistently provide the highest quality effluent from the standpoint of suspended solids and turbidity, which will allow for consistently effective disinfection. When the biological treatment system is properly sized and operated for nitrogen removal, the membrane bioreactor technology is an excellent technology for meeting stringent permit requirements. Because of its relatively small footprint, the system can be covered and contained, making it an attractive alternative from an aesthetic, noise, and odor standpoint. MBR effluent is often conducive to groundwater disposal.

Activated sludge systems, Sequencing Batch Reactors (SBRs), and Rotating Biological Contactors (RBCs), when designed for total nitrogen removal (nitrification and denitrification) and coupled with a filter can also meet stringent permit requirements. However, these systems have a greater risk of solids breakthrough than MBRs. Oxidation ditch, and four and five-stage Bardenpho processes are proven technologies that haven't been widely implemented in satellite treatment facilities in Massachusetts due to the relatively larger footprint required for the processes.

Trickling filter systems are especially susceptible to low temperature loss of nitrification because the aeration of the microbes is often provided through a vent or fan drawing from the outdoors. These systems may need to be designed with heating systems.

There are several installations of "package systems" including Bioclere, Amphidrome and RBC systems in Massachusetts. In the case of the Bioclere installations, when coupled with a denitrification filter, the system was able to more consistently meet the permit requirements. In the case of the Amphidrome system, permit compliance did not change appreciably when operated with and without a denitrification filter. However, pairing any biological process with a tertiary filter will typically improve its ability to consistently meet effluent targets.

7.3.5.4 Nutrient Removal

Nitrogen can be present in a variety of forms in water, including nitrate, nitrite, ammonia and organic nitrogen. Total nitrogen is a sum of these components. Total Kjeldahl Nitrogen (TKN) is the sum of the ammonia and organic nitrogen. Typical raw wastewater is composed primarily of TKN.

To remove nitrogen from the wastewater, a two-step biological treatment process is commonly employed: nitrification followed by denitrification. Nitrification converts the ammonia to nitrates, and denitrification converts the nitrates to nitrogen gas. Important factors for successful nitrification are temperature, pH, dissolved oxygen concentrations and hydraulic and solids retention times. Available carbon source is an important factor in the denitrification process.

Phosphorus in municipal wastewater is typically removed through biological and/or chemical processes. Biological phosphorus removal proceeds in anaerobic conditions and requires additional biological process tanks. Chemical phosphorus removal is accomplished through the addition of metal salts, typically aluminum sulfate (alum), ferric chloride, or polyaluminum chloride (PAC), to one or more treatment processes ahead of the final solids removal system. The aluminum and iron ions will precipitate the phosphorus. This chemical reaction consumes alkalinity and can lower pH. The addition of a pH control chemical is often employed to counteract this process. Chemical phosphorus removal also generate additional solids to be treated in the solids handling system.

7.3.5.5 Advanced Treatment

Advanced treatment processes are those that remove suspended, colloidal, and dissolved constituents that are present in the wastewater after secondary treatment. Although discussed separately above, treatment processes designed to remove nutrients are advanced treatment processes. Other processes include: filtration, reverse osmosis, electrodialysis, adsorption, air stripping, ion exchange, advanced oxidation processes, distillation, chemical precipitation, and chemical oxidation. Many of the processes are used in the treatment of industrial wastewaters or production of recycled water. Filtration and chemical precipitation are the advanced treatment processes most commonly used in municipal wastewater treatment facilities. The water quality prescribed in the effluent discharge permit determines the need for advanced treatment.

7.3.5.6 Disinfection

Disinfection is used to destroy disease-causing organisms including bacteria, protozoan oocysts and cysts, helminthes, and viruses. Traditionally, gaseous chlorine or sodium hypochlorite is used for disinfection. Ultraviolet light (UV) disinfection has become a popular alternative to chemical disinfection because it eliminates the need for dechlorination and does not produce disinfection byproducts.

7.3.5.7 Odor, Noise, and Aesthetic Controls

Although not shown in the process flow diagram in Figure 7-2, odor control, noise control, and aesthetic considerations are critical elements of a successful design of any wastewater treatment facility. Incorporating these elements into the facility design can increase costs of initial construction but provide long-term public acceptance. It is important that the facility is a "good neighbor" with minimal impact on the neighborhood.

Wastewater treatment facilities, by the nature of the substances handled and treated, have the potential to generate odors. Raw influent, unaerated tanks and solids handling facilities have the largest potential for generating odors at treatment facilities. Odor control strategies include covering tanks, locating equipment indoors, tailoring design to minimize odor-producing environments, and installing malodorous air collection and treatment equipment.

Wastewater treatment facilities include equipment such as motors, blowers, pumps and emergency generators, which can generate noise. Noise impacts may be minimized by placing equipment within buildings or providing insulating enclosures.

Aesthetically-conscious designs typically include buildings and structures that fit with the architectural style of the neighborhood and fencing and/or vegetative screening.

7.3.5.8 Constructed Wetlands

Constructed wetlands are man-made systems that are designed to treat wastewater and stormwater using processes found in natural wetlands. The two major types of constructed wetlands are free water surface (FWS) and vegetated submerged beds (VSB). FWS wetlands resemble natural wetlands and can have areas of open water area or be covered with dense vegetation. In addition to treatment, FWS wetlands can provide habitat for wildlife and augment the quantity of natural wetlands in the area. No standing water is present in VSB wetlands, and the treatment occurs in the soils just below the surface in the rootzone of the plants. VSB wetlands may not provide the same wildlife habitat benefits as FWS wetlands.

FWS treatment wetlands are complex systems that use a combination of physical, chemical and biological processes to transform and remove BOD and TSS. According to the September 2000 EPA Manual for Constructed Wetlands Treatment of Municipal Wastewaters, design parameters are based on largely empirical information from existing construction. Wetlands can be designed to provide secondary treatment or provide effluent polishing of wastewater that has already received conventional secondary treatment. However, typical constructed wetlands do not provide significant ammonia and phosphorus removal (EPA 2000).

While there are approximately 1,000 constructed wetlands in the United States, they are not common in Massachusetts and, where present, are used primarily for stormwater treatment. Constructed wetlands can be less costly to operate and maintain compared to conventional treatment plants, but the land requirement for constructed wetlands is substantial. Based on anticipated future water quality requirements for nutrient removal and constraints on available land for treatment and subsurface discharge of wastewater, constructed wetlands will likely not be an appropriate technology for implementation in Mattapoisett.

7.3.6 Groundwater Discharge Alternatives

Technology alternatives for groundwater disposal of treated wastewater effluent include:

1. At-surface technologies:
    a. Open sand beds (rapid infiltration beds)
    b. Subsurface trenches
    c. Subsurface chambers
2. Well technologies:
    a. Deep well injection
    b. Shallow gravity wells
    c. Wick wells

These technologies are described in the following subsections. Technology selection and system size is dependent upon the effluent quality, design flow, and subsurface geologic and hydrologic characteristics of the disposal site.

7.3.6.1 At-Surface Disposal Technologies

Open sand beds, also known as rapid infiltration beds, are bermed beds of sand approximately two feet deep. Treated effluent is discharged to the bed where it infiltrates through the sand and unsaturated soils below to groundwater. Open sand beds are readily accessible for maintenance and relatively inexpensive to construct. However, the public access to the beds needs to be restricted with fences, and the area cannot be used for other purposes.

Subsurface trenches consist of buried perforated pipe within gravel beds. Effluent percolates through the gravel and unsaturated soils below to groundwater. The distribution trenches are located below ground, allowing for other uses of the site such as ball fields and golf courses. Maintenance is more difficult than open sand beds because the system requires excavation for access. Similar to subsurface trenches, below-grade leaching chambers allow subsurface infiltration of the wastewater. Chambers are prefabricated structures which allow for higher wastewater loading rates than trenches.

Design effluent loading rates are typically determined based on percolation or infiltration rate, which are empirical measures. Table 7-4 contains MADEP's guidance for design effluent loading rates based on percolation tests for different types of effluent disposal systems. These design criteria were developed for small treatment systems, between 10,000 and 150,000 gpd. There are few larger subsurface disposal systems within Massachusetts, and absent site-specific hydrogeologic investigations, these criteria provide a reasonable planning-level estimate of system requirements.

TABLE 7-4
Subsurface Disposal Design Loading Rates

	Design Loading Rate[1] (gpd/sf)				
Percolation Rate	**< 2 min/in**	**2-5 min/in**	**5-10 min/in**	**10-20 min/in**	**> 20 min/in**
Open Sand Bed	5.0	5.0	4.0	2.0	0.3
Leaching Chamber	3.0	3.0	2.5	1.5	0.2
Subsurface Trench	2.5	2.5	1.5	1.0	0.2

[1]MADEP. Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal. April 2004. Boston, MA. Table 3.

Higher percolation rates allow higher design loading rates, resulting in smaller active disposal areas. Likewise, lower percolation rates require lower design loading rates, resulting in larger active disposal areas. Soils with percolation rates greater than 20 minutes per inch make the disposal fields prohibitively large and expensive. Typically, soils composed of sands and gravels have percolation rates suitable for rapid infiltration of treated wastewater effluent, less than 20 minutes per inch.

An open sand bed allows for the highest design loading rates. Additionally, based on the MADEP's guidance for disposal system design, full reserve capacity may not be required for open sand beds but is required for the other subsurface disposal systems. However, open sand beds require dedicated land whereas buried disposal systems, such as leaching chambers or trenches, allow for other uses such as playing fields or parking lots.

In addition to soil characteristics, depth to groundwater is a major determinant in the siting of these at-surface disposal systems. MADEP's guidance requires a minimum of four feet of separation between the bottom of the system to the high groundwater level. Locations that do not have the requisite separation require additional fill to raise the system to achieve the four-foot minimum.

Based on the design loading rates listed in Table 7-4, total acreage for a subsurface disposal sites was calculated with the following assumptions:

- The active area for each system is based on a percolation rate of 10-20 minutes per inch.
- The active area of open sand beds and leaching chambers was doubled to account for a reserve area for 100% of the system capacity.

- The total area of a subsurface trench system is based on 4-foot by 100-foot trenches with 12 feet between each trench. Three times the width of the trench is required for spacing between trenches to provide a 100% reserve area.
- The calculated total area of each system was increased by 150% to account for site geometry, distribution piping, and access.

Estimated areas for subsurface disposal systems are shown in Figure 7-3.

7.3.6.2 Well Disposal Technologies

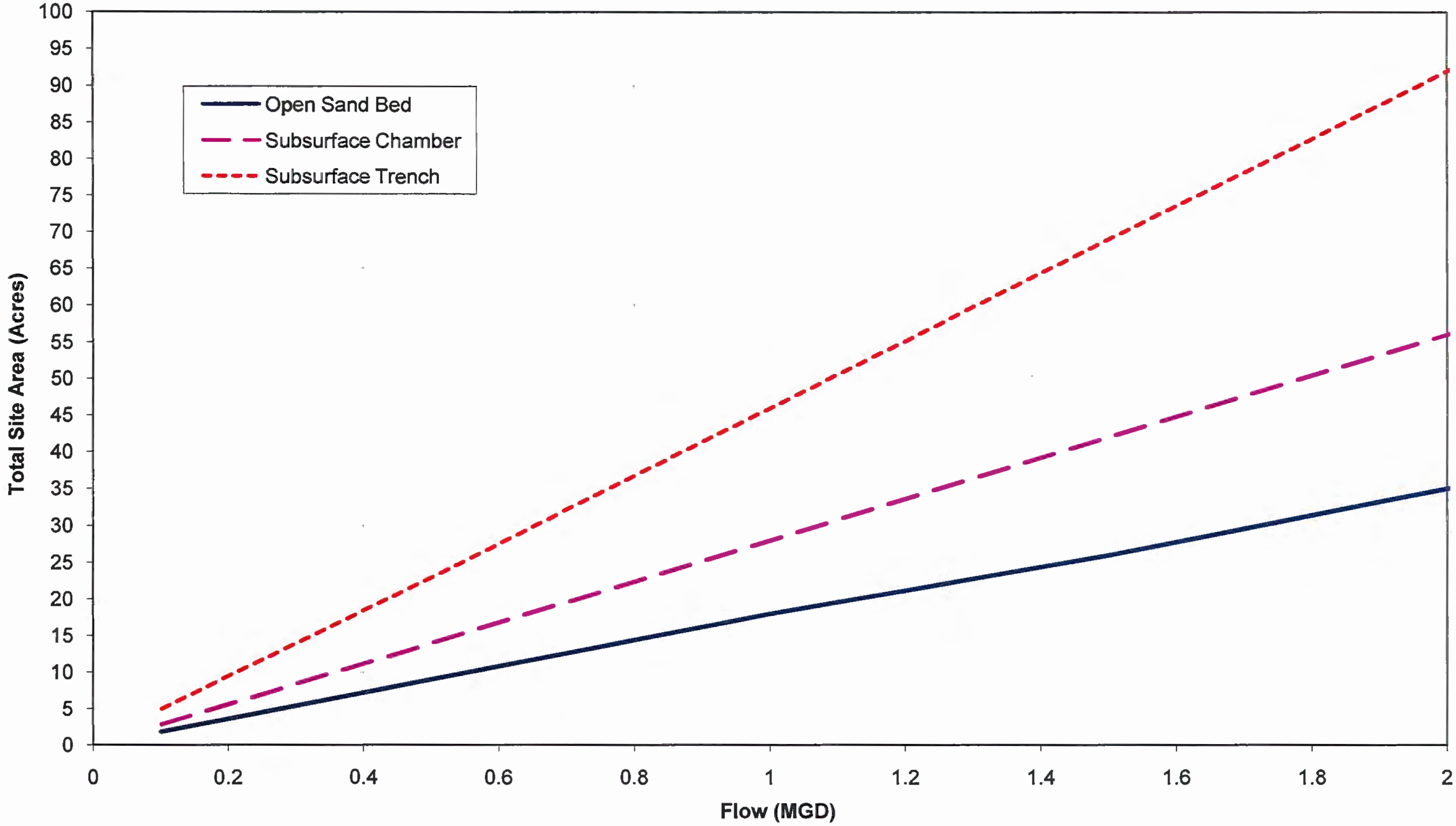
Groundwater injection wells have not been widely used in Massachusetts, and wick wells have a limited number of installations. However, these technologies have successfully been used in other parts of the country (largely in Florida and California). Disposal via wells does not have the same soil and groundwater constraints and can be used in areas where at-surface technologies are infeasible. Additionally, the overall footprint of disposal wells is much smaller than at-surface technologies. The main drawbacks of well disposal technologies are plugging due to solids and fouling due to biological growth fostered by the organic content and nutrients in the effluent. Highly treated effluent is required for successful well disposal installations.

Groundwater injection wells operate essentially in reverse of groundwater supply wells. Water is pumped through a well into a subsurface permeable zone that is typically saturated. The depth of the well depends upon the desired location of discharge; wells can be shallow or several hundred feet deep. Groundwater injection wells were pilot tested in Barnstable, MA in 1999. The wells plugged when unchlorinated effluent was injected into the well. The conclusion of the test was that chlorine disinfection and effluent filtration would be required to make the process technically viable (Stearns and Wheler 2005). Currently, MADEP does not allow injection of chlorinated effluent into aquifers which may serve as drinking water sources due to concern over disinfection byproducts.

Gravity wells are similar to injection wells except that they use gravity rather than pressure created by injection pumps to force the water into the subsurface and tend to be relatively shallow.

Wick wells are considered an innovative groundwater disposal technology that is in use at a couple of sites in Massachusetts including Fairhaven and Hingham. Water is discharged by gravity into three- to six-foot diameter gravel-filled wells, and the hydraulic head gradient drives water from the surface into the groundwater aquifer. A typical configuration of a wick well is illustrated in Figure 7-4. Wick wells are typically installed in conjunction with nearby cleanout wells, which are used to recondition the wick wells to alleviate fouling and plugging in the wick well.

FIGURE 7-3
Estimated Groundwater Disposal System
Site Area Requirements



Site area requirements based on percolation rate of 5-10 minutes/inch, 100% reserve area, and 150% safety factor.

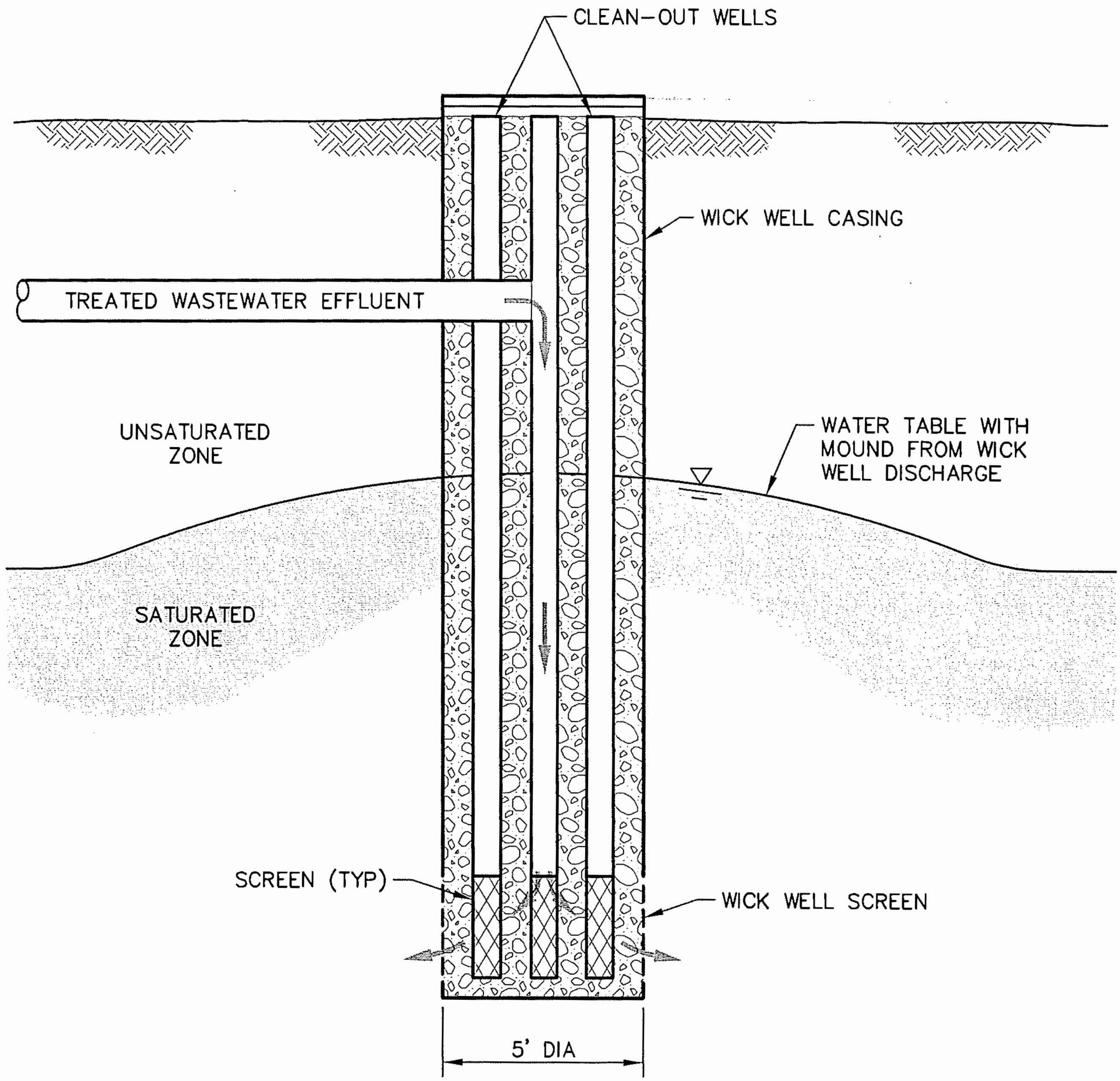


FIGURE 7-4

TYPICAL WICK WELL SCHEMATIC

TOWN OF MATTAPOISETT
COMPREHENSIVE WASTEWATER
MANAGEMENT PLAN
MATTAPOISETT, MASSACHUSETTS

TIGHE & BOND CONSULTING ENGINEERS
WESTFIELD, MASSACHUSETTS

SCALE: NO SCALE

DATE: MARCH 2008

S1240\FIG7-4

7.4.3.2 Operation and Maintenance

I/A systems are more expensive to maintain than conventional on-site systems. Many of these I/A systems use mechanical equipment that require a higher level of operation and maintenance than conventional on-site systems, and system owners are required to contract with a Certified Wastewater Operator in Massachusetts for service. Operators are required to submit reports to MADEP and the Local Board of Health including an annual checklist of inspections and, in cases where enhanced treatment is provided, wastewater sampling results. Typically, enhanced treatment systems are required to test their effluent quarterly for BOD, TSS, pH, and total nitrogen (TN). Influent sampling and analysis is typically required for systems with design flows greater than 2,000 gpd.

7.4.3.3 Application in Mattapoisett

I/A systems may be used in the future for remedial purposes for failing systems. Although individual property owners may employ these technologies, it is not envisioned that the Town of Mattapoisett will use I/A systems for long term management of its municipal wastewater flows.

7.4.4 Cluster (Shared) Systems

7.4.4.1 System Description

Cluster or shared systems are Title 5 systems serving more than one property. Systems with design flow up to 10,000 gpd are regulated in Title 5, which is equivalent to approximately 30 homes with design flows (maximum day) of 330 gpd each. Therefore, cluster systems typically serve small commercial developments or residential subdivisions. The treatment technologies that are used are the same as those described for a single lot, either a conventional septic/SAS system or I/A system.

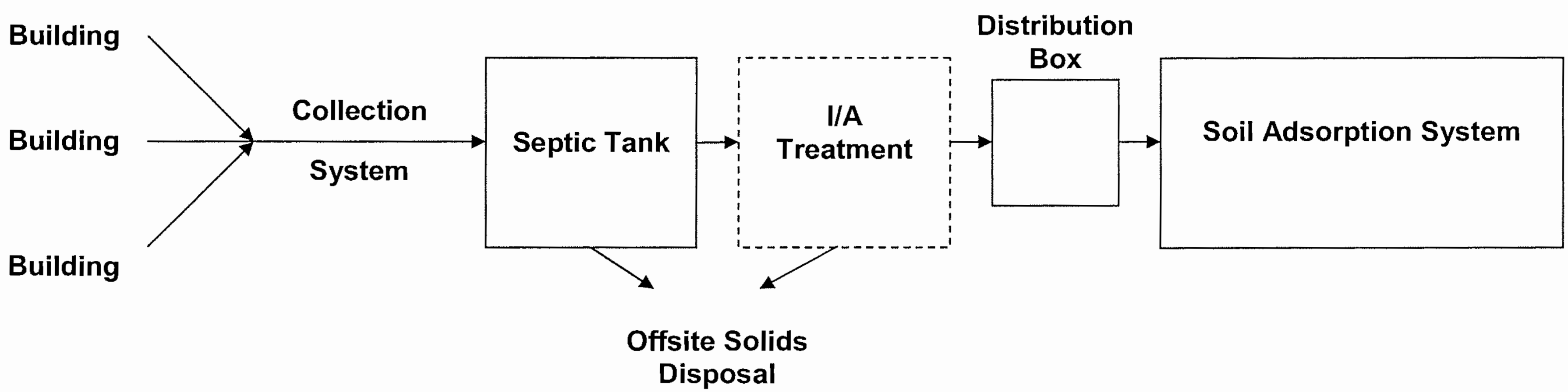
The differences between a cluster system and individual system are that these systems have a collection component and require agreements among the system owners for construction, operation and maintenance of the system including:

- Operation and maintenance plan;
- Legal documentation of system ownership;
- Description of financial assurance for system operation and maintenance;
- Grant of Title 5 Covenant and Easement (Form in 310 CMR Appendix 1).

Approval for these systems is required by both the local Board of Health and MADEP. A process flow diagram of the system is shown in Figure 7-8.

Tighe&Bond

FIGURE 7-8
General Process Flow Diagram
Cluster Treatment System



Dashed lines indicate process may not be applicable in all situations

7.4.4.2 Operation and Maintenance

The operation and maintenance is similar to a single lot system and depends upon the size of the system and technologies employed (conventional or I/A).

7.4.4.3 Application in Mattapoisett

Cluster systems require a suitable location in close proximity to the parcels served by the system for the disposal, and if applicable, treatment system. This type of system may be applicable to commercial areas and new residential subdivisions in rural areas.

7.4.5 Collection Alternatives

The collection systems that are applicable to cluster systems with off-site treatment and SAS are described in Section 7.6.

7.4.6 Septage Management

Septage generated from homes in Mattapoisett is transported by private haulers to Fairhaven for treatment, as there is no septage treatment facility in Mattapoisett.

Septage generated from Mattapoisett homes is transported by private haulers to Fairhaven for treatment, as there is no septage treatment facility in Mattapoisett. Alternatives for future septage management include:

1. Continue to transport and dispose of septage at facilities in surrounding communities;
2. Construct an in-town (Town-owned) septage treatment facility;

Septage can be a source of revenue, and some municipalities investigate the idea of septage treatment either at an existing wastewater treatment plant or new facility. However, as the Town of Mattapoisett does not currently have its own wastewater treatment plant, it is unlikely that Mattapoisett would pursue the development of a dedicated in-Town septage treatment facility.

7.4.7 Decentralized System Management

As decentralized treatment becomes more advanced and more stringent effluent limits are promulgated, communities are adopting various management approaches. Depending on the population, municipalities can have hundreds of decentralized treatment systems. EPA's Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems (March 2003) provides guidance on five different community management systems with increasing levels of oversight and responsibility by the managing entity:

1. **Homeowner awareness model**: This is the simplest model applicable to systems owned by individual property owners in areas with low environmental sensitivity. Regulatory authorities provide timetable and reminders for operation and maintenance.
2. **Maintenance contract model**: This model is targeted to systems with more complex technologies than conventional systems and includes contracts with qualified operators for maintenance.
3. **Operating permit model**: This model is employed for systems that require sustained compliance to protect public health and the environment. The system includes operating permits issued to system owners with renewal contingent on performance.
4. **Responsible management entity (RME) operation and maintenance model**: In this model, the operating permits with performance contingencies for renewal are issued to RMEs.
5. **RME ownership model**: This is the most complex model that provides the greatest assurance of system performance. The RME owns, operates and maintains the system.

It is anticipated that decentralized systems will continue to serve a portion of Mattapoisett's wastewater needs. The development of a management plan could benefit the community and prevent systems from degrading the environment. Under the simplest model, a septage management plan can be developed and made available through the Mattapoisett Board of Health and mailed out with water bills as a separate mailing to serve as an educational reference document for residents and business owners. The plan would contain recommendations for system operation and maintenance, pumpout frequency, and system inspection schedules and checklists. The plan could also include information on I/A systems. The goal of a septage management plan is to provide homeowners with usable information to encourage proper operation and maintenance of Title 5 systems, reduce the number of system failures, and provide a higher probability of protection for public health and the environment.

7.5 SUMMARY OF WASTEWATER MANAGEMENT ALTERNATIVES

A wide range of alternatives are presented in this section for managing future wastewater needs in Mattapoisett. Wastewater management alternatives are described in detail in Table 7-1 and their applicability to Mattapoisett is summarized in Table 7-7.

7.6.3 Study Area 8

Study Area 8 is located west of the existing collection system, on the north and south sides of Fairhaven Road (Route 6), east of the Mattapoisett River. Gravity sewers located in Shaw Street, Parker Street, and Tallman Street north of Fairhaven Road would connect to a new gravity sewer in Fairhaven Road. A gravity sewer located in an un-named street south of Fairhaven Road would discharge to a pump station, which would pump the flow to Fairhaven Road, west of the Mattapoisett River. A force main from this pump station on Fairhaven Road would discharge to the existing 12-inch force main located in the railroad bed south of Route 6.

7.6.4 Study Area 9

Study Area 9 is located north of Fairhaven Road, west of the Mattapoisett River. A combination of gravity and low pressure sewer would best serve this area. Low pressure sewers would serve Randall Lane on the northern part of this study area, discharging to a gravity sewer in River Road. A short segment of gravity sewers in Appaloosa Lane would also discharge to the River Road sewer. The River Road gravity sewer would discharge to the proposed Fairhaven Road pump station west of the Mattapoisett River (referenced in Study Area 8 text). Gravity sewers west of the Mattapoisett River would also discharge to this pump station. Low pressure sewers in Lynnfield Lane would discharge to sewer proposed for Study Area 10.

7.6.5 Study Area 10

Study Area 10, located west of Study Area 9 on the Fairhaven border, would be served by low pressure sewers discharging to the Fairhaven Road collection system.

7.6.6 Study Area 11

Study Area 11 is located west of the Mattapoisett River, south of Fairhaven Road. A gravity sewer would be provided in Mattapoisett Neck Road, north of the former railroad right-of-way in which the force main from the Eel Pond Pump Station is located. This gravity sewer would discharge north to the proposed gravity sewer in Fairhaven Road referenced in study Area 9. Another segment of gravity sewers in Mattapoisett Neck Road, south of the abandoned railroad force main right-of-way would discharge south to a proposed new pump station on Old Mattapoisett Neck Road (see Study Area 13). The force main from this pump station would discharge to the Eel Pond pump Station force main to the north. Locust Street, east of Mattapoisett Neck Road, would be provided with low pressure sewers that would discharge to the gravity sewer on Mattapoisett Neck Road.

7.6.7 Study Area 12

Study Area 12 is located south of Study Area 13 on Mattapoisett Neck Road. Study Area 12 would be served entirely by low pressure sewers that would discharge to a proposed force main in Mattapoisett Neck Road. This force main would discharge to the proposed gravity sewer in Old Mattapoisett Neck Road described in Study Area 13.

7.6.8 Study Area 13

Study Area 13 is located south of Study Area 11 on the east and west side of Mattapoisett Neck Road. This area would primarily be served by gravity sewers, with a small portion being low pressure sewers. Gravity sewers in Oliver's Lane, West Hill Road, Whalers Way, Tara Road, Hi-Ona-Hill Road, and Anchorage Way would discharge to a new pump station on Old Mattapoisett Neck Road. Low pressure sewers in a small segment of Old Mattapoisett Neck Road and in Mattapoisett Neck Road would also discharge to this pump station.

7.6.9 Study Area 14

Study Area 14 is located west of Study Area 13 on both sides of Brandt Island Road. This area would be served entirely by a low pressure sewer main that would discharge directly to the gravity sewer in Brandt Island Road to the south in Study Area 15.

7.6.10 Study Area 15

Study Area 15 is located south of Study Area 14, on both sides of Brandt Island Road, east of Brandt Beach Avenue. This area would be served by a combination of gravity and low pressure sewers. Gravity sewers in Gary Drive, Jowick Street, Marina Drive, Birchwood Street, Dupont Drive, David Street, Brandt Island Road, and a portion of Meadowbrook Lane would discharge to a new pump station on Brandt Island Road. A force main from this pump station would discharge to the existing force main on Brant Beach Avenue. Low pressure sewers on the eastern end of Meadowbrook Lane would discharge to the gravity sewer on this street.

7.6.11 Study Area 17

Although Study Area 17 was not determined to have a high need for alternative wastewater management solutions, adjacent Study Areas 18, 19, and 20 did receive this designation. The most feasible way to serve Study Areas 18, 19, and 20 is to construct sewers in Study Area 17 to deliver flow north to Study Area 12. Therefore, a sewage force main in Mattapoisett Neck Road, north of Harbor Road, would deliver flow from Study Area 18, through Area 17, to the proposed force main in Study Area 12. A low pressure sewer system would be constructed in Mattapoisett Neck Road, south of

Harbor Road, to deliver flow from Study Area 19 to a force main proposed for Study Area 18. Existing properties that abut the proposed force main and low pressure sewer in Mattapoisett Neck Road would be provided with grinder pumps to connect directly to these force mains.

7.6.12 Study Area 18

Study Area 18 is located directly east of Mattapoisett Neck Road and west of Mattapoisett Harbor. This study area would be served by a combination of both gravity and low pressure sewers. Gravity sewers would be constructed in Harbor Road, east of Noyes Avenue, as well as in Bay View, Grand View, Highland View, and Pleasant View Avenues and in Ocean Drive. These gravity sewers would flow to a new pump station located on Ocean Drive. The force main from this pump station would discharge north to a force main in Harbor Road then to Mattapoisett Neck Road. Low pressure sewers would be provided in Noyes Avenue, Dyar Road, Cecelia Avenue, and Millbank Road discharging to the low pressure sewer in Harbor Road which, in turn, discharges to the gravity sewer in Bay View Avenue.

7.6.13 Study Area 19

Study Area 19 is located on the southernmost boundary of Mattapoisett on Antassawamock Harbor, south of Study Areas 17 and 20. This study area will be served entirely with low pressure sewers which will discharge to a low pressure sewer in Antassawamock Road then to Mattapoisett Neck Road.

7.6.14 Study Area 20

Study Area 20 is south of Study Area 18, on Mattapoisett Harbor. A small segment of this study area would be served by gravity sewers, with the remainder served by low pressure sewers. The low pressure sewer system serving this area would discharge from Ocean Drive into the gravity sewer in Pleasant View Avenue.

7.6.15 Study Area 21

Study Area 21 is located south of I-195, southwest of the industrial park, and borders North Street. The northern section of this study area would be served by a gravity sewer in North Street that would discharge to a Pump Station on North Street near the intersection with Industrial Drive. The force main from this pump station would discharge existing gravity sewers in North Street. The southern portion of North Street would also be served by a gravity sewer that would discharge to the south to the existing collection system in North Street. Edgewood Lane would be served by a low pressure sewer that would discharge to the gravity sewer in North Street.

7.6.16 Study Area 22

Study Area 22 is south of I-195, extending from North Street to the Marion border. The Mattapoisett Industrial Park is located in Study Area 22. The Industrial Park would be served by gravity sewers in Boat Rock Road, Bay Club Drive, and Industrial Drive that would discharge to the Study Area 21 gravity sewer in North Street.

7.6.17 Study Area 23

Study Area 23 is located on the Marion border, abutting Harbor Beach to the east. This area would be served by a combination of gravity and low pressure sewers. The northern portion of Aucoot Road would be served by a low pressure sewer discharging to the south to a gravity sewer in Aucoot Road. All streets in the Harbor Beach area would be served by gravity sewers to a pump station on Aucoot Road. The force main from this pump station would be located in Aucoot Road and Hollywoods Road and would discharge to a force main constructed as part of Study Area 25.

7.6.18 Study Area 25

Study Area 25 is located directly south of Study Area 23 on Hollywood Beach. A force main from the Study Area 23 pump station would be located in Hollywoods Drive and would discharge to the gravity sewer on this same street. The remainder of the study area would be served by gravity sewers in the Hollywood Beach area. These gravity sewers would flow to a pump station located on Avenue A. The force main from this pump station would discharge west to the existing gravity sewer in Bay Road in the Point Connett area. This force main would, most likely, be constructed using directionally drilling techniques. The feasibility of this construction technique would need to be evaluated in greater detail during design. Study Area 25 sewer improvements would need to be constructed before Study Area 23.

7.6.19 Study Area 26

Study Area 26 is located south of Point Connett on Nyes Cove. This study area could be served by a low pressure sewer in Cove Street. This low pressure sewer would discharge to the existing gravity sewer system to the east on Point Connett.

The primary goal of the Mattapoisett CWMP is to identify and address wastewater needs throughout the Town. Throughout this report, significant efforts have been made to evaluate the three main factors that produce a wastewater need. These factors include the following:

- Infrastructure Capacity & Condition
- Problems with Continued Use of Septic Systems
- Future Growth

Infrastructure capacity and condition have been addressed in the Existing Conditions Assessment of Section 3, and the Infiltration/Inflow Evaluation of Section 4. Septic system problems were identified and evaluated in Section 5 - Needs Analysis, and future growth was evaluated in Section 6 - Future Conditions. Possible solutions to the Town's wastewater management needs are presented in Section 7, Wastewater Management Alternatives. The Recommended Plan portion of the report that follows draws upon the analysis and findings of these previous sections to develop a wastewater master plan that will address the Town's needs for the next 20 years.

The subsections that follow present a recommended plan for each of the following:

- Existing Sewerage System Needs
- Infiltration/Inflow Control & Mitigation
- Wastewater System Expansion & Upgrade
- Non-structural Wastewater Management Measures

Each of the recommendations that follow have been developed with input from technical experts, regulators, local residents, Town staff and elected officials. The recommended plan is intended to present solutions to the Town's wastewater management needs that will balance environmental protection with community growth concerns.

8.1 EXISTING SEWERAGE SYSTEM NEEDS

The existing Mattapoisett sewerage system is less than 30 years old and is in good condition. However, there are system needs that should be addressed to maintain the system and ensure that the system can serve the community for the next 20 years. Recommended system improvements include:

1. The old North Street sewer should be replaced to eliminate old, vitrified clay pipe and to address historic infiltration/inflow concerns.

2. The Eel Pond wastewater pumping station is almost 30 years old and needs an upgrade to replace old equipment and to protect pump station operations. Refer to Section 3 for a summary of recommended phased improvements. A summary of estimated costs for this work is included in Table 8-1 below:

TABLE 8-1
Eel Pond Pump Station – Summary of Estimated Costs for Repairs

Item	Priority #1	Priority #2
Wet Well Conc. Repairs		$15,000
Wet Well Safety	$3,000	
Chemical Pumps	$3,000	
Sump Pump		
Hot Water Tank		$1,000
Fuel Storage	$5,000	
New Sewage Pump	$70,000	
Replace Existing Pumps		$140,000
Comminutor	$45,000	
Composite Sampler	$8,000	
Bubbler System Upgrades	$2,000	
Flood Alarm	$1,000	
Emergency Lighting	$1,000	
Replace Furnace		$5,000
Replace Ventilator	$15,000	
Miscellaneous	$15,000	$15,000
SUBTOTAL	$170,000	$176,000
35% Eng. & Cont.	$60,000	$62,000
TOTAL	**$230,000**	**$238,000**

3. The Mattapoisett Sewer Department should implement a more defined sewerage system maintenance plan that includes an annual, planned inspection of select manholes to review flow and structural conditions. Ideally, all manholes should be included in the program and optimistically reviewed once every 6 to 10 years. In addition, the department should implement an annual TV inspection program that reviews suspect areas of the sewerage system looking for pipe problems, infiltration, roots and debris. If warranted, select sections of the sewerage system should be cleaned as a response to TV inspection activity. The Sewer Department should budget $5,000 to $10,000 annually for this maintenance work.

4. The Mattapoisett Sewer Department should implement a computerized maintenance program that allows staff to enter sewer system maintenance data such as sewer maintenance calls, blockages, manhole inspection data, TV inspection work, pump station maintenance information and equipment repairs. Ideally, the maintenance program should be electronically connected to a sewerage system map so that records are site specific, can be tracked and can be readily summarized. If this system utilized mapping developed for this CWMP, additional software, hardware, and training costs could be between $20,000 and $30,000. Information could be logged into the system by sewer department personnel as it was collected in the field.

Many Massachusetts communities have implemented proactive sewer maintenance programs using a variety of record keeping tools including GIS (geographic information system) and asset management software. These tools have helped communities reduce I/I and overall treatment and pumping costs, as well as maximize the capacity of their systems.

8.2 INFILTRATION/INFLOW CONTROL & MITIGATION

Mattapoisett's sewerage system is relatively new in that all facilities, with the exception of the North Street sewer, have been constructed within the last 30 years. Based on information reviewed for this study, as well as on limited field investigations, the Mattapoisett sewerage system does not have excessive infiltration. However, the system does have inflow concerns. The I/I summary comments follow:

1. The North Street sewer that is scheduled for replacement in the fall of 2008 will mitigate isolated infiltration problems and mitigate inflow problems that have historically been associated with the North Street sewer. When the replacement project is implemented, each service connection that is connected to the new sewer should be investigated for inflow. If service connection inflow sources are identified, the sources should be brought to the attention of the homeowner and addressed.

2. Three obvious infiltration locations were located on Barstow Street, Water Street and to a lesser degree on Church Street. Construction deficiencies noted at each location should be addressed to mitigate infiltration.

3. Select manhole inspections confirmed that minor infiltration sources exist, but mitigation work is probably not cost effective. However, Mattapoisett should implement an annual manhole inspection program where at least 50 manholes are inspected on an annual basis. The inspection should focus on the structural integrity of the manhole, on debris/sediment, and on infiltration/inflow concerns. The program should systematically review the entire sewerage system with initial

efforts focusing on the downtown area. Inspection deficiencies should be addressed annually and inspections should be documented in a GIS or other database system.

4. Inflow does impact the sewerage system. Besides the North Street sewer, other inflow sources should be pursued by the town. Examples include:

   - Leaky manhole frames and covers
   - Manhole frames and covers that are not properly installed on manhole sections (cross-country sewer between Church Street and Route 6)
   - Roof leaders from 4 Pepperbush Lane
   - Additional suspect roof leader connections to the sewerage system. Suspect connections should be dye tested to confirm that there is no connection to the sewerage system. Reference Table 4-4 for locations.
   - Additional suspect inflow sources identified on Table 4-4 that are not associated with North Street should be investigated

Inflow into sewer systems is a common problem. Besides the sources noted herein, additional sources include sump pump connections, foundation drain connections and manholes located in wetland areas or in depressed paved areas. Inflow into manhole covers is probably the easiest inflow to mitigate, but the effort takes time and financial resources. Manhole cover inflows can be addressed by any one of the following:

1. Checking manhole locations and addressing obvious low spots
2. Ensuring that manhole covers are seated on a clean frame surface to minimize inflow opportunities
3. Installing manhole cover inserts to reduce cover inflow
4. Installing manhole frame and structure inserts/liners to reduce inflow through deteriorated masonry around and beneath manhole frames

Overall, minimizing the amount of I/I entering the system is one of the best ways to maximize capacity. Identifying and mitigating I/I should be an ongoing effort by the Sewer Department.

8.3 WASTEWATER SYSTEM EXPANSION & UPGRADE

As stated earlier in this report, MADEP identifies wastewater management needs based on an assessment of the following:

- Infrastructure Capacity and Condition
- Septic System Problems
- Future Growth

The preceding sections discussed each of these issues and identified a number of wastewater management needs. This section draws on the assessment of these needs, as well as the wastewater management alternatives developed in Section 7 to generate a number of recommendations for structural system improvements.

8.3.1 Results of Wastewater Management Needs Analysis

Wastewater disposal service for parcels within the existing sewer service area is currently provided via connection to the Town's sewer system. Wastewater disposal capacity for parcels abutting a sewer that are currently developed but not connected to the sewer system has been reserved. Based on the Town's policy, a limited amount of capacity is also available for undeveloped parcels that abut the existing collection system. This capacity is distributed based on the connection of one equivalent dwelling unit per parcel to the sewer. Therefore, for parcels within the existing wastewater collection system, alternative means for wastewater disposal are not necessary.

For parcels outside the existing sewer service area, a wastewater management needs analysis was conducted. The wastewater management needs analysis classified study areas into two categories:

- Significant Need - Due to current wastewater disposal challenges, several study areas demonstrated a significant need for alternatives to conventional on-site septic systems. Generally, properties within the "significant need" study areas have one or more of the following factors: small parcel size, high groundwater, poor soils, and/or a history of septic system failures. Each of these qualities alone poses challenges to on-site wastewater disposal. Together, these parameters can result in severe problems. As such, the continued use of on-site systems in significant need areas will likely result continued degradation of the groundwater quality. The significant need areas are scattered throughout the Town, with many located adjacent to water bodies.
- Moderate/Low Need – These study areas demonstrated moderate/low on-site wastewater disposal problems and alternatives to conventional on-site septic systems are not necessary at this time. However, this need may increase in the future if more severe problems are encountered and documented.

Results of the wastewater management needs analysis are summarized in Figure 5-6.

8.3.2 Recommendations for Significant Need Areas

The recommended plan for addressing areas identified as having a significant need utilizes two of the wastewater treatment alternatives outlined in Section 7 of this report. Based on the results of the needs analysis, noted septic system problems, environmental constraints, and future flow estimates, Tighe & Bond recommends that the Town plan to address the needs of all significant need study areas. Moderate/low need areas can most likely continue to be served by conventional septic systems or other existing wastewater management techniques. Within the group of areas that have been defined as significant need areas, a mix of centralized and satellite treatment alternatives are recommended.

Recommendations for each of the significant need areas are presented below and are shown in Figure 8-1.

8.3.3 Centralized Sewer System Recommendations

Mattapoisett's IMA with Fairhaven allows the Town to discharge 0.5 mgd (average daily flow) to the Fairhaven WWTP. In fiscal year 2007, Mattapoisett discharged 0.252 mgd to Fairhaven (average day flow). As previously noted, the FY 07 sewage flow was low because the year had little rainfall. A more reasonable estimate of Mattapoisett's sewage flow in FY 07 is 0.271 mgd. The Future Conditions section of this report estimated existing and 2028 wastewater flow rates from the existing collection system, as well as from each of the study areas. These flow projections, in conjunction with the results of the wastewater management needs analysis and alternatives analysis, have been used to develop recommendations for centralized sewer service in Mattapoisett.

To select specific areas for centralized system expansion Tighe & Bond considered existing wastewater management problems, available flow capacity, and the potential for growth. Study areas that exhibited a moderate or low need for alternative wastewater management solutions were not considered in the evaluation of areas to be included in a possible centralized sewer system expansion.

A summary of flow projections for each of the study areas exhibiting a significant need is shown on Table 8-2 below. For emphasis purposes, the flows are future flows not the flows anticipated for homes that exist in 2008.

TABLE 8-2
Flow Projections for Significant Need Areas

Study Area	2028 Average Daily Flow (GPD)
1	23,100
5	29,700
8	16,500
9	11,000
10	20,900
11	7,700
12	8,800
13	15,400
14	7,700
15	27,500
18	30,800
19	24,200
20	5,500
21	36,300
22	25,000
23	38,500
25	29,700
26	7,700
Total	**366,000**

Table 8-2 indicates that future projected flows from significant need areas total 0.366 mgd. Mattapoisett currently discharges approximately 0.271 mgd to Fairhaven. Flow from the existing service area is projected to increase to 0.376 mgd in 2028, assuming additional connections to the existing collection system. If all of the significant need areas were to connect to the existing sewer system, the projected future flow would be 0.742 mgd, exceeding the 0.50 mgd IMA limitation. Therefore, Mattapoisett will be unable to serve each of the significant need areas via the existing centralized sewer system unless the IMA is re-negotiated to increase the flow allocation to Mattapoisett.

Because of continued problems with existing septic systems in the Mattapoisett Neck area, small lot sizes and nearby wetland resources, Mattapoisett has identified this area as a high priority for sewer service, prior to the development of this CWMP. The results of the wastewater management needs analysis confirm Mattapoisett's belief that the Mattapoisett Neck area has on-going problems with on-site septic systems, as many of the study areas in this location exhibited a significant need for alternative wastewater management solutions. Since the Town does not have sufficient capacity to serve all of the significant need areas via its centralized collection system, priority should be given to those Study Areas in the Mattapoisett Neck area. Table 8-3 lists the significant need areas located in the Mattapoisett Neck area and their associated 2008 and projected 2028 future flows.

TABLE 8-3
Flow Projections for Mattapoisett Neck Area

Study Area	2008 Average Daily Flow (GPD)	2028 Average Daily Flow (GPD)
9	9,000	11,000
11	6,000	7,700
12	7,000	8,800
13	12,000	15,400
17	8,000	9,900
18	23,000	30,800
19	18,000	24,200
20	4,000	5,500
Total	**87,000**	**113,300**

Information in the previous paragraph is confirmed by annual data that the Mattapoisett Board of Water & Sewer Commissioners submit to the State Legislature each year to comply with Chapter 73 of the Acts of 2002 that specifically deals with sewage capacity allocations in Mattapoisett. The community has included the Neck project in each annual report since 2002.

Although study area 17 was not determined to have a significant need, a sewer must be constructed through this area to serve key areas of Mattapoisett Neck. Consequently, properties adjacent to the new sewer could tie-in to the sewer and should be included in future flow projections. Total flows from the existing service area (fully utilized but with 10% redevelopment contingency) and the Mattapoisett Neck area would be approximately 0.489 mgd (0.376 + 0.113 mgd) immediately below the IMA limit of 0.5 mgd.

Many of the other areas identified as having a significant need are located adjacent to the existing collection system and could readily be served by this method of wastewater management, if capacity were available via the IMA. A summary of flow projections for additional significant need study areas that could be served via the centralized sewer system are outlined in Table 8-4.

TABLE 8-4
Flow Projections for Additional Significant Need Areas

Study Area	2028 Average Daily Flow (GPD)	Full Build Out Flows (GPD)
8	16,500	16,500
10	20,900	23,100
14	7,700	11,000
15	27,500	31,900
21	36,300	39,600
22	25,000	25,000
23	38,500	41,800
25	29,700	30,800
26	7,700	9,900
Total	**209,800**	**229,600**

Although there is insufficient capacity available via the existing IMA to serve all of the significant need areas, alternative solutions to address current wastewater management concerns should be provided for these study areas. Mattapoisett should implement a phased approach to a centralized system expansion over a 20-year planning period as capacity becomes available, funding opportunities become available, or as environmental impacts mandate. Refer to Table 8-5 for a summary of recommended centralized sewer system expansion and associated flow projections.

For information purposes, Mattapoisett has initiated discussion with the Fairhaven Board of Public Works for 0.3 MGD of additional sewage capacity via correspondence generated in November 2007 and a meeting with the Fairhaven Board on March 10, 2008. Since the duration of an IMA can exceed the length of the CWMP planning period, the requested flow has been rounded up to account for unanticipated growth beyond the 20-year planning period.

TABLE 8-5
Recommended Centralized System Expansion Areas & Flows

Flow Source	2028 Average Total Daily Flow (gpd)	Total Flow (gpd)
Flows from existing development currently connected to the sewer	271,000	
Total Existing Flow		**271,000**
Future flow from parcels in existing sewer service area (not presently connected)	105,000	
Total Future Flow Existing Sewer Areas		**376,000**
Phase 1 Recommendations		
Mattapoisett Neck Study Areas		
9	11,000	
11	7,700	
12	8,800	
13	15,400	
17	9,900	
18	30,800	
19	24,200	
20	5,500	
Subtotal	**113,300**	**489,300**
Phase 2 Recommendations		
Additional Significant Need Study Areas		
8	16,500	
10	20,900	
14	7,700	
15	27,500	
21	36,300	
22	35,000	
23	38,500	
25	29,700	
26	7,700	
Subtotal	**219,800**	**709,100**
10% Existing Service Area Redevelopment Allowance	**37,600**	**746,700**
Capacity via IMA with Fairhaven	**500,000**	
Capacity Deficit		**246,700**

8.3.4 Satellite Treatment Systems

Certain significant need study areas in Mattapoisett are remote from the centralized sewer system and cannot easily be served via the existing collection system. Providing sewer extensions to these areas would be costly and, in some cases, have a minor impact to existing watershed balances by diverting groundwater discharge to an alternate drainage area.

For remote areas with sewer needs, this planning document recommends a three phased approach to wastewater management. First, homeowners should be encouraged to adopt water conservation measures that, in turn, can help protect existing, on-site septic systems. Second, homeowners should be encouraged to address on-site sewage problems with on-site system repairs and upgrades. Third, if on-site sewage problems increase in a specific area, the homeowners should discuss the problems with the Board of Health and the Water & Sewer Commission to determine if satellite wastewater treatment systems are appropriate for the area and will be supported by a majority of the owners.

As previously described in this report, satellite systems are wastewater treatment systems that are typically sized between 10,000 gpd and 150,000 gpd, utilize a groundwater discharge for effluent disposal, and provide a more advanced level of treatment than septic systems. The significant needs study areas that are remote from the existing collection system that may potentially be served by a satellite treatment system are listed in Table 8-6.

TABLE 8-6
Significant Need Areas for Potential Satellite Treatment System

Study Area	Need Rating	2028 Average Daily Flow (GPD)
1	Significant	23,100
5	Significant	29,700

The precise nature of collection, treatment and discharge systems for these areas is undetermined at this time. After exhausting all other alternatives, the Town should develop a preliminary layout of a satellite treatment system for these significant need areas systems to further evaluate system extent, discharge locations, and appropriate treatment technologies and cost. Prior to performing these preliminary design tasks, the Town should consult with MADEP to gauge the Department's support for this type of wastewater management activity. Additionally, feedback can be gained during the Environmental Notification Form (ENF) review process conducted by MEPA and the MADEP.

8.3.4.1 Capital Costs

Table 8-7 shows a summary of probable construction costs for the recommended plan for sewer expansion.

TABLE 8-7
Opinion of Probable Construction Costs
Recommended Plan for Sewer Expansion
ENR Index 8126

	Anticipated Construction Cost
Phase I – Mattapoisett Neck	$13,630,000
Phase II – Aucoot Cove, Mattapoisett River, North Street, Industrial Park	$16,762,000
Total	**$30,392,000**

All costs are presented in 2008 dollars with a reference ENR construction cost index of 8126. The opinion of probable cost should be adjusted for inflation at the anticipated time of construction. All costs include a 40% Engineering and Contingency allowance.

Finally, a detailed breakdown of the $30,392,000 cost is in Appendix H - Sewer System Expansion Costs.

8.4 FAIRHAVEN NEGOTIATIONS

To implement the recommendations of this report, Mattapoisett needs additional sewage capacity from Fairhaven. Mattapoisett has already initiated discussions with Fairhaven for an increase of 0.3 MGD capacity via the IMA. This requested capacity increase will support the recommended sewer system expansion outlined in this CWMP.

Mattapoisett should periodically follow up with Fairhaven on the capacity need. Additional sewage capacity will have a buy-in cost; however, in 2008, there is no preliminary estimate of the cost for 0.3 MGD of additional sewage capacity.

8.5 NON-STRUCTURAL RECOMMENDATIONS

In addition to the wastewater infrastructure upgrades outlined above, there are non-structural measures that Mattapoisett could implement to improve local water quality and better manage wastewater infrastructure over the next 20-years. These measures include bylaws and policies that could be implemented by a number of different Departments and Boards throughout Town including: the Board of Health, the Planning Board, the Building Department and the Water & Sewer Commission. A brief description of non-structural recommendations follows.

8.5.1 Flow Allocation Bylaw

Given the Town's policy of limiting new connections within the existing service area to the equivalent of one dwelling unit connection per established lot, it is recommended that the Town reinforce this policy through an act of the State legislature. Such an act would limit new connections to subdivided parcels at the time of sewer installation. Pursuing this legislation through the State rather than local government also protects the Town from challenges associated with Chapter 40B development projects.

8.5.2 Title 5 Addenda

The State's sanitary code (310 CMR 15.0), commonly referred to as Title 5, allows Towns to implement amendments to the code that are seen as more stringent than the State code. Some communities have used this to create natural resource protection districts, require more extensive engineering for new systems, or implement more stringent water quality standards.

Mattapoisett could benefit from enacting amendments to Title 5 that expand what the current State code defines as 'nitrogen sensitive areas'. While the current Title 5 code defines 'nitrogen sensitive areas' as being within coastal watersheds and Zone II wellhead protection districts, this definition could be expanded to protect areas adjacent to the Mattapoisett River or Buzzard Bay coastal areas. Expanding this definition would require failing or new septic systems to provide additional treatment to remove nitrogen from septic system effluent.

8.6 RECOMMENDED PLAN SUMMARY

The recommendations described above establish a plan to address Mattapoisett's wastewater management needs over the next 20 years. The goal of the recommended plan is to address specific wastewater needs associated with system capacity and condition, septic system problems, and future growth. Table 8-8 is a summary of the recommended plan for Mattapoisett wastewater system improvements:

TABLE 8-8
Summary of Recommendations

Item	Recommendation
Existing Sewerage System Needs	• Replace old North Street Sewer • Implement phased Eel Pond Pump Station Improvement program • Implement defined sewerage system maintenance plan • Implement computerized maintenance program
I/I Control & Mitigation	• After North Street Sewer replacement is complete, investigate service connections for inflow • Address construction deficiencies at Barstow Street, Water Street, and Church Street to mitigate infiltration • Implement annual manhole inspection program to address minor infiltration sources • Address additional potential inflow sources
Wastewater System Expansion & Upgrade	• Address all significant need areas • Phase 1 - extend Mattapoisett's centralized sewer system to serve significant need areas in the Mattapoisett Neck area (Study Areas 9, 11, 12, 13, 17, 18, 19, & 20) • Phase 2 - when capacity is available, extend sewer system to additional significant need areas in vicinity of sewer system (Study Areas 8, 10, 14, 15, 21, 22, 23, 25, & 26) • For remote, significant need areas: - encourage homeowners to adopt water conservation measures - encourage homeowners to address on-site sewage problems via septic system repairs and/or upgrades - if problems persist, encourage homeowners to work with Town to determine if satellite treatment systems are appropriate for the area - if satellite systems are deemed appropriate, develop preliminary layouts of treatment system to determine discharge locations, treatment technology, and cost
Fairhaven Negotiations	• Continue negotiations with Fairhaven for increased capacity at WWTP
Non-Structural Recommendations	• Develop bylaw for existing flow allocation policy • Consider implementing amendment to Sate's sanitary code (Title 5) to expand definition of nitrogen sensitive areas to protect Mattapoisett River or Buzzards Bay

9.1 PUBLIC MEETINGS

9.1.1 March 22, 2007 - Public Meeting No. 1

The first public meeting for the Mattapoisett CWMP was held on March 22, 2007 at the Mattapoisett Town Hall. The meeting was advertized in the Wanderer, a local newspaper, on March 7, 2007. At this meeting, the Board of Water & Sewer Commissioners and Tighe & Bond presented the following information:

- overview of the CWMP process
- review wastewater planning history
- review sewer system expansion history
- review CWMP objectives and tasks
- explain reasons for Mattapoisett CWMP
- review scope of study
- discuss schedule

A copy of the PowerPoint presentation, a meeting sign-in sheet, introductory comments from the meeting, meeting notes, and a copy of the newspaper advertisement are included in Appendix I.

9.1.2 July 19, 2007 – CAC Briefing Meeting

A second meeting was held on July 19, 2007 to present information about the project to the Citizen's Advisory Committee (CAC). The CAC was formed to provide input to the Town and Tighe & Bond on the CWMP, and consists of members of various Town boards, as well the general public. Members of the CAC are listed in Section 1.5.

At this CAC briefing meeting, the following information was presented:

- project status
- existing conditions assessment
- wastewater needs analysis criteria and methodology
- future work

A copy of the PowerPoint presentation is included in Appendix I.

9.1.3 August 16, 2007 – Project Update Meeting

A third meeting was held on August 16, 2007 to present additional information on the status of the project. The meeting was advertized in the Wanderer, as well as on local cable TV. At this meeting, the Board of Water & Sewer Commissioners and Tighe & Bond presented the following information:

- project status
- existing conditions assessment
- sewer system mapping
- I/I evaluation
- Eel Pond Pump Station Evaluation
- wastewater needs analysis results
- remaining work

A copy of the PowerPoint presentation, a meeting sign-in sheet, introductory comments from the meeting and meeting notes are included in Appendix I.

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Town of Mattapoisett

Massachusetts 02739

Tel.: 508-758-4161
Fax: 508-758-4162

Water and Sewer Department

19 County Road
P.O. Box 474

MATTAPOISETT SEWER COMMISSIONERS
REPORT PURSUANT TO CHAPTER 73 OF THE ACTS OF 2002

In accordance with Chapter 73 of the Acts of 2002, (the "Act"), the Sewer Commissioners of the Town of Mattapoisett hereby report the available unused capacity of the Mattapoisett Sewer System. In accordance with the Act, the Commissioners have included the following calculations, based on a twenty year forecast: (1) existing flow into the Town system; (2) flow from existing permits to construct: (3) estimated flow from the Commissioners' commitments made to issue permits prior to the Act; and (4) Projected flow that will result from completion of all pending extension projects, as to which funds from design or construction have been appropriated at Town Meeting. In calculating the latter figure, the Commissioners have adjusted the flow forecast for committed municipal extensions to assume only partial development of vacant land, as dictated by the Act, and to account for seasonal flow from primarily summer communities. Actual flow realized can be significantly affected by a number of factors, including economic conditions, changing land use patterns, and technological change, among others, so there is necessarily much uncertainty associated with making these forecasts. Moreover, the Commissioners note that there are only 5 years remaining under the inter-municipal agreement between the Town of Mattapoisett and the Town of Fairhaven authorizing the Town to use up to 500,000 gallons of daily flow into the Fairhaven Treatment Plant (calculated on an annual average). For the purpose of this calculation, the Commissioners have assumed that that agreement will be extended with no increase or decrease in capacity allocated to Mattapoisett. Notwithstanding that assumption, the Commissioners expect that the Town will seek to negotiate an increase in the allocated capacity for the Town at the Fairhaven Treatment Plant either before expiration of the current agreement or in connection with extension of the current agreement.

MATTAPOISETT SEWER CAPACITY 2007
EXISTING DAILY FLOW AND PROJECTED INCREASES

Daily combined flow	Units	Increases
1. Present usage actual 292,100	1382	

2. Permits and Commitments

328,100	Golf Club		48,000

3. Extension Projects

354,940	Homes Abutting O.R.R.H.S. Ext.	56	14,840
368,190	Park Street	50	13,250
384,090	Crescent Beach & Pt. Connett	60	15,900 (1)
409,265	Brandt Beach	95	25,175
495,265	Mattapoisett Neck	430	86,000 (2)
494,705	Balance of Village	10	2,650
Totals: 497,915		2,083	

500,000 current Fairhaven limit:

Projected available capacity: 2,085 Gals. Per Day

(1) Figure includes 25% reduction of flow from existing residences to account for seasonal usage.

(2) Commission projections prepared in 1997 showed 240 units being served by this extension. More recent analysis suggests that that figure is understated. Current estimate for this area is now 430 units. Flow includes a factor for some seasonal usage.

Board of Water/Sewer Commissioners

Daniel W. Chase

Gary A. Gaspar

Christopher Jaskolka

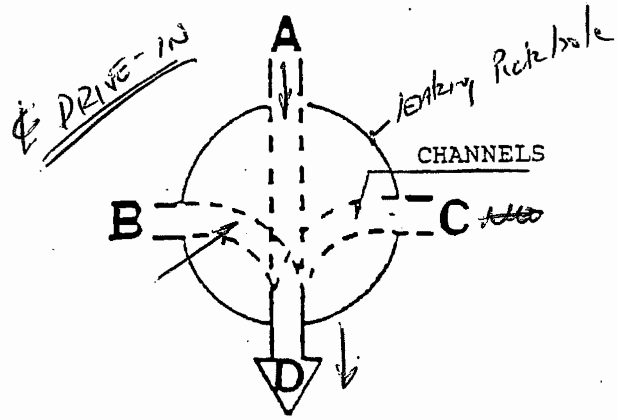
XC-6

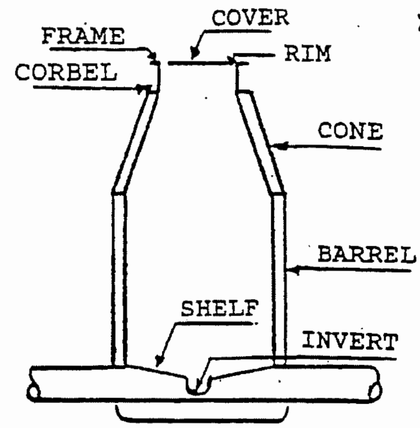
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-01 DATE: 4-24-07 TIME 8:57 AM INSPECTOR PJS

ELEVATION_______ DEPTH TO INVERT 8.2 CLEANLINESS ~~[illegible]~~ Standing Sewage

TYPE CONSTRUCTION PRECAST STREET REFERENCE County Rd C Shipyard Galley & Bay Club





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. INTC NOT Bolted 4 Bolt holes 2 Pick holes
2. Leak @ Top Boot @ Pipe A
3. Leaking Pick hole LEFT of Stairs Bottom Section
4. Leaking Pick hole 2nd Section -2 ea
5. Mortar & Dirt on Steps & shelf
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8						
B.	8						
C.							
D.	8					8.2/7.8'	

REMARKS: Δ = 0.4 WATER

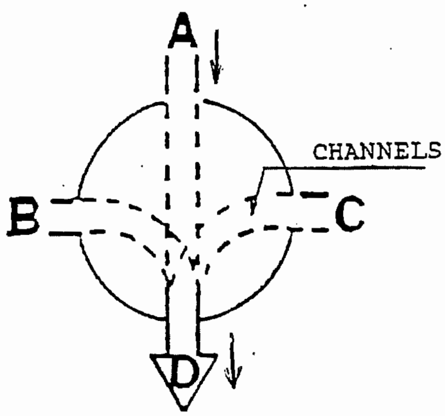
(Include need for repairs) ______

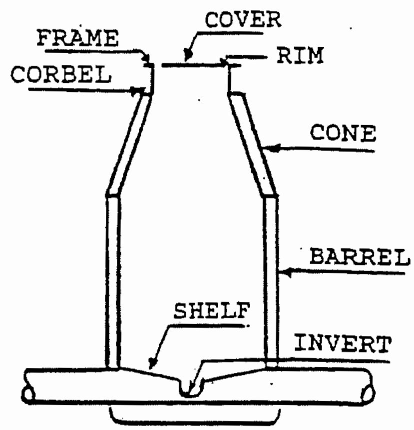
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-02 DATE: 4-24-07 TIME 9:25 INSPECTOR PJS

ELEVATION - DEPTH TO INVERT 6.7' CLEANLINESS OK

TYPE CONSTRUCTION Precast STREET REFERENCE County Rd @ Salvation Army Store





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. F/C NOT MORTARED
2. 2 Pick holes
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8"					∅	
B.							
C.							
D.	8'					∅	

REMARKS: Salvation Army Store closed

(Include need for repairs)

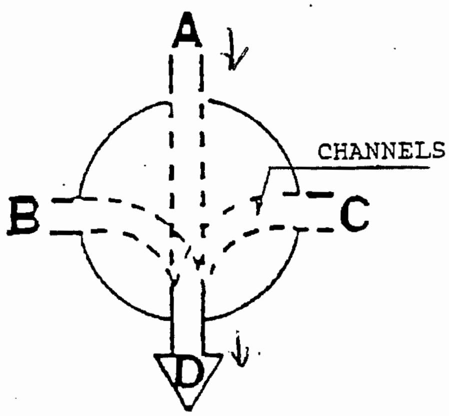
SAMPLE OF
MANHOLE INSPECTION REPORT

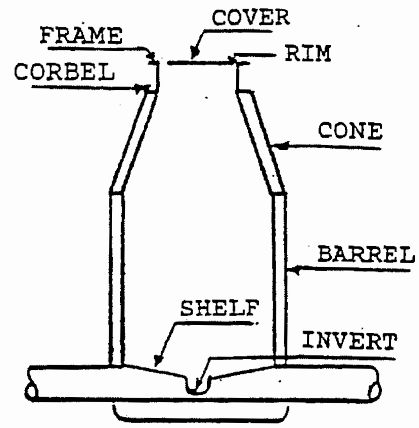
CH-7

MH NO. V-05 DATE: 4-24-07 TIME 10:05 AM INSPECTOR PJS

ELEVATION ________ DEPTH TO INVERT 9.2 CLEANLINESS ok

TYPE CONSTRUCTION PRECAST STREET REFERENCE Church St - west of North St





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. None observed
2. 2 Pick holes
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8' Ac					1"	
B.							
C.							
D.	8' Ac					1"	

REMARKS:

(Include need for repairs) ____________________

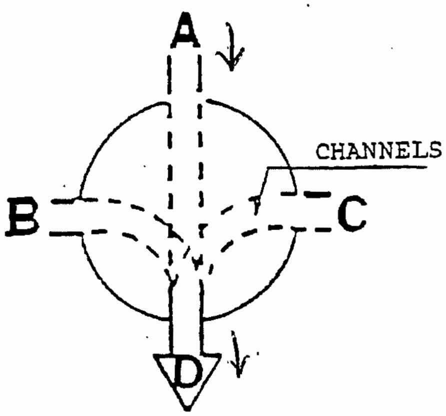
MC-1

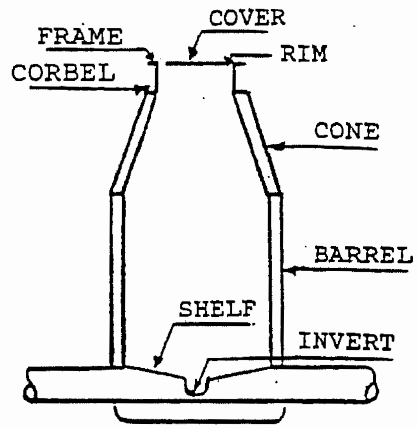
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-06 DATE: 4-24-07 TIME 10:35 AM INSPECTOR RJS

ELEVATION ______ DEPTH TO INVERT 8.9 CLEANLINESS clean

TYPE CONSTRUCTION Precast STREET REFERENCE Mechanic St - North of Water St





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. None observed
2. WTC w/ 4 Brass Bolts
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" AC					1"	
B.							
C.							
D.	8" AC					1"	

REMARKS:

(Include need for repairs) ______

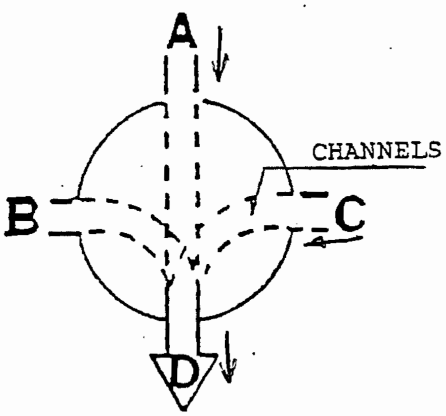
NS-7

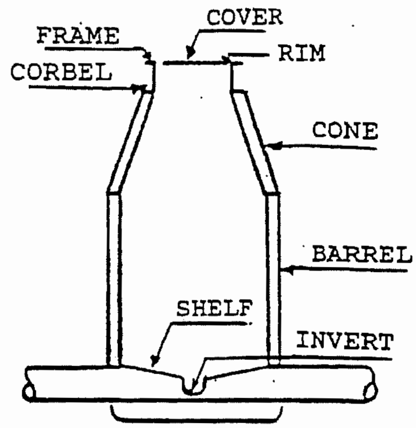
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-07 DATE: 4-24-07 TIME 10:47 AM INSPECTOR RS

ELEVATION ________ DEPTH TO INVERT 4.6 CLEANLINESS ok

TYPE CONSTRUCTION Precast STREET REFERENCE North St & Dexter Ln





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. None Detected
2. 2 Pick holes
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" VC					1/2"	
B.							
C.	8" PVC					1/2"	
D.	8" VC					1/2"	

REMARKS:

(Include need for repairs) ________________

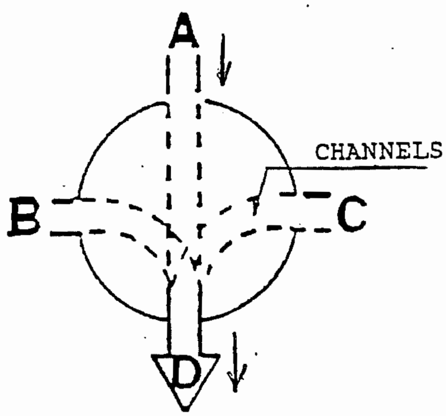
NS-1

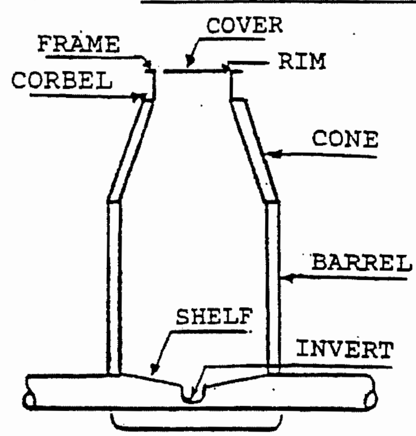
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-08 DATE: 4-24-07 TIME 10:55 AM INSPECTOR PJS

ELEVATION ________ DEPTH TO INVERT 4.2 CLEANLINESS o/2

TYPE CONSTRUCTION Block STREET REFERENCE North St - North of Water





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. None observed
2. WTC Bolted
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" VC					1"	
B.							
C.							
D.	8" VC					1"	

REMARKS:

(Include need for repairs) ____________________

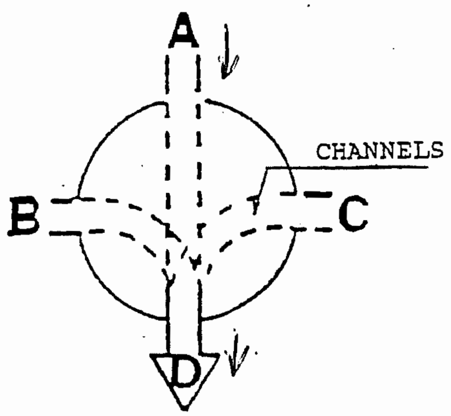
BR-1

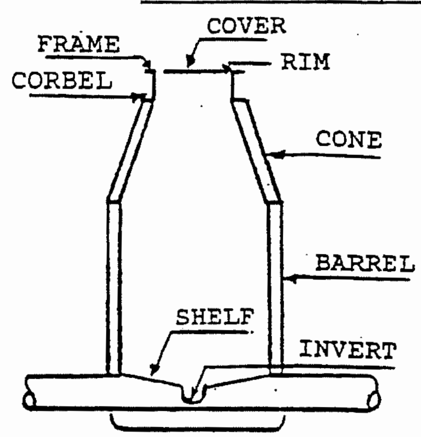
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-09 DATE: 4-24-07 TIME 11:02 AM INSPECTOR AJS

ELEVATION_______ DEPTH TO INVERT 9.5 CLEANLINESS ok

TYPE CONSTRUCTION Precast STREET REFERENCE Barstow St - North of Water St





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 2 of 4 Bolts Missing
2. F/C not mortared & leaking
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" AC					1"	
B.							
C.							
D.	8" AC					1"	

REMARKS: Strong Petroleum smell/odor in manhole

(Include need for repairs) __________

SAMPLE OF

MANHOLE INSPECTION REPORT

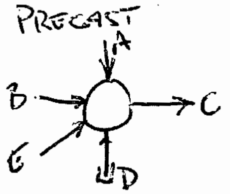
PL-6

MH NO. V-11 DATE: 4-24-07 TIME 11:40 AM INSPECTOR PJS

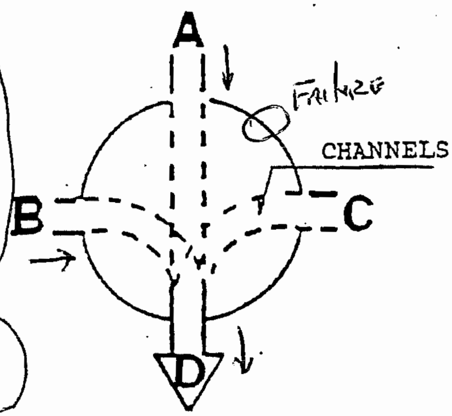
ELEVATION ______ DEPTH TO INVERT 11.2' CLEANLINESS OK

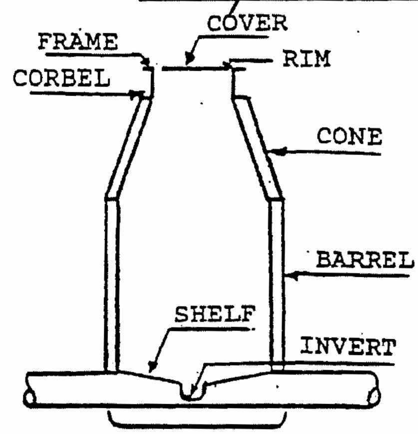
TYPE CONSTRUCTION Precast STREET REFERENCE County Rd - 1st North side of Pearl St

CT-1A
V-11A 11:33 AM
9.3' clean
Precast



F/C not mortared
Bottom Ring leaking
E 4" S.C
8" AC





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. 2 Pick Holes
2. Mortar @ F/C Failed
3. Pipe 'B' leaking Around
4. Failure Area between A & C @ Bottom MH Joint
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" AC					1"	
B.	4" PVC					Ø	
C.							
D.	8" AC					1"	

REMARKS:

(Include need for repairs) ______

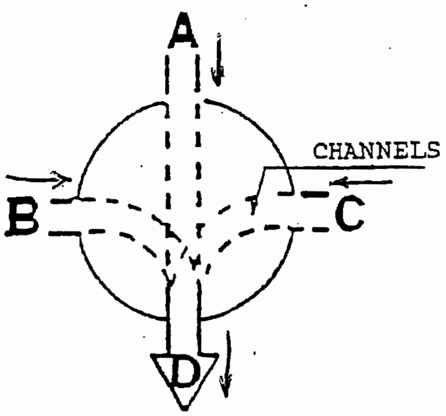
MA-6

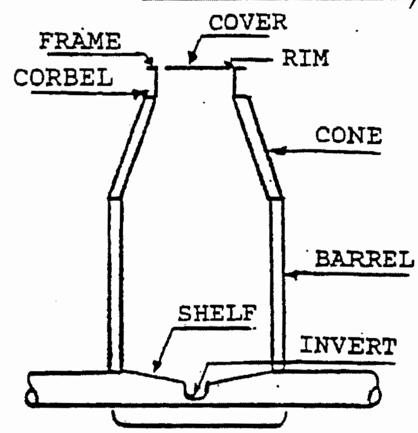
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-12 DATE: 4-24-07 TIME 11:45 AM INSPECTOR RJS

ELEVATION ________ DEPTH TO INVERT 11.0 CLEANLINESS Gravel @ Invert

TYPE CONSTRUCTION Precast STREET REFERENCE Main St @ Depot St





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. 6" Service Pipe leaking Around Pipe @ wall
3. ____
4. ____
5. ____
6. ____
7. ____

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A. 12" AC					1½"	
B. 12" PVC					2"	
C. 6" PVC					∅	
D. 12" AC					3"	

REMARKS:

(Include need for repairs) ________________

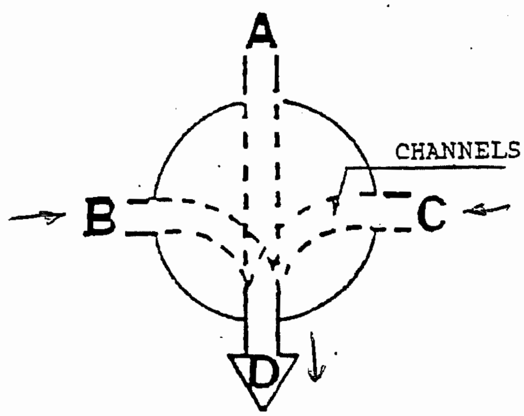
MA-4

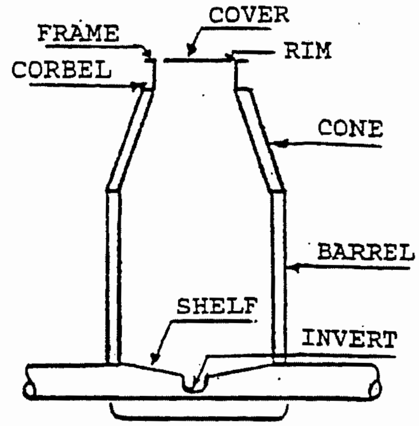
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. V-13 DATE: 4-24-07 TIME 12:51 PM INSPECTOR RJS

ELEVATION ______ DEPTH TO INVERT 16.2 CLEANLINESS OK

TYPE CONSTRUCTION Precast STREET REFERENCE MAIN St @ Mahoneys W





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC 1 4 Bolts
2. Brick Mortor failing
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.						4	
B.	12" AC					3"	
C.	12" AC					4"	
D.	12" AC					5"	

REMARKS:

(Include need for repairs) ______

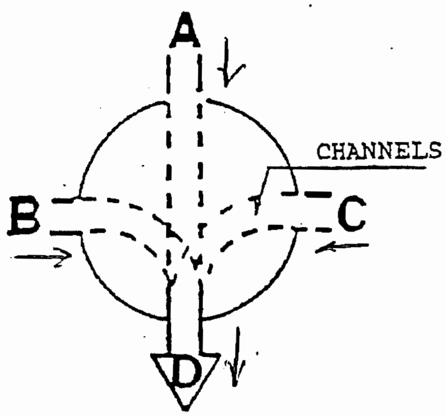
SAMPLE OF

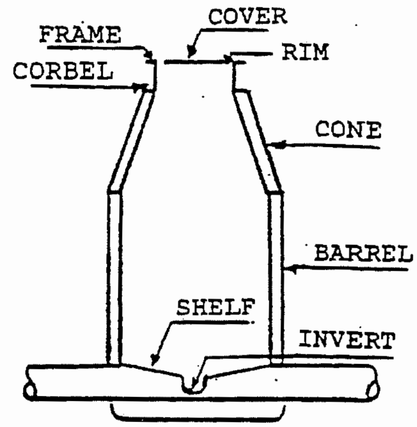
MANHOLE INSPECTION REPORT

MH NO. 55-6 DATE: 4-24-07 TIME 1:09 pm INSPECTOR RJS

ELEVATION ______ DEPTH TO INVERT 9.8 CLEANLINESS clear

TYPE CONSTRUCTION Precast STREET REFERENCE S/ine shell @ channel





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. None observed
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	12" PVC					2½"	
B.	8" PVC					φ"	
C.	10" PVC					φ"	
D.	12" PVC					2½"	

REMARKS:

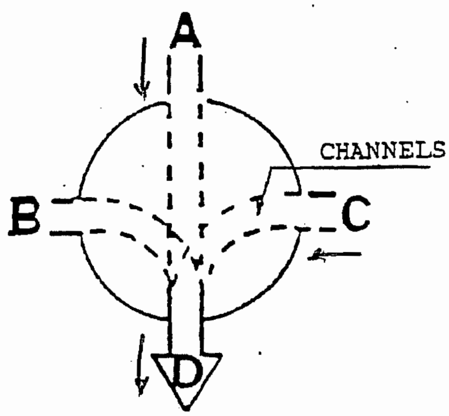
(Include need for repairs) ______

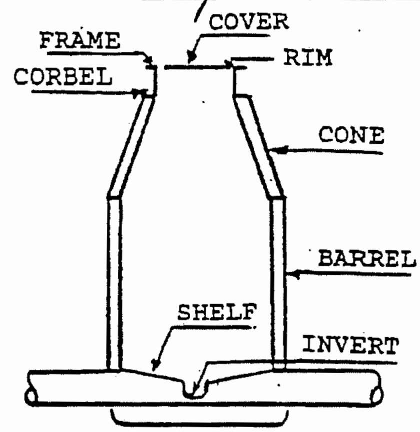
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. AN-9 DATE: 4-24-07 TIME________ INSPECTOR PJS

ELEVATION________ DEPTH TO INVERT 10.8 CLEANLINESS OK

TYPE CONSTRUCTION PRECAST STREET REFERENCE Angelica @ BAY (SOUTH)





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. None observed
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	12" PVC					1"	
B.							
C.	8" PVC					1/8"	
D.	12" PVC					1"	

REMARKS:

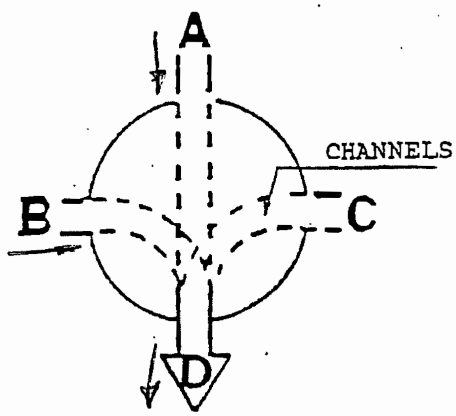
(Include need for repairs) __________

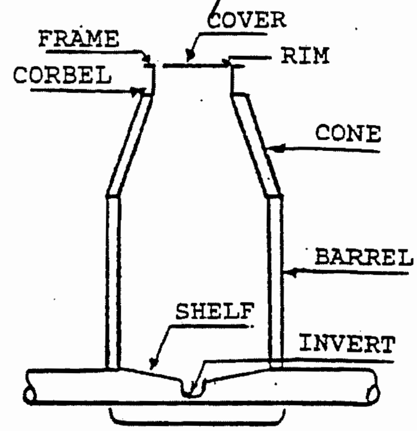
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. AN-4 DATE: 4-24-07 TIME 1:26 pm INSPECTOR PJS

ELEVATION ____ DEPTH TO INVERT 12.8 CLEANLINESS ok

TYPE CONSTRUCTION Precast STREET REFERENCE Angelica @ Laurel





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. None observed
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	12 PVC					3"	
B.	8 PVC					1/2"	
C.							
D.	12 PVC					3"	

REMARKS:

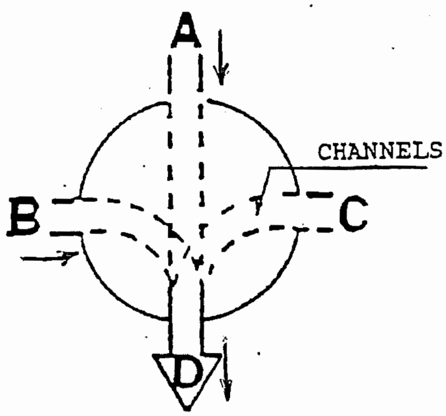
(Include need for repairs)

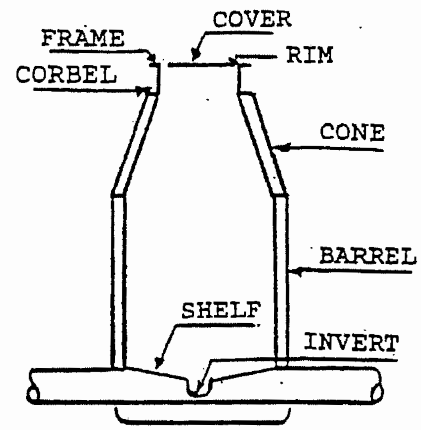
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. BV-1 DATE: 4-24-07 TIME 1:36 pm INSPECTOR RS

ELEVATION ________ DEPTH TO INVERT 6.8 CLEANLINESS ok

TYPE CONSTRUCTION Precast STREET REFERENCE BAY VIEW @ SHORE





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. None observed
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" PVC					1/8"	
B.	8" PVC						
C.							
D.	8" PVC						

REMARKS:

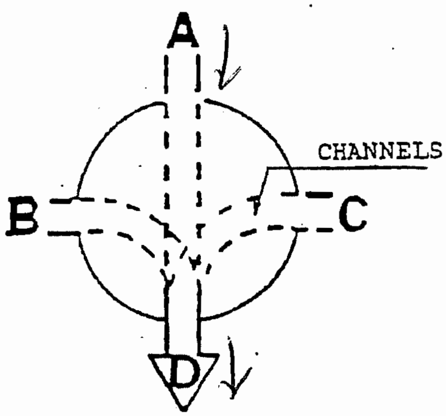
(Include need for repairs) ________________________________

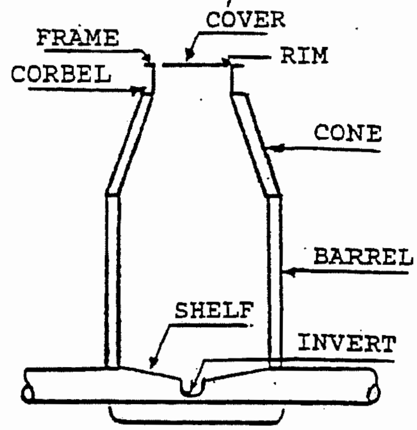
SAMPLE OF
MANHOLE INSPECTION REPORT

MH NO. PR-5 DATE: 4-24-07 TIME 1:41 pm INSPECTOR RJS

ELEVATION ______ DEPTH TO INVERT 9.3 CLEANLINESS ok

TYPE CONSTRUCTION Precast STREET REFERENCE Prospect @ Evergreen





DEFECTS: (Cover, frame, grout, steps, shelf, pipes, or channels)

1. WTC w/ 4 Bolts
2. None observed
3.
4.
5.
6.
7.

(USE REVERSE SIDE FOR ADDITIONAL DEFECTS TO BE NOTED.)

	PIPE SIZE	LENGTH	FROM MH# TO MH#	EST. FLOW	TYPE OF FLOW	DEPTH OF FLOW	VEL. OF FLOW
A.	8" PVC					1/2"	
B.							
C.							
D.	8" PVC					1/2"	

REMARKS:

(Include need for repairs) ______________________

MATTAPOISETT, MA SMOKE TESTING REPORT JULY 2007

TABLE OF CONTENTS

TABLE I – (Summary of Findings)……………..……………

SMOKE TESTING LOGS (W/Photo & Sketch)...………………

PRODUCTION SUMMARY…………………… …………..

SUSPECT SOURCES……………………………………...

SKETCHES………….. ……………………………………..

PHOTOS……………...……………………………………

TABLE I

SUMMARY
OF
FINDINGS

Line Section	Date	Location		Further Invest. Req.	Line Footage	Drainage Area SqFt	Runoff Coeff
MC3 To MC2	07/26/07	MECHANIC STREET	NO DEFECTS OBSERVED		168	0	0
MC4 To MC3	07/26/07	MECHANIC STREET	NO DEFECTS OBSERVED		350	0	0
MC5 To MC4	07/26/07	MECHANIC STREET	NO DEFECTS OBSERVED		356	0	0
MC6 To MC5	07/26/07	MECHANIC STREET	HOUSE #29 HAMMOND STREET SMOKING CLEANOUT AT GRADE		400	4	0.3
NS1 To WA5	07/26/07	NORTH STREET	NO DEFECTS OBSERVED		44	0	0
NS2 To NS1	07/26/07	NORTH STREET	NO DEFECTS OBSERVED		206	0	0
NS3 To NS2	07/26/07	NORTH STREET	NO DEFECTS OBSERVED		205	0	0
NS4 To NS3	07/26/07	NORTH STREET	LIGHT SMOKE FROM CATCH BASIN, INDIRECT CONNECTION		33	0	0
NS5 To NS4	07/26/07	NORTH STREET	HEAVY SMOKE FROM CATCH BASIN, INDIRECT CONNECTION		366	0	0
NS6 To NS5	07/26/07	NORTH STREET	NO DEFECTS OBSERVED		487	0	0
NS7 To NS6	07/26/07	NORTH STREET	NO DEFECTS OBSERVED		442	0	0
NS8 To NS7	07/26/07	NORTH STREET	MODERATE SMOKE FROM CATCH BASIN, INDIRECT CONNECTION. FOOTAGES SEALED		380	0	0
NS9 To NS8	07/26/07	NORTH STREET	HOUSE #44 SMOKING CLEANOUT AT GRADE		0	9	0.3
PB2 To PB1	07/26/07	PEPPER BUSH ROAD	HOUSE #4 - 8 ROOF LEADERS SMOKING, DIRECT CONNECTION		0	0	0
PB2 To PB1	07/26/07	PEPPER BUSH ROAD	HOUSE #4 - 8 ROOF LEADERS SMOKING, DIRECT CONNECTION		0	0	0

Sub-System: NONE		MATTAPOISETT, MA Smoke Testing Summary of Findings Table 1			Page: 3		
Line Section	Date	Location		Further Invest. Req.	Line Footage	Drainage Area SqFt	Runoff Coeff
PB2 To PB1	07/26/07	PEPPER BUSH ROAD	HOUSE #4 - 8 ROOF LEADERS SMOKING, DIRECT CONNECTION		109	3000	0.9
PB3 To PB2	07/26/07	PEPPER BUSH ROAD	NO DEFECTS OBSERVED		110	0	0
PB4 To PB3	07/26/07	PEPPER BUSH ROAD	NO DEFECTS OBSERVED		129	0	0
UR1 To HP1	07/26/07	UPLAND WAY	NO DEFECTS OBSERVED		217	0	0
UR2 To UR1	07/26/07	UPLAND WAY	NO DEFECTS OBSERVED		209	0	0
UR3 To UR2	07/26/07	UPLAND WAY	HOUSE #18 SMOKING CLEANOUT AT GRADE		353	9	0.3
UR4 To UR3	07/26/07	UPLAND WAY	NO DEFECTS OBSERVED		405	0	0
UR5 To UR4	07/26/07	UPLAND WAY	NO DEFECTS OBSERVED		312	0	0
XC1 To CH10A	07/26/07	COUNTY ROAD EASEMENT	MANHOLE XC1 IN WETLANDS NEEDS FLOOD COVER		126	0	0
XC2 To XC1	07/26/07	COUNTY ROAD EASEMENT	MANHOLE XC2 IN WETLANDS NEEDS FLOOD COVER		237	0	0
XC3 To XC2	07/26/07	COUNTY ROAD EASEMENT	MANHOLE XC3 IN WETLANDS NEEDS FLOOD COVER		142	0	0
XC4 To XC3	07/26/07	COUNTY ROAD EASEMENT	NO DEFECTS OBSERVED		237	0	0
XC5 To XC4	07/26/07	COUNTY ROAD EASEMENT	HOUSE #33 SMOKING CLEANOUT AT GRADE		244	25	0.3
XC5 To XC4	07/26/07	COUNTY ROAD EASEMENT	HOUSE #32 SMOKING CLEANOUT AT GRADE		0	25	0.3
XC6 To XC5	07/26/07	COUNTY ROAD EASEMENT	NO DEFECTS OBSERVED		94	0	0

Sub-System: NONE

MATTAPOISETT, MA
Smoke Testing Summary of Findings
Table 1

Line Section	Date	Location		Further Invest. Req.	Line Footage	Drainage Area SqFt	Runoff Coeff
XC7 To XC2	07/26/07	COUNTY ROAD EASEMENT	MANHOLE XC7 IN WETLANDS NEEDS FLOOD COVER		221	0	0
XC8 To XC7	07/26/07	COUNTY ROAD EASEMENT	MANHOLE XC8 IN WET LANDS NEEDS FLOOD COVER		157	0	0
XC9 To XC8	07/26/07	COUNTY ROAD EASEMENT	HOUSE #36 COUNTY ROAD SMOKING CLEANOUT AT GRADE		162	9	0.3
XC11 To XC9	07/26/07	COUNTY ROAD EASEMENT	NO DEFECTS OBSERVED		223	0	0

Total Sub-System Footage: 10,727

Grand Total Footage: 10,727

SMOKE TESTING
LOGS
W/PHOTOS

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

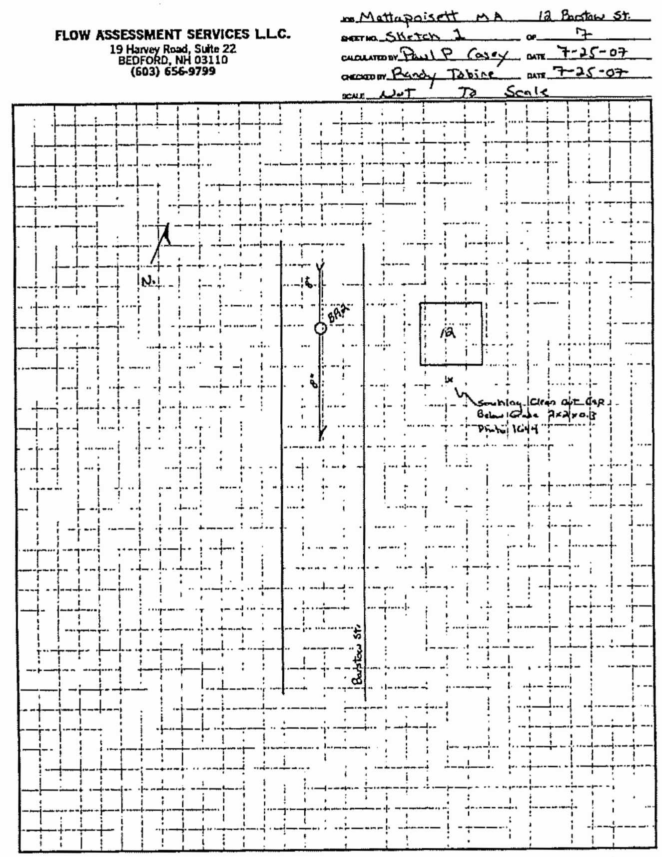
Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	**Line Footage:**	**Street #/Location:**
BR2 To BR1	512	BARSTOW STREET

Findings:	**Drainage Area SqFt**	**Runoff Coeff**
HOUSE #12 SMOKING CLEANOUT BELOW GRADE	4	0.3



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Filename: P:\07052\sketch 1.tif

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

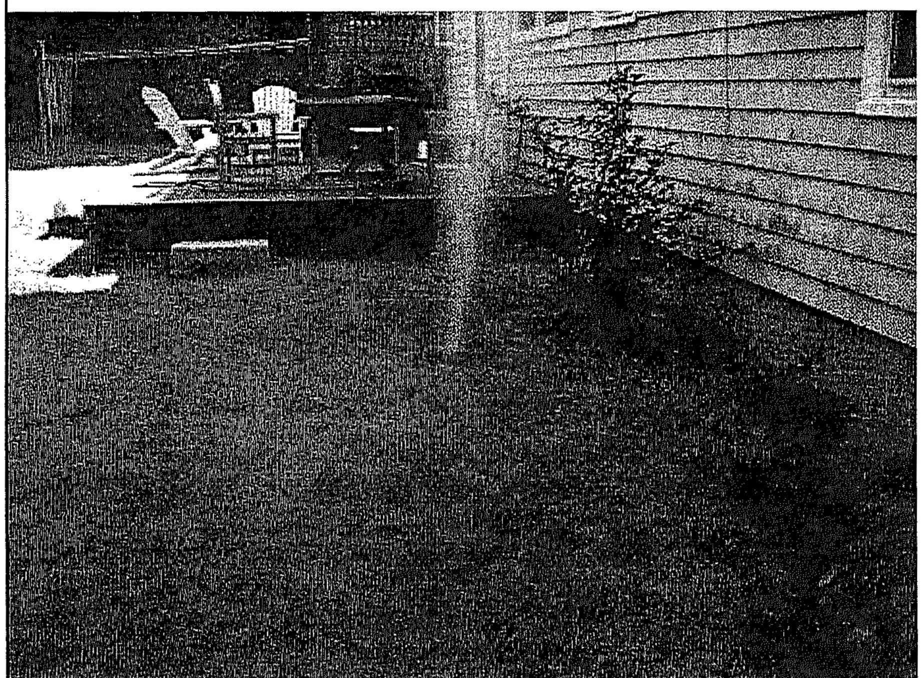
Project No: 07052

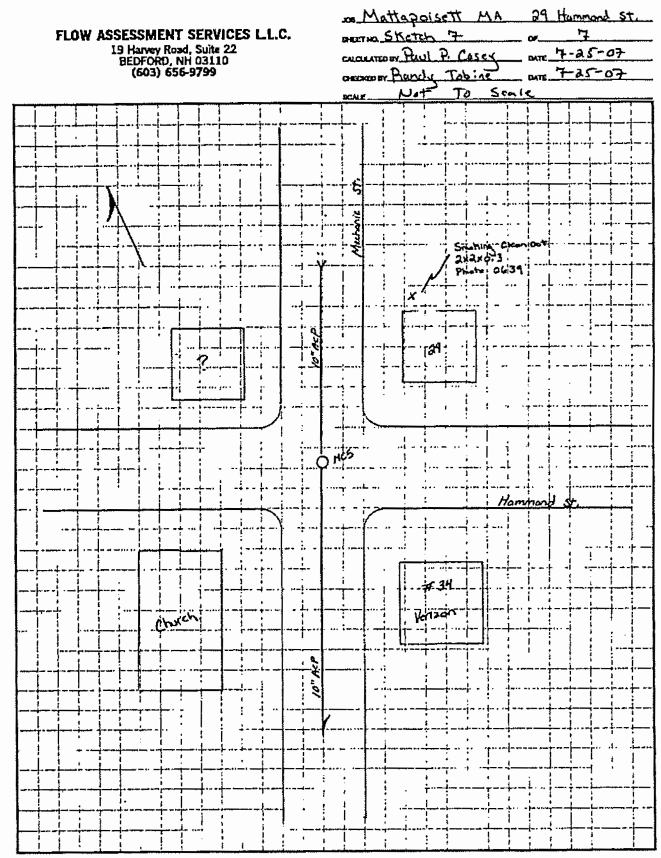
Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	**Line Footage:**	**Street #/Location:**
MC6 To MC5	400	MECHANIC STREET

Findings:	**Drainage Area SqFt**	**Runoff Coeff**
HOUSE #29 HAMMOND STREET SMOKING CLEANOUT AT GRADE	4	0.3





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Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

Date: 07/26/2007

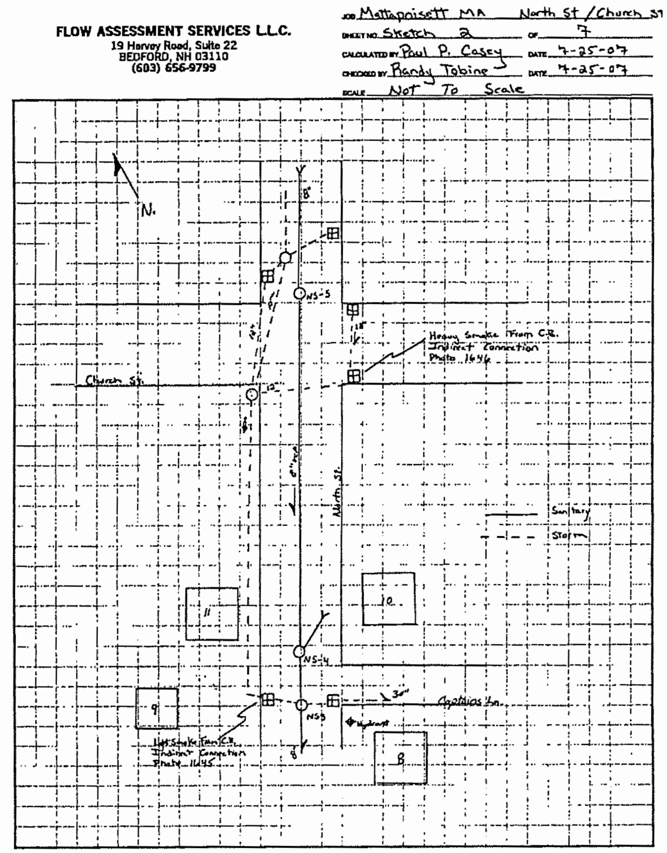
Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
NS4 To NS3	33	NORTH STREET

Findings:

LIGHT SMOKE FROM CATCH BASIN, INDIRECT CONNECTION

Drainage Area SqFt	Runoff Coeff
0	0



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Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

From MH / To MH NS5 To NS4

Line Footage: 366

Street #/Location: NORTH STREET

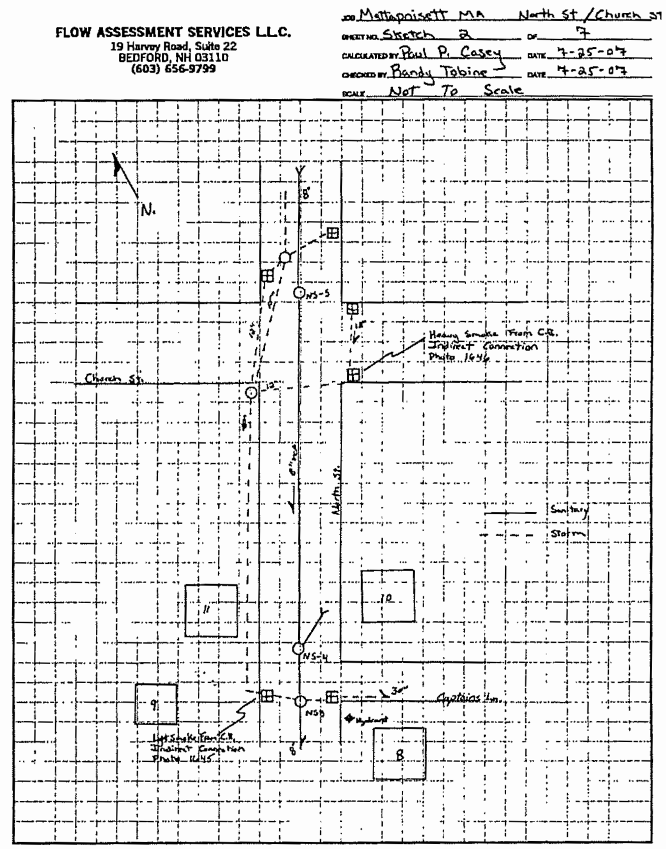
Date: 07/26/2007

Inspector: PPC/RT

Findings:

HEAVY SMOKE FROM CATCH BASIN, INDIRECT CONNECTION

Drainage Area SqFt	Runoff Coeff
0	0



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Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH XC1 To CH10A

Line Footage: 126

Street #/Location: COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
MANHOLE XC1 IN WETLANDS NEEDS FLOOD COVER	0	0

Image #:

Filename:

Sketch #:

Filename:

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
XC2 To XC1	237	COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
MANHOLE XC2 IN WETLANDS NEEDS FLOOD COVER	0	0

Image #:

Filename:

Sketch #:

Filename:

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

From MH / To MH	Line Footage:	Street #/Location:
XC3 To XC2	142	COUNTY ROAD EASEMENT

Date: 07/26/2007

Inspector: PPC/RT

Findings:	Drainage Area SqFt	Runoff Coeff
MANHOLE XC3 IN WETLANDS NEEDS FLOOD COVER	0	0

Image #:

Filename:

Sketch #:

Filename:

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

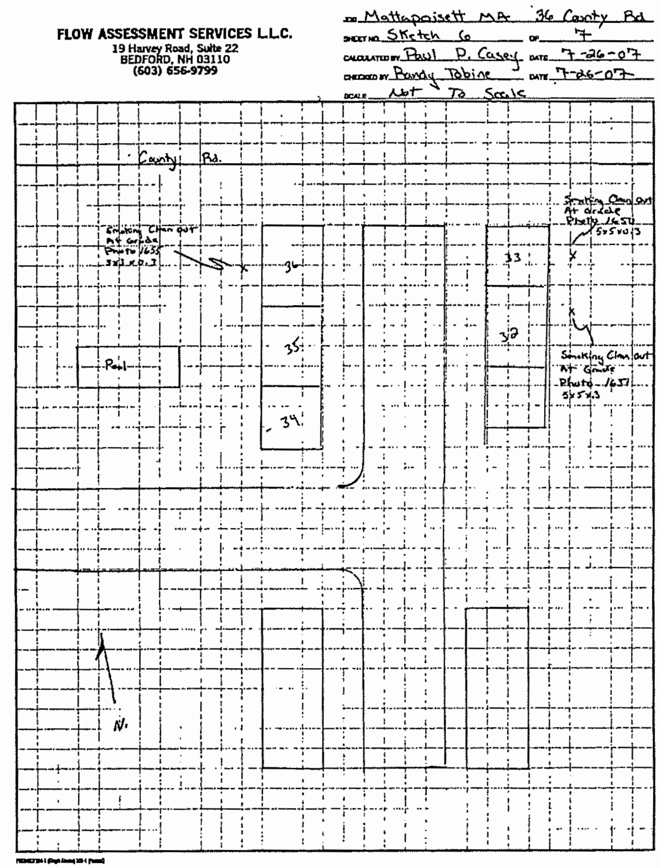
Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
XC5 To XC4	0	COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
HOUSE #32 SMOKING CLEANOUT AT GRADE	25	0.3



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Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

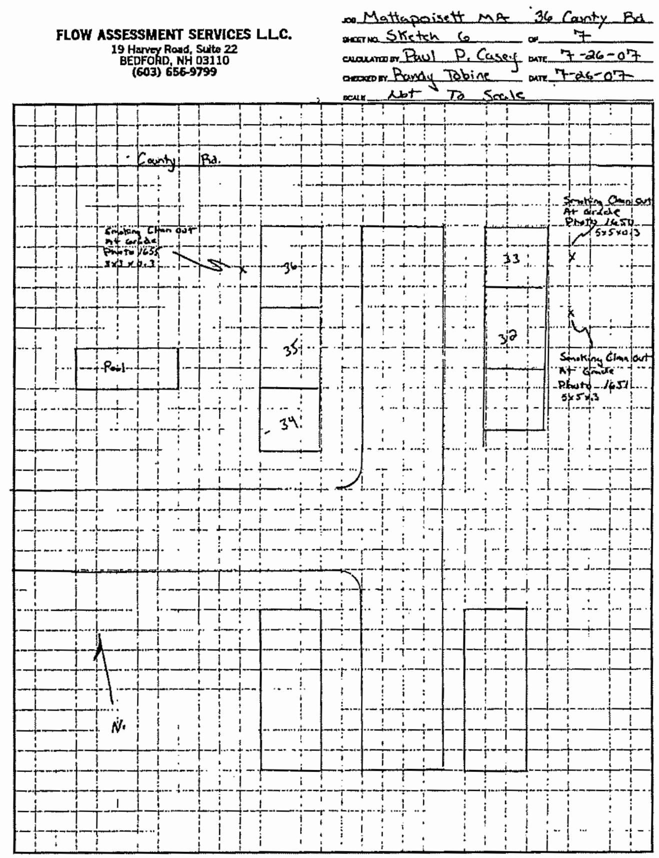
Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
XC5 To XC4	244	COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
HOUSE #33 SMOKING CLEANOUT AT GRADE	25	0.3



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Sketch #:

Filename: P:\07052\sketch 6.tif

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
XC7 To XC2	221	COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
MANHOLE XC7 IN WETLANDS NEEDS FLOOD COVER	0	0

Image #:

Filename:

Sketch #:

Filename:

Flow Assessment Services, L.L.C.

Smoke Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

Project No: 07052

Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	**Line Footage:**	**Street #/Location:**
XC8 To XC7	157	COUNTY ROAD EASEMENT

Findings:	**Drainage Area SqFt**	**Runoff Coeff**
MANHOLE XC8 IN WET LANDS NEEDS FLOOD COVER	0	0

Image #:

Filename:

Sketch #:

Filename:

Flow Assessment Services, L.L.C.

Smoking Testing Log

Municipality: MATTAPOISETT, MA

Sub-System NONE

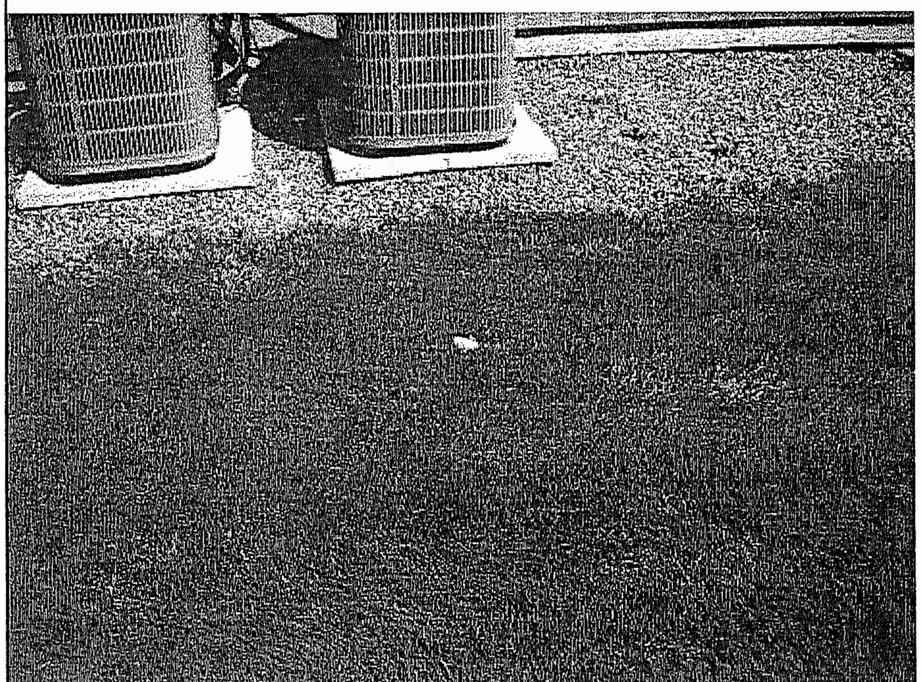
Project No: 07052

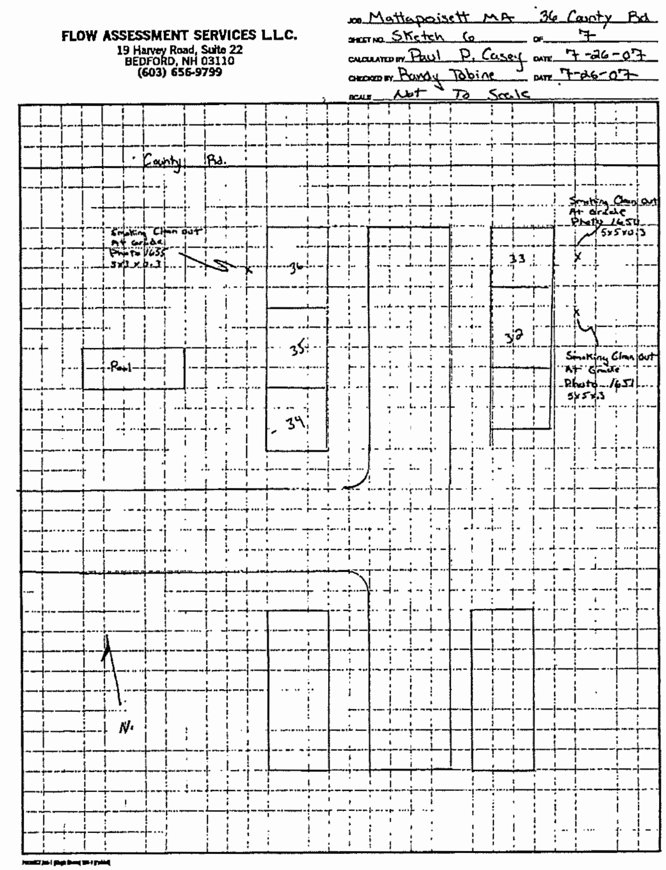
Date: 07/26/2007

Inspector: PPC/RT

From MH / To MH	Line Footage:	Street #/Location:
XC9 To XC8	162	COUNTY ROAD EASEMENT

Findings:	Drainage Area SqFt	Runoff Coeff
HOUSE #36 COUNTY ROAD SMOKING CLEANOUT AT GRADE	9	0.3





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Filename: P:\07052\DSCN1655.JPG

Sketch #:

Filename: P:\07052\sketch 6.tif

PRODUCTION SUMMARY

Date Printed:
07/26/2007

Flow Assessment Services, LLC Smoke Test Log
Production Summary and Billing Report For: 07052
MATTAPOISETT, MA
Sub-System: NONE

Sub-System	Location	Log Date	Line Section	Length In Feet
NONE	BARSTOW STREET	07/26/07	BR1 To WA3	217
NONE	BARSTOW STREET	07/26/07	BR2 To BR1	512
NONE	BARSTOW STREET	07/26/07	BR3 To BR2	39
NONE	BARSTOW STREET	07/26/07	BR3A To BR3	135
NONE	BARSTOW STREET	07/26/07	BR4 To BR3A	152
NONE	BARSTOW STREET	07/26/07	BR5 To BR4	343
NONE	BARSTOW STREET	07/26/07	BR6 To BR5	312
NONE	BARSTOW STREET	07/26/07	BR7 To BR6	93
NONE	CHURCH STREET	07/26/07	CH6 To MC3	126
NONE	CHURCH STREET	07/26/07	CH7 To MC3	205
NONE	HITCHING POST ROAD	07/26/07	HP2 To HP1	366
NONE	HITCHING POST ROAD	07/26/07	HP3 To HP2	312
NONE	HITCHING POST ROAD	07/26/07	HP4 To HP3	176
NONE	MECHANIC STREET	07/26/07	MC1 To WA4	318
NONE	MECHANIC STREET	07/26/07	MC2 To MC1	297
NONE	MECHANIC STREET	07/26/07	MC3 To MC2	168
NONE	MECHANIC STREET	07/26/07	MC4 To MC3	350
NONE	MECHANIC STREET	07/26/07	MC5 To MC4	356
NONE	MECHANIC STREET	07/26/07	MC6 To MC5	400
NONE	NORTH STREET	07/26/07	NS1 To WA5	44
NONE	NORTH STREET	07/26/07	NS2 To NS1	206
NONE	NORTH STREET	07/26/07	NS3 To NS2	205
NONE	NORTH STREET	07/26/07	NS4 To NS3	33
NONE	NORTH STREET	07/26/07	NS5 To NS4	366
NONE	NORTH STREET	07/26/07	NS6 To NS5	487
NONE	NORTH STREET	07/26/07	NS7 To NS6	442

Flow Assessment Services, LLC Smoke Test Log
Production Summary and Billing Report For: 07052
MATTAPOISETT, MA
Sub-System: NONE

Sub-System	Location	Log Date	Line Section	Length In Feet
NONE	NORTH STREET	07/26/07	NS8 To NS7	380
NONE	NORTH STREET	07/26/07	NS9 To NS8	0
NONE	PEPPER BUSH ROAD	07/26/07	PB2 To PB1	0
NONE	PEPPER BUSH ROAD	07/26/07	PB2 To PB1	0
NONE	PEPPER BUSH ROAD	07/26/07	PB2 To PB1	109
NONE	PEPPER BUSH ROAD	07/26/07	PB3 To PB2	110
NONE	PEPPER BUSH ROAD	07/26/07	PB4 To PB3	129
NONE	UPLAND WAY	07/26/07	UR1 To HP1	217
NONE	UPLAND WAY	07/26/07	UR2 To UR1	209
NONE	UPLAND WAY	07/26/07	UR3 To UR2	353
NONE	UPLAND WAY	07/26/07	UR4 To UR3	405
NONE	UPLAND WAY	07/26/07	UR5 To UR4	312
NONE	COUNTY ROAD EASEMENT	07/26/07	XC1 To CH10A	126
NONE	COUNTY ROAD EASEMENT	07/26/07	XC2 To XC1	237
NONE	COUNTY ROAD EASEMENT	07/26/07	XC3 To XC2	142
NONE	COUNTY ROAD EASEMENT	07/26/07	XC4 To XC3	237
NONE	COUNTY ROAD EASEMENT	07/26/07	XC5 To XC4	244
NONE	COUNTY ROAD EASEMENT	07/26/07	XC5 To XC4	0
NONE	COUNTY ROAD EASEMENT	07/26/07	XC6 To XC5	94
NONE	COUNTY ROAD EASEMENT	07/26/07	XC7 To XC2	221
NONE	COUNTY ROAD EASEMENT	07/26/07	XC8 To XC7	157
NONE	COUNTY ROAD EASEMENT	07/26/07	XC9 To XC8	162
NONE	COUNTY ROAD EASEMENT	07/26/07	XC11 To XC9	223

Line Sections Logged for sub-syste NONE 49 **Total Footage** 10,727

Total Line Sections Logge 49 **Grand Total Footage** 10,727

SUSPECT SOURCES

FLOW Assessment SERVICES LLC

SUSPECT INFLOW SOURCES
MATTAPOISETT, MA

SUB SYSTEM	STREET/LOCATION	POTENTIAL INFLOW SOURCE
	BARSTOW STREET (LIBRARY)	STAIRWELL DRAIN (2) - REAR
	12 BARSTOW STREET	3 ROOF LEADERS
	17 BARSTOW STREET	ROOF LEADER, FLAT ROOF
	9 MECHANIC STREET	ROOF LEADER
	31 CHURCH STREET	ROOF LEADER
	24 MECHANIC STREET	ROOF LEADER
	30 MECHANIC STREET	ROOF LEADER
	MECHANIC STREET (COUNTY ROAD WEBSTER BANK)	ROOF LEADER
	25 NORTH STREET	ROOF LEADER
	27 NORTH STREET	ROOF LEADER
	29 NORTH STREET	ROOF LEADER
	47 NORTH STREET	ROOF LEADER
	40 NORTH STREET	ROOF LEADER
	13 HITCHING POST ROAD	STAIRWELL DRAIN
	20 UPLAND WAY	ROOF LEADER
	22 UPLAND WAY	ROOF LEADER, ALL
	24 UPLAND WAY	ROOF LEADER, ALL
	19 BARSTOW STREET @ WATER STREET	7 ROOF LEADERS @ WHOLE HOUSE
	1736 BARSTOW STREET @ CHURCH STREET (CHURCH)	6 ROOF LEADERS - 1 FRONT LEFT, 5 BACK SIDE
	20 BARSTOW STREET	1 ROOF LEADER, LEFT SIDE FRONT
	22 BARSTOW STREET	ROOF LEADERS, 3 RIGHT SIDE, 1 FRONT, 3 LEFT SIDE
	? BARSTOW STREET (ST. ANTHONY'S CHURCH)	ROOF LEADERS, 4 BACK SIDE
	25 BARSTOW STREET	"SMOKE IN BASEMENT"
	32 MECHANICS STREET	ROOF LEADER, 1 FRONT (INTO FOUNDATION)

FLOW Assessment SERVICES LLC

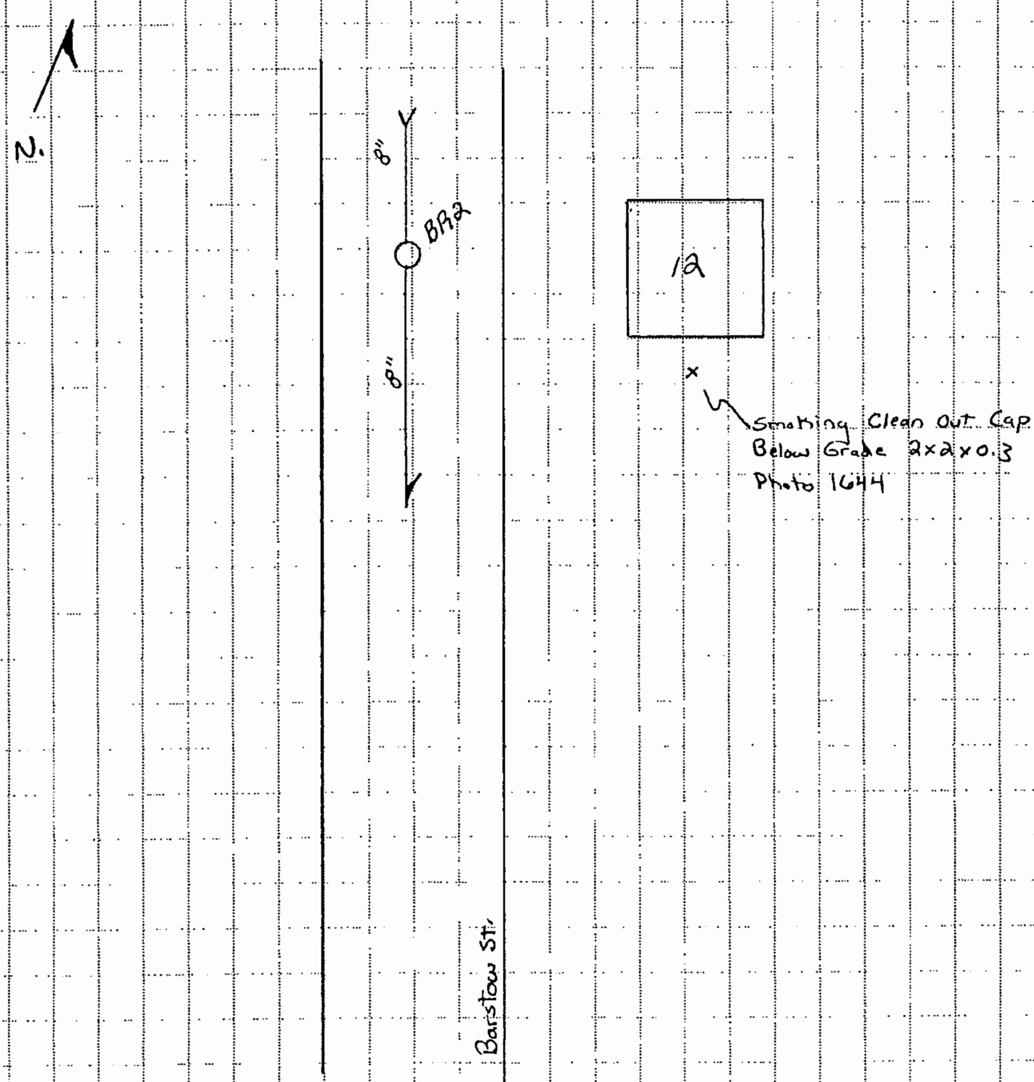
SUSPECT INFLOW SOURCES
MATTAPOISETT, MA

	MECHANIC STREET	ROOF LEADERS, 3 BACK OF HOUSE
	1834 MECHANICS STREET	ROOF LEADER, 2 RIGHT SIDE
	34 MECHANICS STREET	ROOF LEADERS, 2 RIGHT, 2 LEFT, 2 BACK
	29 MECHANICS STREET @ HAMMOND STREET	ROOF LEADER, 1 BACK/ SMOKING 6" PIPE IN BACK
	1850 NORTH STREET	ROOF LEADER, 1 RIGHT
	10 NORTH STREET	SMOKE IN BASEMENT
	22 NORTH STREET	ROOF LEADER, 1 LEFT
	24 NORTH STREET	ROOF LEADER, 1 FRONT RIGHT
	6 DEXTER LANE	ROOF LEADERS, 2 LEFT, 2 RIGHT
	2 HITCHING POST ROAD	ROOF LEADERS, 2 RIGHT
	6 HITCHING POST ROAD	ROOF LEADERS, 5 ALL AROUND HOUSE
	7 UPLAND WAY	ROOF LEADERS, 2 FRONT , 2 REAR
	8 HITCHING POST ROAD	ROOF LEADERS, 6 ALL AROUND BUILDING
	10 HITCHING POST ROAD	ROOF LEADERS, 6 ALL AROUND BUILDING
	12 HITCHING POST ROAD	ROOF LEADERS, 5 ALL AROUND BUILDING
	14 HITCHING POST ROAD	ROOF LEADERS, 7 ALL AROUND BUILDING
	30 UPLAND WAY	ROOF LEADER
	18 UPLAND WAY	ROOF LEADERS, ALL AROUND BUILDING
	20 UPLAND WAY	ROOF LEADERS, 6 ALL AROUND BUILDING
	15 UPLAND WAY	ROOF LEADERS, ALL AROUND BUILDING
	13 UPLAND WAY	ROOF LEADERS, ALL AROUND BUILDING
	51 COUNTRY ROAD (THRIFT STORE)	ROOF LEADERS, 3 BACK
	67 COUNTRY ROAD	ROOF LEADERS, 3 BACK, 1 DRIVEWAY DRAIN BACK
	63 COUNTRY ROAD (COMM. CENTER)	ROOF LEADERS (3), YARD DRAIN BACK RIGHT

SKETCHES

FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

JOB Mattapoisett MA 12 Barstow St.
SHEET NO. Sketch 1 OF 7
CALCULATED BY Paul P Casey DATE 7-25-07
CHECKED BY Randy Tobine DATE 7-25-07
SCALE Not To Scale



FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

JOB Mattapoisett MA North St / Church St
SHEET NO. Sketch 2 OF 7
CALCULATED BY Paul P. Casey DATE 7-25-07
CHECKED BY Randy Tobine DATE 7-25-07
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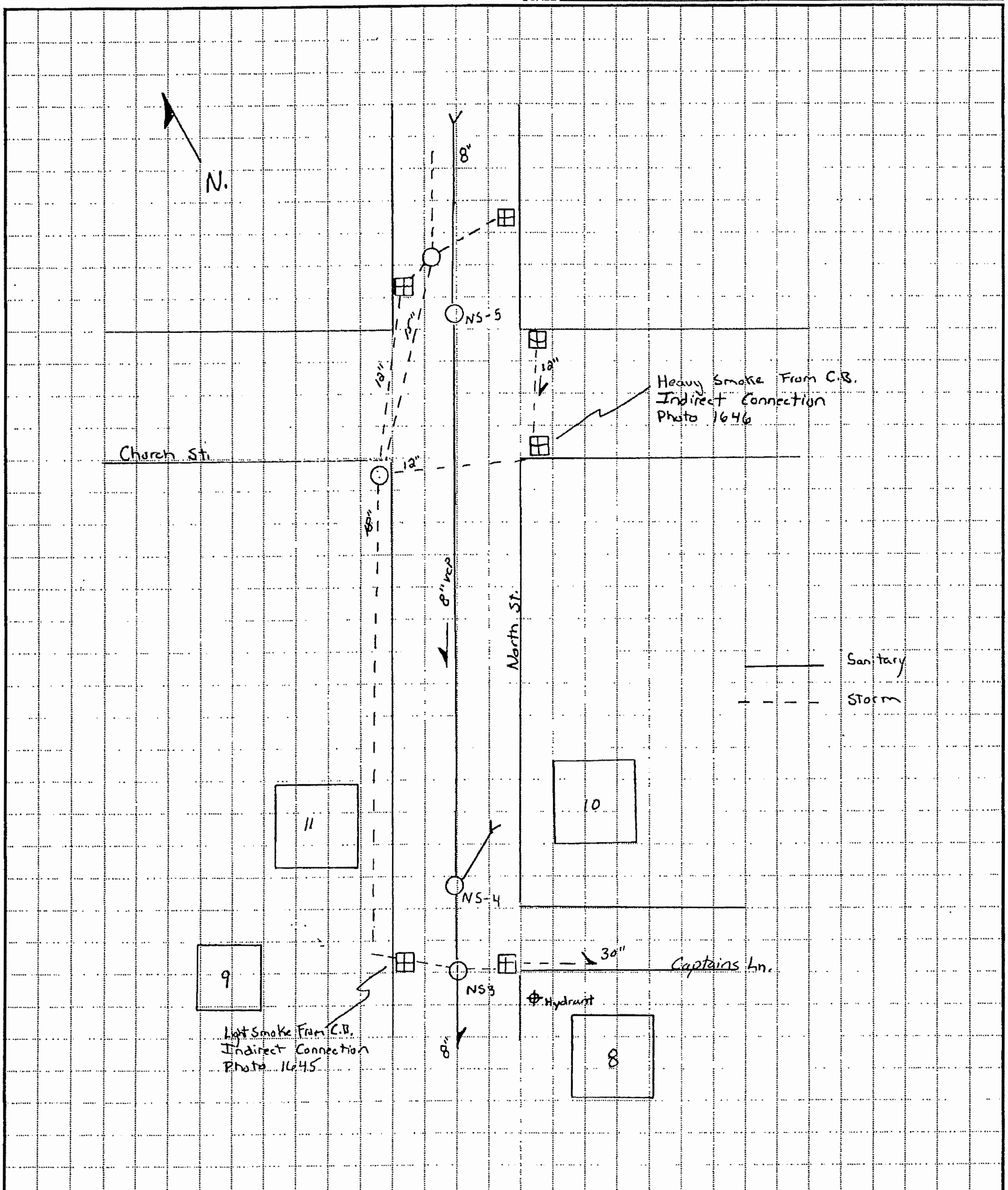


PRODUCT 204-1 (Single Sheets) 205-1 (Padded)

FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

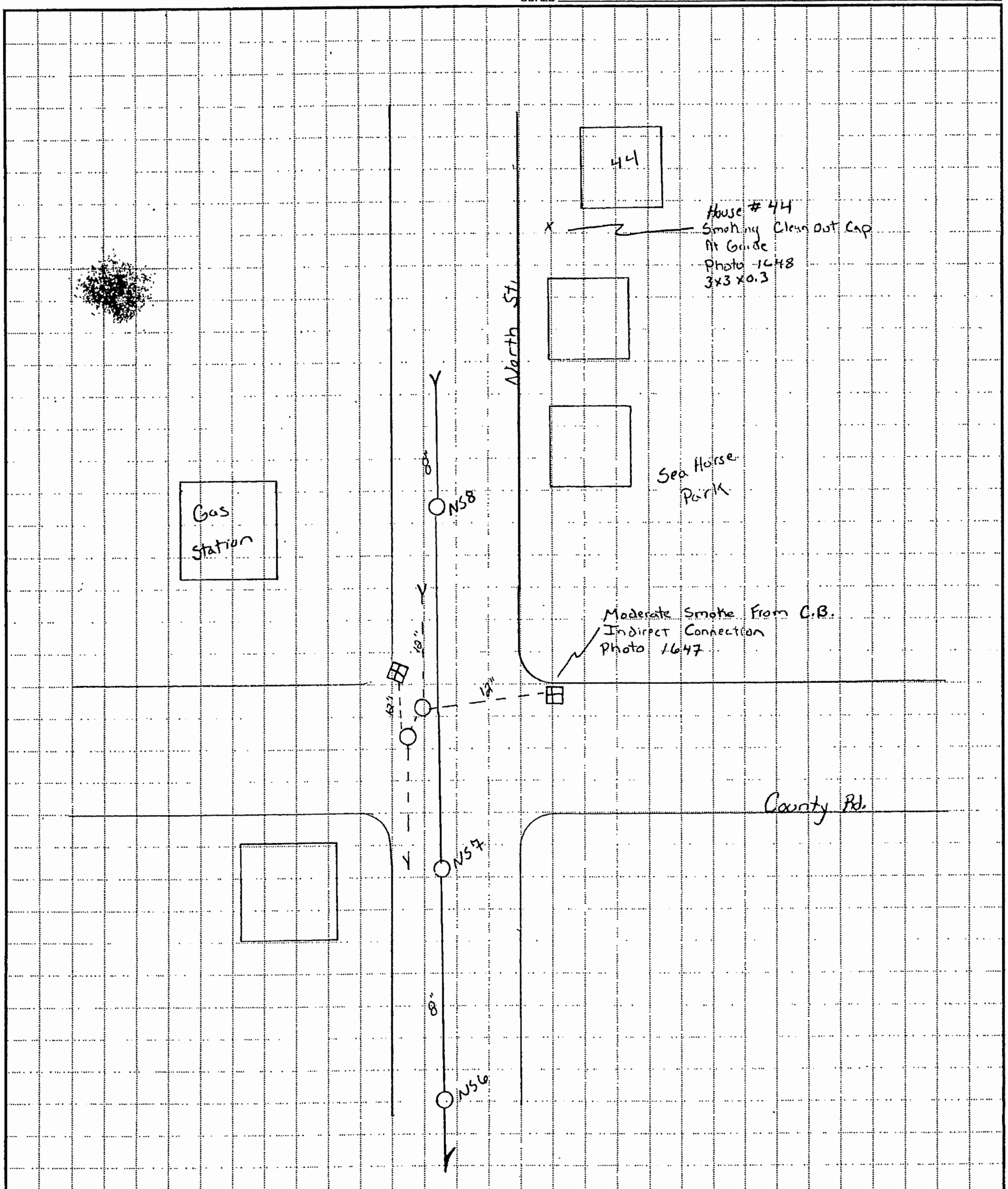
JOB Mattapoisett MA North St/County Rd

SHEET NO. Sketch 3 OF 7

CALCULATED BY Paul P. Casey DATE 7-25-07

CHECKED BY Randy Tobine DATE 7-25-07

SCALE Not To Scale



FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

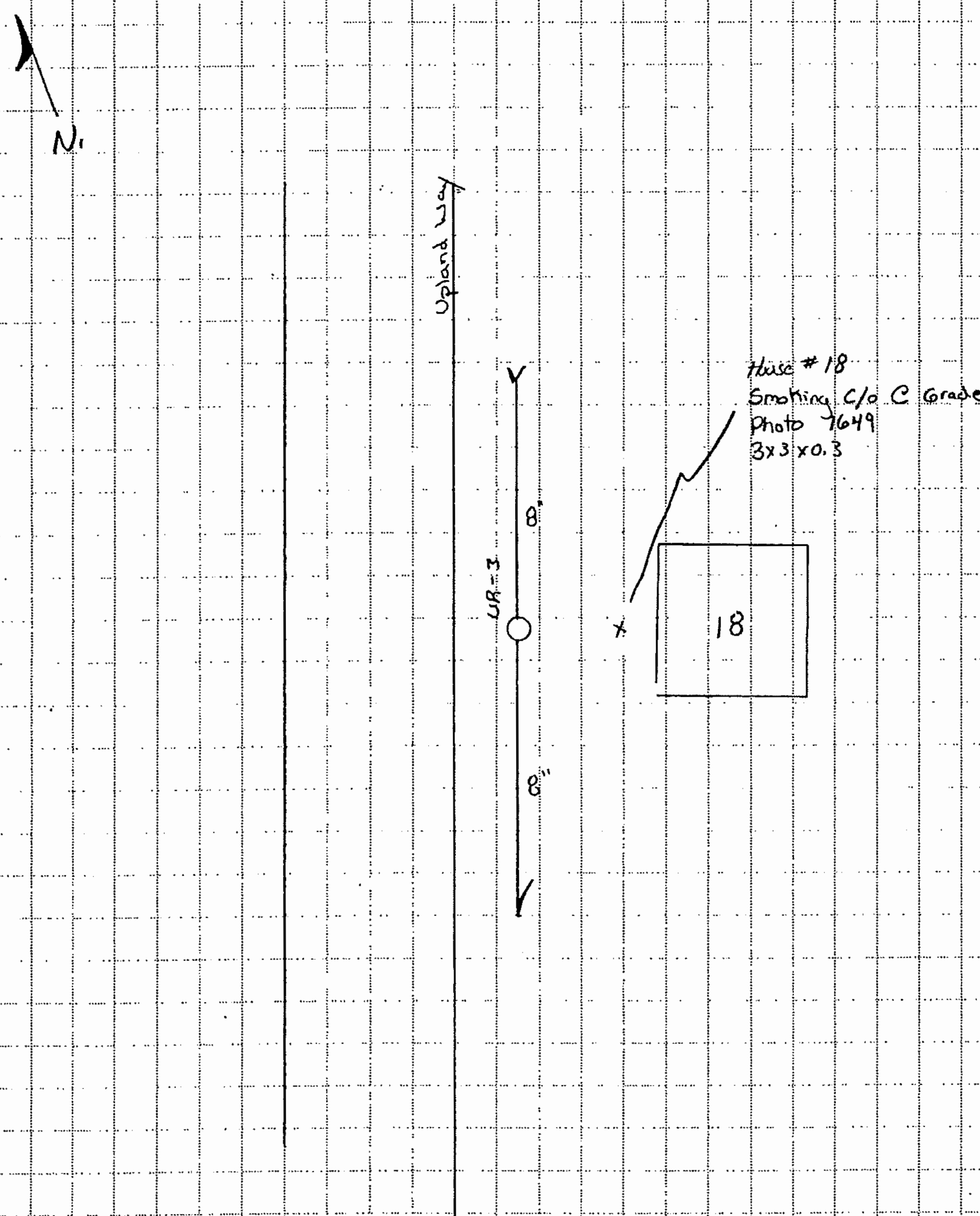
JOB Mattapoisett MA 18 Upland Way

SHEET NO. Sketch 4 OF 7

CALCULATED BY Paul P. Casey DATE 7-25-07

CHECKED BY Randy Tobine DATE 7-25-07

SCALE Not To Scale



PRODUCT 204-1 (Single Sheets) 205-1 (Padded)

FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

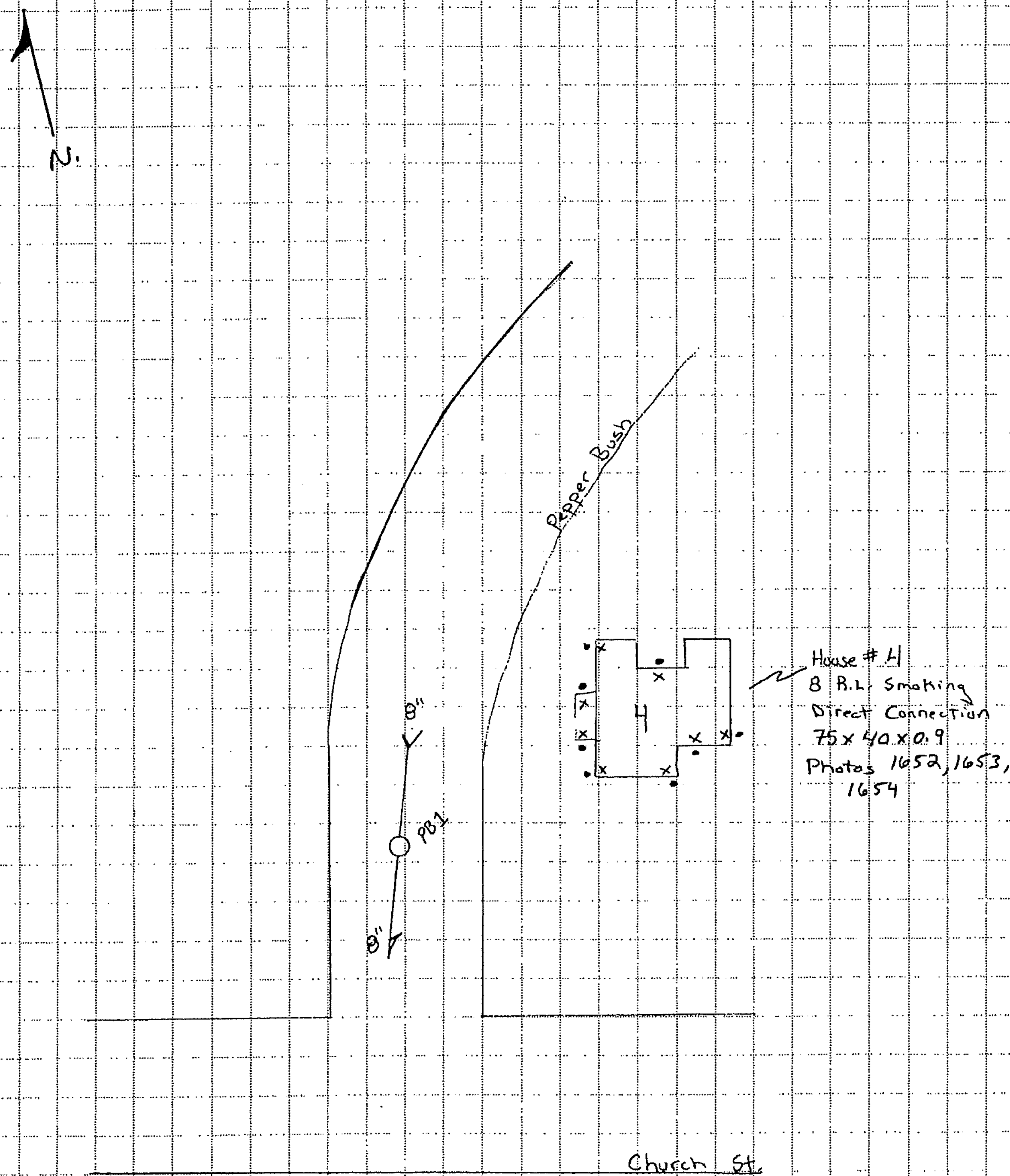
JOB Mattapoisett MA 4. Pepper Bush

SHEET NO. Sketch 5 OF 7

CALCULATED BY Paul P. Casey DATE 7-25-07

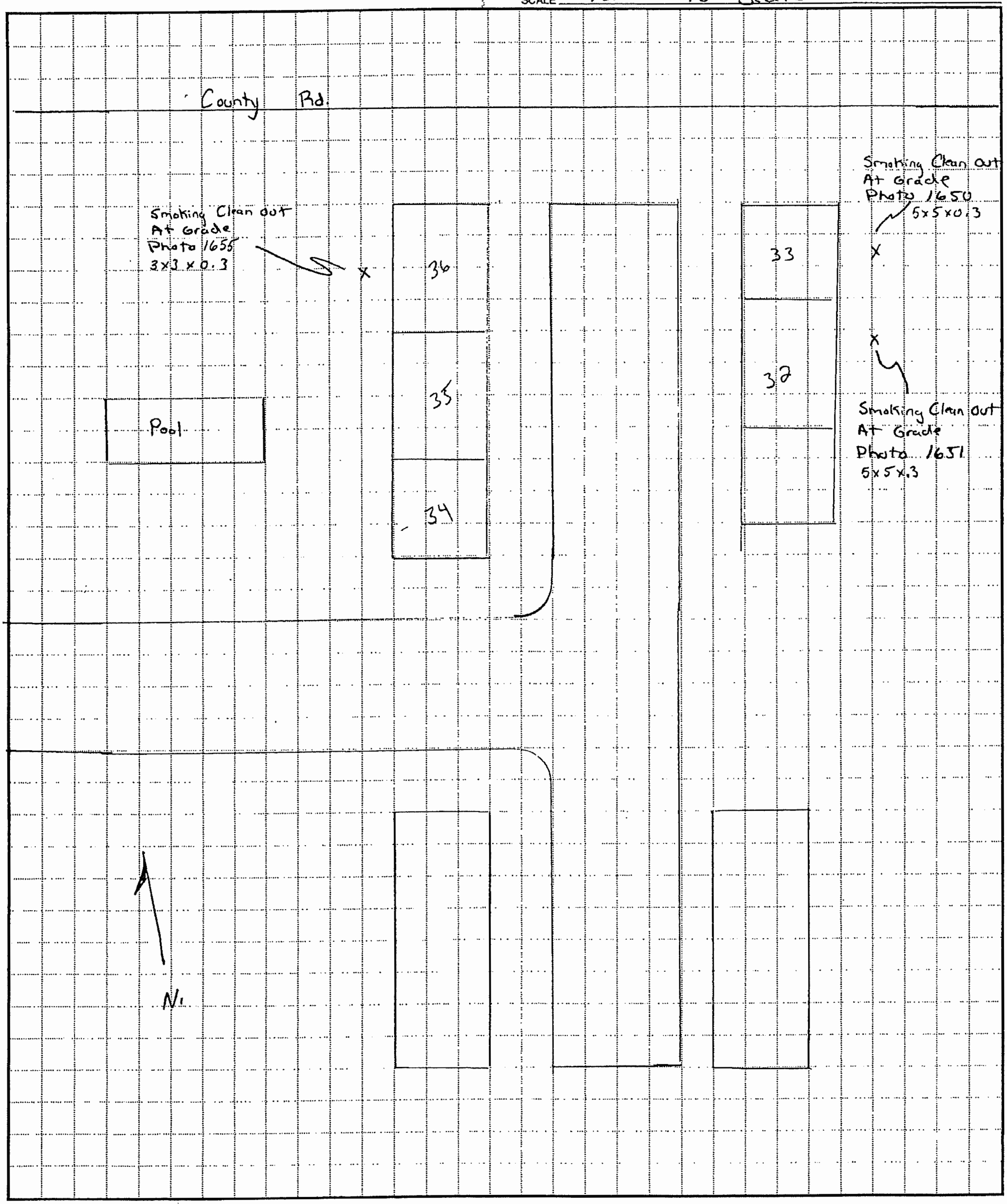
CHECKED BY Randy Tobine DATE 7-25-07

SCALE Not To Scale



FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

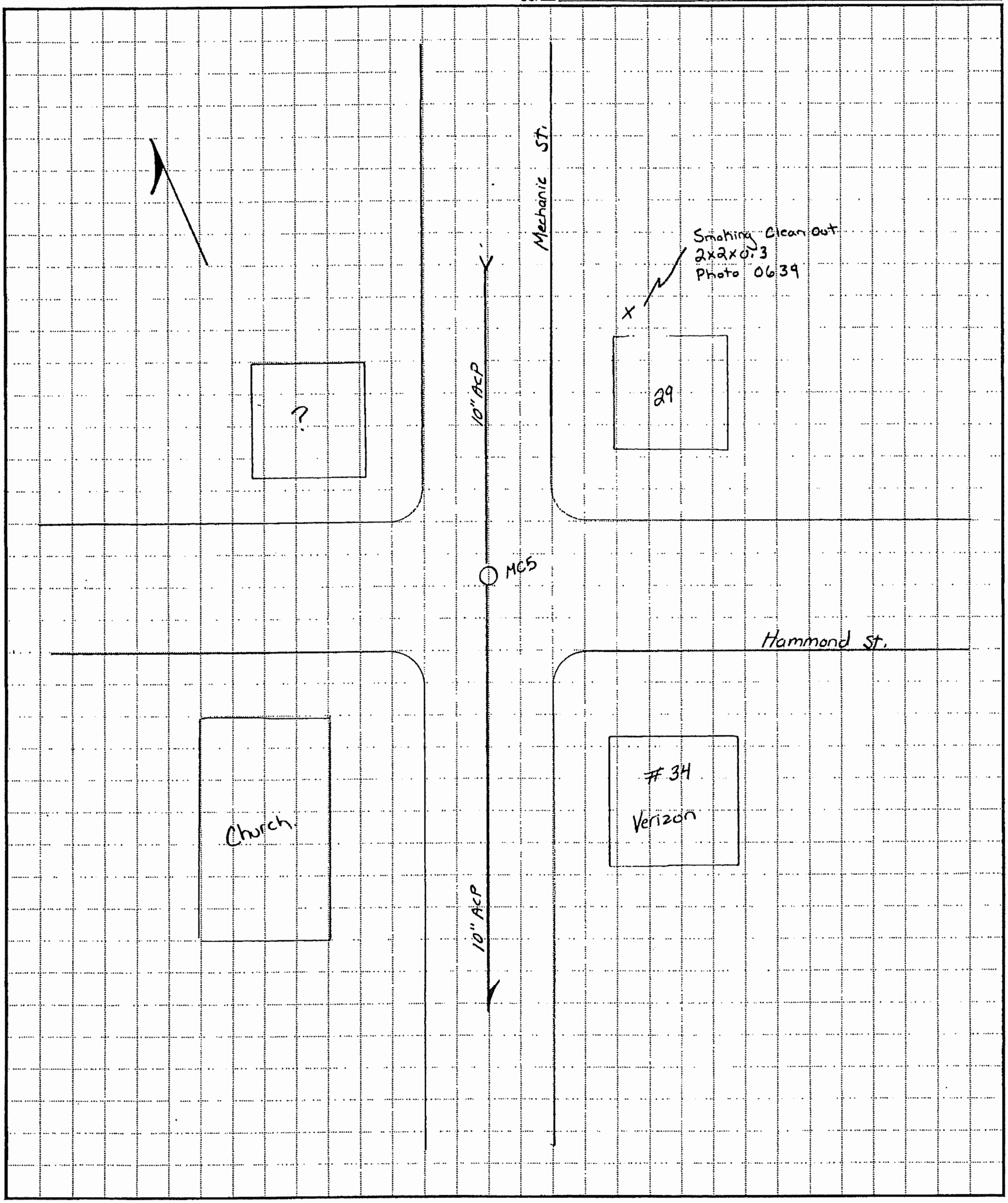
JOB Mattapoisett MA 36 County Rd
SHEET NO. Sketch 6 OF 7
CALCULATED BY Paul P. Casey DATE 7-26-07
CHECKED BY Randy Tobine DATE 7-26-07
SCALE Not To Scale



PRODUCT 204-1 (Single Sheets) 205-1 (Padded)

FLOW ASSESSMENT SERVICES L.L.C.
19 Harvey Road, Suite 22
BEDFORD, NH 03110
(603) 656-9799

JOB Mattapoisett MA 29 Hammond St.
SHEET NO. Sketch 7 OF 7
CALCULATED BY Paul P. Casey DATE 7-25-07
CHECKED BY Randy Tobine DATE 7-25-07
SCALE Not To Scale



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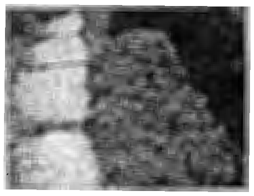

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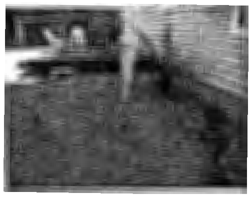

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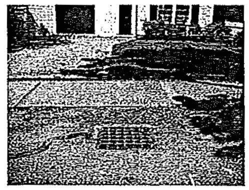

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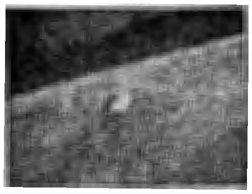
DSCN1648.JPG

DSCN1649.JPG



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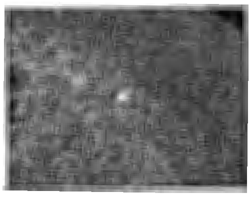

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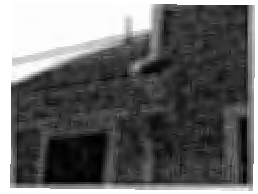
DSCN1652.JPG

DSCN1653.JPG



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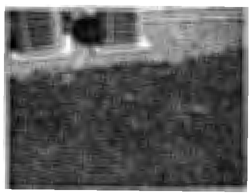

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TOWN OF MATTAPOISETT

MASSACHUSETTS 02739

WATER AND SEWER DEPARTMENT
P.O. BOX 474

Dear Mattapoisett Resident:

A detailed study of wastewater disposal problems in Mattapoisett is underway. The study is part of a Comprehensive Wastewater Management Planning study being carried out for the Town by Tighe & Bond.

An important part of this study is the identification of problems with on-site wastewater disposal systems (i.e. septic tanks, leachfields, etc.) in various parts of town . The information collected by the attached survey will be helpful in understanding these problems and in developing solutions. Please fill out the attached questionnaire as completely and accurately as possible and promptly mail the card (no postage necessary) to Tighe & Bond.

The cards have been coded so that information from various areas of the Town can be summarized for review and evaluation. The cards are <u>not</u> specific to your residence and your response will not be traceable to you.

Over the next several months, public meetings will be held on the Comprehensive Wastewater Management Planning project. The next public meeting is scheduled for August 16th, 2007 at the Center School , at 7 PM.. Residents are encouraged to attend to learn more about the project and provide our Engineer with additional local information.

Thank you,

William T. Nicholson
Water and Sewer Superintendent

Residence: Year Round ___ Seasonal ___ Number of Residents ___

1. Have you had any septic system problems within the last three (3) years? Yes ___ No ___

   If Yes, describe problem ____

   ____

2. Do septic system problems exist in your neighborhood? Yes ___ No ___

3. To what conditions do you attribute the problems? ______________________________

   ____

4. Septic system was last pumped out ___ years ago. System is pumped out every ___ years.

5. How many times has your septic system been pumped in the past twelve (12) months? ___

6. The age of the septic system is: 0-5 years ___ 5-10 years ___ 10+years___

   Date of construction or last repair, if known: __________

7. Do you wish your neighborhood was served by sewers? Yes ___ No ___

8. Comments:____

   ____

   ____

Printed from DEP website on May 30, 2006:
http://www.mass.gov/dep/water/wastewater/techsum.htm

Summary of Innovative/Alternative Technologies Approved for Use in Massachusetts and Under Review

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The inclusion in this table of URLs for I/A technology companies does not in any way constitute a recommendation or endorsement by DEP. (Links to external sites will open in new browser windows.)

Certified for General Use

Click here for approval letters and O&M checklists for all technologies certified for general use.

Technology	Model(s)	Company	Technology Description	Approved Use
Composting Toilets	Compliant with Title 5	Generic	Composting Toilet	Composting toilets as described in Title 5 (310 CMR 15.289 (3)(b))
Biolet	XL Composting Toilet	Biolet USA, Inc. 150 East State Street Newcomerstown, OH 43832	Composting Toilet	Equivalent to composting toilets as described in Title 5 (310 CMR 15.289 (3)(b))
Sun-Mar	Compliant with Title 5	Sun-Mar Corp. 5370 South Service Rd. Burlington, ON, L7L 5L1	Composting Toilet	Equivalent to composting toilets as described in Title 5 (310 CMR 15.289 (3)(b))
Recirculating Sand Filter	Compliant with Title 5	Generic	Sand Filter	BOD_5 and TSS removal Nitrogen reduction
RUCK	Systems less than 2000 gpd	Innovative RUCK Systems, Inc. 200 Main Street Falmouth, MA 02540	Filter	Nitrogen Reduction Equivalent to conventional Title 5 system
FRALO SEPTECH Poly Tanks	ST-1060, ST-1250 and ST-1500	FRALO Plastech Manufacturing, LLC One General Motors Drive Syracuse, NY 13206	Polyethylene septic tank	Equivalent to conventional septic tank
Advantex	Advantex AX20	Orenco Systems, Inc. 814 Airways Avenue Sutherlin, OR 97479	Textile filter	Equivalent to conventional Title 5 system
SeptiTech Treatment System	400, 550, 750, 1200, 1500, 3000H	SeptiTech, Inc. 220 Lewiston Road Gray, ME 04039	Trickling Filter	
Intermittent Sand Filter by Orenco Systems, Inc.	Low-Rate	Saneco, Inc. Box 9B 65 Eastern Avenue Essex, MA 01929	Sand Filter	

Certified for General Use

Click here for approval letters and O&M checklists for all technologies certified for general use.

Technology	Model(s)	Company	Technology Description	Approved Use
Bioclere	16, 22, 24, 30, and 36 series	Aquapoint 241 Duchaine Blvd. New Bedford, MA 02745	Trickling Filter	
Cromaglass WWT Systems	CA-5, CA-12, CA-25, CA-30, CA-50, CA-60, CA-100, CA-120, and CA-150	Cromaglass Corporation P.O. Box 3215 2902 N. Reach Road Williamsport, PA 17701	Sequencing Batch Reactor	
JET Aerobic Wastewater Treatment	JET-500, JET-750, JET-1250, JET-1500	Clearwater Recovery 175 Spring Street Rockland, MA 02370	Aerobic Treatment Unit	
FAST	MicroFAST, High Strength FAST, and NitriFAST	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227	Aerobic Treatment Unit	
FAST	Modular FAST	Smith & Loveless, Inc. 14040 Santa Fe Trail Drive Lenexa, KS 66215	Aerobic Treatment Unit	
Norweco	Singulair 960 and 960 DN	Siegmund Environmental Services, Inc. 49 Pavilion Avenue Providence, RI 02905	Aerobic Treatment Unit	
Amphidrome	Amphidrome Process	F.R. Mahony & Associates, Inc. 131 Weymouth Street Rockland, MA 02370	Submerged Attached-Growth Sequencing Bioreactor	
Waterloo	Biofilter	Waterloo Biofilter System, Inc. 143 Dennis Street Rockwood, ONT, N0B 2K0	Trickling Filter	
Eljen Xpandable Chamber	XP1607 through XP 3614	Eljen Corporation 125 McKee Street East Hartford, CT 06108	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations

Certified for General Use				
Click here for approval letters and O&M checklists for all technologies certified for general use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
EZ Flow	EZ1202V, EZ1203T, EZ1203H, EZ1402V, EZ1203 Bed, EZ1203 Mound	Ring Industrial Group/EZ Flow 65 Industrial Park Road Oakland, TN 38060	Alternative SAS	
Hancor Enviro Chambers	Standard Capacity, High Capacity, and Narrow	Hancor, Inc 401 Olive Street Findlay, OS 45840	Alternative SAS	
BioDiffuser Chambers	Biodiffuser 14 inch and 16 inch High Capacity, 11 inch Standard and Bio 2 and Bio 3 Biodiffusers	Advanced Drainage Systems, Inc. 4640 Trueman Boulevard Hilliard, OH 43026	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242).
Cultec Chambers	EZ-24, Recharger 280 and 400	Cultec, Inc. 878 Federal Road Brookfield, CT 06804	Alternative SAS	
Cultec Chambers	Contactor 75, 100, 125; Recharger 180 and 330			
Cultec Chambers	Contactor Field Drain C1, C2, C3, and C4			
Infiltrator Chambers	High Capacity Chamber, Standard Chamber, Infiltrator 3050 (Storm Tech SC-740) and Equalizer 24 and 36	Infiltrator Systems, Inc. P.O. Box 768 6 Business Park Road Old Saybrook, CT 06475	Alternative SAS	
Eljen In-Drain Systems	Type B43 and A42	Eljen Corporation 125 McKee Street East Hartford, CT 06108	Alternative SAS	
Enviro-Septic Leaching System	Enviro-Septic	Presby Enviromental Inc. Route 117, PO Box 617 Sugar Hill, NH 03586	Alternative SAS *	* Bed only

Approved for Piloting

Click here for approval letters and O&M checklists for all technologies approved for piloting use.

Technology	Model(s)	Company	Technology Description	Approved Use
Omni Recirculating Sand Filter System	RSF System	OMNI Environmental Systems, Inc. P.O. Box 128/465 East Falmouth Hwy Falmouth, MA 02536	Recirculating Sand Filter	
Cromaglass WWT System	CA-5D, CA-12D, CA-25D, CA-30D, CA-50D, CA-60D, CA-100D, CA-120D, and CA-150D	Cromaglass Corporation P.O. Box 3215 2902 N. Reach Road Williamsport, PA 17701	Sequencing Batch Reactor	
Amphidrome Process	Amphidrome Process	F.R. Mahony & Associates, Inc. 131 Weymouth Street Rockland, MA 02370	Submerged Attached-Growth Sequencing Bioreactor	BOD_5 and TSS removal Nitrogen reduction
Norweco	Singulair 960 DN	Siegmund Environmental Services, Inc. 49 Pavilion Avenue Providence, RI 02905	Aerobic Treatment Unit	
Nitrex	Nitrex Filters and Nitrex Plus Filters	Lombardo Associates, Inc. 49 Edge Hill Road Newton, MA 02467-1170	Filter with nitrate-reactive media	
RID	RID Phosphorus Removal System	Lombardo Associates, Inc. 49 Edge Hill Road Newton, MA 02467-1170	Upflow filter	Phosphorus removal
Waterloo	Biofilter	Waterloo Biofilter System, Inc. 143 Dennis Street Rockwood, ONT, N0B 2K0	Trickling Filter	Increased loading rates and reduced separation to groundwater

Approved for Piloting				
Click here for approval letters and O&M checklists for all technologies approved for piloting use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
SeptiTech Treatment Systems	400N, 550N, 750N, 1200N, 1500N, 3000N, SeptiTech Engineered Systems	SeptiTech, Inc. 220 Lewiston Road Gray, ME 04039	Enhanced recirculating biological trickling filter	BOD_5 and TSS removal & Nitrogen reduction
RUCK	CFT System	North Coast Technologies, LLC 200 Main Street, Suite 201 Falmouth, MA 02540	Aerobic RUCK filter	Nitrogen reduction
OAR	OAR System	Environmental Operating Solutions, Inc. 230 Jones Street Falmouth, MA 02540	Aerobic reactor with Bio-augmentation	

Approved for Remedial Use				
Click here for approval letters and O&M checklists for all technologies approved for remedial use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
White Knight Inoculator / Generator Alternative Treatment System	Bacterial Augmentation and Aeration System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126	Bio-augmentation	Renovation of failed SAS
Piranaco Alternative Treatement System	Bacterial Augmentation and Aeration System	Piranaco 1875 Joy Road Occidental, CA 95465		
Geoflow Subsurface Drip Wastewater Disposal System	Drip Irrigation System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925	Alternative SAS	Alternative SAS trench-drip irrigation
Perc-Rite Subsurface Drip Wastewater Disposal System	Drip Irrigation System	American Manufacturing Co. Inc. P.O. Box 549 Manassas, VA 20108-0549	Alternative SAS	Alternative SAS trench-drip irrigation
Composting Toilets	Compliant with Title 5	Generic	Composting Toilet	Composting toilets as described in Title 5 (310 CMR 15.289 (3)(b))
Recirculating Sand Filters	Compliant with Title 5	Generic	Sand Filter	BOD_5 and TSS removal
Puraflo	Peat Fiber Biofilter	Bord na Mona Environmental Products U.S. Inc. 4106 Bernau Avenue Greensboro, NC 27407	Peat Filter	

Approved for Remedial Use				
Click here for approval letters and O&M checklists for all technologies approved for remedial use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
White Knight Inoculator / Generator Alternative Treatment System	Bacterial Augmentation and Aeration System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126	Bio-augmentation	Renovation of failed SAS
Piranaco Alternative Treatement System	Bacterial Augmentation and Aeration System	Piranaco 1875 Joy Road Occidental, CA 95465		
Geoflow Subsurface Drip Wastewater Disposal System	Drip Irrigation System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925	Alternative SAS	Alternative SAS trench-drip irrigation
Jet Home Aerobic Wastewater Systems	J-500, J-750, J-1000, J-1250, and J-1500	Clearwater Recovery (Stephen B. Nelson) 175 Spring Street Rockland, MA 02370	Aerobic treatment system	
Amphidrome	Amphidrome Process	F.R. Mahony & Associates, Inc. 131 Weymouth Street Rockland, MA 02370	Submerged Attached-Growth Sequencing Bioreactor	
Orenco Intermittent Sand Filter	Low-Rate Filter	Saneco, Inc. Box 9B 65 Eastern Avenue Essex, MA 01929	Sand Filter	

Approved for Remedial Use				
Click here for approval letters and O&M checklists for all technologies approved for remedial use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
White Knight Inoculator / Generator Alternative Treatment System	Bacterial Augmentation and Aeration System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126	Bio-augmentation	Renovation of failed SAS
Piranaco Alternative Treatement System	Bacterial Augmentation and Aeration System	Piranaco 1875 Joy Road Occidental, CA 95465		
Geoflow Subsurface Drip Wastewater Disposal System	Drip Irrigation System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925	Alternative SAS	Alternative SAS trench-drip irrigation
FAST	Modular FAST	Smith & Loveless, Inc. 14040 Santa Fe Trail Drive Lenexa, KS 66215	Aerobic Treatment Unit	
FAST	MicroFAST, High Strength FAST, and NitriFAST	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227	Aerobic Treatment Unit	
SeptiTech Treatment Systems	300, 400, 550, 750, 1200 3000, and SeptiTech Engineered Systems	SeptiTech, Inc. 220 Lewiston Road Gray, ME 04039	Aerobic Treatment unit	

Approved for Remedial Use				
Click here for approval letters and O&M checklists for all technologies approved for remedial use.				
Technology	**Model(s)**	**Company**	**Technology Description**	**Approved Use**
White Knight Inoculator / Generator Alternative Treatment System	Bacterial Augmentation and Aeration System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126	Bio-augmentation	Renovation of failed SAS
Piranaco Alternative Treatement System	Bacterial Augmentation and Aeration System	Piranaco 1875 Joy Road Occidental, CA 95465		
Geoflow Subsurface Drip Wastewater Disposal System	Drip Irrigation System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925	Alternative SAS	Alternative SAS trench-drip irrigation
Cromaglass Wastewater Treatment System	CA-5, CA-12, CA-15, CA-25, CA-30, CA-50, CA-60, CA-100, CA-120, CA-150	Cromaglass Corporation P.O. Box 3215 2902 N. Reach Road Williamsport, PA 17701	Sequencing Batch Reactor	
Bioclere	16, 22, 24, and 30 series	Aquapoint 241 Duchaine Blvd. New Bedford, MA 02745	Trickling Filter	
Jet	J-335 Tertiary Sand Filter	Clearwater Recovery (Stephen B. Nelson) 175 Spring Street Rockland, MA 02370	Sand filter	NA

Approved for Remedial Use

Click here for approval letters and O&M checklists for all technologies approved for remedial use.

Technology	Model(s)	Company	Technology Description	Approved Use
White Knight Inoculator / Generator Alternative Treatment System	Bacterial Augmentation and Aeration System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126	Bio-augmentation	Renovation of failed SAS
Piranaco Alternative Treatement System	Bacterial Augmentation and Aeration System	Piranaco 1875 Joy Road Occidental, CA 95465		
Geoflow Subsurface Drip Wastewater Disposal System	Drip Irrigation System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925	Alternative SAS	Alternative SAS trench-drip irrigation
Enviro-Septic	Enviro-Septic System	Presby Enviromental Inc. Route 117, PO Box 617 Sugar Hill, NH 03586	Alternative SAS	Alternative SAS in bed configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242).
Eljen In-Drain Systems	Type B43 and A42	Eljen Corporation 125 McKee Street East Hartford, CT 06108	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242).

I/A Technologies with Nitrogen Reduction Credit

A number of the technologies listed above have received nitrogen reduction credit as part of their technology approvals:

General Use Certification

Recirculating Sand Filters
RUCK

Provisional Use Approvals

Advantex
Amphidrome
Bioclere
MicroFAST, High Strength FAST, NitriFAST, and Modular FAST
Waterloo Biofilter

Piloting Use Approvals

Amphidrome Process
Cromaglass WWT System
Nitrex-Nitrex Plus
Norweco Singulair
OAR
OMNI Recirculating Sand Filter System
RUCK CFT
SeptiTech

Technologies Under Review by DEP			
Technology	**Company**	**Technology Description**	**Proposed DEP Approval**
WAI BioCon	Wastewater Alternatives of NE, Inc.	Aerated submerged media biological contractor	Remedial
WAI BioCon	Wastewater Alternatives of NE, Inc.	Aerated submerged media biological contractor	General
GeoFlow Drip	GeoFlow	Drip Irrigation	General Use
MBR	Bio-Microbics	Membrane Reactor	Piloting
Singulair	Seigmund Environmental	Aerated Biological Contractor	Provisional

J:\S\S1240\REPORT\PHASE I\APPENDIX E I-A TECHNOLOGIES.DOC

Client: Mattapoisett Sewer Com.		**Performed By:** I. Catlow	
Location: Mattapoisett, MA		**Checked By:**	
Job Number: M0382		**Date:** 4/16/2008	

Sewer Extension Opinion of Cost Summary

Study Area	Description	Total Cost
8	Mattapoisett River East	1,306,000
9	Mattapoisett River West	1,428,000
10	Rt 6 at Fairhaven Town Line	1,441,000
11	Mattapoisett Neck Rd., South of Rt 6	1,304,000
12	Mattapoisett Neck Rd., Bordering Harbor	1,223,000
13	Mattapoisett Neck Rd., Bordering Harbor	2,336,000
14	Brandt Island Road	503,000
15	Brandt Island Cove	3,232,000
17	Mattapoisett Neck Rd., Bordering Brandt Island Cove	1,456,000
18	Mattapoisett Neck East	2,716,000
19	Mattapoisett Neck Southeast	2,009,000
20	Mattapoisett Neck South	1,158,000
21	North Street	1,750,000
22	Industrial Park	1,962,000
23	Aucoot Cove	2,829,000
25	Hollywood Road	2,883,000
26	Pine Island Pond	856,000
	Opinion of Total Project Cost:	**$30,392,000**

Notes:

Client: Mattapoisett Sewer Com.
Location: Mattapoisett, MA
Job Number: M0382

Performed By: I. Catlow
Checked By:
Date: 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 8

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	0	LF	$65.00	$0
Force Main	914	LF	$85.00	$77,731
Gravity Sewer	3,670	LF	$105.00	$385,385
Grinder Pump	0	EA	$10,000.00	$0
LPS Terminal Manhole	0	EA	$8,000.00	$0
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	15	EA	$4,200.00	$63,000
Police Detail	20	DAY	$320.00	$6,400
			Construction Subtotal:	$932,516
			40% Engineering & Contingency	$373,006
			Opinion of Probable Cost:	**$1,306,000**

Notes:

Client: Mattapoisett Sewer Com. | **Performed By:** I. Catlow
Location: Mattapoisett, MA | **Checked By:**
Job Number: M0382 | **Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 9

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	1,322	LF	$65.00	$85,944
Force Main	229	LF	$85.00	$19,463
Gravity Sewer	3,161	LF	$105.00	$331,938
Grinder Pump	8	EA	$10,000.00	$80,000
LPS Terminal Manhole	2	EA	$8,000.00	$16,000
LPS Air Release Manhole	3	EA	$10,000.00	$30,000
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	12	EA	$4,200.00	$50,400
Police Detail	20	DAY	$320.00	$6,400
			Construction Subtotal:	$1,020,145
			40% Engineering & Contingency	$408,058
			Opinion of Probable Cost:	**$1,428,000**

Notes:

Client: Mattapoisett Sewer Com.
Location: Mattapoisett, MA
Job Number: M0382

Performed By: I. Catlow
Checked By:
Date: 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 10

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	6,412	LF	$65.00	$416,804
Force Main	0	LF	$85.00	$0
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	54	EA	$10,000.00	$540,000
LPS Terminal Manhole	2	EA	$8,000.00	$16,000
LPS Air Release Manhole	3	EA	$10,000.00	$30,000
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	1	EA	$20,000.00	$20,000
Gravity Sewer Manhole	0	EA	$4,200.00	$0
Police Detail	20	DAY	$320.00	$6,400
			Construction Subtotal:	$1,029,204
			40% Engineering & Contingency	$411,682
			Opinion of Probable Cost:	**$1,441,000**

Notes:

Client: Mattapoisett Sewer Com. **Performed By:** I. Catlow
Location: Mattapoisett, MA **Checked By:**
Job Number: M0382 **Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 11

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	1,304	LF	$65.00	$84,740
Force Main	5,499	LF	$85.00	$467,428
Gravity Sewer	1,295	LF	$105.00	$135,983
Grinder Pump	16	EA	$10,000.00	$160,000
LPS Terminal Manhole	2	EA	$8,000.00	$16,000
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	1	EA	$20,000.00	$20,000
Gravity Sewer Manhole	9	EA	$4,200.00	$37,800
Police Detail	30	DAY	$320.00	$9,600

Construction Subtotal: $931,551
40% Engineering & Contingency $372,620

Opinion of Probable Cost: **$1,304,000**

Notes:

Client: Mattapoisett Sewer Com.	**Performed By:** I. Catlow
Location: Mattapoisett, MA	**Checked By:**
Job Number: M0382	**Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost

Study Area: 12

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	2,587	LF	$65.00	$168,138
Force Main	1,811	LF	$85.00	$153,938
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	40	EA	$10,000.00	$400,000
LPS Terminal Manhole	6	EA	$8,000.00	$48,000
LPS Air Release Manhole	6	EA	$10,000.00	$60,000
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	2	EA	$20,000.00	$40,000
Gravity Sewer Manhole	0	EA	$4,200.00	$0
Police Detail	10	DAY	$320.00	$3,200
			Construction Subtotal:	$873,276
			40% Engineering & Contingency	$349,310
			Opinion of Probable Cost:	**$1,223,000**

Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 13

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	802	LF	$65.00	$52,099
Force Main	1,407	LF	$85.00	$119,577
Gravity Sewer	8,370	LF	$105.00	$878,832
Grinder Pump	5	EA	$10,000.00	$50,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	35	EA	$4,200.00	$147,000
Police Detail	40	DAY	$320.00	$12,800

Construction Subtotal:	$1,668,308
40% Engineering & Contingency	$667,323
Opinion of Probable Cost:	**$2,336,000**

Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 14

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	1,418	LF	$65.00	$92,169
Force Main	55	LF	$85.00	$4,690
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	25	EA	$10,000.00	$250,000
LPS Terminal Manhole	0	EA	$8,000.00	$0
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	3	EA	$4,200.00	$12,600
Police Detail	0	DAY	$320.00	$0

Construction Subtotal:	$359,458
40% Engineering & Contingency	$143,783
Opinion of Probable Cost:	**$503,000**

Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 15

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	1,094	LF	$65.00	$71,141
Force Main	7,460	LF	$85.00	$634,130
Gravity Sewer	9,042	LF	$105.00	$949,387
Grinder Pump	8	EA	$10,000.00	$80,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	35	EA	$4,200.00	$147,000
Police Detail	60	DAY	$320.00	$19,200
			Construction Subtotal:	$2,308,858
			40% Engineering & Contingency	$923,543
			Opinion of Probable Cost:	**$3,232,000**

Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 17

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	3,620	LF	$65.00	$235,303
Force Main	4,904	LF	$85.00	$416,852
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	32	EA	$10,000.00	$320,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	1	EA	$10,000.00	$10,000
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	2	EA	$20,000.00	$40,000
Gravity Sewer Manhole	0	EA	$4,200.00	$0
Police Detail	30	DAY	$320.00	$9,600
			Construction Subtotal:	$1,039,755
			40% Engineering & Contingency	$415,902
			Opinion of Probable Cost:	**$1,456,000**

Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 18

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	6,492	LF	$65.00	$421,978
Force Main	3,362	LF	$85.00	$285,740
Gravity Sewer	4,333	LF	$105.00	$454,914
Grinder Pump	57	EA	$10,000.00	$570,000
LPS Terminal Manhole	8	EA	$8,000.00	$64,000
LPS Air Release Manhole	6	EA	$10,000.00	$60,000
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	16	EA	$4,200.00	$67,200
Police Detail	50	DAY	$320.00	$16,000

Construction Subtotal:	$1,939,831
40% Engineering & Contingency	$775,932
Opinion of Probable Cost:	**$2,716,000**

Notes:

Client: Mattapoisett Sewer Com. **Performed By:** I. Catlow
Location: Mattapoisett, MA **Checked By:**
Job Number: M0382 **Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 19

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	6,161	LF	$65.00	$400,491
Force Main	0	LF	$85.00	$0
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	84	EA	$10,000.00	$840,000
LPS Terminal Manhole	11	EA	$8,000.00	$88,000
LPS Air Release Manhole	10	EA	$10,000.00	$100,000
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	0	EA	$4,200.00	$0
Police Detail	20	DAY	$320.00	$6,400
			Construction Subtotal:	$1,434,891
			40% Engineering & Contingency	$573,956
			Opinion of Probable Cost:	**$2,009,000**

Notes:

Tighe & Bond

Client: Mattapoisett Sewer Com.
Location: Mattapoisett, MA
Job Number: M0382

Performed By: I. Catlow
Checked By:
Date: 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 20

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	3,175	LF	$65.00	$206,375
Force Main	136	LF	$85.00	$11,520
Gravity Sewer	603	LF	$105.00	$63,272
Grinder Pump	9	EA	$10,000.00	$90,000
LPS Terminal Manhole	2	EA	$8,000.00	$16,000
LPS Air Release Manhole	2	EA	$10,000.00	$20,000
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	4	EA	$4,200.00	$16,800
Police Detail	10	DAY	$320.00	$3,200
			Construction Subtotal:	$827,167
			40% Engineering & Contingency	$330,867
			Opinion of Probable Cost:	**$1,158,000**

Notes:

Client: Mattapoisett Sewer Com.		**Performed By:** I. Catlow	
Location: Mattapoisett, MA		**Checked By:**	
Job Number: M0382		**Date:** 4/16/2008	

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 21

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	463	LF	$65.00	$30,070
Force Main	1,446	LF	$85.00	$122,937
Gravity Sewer	5,379	LF	$105.00	$564,814
Grinder Pump	6	EA	$10,000.00	$60,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	1	EA	$20,000.00	$20,000
Gravity Sewer Manhole	9	EA	$4,200.00	$37,800
Police Detail	20	DAY	$320.00	$6,400
			Construction Subtotal:	$1,250,021
			40% Engineering & Contingency	$500,009
			Opinion of Probable Cost:	**$1,750,000**

Notes:

Client: Mattapoisett Sewer Com.
Location: Mattapoisett, MA
Job Number: M0382

Performed By: I. Catlow
Checked By:
Date: 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 22

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	0	LF	$65.00	$0
Force Main	0	LF	$85.00	$0
Gravity Sewer	12,223	LF	$105.00	$1,283,430
Grinder Pump	0	EA	$10,000.00	$0
LPS Terminal Manhole	0	EA	$8,000.00	$0
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	25	EA	$4,200.00	$105,000
Police Detail	40	DAY	$320.00	$12,800
			Construction Subtotal:	$1,401,230
			40% Engineering & Contingency	$560,492
			Opinion of Probable Cost:	**$1,962,000**

Notes:

Client: Mattapoisett Sewer Com. **Performed By:** I. Catlow
Location: Mattapoisett, MA **Checked By:**
Job Number: M0382 **Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 23

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	2,608	LF	$65.00	$169,536
Force Main	4,216	LF	$85.00	$358,332
Gravity Sewer	6,506	LF	$105.00	$683,096
Grinder Pump	24	EA	$10,000.00	$240,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	2	EA	$10,000.00	$20,000
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	1	EA	$20,000.00	$20,000
Gravity Sewer Manhole	26	EA	$4,200.00	$109,200
Police Detail	40	DAY	$320.00	$12,800
			Construction Subtotal:	$2,020,965
			40% Engineering & Contingency	$808,386
			Opinion of Probable Cost:	**$2,829,000**

Notes:

Tighe & Bond

Client: Mattapoisett Sewer Com.	**Performed By:** I. Catlow
Location: Mattapoisett, MA	**Checked By:**
Job Number: M0382	**Date:** 4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 25

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	0	LF	$65.00	$0
Force Main	2,435	LF	$85.00	$206,987
Gravity Sewer	11,837	LF	$105.00	$1,242,926
Grinder Pump	0	EA	$10,000.00	$0
LPS Terminal Manhole	0	EA	$8,000.00	$0
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station	1	LS	$400,000.00	$400,000
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	46	EA	$4,200.00	$193,200
Police Detail	50	DAY	$320.00	$16,000
			Construction Subtotal:	$2,059,113
			40% Engineering & Contingency	$823,645
			Opinion of Probable Cost:	**$2,883,000**

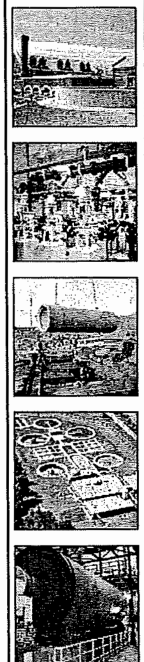
Notes:

Client:	Mattapoisett Sewer Com.	**Performed By:**	I. Catlow
Location:	Mattapoisett, MA	**Checked By:**	
Job Number:	M0382	**Date:**	4/16/2008

Calculation: Sewer Extension Engineer's Opinion of Cost
Study Area: 26

Item	Quantity	Units	Unit Cost	Total
LPS Force Main	4,030	LF	$65.00	$261,954
Force Main	0	LF	$85.00	$0
Gravity Sewer	0	LF	$105.00	$0
Grinder Pump	33	EA	$10,000.00	$330,000
LPS Terminal Manhole	1	EA	$8,000.00	$8,000
LPS Air Release Manhole	0	EA	$10,000.00	$0
Small Pump Station		LS	$400,000.00	$0
Medium Pump Station		LS	$600,000.00	$0
Clean Out Manhole	0	EA	$20,000.00	$0
Gravity Sewer Manhole	2	EA	$4,200.00	$8,400
Police Detail	10	DAY	$320.00	$3,200
			Construction Subtotal:	$611,554
			40% Engineering & Contingency	$244,622
			Opinion of Probable Cost:	**$856,000**

Notes:



Comprehensive Wastewater Management Plan (CWMP)

Board of Water & Sewer Commissioners
Mattapoisett, MA

March 22, 2007

Public Meeting

Tighe&Bond

Who's Involved with the CWMP Effort:

- Water & Sewer Commissioners
- Department of Environmental Protection (DEP)
- Tighe & Bond
  - Ron Michalski, P.E. — Ian Catlow, P.E.
  - Pat Sheridan — Crystal Chalapatas
- Citizen Advisory Committee (CAC)
  - Dan Lee – Board of Health
  - Ray Andrews – Board of Selectmen
  - Dave Nicolosi – Conservation Commission
  - Tom Tucker – Planning Board
  - Dan Chase – Water/Sewer Board
  - Dan Barrows – Citizen Appointee
  - Nick Nicholson – Water/Sewer
- Mattapoisett Residents
- Other State Agencies

Tighe&Bond

Background Information:

- **Limited Sewers (1930-1975)**
- **Expanded Municipal Sewerage System (late 1970's)**
  - Downtown area sewered
  - Regionalization with Fairhaven
- **Sewer Facilities Plan Completed (1983)**
  - Reviewed sewer needs
  - Prioritized sewer needs
  - Recommended more Fairhaven capacity
  - Developed sewer expansion recommendations
  - Provided cost estimates
  - Reviewed environmental issues
- **Sewer System Expanded (1996-2007)**

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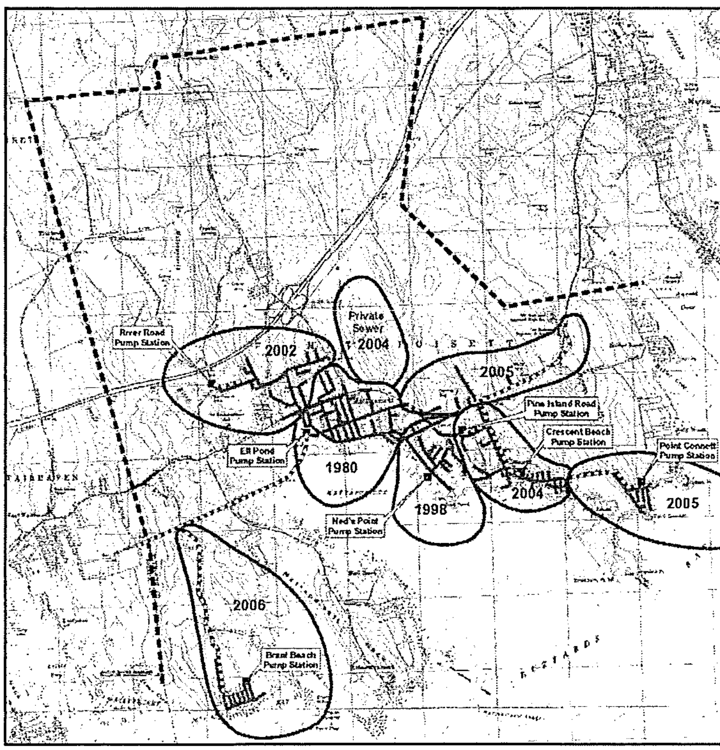


Where Have Sewers Been Installed?

Tighe&Bond

Why is the CWMP Needed in 2007?

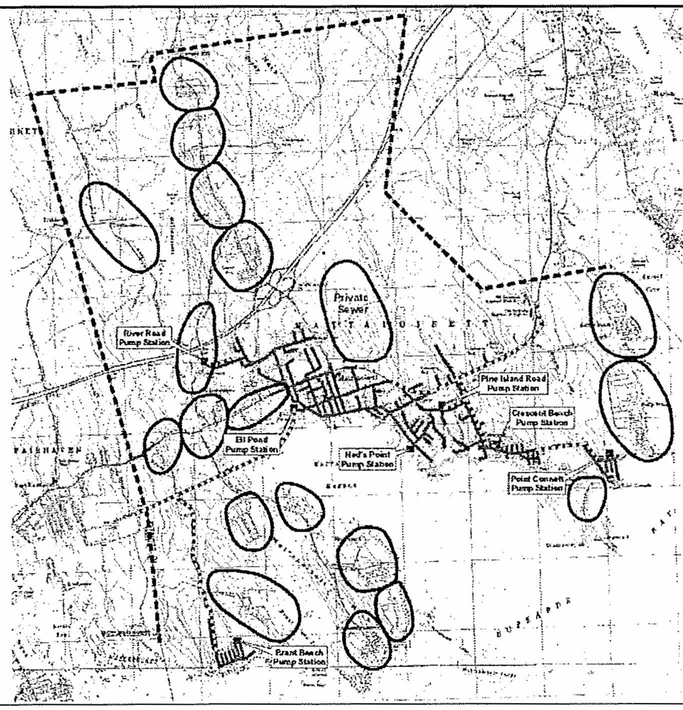
- DEP Requirement
- Existing Plan 25 Years Old
- Review Existing Sewage Flows
- Review Current Sewer Needs
- Review Sewer Service Options
- Determine Future Sewage Capacity Needs
- Initiate Fairhaven Discussions
- Plan for the Future

Tighe&Bond

Key CWMP Efforts Include:

- Review Existing Conditions
  - Develop sewer map
- Identify Wastewater Needs
  - Sewer needs analysis
  - Evaluate I/I
  - Assess Eel Pond PS
  - Fairhaven IMA
- Discuss Future Conditions
- Develop Sewer Alternatives
- Evaluate Sewer Alternatives
- Review Environmental Issues
- Provide Long Term Recommendations

Tighe&Bond



Tighe&Bond

Project Status

In Progress

- Existing Conditions Assessment
- Wastewater Needs Analysis

Future Work

- Future Conditions Assessment
- Develop & Screen Alternatives
- Recommend Alternatives
- MEPA ENF & Public Participation

Tighe&Bond

Wastewater Needs Analysis

- Develop Evaluation Criteria
- Define Study Areas
- Collect & Evaluate Septic System Data
  - Date of construction/repair
  - Pump-out records
  - System inspection records
  - Card survey
- Evaluate Physical Constraints
- Apply Evaluation Criteria

Tighe&Bond

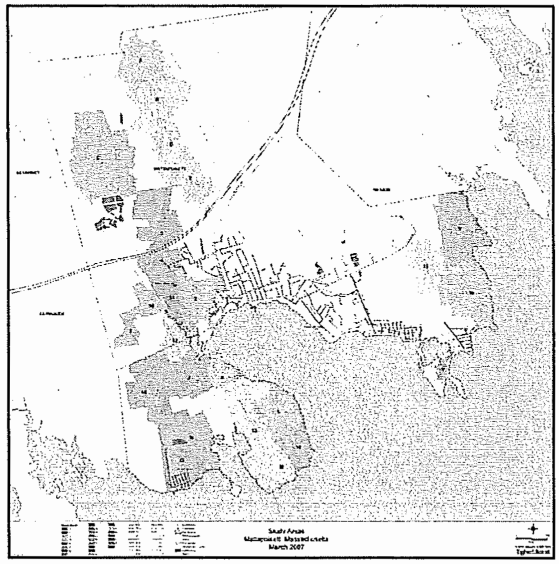
Needs Analysis Evaluation

Weight	Septic	Soils	Ground-water	Lot Size	Envir. Resource
High	Failure / Pumpout/ older system	Low perc rate	Shallow	Small	Closer
⇕	⇕	⇕	⇕	⇕	⇕
Low	Repair/ newer system	High perc rate	Deep	Large	Farther

Tighe&Bond

Study Areas

- 21 Areas Defined
- Grouping Criteria
  - Lot size
  - Zoning
  - Physical/Environmental Constraints



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Needs Analysis Data Collection

Board of Health Septic Records

Assessors Database

Town-wide Parcel Mapping

Water Resource Mapping

Soil and Groundwater Mapping

Needs Analysis ⟷ Public Participation

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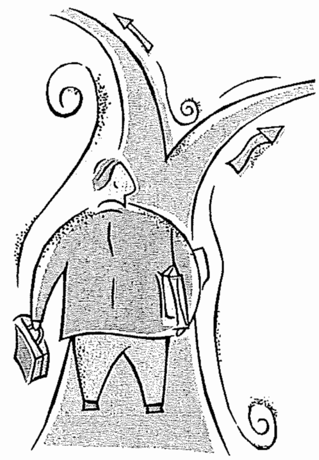
Future Work

- Complete Needs Analysis
- Future Conditions Assessment
  - Flow projections
- Develop & Screen Alternatives
  - Onsite systems
  - Decentralized systems
  - Municipal system expansion
  - Inter Municipal Agreement
- Recommended Plan
- Public Participation



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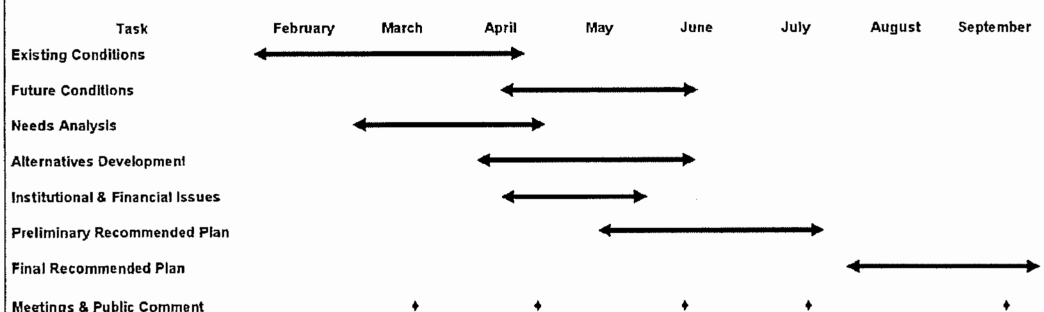
Anticipated Schedule



Tighe&Bond

Project Contacts

Nick Nickolson
Mattapoisett Water & Sewer Department
Superintendent
County Rd.
Mattapoisett, MA
E: wnicholson@mattapoisett.net
P: 508-758-4161

Ron Michalski, P.E.
Tighe & Bond
Principal In Charge
53 Southampton Rd.
Westfield, MA 01085
E: ramichalski@tighebond.com
P: 413-572-3203

Ian Catlow, P.E.
Tighe & Bond
Project Manager
446 Main St.
Worcester, MA 01608
E: ibcatlow@tighebond.com
P: 508-471-9605

Tighe&Bond

March 22, 2007 Public Meeting

Jim Huntoon Introductory comments

On behalf of the Board of Water & Sewer Commissioners, welcome to the first public meeting on a study that will be reviewing the sewage needs of Mattapoisett. DEP has a fancy name for the study----it's called a Comprehensive Wastewater Management Plan.

At this time, I'd like to introduce the members of the Water & Sewer Commissioners who are attending the meeting, as well as Nick Nicholson.

For everyone's information, Mattapoisett completed a similar study in the early 1980's. The Board has used the study as a planning guide for more than $15,000,000 worth of sewer extensions over the last 15 years that have added more than 1,000 additional homes/businesses to our municipal sewerage system. A driving force for sewer extensions in our community were new Title V Septic System regulations that were adopted by the State in 1996. The regulations require septic tank inspections for all real estate transactions and included more stringent details for septic system repairs and updates-----requirements that some homeowners have a very difficult time dealing with.

Sewer extensions projects that have been completed have addressed sewage needs in areas where groundwater is high, where lots are small, where septic systems failures are frequent and where homeowners have few options to economically upgrade their on site septic systems.

Our Board has addressed sewage needs in many community areas. However, our Board still believes there is more work to do in that there are still sections of Mattapoisett where on site septic system problems exist. Rather than continue to use a 25 year old study as a planning guide, our Board and the town has funded this new study to look at Mattapoisett's sewage needs in 2007 and for 20 years into the future.

Tighe & Bond, who has worked with our Board for more than 30 years, will be completing the study. Two representatives of the firm are here tonight to introduce the study concept to interested citizens and to outline what the study will accomplish over the next nine months.

Finally, this meeting was publicized in the Wanderer. The advertisement noted that written comments from interested citizens can be submitted to the Water & Sewer Department at their convenience.

Before turning the meeting over to Tighe & Bond, I'd like to welcome residents who will act as advisors on the study. They're actually members of a Citizens Advisory Committee who will be introduced during the presentation and will hopefully enable the study to address the specific needs of Mattapoisett as seen by Mattapoisett residents.

On behalf of the Board, thank you for your anticipated assistance. Now, I'll turn the meeting over to Ron Michalski.

General Notes from the March 22, 2007 public meeting

1. Question on Leisure Shore Area----this is the area adjacent to the Brant Beach project. The response pointed out that the Leisure Shore area would be reviewed during the needs analysis. If a need was identified, the study would review options to serve the area.

2. Question on Mattapoisett Neck----attendees were advised that sewer extensions were being designed for the Neck. However, there are no plans to construct sewers. The CWMP effort must be completed confirming a need and confirming sewer capacity. The CWMP will outline a possible construction program for the area.

3. Follow-up question on the Neck regarding pumping stations----two pumping stations are being designed. One for the residential area on the east side of the Neck that will serve most of the southern section of Mattapoisett Neck and one main pump station within an existing traffic island on the Neck Road in the vicinity of Oliver Lane and West Hill. The town owns the traffic island. The town does not own the residential area pump station but has initiated discussions with a land owner for a location.

4. Question of low pressure sewers-----attendees were notified that a majority of Mattapoisett Neck would be served by low pressure sewers. Each home would have a grinder pump installed, the pump chamber would collect sewage and pump the sewage into small pipes in the street that would transport sewage to a larger, central pumping station. While gravity sewers were preferred, the terrain, soils conditions, ledge and costs frequently dictate gravity versus low pressure sewers.

5. Question on betterments----people were advised that all Mattapoisett sewer connections are paid for by the actual sewer users via betterment assessments. Average betterment costs range between $10,000 and $22,000 depending on the facilities required to support a partial construction project. Mr. Huntoon confirmed that a fixed assessment process is used whereby all users are assessed the same cost that can be paid for over a 20 year borrowing period.

6. Comment of Title V requirements---attendees were advised that new Title V regulations adopted by the State in 1996 has impacted the need for sewers. The regulations require an inspection of septic systems as part of a real estate transaction. In addition, the requirements dictate more difficult septic system installation and repair details that are sometimes difficult to comply with.

7. Question on connections to new sewers ---are they required-------attendees were notified that the Board of Health does anticipate the all homeowners will connect to the sewer system. However, the Board is somewhat flexible depending on existing circumstances. Dan Lee noted that homeowners with newer septic systems are allowed to wait before a connection. In addition, Mr. Lee pointed out

that Board will work with homeowners with troublesome systems when sewer construction activity is imminent.

8. Comment from Mr. Lee on behalf of the Board of Health-----the Board is very interested in seeing sewer extensions to River Road, Shaw Street and the Industrial Park. These are areas with problems or close to the Mattapoisett River basin.

9. Question on sewer capacity----a lengthy discussion on sewer capacity took place. Attendees were advised that Mattapoisett owns 500,000 gpd of sewage capacity in the Fairhaven system. Currently, Mattapoisett generates almost 300,000 gpd of sewage but not all homes have connected to the sewerage system where sewer extensions have been completed. In addition, the sewage capacity issue is complicated by Infiltration/Inflow concerns in certain existing sewers, by summer seasonal usage of the sewer system and by the cumulative impact of various sewer flows for each sewer extension project. DEP and Fairhaven believe that Mattapoisett is approaching or will exceed the current IMA limit of 500,000 gpd. Optimistically, the CWMP will review this issue and provide insights to Mattapoisett officials that may result in negotiations for additional sewage capacity from Fairhaven.

10. Another question on sewer capacity regarding Mattapoisett Neck----the response noted that there may be capacity available for the Neck project but the study must be completed to review the issue. The study may determine that Mattapoisett needs additional capacity to pursue the Neck project.

11. If there is some available capacity, who gets it------optimistically, the sewer needs analysis will determine where the priority sewer needs are and make recommendations accordingly.

12. Question on nitrogen and the Fairhaven WWTP---attendees were advised that nitrogen removal at treatment facilities was an issue being reviewed by DEP. In the future, the Fairhaven WWTP may be required to provide a higher level of treatment to reduce nitrogen levels to New Bedford Harbor. Since Mattapoisett owns 10% of the Fairhaven facility, Mattapoisett will share in the costs to improve the plant.

13. Comments on the development concept----attendees were advised that Mattapoisett sewer planning focuses on serving existing homes. There is no current plan to reserve or project sewage capacity for the development of open land in the community. As an example, if a sewer passes by a lot that has 100 acres, the lot is considered one building lot with no capacity considered for the possible development of the parcel into numerous building lots.

14. Question on I/I---will I/I removal provide additional sewage capacity----optimistically yes but attendees were advised that I/I mitigation is difficult. The

3/22/07

M-382
CWMP

NAME	ADDRESS OR EMAIL
[illegible]n Michalski	RAMICHALSKI@TIGHEBOND.COM
N[illegible]ck Nicholson	19 County RD MATTAPOISETT
[illegible]	4 E [illegible] St Matt.
David [illegible]colosi	5 Perkins Ln
Dana Barrows	136 [illegible] Island Rd
DAVID NORTON	11 Tinkham Lane DNORTON@CI.BROCKTON.MA.US
JACK Hamm	JACK.Hamm@~~[illegible]~~.state.MA.us
Laura Deorocki	~~[illegible]~~ deorocki@comcast.net
[illegible]om Tucker	12 Oliver's Lane Tucker@surfglobal.net
Greg Downey	175 North gmdowney@yahoo.com
David Mc[illegible]	18 Main St DM@mahoneylumber.com
Cornelius J Coleman	1 Bay Shore Dr. CJColemanBeach@AOL.com
ANDREW SMITH	882 MAIN ST W. WAREHAM 02576 downtheroad28@yahoo.com
PATRICK BREAULT	6 Old Mattapoisett Neck Rd. pbreault@rightnow.com
Rebecca Fealy	3 Oliver's Lane g.fealy@comcast.net
RICHARD CLARKE	185 BRANDT ISLAND RD
Jim Huntoon	W/S Commission
DAN CHASE	W/S Commission
IAN CATLOW	T&B

Mattaposiett Sewer Study

The Mattaposiett Board of Water and Sewer Commissioners is proceeding with a Comprehensive Wastewater Management Plan (CWMP) that reviews the long-term sewage needs of the community. The project is funded through a $154,818 low-interest loan from the Department of Environmental Protection (DEP) and is being conducted by Tighe and Bond, Inc. The engineer will be assisted by the board as well as by a Citizens Advisory Committee with representatives from various boards.

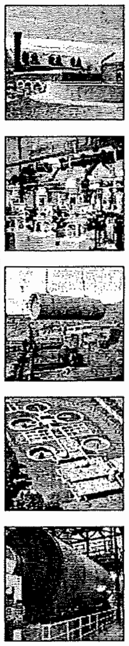
The Water and Sewer Commissioners completed a similar planning study back in 1982 that has been used as a guide for the expansion of the municipal sewerage system for the last 25 years. The current study will include the following tasks: a sewer needs assessment to determine areas of the community where sewer extensions may be needed; an infiltration/inflow study to review potential drainage leaks into the sewer system; an evaluation of the mechanical and electrical equipment at the Eel Pond sewer pumping station; a review of the future sewer capacity needs of the community and initial discussions with Fairhaven regarding the possibility of increased sewage capacity in the Fairhaven sewerage system.

The CWMP process started in late 2006. A public meeting is scheduled for 7:00 pm on Thursday, March 22 in the Conference Room of the Mattapoisett Town Hall. The public is welcome to attend and learn more about the CWMP process and to offer comments/suggestions.

If you have an interest in participating in the public meeting process but cannot attend the March 22 meeting, written comments/questions can be submitted to the Board of Water and Sewer Commissioners, 19 County Road, P.O. Box 474, Mattapoisett, MA 02739.

Mattapoisett Woman's Club

The Mattapoisett Woman's Club is offering one of many events that will be available during the town's



Comprehensive Wastewater Management Plan (CWMP)

Board of Water & Sewer Commissioners
Mattapoisett, MA

July 19, 2007

Citizen's Advisory Committee Briefing

Tighe&Bond

Project Status

In Progress
- Existing Conditions Assessment (90%)
- Wastewater Needs Analysis (90%)
- Future Conditions Assessment (50%)

Future Work
- Develop & Screen Alternatives
- Recommend Alternatives
- MEPA ENF & Public Participation

Tighe&Bond

Existing Conditions Assessment

- Sewer System Mapping
- I/I Evaluation
- Eel Pond Pump Station Evaluation
- Physical & Environmental Conditions
  - Demographics: population, land use & zoning
  - Physical Characteristics: climate, soils & topography
  - Environmental Conditions: water resources, historic sites & environmentally sensitive areas

Tighe&Bond

What Defines Wastewater Needs?

- Septic System Performance
- Collection System Capacity & Condition
- Future Conditions & Community Growth
  - Limited to existing residents

Tighe&Bond

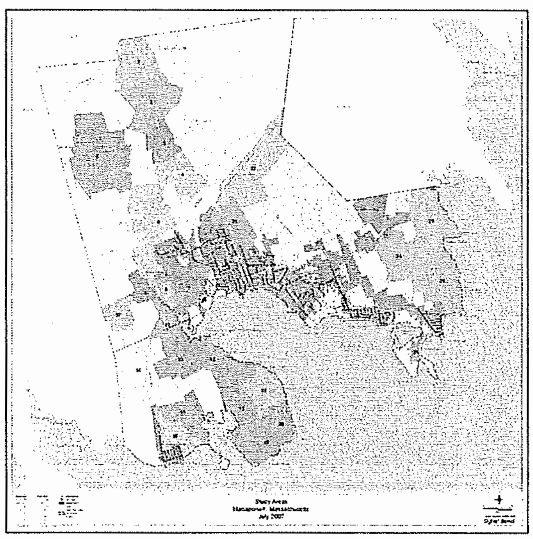
Wastewater Needs Analysis

- **Define Study Areas**
- **Develop Evaluation Criteria**
- **Collect & Evaluate Septic System Data**
  - Date of construction/repair
  - Pump-out records
  - System inspection records
  - Card survey
- **Evaluate Physical Constraints**
- **Apply Evaluation Criteria**

Tighe&Bond

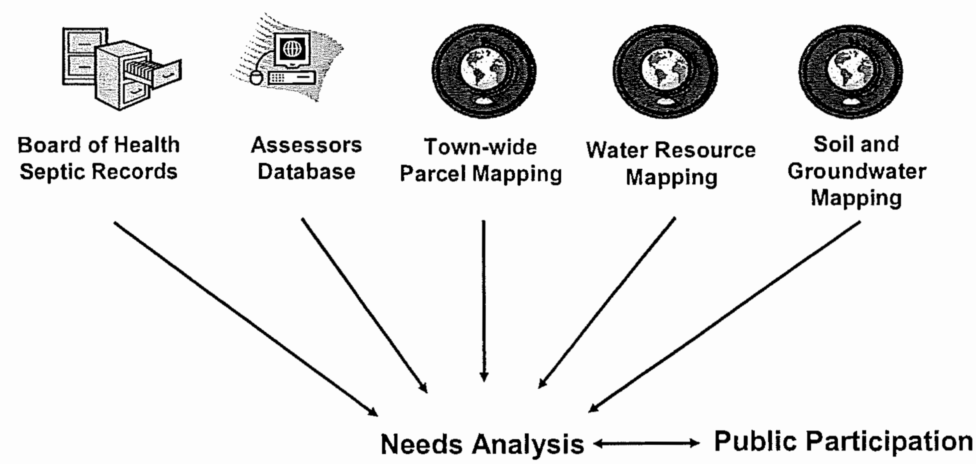
Study Areas

- **26 Areas Defined**
- **Grouping Criteria**
  - Lot size
  - Zoning
  - Physical/Environmental Constraints



Tighe&Bond

Needs Analysis Data Collection

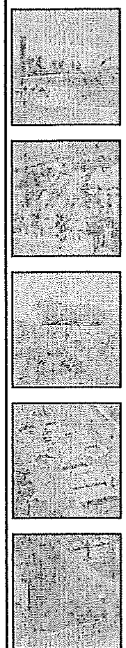


Tighe&Bond

Needs Analysis Evaluation

Weight	Septic	Soils	Ground-water	Lot Size	Envir. Resource
High	Failure / Pumpout/ older system	Low perc rate	Shallow	Small	Closer
⇕	⇕	⇕	⇕	⇕	⇕
Low	Repair/ newer system	High perc rate	Deep	Large	Farther

Tighe&Bond



Comprehensive Wastewater Management Plan (CWMP)

Board of Water & Sewer Commissioners
Mattapoisett, MA

August 16, 2007

Project Update Meeting

Ron Michalski, P.E.
Ian Catlow, P.E.

Tighe&Bond

Project Status

In Progress

- Existing Conditions Assessment (90%)
- Wastewater Needs Analysis (90%)
- Future Conditions Assessment (50%)

Future Work

- Develop & Screen Alternatives
- Recommend Alternatives
- MEPA ENF & Public Participation

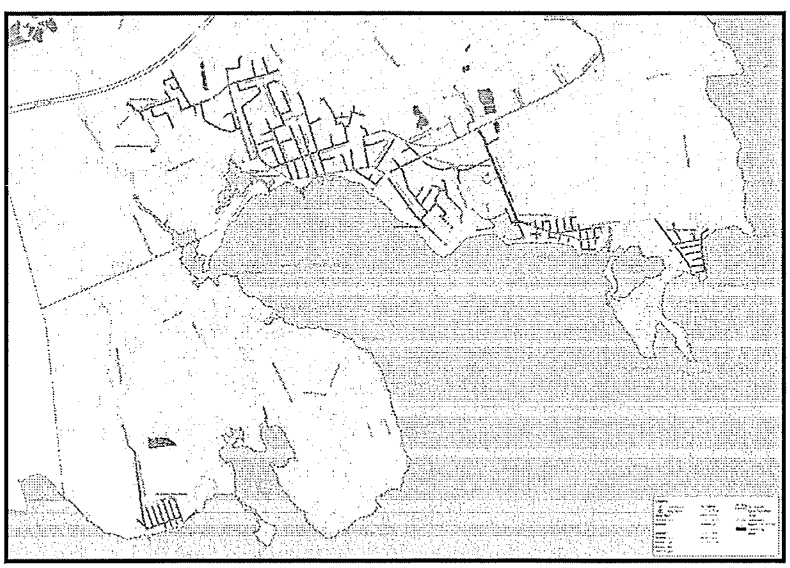
Tighe&Bond

Existing Conditions Assessment

- Sewer System Mapping
- I/I Evaluation
- Eel Pond Pump Station Evaluation
- Physical & Environmental Conditions
  - Demographics: population, land use & zoning
  - Physical Characteristics: climate, soils & topography
  - Environmental Conditions: water resources, historic sites & environmentally sensitive areas

Tighe&Bond

Sewer System Mapping



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Infiltration/Inflow Evaluation

- Infiltration Evaluation Complete
  - Some Infiltration Found at: Church St, Barstow St, North St, Water St.
  - Problems Due to Leaky Sewers, Lateral Connections & Manholes
- Inflow Evaluation
  - Smoke Testing Complete

Tighe&Bond

Eel Pond Pump Station Evaluation

- Short Term Improvements
  - Safety Equipment, Fuel Storage, New Pump, New Comminuter, Sampling Equipment, HVAC Equipment
  - Estimated Cost = $230,000 +/-
- Long Term Improvements
  - Concrete Repairs, 2 New Pumps, New Furnace
  - Estimate Cost = $238,000 +/-

Tighe&Bond

What Defines Wastewater Needs?

- Septic System Performance
- Collection System Capacity & Condition
- Future Conditions & Community Growth
  - Limited to existing residents

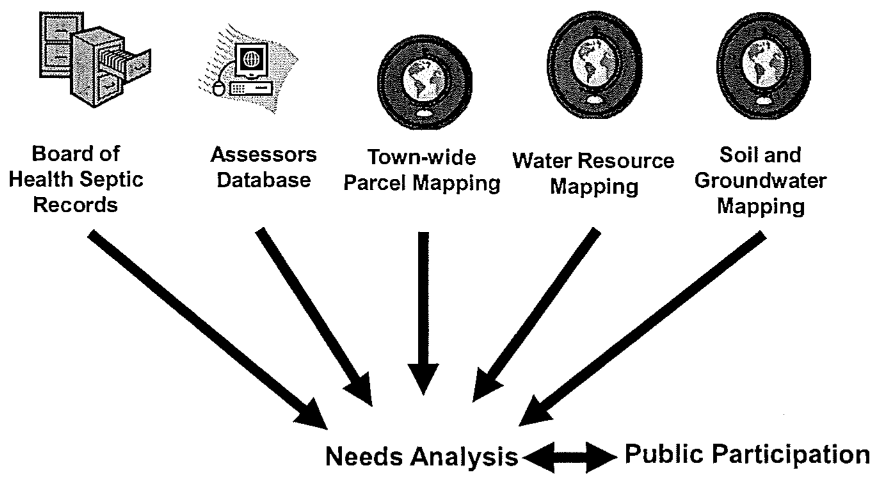
Tighe&Bond

Wastewater Needs Analysis

- Define Study Areas
- Develop Evaluation Criteria
- Collect & Evaluate Septic System Data
  - Date of construction/repair
  - Pump-out records
  - System inspection records
  - Card survey
- Evaluate Physical Constraints
- Apply Evaluation Criteria

Tighe&Bond

Needs Analysis Data Collection



Tighe&Bond

Needs Analysis Scoring Process

Actual/Categorical Failure - 8 Points	
Septic System:	Pumpouts: >4 times per year
Septic System:	Title 5 inspection failure (current and historical)
Lot Size:	Developed Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well
Water Resources:	Located within Zone 1 Aquifer Recharge Area
High Likelihood of Failure/Significant Impact - 4 Points	
Septic System:	Pumpouts: 2-4 times per year
Septic System:	Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record
Lot Size:	5,000 sf - 1/4 acre with public water or 1/4 - 1/2 acre with private well
Soils:	Low soil permeability (<0.2 in/hr) for greater than 50% of lot area
Water Resources:	Located within 200 feet of surface water supply tributary
Potential Failure/Moderate Impact - 2 Points	
Septic System:	Repaired prior to 3/31/95 (Revised Title 5)
Groundwater:	Shallow groundwater depth (≤ 1.5 feet) for greater than 50% lot area
Water Resources:	Located within IWPA, Zone II, or Zone B (nitrogen-sensitive areas)
Water Resources:	Located within 100 feet of impaired water
System Concern/Potential Impact - 1 Point	
Septic System:	Repaired on or after 3/31/95 (Revised Title 5)
Septic System:	Constructed between 1978 and 1995 without upgrade
Lot Size:	1/4 - 1/2 acre with public water
Water Resources:	Located within 100 feet of surface water or wetland

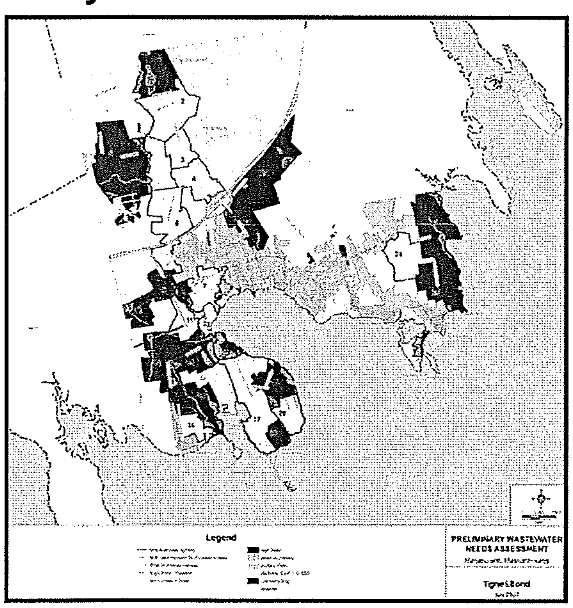
Tighe&Bond

Needs Analysis Results

Level of Wastewater Management Need	Study Area
Significant Need	19, 26, 23, 10, 18, 22, 15, 25, 21, 9, 14, 12, 13, 8, 5, 1
Moderate & Low Need	11, 20, 12, 17, 3, 4, 24, 6, 7

Tighe&Bond

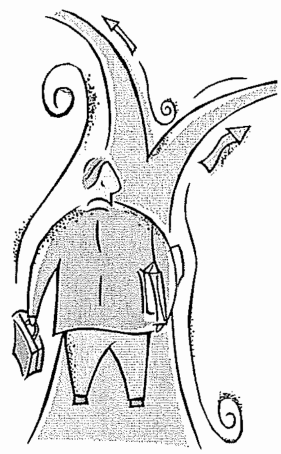
Needs Analysis Results



Tighe&Bond

Future Work

- Refine Needs Analysis
- Finish Future Conditions Assessment
  - Future Flow projections
- Develop & Screen Alternatives
  - Onsite systems
  - Decentralized systems
  - Municipal system expansion
  - Inter Municipal Agreement
- Recommended Plan
- Public Participation



Tighe&Bond

Project Contacts

Nick Nickolson
Mattapoisett Water & Sewer Department
Superintendent
County Rd.
Mattapoisett, MA
E: wnicholson@mattapoisett.net
P: 508-758-4161

Ron Michalski, P.E.
Tighe & Bond
Principal In Charge
53 Southampton Rd.
Westfield, MA 01085
E: ramichalski@tighebond.com
P: 413-572-3203

Ian Catlow, P.E.
Tighe & Bond
Project Manager
446 Main St.
Worcester, MA 01608
E: ibcatlow@tighebond.com
P: 508-471-9605

Tighe&Bond

Introductory Comments for August 16, 2007 Public Meeting

My name is Dan Chase and I'm the Chairman of the Board of Water & Sewer Commissioners.

On behalf of the Board, I'd like to thank everyone for joining us this evening to hear about progress on our Comprehensive Wastewater Management Planning effort, a fancy name for a sewer study. Before I continue I'd like to introduce other members of my Board.

Also, I'd like to introduce members of the Advisory Committee that are helping in guiding the development of the study. Member include: Dan Lee, Dave Nicolosi, Tom Tucker, Ray Andrews, Nick Nicholson and Dana Barrows.

In addition, Tighe & Bond, our consulting engineer on the project is here represented by Ron Michalski and Ian Catlow.

Before getting into specifics, I like to emphasis that this meeting was advertised in the Wanderer as well as on the Mattapoisett Cable TV network. In addition, more than 1,600 letters were recently mailed to various property owners in town initiating a Card Survey. The letter also advertised this meeting.

For general information, this sewer study started in late 2006 and has one primary goal-------to evaluate the sewer needs of our community. The study is financed by a low interest loan from MA DEP, is following study guidelines stipulated by MA DEP and was funded by a $160,000 town meeting authorization.

This is the second or three informational meetings that will be held. The first meeting occurred in March 2007 and introduced the overall study concept to interested citizens. This meeting will provide a brief project overview but will then focus on the sewer needs of our community-------are there areas in Mattapoisett where residents have problems with on site septic systems?

Finally, Tighe & Bond is going to make the presentation this evening. After the presentation, Tighe & Bond and Board members will address questions and comments from meeting participants.

I'm now going to turn the presentation over to Ron.

5. One person asked if they could review the points assigned to their parcel as part of the sewer needs analysis. Participants were advised that parcels were used to review needs but that the sewer study did not concentrate on individual needs but did concentrate on the needs of an area. Residents should not be concerned about how their particular parcel was assessed because one parcel was only a small component of the overall needs assessment.

6. Question of the Card Survey---some people indicated that they did not receive a Card Survey form? Participants were advised that Assessor data was used for the Card Survey. In addition, every Mattapoisett resident was not included in the Card Survey. The survey was limited to the sewer study areas. Residents were asked to identify themselves if they did not receive a card survey and data would be promptly mailed to them.

7. Is Fairhaven aware of Mattapoisett's sewage needs? Participants were advised that an official request for additional sewage capacity has not been made. However, Fairhaven knows that Mattapoisett is completing a sewer study. In addition, discussions with Fairhaven will be scheduled as soon as the future sewage capacity needs of the community are developed---probably within the next month to 6 weeks.

8. Question on development and sewer extensions – participants were advised that the Board of Water & Sewer Commissioners have a policy of serving existing homes with septic system problems. If a gravity sewer pipe happens to pass by an open lot, the open lot is left with one potential sewer service whether the lot is 1 acre or 100 acre. The Board intends to limit sewer service to that lot to one house connection because that is the capacity that has been reserved for a particular sewer extension project.

9. Question on connecting to the sewer system – is connecting a requirement? Participants were advised that the Board of Health has adopted a policy that all homes with the access to the sewer should be connected to the sewer. However, there is a time allowance for the connection. In some cases, the time allowance is expanded if a homeowner has recently expended significant funds to upgrade an on site septic system.

10. Question about water service to the Neck—when will it happen? Participants were advised that the Board of Water and Sewer Commissioners have plans to upgrade the municipal water system. In fact, a design contract for a new water storage tank was recently approved by the Board. Providing water service to areas like the Neck and Brant Beach is a long range goal. Meetings will probably be held in the future to discuss future water extensions.

11. Question on fire flows – can water mains be installed to provide fire service only? Participants were advised that the existing water distribution system has hydraulic

SIGN IN ~~[illegible]~~ M-382 CWMP

Name	Address
Bernie & Libby Klim	25 Antassawamock Rd
Susan & Tom McAvoy	28 Antassawamock Rd (TRI TOWN OBSERVER) 02576
ANDREA SMITH	882 MAIN ST W. WAREHAM
MADELYN FOGLER	20 SAGAMORE RD, MATT.
TED MACH	9 Hi-ONA-Hill.
Douglas Peck	33 Antassawamock Rd.
Michael & Laurie Harrington	19 Sagamore Rd Matt
Ray LaFleur	169 Brandt Island Rd
RICHARD CLARKE	145 BRANDT ISLAND RD
ROBERT ROUSSEAU	10 JOWICK ST.
DAVE NORTON	11 TINKHAM LANE
Brad + Priscilla Hathaway	87 Aucoot Rd.
Bill Straus - State Rep.	8 Nashawena Rd
John & Elizabeth Dawson	20 Shawmut Rd
Nancy M Ares please mail notice of next meeting	(31 Hollywoods Rd) to 102 Benvenue Wellesley 02482
Ellie Haines	1 Mattakeesett Rd.
Kathleen Reed	21 Antassawamock Rd.
Helen McGowan [illegible]	18 " "
BARRY DENHAM	5 PARK PLACE
Michael Fornelos	17 NASHAWENA RD
LISA WINSOR	1 DUPONT DR
Jan Kenney	12 Mattakeset Rd
Dave Kenney	12 " "
Laurie Loftus	3 King Phillip Rd. BL.Loftus@comcast.net
[illegible]	5 NASHAWENA RD
Charles A. Soares	217 North St.

J THOMPSON .com
@ NEEDHAMCO.com

PETE WOLSKI	4 CRYSTAL SPRING RD.
JOHN THOMPSON	2 MATTAKISET
Janet Liljedahl	8 Seaconet Rd
Bob [illegible]	8 Seaconet Rd
Hark Chadwick	9 Fairfield Ave
	12 Grand Ave
John Engel	14 Euclid Ave
Larry Jarvis	5 Euclid Ave.
Greg Downey	175 North
Ron Michalski	T & B
IAN CATLOW	T & B
DAN CHASE	Water & Sewer Comm

(C) JOHN THOMPSON 2 MATTAKISET
MAILING ADDRESS 27 College RD
Wellesley, MA 02482
J THOMPSON@Needhamco.com

(C) Mike Huguenin 48 Mt Pleasant St
Cambridge MA 02140

Tighe&Bond

TABLE 5-1
Study Area Description

	1	2	3	4	5
Major Roads	North Street	North Street Tinkham Hill Road	North Street	North Street Crystal Spring Road	Acushnet Road Long Plain Road Tinkham Lane
Zoning[5]	R80 - Residence (77%) RR80 - Rural Residence (23%)	R80 - Residence (71%) RR40 - Rural Residence (11%) RR80 - Rural Residence (18%)	R80 - Residence (97%) RR80 - Rural Residence (3%)	R80 - Residence (87%) RR80 - Rural Residence (9%) RR40 - Rural Residence (2%) NZ - Interstate 195 (2%)	RR80 - Rural Residence
Land Use[1,5]	Forest (52%) Low Density Residential (19%) Medium Density Residential (26%) Open Land (1%) Pasture (2%)	Forest (67%) Low Density Residential (19%) Medium Density Residential (13%) Open Land (0.3%) Pasture (0.5%) Crop Land (0.7%)	Forest (52%) Low Density Residential (47%) Pasture (1%)	Forest (43%) Low Density Residential (20%) Medium Density Residential (25%) Open Land (7%) Urban Open (1%) Pasture (1%) Transportation (3%)	Forest (60%) Low Density Residential (20%) Open Land (4%) Crop Land (14%) Non-Forested Wetland (2%) Pasture (0.1%) Urban Open (0.2%)
Watershed	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay
Water Resources[5]	IWPA (45%) Zone II (50%) Limited Wetland Resource Areas Mattapoisett River	Zone II (29%) Potentially Productive Medium Yield Aquifer (1%) Wetland Resource Areas Mattapoisett River	Zone II (24%) Wetland Resource Areas	Limited Wetland Resource Areas	Zone II (82%) Potentially Productive Medium Yield Aquifer (19%) Potentially Productive High Yield Aquifer (6%) Wetland Resource Areas Mattapoisett River Community PWS - Groundwater
Soil and Groundwater Characteristics[3,4,5]	Throughout study area: Depth to groundwater: shallow Throughout 98% of study area: Soil permeability: low Throughout 2% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 83% of study area: Soil permeability: low Throughout 17% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 86% of study area: Soil permeability: low Throughout 14% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 93% of study area: Soil permeability: low Throughout 7% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Soil permeability: low

1. Land use descriptions from MaGIS include:
   low density res.: >0.5 acre lots
   medium density res.: 0.25-0.5 acre lots
   high density res.: <0.25 acre lots
2. Not listed as land use in MaGIS data
3. Depth to groundwater:
   shallow: 4 ft or less
   deep: greater than 4 feet
4. Permeability:
   low: 0.6 in/hr or less
   high: greater than 0.6 in/hr
5. Percentages represent % of study area

TABLE 5-1
Study Area Description

	6	7	8	9	10
Major Roads	Interstate 195 Crystal Spring Road River Road Acushnet Road	Route 6 (Fairhaven Road) Reservation Road	Route 6 (Fairhaven Road) Shaw Street	Route 6 (Fairhaven Road) River Road	Route 6 (Fairhaven Road) Brandt Island Road
Zoning[5]	RR80 - Rural Residence (63%) RR30 - Rural Residence (33%) R80 - Residence (0.2%) RR40 - Rural Residence (0.3%) NZ - Interstate 195 (4%)	RR30 - Rural Residence (71%) GB - General Business (7%) MR - Marine Residence (15%) R30 - Residence (6%) VR10 - Village Residence (0.1%)	RR30 - Rural Residence (87%) GB - General Business (13%)	RR30 - Rural Residence (62%) GB - General Business (38%)	RR30 - Rural Residence (76%) GB - General Business (24%)
Land Use[1,5]	Forest (60%) Low Density Residential (18%) Open Land (5%) Pasture (2%) Crop Land (11%) Medium Density Residential (<0.1%) Transportation (3%) Non-Forested Freshwater Wetland (3%)	Forest (9%) Low Density Residential (24%) Open Land (9%) Salt Water Wetland (14%) Participation Recreation (30%) Commercial (10%) Pasture (0.1%) High Density Residential (0.5%) Urban Open (0.1%)	Forest (27%) Low Density Residential (13%) Medium Density Residential (13%) Open Land (8%) Urban Open (12%) Pasture (2%) Crop Land (6%) Participation Recreation (5%) Commercial (9%) Salt Water Wetland (4%)	Forest (54%) Low Density Residential (35%) Pasture (3%) Commercial (8%)	Forest (58%) Low Density Residential (8%) Medium Density Residential (32%) Waste Disposal (2%)
Watershed	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay
Water Resources[5]	IWPA (52%) Zone II (67%) Potentially Productive Medium Yield Aquifer (2%) Wetland Resource Areas Mattapoisett River Community PWS - Groundwater	IWPA (0.6%) Zone II (22%) Potentially Productive Medium Yield Aquifer (30%) Limited Wetland Resource Areas Adjacent to: Mattapoisett R., Eel Pond, Mattapoisett Harbor	IWPA (26%) Zone II (69%) Potentially Productive Medium Yield Aquifer (64%) Limited Wetland Resource Areas Adjacent to: Mattapoisett R.	IWPA (43%) Zone II (92%) Potentially Productive Medium Yield Aquifer (13%) Adjacent to: Mattapoisett R.	Swift Brook Adjacent to: Zone II
Soil and Groundwater Characteristics[3,4,5]	Throughout 52% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 48% of study area: Depth to groundwater: deep Soil permeability: high	Throughout study area: Depth to groundwater: deep Soil permeability: high	Throughout study area: Depth to groundwater: deep Soil permeability: high	Throughout 77% of study area: Depth to groundwater: deep Soil permeability: high Throughout 23% of study area: Depth to groundwater: shallow Soil permeability: low	Throughout study area: Depth to groundwater: shallow Soil permeability: low

1. Land use descriptions from MaGIS include:
   low density res.: >0.5 acre lots
   medium density res.: 0.25-0.5 acre lots
   high density res.: <0.25 acre lots
2. Not listed as land use in MaGIS data
3. Depth to groundwater:
   shallow: 4 ft or less
   deep: greater than 4 feet
4. Permeability:
   low: 0.6 in/hr or less
   high: greater than 0.6 in/hr
5. Percentages represent % of study area

TABLE 5-1
Study Area Description

	11	12	13	14	15	16
Major Roads	Mattapoisett Neck Road	Mattapoisett Neck Road Shore View Avenue	Mattapoisett Neck Road West Hill Road	Brandt Island Road	Brandt Island Road Meadowbrook Lane	Brant Beach Avenue Highland Avenue BB Ocean View Avenue
Zoning[5]	RR30 - Rural Residence	RR30 - Rural Residence (63%) W30 - Waterfront Residence (37%)	RR30 - Rural Residence	RR30 - Rural Residence (99%) MR - Marine Residence (1%)	MR - Marine Residence (67%) W30 - Waterfront Residence (20%) RR30 - Rural Residence (13%)	W30 - Waterfront Residence (98%) RR30 - Rural Residence (0.5%) MR - Marine Residence (0.1%)
Land Use[1,5]	Forest (52%) Low Density Residential (25%) Open Land (11%) Salt Water Wetland (11%)	Forest (13%) Medium Density Residential (32%) Salt Water Wetland (53%)	Forest (60%) Low Density Residential (20%) Medium Density Residential (5%) Open Land (2%) Salt Water Wetland (13%)	Forest (84%) Low Density Residential (8%) Pasture (5%) Open Land (2%) Crop Land (1%) Medium Density Residential (1%)	Forest (39%) Low Density Residential (22%) Medium Density Residential (14%) Salt Water Wetland (11%) Open Land (9%) Pasture (2%) Commercial (1.4%) Water Based Recreation (1%) Urban Open (0.1%) Cranberry Bog[2]	Forest (53%) Low Density Residential (5%) High Density Residential (30%) Salt Water Wetland (9%) Medium Density Residential (0.3%) Open Land (0.7%)
Watershed	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay
Water Resources[5]	Adjacent to: Zone II Limited Wetland Resource Areas Swift Brook Adjacent to: Mouth of Mattapoisett R.	Large Wetland Resource Areas Swift Brook Adjacent to: Mattapoisett Harbor	Wetland Resource Areas Swift Brook Adjacent to: Mouth of Mattapoisett R., Mattapoisett	Limited Wetland Resource Areas Swift Brook	Limited Wetland Resource Areas	Limited Wetland Resource Areas Adjacent to: Buzzards Bay
Soil and Groundwater Characteristics[3,4,5]	Throughout 98% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 2% of study area: Depth to groundwater: deep Soil permeability: high	Throughout study area: Depth to groundwater: deep Soil permeability: high	Throughout 92% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 8% of study area: Depth to groundwater: deep Soil permeability: high	Throughout study area: Depth to groundwater: shallow Soil permeability: low	Throughout 74% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 26% of study area: Depth to groundwater: deep Soil permeability: high	Throughout 85% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 15% of study area: Depth to groundwater: deep Soil permeability: high

1. Land use descriptions from MaGIS include:
   low density res.: >0.5 acre lots
   medium density res.: 0.25-0.5 acre lots
   high density res.: <0.25 acre lots
2. Not listed as land use in MaGIS data
3. Depth to groundwater:
   shallow: 4 ft or less
   deep: greater than 4 feet
4. Permeability:
   low: 0.6 in/hr or less
   high: greater than 0.6 in/hr
5. Percentages represent % of study area

7.6 STUDY AREA COLLECTION SYSTEM ALTERNATIVES

Alternatives for delivering flow from each of the study areas determined to have a severe need in Section 5 to the existing collection system, or potentially to other wastewater management treatment alternatives, are presented in this sub-section. In either case, a central collection system will likely be required to convey sewage to the treatment system.

In general, gravity alternatives are shown, along with pumping stations in locations that cannot be served solely by a gravity system. Low pressure sewers are also shown, where appropriate, for many areas. Collection system alternatives for each high need study area are summarized below and are shown on a map located in Appendix G. Recommendations for collection system alternatives are discussed in Section 8.

7.6.1 Study Area 1

Study area 1 was determined to have a severe need for alternative wastewater management solutions other than on-site septic systems. Study area 1 is located in northern Mattapoisett, on the Rochester border, remote from Mattapoisett's existing wastewater collection system. It is not considered feasible to extend the collection system north across I-195 to Study area 1 at this time. Furthermore, constructing such a sewer would reduce the amount of recharge in the upper reaches of the Mattapoisett River basin, producing a local water imbalance. There is only one other high need study area north of I-195 (area 5) and it is not practical to consider an extension of the collection system to serve these remote areas. Therefore, Study Area 1 will, most likely, be served by upgraded/improved on-site systems or by a satellite treatment system if conditions warrant the process. Collection system alternatives are not shown for this study area because the location of the satellite treatment system and extent of the collection system are not yet defined.

7.6.2 Study Area 5

Similar to Study Area 1, Study Area 5 was also determined to have a high need for alternative wastewater management solutions but is also located remote from the existing collection system, north of I-195. Therefore, Study Area 5 will, most likely, be served by upgraded/improved on-site systems or by a satellite treatment system if conditions warrant the process. Collection system alternatives are not shown for this study area because the location of the satellite treatment system is not yet defined.

TABLE 3-2
Zoning Districts

District	Minimum Lot Size (sq. ft.)	Permitted Uses	Minimum Frontage	Mininum Setbacks
Residence 80 (R80)	80,000	Detached one-family dwelling with accessory private structures, renting of rooms for not more than 2 persons in a res. dwelling, stabling of not more than 2 riding horses for personal use of occupants of premises. Accessory uses (see By-Laws). Family related apts (see By-Laws).	150'	street: 50' rear: 40' side: 30'
Rural Residence 80 (RR80)	80,000	Any use permitted in W30. All agricultural, horitcultural, and floricultural uses (See Byl-Laws), roadside stands owned and operated by a resident for the sale of produce at least 75% of which is grown in Town, public access and private golf courses with 9 or 18 regulation length golf holes located on parcel(s) of land not less than 75 acres (See By-Laws).	150'	street: 50' rear: 40' side: 30'
Rural Residence 45 (RR45)	45,000	(Same as RR80)	150'	street: 50' rear: 40' side: 30'
Residence 40 (R40)	40,000	(Same as R80)	150'	street: 50' rear: 40' side: 30'
Rural Residence 40 (RR40)	40,000	(Same as RR80)	150'	street: 50' rear: 40' side: 30'
Residence 30 (R30)	30,000	Any use permitted in R40 except that the lot size for a principal dwelling and one guest house shall be at least 40,000 sq. ft.	150'	street: 50' rear: 40' side: 30'
Rural Residence 30 (RR30)	30,000	(Same as RR80)	150'	street: 50' rear: 40' side: 30'
Waterfront 30 (W30)	30,000	Any use permitted in R30. Renting of rooms and furnishing of board for not more than four (4) persons, in a dwelling occupied for residential purposes, provided no signs are displayed. Accessory uses (see By-Laws).	125'	street: 35' rear: 30' side: 20'
Marine Residence (MR)	30,000	Any use permitted in W30. Inns and hotels, marinas if authorized by Special Permit by Board of Appeals.	125'	street: 35' rear: 30' side: 20'
Residence 20 (R20)	20,000	Any use permitted in R30. Land serviced by Town's sanitary sewer shall be subject to Zoning Dist.	125'	street: 35' rear: 30' side: 20'
Village Residence (VR 10)	10,000	Any use permitted in W30. Inns on north side of Water St. only. Multi-family dwellings of no more than 4 dwelling units and no more than 2.5 stories in height, provided the lot retains at least 40,000 sq. ft. unoccupied by bldgs. Conversion of one-family dwelling to two-family dwelling provided no additions to dwelling are made and alteration preserves character of dwelling and provided land is serviced by Town's sanitary sewer.	100'	street: 25' rear: 30' side: 10'
General Business (GB)	-	Uses permitted in any res. Dist. except multi-family which only will be allowed following issuance of special permit by Board of Appeals (See By-Laws), professional offices, personal service agencies, home based businesses and retail structures, restaurants (non-fast-food)	150'	street: 65' rear: 30' side: 20'
Limited Industry (LI)	-	Any use permitted in any District except residential uses; the following uses provided they will not be detrimental, dangerous, or obnoxious to adjoining areas: warehousing; storage/sale of equipment, materials or fuel oil; product fabrication or assembly of parts; research labs and small component mfrs.; clerical, statistical, and construction service offices; publishing and printing businesses; food processing and packaging; marine industry; adult live entertainment establishment, adult theater/sexually oriented business, as defined in Article 2 of By-Laws.	200'	street: 75' rear: 50' side: 50'

5.2 EVALUATION CRITERIA

Developed parcels in each study area were evaluated based on several criteria to determine the adequacy of conventional on-site wastewater disposal systems to address wastewater management needs. These criteria include the following:

- Existing on-site wastewater disposal problems
- Lot size
- Soil permeability
- Depth to groundwater
- Proximity to water resource areas including surface water bodies, wetlands, and drinking water supplies

Some criteria indicate a higher potential for an on-site wastewater disposal system to fail or represent a greater threat to public health and water quality than others. Therefore, the criteria were ranked in the following categories based on potential impact to the public health or environment:

1. Actual/Categorical Failure
2. High Likelihood of Failure/Significant Impact
3. Potential Failure/Moderate Impact
4. System Concern/Potential Impact

The needs criteria are discussed in more detail in sections 5.2.1 to 5.2.5 below and are summarized in Table 5-2 at the end of this subsection.

5.2.1 Existing On-Site Wastewater Disposal Problems

Records of on-site wastewater disposal system failures or significant repairs, such as leaching field replacement, are indicative of not only past problems, but also of the potential for future problems. Dates of the construction and repair indicate the standards to which the systems were designed. The newer the system, the more likely it complies with current Title 5 regulations and will be able to continue to meet on-site wastewater needs. In addition, the frequency of septic tank pumpouts also points to an existing or potential system failure. Systems that are pumped frequently are likely problematic. Systems that are pumped more than four times per year are indicative of a failed system per Title 5.

Evaluation criteria for septic system failures, repairs, age and pumpouts utilized in the needs analysis include the following:

1. Actual/Categorical Failure
   a. Pumpouts: More than 4 times per year
   b. Title 5 inspection failure (current and historical)
2. High Likelihood of Failure/Significant Impact
   a. Pumpouts: 2-4 times per year
   b. Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record
3. Potential Failure/Moderate Impact
   a. Repaired prior to 3/31/95 (Revised Title 5)
4. System Concern/Potential Impact
   a. Repaired on or after 3/31/95 (Revised Title 5)
   b. Constructed between 1978 and 1995 without upgrade

The Mattapoisett Board of Health maintains records of on-site septic systems using a program called SepTrak. This program was originally developed by SRPEDD to document septic system performance throughout southeastern Massachusetts. Mattapoisett has attempted to populate the SepTrak database with paper records dating back to 1996. Information recorded in the SepTrak database was linked with Assessor's parcel data in a Geographic Information System (GIS) database. This allowed for a spatial analysis of the septic system records.

Approximately eleven years of SepTrak data was evaluated for approximately 1,485 developed parcels within the study areas. Records were available for 400 of these 1,485 parcels (27% of developed lots in study areas). Of these 400 parcels, there were:

- 75 Title 5 failures
- 14 septic tank pumpouts >4 times/year
- 259 septic tank pumpouts 2-4 times/year
- 141 septic systems constructed before Title 5 (1978) or developed lots pre-1978 with no Board of Health record
- 96 septic systems repaired prior to the revised Title 5 (3/31/95)
- 287 septic systems repaired on or after the revised Title 5 (3/31/95)
- 372 septic systems were constructed between 1978 and 1995 without an upgrade

Numerous developed properties within the study areas have exhibited problems with on-site disposal systems, and additional properties have the potential for problems with their existing systems.

5.2.2 Lot Size

Lot size can impede the siting of a code compliant septic system, especially if there are other constraints such as on-site drinking water wells, low permeability soils or wetlands located on the site. According to MADEP's criteria for project funding described in the Project Evaluation Form guidelines, lots less than 5,000 square feet (sf) are considered to be too small for a complying system and are considered failures. The smaller the lot, the more likely the effluent will impact groundwater quality, especially when lots are less than one acre. Figure 5-2 depicts lots in Mattapoisett with a lot size less than one half acre.

Evaluation criteria for lot size utilized in the needs analysis include the following:

1. <u>Actual/categorical failure</u>
    a. Developed Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well
2. <u>High likelihood of failure/Significant impact</u>
    a. 5,000 sf - 1/4 acre with public water or 1/4 - 1/2 acre with private well
3. <u>Potential failure/Moderate impact</u>
    a. None
4. <u>System concern/Potential impact</u>
    a. 1/4 - 1/2 acre with public water

Of the 1,485 developed lots within the study areas, there are:

- 178 developed lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well
- 260 developed lots 5,000 sf - 1/4 acre with public water or 1/4 - 1/2 acre with private well
- 236 developed lots 1/4 - 1/2 acre with public water

Approximately 45% of the developed properties within the study areas have small lots that limit their ability to properly site a complying septic system.

5.2.3 Soils

Permeability is a measure of how quickly water can flow through soil. The less permeable the soil, the larger the soil absorption system has to be to comply with Title 5 regulations and to prevent problems such as breakout or backups into homes.

When siting soil absorption systems, percolation tests are often used as an empirical measure of a site's ability to accept wastewater effluent. Percolation test records for existing septic systems are limited in scope because not all developed lots have these records on file. In addition, the standard of care for percolation tests on older systems are not as stringent as the current Title 5 regulations (1995). Therefore, the basis for determining soil suitability for a soil absorption system used in this wastewater management needs analysis is soil permeability estimated by the Natural Resources Conservation Service (formerly Soil Conservation Service) based on generalized town-wide soil mapping.

According to the NRCS Soil Survey analysis, soils with permeability less than 0.6 inches per hour (in/hr) are considered unsuitable for on-site wastewater disposal systems.

Figure 5-3 depicts the areas of Town with soil permeability less than 0.6 in/hr. Approximately 85% of the developed lots within the study areas have soil permeability less than 0.6 in/hr over more than 50% of the lot. For this analysis, lots meeting this criterion were considered to have a "high likelihood of failure/significant impact" in the needs analysis.

5.2.4 Groundwater

Unless a variance is granted, Title 5 requires a minimum of four feet between the bottom of the soil absorption system and the seasonal high groundwater table for new construction. A minimum of two feet of separation is required for replacement soil absorption systems if a variance is granted. While sites with high groundwater can still accommodate compliant soil absorption systems, systems are less reliable and more costly because more sophisticated pumped distribution systems, fill, and extensive grading are required.

For this needs analysis, groundwater depths less than 4 feet below the surface were considered to have a higher risk of non-compliance than lots with a greater depth to groundwater. Figure 5-4 depicts the areas of Town with groundwater levels less than 4 feet below grade based on NRCS data, and data from nesoils.com, which provides soils information for New England. Lots meeting this criterion for more than 50% of their area were considered to have a "potential failure/moderate impact" in the needs analysis. Approximately 90% of the developed lots within the study areas have groundwater levels less than 4 feet below grade for more than 50% of their lot.

5.2.5 Water Resources

Septic system proximity to water resources has the potential to impact both human health and the environment. Septic system effluent can contaminate water resources with bacteria, nutrients, and other pollutants. Figure 5-5 depicts the water resource areas for Mattapoisett.

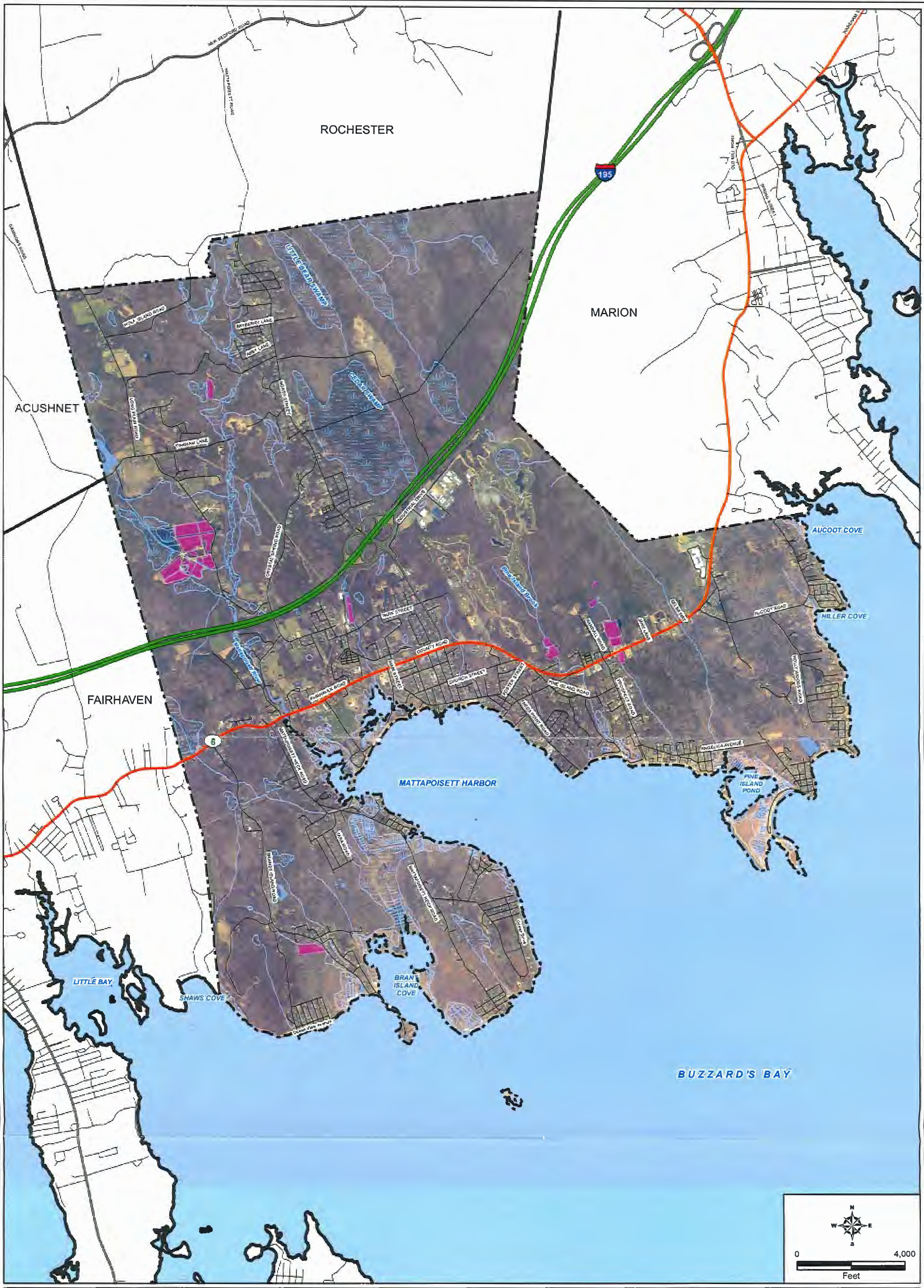
New septic systems cannot be located within a Zone I Aquifer Recharge Area. Systems located within Zone IIs are required to comply with the Title 5 requirements for nitrogen-sensitive areas. In addition, new septic systems are not allowed to be located within the 200-foot buffer zone of a surface water supply tributary.

Required setbacks from water and wetland resources for systems per Title 5 and the Wetland Protection Act vary from 25 to 400 feet, depending on the resource. Mattapoisett Board of Health regulations restrict construction of septic systems within 100 feet of wetlands or protected resource areas. The 2004 Massachusetts Integrated List of Waters lists water bodies that are classified as impaired waters "requiring a TMDL." Siting a septic system near an impaired water body could further degrade this water resource.

Evaluation criteria for water resources include the following:

1. Actual/Categorical Failure
    a. Located within Zone 1 Wellhead Protection Area
2. High Likelihood of Failure/Significant Impact
    a. Located within 200 feet of surface water supply tributary
3. Potential Failure/Moderate Impact
    a. Located within IWPA or Zone II
    b. Located within 100 feet of impaired water
4. System Concern/Potential Impact
    a. Located within 100 feet of surface water or wetland

There are a number of water supply wells with associated Zone I and IWPA areas in Mattapoisett. Many of the developed properties within the study areas are located within these water supply well protection areas. In addition there are a number of impaired waters in Mattapoisett that are adjacent to study areas. There are no surface water supplies in Mattapoisett.



Legend

- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Town Boundary
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road

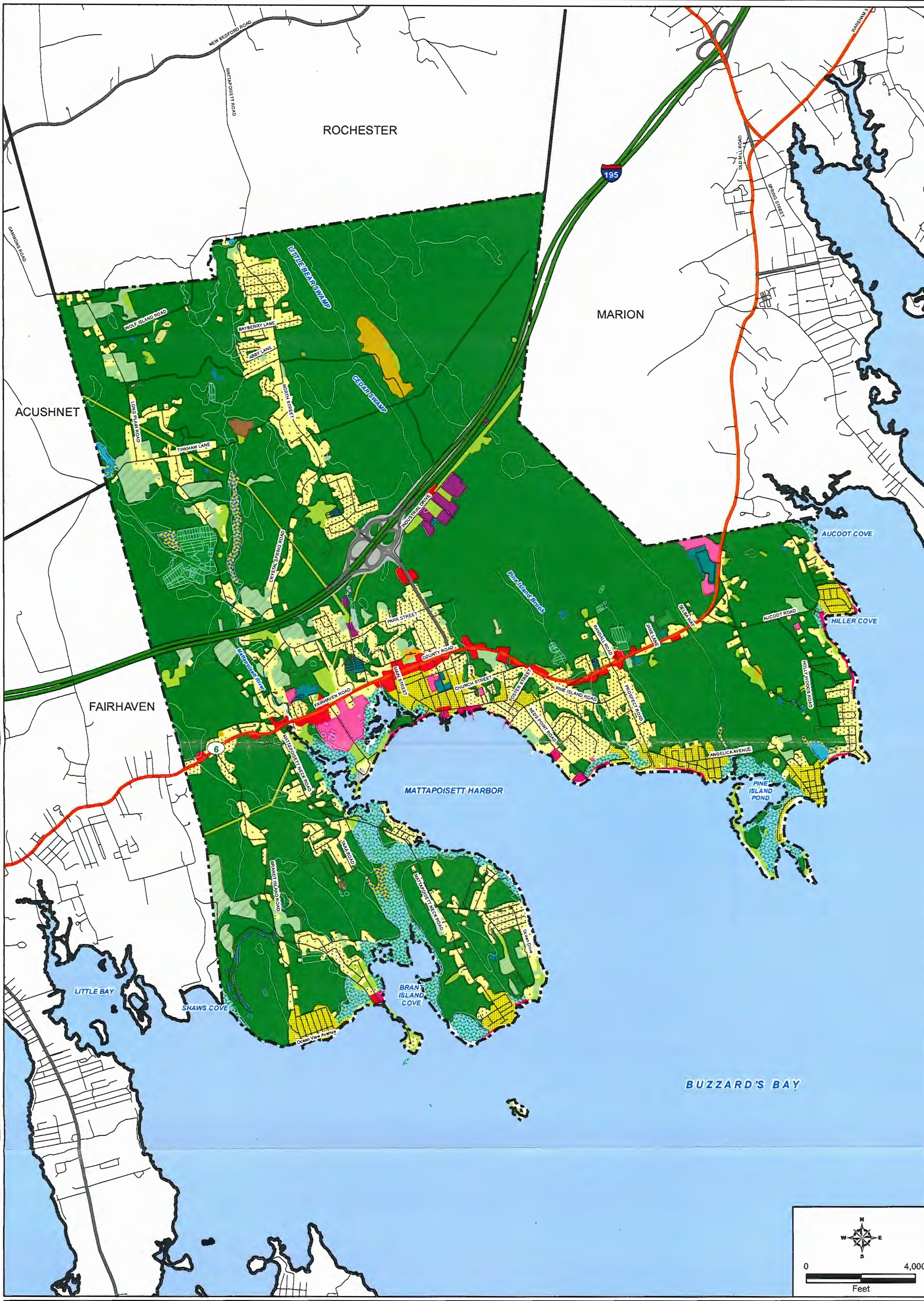
Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.
Orthophotography courtesy of MassGIS (April 2005).

FIGURE 3-1
ORTHOPHOTOGRAPHY

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\Ortho.mxd Date Last Updated: March 25, 2008



Legend

Crop Land	Medium Density Residential	Town Boundary
Pasture	Low Density Residential	Streams
Forest	Salt Water Wetland	Limited Access Highway
Non-Forested Wetland	Commercial	Multi-Lane Highway, NOT Limited Access
Mining	Industrial	Other Numbered Highway
Open Land	Urban Open	Major Road - Collector
Participation Recreation	Transportation	Minor Street or Road
Water-Based Recreation	Waste Disposal	
Multi-Family Residential	Water	
High Density Residential	Woody Perennial	

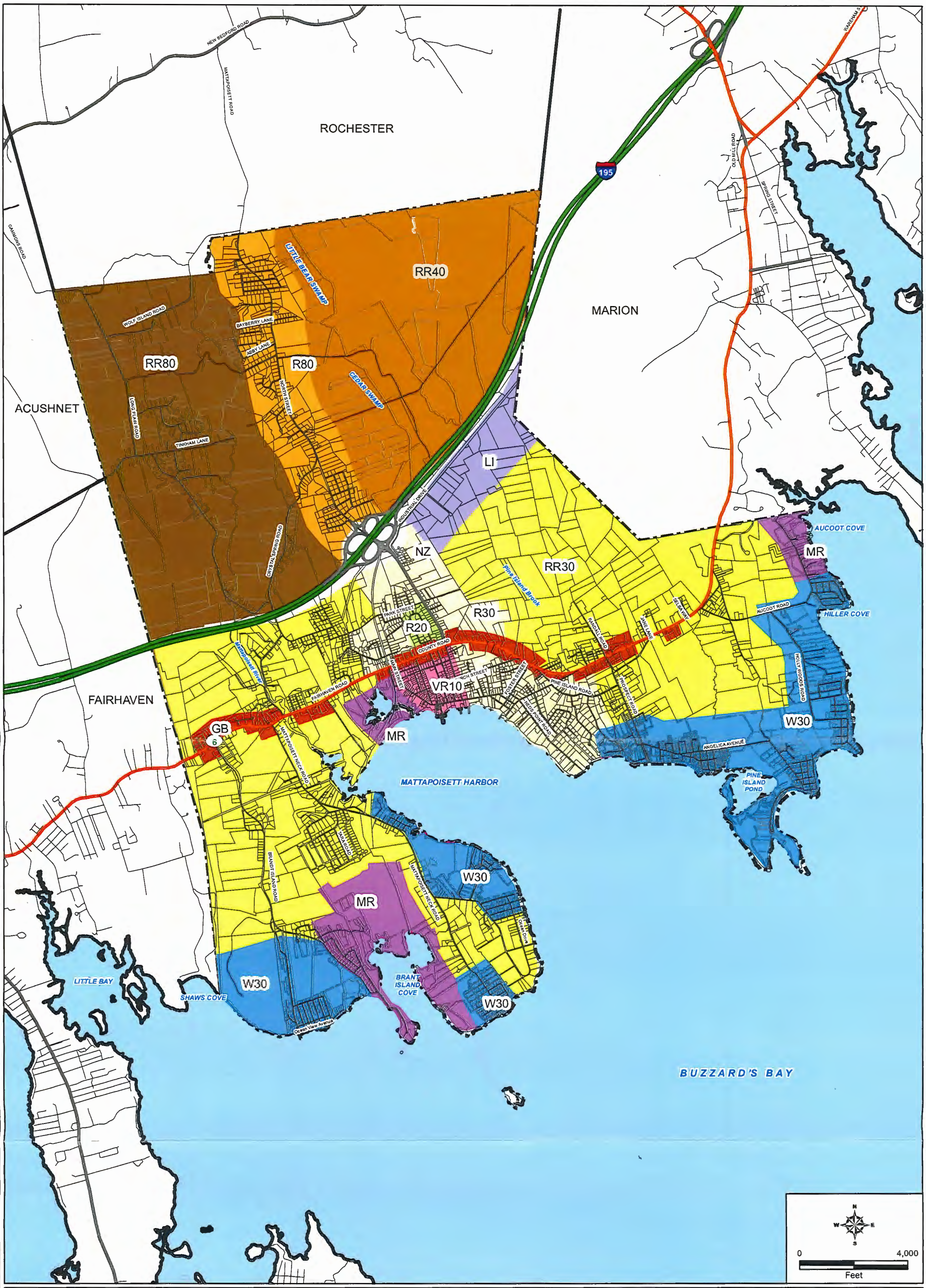
Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 3-2
LAND USE

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\LandUse.mxd Date Last Updated: March 27, 2008



Legend

GB General Business	R80 Residence	Limited Access Highway
LI Limited Industry	RR30 Rural Residence	Multi-Lane Highway, NOT Limited Access
MR Marine Residence	RR40 Rural Residence	Other Numbered Highway
NZ Interstate 195	RR80 Rural Residence	Major Road - Collector
R20 Residence	VR10 Village Residence	Minor Street or Road
R30 Residence	W30 Waterfront Residence	

Streams
Surface Water
Wetlands (DEP 1:12,000)
Cranberry Bog
Parcels
Town Boundary

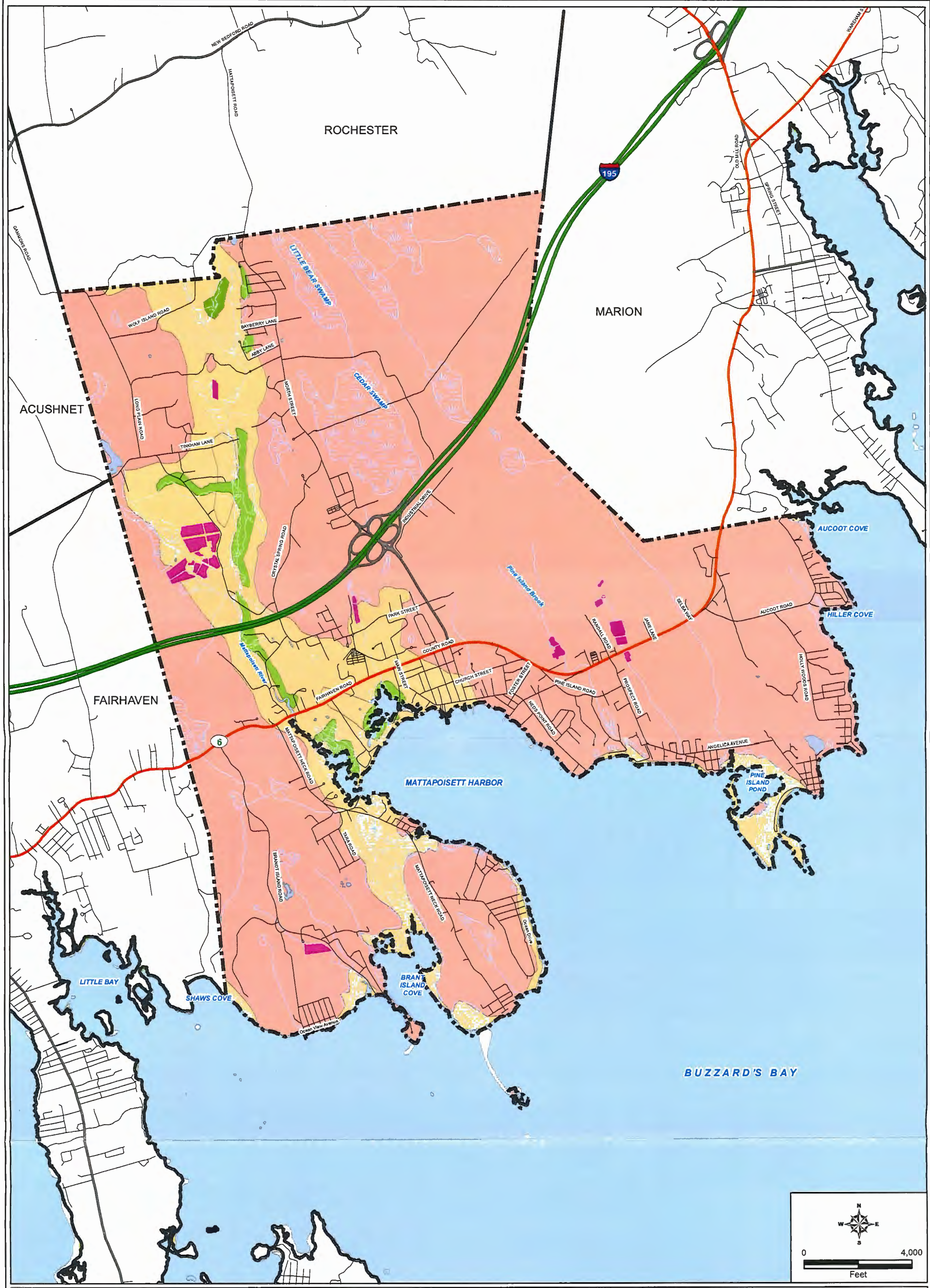
Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 3-3
ZONING

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\Zoning.mxd Date Last Updated: March 25, 2008



Legend

- Sand & Gravel Deposits
- Till or Bedrock
- Floodplain Alluvium
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road
- Town Boundary

Data source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 3-5
SURFICIAL GEOLOGY

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\SurficialGeology.mxd Date Last Updated: March 31, 2008

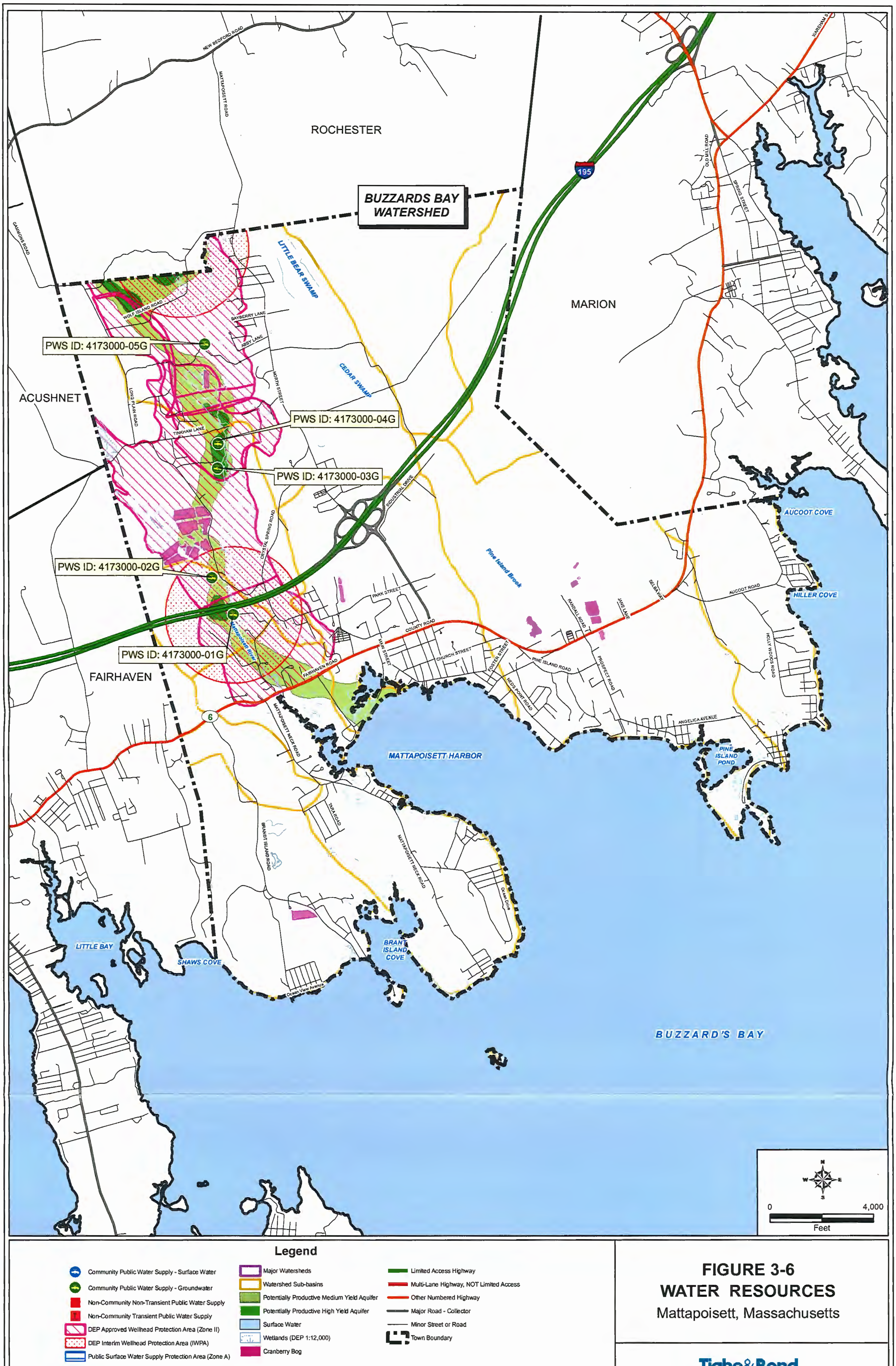
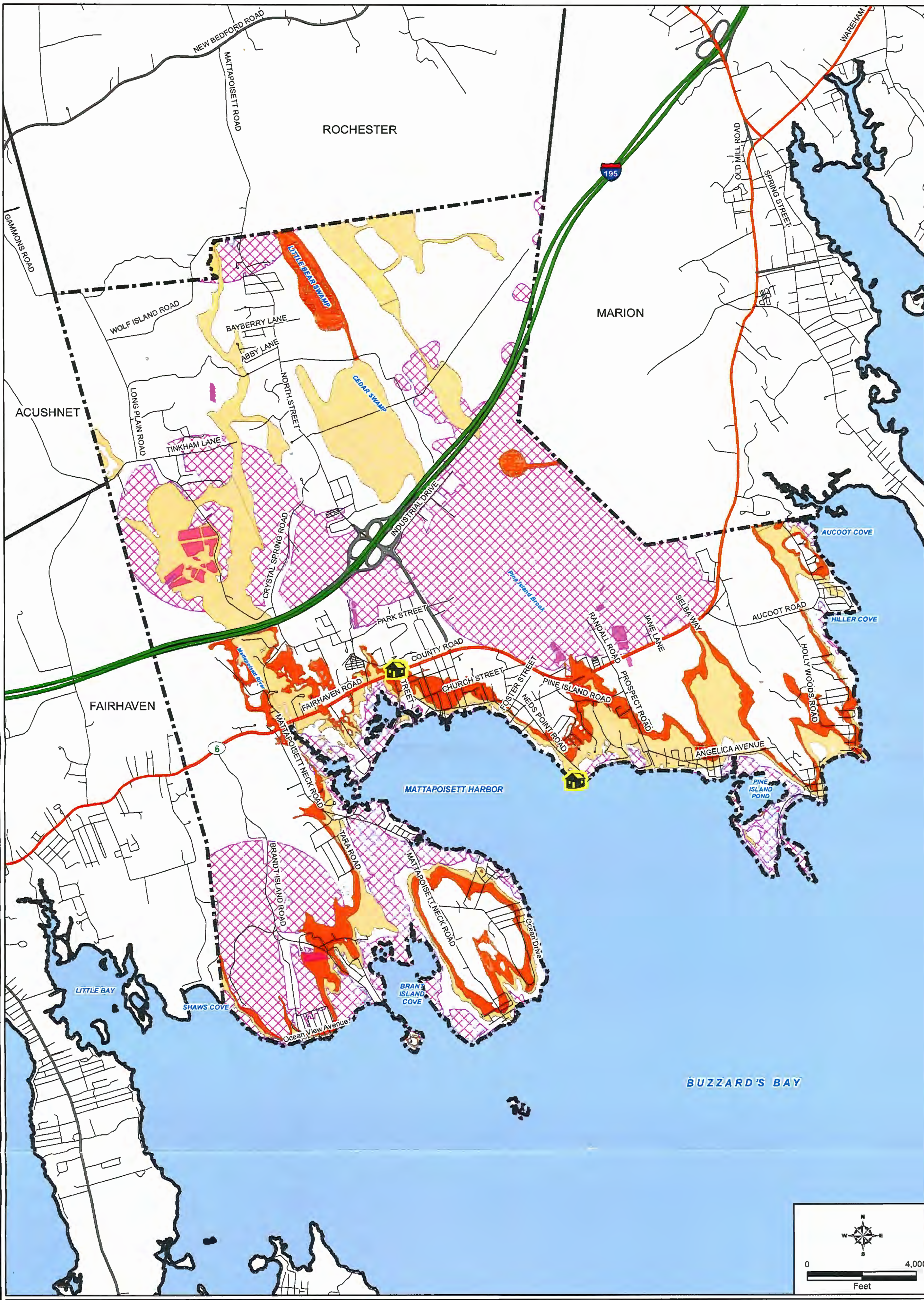


FIGURE 3-6
WATER RESOURCES
Mattapoisett, Massachusetts

March 2008

Data source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs, June 2006

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\WaterResources.mxd Date Last Updated: March 27, 2008



Legend

- Cultural Landmarks
- State Register of Historic Places - Sites **
- State Register of Historic Places - Districts **
- NHESP 2005 Priority Habitats for State-Protected Rare Species *
- NHESP 2005 Estimated Habitats for Rare Wildlife *
- 100-Year Floodplain
- 500-Year Floodplain
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road
- Town Boundary

* NHESP 2005 Estimated Habitats for Rare Wildlife: For Use with the MA Wetlands Protection Act Regulations (310 CMR 10).
** Historic Districts - Massachusetts Historical Commission: This is a beta version and does not reflect listings past 1997. Users should consult the most recent State Register of Historic Places (available at the State House Bookstore) for updates. Listings are regularly updated in the weekly State Register.
Data source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 3-7
ENVIRONMENTAL & CULTURAL RESOURCES
Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\EnvironResources.mxd Date Last Updated: March 24, 2008

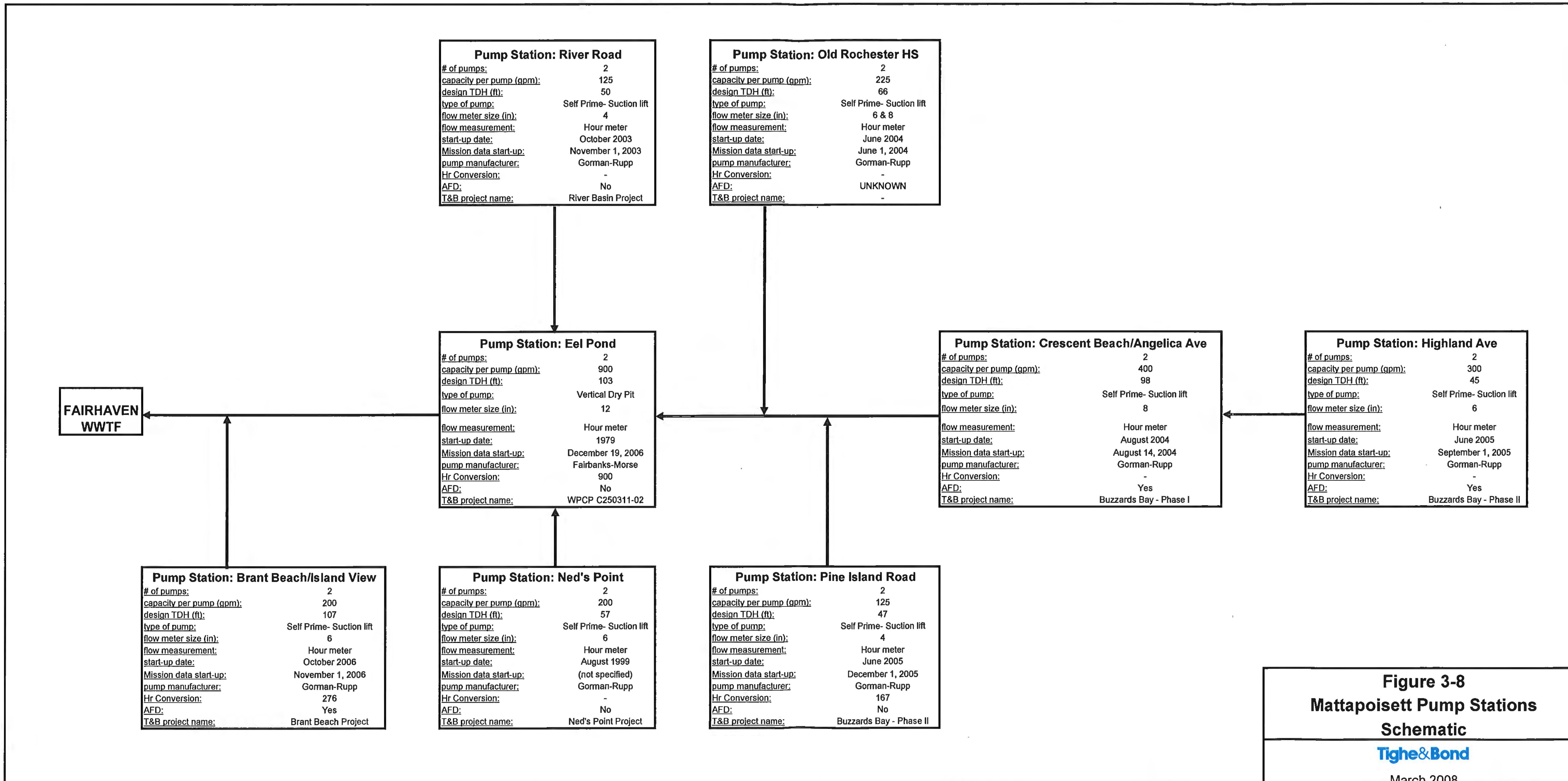
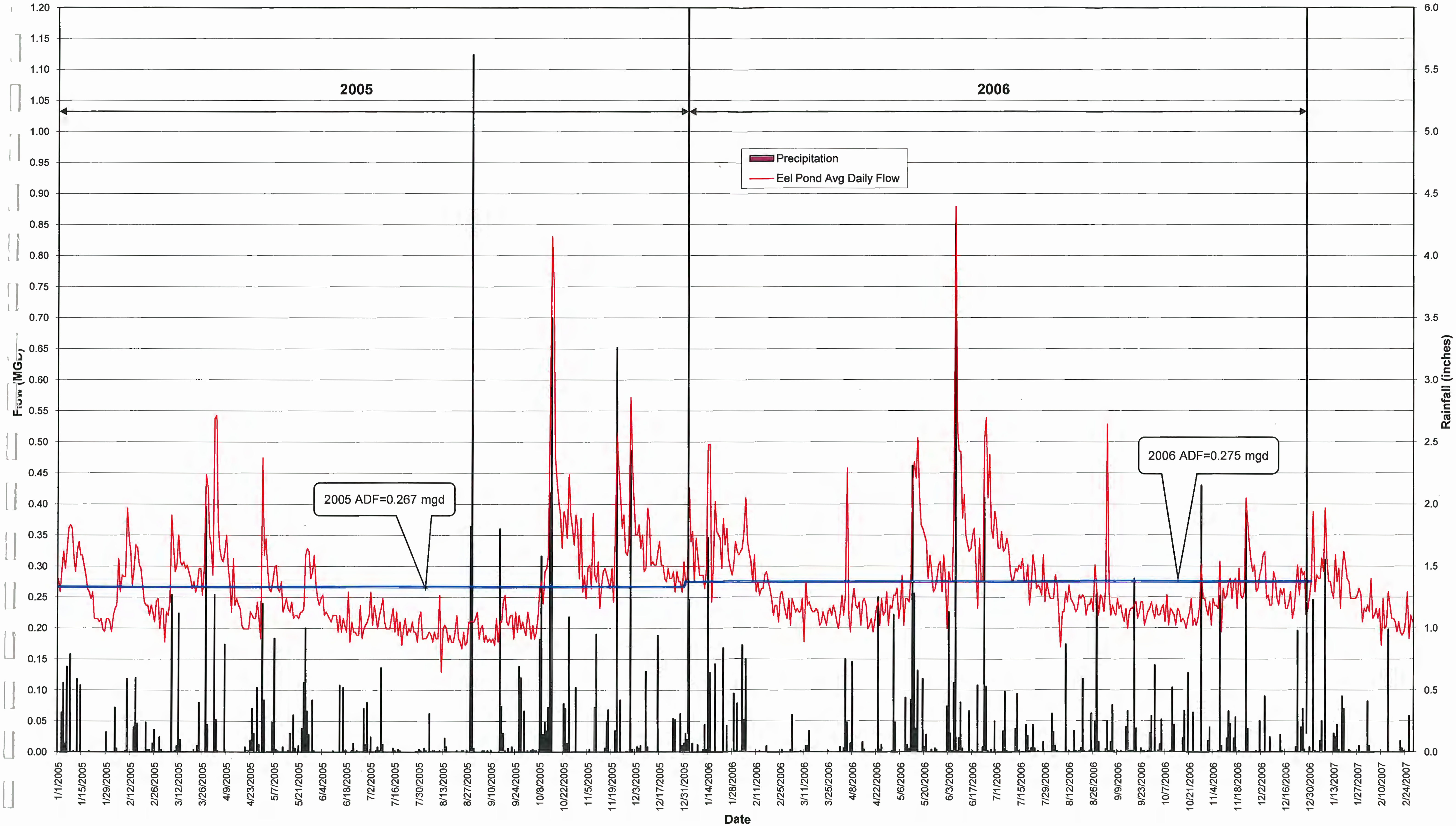


Figure 3-8
Mattapoisett Pump Stations Schematic

Tighe&Bond

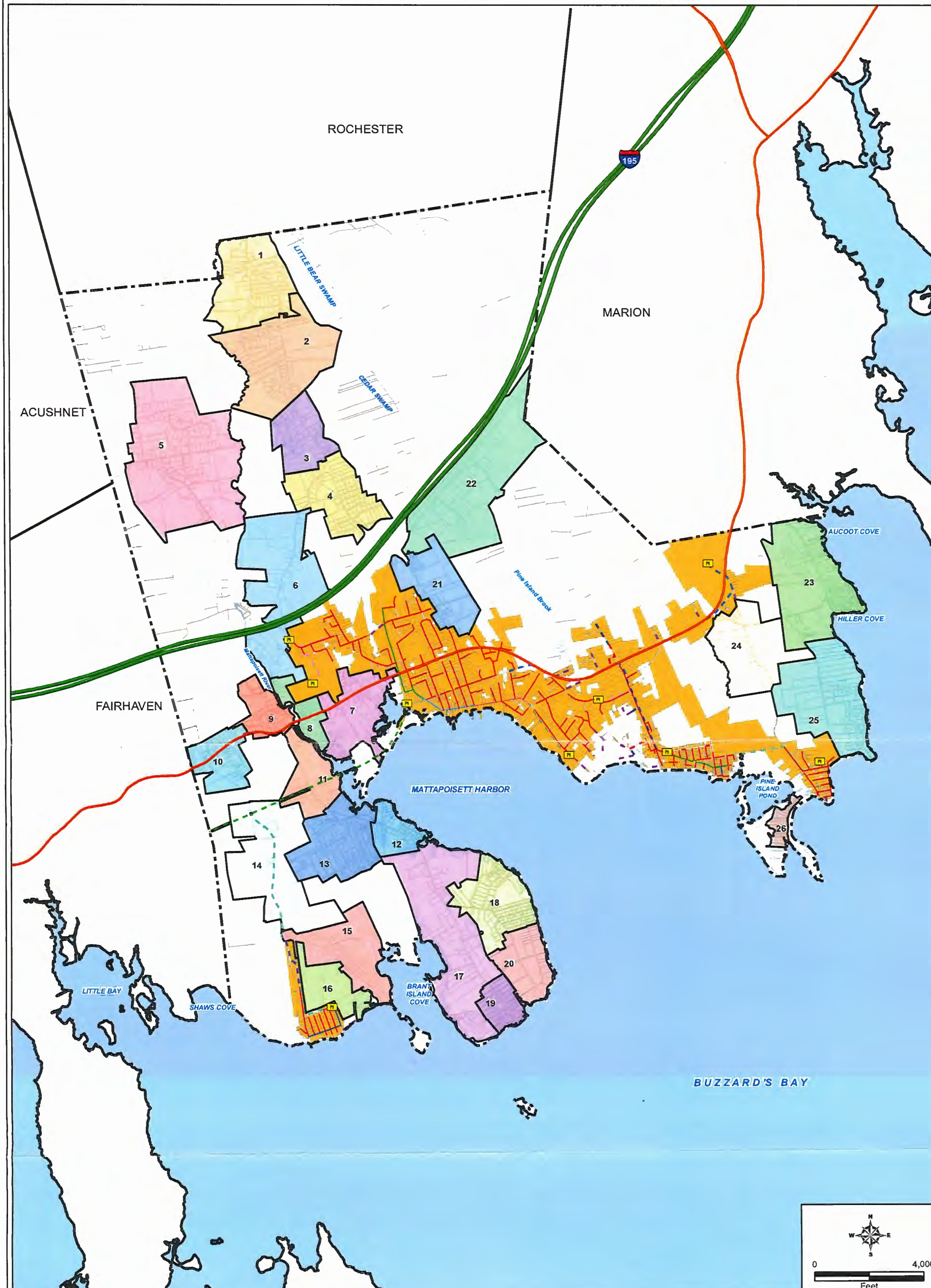
March 2008

Figure 4-1
Flow and Rainfall Data
Eel Pond Pump Station



J:\M\M0382\DATA\Pump Station Flow Data DJP.xls/Q, Precip - Eel

4/17/2008



Legend

Sewer Main	Force Main	
1.5 in	1.5 in	Study Areas
2 in	2 in	Sewered Parcels
6 in	2.5 in	Limited Access Highway
8 in	3 in	Multi-Lane Highway, NOT Limited Access
10 in	4 in	Other Numbered Highway
12 in	6 in	
16 in	8 in	
18 in	12 in	

Data source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs. June 2006

FIGURE 5-1
WASTEWATER MANAGEMENT STUDY AREAS
Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\WaterResources.mxd Date Last Updated: March 27, 2008

TABLE 5-1
Study Area Description

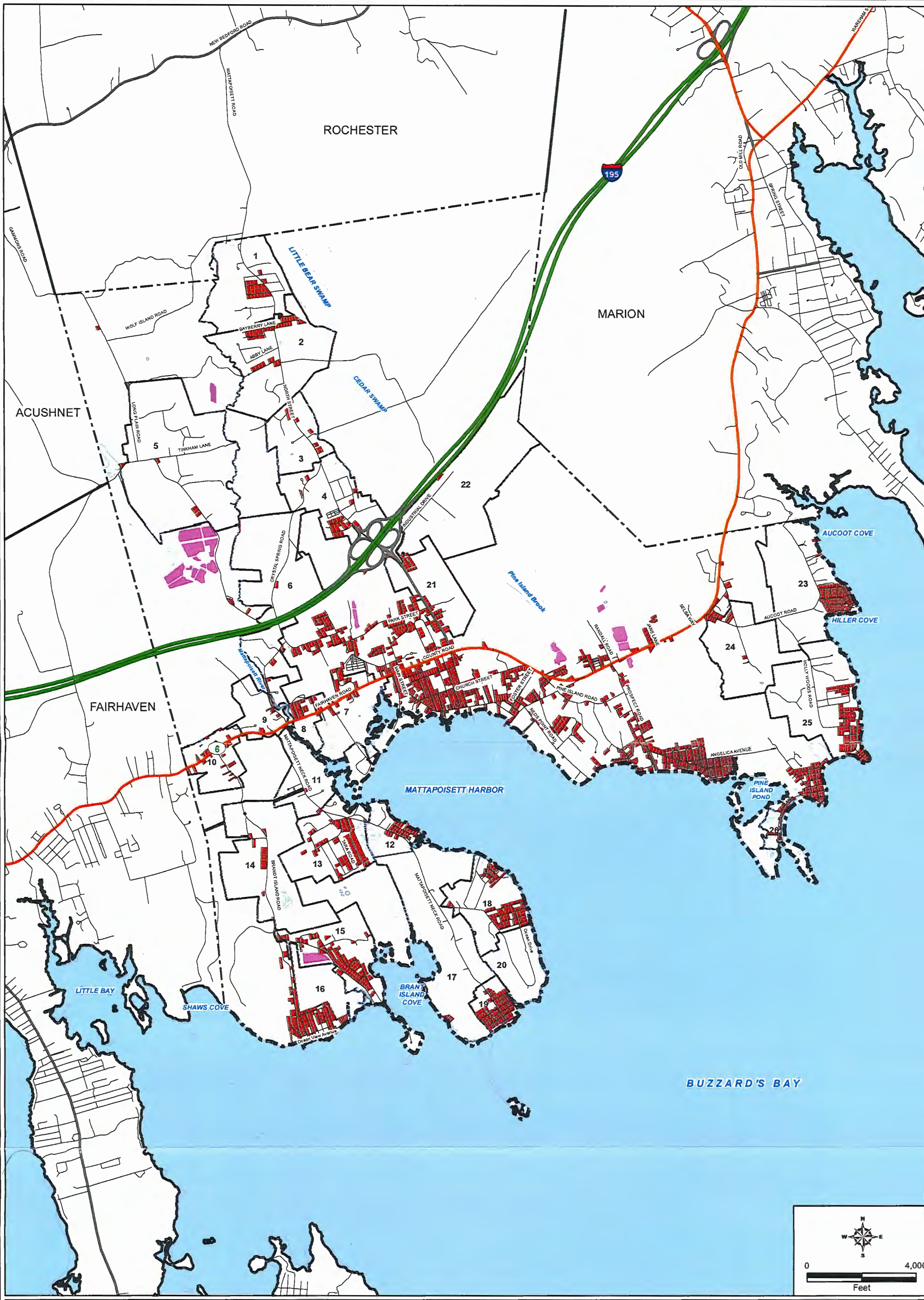
	1	2	3	4	5
Major Roads	North Street	North Street Tinkham Hill Road	North Street	North Street Crystal Spring Road	Acushnet Road Long Plain Road Tinkham Lane
Zoning[5]	R80 - Residence (77%) RR80 - Rural Residence (23%)	R80 - Residence (71%) RR40 - Rural Residence (11%) RR80 - Rural Residence (18%)	R80 - Residence (97%) RR80 - Rural Residence (3%)	R80 - Residence (87%) RR80 - Rural Residence (9%) RR40 - Rural Residence (2%) NZ - Interstate 195 (2%)	RR80 - Rural Residence
Land Use[1,5]	Forest (52%) Low Density Residential (19%) Medium Density Residential (26%) Open Land (1%) Pasture (2%)	Forest (67%) Low Density Residential (19%) Medium Density Residential (13%) Open Land (0.3%) Pasture (0.5%) Crop Land (0.7%)	Forest (52%) Low Density Residential (47%) Pasture (1%)	Forest (43%) Low Density Residential (20%) Medium Density Residential (25%) Open Land (7%) Urban Open (1%) Pasture (1%) Transportation (3%)	Forest (60%) Low Density Residential (20%) Open Land (4%) Crop Land (14%) Non-Forested Wetland (2%) Pasture (0.1%) Urban Open (0.2%)
Watershed	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay
Water Resources[5]	IWPA (45%) Zone II (50%) Limited Wetland Resource Areas Mattapoisett River	Zone II (29%) Potentially Productive Medium Yield Aquifer (1%) Wetland Resource Areas Mattapoisett River	Zone II (24%) Wetland Resource Areas	Limited Wetland Resource Areas	Zone II (82%) Potentially Productive Medium Yield Aquifer (19%) Potentially Productive High Yield Aquifer (6%) Wetland Resource Areas Mattapoisett River Community PWS - Groundwater
Soil and Groundwater Characteristics[3,4,5]	Throughout study area: Depth to groundwater: shallow Throughout 98% of study area: Soil permeability: low Throughout 2% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 83% of study area: Soil permeability: low Throughout 17% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 86% of study area: Soil permeability: low Throughout 14% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Throughout 93% of study area: Soil permeability: low Throughout 7% of study area: Soil permeability: high	Throughout study area: Depth to groundwater: shallow Soil permeability: low

1. Land use descriptions from MaGIS include:
   low density res.: >0.5 acre lots
   medium density res.: 0.25-0.5 acre lots
   high density res.: <0.25 acre lots
2. Not listed as land use in MaGIS data
3. Depth to groundwater:
   shallow: 4 ft or less
   deep: greater than 4 feet
4. Permeability:
   low: 0.6 in/hr or less
   high: greater than 0.6 in/hr
5. Percentages represent % of study area

TABLE 5-1
Study Area Description

	23	24	25	26
Major Roads	Aucoot Road Shore Drive	Aucoot Road	Hollywoods Road	Cove Street
Zoning[5]	MR - Marine Residence (30%) W30 - Waterfront Residence (42%) RR30 - Rural Residence (25%)	RR30 - Rural Residence (92%) W30 - Waterfront Residence (8%)	W30 - Waterfront Residence (83%) RR30 - Rural Residence (16%)	W30 - Waterfront
Land Use[1,5]	Forest (63%) Low Density Residential (12%) High Density Residential (11%) Open Land (0.1%) Urban Open (0.4%) Pasture (2.5%) Salt Water Wetland (3.4%) Participation Recreation (0.4%) Water Based Recreation (3%)	Forest (85%) Low Density Residential (8%) Open Land (5%) Waste Disposal (2%)	Forest (68%) Low Density Residential (6%) Medium Density Residential (18%) Open Land (2%) Urban Open (1%) Pasture (0.1%) Non-Forested Freshwater Wetland Water Based Recreation (2%)	High Density Residential Salt Water Wetland (68%) Forest (2%) Open Land (0.7%)
Watershed	Buzzards Bay	Buzzards Bay	Buzzards Bay	Buzzards Bay
Water Resources[5]	Limited Wetland Resource Areas		Limited Wetland Resource Areas Adjacent to: Buzzards Bay	Wetland Resource Areas
Soil and Groundwater Characteristics[3,4,5]	Throughout 96% of study area: Depth to groundwater: shallow Soil permeability: low Throughout 4% of study area: Depth to groundwater: deep Soil permeability: high	Throughout study area: Depth to groundwater: shallow Soil permeability: low	Throughout study area: Depth to groundwater: shallow Soil permeability: low	Throughout study area: Depth to groundwater: deep Soil permeability: high

1. Land use descriptions from MaGIS include:
   low density res.: >0.5 acre lots
   medium density res.: 0.25-0.5 acre lots
   high density res.: <0.25 acre lots
2. Not listed as land use in MaGIS data
3. Depth to groundwater:
   shallow: 4 ft or less
   deep: greater than 4 feet
4. Permeability:
   low: 0.6 in/hr or less
   high: greater than 0.6 in/hr
5. Percentages represent % of study area



Legend

- Lot Size < .5 Acres
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Study Areas

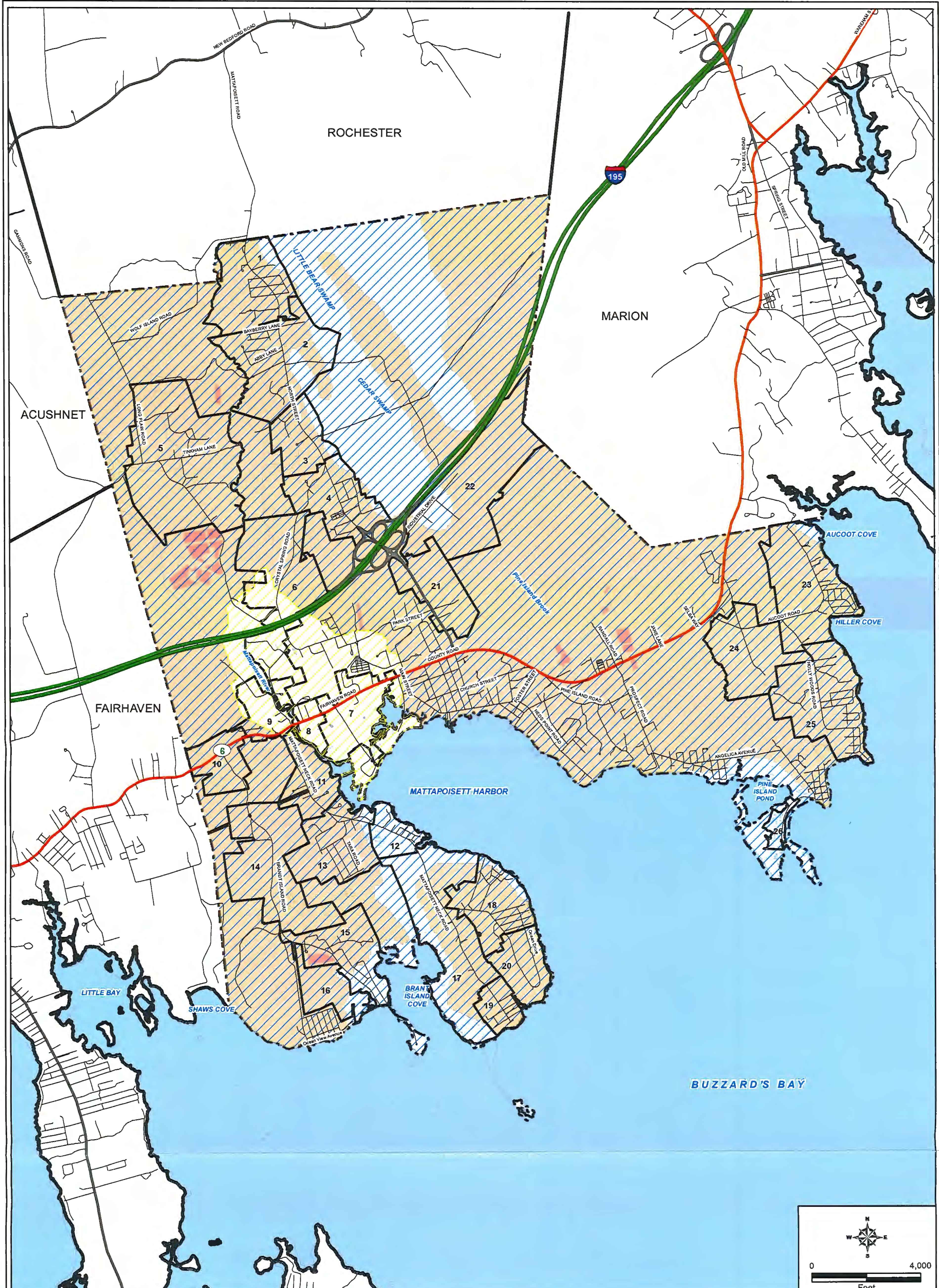
Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 5-2
LOT SIZE CONSTRAINTS

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\LotSizeConstraints.mxd Date Last Updated: March 26, 2008



Legend

- Shallow Groundwater < 4 feet
- Unconstrained Soils
- Study Areas
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road

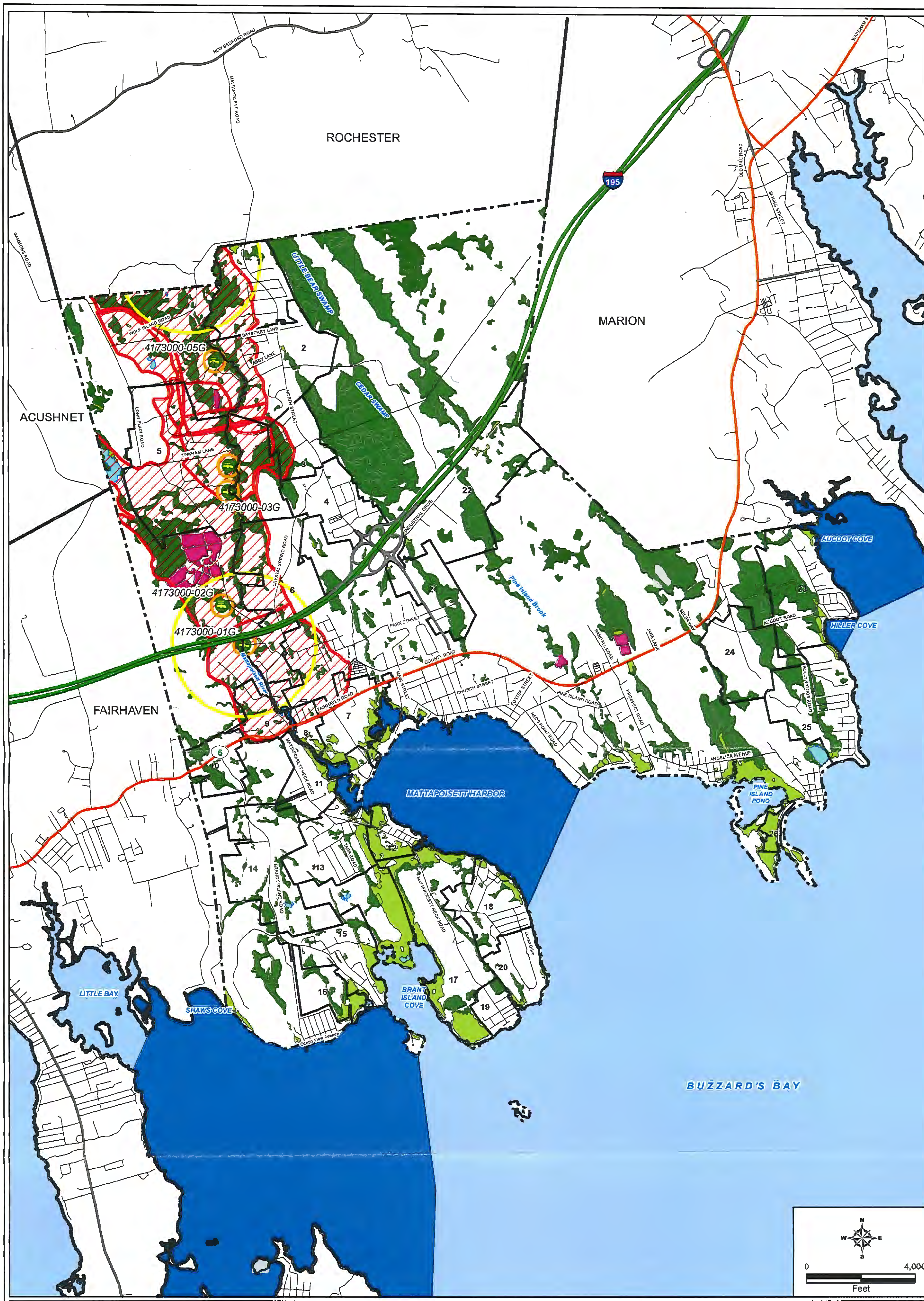
Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 5-3
SOIL CONSTRAINTS

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\SoilConstraints.mxd Date Last Updated: March 27, 2008



Legend

- Community Public Water Supply - Surface Water
- Community Public Water Supply - Groundwater
- Non-Community Non-Transient Public Water Supply
- Non-Community Transient Public Water Supply
- Towns (Survey)
- Impaired Water
- IWPA
- Zone1
- Zone 2

Wetlands (DEP)

- Cranberry Bog
- Marsh
- Open Water
- Swamp
- Streams

- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road
- Study Areas

Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 5-5
WATER RESOURCE AREAS

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

Tighe&Bond

TABLE 5-3
Mattapoisett Wastewater Management Needs Analysis Scoring Summary

		Total for All Study Areas		Study Area 1		Study Area 2		Study Area 3		Study Area 4		Study Area 5		Study Area 6	
Description	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**
Acres		2,025		185.4		229.8		96.8		132.0		407.2		258.3	
Developed Acres		922		167.6		92.2		61.8		82.1		185.6		92.8	
% Developed Area		46%		90%		40%		64%		62%		46%		36%	
Total Number of Lots		2,167		97		126		56		122		158		57	
Total Number of Developed Lots		1,486		92		112		46		93		105		43	
Average Acreage of All Lots		0.9		1.9		1.8		1.7		1.1		2.6		4.5	
Actual/Categorical Failure (8 Points)															
Septic System: Pumpouts: >4 times per year	8	14	112	0	0	0	0	1	8	0	0	0	0	1	8
Septic System: Title 5 inspection failure (current and historical)	8	75	600	9	72	1	8	1	8	9	72	1	8	1	8
Lot Size: Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well	8	178	1424	0	0	0	0	0	0	0	0	1	8	0	0
Water Resources: Located within Zone 1 Aquifer Recharge Area	8	5	40	0	0	1	8	0	0	0	0	1	8	3	24
High Likelihood of Failure/Significant Impact (4 Points)															
Septic System: Pumpouts: 2-4 times per year	4	259	1036	18	72	15	60	9	36	12	48	14	56	6	24
Septic System: Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record	4	141	564	4	16	11	44	4	16	10	40	7	28	3	12
Lot Size: 5,000 sq. ft. - 1/4 acre with public water or 1/4 - 1/2 acre with private well	4	260	1040	0	0	0	0	0	0	0	0	2	8	0	0
Soils: Low soil permeability (<0.6 in/hr) for greater than 50% of lot area	4	1238	4952	89	356	112	448	42	168	89	356	105	420	18	72
Water Resources: Located within 200 feet of surface water supply tributary	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Failure/Moderate Impact (2 Points)															
Septic System: Repaired prior to 3/31/95 (Revised Title 5)	2	96	192	5	10	4	8	1	2	4	8	4	8	3	6
Groundwater: Shallow groundwater depth (≤ 4 feet) for greater than 50% lot area	2	1338	2676	92	184	112	224	46	92	93	186	105	210	18	36
Water Resources: Located within IWPA or Zone II or Zone B	2	274	548	39	78	33	66	7	14	0	0	84	168	29	58
Water Resources: Located within 100 feet of impaired water	2	140	280	0	0	0	0	0	0	0	0	0	0	0	0
System Concern/Potential Impact (1 Points)															
Septic System: Repaired on or after 3/31/95 (Revised Title 5)	1	287	287	17	17	14	14	6	6	32	32	10	10	8	8
Septic System: Constructed between 1978 and 1995 without upgrade	1	372	372	17	17	33	33	14	14	17	17	34	34	16	16
Lot Size: 1/4 - 1/2 acre with public water	1	236	236	21	21	39	39	8	8	19	19	3	3	5	5
Water Resources: Located within 100 feet of surface water or wetland	1	715	715	38	38	46	46	20	20	17	17	48	48	25	25
Total Points			15,074		881		998		392		795		1017		302
Points per Developed Lot			10.1		9.6		8.9		8.5		8.5		9.7		7.0

(1)Lot size for certain parcels not included in assessor's database and, therefore, not included in total acres or average lot size.

J:\M\M0382\Needs Analysis\Needs analysis scoring032408.xls

TABLE 5-3
Mattapoisett Wastewater Management Needs Analysis Scoring Summary

		Study Area 7		Study Area 8		Study Area 9		Study Area 10		Study Area 11		Study Area 12		Study Area 13	
Description	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**	**Number**	**Points**
Acres		138.9		44.6		49.5		89.3		90.6		53.5		144.8	
Developed Acres		100.0		32.7		42.0		54.8		72.6		18.9		59.3	
% Developed Area		72%		73%		85%		61%		80%		35%		41%	
Total Number of Lots		79		51		47		79		33		50		139	
Total Number of Developed Lots		62		36		32		55		27		32		58	
Average Acreage of All Lots		1.8		0.9		1.1		1.1		2.7		1.1		1.0	
Actual/Categorical Failure (8 Points)															
Septic System: Pumpouts: >4 times per year	8	3	24	1	8	1	8	0	0	0	0	1	8	0	0
Septic System: Title 5 inspection failure (current and historical)	8	1	8	6	48	0	0	5	40	2	16	2	16	3	24
Lot Size: Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well	8	0	0	3	24	7	56	12	96	0	0	8	64	0	0
Water Resources: Located within Zone 1 Aquifer Recharge Area	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
High Likelihood of Failure/Significant Impact (4 Points)															
Septic System: Pumpouts: 2-4 times per year	4	11	44	10	40	7	28	14	56	6	24	7	28	12	48
Septic System: Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record	4	10	40	5	20	5	20	6	24	3	12	1	4	5	20
Lot Size: 5,000 sq. ft. - 1/4 acre with public water or 1/4 - 1/2 acre with private well	4	9	36	14	56	3	12	14	56	0	0	8	32	0	0
Soils: Low soil permeability (<0.6 in/hr) for greater than 50% of lot area	4	0	0	0	0	7	28	55	220	27	108	0	0	58	232
Water Resources: Located within 200 feet of surface water supply tributary	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Failure/Moderate Impact (2 Points)															
Septic System: Repaired prior to 3/31/95 (Revised Title 5)	2	5	10	2	4	3	6	2	4	0	0	5	10	4	8
Groundwater: Shallow groundwater depth (≤ 4 feet) for greater than 50% lot area	2	0	0	0	0	7	14	55	110	27	54	32	64	58	116
Water Resources: Located within IWPA or Zone II or Zone B	2	23	46	28	56	31	62	0	0	0	0	0	0	0	0
Water Resources: Located within 100 feet of impaired water	2	6	12	14	28	10	20	0	0	5	10	20	40	5	10
System Concern/Potential Impact (1 Points)															
Septic System: Repaired on or after 3/31/95 (Revised Title 5)	1	11	11	8	8	5	5	18	18	3	3	12	12	9	9
Septic System: Constructed between 1978 and 1995 without upgrade	1	15	15	8	8	15	15	12	12	9	9	2	2	19	19
Lot Size: 1/4 - 1/2 acre with public water	1	21	21	5	5	1	1	0	0	1	1	8	8	25	25
Water Resources: Located within 100 feet of surface water or wetland	1	11	11	21	21	28	28	41	41	12	12	25	25	29	29
Total Points			278		326		303		677		249		313		540
Points per Developed Lot			4.5		9.1		9.5		12.3		9.2		9.8		9.3

[1] Lot size for certain parcels not included in assessor's database and, therefore, not included in total acres or average lot size.

Tighe&Bond

TABLE 5-3
Mattapoisett Wastewater Management Needs Analysis Scoring Summary

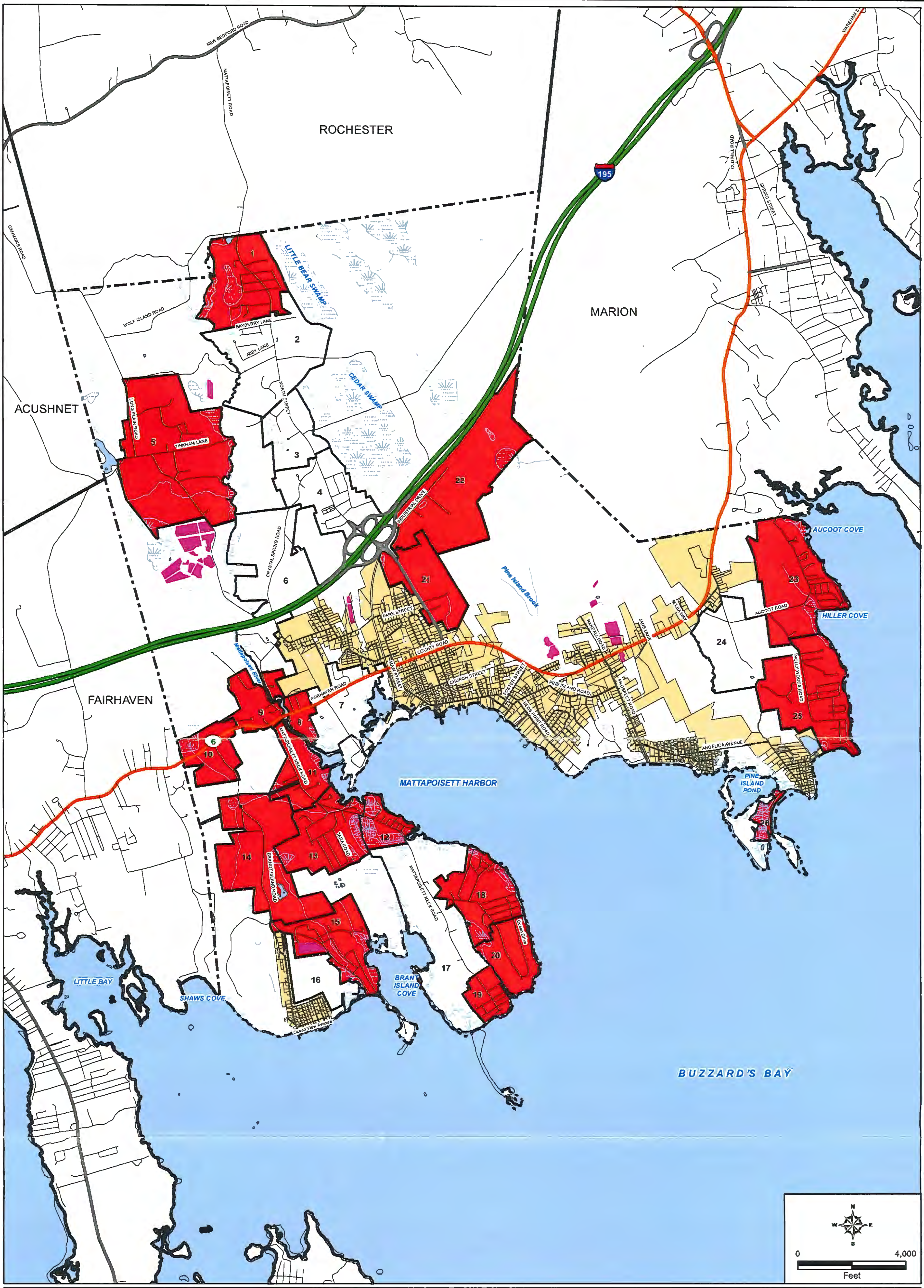
Description	Points	Study Area 14		Study Area 15		Study Area 16		Study Area 17		Study Area 18		Study Area 19		Study Area 20	
		Number	Points	Number	Points	Number	Points	Number	Points	Number	Points	Number	Points	Number	Points
Acres		238.9		135.3		84.6		308.4		142.8		38.6		89.4	
Developed Acres		82.7		91.4		0.0		100.6		80.9		22.0		25.0	
% Developed Area		35%		68%		0%		33%		57%		57%		28%	
Total Number of Lots		50		143		6		67		147		129		27	
Total Number of Developed Lots		25		90		0		35		108		84		15	
Average Acreage of All Lots		4.8		0.9		14.1		4.6		1.0		0.3		3.3	
Actual/Categorical Failure (8 Points)															
Septic System: Pumpouts: >4 times per year	8	0	0	0	0	0	0	0	0	1	8	3	24	0	0
Septic System: Title 5 inspection failure (current and historical)	8	1	8	7	56	0	0	2	16	3	24	2	16	0	0
Lot Size: Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well	8	0	0	9	72	0	0	0	0	14	112	57	456	0	0
Water Resources: Located within Zone 1 Aquifer Recharge Area	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
High Likelihood of Failure/Significant Impact (4 Points)															
Septic System: Pumpouts: 2-4 times per year	4	0	0	12	48	0	0	9	36	16	64	20	80	3	12
Septic System: Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record	4	3	12	8	32	0	0	1	4	9	36	9	36	4	16
Lot Size: 5,000 sq. ft. - 1/4 acre with public water or 1/4 - 1/2 acre with private well	4	10	40	44	176	0	0	0	0	53	212	22	88	0	0
Soils: Low soil permeability (<0.6 in/hr) for greater than 50% of lot area	4	25	100	70	280	0	0	34	136	104	416	84	336	15	60
Water Resources: Located within 200 feet of surface water supply tributary	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Failure/Moderate Impact (2 Points)															
Septic System: Repaired prior to 3/31/95 (Revised Title 5)	2	0	0	1	2	0	0	1	2	3	6	2	4	0	0
Groundwater: Shallow groundwater depth (≤ 4 feet) for greater than 50% lot area	2	25	50	90	180	0	0	35	70	108	216	84	168	15	30
Water Resources: Located within IWPA or Zone II or Zone B	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Resources: Located within 100 feet of impaired water	2	0	0	3	6	0	0	1	2	13	26	0	0	0	0
System Concern/Potential Impact (1 Points)															
Septic System: Repaired on or after 3/31/95 (Revised Title 5)	1	3	3	13	13	0	0	9	9	9	9	18	18	0	0
Septic System: Constructed between 1978 and 1995 without upgrade	1	6	6	31	31	0	0	8	8	22	22	27	27	6	6
Lot Size: 1/4 - 1/2 acre with public water	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Resources: Located within 100 feet of surface water or wetland	1	11	11	60	60	0	0	23	23	40	40	27	27	14	14
Total Points			230		956		0		306		1191		1280		138
Points per Developed Lot			9.2		10.6		0.0		8.7		11.0		15.2		9.2

(1)Lot size for certain parcels not included in assessor's database and, therefore, not included in total acres or average lot size.

TABLE 5-3
Mattapoisett Wastewater Management Needs Analysis Scoring Summary

Description	Points	Study Area 21 Number	Study Area 21 Points	Study Area 22 Number	Study Area 22 Points	Study Area 23 Number	Study Area 23 Points	Study Area 24 Number	Study Area 24 Points	Study Area 25 Number	Study Area 25 Points	Study Area 26 Number	Study Area 26 Points
Acres		83.6		270.7		226.1		161.7		220.9		23.5	
Developed Acres		49.4		142.7		132.6		25.5		160.8		8.6	
% Developed Area		59%		53%		59%		16%		73%		37%	
Total Number of Lots		67		42		189		41		136		29	
Total Number of Developed Lots		36		14		135		17		106		28	
Average Acreage of All Lots		1.2		6.4		1.2		3.9		1.6		0.8	
Actual/Categorical Failure (8 Points)													
Septic System: Pumpouts: >4 times per year	8	0	0	1	8	1	8	0	0	0	0	0	0
Septic System: Title 5 inspection failure (current and historical)	8	1	8	6	48	5	40	1	8	6	48	0	0
Lot Size: Lots ≤ 5,000 sf (0.115 acre) with public water or ≤ 1/4 acre with private well	8	0	0	1	8	46	368	0	0	5	40	15	120
Water Resources: Located within Zone 1 Aquifer Recharge Area	8	0	0	0	0	0	0	0	0	0	0	0	0
High Likelihood of Failure/Significant Impact (4 Points)													
Septic System: Pumpouts: 2-4 times per year	4	9	36	1	4	25	100	2	8	14	56	7	28
Septic System: Constructed pre-Title 5 (1978) without upgrade or developed lot pre-1978 w/ no BOH septic record	4	5	20	0	0	16	64	3	12	8	32	1	4
Lot Size: 5,000 sq. ft. - 1/4 acre with public water or 1/4 - 1/2 acre with private well	4	5	20	0	0	42	168	0	0	28	112	6	24
Soils: Low soil permeability (<0.6 in/hr) for greater than 50% of lot area	4	36	144	11	44	134	536	17	68	106	424	0	0
Water Resources: Located within 200 feet of surface water supply tributary	4	0	0	0	0	0	0	0	0	0	0	0	0
Potential Failure/Moderate Impact (2 Points)													
Septic System: Repaired prior to 3/31/95 (Revised Title 5)	2	2	4	0	0	9	18	0	0	13	26	23	46
Groundwater: Shallow groundwater depth (≤ 4 feet) for greater than 50% lot area	2	36	72	14	28	135	270	17	34	106	212	28	56
Water Resources: Located within IWPA or Zone II or Zone B	2	0	0	0	0	0	0	0	0	0	0	0	0
Water Resources: Located within 100 feet of impaired water	2	0	0	0	0	60	120	0	0	3	6	0	0
System Concern/Potential Impact (1 Points)													
Septic System: Repaired on or after 3/31/95 (Revised Title 5)	1	11	11	3	3	39	39	3	3	25	25	1	1
Septic System: Constructed between 1978 and 1995 without upgrade	1	8	8	1	1	24	24	4	4	22	22	2	2
Lot Size: 1/4 - 1/2 acre with public water	1	16	16	0	0	10	10	8	8	43	43	3	3
Water Resources: Located within 100 feet of surface water or wetland	1	8	8	13	13	73	73	6	6	51	51	28	28
Total Points			347		157		1838		151		1097		312
Points per Developed Lot			9.6		11.2		13.6		8.9		10.3		11.1

[(1)]Lot size for certain parcels not included in assessor's database and, therefore, not included in total acres or average lot size.



Legend

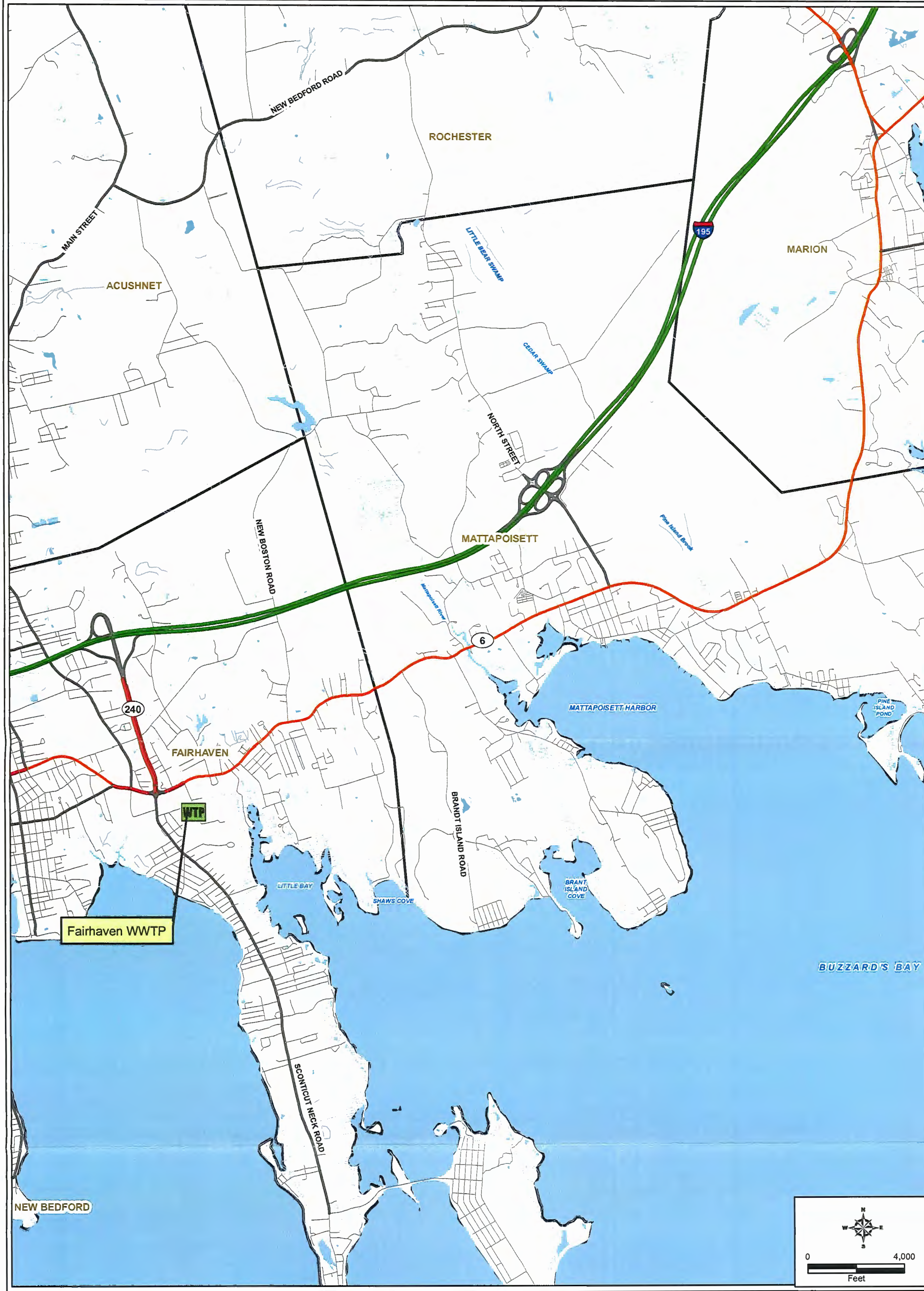
- Study Area
- High Need Study Area
- Sewered Parcels
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road

Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 5-6
WASTEWATER NEEDS ASSESSMENT
Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\WastewaterNeedsAssessment.mxd Date Last Updated: March 27, 2008



Legend

- MA Towns
- Streams
- Surface Water
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road

Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 7-1
FAIRHAVEN WWTP

Mattapoisett, Massachusetts

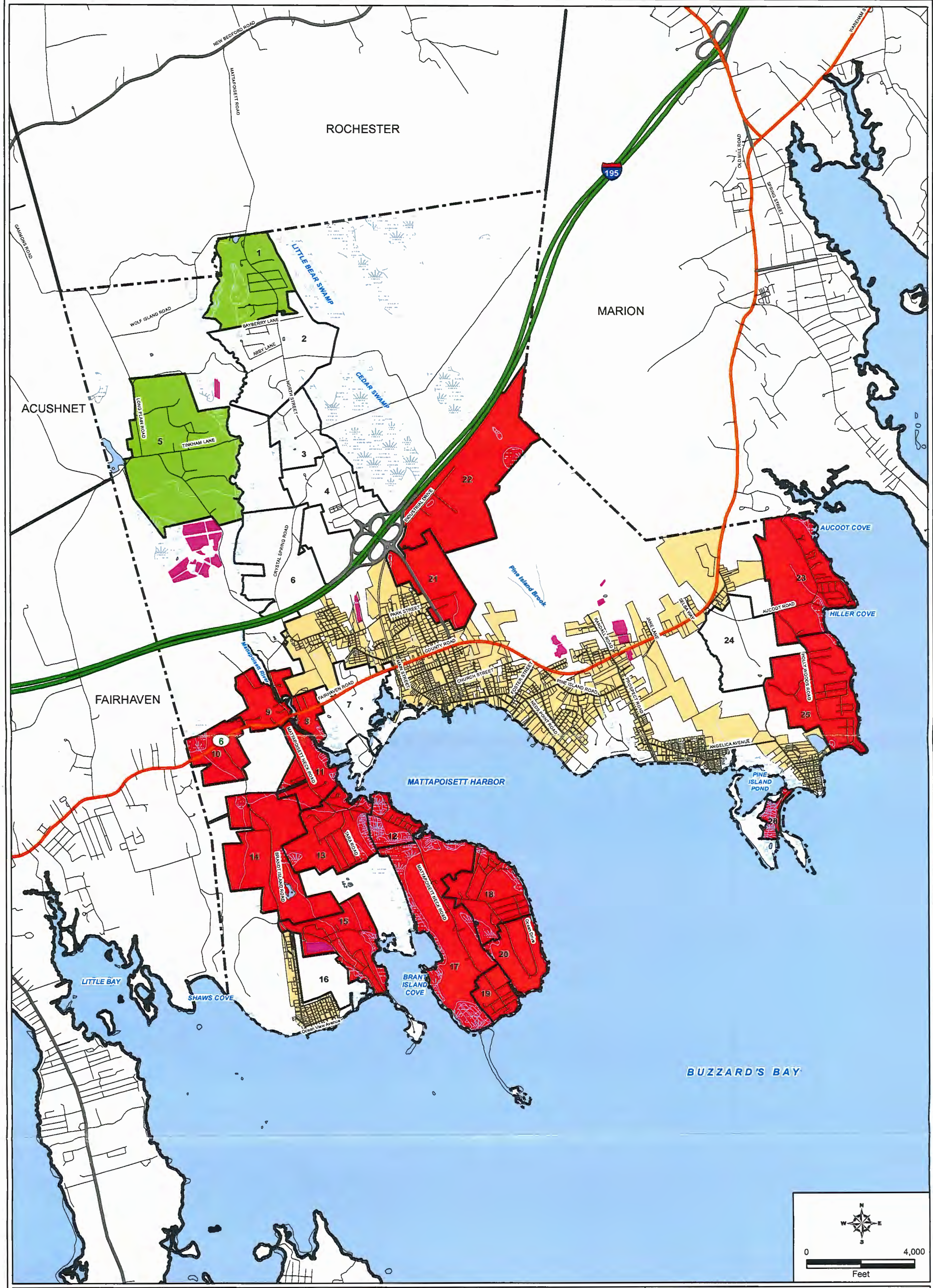
Tighe&Bond
April 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\FairhavenWWTP.mxd Date Last Updated: April 11, 2008

Tighe&Bond

TABLE 7-7
Summary of Wastewater Management Alternatives

Wastewater Management Alternative	Applicability to Mattapoisett	Collection System	Recommendation
Regional Solutions			
Continued Wastewater Discharge to Fairhaven	Mattapoisett will continue discharge to Fairhaven WWTP until IMA capacity limit is reached. Recommend negotiations with Fairhaven to increase capacity.	Extension of wastewater collection system is required to serve high need study areas recommended to receive sewer service.	Continue discharge to Farihaven WWTP until IMA capacity limit is approached. Initiate negotiations with Fairhaven to increase capacity.
Community Systems			
Satellite Systems	Satellite systems could be a viable alternative for some high and many low need areas.	Collection system would be required to deliver flow to satellite system. Extension of Town's existing wastewater collection system would not be required.	Satellite systems could be used by the Town for long term wastewater management if WWTP capacity is not available to serve areas in need. However, a satellite system may be a viable alternative for a private development that is unable to connect to the existing sewer system because of capacity limitations.
Centralized Systems w/ Groundwater Disposal	Groundwater disposal systems are a desirable alternative from a permitting standpoint (i.e., easier to permit that surface water discharge). However, prevalence of low permeable soils and high groundwater conditions in Mattapoisett will make implementing this option challenging.	Collection system would be required to deliver flow to centralized system. If this option is pursued in the future for treatment of flows that are currently transported to Fairhaven, then an extension from the existing collection system to the treatment systems would be required.	A centralized WWTP could theorectically be used by the Town for long term wastewater management if capacity via the IMA is no longer available. Refer to Section 6 for general requirements for groundwater disposal treatment facilities.
Centralized Systems w/ Surface Water Discharge	Siting a new surface water discharge in Mattapoisett would be very difficult from a permitting standpoint.	See comment above	If the Town must pursue a centralized system in the future due to IMA capacity issues, a groundwater disposal system is recommended vs. a surface water discharge.
Decentralized Systems			
Conventional On-Site Systems	For high need areas, alternative solutions to conventional on-site systems are necessary. Continued use of on-site septic systems may be an option for moderate and low need areas.	Collection system not required	Continue using on-site septic systems in moderate and low need areas unless WWTP capacity becomes available to serve areas and problems with on-site septic systems become problematic.
Tight Tanks	Use of tight tanks is not a long term alternative for wastewater management.		Tight tanks are not recommended for use in Mattapoisett.
I/A Systems	I/A systems may be used for remedial purposes for failing on-site systems. Use of I/A systems is not a long term alternative for Mattapoisett.		I/A systems are not recommended for long term wastewater management for Mattapoisett.
Cluster Systems	Suitable location in close proximity to the parcels to be served is required. Cluster systems may be applicable to commercial areas and new residential subdivisions in rural areas.	Collection system is required	Cluster systems are not recommended to be utilized by the Town for long term wastewater management. However, cluster systems may be applicable for private subdivision developments where Town sewerage or capacity is not available.



Legend

- Study Area
- Centralized Wastewater Management System
- Decentralized Wastewater Management Alternatives
- Existing Sewered Parcels
- Surface Water
- Wetlands (DEP 1:12,000)
- Cranberry Bog
- Streams
- Limited Access Highway
- Multi-Lane Highway, NOT Limited Access
- Other Numbered Highway
- Major Road - Collector
- Minor Street or Road

Data sources: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs.

FIGURE 8-1
RECOMMENDED PLAN

Mattapoisett, Massachusetts

Tighe&Bond
March 2008

G:\GIS\MA\MattapoisettMA\avproj\FinalReportFigs\RecommendedPlan.mxd Date Last Updated: April 7, 2008